2012

volume two

USRDS Annual Data Report

Atlas of End-Stage Renal Disease in the United States

national institutes of health
national institute of diabetes & digestive & kidney diseases
division of kidney, urologic, & hematologic diseases

volume one
Atlas of Chronic Kidney Disease in the United States

I come into the presence
of still water.
And I feel above me the
day-blind stars
waiting with their
light. For a time
I rest in the grace of the
world, and am free.

WENDELL BERRY,
"The Peace of Wild Things"

volume two
Atlas of End-Stage Renal Disease in the United States

data on end-stage renal disease
appearing each year in the Annual Data Report

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program highlights

patients

116,946 number of new ESRD patients, 2010 (Table p.a)

348 adjusted rate of incident ESRD, 2010 (per million population; Figure 1.5)
white: 275 » black/African American: 924 » Native American: 465 » Asian: 389

14.6 adjusted rate of incident ESRD in pediatric patients, 2010 (per million population; Figure 8.17)

594,374 number of prevalent ESRD patients, 2010 (Table p.a)

1,763 adjusted rate of prevalent ESRD, 2010 (per million population; Figure 1.13)
white: 1,311 » black/African American: 5,242 » Native American: 2,565 » Asian: 2,101

86.4 adjusted rate of prevalent ESRD in pediatric patients, 2010 (per million population; Figure 8.22)

74% prevalent hemodialysis patients enrolled in Medicare Part D, 2010 (Table 6.c)

56% prevalent transplant patients enrolled in Medicare Part D, 2010 (Table 6.c)

patient care

55% patients with hemoglobin <10 g/dl at initiation, 2010 (Table 1.g)

74% diabetic patients receiving two or more A1c tests, 2009–2010 (Figure 2.8)

59% diabetic patients receiving two or more lipid tests, 2009–2010 (Figure 2.9)

21% diabetic patients receiving two or more eye examinations, 2009–2010 (Figure 2.10)

15% patients using a fistula at first outpatient dialysis, 2010 (Figure 2.12)

outcomes

1.88 adjusted all-cause admission rate, 2009–2010 (admissions per patient year; Table 3.a)
white: 1.90 » black/African American: 1.93 » other race: 1.52

520 adjusted cardiovascular admission rate among hemodialysis patients, 2010 (admissions per 1,000 patient years; Figure 3.3)

458 adjusted rate of admission for infection among hemodialysis patients, 2010 (admissions per 1,000 patient years; Figure 3.3)

211 adjusted all-cause first-year mortality among 2009 incident patients (deaths per 1,000 patient years at risk, from day 90; Figure 5.1)
hemodialysis: 225 » peritoneal dialysis: 125 » transplant: 59

198 adjusted all-cause fifth-year mortality among 2005 incident patients (deaths per 1,000 patient years at risk, from day 90; Figure 5.1)
hemodialysis: 236 » peritoneal dialysis: 254 » transplant: 60

0.32 adjusted five-year survival probability among white ESRD patients incident in 2005 (Table 5.a)

0.39 adjusted five-year survival probability among black/African American ESRD patients incident in 2005 (Table 5.a)

transplantation

17,778 total kidney transplants, 2010 (Table p.a)
deceased donor: 11,446 » living donor: 6,273

21.8 rate of deceased donor kidney donation, 2010 (per million population; Figure 7.10)
white: 21.4 » black/African American; 28.1 » Native American: 7.7 » Asian: 8.5

22.3 rate of living donor kidney donation, 2010 (per million population; Figure 7.10)
white: 22.7 » black/African American: 21.9 » Native American: 6.5 » Asian: 11.5

2.4 adjusted rate of deceased donor kidney transplants, 2010 (per 100 dialysis patient years; Figure 7.13)
white: 2.6 » black/African American: 2.0 » Asian: 3.4 » other race: 2.3

1.3 adjusted rate of living donor kidney donation, 2010 (per 100 dialysis patient years; Figure 7.15)
white: 1.9 » black/African American: 0.5 » Asian: 2.3 » other race: 1.0

expenditures

$33 billion total Medicare ESRD expenditures, 2010 (Table p.a)

$14.5 billion total non-Medicare ESRD expenditures, 2010 (Table p.a)

$47.5 billion total ESRD expenditures, 2010 (Table p.a)

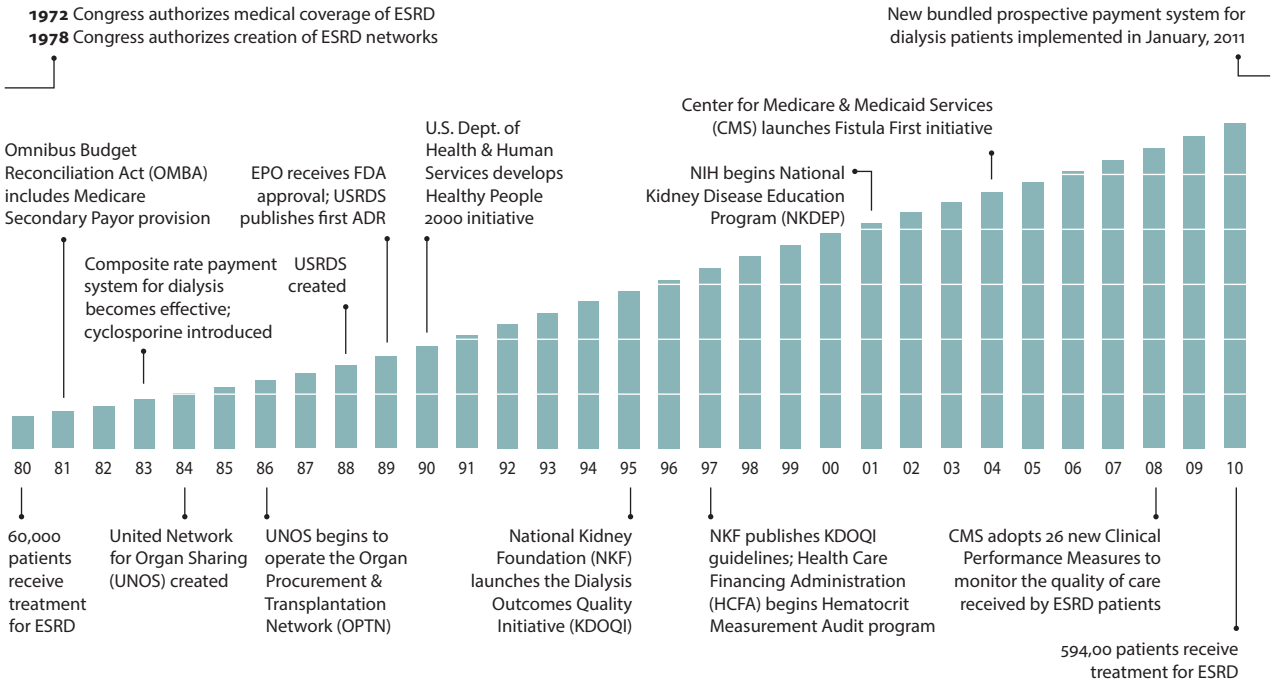
$87,561 total Medicare expenditures per person per year for hemodialysis patients, 2010 (Table p.a)

$66,751 total Medicare expenditures per person per year for peritoneal dialysis patients, 2010 (Table p.a)

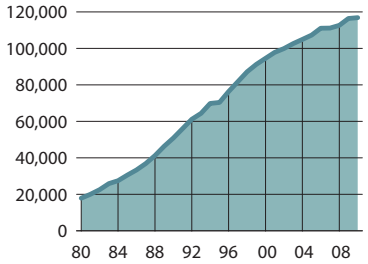
$32,914 total Medicare expenditures per person per year for transplant patients, 2010 (Table p.a)

$1.8 billion total estimated net Part D payment for ESRD patients, 2010 (Figure 6.9)
hemodialysis: $1.43 billion » peritoneal dialysis: $98 million » transplant: $306 million

end-stage renal disease (ESRD)
IN THE UNITED STATES

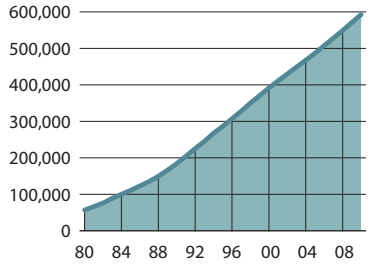


New patients
Nearly 117,000 people began treatment for end-stage renal disease (ESRD) in 2010.

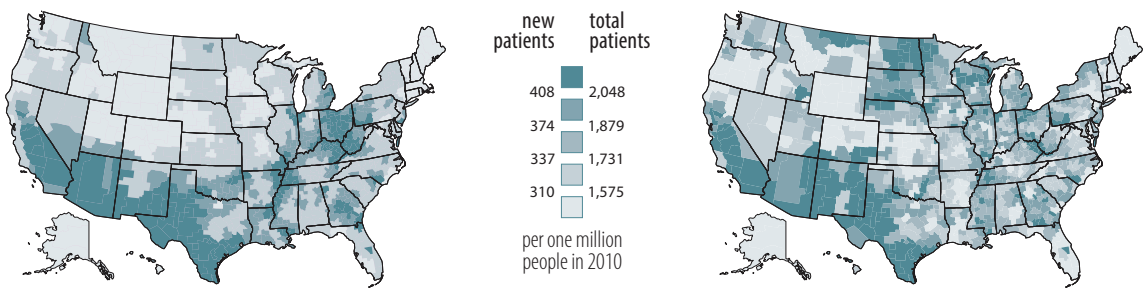


1980 I in 11,600 — U.S. patients newly diagnosed with ESRD — 2010 I in 2,900

Total patients
Nearly ten times more patients are now being treated for ESRD than in 1980.



1980 I in 3,450 — U.S. patients being treated for ESRD — 2010 I in 570



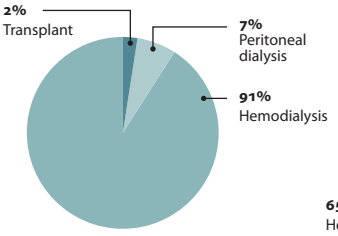
Graphs: Figure 1.1
Rates of new & existing patients: Figures 1.5 & 1.13
Maps: Figures 1.3 & 1.11

44% of new ESRD cases have a primary diagnosis of **DIABETES;**
28% have a primary diagnosis of **HYPERTENSION**

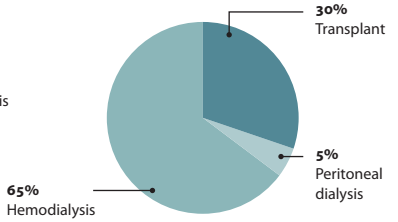
The rate of new ESRD cases is **3.4 TIMES HIGHER** among **AFRICAN AMERICANS** than among whites

Renal replacement therapy

Most new patients begin therapy on hemodialysis.



And in the entire ESRD population, 3 in 10 patients have a kidney transplant.



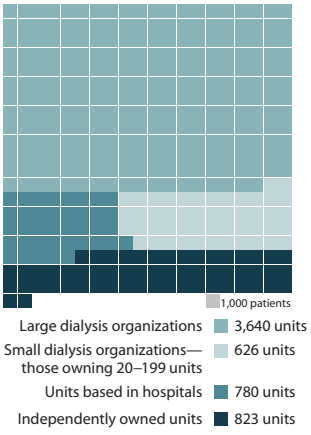
While most hemodialysis occurs in a dialysis unit, use of home hemodialysis is rising. In Australia and New Zealand, 9–18% of dialysis patients receive therapy at home.

23,000
number of adult patients waiting for a kidney transplant in 1995

86,000
number waiting in 2010

2.6 years
median time on transplant wait list (adults)

Dialysis unit ownership

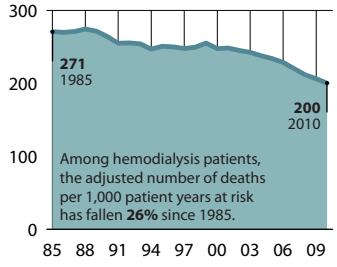


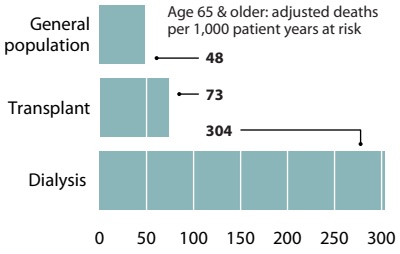
6 in 10 dialysis patients are treated in units owned by **FRESENIUS** or **DAVITA**

Mortality

People are surviving longer on dialysis than in the past.

But mortality for dialysis patients is still far higher than in the general population.

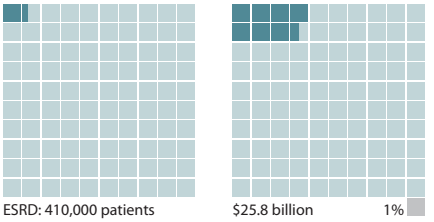




Costs of caring for patients with ESRD, 2010

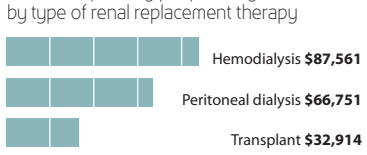
1.3% of Medicare patients have ESRD

They account for **7.5%** of Medicare spending



TOTAL MEDICARE SPENDING
$343 BILLION

Medicare spending per patient year, by type of renal replacement therapy



$47.5 BILLION
total costs per year for ESRD patient care

Diabetes & hypertension; race: Table p.a
Pie charts: Figure 1.1, Table 12.c
Transplant wait list: Figures 7.1 & 7.6

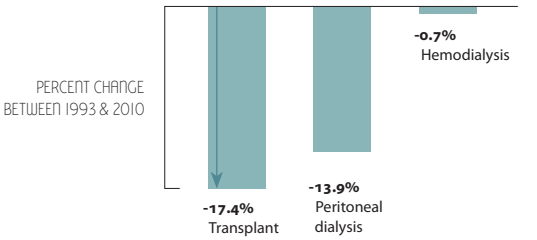
Mortality: Figures 5.4 & 5.2
Unit ownership: Figure 10.1
Costs: Figure p.1; Figure 11.7

hospitalization and Part D use
IN THE ESRD POPULATION

Hospital days per year
Patients with ESRD are now spending fewer days each year in the hospital.

1993		2010
8.6	Transplant	5.5 days per year
18.1	Peritoneal dialysis	11.9
14.8	Hemodialysis	12.1

Hospitalization rates
And all-cause hospitalization rates have fallen since 1993.



But **INFECTION** remains a major cause of **HOSPITALIZATION** among patients with ESRD

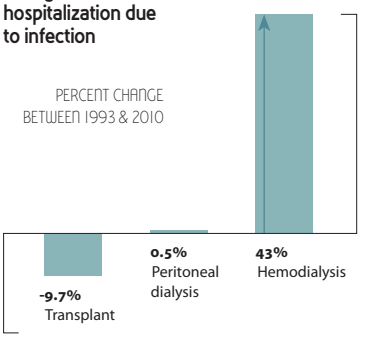
Admissions for infection, per 1,000 patient years

219
transplant

558
peritoneal dialysis

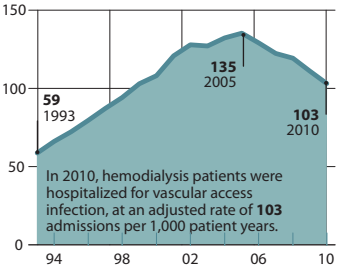
458
hemodialysis

Change in rates of hospitalization due to infection



Since 1993, the rate of hospitalization due to **INFECTION** has increased **31%** overall

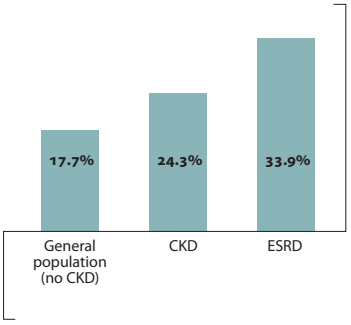
The rate of hospitalization for vascular access infection in hemodialysis patients remains 75 percent higher than in 1993.



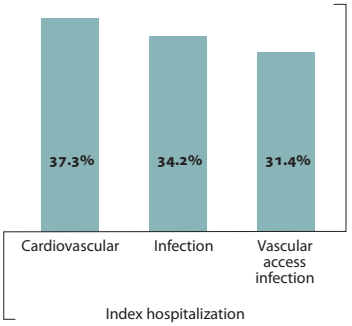
ESRD patients also face a high risk of **REHOSPITALIZATION** after discharge from the hospital

Patients rehospitalized within 30 days of a live hospital discharge

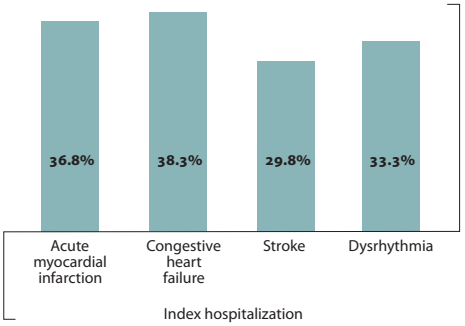
All-cause rehospitalization age 66 & older



All-cause rehospitalization (hemodialysis patients) all ages



Rehospitalization after a cardiovascular index hospitalization (hemodialysis patients) all ages



Hospital days: Figure 3.2
Change in hospitalization rates: Figure 3.1
Admissions for infection: Figure 3.1
Admissions: vascular access infection: Figure 3.3
Rehospitalization: Figures 3.19, 3.6, & 3.9

JANUARY 1, 2006: MEDICARE PART D GOES INTO EFFECT

to help subsidize the costs of prescription drugs in Medicare beneficiaries

DAYS SUPPLY top three drug classes used by Part D enrollees on **dialysis**

35 million — 8.2%
phosphate binder agents

27 million — 6.3%
calcium channel blockers

24 million — 5.9%
statins

20.4% of total Medicare Part D drug use in 2010

COSTS top three drug classes used by Part D enrollees on **dialysis**

$419 million — 29.5%
phosphate binder agents

$259 million — 18.3%
calcimimetic agents

$65 million — 4.6%
insulin

52.4% of total Medicare Part D drug costs in 2010

NET PART D COSTS FOR MEDICARE **DIALYSIS** PATIENTS IN 2010

$1.52 BILLION

DAYS SUPPLY top three drug classes used by Part D enrollees with a **transplant**

9.3 million — 7.4%
statins

8.4 million — 6.8%
calcium channel blockers

8.3 million — 6.6%
beta blockers

20.8% of total Medicare Part D drug use in 2010

COSTS top three drug classes used by Part D enrollees with a **transplant**

$35 million — 13.5%
immunosuppressive agents

$27 million — 10.6%
insulin

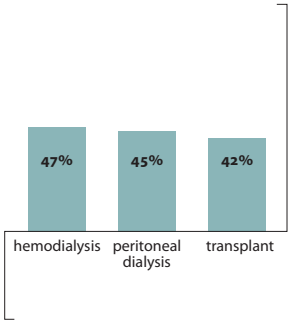
$19 million — 7.2%
cytomegalovirus agents

31.3% of total Medicare Part D drug costs in 2010

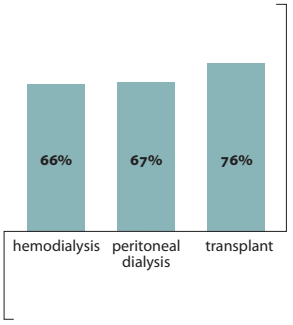
NET PART D COSTS FOR MEDICARE **TRANSPLANT** PATIENTS IN 2010

$306 MILLION

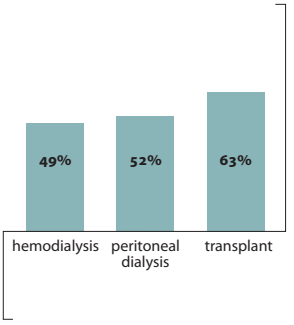
ACEI/ARB use among patients with congestive heart failure



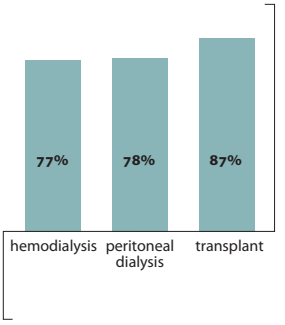
Beta blocker use among patients with congestive heart failure



Statin use among patients with a stroke



Beta blocker use among patients with AMI



Medication frequency & costs: Figures 6.18–21
Total Part D costs: Figure 6.9
Medication use: Table 4.c

This is the twenty-fourth annual report on the end-stage renal disease (ESRD) program in the United States, and the thirteenth in our atlas series, which provides an in-depth, graphic presentation of data spanning the last quarter century.

As noted in the introduction to Volume One, this year's report incorporates the theme of conservation and preservation, using images from America's national parks. The often harsh realities of the varied landscapes across our parks symbolize the challenges faced by those living with kidney disease. At the same time, the biodiversity of the many ecosystems present in these environments is akin to the versatility of people affected by this disease. Kidney disease has a unique and profound impact on the populations it touches. It creates daily challenges, yet we continue to be amazed at the ways in which patients adapt, and at the work done to preserve both life and its quality in this vulnerable population.

Volume Two continues to focus on ESRD, and on the historical surveillance data that were the basis of the first USRDS reports. We summarize the ESRD program in the United States, and examine public health issues such as changing trends in disease rates, treatment modalities, and morbidity and mortality in the first year of therapy — an area in which there has been some recent progress. This year we show that first-year survival continues to improve, in parallel to improved survival after the first year of treatment, something we have observed for many years.

At the end of 2010, 594,374 (table p.a) dialysis and transplant patients were receiving treatment for ESRD — a 4 percent increase from 2009. There were 116,946 new cases of ESRD reported, 0.47 percent more than in 2009, and among the smallest increases since 1988. Growth in the incident population should, however, be viewed with caution, as it may take several years to determine whether any changes are sustained. Late reporting of data is always an issue, as complete and stable incident counts sometimes take several years to be finalized.

In this year's program highlights (pages 154–155), infographics (pages 156–159), and Précis we again provide an overview of ESRD patients in the U.S., their care, and their expenditures. We examine pre-ESRD care, reported on the Medical Evidence (ME) form (2728) used to register all ESRD patients. We also look at dialysis modality use, the transplant wait list, and indicators of quality of care, and illustrate recent changes in hospitalization rates, mortality rates, and five-year survival in the dialysis population. Prevalent death rates have been falling for a number of years, and mortality in the first year of dialysis has, since 2004, continued to decline, reaching rates which are the lowest in 30 years and down 17.8 percent from just a decade ago.

Figures on ESRD expenditures show per person and total costs in the program. Total Medicare expenditures for separately billed intravenous medications have been stable since 2004, reflecting changes in payment policies implemented by CMS. The new "bundled" payment system was introduced in 2011; data from the transition are highlighted in Chapter Ten of this year's ADR as well.

Next we provide a full layout of the Healthy People 2020 goals related to kidney disease. Many of the goals were introduced to the chapter in the 2011 ADR; in consultation with the HP2020 group at DHHS and the CDC, we will further develop related data in upcoming reports. Some goals have already been met, and new targets will be developed in the mid-course assessment of progress in 2013 and 2014.

Chapter One consolidates information on incidence, prevalence, patient characteristics, and modalities of therapy. As in prior years, we illustrate trends in incidence and prevalence by age, gender, race, and ethnicity, and present data on modality use and insurance coverage. We compare trends in the incidence of ESRD due to diabetes and hypertension for younger and older age groups, showing that in those older than 60, rates of ESRD due to diabetes have substantially narrowed between blacks/African Americans and whites, a finding not evident in the younger populations. We examine nephrology referral prior to ESRD, and look at levels of estimated kidney function at initiation, using the CKD-EPI formula. And we present data on the degree of anemia at initiation, on pre-ESRD treatment with erythropoiesis stimulating agents (ESAs), and, from the most recent version of the ME form, on serum albumin, hemoglobin, cholesterol, triglycerides, and hemoglobin A1c levels in those with diabetes at initiation.

Chapter Two, on clinical indicators of care, assesses dialysis adequacy, vascular access, anemia treatment, anemia correction in the first months of ESRD, IV iron therapy, and preventive care in the diabetic and general ESRD populations, and illustrates the marked differences in vascular access complication rates associated with the use of fistulas, catheters, and grafts.

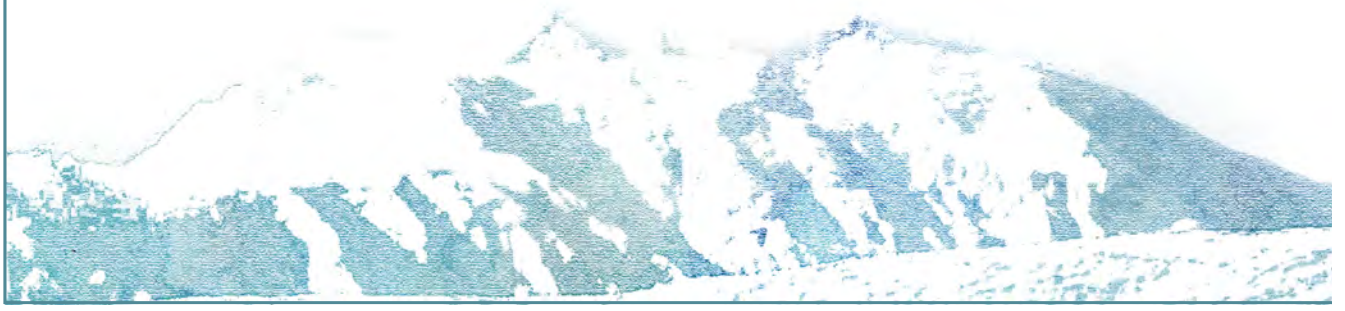
Data on hospitalization are presented in Chapter Three. In the prevalent hemodialysis population, the continued high rate of hospitalization due to infection needs to be addressed by providers; the rate is now 43 percent greater than it was in 1993. Rates of hospitalization for vascular access infection have declined, but those due to bacteremia/sepsis have increased, possibly due to a changing classification of these complications based on hospital billing practices. A concurrent decrease in access infections in the peritoneal dialysis population suggests that these trends may be affected by factors outside of the dialysis populations themselves, but may also reflect the use of hemodialysis catheters in peritoneal dialysis patients whose peritoneal dialysis catheter has failed and who are waiting for placement of a new one in order to resume therapy.

This year we present expanded data on rehospitalization after a prior discharge. Thirty-six percent of hemodialysis patients, for instance, are rehospitalized within 30 days of discharge — a number substantially higher than the rates of 17.7 and 24.3 percent noted for the general Medicare and CKD populations. We also look at data by organ system of the index event, comparing causes of the repeat and index hospitalizations, and at outcomes 30 days after discharge.

We conclude the chapter with another new analysis, looking at hospitalizations and causes of death in the hemodialysis population by interdialytic interval. This analysis is similar to that published by the USRDS in the NEJM, but is applied here to a larger cohort. The long two-day interval is associated with the highest rates of hospitalization and mortality, with the risk declining throughout the week until rising again with the longer interval.

In Chapter Four we examine cardiovascular disease in ESRD patients, beginning with data on cardiovascular mortality, presenting a new method to define sudden cardiac death (SCD), and examining rates of SCD over time and within the first year of therapy. We revisit the use of cardiac defibrillators and resynchronization devices, and look at the newer, wearable cardioverter-defibrillators. Data on cardiovascular event and procedure rates include AMI, stroke, heart failure, percutaneous interventions, and CABG procedures over time. We conclude by looking at the use of cardiovascular drugs in 2006 and 2010, and examining the relationship of medication use to survival in CHF and AMI patients.

We begin Chapter Five, on mortality, by highlighting trends in the first and subsequent years on ESRD therapy. Data now show similar reductions in mortality rates among patients of



all vintages, and there is continued progress in the first year of hemodialysis therapy. Mortality rates for dialysis patients, however, remain eight times greater than those in the general Medicare population.

Figures on mortality during the first year of hemodialysis illustrate a sharp increase in all-cause rates in month two of treatment, following by a steady decline during the rest of the year. These rates are defined from the first ESRD service date, with no 90-day waiting period. Survival in the first six months of treatment has improved for the peritoneal dialysis and transplant populations; for hemodialysis patients, in contrast, the rates since 1997 have shown little change.

This issue of early survival clearly merits increased attention, and the role of infectious complications — particularly those related to dialysis catheters — needs to be addressed. Perhaps the changing incentives in the new bundled payment system, directed at lowering costs and complications, will translate to reductions in the use of dialysis catheters and to a focus on preventive care.

Chapter Six looks at Part D prescription drug coverage. We show, for example, that CKD, dialysis, and transplant patients are quite different from those in the general Medicare population in their use of the low income subsidy (LIS), and that heavy use among ESRD patients is reflected in the proportion who reach the coverage gap. The chapter includes data on Medicare costs for the Part D benefit, on out-of-pocket expenditures for enrollees, and on the most frequently used and most expensive drugs.

As we illustrate in Chapter Seven, the number of transplants from deceased donors, which had declined in the past few years, has now returned to the peak level seen in 2006, reaching 10,891 in 2010. Transplants from living donors have also rebounded, reaching 5,898 in 2010, just below the 6,172 reported for 2004. Waiting times, however, continue to grow, due to the continued shortage of donated kidneys. And death with a functioning graft continues to be a concern, with cardiovascular disease accounting for 30 percent of deaths with a known cause. The rate of influenza vaccinations among transplant patients is still far lower than that in the dialysis population, with very little progress since 1991.

Chapter Eight, on the pediatric ESRD population, begins with data on rehospitalization within 30 days of a discharge. Rates have changed little over the past decade, and are similar to those for adult patients. A comprehensive table then reports the causes of ESRD in the pediatric population, and figures on hospitalization compare rates by modality, with particular focus on infections. Rates of influenza vaccinations among these patients, as reported in claims data, continue to be low, despite high rates of pneumonia and other respiratory infections. And, as noted in past ADRS, five-year survival among children with ESRD has not improved in more than a decade.

New this year are figures comparing the pediatric ESRD populations in the United States and Canada, using data from CORR, the Canadian Organ Replacement Registry.

In Chapter Nine, The Nutrition Special Studies Center presents data from the Comprehensive Dialysis Study (CDS), while the Rehabilitation/Quality of Life Special Studies Center evaluates patient awareness of peritoneal dialysis and kidney transplantation as treatment options. Conditions of coverage for dialysis unit certification require that patients be made aware of their treatment options.

The landscape of dialysis providers continued to evolve in 2010, with growth in some of the smaller dialysis organizations (SDOs) as well as the large dialysis organizations (LDOs). The LDOs now treat 64 percent of dialysis patients in the United States; SDOs account for 12.1 percent, hospital-based units 9.4 percent, and independently owned units 14.2 percent.

New this year is an evaluation of the major changes that have occurred after the start of the bundled prospective payment system, introduced in January of 2011. Preliminary data was first reported by the USRDS at the 2012 National Kidney Foundation spring clinical meeting. Here we present more complete data based on claims between September 2010 to September 2011, looking at providers switching to the new payment system, changes in the use of EPO, IV iron, and vitamin D, changes in hemoglobin levels, and trends in transfusion events. The chapter concludes with comparisons of standardized hospitalization and mortality ratios across provider groups.

Chapter Eleven, on expenditures related to ESRD, begins with data on dialysis expenditures by payor. Medicare paid claims accounted for 62.2 percent of total ESRD spending in 2010, up from 57.6 percent the previous year. The chapter then presents updated data on the overall costs of ESRD and

injectables, looks at differences in costs by race and in matched and unmatched dialysis populations, and examines Medicare Part A, B, and D costs.

In Chapter Twelve we summarize data from the international community, and present a map of ESRD incidence worldwide. We are, as always, grateful to the registries providing this information, allowing us to see the U.S. ESRD community through a wider lens.

Most of this ADR contains data through December 31, 2010; data on patient characteristics, obtained from the Medical Evidence form, are complete through June, 2011. Current estimated incident and prevalent counts can be found on the USRDS website.

RENDER & the Researcher's Guide

Our real-time online query system allows users to build data tables and maps. The Renal Data Extraction and Referencing System (RENDER) can be accessed on our website.

To assist users of USRDS data, the Coordinating Center (CC) annually updates the Researcher's Guide, which provides information on all analytical methods used by the CC, along with a detailed index of files and variables in the USRDS researcher datasets. It is available on our website in PDF format.

USRDS database

The USRDS dataset is a living record of patient care in the United States, continually updated with new data. Delays in data reporting are unavoidable, and we add late information as soon as it becomes available. This includes data from the Medical Evidence form, claims for hospital and physician services, and updates of the Medicare Enrollment Database received after the ADR has gone to press.

administrative oversight

Project Officers (POs) Lawrence Agodoa, MD, and Paul Eggers, PhD, provide direct oversight of the CC and Special Studies Centers (SSCs), and members of CMS, the ESRD networks, and the renal community provide crucial input and feedback through their committee participation.

The Steering Committee, the governing body of the USRDS, is responsible for the operations of the CC and SSCs. It works under the direction of the POs, and includes representatives from CMS, the National Institutes of Health, the CC, and the SSCs. Its responsibilities include coordination among the centers, study design, project tracking, data management and validation, assurance of data availability for researchers and government officials, and oversight of ADR production.

The USRDS External Expert Committee plays a major role in advising POs on special studies, data studies, and analyses. It is also responsible for reviewing manuscripts and ADRs.

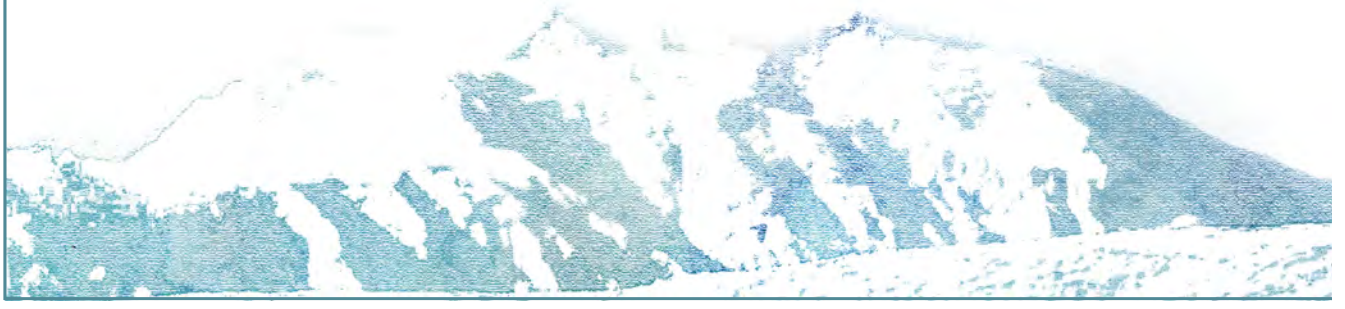
The Special Studies Review and Implementation Committee, the operations committee for SSC proposals and CC project support, is a collaboration of CMS, the ESRD networks, and the providers. The Data Request Review Committee reviews data requests requiring more than two hours of staff time to fulfill, and makes recommendations to the POs based on the datasets requested and the ways in which the CC can improve data availability.

reading the maps

Many maps in the ADR are by Health Service Area (HSA), a group of counties described by authors of the CDC Atlas of United States Mortality as "an area that is relatively self-contained with respect to hospital care."

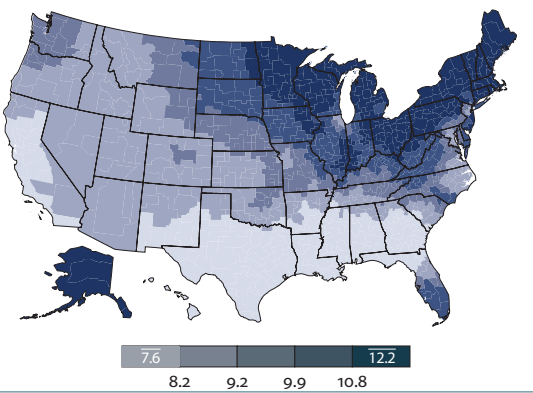
Maps here present data divided into quintiles, with each range in a legend containing approximately one-fifth of the data points. In the sample map, for example, one-fifth of all data points have a value of 10.8 or above. Ranges include the number at the lower end of the range, and exclude that at the upper end (i.e, the second range in the sample map is 8.2–<9.2). To facilitate comparisons of maps with data for different periods, we commonly apply a single legend to each map in a series. Because such a legend applies to multiple maps, the data in each individual map are not evenly distributed in quintiles, and a map for a single year may not contain all listed colors or ranges.

Numbers in the first and last boxes indicate the mean values of data points in the highest and lowest quintiles; these can be used to calculate the percent variation between quintiles. For maps with shared legends we have provided these values by repeating the legends and inserting the unique quintile values. Mean numbers within the quintiles can be calculated as a simple half-way point.



On the Excel page for each map (found on the website and CD-ROM) we include several numbers to help you interpret the maps and their relation to other data in the ADR. The map-specific mean is calculated using only the population whose data are included in the map itself. This mean will usually not match data presented in tables elsewhere in the ADR, and should be quoted with caution. The overall mean includes all patients for whom data are available, whether or not their residency is known. We also include the number of patients excluded in the map-specific mean, and the total number of patients used for the overall calculation.

Throughout the ADR, with the exception of NHANES data, CKD cohorts exclude ESRD patients.



acknowledgements

The ADR could not be produced without the extraordinary work of members of the ESRD community — including the staff of CMS and the ESRD networks — and the dedicated efforts of the USRDS staff and investigators. The efforts of the providers themselves are crucial in the collection of data used by the USRDS, and their dedication to this task is greatly appreciated.

We welcome feedback on all elements of USRDS work. All comments are reviewed by the Director, Deputy Director, and staff of the USRDS in order to improve future materials and to ensure a strong working relationship between the USRDS and the clinicians, researchers, patients, and others involved in the care of ESRD patients across the U.S. and throughout the world.

Précis

Mount McKinley, Denali National Park, Alaska

AN INTRODUCTION TO END-STAGE RENAL DISEASE IN THE U.S.

This year the USRDS not only reports on the traditional ESRD population, but presents data on the impact of the new bundled prospective payment system for dialysis. This section, included in Chapter Ten, focuses on how large and small dialysis organizations, hospital-based units, and independent unit have shifted costs under the new payment structure, and looks at the collateral impact on patient care.

The size of the ESRD population reached a new high in 2010, with 594,374 patients under treatment — just short of the 600,000 mark. The number of patients returning from a failed transplant fell 0.4 percent, to 5,586, while the number restarting dialysis increased to 3,744.

The number of patients starting ESRD therapy grew by only 500 in 2010, to a total of 116,946, while the prevalent dialysis population (including other peritoneal dialysis and unknown dialysis) reached 415,013 on December 31. The number of kidney transplants reached 17,778, just 42 more than in 2009, while the prevalent transplant population increased 4.0 percent, to 179,361, despite continued growth in the number of patients on the transplant waiting list. The median time on the kidney-only and kidney-pancreas waiting lists was 1.7 years, unchanged from prior years.

In the rest of this Précis we show that the rate of new ESRD cases remains quite stable, at 348 per million population in 2010 — similar to rates seen earlier in the decade. ESRD due to diabetes has been relatively stable over the last decade, with a rate of 152 in 2010, while the rate of ESRD caused by hypertension decreased 2.0 percent, falling to 99 per million in 2010. Age differences are most dramatic in data on ESRD due to diabetes, with rates 4–5 times higher in younger blacks/African Americans than in their white counterpars. We have examined this in prior ADRs, but the lack of change in these rates suggests that more needs to be done to address this major racial disparity. The prevalent rate of ESRD increased 1.7 percent in 2010, reaching 1,763.

Patients who see a nephrologist for more than 12 months before starting dialysis are the most likely to use a fistula or internal graft at the first outpatient dialysis treatment. Nephrologists are central to discussions with patients and families about ESRD treatment options, and greater pre-ESRD referral would help ensure increased use of fistulas, which are associated with the lowest rates of adverse events.

The treatment of anemia has changed during the last five years, after changes in product labeling from the FDA and in payment structures from CMS (implemented in January, 2011). Among patients receiving erythropoiesis stimulating agents (ESAs) prior to dialysis, hemoglobin levels at initiation have fallen below 10 g/dl, a level not seen since the mid-1990s, while pre-ESRD use of ESAs has also fallen — below 20 percent, a level not seen since April, 1996. Hemoglobin levels at six months following the start of ESRD therapy are now close to those seen in 1998, and levels in the prevalent dialysis population have decreased as well.

Hospitalizations continue to be an area of concern, with admissions for infection in hemodialysis patients 43 percent higher than in 1993, and showing no sign of improvement. The rate of hospitalization for bacteremia/sepsis is up, while admissions due to infection have fallen; as there has been little change in the overall rate of hospitalization due to infection, this suggests a shift in hospital coding.

New data on hospitalizations by day of the week show marked variations, with rates highest on the day of the long interval off treatment; these trends are similar to those we reported for mortality in the New England Journal of Medicine (September, 2011).

This year we present additional data on the Medicare Part D prescription drug benefit, which started in 2006. Many elderly, disabled individuals and those with

When we contemplate the whole globe as one great dewdrop, striped and dotted with continents and islands, flying through space with other stars all singing and shining together as one, the whole universe appears as an infinite storm of beauty.

JOHN MUIR,
Travels in Alaska

ESRD have Medicare coverage; these patients can enroll in Medicare Part D for prescription drug coverage. Seventy-seven and 64 percent of hemodialysis and peritoneal dialysis patients were enrolled in Part D in 2010, compared to 56–60 percent of general Medicare patients (with or without CKD) and transplant patients.

As we show here and in Chapter Five, mortality among peritoneal dialysis patients continues to fall, despite an expanding population. Outcomes for these patients will need close attention, as incentives to use peritoneal dialysis have changed under the new bundled payment system. Mortality in the first months of dialysis has also declined, a new finding when compared to 2004 and 1999. In an analysis parallel to that of hospitalization in Chapter Three, we present data on mortality by day of the week, assessing the entire hemodialysis population rather than the random sample examined in previous years. Interestingly, mortality due to infection is highest on the day after the first run of the week, while mortality due to cardiovascular causes is highest on the day of the first run.

The kidney transplant wait list for active and inactive patients continues to grow, reaching 87,000 in 2010; 17,778 transplants were performed during that year. Living donor donation rates appear to be rebounding, while donations from deceased donors have been stable. Hospitalizations due to cardiovascular disease and infection continue to be major issues for the transplant population, with heart failure and urinary tract infections leading these two major areas of morbidity.

Highlighted data on children with ESRD show that their rates of rehospitalization are as high as those seen in adults, and have remained unchanged over the past decade. Children younger than five, whether on peritoneal dialysis or hemodialysis, have the highest rates of hospitalization for infection, and peritoneal dialysis is associated with higher rates than hemodialysis. Rates of influenza vaccinations continue to be low across modalities — a continuing concern, given that pneumonia occurs frequently in this population. The lack of improvement in mortality rates among children is also a concern, one yet to be addressed.

This year we introduce data from the Canadian Organ Replacement Registry (CORR), comparing trends in pediatric ESRD in the United States and Canada. Over the last twenty years, incident and prevalent rates of ESRD have been 1–2 times higher for children in the U.S. than for those in Canada. The prevalence of ESRD due to cystic and congenital diseases has been growing in the U.S., but not in Canada.

Dialysis providers continue to consolidate, with Fresenius Medical Care announcing the purchase of additional units in July, 2011; the company thus maintains its position as the largest provider of dialysis care in the U.S. Overall, 95 percent of dialysis providers opted into the the new bundled prospective payment system for dialysis (introduced in January, 2011) , including nearly 70 percent of hospital-based units and nearly 100 percent participation from Fresenius, DaVita, and DCI.

Data on monthly EPO dosing show a 27 percent decrease between September, 2010 and September, 2011; in DaVita and DCI units, dosing fell 37 percent. IV iron and vitamin D dosing fell 23 and 12 percent, respectively. Average hemoglobin levels fell 3.6 percent over the time period, while rates of transfusion events rose 24 percent.

DCI continues to have the lowest standardized hospitalization and mortality ratios among the large providers, while, among the smaller providers, hospital-based units have the highest standardized mortality ratios. DaVita this year had mortality ratios similar to those of DCI, a new finding.

We conclude the Précis with data on the costs of ESRD patient care, which rose to $29 billion in 2010 (including Medicare Part D). Costs per person per year remain highest for hemodialysis patients, at $87,561, compared to $66,761 and $32,914 for peritoneal dialysis and transplant patients. » **Figure p.1;** see page 428 for analytical methods. *Period prevalent general (fee-for-service) Medicare patients. Diabetes, CKD, & congestive heart failure determined from claims, 1999–2000 & 2009–2010; costs are for calendar years 2000 & 2010.*

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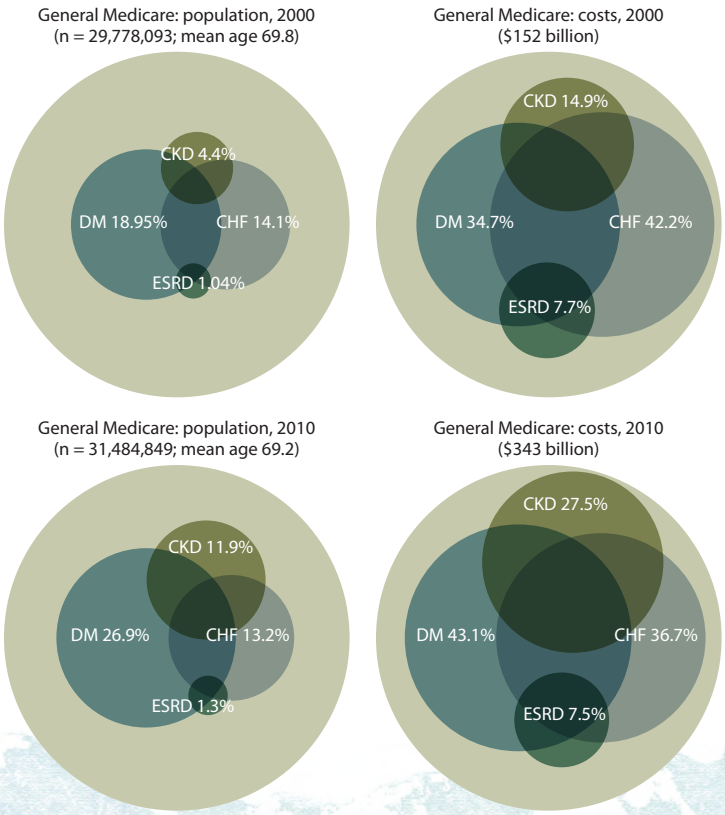
Distribution of general (fee-for-service) Medicare patients & costs for CKD, CHF, diabetes, & ESRD, 2000 & 2010



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Summary statistics on reported ESRD therapy in the United States, by age, race, ethnicity, gender, & primary diagnosis, 2010

	Incidence[A]			December 31 point prevalence							Kidney transplants		
	Count	%	Adj. rate[B]	Count[C]	%	Adj. rate[B]	Dialysis[C]	%	Tx[C]	%	Deceased donor	Living donor	ESRD deaths[D]
0-19[E]	1,395	1.2	15.5	7,811	1.3	86	2,377	0.6	5,434	3.0	555	375	159
20-44	13,863	11.9	127.6	101,245	17.0	940	57,153	13.8	44,092	24.6	2,926	2,138	4,297
45-64	44,950	38.4	580.9	268,124	45.1	3,402	174,727	42.1	93,397	52.1	5,934	2,976	27,418
65-74	27,630	23.6	1,367.7	122,550	20.6	6,068	93,583	22.5	28,967	16.2	1,795	716	24,301
75+	29,055	24.8	1,772.6	94,644	15.9	5,865	87,173	21.0	7,471	4.2	236	68	34,826
Unknown	53	0.0						0.0		0.0			
White	77,030	65.9	275.3	360,289	60.6	1,311	232,499	56.0	127,790	71.2	6,555	4,633	61,693
Black/African American	32,018	27.4	924.0	187,864	31.6	5,242	152,540	36.8	35,324	19.7	3,709	882	24,704
Native American	1,422	1.2	465.2	8,085	1.4	2,566	6,032	1.5	2,053	1.1	177	80	1,008
Asian/Pacific Islander	5,853	5.0	388.6	32,862	5.5	2,101	21,155	5.1	11,707	6.5	884	620	3,198
Other/unknown	623	0.5		5,274	0.9		2,787	0.7	2,487	1.4	121	58	398
Hispanic	16,823	14.4	500.9	93,510	15.7	2,606	69,290	16.7	24,220	13.5	1,627	881	10,582
Non-Hispanic	100,123	85.6	338.0	500,864	84.3	1,717	345,723	83.3	155,141	86.5	9,819	5,392	80,419
Male	66,650	57.0	441.3	337,441	56.8	2,169	230,578	55.6	106,863	59.6	6,886	3,871	50,780
Female	50,288	43.0	275.2	256,920	43.2	1,425	184,425	44.4	72,495	40.4	4,560	2,400	40,219
Unknown	*	0.0		13	0.0		*	0.0	*	0.0	.	2	*
Diabetes	51,636	44.2	151.7	224,722	37.8	656	183,065	44.1	41,657	23.2	3,541	1,282	41,764
Hypertension	32,861	28.1	99.0	147,174	24.8	437	118,357	28.5	28,817	16.1	2,402	979	25,876
Glomerulonephritis	7,428	6.4	22.7	86,499	14.6	263	40,494	9.8	46,005	25.6	2,231	1,615	5,710
Cystic kidney disease	2,630	2.2	8.1	28,345	4.8	85	10,968	2.6	17,377	9.7	856	714	1,542
Urologic disease	1,585	1.4	4.7	13,220	2.2	40	7,329	1.8	5,891	3.3	223	149	1,456
Other known cause	14,940	12.8	45.8	65,402	11.0	202	38,654	9.3	26,748	14.9	1,541	1,067	10,491
Unknown cause	3,963	3.4	12.1	21,958	3.7	66	13,897	3.3	8,061	4.5	415	234	3,154
Missing cause	1,903	1.6	3.7	7,054	1.2	14	2,249	0.5	4,805	2.7	237	233	1008
All	116,946	100.0	347.8	594,374	100.0	1,763	415,013[F]	100.0	179,361		11,446	6,273	91,001
Unadjusted rate[G]			369.4			1,870					Total transplants[H]	17,778	

A Incident counts: include all known ESRD patients, regardless of any incomplete data on patient characteristics and of U.S. residency status.

B Includes only residents of the 50 states and Washington D.C. Rates are adjusted for age, race, and/or gender using the estimated July 1, 2005 U.S. resident population as the standard population. All rates are per million population. Rates by age are adjusted for race and gender. Rates by gender are adjusted for race and age. Rates by race are adjusted for age and gender. Rates by disease group and total adjusted rates are adjusted for age, gender, and race. Adjusted rates do not include patients with other or unknown race.

C Patients are classified as receiving dialysis or having a functioning transplant. Those whose treatment modality on December 31 is unknown are assumed to be receiving dialysis. Includes all Medicare and non-Medicare ESRD patients, and patients in the U.S. Territories and foreign countries.

D Deaths are not counted for patients whose age is unknown.

E Age is computed at the start of therapy for incidence, on December 31 for point prevalence, at the time of transplant for transplants, and on the date of death for death.

F Includes patients whose modality is unknown.

G Unadjusted total rates include all ESRD patients in the 50 states and Washington D.C.

H Total transplants as known to the USRDS: 59 transplants with unknown donor type excluded from counts.

I Adjustments using the Bureau of Labor Statistics inflationary adjustment and the CMS inflation adjustment for the medical component.

* *Values for cells with ten or fewer patients are suppressed. "." Zero patients in this cell.*

Wait-list for kidney & kidney/pancreas transplants

	New listings in 2010	N, as of 12.31.10	Median time on list (yrs)
0-17	763	770	0.79
18-34	4,141	9,038	1.52
35-49	9,513	24,137	1.73
50-64	14,567	37,490	1.73
65+	5,919	15,957	1.79
Male	21,229	51,346	1.66
Female	13,675	36,047	1.80
White	20,938	47,469	1.58
African American	10,193	30,285	1.91
Native American	436	1035	1.68
Asian/Pacific Islander	2,506	6,651	1.90
Other/unknown	831	1,953	1.48
Hispanic	5,731	16,188	1.84
Non-Hispanic	29,173	71,205	1.68
Diabetes	11,953	29,593	1.60
Hypertension	7,208	19,941	1.80
Glomerulonephritis	6,030	15,637	1.90
Cystic kidney disease	2,459	5,532	1.57
Urologic disease	514	1,494	2.11
Other known cause	5,042	11,496	1.69
Unknown cause	1,000	2,665	1.96
Missing cause	698	1035	1.06
Blood type A	11,553	25,297	1.51
B	5,056	14,008	1.86
AB	1,384	2,598	1.28
O	16,911	45,490	1.81
PRA 0%	23,789	53,493	2.80
1-9	1,490	3,829	2.72
10-79	5,538	15,126	3.01
80+	4,061	14,907	3.84
Unknown	26	38	0.62
Total	34,904	87,393	1.71

Medicare & non-Medicare spending

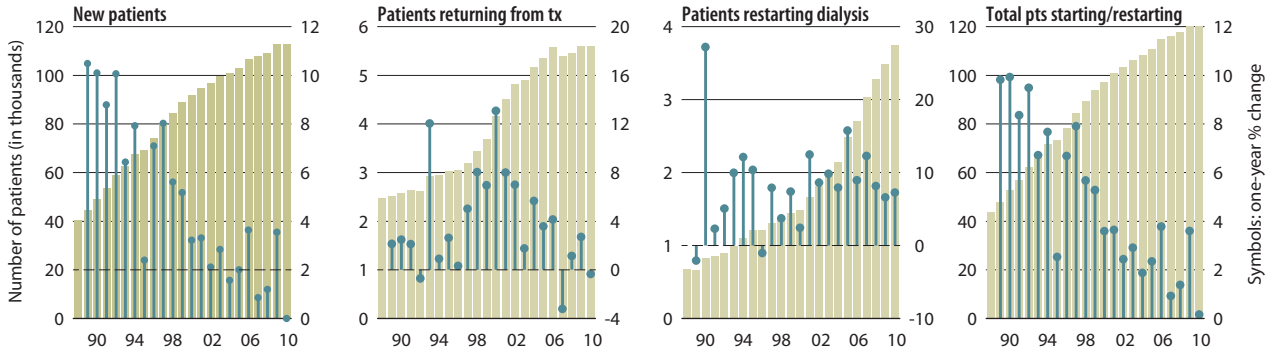
Medicare spending for ESRD, 2010 (billions of dollars)	
SAF paid claims (Part A & B)	28.70
2% incurred but not reported	0.57
HMO-Medicare risk	3.38
Organ acquisition	0.29
Total Medicare costs	32.94
Non-Medicare spending for ESRD, 2010 (billions of dollars)	
EGHP (MSP)	3.22
Patient obligations	5.42
Non-Medicare patients	5.91
Total non-Medicare costs	14.55
Total ESRD costs (billions), 2010	47.49
Change in Medicare spending, 2009 to 2010	
Total	6.1
Per patient year	1.2
Adjusted for inflation[I]	-0.3% to -2.1%
Medicare spending per patient year, 2010	
ESRD	$75,043
Hemodialysis	$87,561
Peritoneal dialysis	$66,751
Transplant	$32,914

In 2010, 116,946 new dialysis and transplant patients initiated ESRD therapy, for an adjusted rate per million population of 349. On December 31, 2010, there were 594,374 patients receiving treatment, for an adjusted rate of 1,763 per million population. More than 415,000 of these patients were being treated with dialysis, while 179,361 had a functioning graft; 91,001 ESRD patients died during the year. A total of 17,778 transplants were performed during 2010, including 6,273 from living donors. Almost 35,000 patients were added to the transplant wait list, 87,393 were on the kidney-alone and kidney/pancreas wait lists at the end of 2010, and the median time on the list (for pediatric and adult patients combined) was 1.7 years.

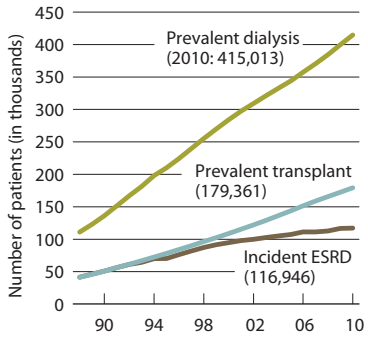
With Medicare spending for ESRD at $32.9 billion, and non-Medicare spending at $14.6 billion, total ESRD costs in 2010 reached $47.5 billion. Medicare costs per person per year were more than $75,000 overall, ranging from $32,914 for transplant patients to $87,561 for those receiving hemodialysis therapy. » **Table p.a;** see page 428 for analytical methods. *Dialysis & transplant patients, 2010.*

The number of new dialysis patients remained stable in 2010 — after a 3.5 percent increase in 2009 — at close to 113,000 patients. Close to 5,600 patients with graft failure returned to dialysis from transplant, a number also similar to that of the previous year. The number of patients restarting dialysis increased 7.2 percent, to 3,744. Overall, the CMS Annual Facility Survey showed 122,067 patients starting or restarting dialysis in 2010, up just 0.2 percent from 2009. » **Figure p.2;** see page 428 for analytical methods. *CMS Annual Facility Survey.*

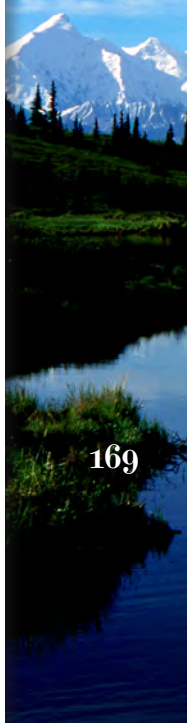
vol 2 p.2 **Counts of new & returning dialysis patients**



vol 2 p.3 **Patient counts, by modality**

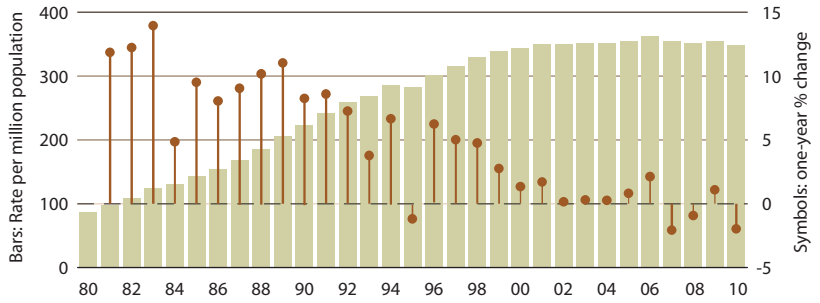


The size of the prevalent dialysis population increased 3.8 percent in 2010, reaching 415,013, and is now 46 percent larger than in 2000. The size of the transplant population rose 4.0 percent, to reach 179,361 patients, while the number of incident patients rose just 0.4 percent, to 116,946. » **Figure p.3.** *Incident & December 31 point prevalent ESRD patients.*



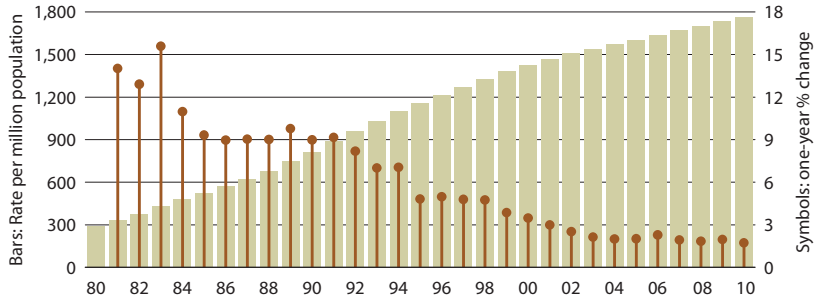
After a 1.1 percent increase in 2009, the adjusted incident rate of end-stage renal disease fell 2.0 percent in 2010, to 348 per million population. Since 2000, changes in adjusted incident rates have shown little variation, ranging from -2.1 percent to 2.1 percent. » **Figure 1.2;** see page 429 for analytical methods. *Incident ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

vol 2
1.2 Adjusted incident rates of ESRD & annual percent change



The adjusted rate of prevalent cases of end-stage renal disease rose 1.7 percent in 2010 — slightly lower than the 1.9 percent growth in 2009 — to 1,763 per million population. This rate is 21 percent higher than that seen in 2000. The annual rate of increase has remained between 1.7 and 2.3 percent since 2004. » **Figure 1.10;** see page 429 for analytical methods. *December 31 point prevalent ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

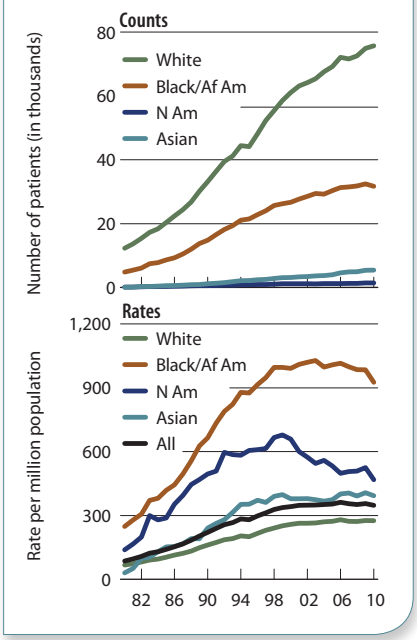
vol 2
1.10 Adjusted prevalent rates of ESRD & annual percent change



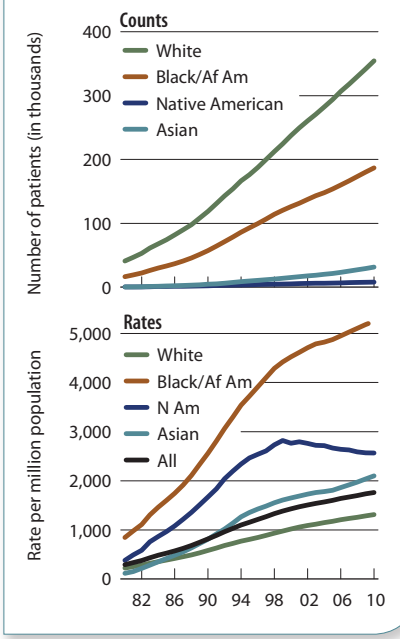
By race, adjusted incident rates of ESRD for blacks/African Americans and Native Americans in 2010 were 924 and 465 per million population, respectively — 3.4 and 0.5 times greater than the rate of 276 found among whites. Since 2000, the rate of new ESRD cases has grown 6.1 percent among whites and 2.5 percent among Asians, while falling 7.0 percent in the black/African American population.

Rates of prevalent ESRD remain greatest in the black/African American and Native American populations, at 5,242 and 2,566 per million population in 2010, compared to 1,311 and 2,101 among whites and Asians. The rate among Hispanics reached 2,606 in 2010, 1.5 times greater than that in the non-Hispanic population. » **Figures 1.5 & 13;** see page 429 for analytical methods. *Incident ESRD patients (1.5). December 31 point prevalent ESRD patients (1.13). Adj: age/gender; ref: 2005 ESRD patients.*

vol 2
1.5 Incident counts & adjusted rates of ESRD, by race



vol 2
1.13 Prevalent counts & adjusted rates of ESRD, by race



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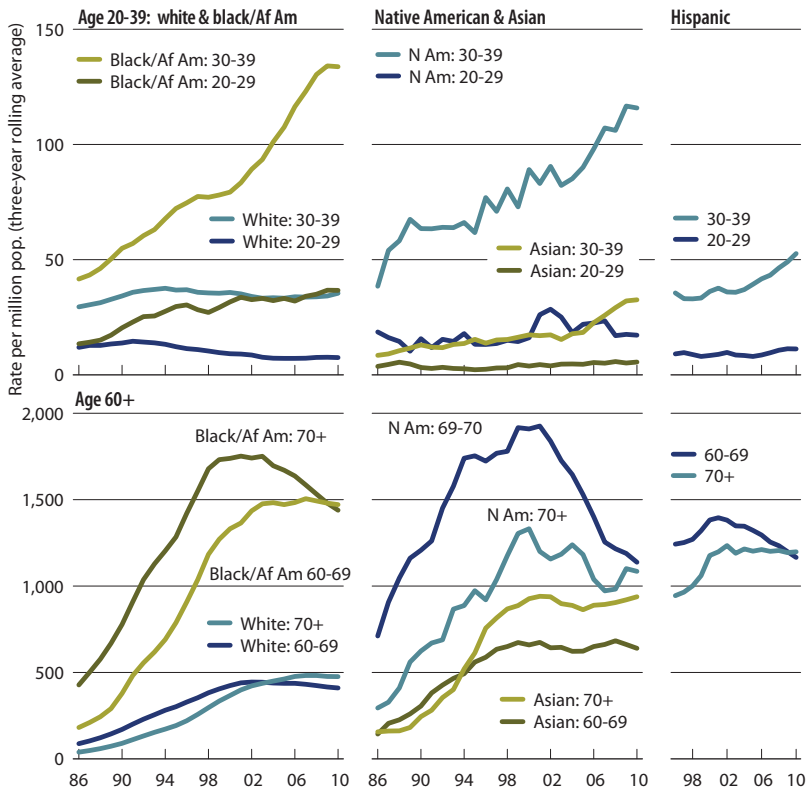
Adjusted incident rates of ESRD due to diabetes, by age, race, & ethnicity



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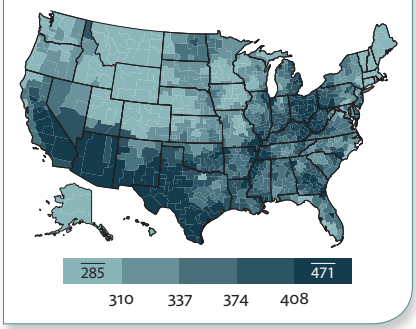
1.3

Geographic variations in adj. inc. rates of ESRD per million pop., 2010, by HSA



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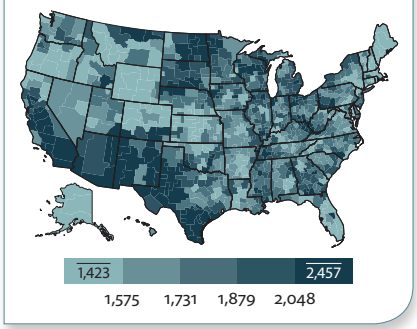
Geographic variations in adj. prev. rates of ESRD per million pop., 2010, by HSA

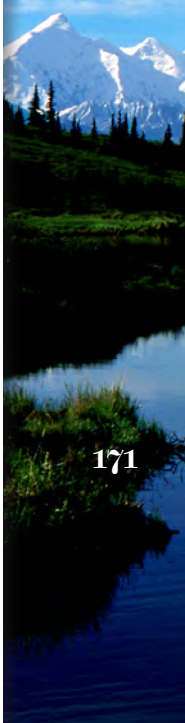


In 2010, the adjusted incident rate of ESRD was 348 per million population, averaging 471 in the upper quintile. The highest adjusted rates occur in the Ohio Valley, portions of Texas and California, and the southwestern states. (Rates are not adjusted for ethnicity.) » **Figure 1.3;** see page 429 for analytical methods. *Incident ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

In 2010, the rate of prevalent ESRD was 1,752 per million population. Patterns generally follow those found in the incident population, with an additional pocket of higher rates in the Dakotas and Minnesota. Rates in the upper quintile average 2,457. (Rates are not adjusted for ethnicity.) » **Figure 1.11;** see page 429 for analytical methods. *Dec. 31 point prev. pts. Adj: age/gender/race; ref: 2005 ESRD pts.*

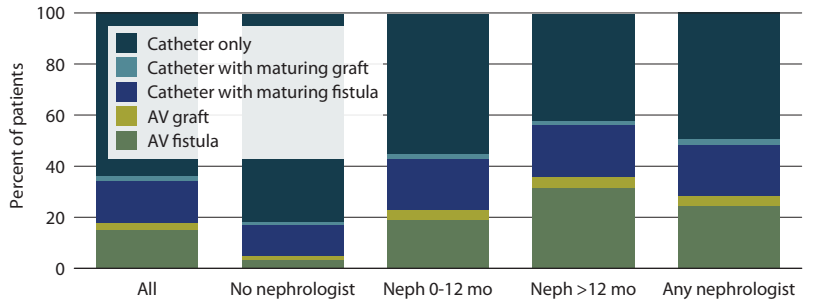
Both the rates of incident ESRD caused by diabetes and their growth over time continue to vary widely by age and race/ethnicity. Among whites age 30–39, for example, the incident rate (adjusted for gender) has fallen just 1.0 percent since 2000, and in 2010 was 35.4 per million population. For blacks/African Americans of the same age, in contrast, the rate has increased 69 percent since 2000, to reach 133.8. The Native American population has seen a rise of 30.1 percent for this age group over the same time period, reaching 116 per million in 2010. And while rates of new ESRD cases among Asians remain comparatively low, among those age 30–39 they have nearly doubled since 2000, reaching 32.6 per million population in 2010.

Different patterns are seen among older populations. Among whites age 60–69, the rate of incident ESRD due to diabetes has fallen 3.6 percent since 2000, in contrast to a 29 percent increase in those age 70 and older. In blacks/African Americans, the rate for those age 60–69 has fallen 17.2 percent since 2000, while rates have decreased 40.4 and 18.4 percent, respectively, in Native Americans age 60–69 and those 70 and older. The rate for Hispanics age 60–69 has fallen 15.7 percent since 2000, to 1,166 in 2010, but has now surpassed the 2010 rate of 1,138 found in Native Americans of the same age. » **Figure 1.8;** see page 429 for analytical methods. *Incident ESRD patients; rates are three-year rolling averages. Adj: gender; ref: 2005 ESRD patients.*



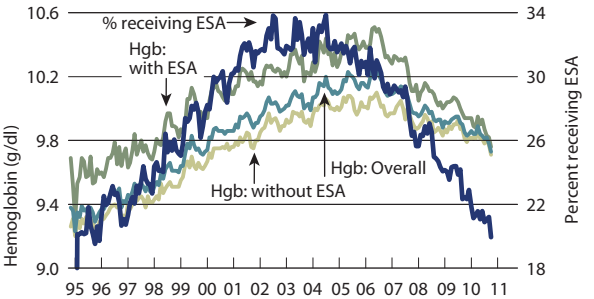
Among hemodialysis patients who have seen a nephrologist for more than a year prior to starting ESRD therapy, 41.8 percent initiate treatment using a catheter; these patients have the greatest likelihood at initiation of having an arteriovenous fistula (AV) or maturing fistula, at 31.3 and 20.1 percent, respectively. Patients with no pre-ESRD nephrology care most frequently start treatment with a catheter, at 81 percent, while only 18.4 percent initiate with either a mature or maturing AV fistula or graph. » **Figure 1.19;** see page 429 for analytical methods. *Incident hemodialysis patients, 2010.*

vol 2
1.19 **Access use at first outpatient hemodialysis, by pre-ESRD nephrology care, 2010**



In the incident ESRD population, the mean hemoglobin at initiation has continued to fall from its peak in 2006, reaching 9.73 g/dl overall, 9.76 for patients receiving pre-ESRD treatment with an erythropoiesis stimulating agent (ESA), and 9.71 for patients without ESA treatment; 20 percent of new patients at the end of 2010 had received a pre-ESRD ESA. » **Figure 1.20;** see page 429 for analytical methods. *Incident ESRD patients.*

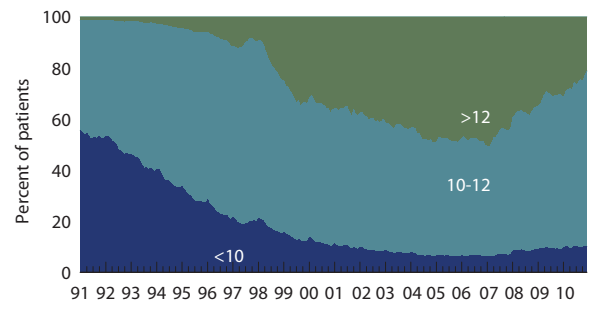
vol 2
1.20 **Mean hemoglobin at initiation, by pre-ESRD ESA treatment**



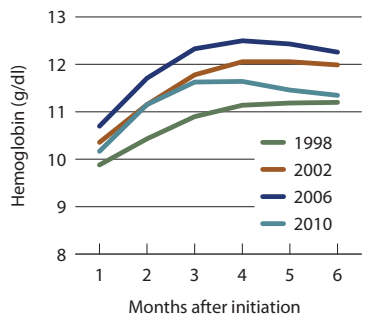
At the end of 2010, slightly more than two-thirds of prevalent dialysis patients had a mean monthly hemoglobin of 10–12 mg/dl. The mean EPO dose per week fell each month within the year, ending at 15,829 in the month of December, while the mean hemoglobin at that time was 11.3 g/dl. » **Figures 2.2–3;** see page 431 for analytical methods. *Period prevalent dialysis patients.*

When compared to 2006 incident patients, those starting dialysis in 2010 did so with lower hemoglobins one month post-initiation, at 10.7 and 10.2 g/dl, respectively. At six months, mean hemoglobin levels were within recommended levels, at 11.4 mg/dl. » **Figure 2.4;** see page 431 for analytical methods. *Incident dialysis patients; EPO doses in 2.5 adjusted for inpatient days.*

vol 2
2.2 **Patient distribution, by mean monthly hemoglobin (g/dl)**



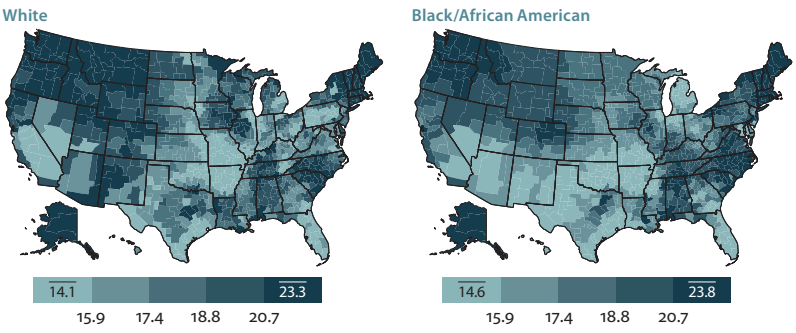
vol 2
2.4 **Mean monthly hemoglobin after initiation, by year**

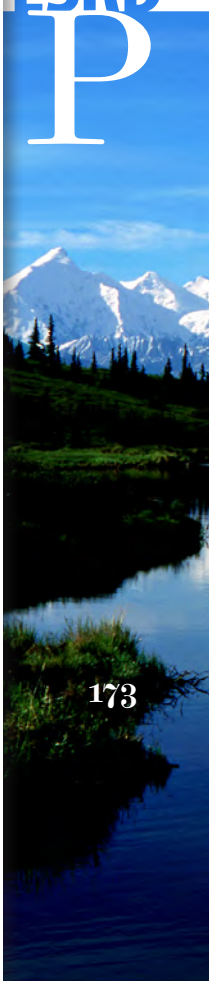


In 2010, among both whites and blacks/African Americans, the percentage of hemodialysis patients starting ESRD with an arteriovenous fistula or graft varied across the county. In the lower quintile, an average of 14.1–14.6 percent initiated treatment with an internal access; means in the upper quintile were 23.3–23.8 percent.

By location, patients residing in the Pacific Northwest, Alaska, and New England were the most likely to initiate dialysis with an internal access. » **Figure 2.14;** see page 431 for analytical methods. *Incident hemodialysis patients, 2010.*

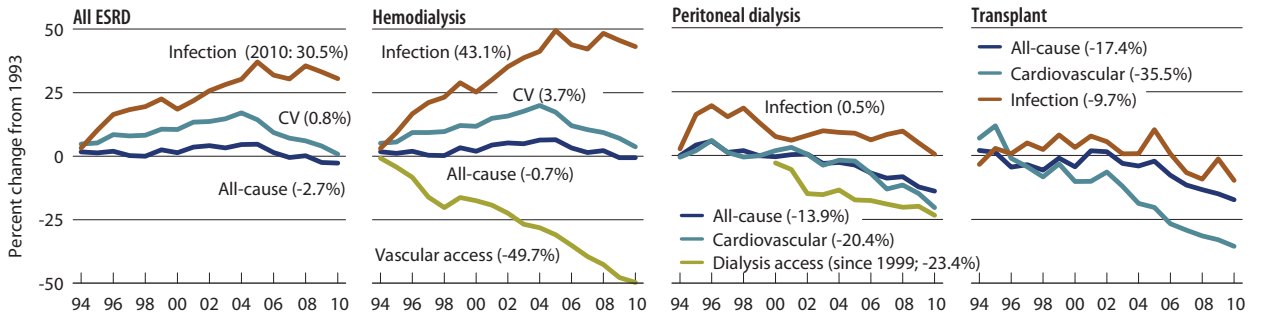
vol 2
2.14 **Geographic variations in the percent of hemodialysis patients using an internal access at initiation, by race & HSA, 2010**



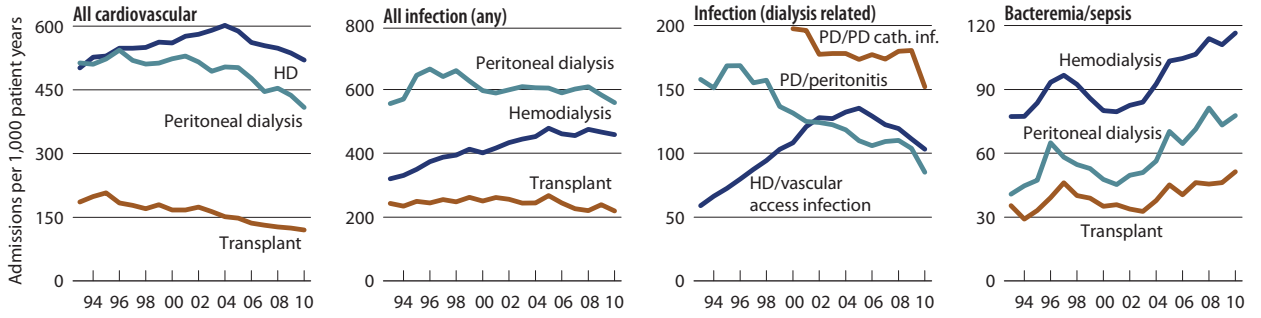


Rates of hospitalization for infection in the hemodialysis population have increased 43 percent since 1994 (in contrast to a 50 percent decrease in vascular access hospitalizations). Hospitals have made significant progress in using less costly settings to address vascular access interventions, but equivalent progress in lowering the rate of infectious complications is lacking. The use of dialysis catheters continues to have the largest associated risk, a finding well known in the dialysis community. » **Figure 3.1;** see page 432 for analytical methods. *Period prevalent ESRD patients; adjusted for age, gender, race, & primary diagnosis; ref: ESRD patients, 2005.*

vol 2
3.1 Change in adjusted all-cause & cause-specific hospitalization rates, by modality



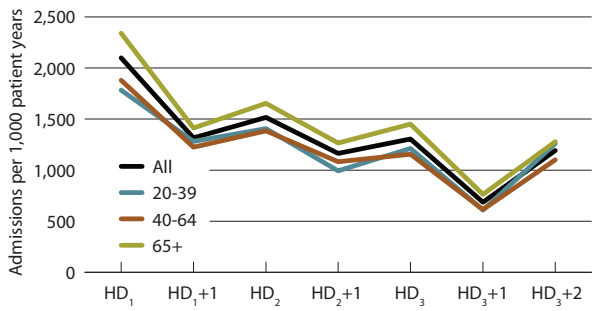
vol 2
3.3 Adjusted hospitalization rates, by principal diagnosis & modality



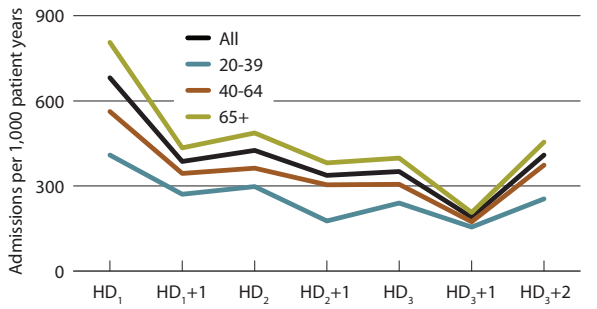
Adjusted cardiovascular admission rates for hemodialysis patients peaked in 2004, at 601 per 1,000 patient years, and have since fallen 13.5 percent. In the same period, rates for peritoneal dialysis and transplant patients fell 19 and 21 percent, respectively. Rates remain lowest for patients with a transplant, at 120 in 2010.

Peritoneal dialysis patients have the highest rate of admission for any infection, at 558 per 1,000 patient years in 2010, yet this rate is 16 percent lower than the 663 seen in 1996. The admission rate for peritonitis among these patients has been falling since the mid-1990s, from a peak of 169 in 1995 to 85 in 2010, and rates of admission for a peritoneal catheter infection have declined 23 percent since 2000, falling to 152 per 1,000 in 2010. Among hemodialysis patients, admissions for vascular access infection rose steadily until 2005, but since have fallen 24 percent, to 103 in 2010. Admissions for bacteremia/sepsis remain highest for hemodialysis patients, at 116 per 1,000 patient years in 2010. » **Figure 3.3;** see page 432 for analytical methods. *Period prevalent ESRD patients. Adj: age/gender/race/primary diagnosis; ref: ESRD patients, 2005.*

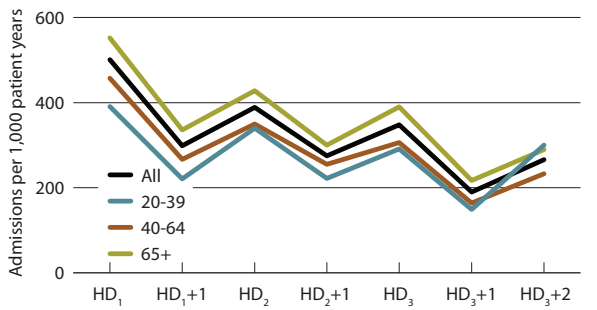
vol 2
3.11 Annualized all-cause admission rates on different days of the dialysis week, by age



vol 2
3.12 Annualized cardiovascular admission rates on different days of the dialysis week, by age



vol 2
3.13 Annualized infectious admission rates on different days of the dialysis week, by age



Maintenance hemodialysis is typically delivered three times a week, and concern has emerged that the two-day, or "long," interval may be associated with higher than expected rates of adverse outcomes. To explore this issue, we here present data on hospitalization rates by different days of the hemodialysis week among prevalent adult hemodialysis patients in 2010.

In the framework of the "hemodialysis week," HD_1, for example, is defined as Monday for patients dialyzed on Monday, Wednesday, and Friday (MWF) and as Tuesday for those treated on Tuesday, Thursday, and Saturday (TTS). $HD_3 + 2$, the second day of the long interval, is Sunday for MWS and Monday for TTS.

As shown in Figure 3.11, hospitalization rates in the overall population are highest, at 2,101 per 1,000 patient years, on the day following the long interval (HD_1), and a downward sawtooth pattern is apparent thereafter, with an opposing direction of changes on any pair of successive days and a decline when any pair separated by two days is studied.

This pattern is replicated across age groups. Figures 3.12 and 3.13 show corresponding analyses for hospitalization rates attributed to cardiovascular disease and infection, respectively, and show patterns similar to those seen with all-cause hospitalization. » **Figures 3.11–13;** see page 432 for analytical methods.

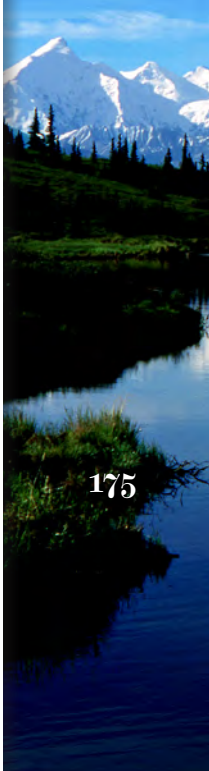
January 1, 2010 point prevalent Medicare HD patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule; HD_1, HD_2, & HD_3 are the first, second, & third hemodialysis sessions. Rates for all patients are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age are adjusted for the other four factors. Ref: all included HD patients in 2010.

Day of the dialysis week

HD_1	Monday for patients on a Monday–Wednesday– Friday schedule; Tuesday for patients on a Tuesday–Thursday–Saturday schdule.
HD_1+1	Tuesday or Wednesday for the respective shedules.
HD2	Wednesday or Thursday, respectively.
HD_2+1	Thursday or Friday, respectively.
HD3	Friday or Saturday, respectively.
HD_3+1	Saturday or Sunday, respectively.
HD_3+2	Sunday or Monday, respectively.

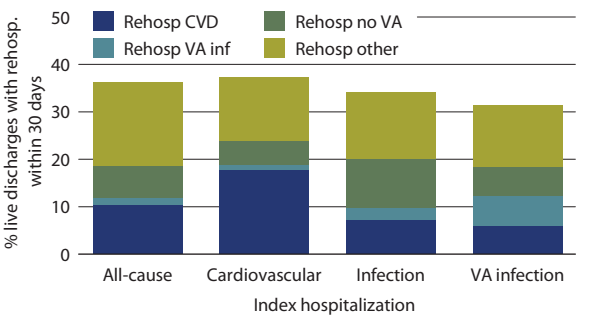
Interdialytic intervals

1	Day after long interdialytic interval: Monday for patients with a Monday–Wednesday–Friday dialysis schedule; Tuesday for patients with a Tuesday–Thursday–Saturday dialysis schedule.
2	Day after short interdialytic interval: Wednesday and Friday for patients with a Monday–Wednesday–Friday dialysis schedule; Thursday and Saturday for patients with a Tuesday–Thursday–Saturday dialysis schedule.
3	Days without dialysis: Other respective weekdays.



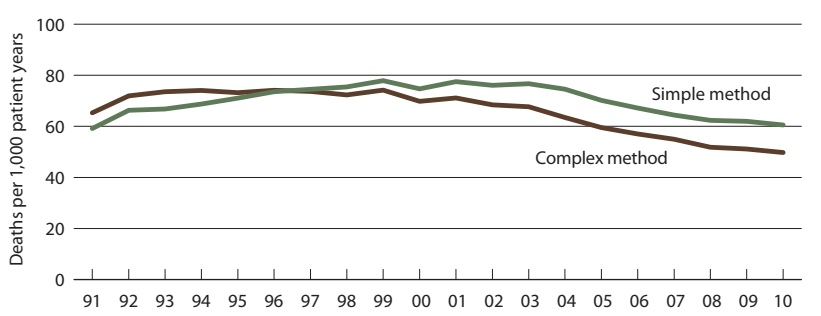
In the 30 days following a live hospital discharge from a cardiovascular index hospitalization in 2010, 48 percent of rehospitalizations were for cardiovascular issues. Rehospitalization for overall infection and vascular access infection, respectively, followed 13 percent and 6 percent of discharges from index hospitalizations of the same category, compared to 8 percent and less than 2 percent of discharges from all-cause index hospitalization. » **Figure 3.7;** see page 432 for analytical methods. *Period prevalent hemodialysis patients, all ages (0-75+), 2010; unadjusted. Includes live hospital discharges from January 1 to December 1, 2010.*

vol 2 **3.7** **Cause-specific rehospitalization in hemodialysis patients 30 days after live hospital discharge, by cause-specific index hospitalization, 2010**



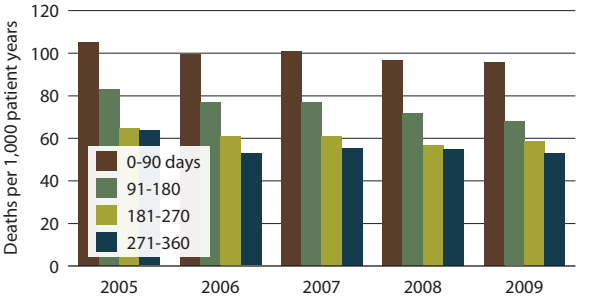
This figure uses the old/simple method and the new/complex method to estimate SCD rates in prevalent dialysis patients. The complex method yields a consistently lower rate for the past decade, an important consideration in clinical trial design. One important factor in this difference is the number of patients withdrawn from dialysis, a major cause of death which does not figure in clinical trials in the general population. » **Figure 4.2;** see page 435 for analytical methods. *Period prev. dialysis pts, age 20 & older.*

vol 2 **4.2** **Rates of sudden cardiac death in prevalent dialysis patients**



In comparison to the marked reduction in SCD in prevalent dialysis patients (Figures 4.3–6), the reduction in the rates of SCD in the first 90 days of therapy is relatively modest. Between 2005 and 2009 this rate fell only 10 percent, from 105 to 96. The first 90 days after dialysis initiation constitute a period of heightened SCD risk. » **Figure 4.7;** see page 435 for analytical methods. *Incident dialysis patients age 20 & older; unadjusted, simple method.*

vol 2 **4.7** **Rates of sudden cardiac death following initiation of treatment in incident dialysis patients**



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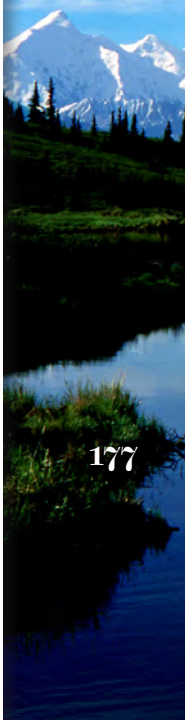
4.c **Cardiovascular disease & pharmacological interventions, by diagnosis & modality (row percent)**

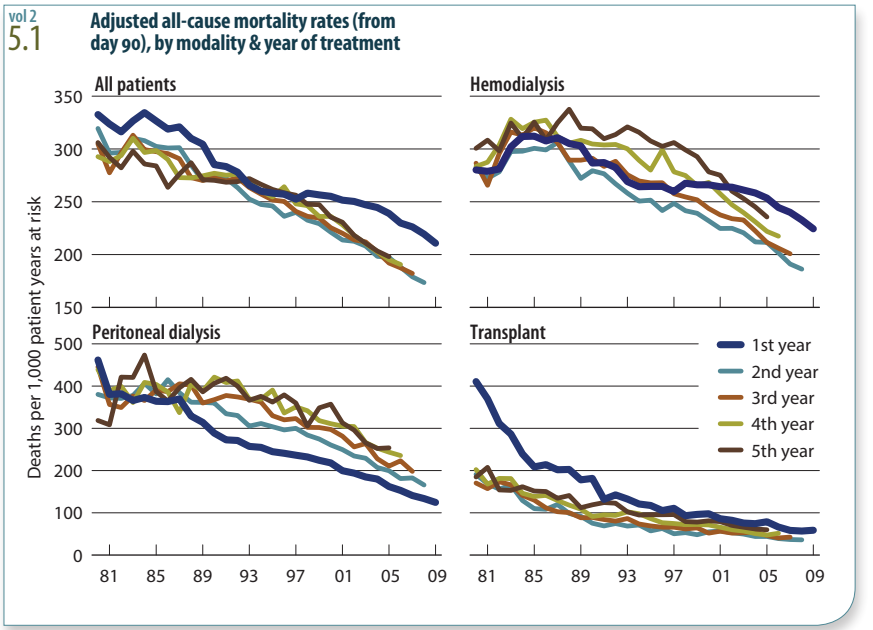
	2007 N	ACEI/ARB	Beta blocker	Clopid-ogrel	Warfarin	Statin	Amio-darone	2010 N	ACEI/ARB	Beta blocker	Clopid-ogrel	Warfarin	Statin	Amio-darone
CHF														
Hemodialysis	56,199	43.5	56.7	17.4	12.2	33.1	5.3	59,664	46.6	66.0	21.7	14.0	42.7	6.3
Peritoneal dialysis	1,924	41.2	57.9	16.6	12.3	37.0	5.0	1,934	45.2	67.2	21.2	13.1	48.6	6.7
Transplant	3,811	41.4	70.0	14.5	17.3	50.4	4.1	4,792	42.2	76.3	16.7	19.4	58.5	4.5
AMI														
Hemodialysis	4,271	56.3	75.0	47.2	11.5	54.8	7.3	4,986	55.5	76.9	51.2	13.2	61.9	7.7
Peritoneal dialysis	200	47.5	78.5	53.5	9.5	56.5	8.5	216	52.8	78.2	61.1	12.5	69.9	6.0
Transplant	264	54.2	84.8	49.2	18.6	69.7	3.8	348	48.6	87.1	54.0	14.9	77.6	5.5
PAD														
Hemodialysis	47,291	39.5	51.6	19.3	12.2	34.8	4.3	50,148	41.9	59.3	23.9	13.6	43.6	5.0
Peritoneal dialysis	1,578	36.9	49.3	22.6	9.5	41.0	3.9	1,584	40.6	56.4	26.8	11.1	53.2	3.3
Transplant	4,387	39.9	59.9	15.3	13.2	51.0	2.1	5,237	41.5	67.6	19.7	13.9	58.0	2.2
CVA/TIA														
Hemodialysis	20,229	43.5	55.8	23.2	12.7	37.8	4.7	20,293	46.4	63.4	27.2	13.5	47.8	5.2
Peritoneal dialysis	719	41.6	55.5	23.9	11.0	47.0	4.5	787	46.0	59.2	27.2	14.4	51.5	4.1
Transplant	1,738	40.5	61.4	20.9	15.8	54.1	2.2	2,076	41.2	66.6	22.6	16.9	63.3	2.9
AFIB														
Hemodialysis	18,938	35.6	55.3	15.8	34.5	33.2	15.8	21,975	37.2	62.9	18.9	38.8	43.2	17.8
Peritoneal dialysis	625	31.0	55.0	16.3	39.8	38.7	17.8	791	33.9	63.8	15.4	43.4	50.7	19.2
Transplant	1,870	37.7	65.1	9.0	47.8	47.0	10.2	2,840	42.6	74.4	10.3	54.0	58.2	11.9
ICD/CRT-D														
Hemodialysis	734	55.3	72.8	29.3	19.6	45.6	13.1	610	58.0	76.6	30.3	22.1	47.5	17.4
Peritoneal dialysis	31	54.8	77.4	19.4	19.4	41.9	19.4	26	53.8	88.5	19.2	11.5	53.8	26.9
Transplant	48	56.3	89.6	27.1	33.3	60.4	8.3	46	52.2	87.0	26.1	34.8	76.1	15.2
Revascularization: PCI														
Hemodialysis	3,507	55.0	76.0	83.1	9.5	60.5	5.2	4,214	54.8	77.4	83.5	9.6	67.8	5.6
Peritoneal dialysis	197	49.7	72.6	85.8	4.1	59.9	6.1	217	47.5	74.2	82.0	6.5	71.4	2.8
Transplant	296	49.7	76.4	86.5	12.2	70.6	3.4	407	49.9	82.1	83.3	8.1	76.9	1.2
Revascularization: CABG														
Hemodialysis	615	58.0	77.2	32.2	10.1	64.7	17.6	687	55.7	83.3	38.3	12.4	70.6	17.2
Peritoneal dialysis	38	57.9	84.2	34.2	21.1	65.8	21.1	54	46.3	81.5	44.4	9.3	70.4	20.4
Transplant	51	58.8	82.4	31.4	15.7	68.6	17.6	73	50.7	90.4	28.8	27.4	83.6	31.5
No cardiac event														
Hemodialysis	55,043	44.2	51.8	8.2	6.8	28.3	1.0	63,847	46.9	58.1	9.4	6.6	33.9	1.1
Peritoneal dialysis	6,320	43.5	47.5	5.4	3.6	33.7	0.6	6,840	49.0	55.9	5.9	4.3	39.7	0.6
Transplant	27,035	41.9	53.9	3.7	4.7	47.6	0.4	31,699	41.8	58.6	4.7	4.8	51.1	0.3

Two-thirds of dialysis patients diagnosed with CHF in 2010 received a beta blocker, while 47 percent of hemodialysis patients with this diagnosis received an ACEI/ARB. Beta blockers were used by more than three-quarters of ESRD patients with an AMI during 2010 and, remarkably, by 58 percent of hemodialysis patients with no cardiovascular diagnosis or intervention. At least with respect to medical therapy with beta blockers, if therapeutic nihilism in dialysis patients is not dead, it would certainly appear to be moribund. This is not to say that ESRD patients uniformly receive therapies to the same degree as patients in the general population, but, at least with respect to certain evidence-based therapies, such as beta blockers, the gap in utilization is markedly smaller than it was a decade ago.

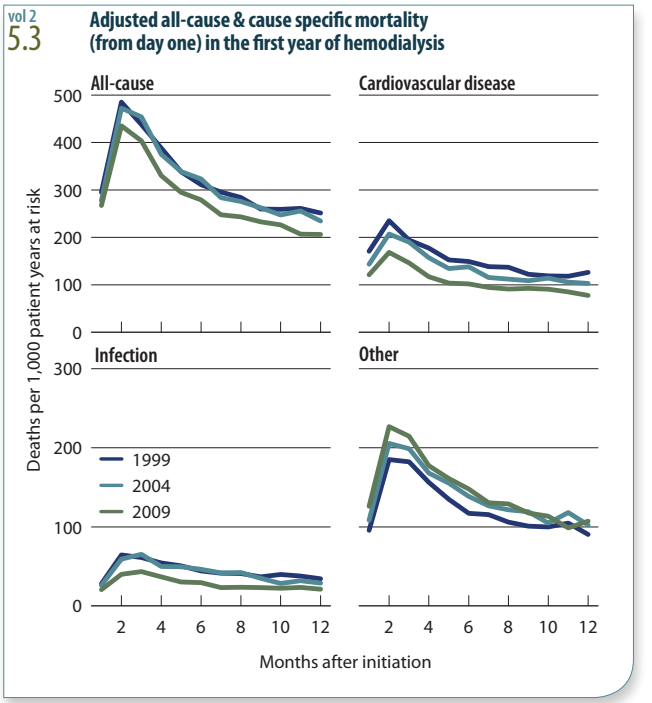
The use of warfarin in hemodialysis patients with atrial fibrillation remains relatively low, perhaps reflecting concerns related to hemorrhagic risk in these patients. And given the relative paucity of data on amiodarone therapy in this population, the rates of amiodarone use are perhaps higher than would be expected.

Finally, despite the publication of the 4D and AURORA trials, there has been no discernible reduction in the use of statin therapy in U.S. dialysis patients. To the contrary, even in those without identified prevalent cardiovascular illness, 28 percent of hemodialysis patients and 34 percent of peritoneal dialysis patients in 2007 received statins, compared to 34 and 40 percent in 2010. In the population qualifying for secondary prevention (e.g., those with an AMI), the use of statin therapy in hemodialysis patients increased from 55 percent in 2007 to 62 percent in 2010. » **Table 4.c;** see page 435 for analytical methods. *January 1 point prevalent patients with Medicare Parts A, B, & D enrollment, with a first cardiovascular diagnosis or procedure in the year.*





Between 1993 and 2003 there was little improvement in first-year death rates in the ESRD population. Between 2003 and 2009, however, these rates fell more than 14 percent, while second-year death rates have fallen 16 percent. **» Figure 5.1;** see page 438 for analytical methods. *Incident ESRD patients. Adj: age/gender/race/primary diagnosis; ref: incident ESRD patients, 2005.*



In the first year of hemodialysis, all-cause mortality and mortality due to cardiovascular disease or to other causes peak in month two following initiation, then fall. For incident hemodialysis patients in 2009, for example, all-cause mortality reached 435 deaths per 1,000 patient years at risk in month two, then fell to 206 in month 12. Cardiovascular mortality peaked at 169, and decreased to 78. Mortality due to infection peaks in months 2 and 3, at 40–43 per 1,000 patient deaths. **» Figure 5.3;** see page 438 for analytical methods. *Incident hemodialysis patients defined on the day of dialysis onset, without the 60-day rule. Adj: age/gender/race/Hispanic ethnicity/primary diagnosis; ref: incident hemodialysis patients, 2005.*

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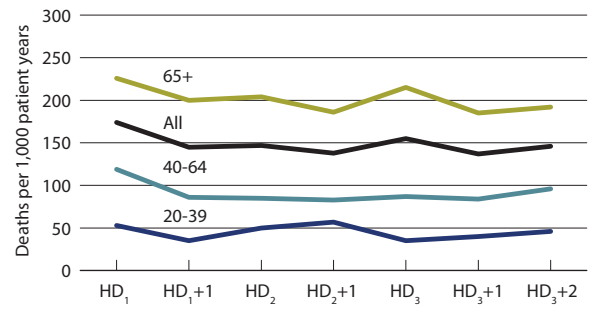
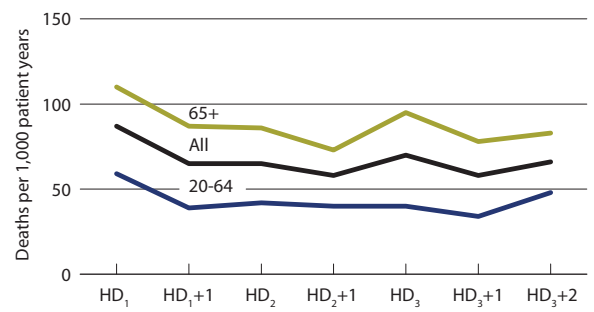
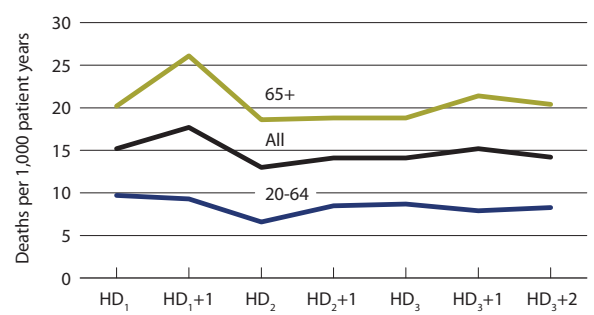
5.7 **Annualized all-cause mortality rates on different days of the dialysis week**



vol 2
5.8 **Annualized cardiovascular mortality rates on different days of the dialysis week**



vol 2
5.9 **Annualized infectious mortality rates on different days of the dialysis week**



Maintenance hemodialysis is typically delivered three times a week, and concern has emerged that the two-day, or "long," interval may be associated with higher than expected rates of adverse outcomes. To explore this issue, we look here at mortality rates by different days of the hemodialysis week among prevalent adult hemodialysis patients in 2010.

In the framework of the "hemodialysis week," HD_1, for example, is defined as Monday for patients dialyzed on Monday, Wednesday, and Friday (MWF) and as Tuesday for those treated on Tuesday, Thursday, and Saturday (TTS). $HD_3 + 2$, the second day of the long interval, is Sunday for MWS and Monday for TTS.

Mortality rates in the overall population are highest, at 174 per 1,000 patient years, on the day following the long interval (HD1), and a sawtooth pattern is apparent, with rates declining and increasing every two days thereafter. This pattern is replicated in patients age 65 and older, with rates varying between 185 and 226, but some differences are seen in younger age groups.

In patients age 20–39, mortality rates are highest on $HD_2 + 1$ (57), lowest on HD_3 (35), and the sawtooth pattern is absent. For ages 40–64, rates are substantially higher on HD_1 (119), stable between $HD_1 + 1$ (86) and $HD_3 + 1$ (84), and intermediate on $HD_3 + 2$ (96).

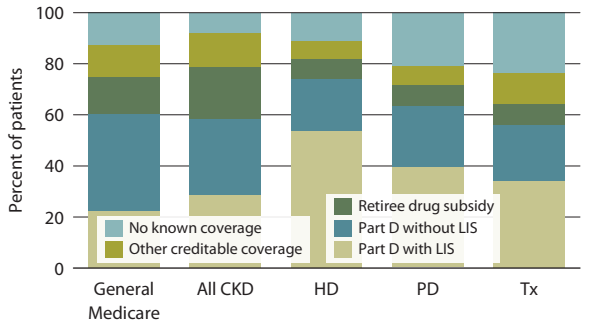
Figures 5.8 and 5.9 show corresponding analyses for mortality rates attributed to cardiovascular disease and infection. Rates are highest on HD_1 (87) for cardiovascular disease, and on $HD_1 + 1$ (17.7) for infection. » **Figures 5.7–9;** see page 438 for analytical methods. *January 1, 2010 point prevalent Medicare hemodialysis patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule; HD_1, HD_2, & HD_3, are the first, second, & third hemodialysis sessions. Rates for all patients are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age are adjusted for the other four factors. Ref: all included hemodialysis patients in 2010.*

Many elderly, disabled individuals and those with ESRD have Medicare coverage; these patients can enroll in Medicare Part D for prescription drug coverage. Seventy-seven and 64 percent of hemodialysis and peritoneal dialysis patients were enrolled in Part D in 2010, compared to 56–60 percent of general Medicare patients (with or without CKD) and transplant patients.

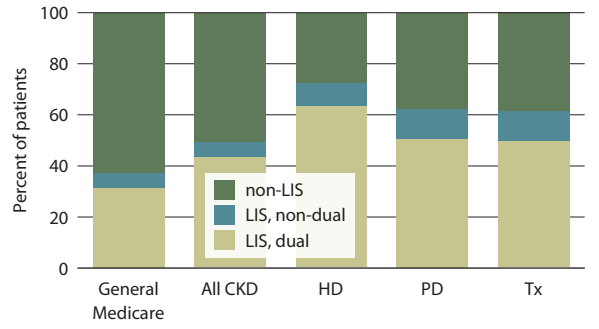
Compared to general Medicare and CKD patients enrolled in Part D, a higher proportion of Part D-enrolled hemodialysis, peritoneal dialysis, and transplant patients (73, 63, and 61 percent compared to 37–50 percent) receive the low-income subsidy (LIS). A higher percentage of patients on peritoneal dialysis or with a transplant have no known prescription drug coverage, but many of these patients are employed and may have coverage that is not tracked by Medicare. » **Figure 6.2;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, 2010.*

Patients dually-enrolled in Medicaid and Medicare qualify for the LIS, and, if they do not choose a plan, are automatically enrolled in a Medicare Part D plan. Sixty-four percent of hemodialysis patients with Part D coverage are dually-eligible LIS beneficiaries, compared to 32 percent of the general Medicare population. An additional but smaller proportion of patients (6–12 percent) receive the LIS after an application documenting low income and resources. » **Figure 6.5;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1.*

vol 2 **6.2** **Sources of prescription drug coverage in Medicare ESRD enrollees, 2010**



vol 2 **6.5** **Patients enrolled in Part D, by dual eligibility & low income subsidy (LIS) status, 2010**



Positioning of the top Part D medications used by dialysis patients changed between 2008 and 2010. Amlodipine has become the most frequently used drug, after being at fourth place in 2008. Sevelamer hydrochloride has dropped off the list as use has transitioned to sevelamer carbonate, now in fourth place. Use of calcium acetate and cinacalcet increased somewhat from 2008 to 2010, while use of lanthanum carbonate has declined. Together, sevelamer carbonate and hydrochloride maintain their status as the top medications, by cost, used by dialysis patients in 2010, with cinacalcet keeping second place. Use of carvediol has grown since 2008. As illustrated by days supply, medication use is a combination of use in the individual patient multiplied by the number of patients in the prevalent dialysis population, which continues to increase. » **Table 6.f;** see page 439 for analytical methods. *Part D claims for all hemodialysis patients, 2010.*

vol 2 **6.f** **Top 15 drugs used by Part D-enrolled dialysis patients, by frequency & net cost, 2010**

By frequency Generic name	Total days supply	By net cost Generic name	Total days supply	Total cost (dollars)
Amlodipine	19,476,423	Cinacalcet	12,948,729	260,023,205
Insulin	19,185,188	Sevelamer carbonate	15,723,597	235,623,936
Metoprolol	18,897,578	Sevelamer HCL	5,580,405	96,695,276
Sevelamer carbonate	15,723,597	Insulin	19,185,188	76,032,463
Simvastatin	15,547,902	Lanthanum carbonate	2,790,692	63,996,592
Calcium acetate	14,777,969	Calcium acetate	14,777,969	51,855,070
Lisinopril	14,425,980	Clopidogrel bisulfate	10,529,417	48,746,816
Cinacalcet	12,948,729	Esomeprazole	4,916,511	27,757,642
Omeprazole	12,265,329	Atorvastatin	6,102,510	20,658,562
Carvedilol	11,904,875	Pantoprazole	3,992,742	14,284,534
Clonidine	11,349,738	Doxercalciferol	855,446	14,108,077
Levothyroxine	10,570,307	Valsartan	4,562,564	12,885,699
Clopidogrel bisulfate	10,529,417	Pioglitazone	2,130,208	12,426,793
Furosemide	9,888,422	Nifedipine	6,588,609	11,260,004
Warfarin	8,170,035	Clonidine	11,349,738	10,202,044

Part D prescription drug coverage

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6.g **Top 15 drugs used by Part D-enrolled transplant patients, by frequency & net cost, 2010**

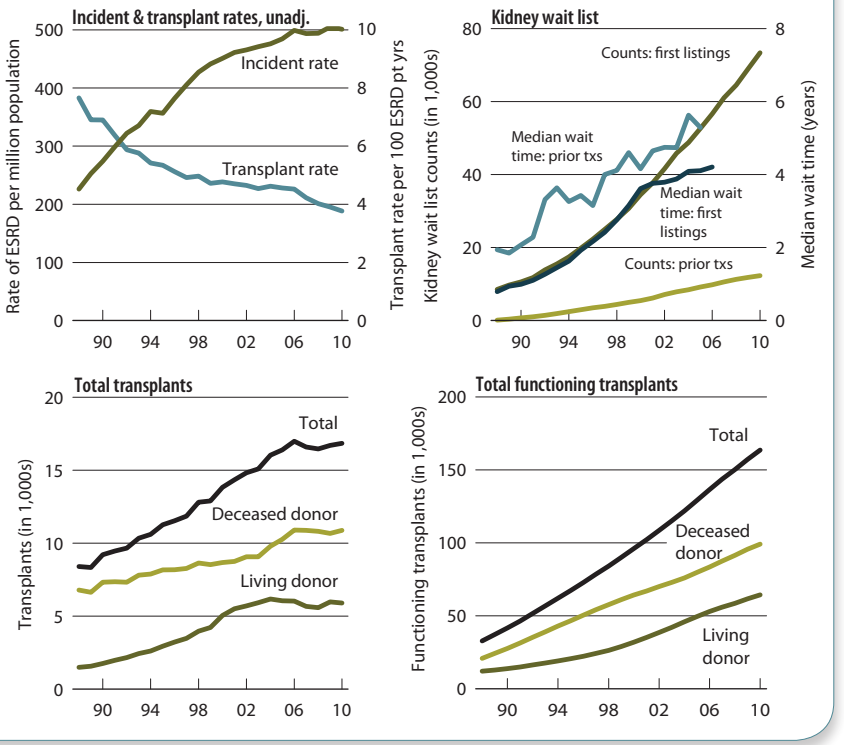
By frequency Generic name	Total days supply	By net cost Generic name	Total days supply	Total cost (dollars)
Prednisone	7,547,599	Valganciclovir	982,135	45,474,908
Metoprolol	6,690,222	Insulin	6,497,226	28,914,728
Insulin	6,497,226	Tacrolimus	1,192,352	15,799,835
Amlodipine	5,202,017	Cinacalcet	862,809	15,790,929
Furosemide	4,184,856	Esomeprazole	1,666,478	9,430,347
Omeprazole	4,079,765	Mycophenolate mofetil	1,184,242	8,940,645
Trimethoprim/ sulfamethoxazole	4,040,453	Atorvastatin	2,830,453	8,685,651
Simvastatin	4,006,447	Epoetin alfa	197,966	6,086,743
Lisinopril	2,944,375	Clopidogrel bisulfate	1,376,772	5,917,211
Atorvastatin	2,830,453	Pantoprazole	1,190,918	4,307,687
Clonidine hydrochloride	2,405,996	Sirolimus	191,171	3,933,897
Levothyroxine	2,309,616	Mycophenolate sodium	229,983	3,432,389
Nifedipine	2,050,584	Darbepoetin alfa	71,610	3,226,774
Allopurinol	1,721,115	Pioglitazone	576,497	3,227,370
Calcitriol	1,694,629	Cyclosporine	686,376	3,092,528

Among transplant patients, prednisone (a generic immunosuppressant) was the most frequently used medication in 2010, followed by metoprolol and insulin; these ranks are unchanged since 2008. Trimethoprim-sulfamethoxazole, used for prophylaxis against *pneumocystis carinii* pneumonia, dropped from sixth to seventh place. No trade name immunosuppressant made the top 15 list in terms of frequency, not surprising given that most are covered under Medicare Part B. In terms of costs, insulin therapies moved from fourth place to second; insulin use increased at a faster pace than did the prevalence of patients with a functioning transplant. The use of valganciclovir, employed for prophylaxis against cytomegalovirus, rose slightly, and maintained its first position by cost — not surprising, as it has noavailable generic. The immunosuppressants mycophenolate mofetil, sirolimus, cyclosporine, and mycophenolate sodium appear on the list by cost, implying that their costs are relatively higher than the frequency of their use. Although generic products became available starting in 2009, tacrolimus remained on the top cost list in 2010. Epoetin alfa and darbepoetin alfa, trade name products not among the most frequently used medications, were among those with the greatest cost, though their use has declined substantially since 2008. » **Table 6.g;** see page 439 for analytical methods. *Part D claims for all kidney transplant patients, 2010. Therapeutic classification based on the Medi-Span's generic product identifier (GPI) therapeutic classification system.*

In 2010, 16,843 kidney transplants were performed in patients age 20 and older in the United States — 135 more than in the previous year. There were 85 fewer living donor transplants performed in 2010 compared to 2009, a decrease of 1.4 percent, compared with a 2.0 percent increase in deceased donor transplants.

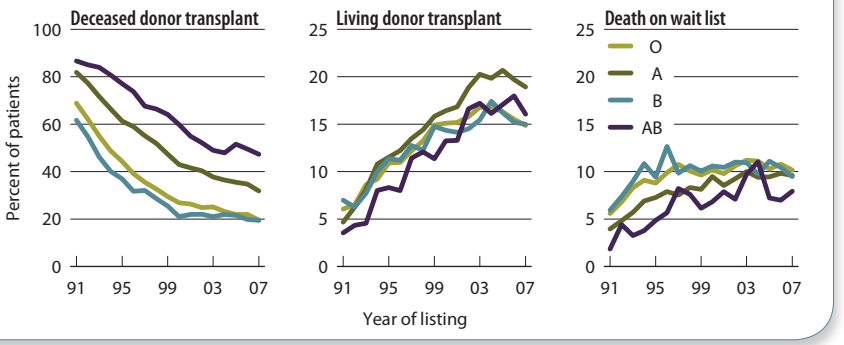
The number of adult candidates on the waiting list continues to increase, growing 6 percent in 2010 to reach 86,620 patients on December 31. The rate of new ESRD cases declined 1.1 percent from 2009 to 2010. » **Figure 7.1;** see page 440 for analytical methods. *Unadjusted incident & transplant rates: limited to ESRD patients age 20 & older, thus yielding a computed incident rate higher than the overall rate presented elsewhere in the Annual Data Report. Wait list counts: patients age 20 & older listed for a kidney or kidney-pancreas transplant on December 31 of each year. Wait time: patients age 20 & older entering wait list in the given year. Transplant counts: patients age 20 & older as known to the USRDS.*

vol 2
7.1 Trends in transplantation: unadjusted rates, wait list, & total & functioning transplants, patients age 20 & older

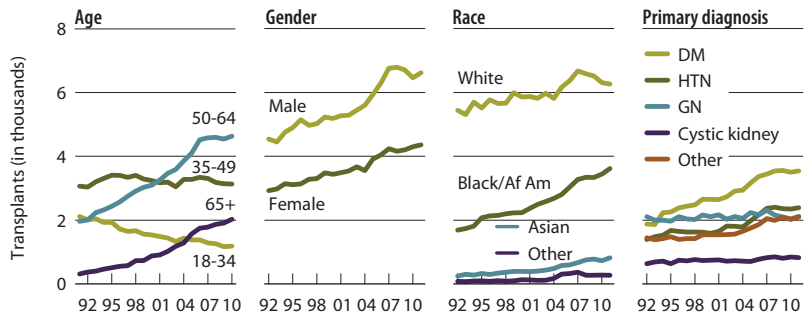


The percentage of adult patients receiving a deceased donor transplant within three years of listing has fallen considerably since 1991, and varies by blood type. It continues to be highest for those of blood type AB — at 47 percent for patients listed in 2007 — and lowest for those of type O or B, at 20 percent. The percentage receiving a living donor transplant has been rising, and varies little by blood type. » **Figure 7.4;** see page 440 for analytical methods. *Patients age 18 & older listed for a first-time kidney or kidney-pancreas transplant.*

vol 2
7.4 Outcomes for wait-listed adult patients within three years of listing, by blood type

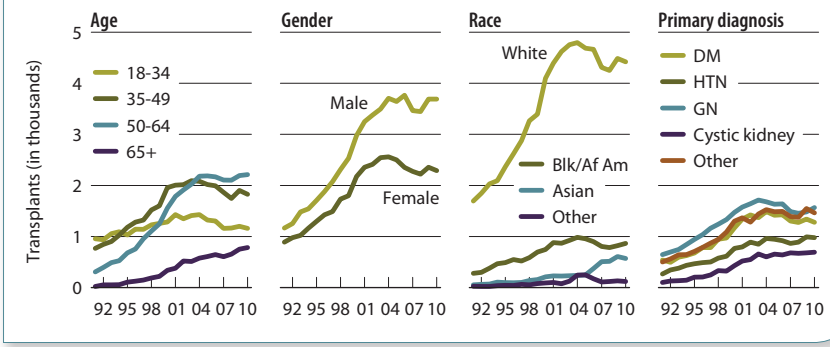


vol 2
7.12 Deceased donor transplants, by age, gender, race, & primary diagnosis



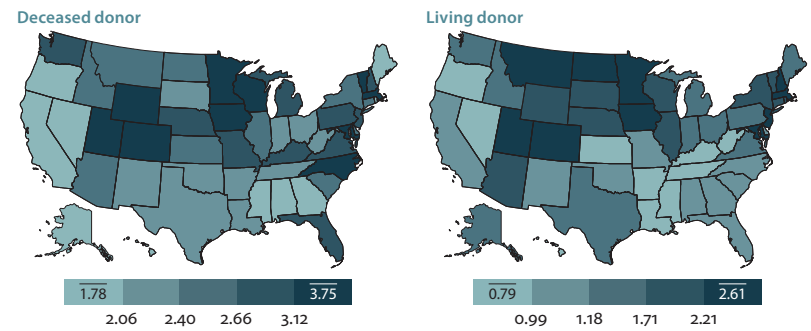
Since 2000, the number of deceased donor transplants among patients age 65 and older has more than doubled, to 2,031, and there has been an increase of 50 percent among patients age 50–64. Among those age 18–34, in contrast, transplants have fallen 23 percent, to 1,187. Among blacks/African Americans and Asians, the number of transplants has grown 53 and 111 percent, respectively. » **Figure 7.12;** see page 440 for analytical methods. *Pts age 18 & older. Includes kidney-alone & kidney-pancreas transplants.*

vol 2
7.14 Living donor transplants, by age, gender, race, & primary diagnosis

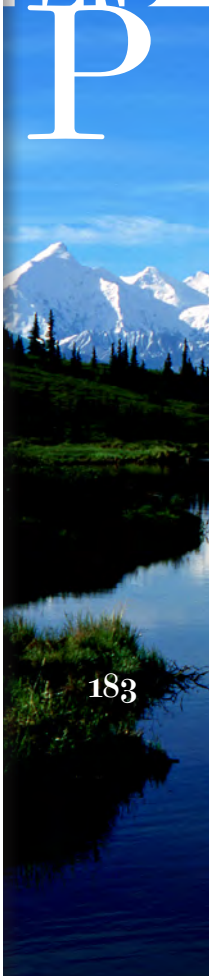


Among patients younger than 50, the number of living donor transplants has fallen 7–10 percent since 2000. For those age 50–64, in contrast, the number is now 42 percent higher, and for patients age 65 and older it has more than doubled. Living donor transplants among whites and blacks/African Americans have increased 8 and 16 percent in this period, and have more than doubled among Asians. » **Figure 7.14;** see page 440 for analytical methods. *Pts age 18 & older. Includes kidney-alone & kidney-pancreas transplants.*

vol 2
7.16 Adjusted transplant rates (per 100 dialysis patient years) by state of patient residence & donor type, 2009



In 2010, the rate of deceased donor transplants reached 6.8 per 100 dialysis patient years in Vermont, and 3.6–4.1 in Colorado, Iowa, and Wyoming. Rates of living donor transplants reached 3.4 in Minnesota, and 3.1 in North Dakota. » **Figure 7.16;** see page 440 for analytical methods. *Patients age 18 & older. Adj: age/gender/race/primary diagnosis; ref: prevalent dialysis patients, 2010.*



In the second year post-transplant, hospitalization rates for adult recipients are 54 percent lower than in the first year, at 67 admissions per 100 patient years. Admissions due to transplant complications fall 69 percent, to 12.1, while admissions due to cardiovascular causes and to infection fall 45 and 46 percent, to 8.2 and 18.1. » **Figure 7.21;** see page 440 for analytical methods. *First-time, kidney-only transplant recipients, age 18 & older, transplanted in 2008; ref: transplant patients, 2005.*

In the first year after transplant, 21 percent of cardiovascular hospitalizations are due to congestive heart failure; this number rises in the second year, to 24 percent. Hospitalizations for coronary atherosclerosis and CVA/TIA also increase, from 5.8 and 5.0 percent, respectively, in year one to 10.5 and 9.7 percent in year two. Urinary tract infection, septicemia, and pneumonia are the most common diagnoses among transplant patients admitted for infection, at 15–16 percent in the second year after transplant. » **Figure 7.22;** see page 440 for analytical methods. *First-time, kidney-only transplant recipients, age 18 & older, with Medicare primary payor coverage, transplanted in 2006–2010.*

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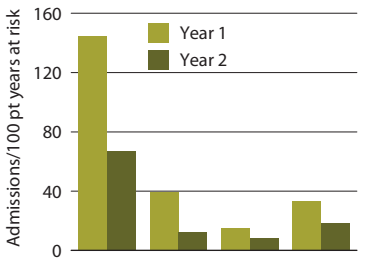
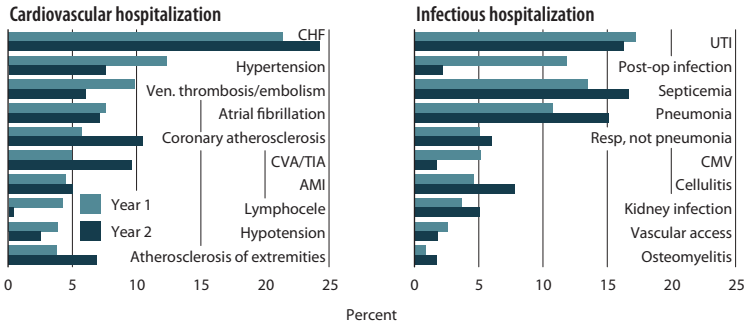
7.21 Hospitalization rates in the first & second years post-transplant, 2008

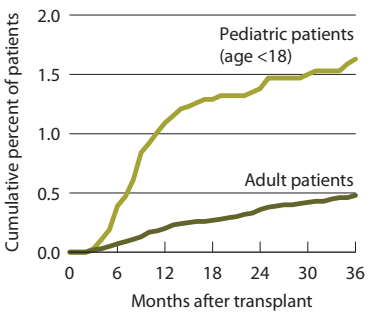


vol 2
7.22 Primary diagnoses of cardiac & infectious hospitalizations in the first & second years post-transplant

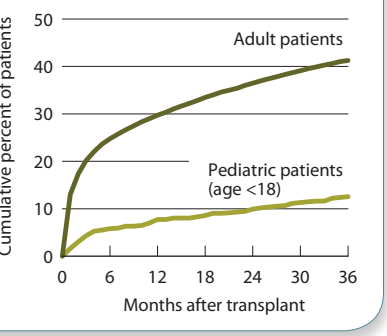


At 36 months after transplant, the cumulative incidence of post-transplant lymphoproliferative disorder (PTLD) is more than three times greater among pediatric patients than among adults, at 1.63 percent compared to 0.48. Adults, in contrast, have a higher incidence of post-transplant diabetes, reaching 41 percent at 36 months, compared to 13 percent among pediatric patients. » **Figures 7.23–24;** see page 440 for analytical methods. *Patients receiving a first-time, kidney-only transplant, 2003–2007 combined.*

vol 2
7.23 Cumulative incidence of post-transplant lymphoproliferative disorder (PTLD)

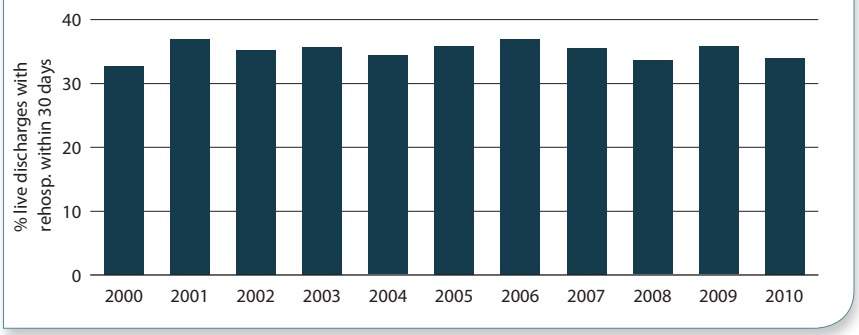


vol 2
7.24 Cumulative incidence of post-transplant diabetes



vol 2
8.1

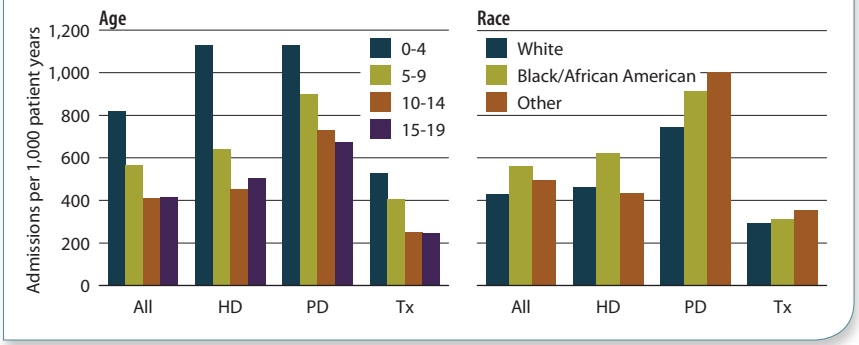
Adjusted all-cause rehospitalization rates in pediatric patients 30 days after live hospital discharge



Almost 35 percent of children with ESRD are rehospitalized within 30 days of discharge. As with the adult population (discussed in Chapter Three), this rate has not changed in a decade. » **Figure 8.1;** see page 442 for analytical methods. *ESRD patients age 0–19. Adj: gender/race/primary diagnosis; ref: discharges in 2005.*

vol 2
8.2

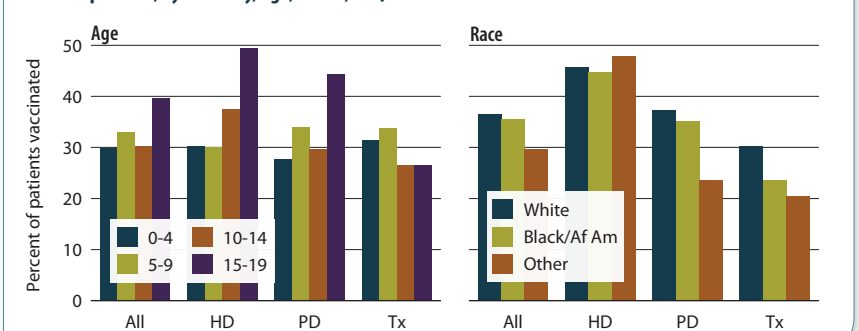
Unadjusted rates of hospitalization for any infection in pediatric patients, by modality, age, & race, 2007–2010



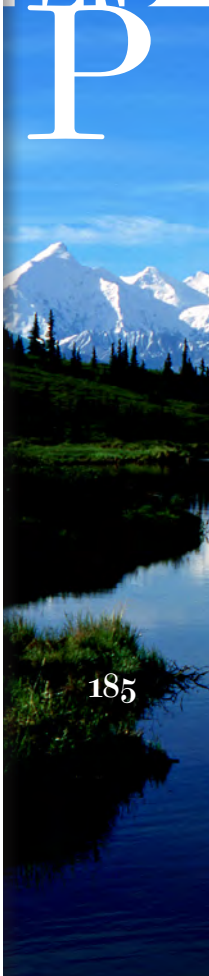
For pediatric hemodialysis and peritoneal dialysis (PD) patients prevalent in 2007–2010, unadjusted rates of hospitalization for infection are highest in those age 0–4, at 1,130 per 1,000 patient years; in all age groups the lowest rates occur in pediatric patients with a transplant. By race, overall rates are highest in blacks/African Americans and lowest in whites, at 560 and 429, respectively. » **Figure 8.2;** see page 442 for analytical methods. *Period prevalent ESRD patients age 0–19, 2007–2010; unadjusted.*

vol 2
8.7

Influenza vaccination rates in pediatric patients, by modality, age, & race, 2007–2010



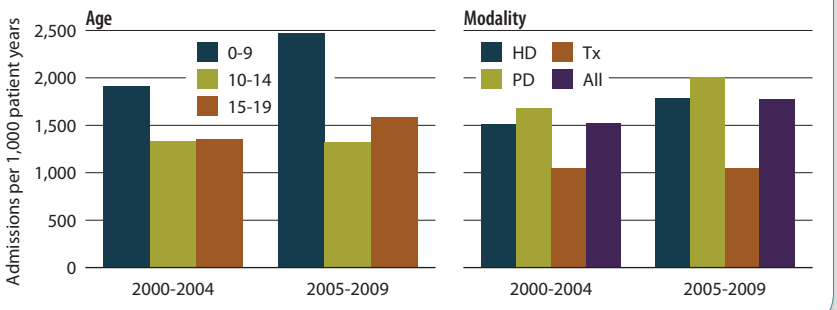
Rates of vaccination against influenza in the pediatric ESRD population have improved, but remain below recommended levels. In 2007–2010, approximately one-third of children age 14 or younger received a vaccination. Rates are highest in those age 15–19, at nearly 40 percent, and vary little by race. In older patients, rates are generally higher in those on hemodialysis compared to those on peritonal dialysis or with a transplant. » **Figure 8.7;** see page 442 for analytical methods. *Point prevalent ESRD patients age 0–19 prior to January 1 of each year, initiating therapy 90 days prior to September 1, & living through December 31 of each year. Vaccinations tracked between September 1 & December 31.*



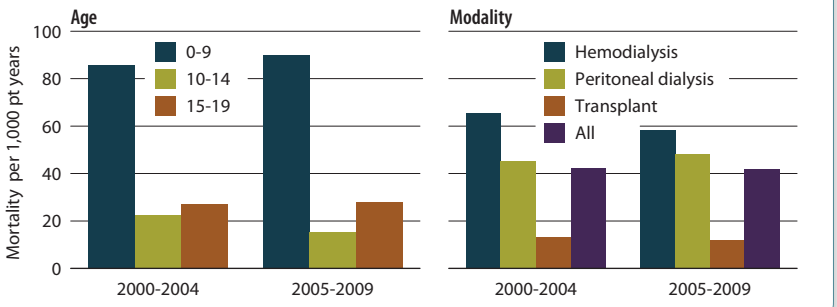
Between 2000–2004 and 2005–2009, one-year adjusted all-cause hospitalization rates per 1,000 patient years increased 29 and 17 percent, respectively, in patients age 0–9 and 15–19; in patients age 10–14, in contrast, rates fell one percent. By modality, rates rose 18–19 percent for dialysis patients and remained stable in those with a transplant; overall, all-cause hospitalization rates increased 16 percent between the two time periods.

The one-year adjusted all-cause mortality rate in children age 0–9 was 89.8 per 1,000 patient years in 2005–2009, nearly six times higher than the rate in patients age 10–14, and slightly more than three times higher than for patients age 15–19. The rate for children on hemodialysis was 58.2, compared to 48.0 and 11.9, respectively, for those on peritoneal dialysis or with a transplant. » **Figures 8.10 & 13;** see page 442 for analytical methods. *Incident ESRD patients age 0–19. Adjusted for gender, race, primary diagnosis & Hispanic ethnicity (8.13). Ref: incident ESRD patients age 0–19, 2004–2005.*

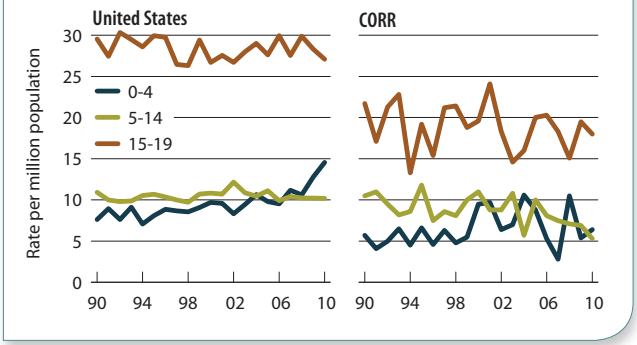
vol 2 **8.10** **One-year adjusted all-cause hospitalization rates in pediatric patients (from day 90), by age & modality**



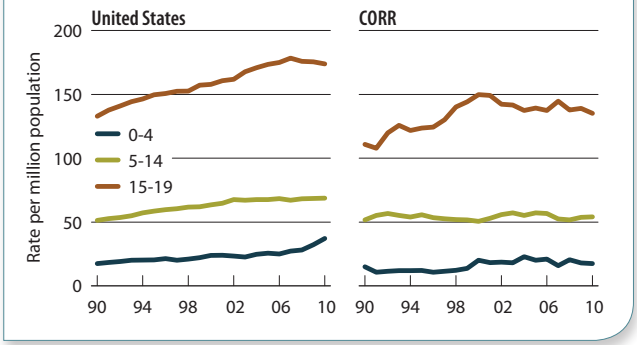
vol 2 **8.13** **One-year adjusted all-cause mortality rates in pediatric patients (from day one), by age & modality**



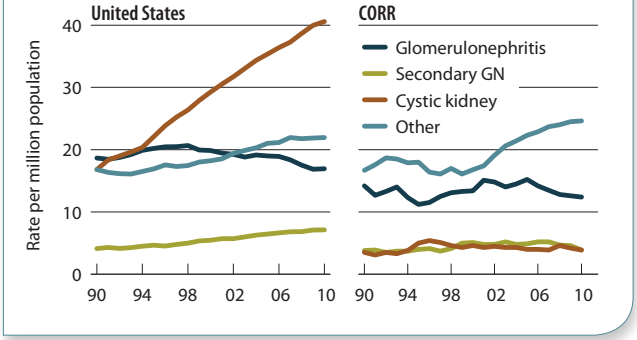
vol 2 **8.17** **Incident rates of pediatric ESRD in the United States & Canada, by age**



vol 2 **8.22** **Prevalent rates of pediatric ESRD in the United States & Canada, by age**



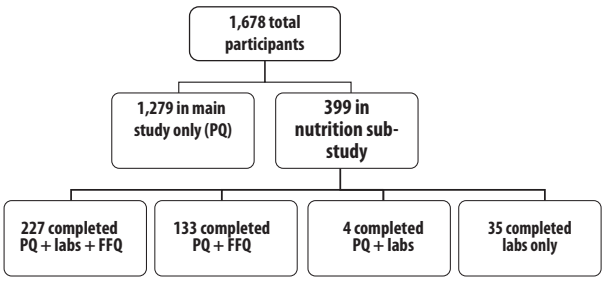
vol 2 **8.25** **Prevalent rates of pediatric ESRD in the United States & Canada, by primary cause of renal failure**



In 2010, the incident rate of ESRD per million population was 16.0 for U.S. children compared to 9.2 for children in Canada. In both countries the rate is higher for adolescents age 15–19 compared to younger children; in the U.S., however, the rate for adolescents is 51 percent greater than for their Canadian counterparts, at 27. Rates of prevalent ESRD in 2010 reached 86.0 for U.S. children and 68.3 for those in Canada.

The rate of ESRD due to cystic kidney disease among pediatric patients is ten times greater in the U.S. than in Canada. Rates of ESRD due to glomerulonephritis and secondary glomerulonephritis are 16.9 versus 12.4 and 7.1 versus 3.9 per million population. » **Figures 8.17, 22, & 25;** see page 442 for analytical methods. *Incident & December 31 point prevalent ESRD pts age 0–19; unadjusted.*

vol 2 9.1 **Distribution of CDS participants**



vol 2 9.b **Sociodemographic characteristics of Comprehensive Dialysis Study participants**

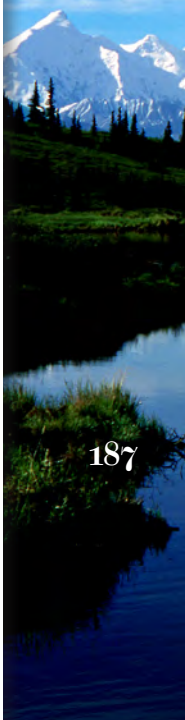
	All participants (n= 1,678) mean age at initiation 59.7 ±14.2		Nutrition study subset (n=399) mean age at initiation 60.9 ±13.8	
	N	Percent	N	Percent
<40	143	8.5	27	6.8
40–49	234	13.9	49	12.3
50–59	442	26.3	102	25.6
60–69	415	24.7	105	26.3
70+	444	26.5	116	29.1
Male	923	55.0	206	51.6
White	1,148	68.4	270	67.7
Black/Af Am	480	28.6	109	27.3
Asian	34	2.0	17	4.3
Other	16	1.0	3	0.8
Hispanic	240	14.3	53	13.3
Hemodialysis	1,561	93.0	359	90.0

The Comprehensive Dialysis Study (CDS), a joint effort between the Nutrition Special Studies Center (SSC) and the Rehabilitation/Quality of Life SSC, enrolled incident dialysis patients from a stratified random sample of U.S. dialysis facilities.

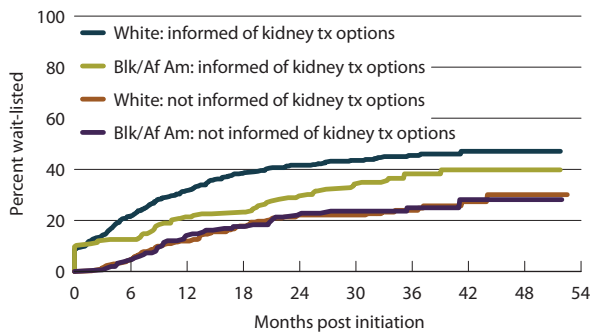
A total of 1,678 participants were enrolled from 296 facilities, of whom 399 participated in the nutrition substudy.

Figure 9.1 shows the distribution of study participants, and Table 9.b shows their sociodemographic characteristics. CDS participants were slightly younger than the overall population of patients who started dialysis in 2005 and had a slightly greater percentage of patients initiating on peritoneal dialysis (10 percent). » **Figure 9.1 & Table 9.b;** see page 443 for analytical methods.

CDS participants who started treatment between June 1, 2005, & June 1, 2007.

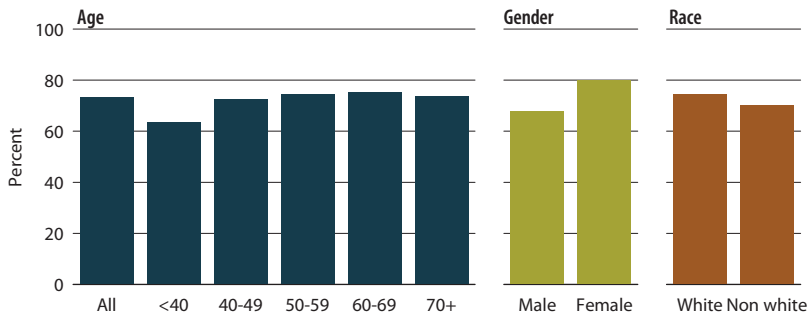


vol 2 **9.8** **Time to wait listing in patients with early awareness of kidney transplant options**



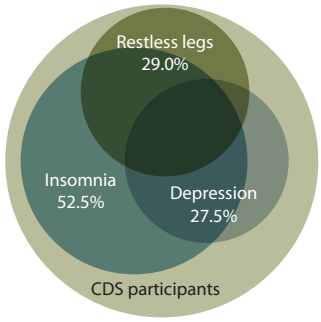
Both black/African American and white patients with early exposure to information about kidney transplantation are more likely to be wait-listed compared to those not reporting this early exposure. At the same time, white patients are significantly more likely to be wait-listed than blacks/African Americans. The differential early discussion/race effects on wait listing are not explained by other patient characteristics, nor by geographic region of the country. » **Figure 9.8;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2 **9.10** **CDS participants classified as frail, by age, gender, & race**



Seventy-three percent of CDS participants were frail, and even among participants younger than 40 years, the prevalence of frailty was 63 percent. As expected, women were more likely to be frail. There was not a substantial difference in the proportion of frail individuals based on age, a finding that differed from previous cohorts using slightly different definitions of frailty. White patients were slightly but not statistically more likely to be frail than non-white patients. » **Figure 9.10;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

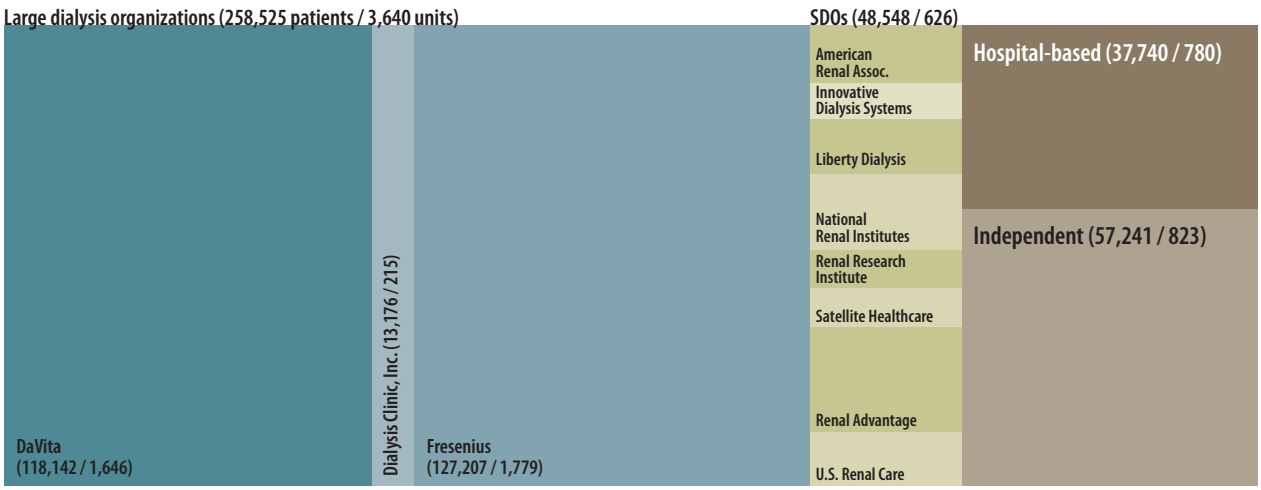
vol 2 **9.15** **Frequency of symptom complexes in CDS participants**



Eighty percent of patients with depression also reported insomnia, restless leg syndrome (RLS) or both; 70 percent of RLS sufferers also reported depression and/or insomnia; and 57 percent of patients with insomnia also reported depression and/or RLS. These results highlight the heavy burden of symptoms among patients with ESRD and the potential for interdependence among symptom complexes. » **Figure 9.15;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

At the end of 2010, 122,216 prevalent patients were being treated by Fresenius in 1,742 units, 110,299 were receiving care in one of DaVita's 1,556 units, and 13,023 patients were being treated by Dialysis Clinic Inc. (DCI), with 213 units. These three major providers manage the majority of the 5,760 dialysis units across the United States. Small dialysis organizations (SDOs), comprising 20–199 units, treated 44,793 patients in 605 units, while independent and hospital-based providers treated 58,090 and 38,596 patients in 848 and 796 units, respectively. » **Figure 10.1;** see page 444 for analytical methods. *CMS Annual Facility Survey, 2010.*

vol 2
10.1 **Distribution of patients, by unit affiliation, 2010**



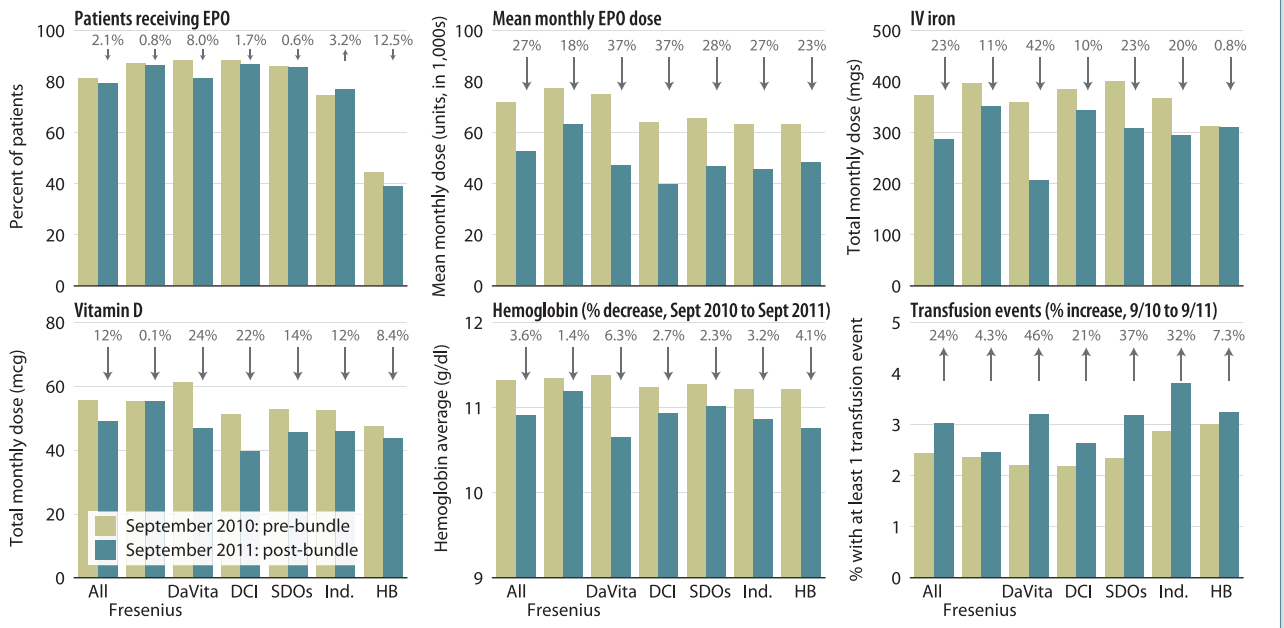
Here we examine care under the new Prospective Payment System for dialysis, or "bundle," which took effect in January, 2011, and show changes between the last two quarters of September, 2010 and the first two quarters of September, 2011. The three largest dialysis providers — Fresenius, DaVita, and DCI — adopted the bundled payment system in virtually all of their units, while 59 percent of the 571 hospital-based units opted into the system.

Figure 10.10 illustrates changes in the use of anemia therapeutics, in hemoglobin levels, and in transfusion events. Between September, 2010 and September, 2011, ESA doses fell 27.1 percent overall, and 37 percent in DaVita and DCI units, compared to 18 percent in units owned by Fresenius. IV iron doses dropped 23 percent overall, and 42 percent in DaVita units; doses declined only 1 percent in hospital-based units. Vitamin D dose declined 12 percent across all providers and 22–24 percent in DaVita and DCI units. » Table 10.a & Figure 10.10; see page 444 for analytical methods. *Point prevalent dialysis patients 2010 & 2011. 10.a: only facilities opting into the new bundle. 10.10: all facilities; only patients with a dialysis claim during the month are included in graphs showing patients receiving EPO & those with a transfusion event.*

vol 2 **10.a** **Distribution of providers opting into the new dialysis composite rate**

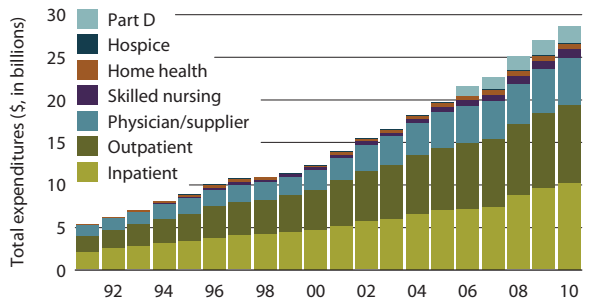
	Number of facilities	Number opting for bundle	Percent of facilities	Percent of patients
All providers	6,167	5,285	85.7	95.3
DaVita	1,609	1,605	99.8	100.0
DCI	209	209	100.0	100.0
Fresenius	1,765	1,757	99.5	99.9
Hospital-based	571	337	59.0	70.1
Independent	767	601	78.4	82.2
SDO	619	574	92.7	92.3

vol 2 **10.10** **Percentage of patients receiving ESAs, total monthly dose of anemia treatment theraputics, average hemoglobin levels, & transfusions, pre- & post- dialysis bundle, by unit affilliation**



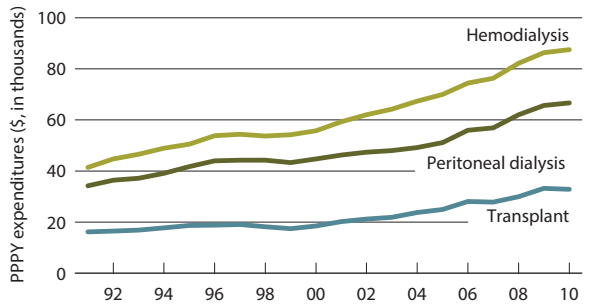
vol 2
11.5

Total Medicare dollars spend on ESRD, by type of service



vol 2
11.7

Total Medicare ESRD expenditures per person per year, by modality

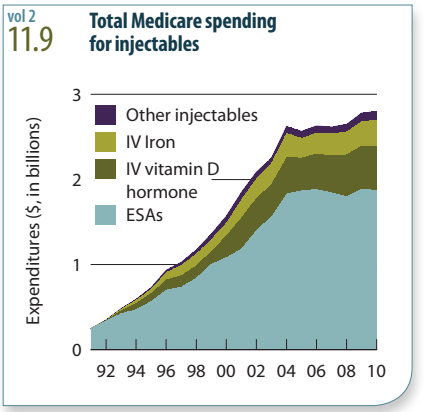


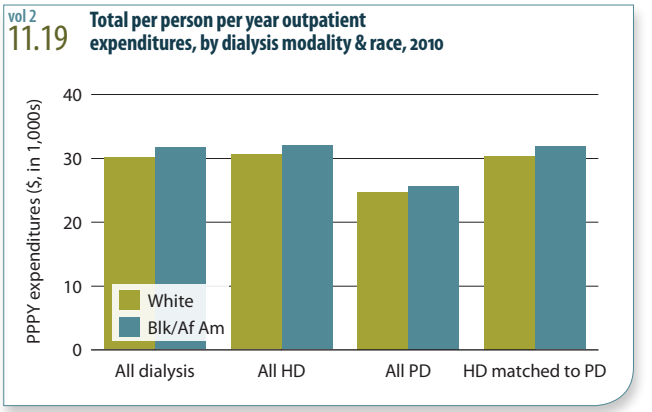
In 2010, 38 percent of Medicare's ESRD dollars were spent on inpatient services, 34 percent on outpatient care, 21 percent on physician/supplier costs, and 7.2 percent on Part D prescription drugs. Part D costs for ESRD patients reached $1.92 billion in 2010, 11 percent higher than in the previous year.

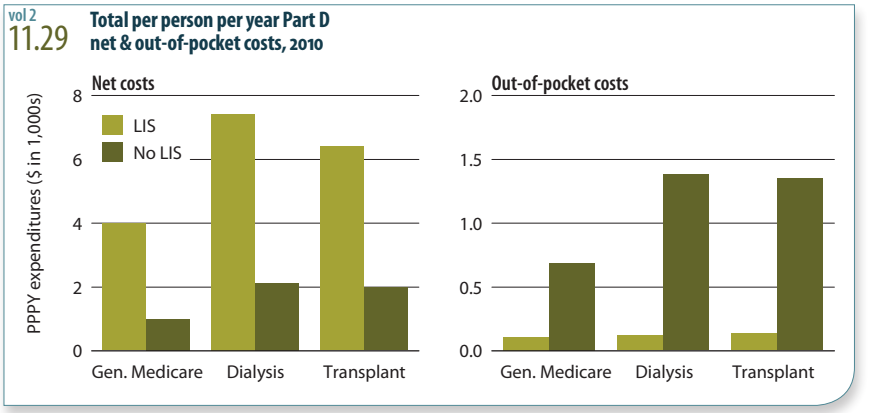
Per person per year Medicare ESRD costs rose just 1.4 and 1.7 percent for hemodialysis and peritoneal dialysis in 2010, to $87,561 and $66,751, while transplant costs fell 1.1 percent, to $32,914. » **Figures 11.5 & 11.7;** see page 445 for analytical methods. *Total Medicare ESRD costs from claims data; includes all Medicare as primary payor claims as well as amounts paid by Medicare as secondary payor (11.5). Period prevalent ESRD patients; patients with Medicare as secondary payor are excluded (11.7).*

Of the $2.8 billion spent in 2010 on injectables for dialysis patients, ESAs accounted for 67 percent, or $1.87 billion. The proportions of total costs for IV vitamin D, IV iron, and other injectables were 18.5, 10.9 and 3.8 percent, or $519 million, $304 million, and $106 million, respectively. » **Figure 11.9;** see page 445 for analytical methods. *Period prevalent dialysis patients.*

In 2010, per person per year (PPPY) outpatient dialysis expenditures were 5.1 percent higher in blacks/African Americans than in whites, at $31,651 and $30,106, respectively. By modality, costs for hemodialysis were generally 24 to 25 percent higher than those sustained by peritoneal patients in both matched and unmatched poplations. » **Figure 11.19;** see page 445 for analytical methods. *Period prevalent dialysis patients, 2010.*







Per person per year (PPPY) net Part D costs are much higher for LIS and non-LIS ESRD patients than costs incurred by patients in the general Medicare population. Among dialysis and transplant patients with the LIS, for example, net Part D costs in 2010 were $7,424 and $6,407, respectively, compared to costs of $3,985 in the general Medicare population. In patients with no LIS, Part D costs were noticeably lower, at $2,133 for dialysis, $1,978 for transplant, and $1,010 in the general population.

Out-of-pocket Part D costs for patients with LIS status are a fraction of those realized by patients without the LIS, at 1.7–2.8 percent of net costs compared to 65–68 percent. » **Figure 11.29;** see page 445 for analytical methods. *Part D-enrolled general Medicare patients from the 5 percent sample & period prevalent dialysis & transplant patients, 2010. Net pay is estimated as the sum of Medicare covered amount & LIS amount.*

HP

Zion National Park, Utah

HEALTHY PEOPLE 2020

The Healthy People program, now in its third decade, was established to improve the health of all Americans through the development and evaluation of national health objectives. HP2020, launched on December 2, 2010, is the next step in the continuum of care, with its foundation based on the success of the four previous HP initiatives.

One of the major goals of the HP2020 program is to "reduce new cases of chronic kidney disease (CKD) and its complications, disability, death, and economic costs." The development and progression of CKD, which results in reduced quality of life, is a major health concern. The HP2020 CKD objectives are designed to further reduce the long-term burden of kidney disease, improve the quality of life among those with the condition, and eliminate disparities — racial or otherwise — within the healthcare system. To accomplish these goals, the HP2020 program developed 14 objectives related to CKD, along with targets designed to evaluate the program's success. We provide data for ten of these objectives, plus information on urine albumin testing in non-CKD patients diagnosed with diabetes. Because we use the Medicare 5 percent data to evaluate objectives related to CKD patients not on dialysis, results are limited to those age 65 and older.

In 2010, 11.9 percent of hospital patients with acute kidney injury had a follow-up renal evaluation six months post-discharge, a slight increase from the 11.4 percent seen in 2009, but below the objective's modest goal of 12.4 percent.

Patients with diabetes are at increased risk of CKD. HP2020 has set a goal that 37 percent of persons with diagnosed diabetes obtain an annual urine albumin measurement. The percentage of elderly patients with diabetes receiving this measurement rose from 12.3 in 2000 to 38.8 in 2010, just over the suggested HP2020 target, but less than would be expected from clinical guidelines.

Serum creatinine and urine albumin are important laboratory markers for monitoring the presence and progression of CKD, and lipid tests are important for assessing cardiovascular risk in this population. In 2010, 29.1 percent of patients received these recommended medical evaluations, an increase from 28.1 percent in 2009, and just below the minimal recommended HP2020 target of 28.4 percent.

Patients with either Type 1 or Type 2 diabetes and CKD require more comprehensive laboratory monitoring. The hemoglobin A1c test is used to assess blood glucose control over prolonged periods of time in patients with diabetes, while diabetic retinopathy can be detected through regular eye examinations. Slightly over one in four elderly diabetic patients receives A1c and eye testing along with serum creatinine, lipid, and urine albumin tests, almost meeting the HP2020 target of 25.4 percent, but a level certainly in need of further improvement.

Use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) is a recommended medical treatment to slow the progression of CKD in patients with diabetes and CKD. In 2010, 72.6 percent of fee-for-service beneficiaries age 65 and older and enrolled in Medicare Part D received these medications, well above the now outdated HP2020 target of 60 percent.

A major HP2020 health objective is targeted at reducing new cases of ESRD, a disease which greatly affects an individual's quality of life, and is an enormous burden on the healthcare system, accounting for approximately 6.3 percent ($33

How like fish we are: ready, nay eager to seize upon whatever new thing some wind of circumstance shakes down upon the river of time! Even so, I think there is some virtue in eagerness, whether its object prove true or false.

ALDO LEOPOLD,
A Sand County Almanac

billion) of total Medicare costs. In 2010, the rate of new ESRD cases stood at 349.7 per million population, 9.8 percent above the new HP2020 target of 318.5, but showing relatively little improvement over the past ten years.

Patients with diabetes are at increased risk of ESRD. The rate of kidney failure due to diabetes fell to 150.6 per million population in 2010, yet remains 8.2 percent above the HP2020 target of 139.2.

In past ADRs the USRDS raised concerns that late referral to a nephrologist prior to ESRD, or the lack of such referral, may contribute to higher morbidity and mortality in the first year of treatment. HP2020 has set a target referral rate of 29.8 percent — a conservative goal that should be updated. Rates have increased since 2005, from 25.6 percent to 29.4 percent in 2010.

We have reported on the high use of catheters at the first outpatient hemodialysis session, and on the associated risks. Among patients who have seen a nephrologist for more than a year, fewer than half use a catheter during their first outpatient dialysis session; they also have the greatest likelihood at initiation of having an arteriovenous (AV) fistula or maturing internal access. In an effort to improve vascular access for hemodialysis patients, HP2020 has developed objectives designed to increase the use of AV fistulas. In 2007, 49.6 percent of prevalent hemodialysis patients had an AV fistula as their primary vascular access, just under the 50.6 percent HP2020 target. The proportion of prevalent patients using a catheter as the only mode of vascular access stood at 27.7 percent in 2007, slightly above the target of 26.1 percent. And in 2010, 33.6 percent of incident hemodialysis patients used an AV fistula or had a maturing fistula for their primary mode of vascular access, nearly reaching the HP2020 target of 34.5 percent.

ESRD patients who receive a kidney transplant have lower mortality and hospitalization rates than those on dialysis. First-year all-cause mortality rates in hemodialysis patients, for example, are nearly four times higher than rates among transplant patients. HP2020 has set a goal of 18.8 percent of dialysis patients younger than 70 being wait-listed and/or receiving a deceased donor kidney transplant within one year of ESRD initiation. In 2009, 17.3 percent of patients met this criterion. Additional goals call for 19.7 percent of patients with treated chronic kidney failure to receive a transplant with three years of registration on the waiting list (the number was 16.2 for 2007 patients), and for increasing the number who receive a transplant at the start of ESRD; of 2010 incident patients younger than 70, only 3.3 percent received a preemptive transplant.

Expanded HP2020 objectives call for reductions in total death rates for persons on dialysis, reduced death rates in the first three months of renal replacement therapy, and a reduced cardiovascular death rate in dialysis and transplant patients. The most impressive gain toward achieving an HP2020 objective is the continued decline in cardiovascular mortality rates in prevalent dialysis patients, from 116.2 deaths per 1,000 patient years at risk in 2000 to 79.9 in 2010, and, for the first time, below the HP2020 goal of 81.3. There have also been positive developments in reducing the death rate in dialysis patients in the first three months after initiation of therapy, from 377.2 in 2000 to 353.5 in 2010; this remains far, however, from the target of 319.9.

Additional information on the HP2020 program objectives can be found at www.healthypeople.gov.

Many HP2020 targets were set 2–3 years before release of the goals, & may need to be updated.

HP2020 CKD-3

Increase the proportion of hospital patients who incurred acute kidney injury who have follow-up renal evaluation in six months post discharge

TARGET: 12.4%

In 2000, just 2.1 percent of patients age 65 and older who were hospitalized for acute kidney injury had a follow-up renal evaluation during the following six months. By 2010 this had increased to 11.9 percent, close to the Healthy People 2020 goal of 12.4 percent.

The lowest rate of follow-up evaluation occurs in the oldest patients, with just 6 percent of those age 85 and older receiving such care, compared to 16.4 percent of those age 65–74. By race and ethnicity, rates range from 9.6 percent among American Indians/Alaskan Natives to 14.6 percent in Hispanics and Latinos. » **Table HP2020 CKD-3;** see page 428 for analytical methods. *Medicare patients age 65 & older (5 percent Medicare sample) with a hospitalized AKI event in given year.*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	2.1	2.5	3.3	4.5	8.4	9.0	10.4	11.2	10.4	11.4	11.9
American Indian or Alaskan Native only	5.9	0.0	0.0	3.3	14.3	5.2	11.3	12.3	12.9	6.7	9.6
Asian only	4.8	3.2	2.4	4.0	7.3	12.3	20.8	14.3	11.6	17.4	14.4
Black or African American only	2.3	3.1	2.6	4.2	8.1	9.9	9.3	11.0	10.3	12.1	10.9
White only	2.0	2.4	3.3	4.5	8.4	8.7	10.5	11.1	10.3	11.1	11.9
Hispanic or Latino	2.5	1.6	7.3	7.7	13.2	13.0	10.2	11.2	14.8	12.6	14.6
Male	1.7	2.2	2.9	4.4	8.0	8.2	9.7	10.0	9.3	10.4	11.3
Female	2.5	2.9	3.7	4.7	8.9	9.9	11.3	12.5	11.6	12.4	12.7
65-74	2.8	4.0	4.4	6.4	11.8	12.9	14.9	16.0	14.4	15.8	16.4
75-84	2.0	2.1	3.4	4.4	8.6	8.6	10.4	11.2	10.7	11.3	12.5
85+	1.0	0.7	1.2	2.1	3.1	4.4	5.0	5.0	5.0	6.3	6.0

HP2020 D-12

Increase the proportion of persons with diagnosed diabetes who obtain an annual urine albumin measurement

TARGET: 37.0%

In the diabetic population age 65 and older, the percentage of patients receiving an annual urine albumin measurement has increased from 12.3 in 2000 to 38.8 in 2010, exceeding the HP2020 target of 37 percent.

Rates fall with age, from 43 percent among those age 65–74 to 25 percent among those 85 and older. By race and ethnicity, rates range from 23 percent among American Indians/Alaskan Natives to 42 percent in the Asian population. Testing may, however, be under-reported in Native Americans, as the Indian Health Service does not report claims through the Medicare system.

Rates vary little by gender, at 40 percent for men and 38 percent for women in 2010. » **Table HP2020 D-12;** see page 428 for analytical methods. *Medicare patients with diabetes, age 65 & older.*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	12.3	15.4	18.4	21.4	25.8	28.7	31.3	33.6	35.6	37.3	38.8
American Indian or Alaskan Native only	8.8	11.6	12.1	13.0	15.5	19.4	19.7	21.1	21.1	24.1	23.4
Asian only	13.1	16.9	20.8	24.1	29.0	30.7	33.8	35.2	37.5	39.9	42.1
Black or African American only	10.2	13.3	15.8	18.9	23.8	26.7	29.5	31.9	33.7	35.7	37.1
White only	12.6	15.7	18.7	21.8	26.0	28.9	31.4	33.8	35.8	37.4	38.9
Hispanic or Latino	11.8	15.4	18.0	20.7	25.9	29.8	31.4	33.6	35.6	38.1	40.4
Male	12.8	16.1	19.1	22.1	26.7	29.6	32.2	34.6	36.6	38.2	39.8
Female	11.9	15.0	17.9	20.9	25.1	28.1	30.6	32.7	34.8	36.6	38.0
65-74	14.5	18.2	21.4	24.8	29.5	32.6	35.2	37.7	40.0	41.9	43.3
75-84	10.9	13.7	16.7	19.6	23.8	26.8	29.6	31.8	33.7	35.3	37.1
85+	5.5	7.2	9.0	10.9	13.9	16.1	18.1	20.5	22.2	23.5	25.1

HEALTHY PEOPLE 2020

recommended care among patients with AKI, diabetes, & CKD

HP2020 CKD-4

Increase the proportion of persons with diabetes and chronic kidney disease who receive recommended medical evaluations

In the Medicare CKD population age 65 and older, 29.1 percent of patients received serum creatinine, lipid, and urine albumin testing in 2010 — a considerable increase from the level of 6 percent in 2000, and for the first time meeting the Healthy People 2020 goal of 28.4 percent. Testing rates by race range from 21 percent among American Indians/Alaskan Natives to 37 percent among Asians. Rates by gender are 28 percent in women compared to 31 percent in men, and by age are lowest among the oldest patients, at 15 percent.

In the diabetic CKD population age 65 and older, 26.6 percent of patients in 2010 received serum creatinine, urine albumin, glycosylated hemoglobin (A1c), and lipid testing, as well as an eye examination; this also reaches the HP2020 goal, set at 25.4 percent. The reported percentage of patients receiving comprehensive diabetic testing is lowest among American Indians/Alaskan Natives, at 15 percent (care provided by the Indian Health Service, however, is not reported to Medicare), and highest among Asians, at 30 percent. Rates vary little by gender, and decrease with age. **» Tables HP2020 CKD-4;** see page 428 for analytical methods. *Medicare patients age 65 & older with CKD (4.1–2) & diabetes (4.2).*

HP2020 CKD-4.1 TARGET: 28.4%

Increase the proportion of persons with chronic kidney disease who receive medical evaluation with serum creatinine, lipids, and urine albumin

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	6.0	7.3	9.1	10.6	19.8	22.1	23.4	25.7	26.7	28.1	29.1
American Indian or Alaskan Native only	5.7	8.2	5.5	7.0	13.7	19.2	15.6	16.9	16.8	18.4	20.5
Asian only	8.3	8.4	14.3	14.2	27.5	28.1	32.7	35.3	34.1	37.6	37.1
Black or African American only	5.3	6.6	8.7	10.0	20.8	22.8	24.4	26.7	27.9	30.1	30.8
White only	5.9	7.1	8.8	10.4	19.3	21.6	22.9	25.1	26.3	27.4	28.4
Hispanic or Latino	11.5	13.1	17.3	17.7	26.8	30.5	31.1	33.1	32.1	36.1	36.9
Male	6.3	7.5	9.3	11.3	21.1	23.4	24.5	27.1	28.3	29.6	30.7
Female	5.8	7.0	8.9	10.0	18.6	20.9	22.4	24.4	25.3	26.7	27.7
65-74	8.3	10.3	12.6	14.2	26.1	29.2	31.4	33.9	35.1	36.7	37.8
75-84	5.5	6.2	8.0	9.8	18.5	20.8	22.6	24.9	26.2	27.7	29.0
85+	1.7	2.3	3.1	4.0	8.2	10.0	10.1	12.1	13.1	14.0	14.8

HP2020 CKD-4.2 TARGET: 25.4%

Increase the proportion of persons with type 1 or type 2 diabetes and chronic kidney disease who receive medical evaluation with serum creatinine, urine albumin, HbA1c, lipids, and eye examinations

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	7.4	9.0	10.4	12.1	18.4	20.0	21.1	23.0	23.7	25.1	26.6
American Indian or Alaskan Native only	5.1	7.3	2.4	5.7	5.6	15.8	12.1	10.2	10.9	11.0	15.3
Asian only	7.4	8.3	12.3	12.8	25.2	21.9	26.2	26.8	25.2	26.9	29.6
Black or African American only	5.6	6.7	7.2	9.9	16.3	17.9	18.8	19.8	21.2	22.4	23.9
White only	7.8	9.4	11.0	12.5	18.6	20.3	21.4	23.4	24.1	25.6	27.0
Hispanic or Latino	8.8	10.4	11.8	11.8	20.4	20.4	19.8	22.3	21.9	24.8	24.3
Male	7.9	9.3	10.6	12.4	18.8	20.3	21.4	23.5	23.7	25.6	26.8
Female	7.1	8.7	10.3	11.8	18.0	19.7	20.9	22.5	23.6	24.7	26.4
65-74	9.0	10.9	12.3	14.3	22.0	23.4	24.6	26.6	27.2	28.5	30.1
75-84	7.0	8.1	9.9	11.7	16.9	18.9	20.7	22.6	23.3	25.2	26.8
85+	2.4	4.0	4.2	4.9	9.5	11.6	11.3	13.0	14.2	15.5	16.7

HP2020 CKD-5

Increase the proportion of persons with diabetes and chronic kidney disease who receive recommended medical treatment with angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers

TARGET: 60.0%

In 2010, 73 percent of patients age 65 and older with diabetes and CKD received recommended medical treatment with angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs), considerably higher than the Healthy People 2020 target of 60 percent.

By race, Hispanics/Latinos and Asians are most likely to receive this treatment, at 79–81 percent compared to 71 , 73, and 75 percent among whites, American Indians/Alaskan Natives, and blacks/African Americans, respectively.

Use varies little by gender, at 71–74 percent. And by age, 77, 71, and 66 percent, respectively, of patients age 65–74, 75–84, and 85 and older received ACEIS/ARBS in 2010. » **Table HP2020 CKD-5;** see page 428 for analytical methods. *Fee-for-service beneficiaries enrolled in Medicare Part D, age 65 & older.*

	2006	2007	2008	2009	2010
All	71.8	73.6	73.5	73.3	72.6
American Indian or Alaskan Native only	65.4	71.0	78.5	75.3	73.3
Asian only	77.4	79.7	80.5	79.9	81.2
Black or African American only	75.6	77.0	74.8	76.1	75.0
White only	70.2	72.3	72.5	72.0	71.2
Hispanic or Latino	78.5	77.3	77.4	77.6	79.3
Male	68.3	70.5	71.2	71.1	70.7
Female	74.2	75.7	75.1	74.9	74.0
65-74	75.7	77.6	77.5	77.2	76.5
75-84	70.3	72.4	72.3	72.0	71.2
85+	64.5	65.2	65.3	66.2	65.6

HP2020 CKD-8

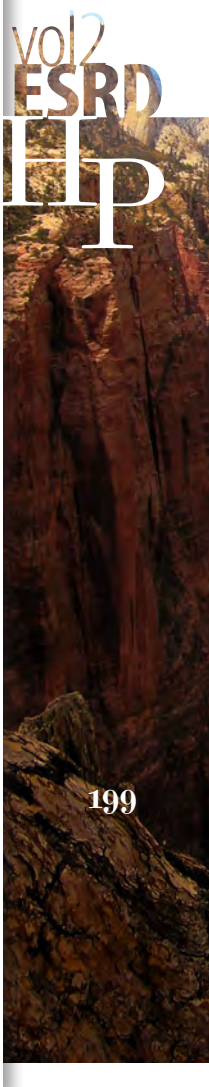
Reduce the rate of new cases of end-stage renal disease (ESRD)

TARGET: 318.5 new cases per million population

At 350 per million population, the rate of new cases of ESRD is now slightly more than 2 percent greater than in 2000, and remains considerably higher than the HP2020 goal of 318.5.

There is substantial variation by race in the rate of new ESRD cases. Among whites and Asians, for example, the rates are 283 and 332, respectively. But the rate among blacks/African Americans is 956, and for Native Hawaiians/Pacific Islanders it reaches 2,453. By ethnicity, the rate ranges from 343 among those who are not Hispanic or Latino to 519 among those who are. And the rate of 443 cases per million population among men is 60 percent greater than the rate of 278 among women. » **Table HP2020 CKD-8;** see page 429 for analytical methods. *Incident ESRD patients. Adj: overall, age/gender/race; rates by age adjusted for gender/race; rates by gender adjusted for age/race; rates by race/ethnicity adjusted for age/gender. Ref: 2005 patients. "." Zero values in this cell. *Values for cells with ten or fewer patients are suppressed.*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	342.4	350.8	351.7	353.1	355.0	358.4	365.9	358.9	355.1	357.7	349.7
American Indian or Alaskan Native only	1,481.5	646.0	615.4	567.8	580.7	560.9	481.8	497.0	502.2	489.1	451.7
Asian only	322.9	293.6	288.4	281.3	264.5	315.4	331.5	332.6	330.8	337.8	331.6
Native Hawaiian or other Pacific Islander only	3,104.2	3,148.4	3,222.6	3,254.0	3,416.3	2,697.3	2,635.1	2,235.2	2,007.1	2,256.9	2,453.4
Black or African American only	1,008.2	1,036.1	1,045.6	1,045.5	1,014.4	1,025.5	1,034.6	1,014.1	997.5	994.4	955.6
White only	254.8	267.8	268.8	270.3	276.4	280.1	290.4	285.4	283.3	286.7	282.8
2 or more races	*	.	*	*	*	115.2	136.4	139.6	144.8	133.6	129.0
Hispanic or Latino	650.4	561.7	571.8	578.2	566.5	552.4	555.1	538.5	534.3	527.2	518.6
Not Hispanic or Latino	330.5	342.9	343.5	345.3	348.2	350.7	356.3	350.3	347.3	350.9	343.3
Black or Af Am only, not Hisp/Latino	1,024.4	1,055.6	1,065.4	1,067.0	1,033.5	1,046.4	1,056.5	1,038.8	1,022.5	1,020.5	981.9
White only, not Hispanic or Latino	237.6	248.0	247.1	247.8	254.1	255.8	261.7	256.4	253.5	256.5	251.8
Male	411.9	423.6	429.6	430.2	439.9	446.0	456.8	449.7	447.1	451.5	443.0
Female	289.0	294.8	292.2	294.5	290.1	291.3	295.7	289.4	284.5	285.5	277.5
<18	11.3	11.5	11.9	12.0	12.8	12.7	11.8	12.5	12.7	13.0	13.0
0-4	9.2	9.4	8.1	9.4	11.1	10.3	9.3	11.3	10.5	13.7	14.9
5-11	8.1	7.3	8.9	7.5	7.9	8.0	6.7	7.1	7.8	7.4	7.4
12-17	16.8	18.0	18.5	19.6	19.8	20.2	19.7	20.0	20.1	19.0	17.9
18-44	111.5	111.6	110.8	110.8	113.2	118.4	122.4	121.2	120.7	124.3	120.0
18-24	42.0	43.6	41.5	42.4	41.0	44.1	44.8	44.4	43.2	42.4	41.0
25-44	135.8	135.4	135.1	134.7	138.5	144.4	149.6	148.0	147.8	153.0	147.7
45-64	599.2	605.1	594.9	599.1	596.7	598.0	608.4	594.2	589.0	587.6	570.0
45-54	381.4	383.8	382.0	385.3	386.2	384.2	402.2	389.8	385.4	386.8	371.4
55-64	817.1	826.4	807.8	813.0	807.2	811.8	814.7	798.6	792.6	788.3	768.6
65+	1,544.6	1,561.0	1,603.8	1,598.2	1,602.7	1,622.1	1,643.1	1,610.5	1,586.0	1,593.9	1,578.9
65-74	1,381.4	1,417.7	1,404.3	1,390.4	1,390.9	1,377.8	1,405.0	1,371.3	1,340.9	1,345.0	1,332.6
75-84	1,743.2	1,735.2	1,830.1	1,825.8	1,832.5	1,882.0	1,898.0	1,860.5	1,837.9	1,847.7	1,835.4
85+	1,190.0	1,252.2	1,336.5	1,399.9	1,422.9	1,467.0	1,474.4	1,504.1	1,519.0	1,544.9	1,476.4



HP2020 CKD-9

Reduce kidney failure due to diabetes

The rate of kidney failure due to diabetes has varied little in the last decade, with a range of 151–160 cases per million population; the rate of 151 seen in 2010 was 1.6 percent lower than the rate in 2000. The HP2020 goal of 139.2 is met only by whites, by women, and by patients 44 and younger. The highest rate of diabetic ESRD occurs among Native Hawaiians/Pacific Islanders, at 1,525; the rate among blacks/African Americans reaches 427.

In 2010, the adjusted rate of kidney failure due to diabetes among diabetic patients was 2,364 per million population, 10.6 percent lower than in 2007 and slightly below the HP2020 target of 2,374. In whites and black/African Americans, rates have fallen 11.1 and 11.6 percent, respectively, and 13.4 percent in those of Hispanic or Latino ethnicity. By gender rates fell 13.4 and 8.1 percent in males and females, at 2,557 and 2,162 per million. » **Tables HP2020 CKD-9;** see page 429 for analytical methods. *Incident ESRD patients. Adj: age/gender/race; ref: 2005. NHIS 2006–2011 used to estimate diabetes prevalence; SUDDAN used for national estimates (9.2). "." Zero values in this cell. *Values for cells with ten or fewer patients are suppressed.*

HP2020 CKD-9.1 TARGET: 139.2 per million population

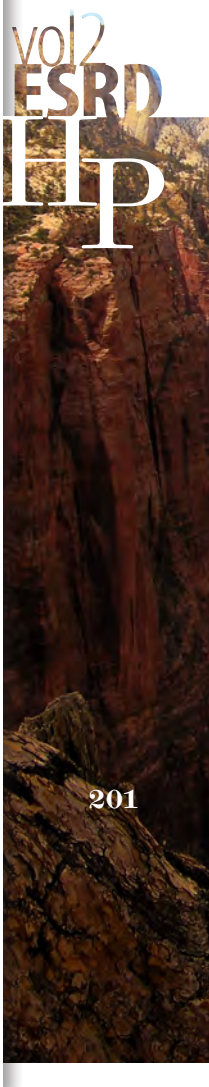
Reduce kidney failure due to diabetes

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	153.1	157.3	155.1	155.1	155.8	156.0	159.7	154.6	152.3	153.1	150.6
American Indian or Alaskan Native only	846.4	475.5	447.9	425.6	431.7	389.8	333.3	348.5	358.0	356.1	320.5
Asian only	150.1	137.3	129.2	126.2	118.5	146.2	162.7	158.5	164.6	163.9	158.9
Native Hawaiian or other Pacific Islander only	1,871.7	1,971.0	1,770.8	1,810.0	2,042.1	1,542.6	1,575.1	1,368.5	1,188.6	1,404.5	1,524.6
Black or African American only	449.8	473.0	469.4	462.3	450.0	452.4	457.5	437.3	432.8	430.9	417.2
White only	115.0	120.6	119.5	120.3	122.8	123.4	128.5	125.4	123.4	124.6	124.0
2 or more races	.	.	*	*	*	56.6	70.1	73.3	71.4	68.9	61.8
Hispanic or Latino	399.5	356.1	359.0	363.0	356.5	339.7	339.9	330.1	330.9	321.4	318.6
Not Hispanic or Latino	143.2	149.2	146.9	147.0	148.1	148.2	151.0	146.2	144.1	145.7	143.2
Black or Af Am only, not Hisp/Latino	456.1	481.3	477.1	470.2	457.3	460.6	465.6	446.7	442.4	441.0	427.2
White only, not Hispanic or Latino	100.6	104.5	102.6	102.5	104.9	104.8	107.4	104.0	100.8	102.1	100.7
Male	166.6	173.3	174.2	174.8	180.5	182.0	187.3	183.4	181.8	184.1	182.2
Female	142.1	144.0	139.6	139.1	135.8	134.9	137.2	131.4	128.4	128.0	124.8
<18	0.1	0.1	0.1	*	0.1	0.1	0.1	0.1	0.1	0.4	0.6
0-4	0.4	*	*	*	*	0.3	0.2	*	*	1.3	1.6
5-11	.	*	0.2	.	.	.	.	.	*	*	*
12-17	.	*	*	*	*	0.2	*	*	0.2	0.2	0.3
18-44	34.3	33.6	32.6	33.6	34.6	35.4	38.7	38.2	38.2	40.5	40.0
18-24	3.3	3.6	3.0	3.0	2.2	3.3	3.2	2.8	2.6	2.7	2.6
25-44	45.1	44.1	43.0	44.3	45.9	46.7	51.1	50.7	50.7	53.7	53.1
45-64	333.1	337.3	326.8	324.0	320.6	320.4	321.0	307.6	305.5	303.6	292.3
45-54	190.6	188.2	185.4	184.4	184.0	181.4	188.8	178.7	177.8	179.3	175.0
55-64	475.7	486.4	468.2	463.5	457.2	459.3	453.2	436.5	433.2	427.8	409.6
65+	648.0	665.0	675.2	671.7	681.5	685.4	698.5	683.0	664.7	664.4	666.8
65-74	714.7	734.7	720.0	716.5	713.8	704.8	718.0	691.7	669.8	666.2	656.4
75-84	620.8	634.6	668.4	662.7	683.5	702.0	713.2	706.3	688.5	690.4	705.7
85+	252.6	271.7	295.6	313.8	337.8	325.6	356.1	362.9	375.9	386.6	381.9

HP2020 CKD-9.2 TARGET: 2,374.1 per million population

Reduce kidney failure due to diabetes among persons with diabetes

	2007	2008	2009	2010
All	2,643	2,512	2,425	2,364
American Indian or Alaskan Native only	2,582	2,951	2,949	2,610
Asian only	2,100	2,208	2,217	2,144
Native Hawaiian or other Pacific Islander only	.	.	.	.
Black or African American only	4,500	4,353	4,255	3,980
White only	2,305	2,167	2,075	2,049
2 or more races	621	559	518	487
Hispanic or Latino	3,340	3,190	2,950	2,894
Not Hispanic or Latino	2,543	2,416	2,346	2,282
Black or Af Am only, not Hisp/Latino	4,727	4,562	4,503	4,210
White only, not Hispanic or Latino	2,070	1,924	1,849	1,821
Male	2,954	2,767	2,643	2,557
Female	2,353	2,263	2,203	2,162
<18	29	73	189	247
0-4	.	.	.	.
5-11	*	.	.	.
12-17	16	57	45	94
18-44	1,643	1,572	1,539	1,489
18-24	351	294	304	309
25-44	1,781	1,721	1,676	1,608
45-64	2,405	2,280	2,216	2,158
45-54	2,037	1,872	1,880	1,893
55-64	2,669	2,592	2,453	2,328
65+	3,122	2,958	2,819	2,727
65-74	3,214	3,011	2,915	2,773
75-84	3,363	3,169	2,948	2,879
85+	1,964	2,102	2,001	2,114



HP2020 CKD-10

Increase the proportion of chronic kidney disease patients receiving care from a nephrologist at least 12 months before the start of renal replacement therapy

TARGET: 29.8%

In 2009, 29.4 percent of patients beginning ESRD therapy on hemodialysis had seen a nephrologist for at least 12 months prior to initiation, nearly reaching the 29.8 percent goal set by Healthy People 2020, and up from the level of 25.6 percent seen in 2005.

By race, rates of pre-ESRD nephrologist care range from 24.1 percent among American Indians/Alaskan Natives to 31 percent among whites; rates by ethnicity are lowest among Hispanics/Latinos, at 22.9 percent. There is little difference in pre-ESRD care by gender; by age, however, rates range from 23.7 percent among those age 18–44 to 36.7 percent in the pediatric population. » **Table HP2020 CKD-10;** see page 429 for analytical methods. *Incident hemodialysis patients with a valid Medical Evidence form; nephrologist care determined from Medical Evidence form.*

	2005	2006	2007	2008	2009	2010
All	25.6	26.3	27.1	28.4	28.4	29.4
American Indian or Alaskan Native only	25.1	27.2	25.8	27.8	26.9	24.1
Asian only	25.5	23.8	26.1	27.4	28.8	29.5
Native Hawaiian or other Pacific Islander only	23.0	24.8	23.6	22.1	23.5	24.8
Black or African American only	22.1	23.1	24.0	24.6	24.9	25.4
White only	27.1	27.8	28.6	30.1	29.9	31.1
2 or more races	23.3	22.3	24.3	29.0	27.8	31.4
Hispanic or Latino	19.2	20.6	20.5	21.5	21.7	22.9
Not Hispanic or Latino	26.5	27.2	28.2	29.5	29.4	30.4
Black or Af Am only, not Hisp/Latino	22.1	23.1	24.1	24.7	24.9	25.5
White only, not Hispanic or Latino	28.7	29.5	30.4	32.1	31.9	33.1
Male	26.0	26.4	27.2	28.2	28.1	29.4
Female	25.1	26.2	27.1	28.6	28.7	29.3
<18	39.4	34.3	33.5	37.8	37.5	36.7
0-4	26.6	17.3	25.1	25.5	24.6	24.7
5-11	48.7	47.0	39.1	49.5	46.2	48.9
12-17	41.9	36.1	35.2	38.3	40.2	37.1
18-44	23.0	22.6	23.1	23.9	23.4	23.7
18-24	23.4	22.6	23.1	23.1	22.9	24.2
25-44	22.9	22.6	23.1	24.0	23.4	23.7
45-64	25.5	26.0	26.5	27.1	27.2	27.7
45-54	24.1	24.9	25.4	25.2	25.5	26.0
55-64	26.6	26.8	27.3	28.5	28.3	28.8
65+	26.0	27.4	28.6	30.3	30.4	31.9
65-74	27.0	28.3	28.7	30.4	30.6	32.0
75-84	25.7	27.3	28.9	31.1	30.9	32.6
85+	22.8	24.1	26.8	27.4	28.3	29.5

HP2020 CKD-11

Improve vascular access for hemodialysis patients

Identified through the ESRD CPM dataset, use of an arteriovenous (AV) fistula as the primary mode of vascular access in prevalent hemodialysis patients increased from 27 percent in 1998 to 50 percent in 2007 (the most recent year of available CPM data). By race, use is highest among Asian patients, at 57 percent, and lowest among African Americans, at 42. The most dramatic variations occur by gender, with fistula use at just 40 percent among women, compared to 57 percent among men. Patients age 65 and older have the lowest use by age of fistulas as their primary access, at 47 percent, compared to 55 percent among those age 18–44.

Among prevalent hemodialysis patients, use of a catheter as the only mode of vascular access has remained relatively stable since the late 1990s. At 28 percent overall in 2007, use ranges by race from 19 percent among Asian patients to 29 percent among whites. Use remains highest among women, at 32 percent compared to 24 percent for men, and is similar among age groups, at 27–29 percent for most ages.

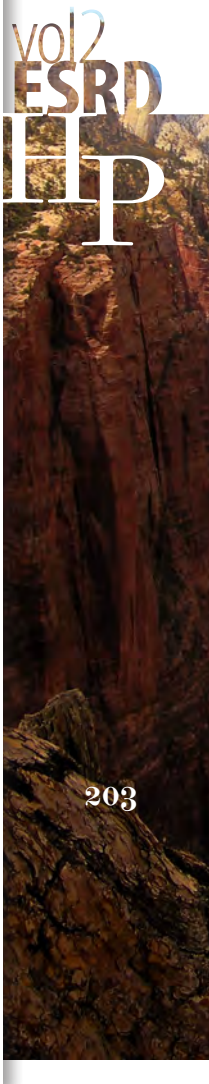
Overall, just 34 percent of patients starting hemodialysis therapy in 2010 — 30 percent of women, and 36 percent of men — had a maturing AV fistula or were using one as their primary vascular access. This varies by race from 32 percent among blacks/African Americans to 41 percent among American Indians/Alaskan Natives.

Programs such as HP2020 and the Fistula First Initiative continue to work to increase the use of fistulas and promote early placement prior to initiation of ESRD therapy. » **Tables HP2020 CKD–11;** see page 429 for analytical methods. *Prevalent hemodialysis patients; ESRD CPM data. Vascular access determined from "current access" within CPM data. Prevalent year represents year of data collection. DNC: data not collected (11.1–2). Incident hemodialysis patients age 18 & older (11.3).*

HP2020 CKD-11.1 TARGET: 50.6%

Increase the proportion of adult hemodialysis patients who use an arteriovenous fistula as the primary mode of vascular access

	Prevalent year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
All	27.1	27.9	29.9	31.6	33.1	36.6	39.4	44.2	46.0	49.6
American Indian or Alaskan Native only	39.0	37.7	38.2	45.3	41.0	54.3	44.3	55.3	57.7	56.6
Asian only	32.8	30.6	33.3	35.3	35.6	48.9	44.4	47.9	55.9	57.4
Native Hawaiian or other Pacific Islander only	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Black or African American only	22.4	22.9	25.9	26.7	28.4	29.6	35.2	38.0	40.0	42.4
White only	29.5	30.0	32.0	34.1	35.6	39.4	41.6	47.5	48.6	53.2
2 or more races	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hispanic or Latino	28.5	30.4	32.1	33.5	38.8	39.5	42.6	51.6	51.9	53.0
Not Hispanic or Latino	26.9	27.7	29.8	31.4	32.2	36.2	39.1	43.0	45.0	49.0
Black or Af Am only, not Hisp/Latino	22.3	23.2	25.8	26.8	28.3	29.6	35.2	37.8	39.7	42.3
White only, not Hispanic or Latino	30.0	30.5	32.5	34.2	34.7	39.3	41.2	46.2	47.6	53.1
Male	36.0	36.4	39.6	41.7	42.6	45.6	49.1	52.9	54.1	57.4
Female	17.0	18.2	19.4	20.4	21.9	26.4	29.4	33.8	35.5	39.9
18-44	35.6	36.1	40.8	41.0	41.7	46.8	49.8	52.2	53.2	54.8
18-24	41.2	47.5	48.6	39.6	42.7	51.9	39.0	52.7	54.7	52.2
25-44	35.1	35.1	40.1	41.1	41.6	46.4	50.5	52.2	53.1	55.0
45-64	29.2	29.1	31.2	33.8	35.5	37.2	39.6	45.1	46.9	50.7
45-54	31.0	31.5	34.5	36.4	38.3	39.4	40.8	46.0	49.1	52.7
55-64	27.7	27.0	28.6	31.8	33.1	35.4	38.6	44.4	45.3	49.3
65+	22.1	23.7	25.0	26.4	28.0	32.6	36.0	41.0	42.9	46.9
65-74	23.0	23.5	25.9	27.3	28.3	33.8	36.3	42.2	43.6	46.6
75-84	22.3	24.4	24.9	25.6	28.3	32.6	36.7	41.6	43.2	48.2
85+	12.7	20.8	19.2	23.7	24.6	25.3	31.1	32.2	38.0	43.7



HP2020 CKD-11.2 TARGET: 26.1%

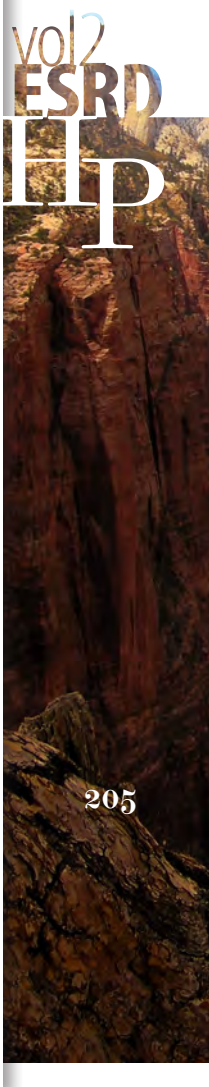
Decrease the proportion of adult hemodialysis patients who use catheters as the only mode of vascular access

	Prevalent year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
All	19.5	23.3	24.5	25.3	26.8	26.8	27.5	27.8	29.0	27.7
American Indian or Alaskan Native only	15.9	15.6	20.1	21.7	17.4	17.1	22.8	22.4	18.8	23.7
Asian only	12.5	15.0	16.8	17.8	21.6	15.8	19.9	23.2	20.1	19.0
Native Hawaiian or other Pacific Islander only	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Black or African American only	17.5	22.1	21.8	23.3	25.3	26.5	26.0	25.9	28.5	27.3
White only	21.4	24.7	26.9	27.4	28.3	28.1	29.2	29.5	30.3	28.7
2 or more races	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hispanic or Latino	16.7	20.7	22.1	21.3	22.6	23.6	23.7	23.7	23.4	24.7
Not Hispanic or Latino	19.9	23.4	24.6	25.8	27.4	27.2	28.0	28.5	29.9	28.2
Black or Af Am only, not Hisp/Latino	17.5	21.5	21.8	23.4	25.4	26.2	25.9	25.6	28.8	27.3
White only, not Hispanic or Latino	22.6	25.7	27.7	28.8	29.6	29.6	30.5	31.3	32.3	30.0
Male	17.5	20.7	20.5	21.6	23.7	23.8	23.8	24.2	25.3	24.4
Female	21.7	26.1	28.8	29.5	30.5	30.3	31.7	32.0	33.7	31.7
18-44	18.7	24.2	24.3	24.1	26.4	24.0	26.1	26.0	27.6	27.0
18-24	17.5	24.6	21.9	33.3	32.0	29.6	40.3	33.3	29.1	37.0
25-44	18.8	24.2	24.5	23.5	25.9	23.4	25.2	25.4	27.5	26.2
45-64	17.5	21.6	21.9	23.6	24.4	25.6	26.1	26.7	27.2	26.9
45-54	18.6	21.5	21.0	23.3	24.9	24.5	25.4	26.6	25.6	26.6
55-64	16.6	21.7	22.6	23.8	23.9	26.6	26.6	26.7	28.3	27.1
65+	21.4	24.3	26.7	27.2	29.0	28.9	29.1	29.3	31.1	28.6
65-74	18.1	22.1	25.5	24.9	27.4	25.9	27.4	26.9	29.0	27.1
75-84	24.1	26.0	26.1	28.5	30.1	30.3	28.9	30.5	32.0	28.3
85+	38.0	33.2	39.5	38.7	33.6	41.0	40.3	36.8	37.4	37.1

HP2020 CKD-11.3 TARGET: 34.5%

Increase the proportion of adult hemodialysis patients who use arteriovenous fistulas or have a maturing fistula as the primary mode of vascular access at the start of renal replacement therapy

	Incident year					
	2005	2006	2007	2008	2009	2010
All	30.9	31.7	31.4	31.0	32.1	33.6
American Indian or Alaskan Native only	36.1	39.0	37.5	41.2	40.9	40.8
Asian only	35.8	37.3	34.7	35.5	35.2	36.9
Native Hawaiian or other Pacific Islander only	40.1	34.9	35.3	32.6	32.1	32.5
Black or African American only	28.3	29.2	29.6	29.0	30.5	31.9
White only	31.7	32.4	31.9	31.4	32.4	34.1
2 or more races	25.4	36.6	32.8	29.7	37.2	38.1
Hispanic or Latino	30.6	31.3	29.3	29.1	30.5	32.1
Not Hispanic or Latino	30.9	31.8	31.7	31.3	32.3	33.9
Black or Af Am only, not Hisp/Latino	28.2	29.1	29.6	29.0	30.4	31.8
White only, not Hispanic or Latino	31.9	32.8	32.6	32.1	33.0	34.7
Male	34.8	34.9	34.6	33.7	34.7	36.1
Female	26.1	27.7	27.3	27.4	28.7	30.3
18-44	29.0	29.0	27.7	27.3	28.8	30.6
18-24	25.0	23.0	20.8	21.6	22.8	23.3
25-44	29.4	29.6	28.5	27.9	29.4	31.4
45-64	32.9	33.0	32.4	32.2	33.0	34.1
45-54	32.0	32.7	32.1	31.8	32.5	33.9
55-64	33.5	33.3	32.6	32.5	33.3	34.3
65+	29.9	31.4	31.5	30.9	32.1	33.9
65-74	31.6	33.4	33.9	32.8	34.2	35.8
75-84	29.4	30.7	30.6	30.7	31.7	33.8
85+	23.6	25.0	25.2	23.9	25.3	26.6



HP2020 CKD-12

Increase the proportion of dialysis patients wait-listed and/or receiving a deceased donor kidney transplant within one year of end-stage renal disease start (among patients under 70 years of age)

TARGET: 18.8% of dialysis patients

Among 2009 ESRD patients younger than 70, 17.3 percent were wait-listed or received a deceased donor kidney transplant within one year of initiation — slightly below the HP2020 target of 18.8 percent.

The target is currently met only among Asians, individuals of two or more races, those younger than 18, and those age 18–44. Groups furthest from the target include American Indians/Alaskan Natives and those older than 65. » **Table HP2020 CKD-12;** see page 429 for analytical methods. *Incident ESRD patients younger than 70. *Values for cells with ten or fewer patients are suppressed.*

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
All	15.0	14.5	14.1	14.4	14.5	15.2	15.7	16.7	16.8	16.7	17.3
American Indian or Alaskan Native only	9.0	12.4	9.1	10.1	9.5	10.2	10.9	10.2	11.1	10.7	11.1
Asian only	26.9	26.9	29.6	28.8	28.6	32.1	28.0	30.9	30.5	31.3	32.1
Native Hawaiian or other Pacific Islander only	18.4	18.7	19.5	22.1	22.2	20.1	18.0	17.6	17.3	16.8	18.0
Black or African American only	10.7	10.8	10.2	10.7	10.5	11.6	12.1	13.1	13.3	13.2	14.0
White only	17.5	16.4	15.9	16.2	16.5	16.7	17.5	18.3	18.2	18.0	18.4
2 or more races	*	*	*	*	*	*	16.5	18.2	13.8	23.4	23.3
Hispanic or Latino	12.5	12.2	12.8	13.5	13.9	13.8	15.0	16.6	16.5	16.7	17.3
Not Hispanic or Latino	15.5	14.9	14.4	14.6	14.6	15.4	15.8	16.7	16.8	16.6	17.1
Black or Af Am only, not Hisp/Latino	10.7	10.9	10.2	10.7	10.5	11.6	12.0	13.0	13.2	13.2	13.9
White only, not Hispanic or Latino	18.6	17.3	16.6	16.8	16.9	17.2	18.1	18.8	18.7	18.3	18.6
Male	16.6	15.8	15.0	15.7	15.7	16.4	16.8	17.9	17.7	17.5	18.2
Female	13.2	12.9	13.1	12.8	13.0	13.6	14.3	15.3	15.5	15.6	15.9
<18	51.2	42.5	44.9	44.6	50.7	45.2	51.7	56.6	54.2	55.4	49.5
0-4	30.0	23.4	28.4	31.6	42.2	33.5	33.7	40.1	34.0	37.8	30.8
5-11	59.5	45.7	56.3	47.0	51.3	49.7	59.2	60.0	64.4	66.9	58.2
12-17	52.5	47.0	44.3	46.9	52.8	47.1	53.9	60.7	57.6	57.4	55.7
18-44	26.8	25.5	24.6	24.4	23.6	24.9	24.5	25.7	25.0	25.0	25.6
18-24	33.1	31.2	28.8	30.9	29.3	32.2	26.4	30.4	29.9	28.7	30.7
25-44	26.3	25.0	24.3	23.8	23.1	24.2	24.3	25.2	24.5	24.6	25.1
45-64	13.5	13.4	13.0	13.2	13.5	14.0	14.5	15.5	15.7	15.4	16.0
45-54	18.1	17.3	16.9	16.9	16.6	16.7	16.8	18.1	18.3	17.2	18.5
55-64	10.1	10.5	10.1	10.5	11.4	12.0	13.0	13.7	13.9	14.2	14.3
65+	4.6	4.7	5.1	5.9	6.2	7.4	8.0	9.0	9.2	9.9	10.9
65-69	4.6	4.7	5.1	5.9	6.2	7.4	8.0	9.0	9.2	9.9	10.9

HP2020 CKD-13

Increase the proportion of patients with treated chronic kidney failure who receive a transplant (among patients under 70 years of age)

The goal of Objective 13.1 is to have 19.7 percent of incident ESRD patients younger than 70 transplanted within three years of initiation; as of 2007, the rate was 16.2 percent. Rates are lowest among blacks/African Americans and American Indians/Alaskan Natives, at 9–10 percent.

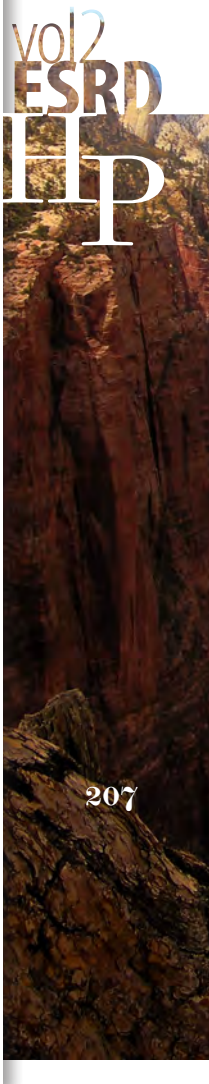
The percentage transplanted falls with age, from 75.4 among pediatric patients to 8.1 among those age 65 and older.

The percentage of patients who receive a preemptive transplant at the start of ESRD has risen only slightly over the past decade, from 2.8 in 2000 to 3.3 in 2010. Preemptive transplants are most common in the pediatric population, reaching 26 percent among those age 5–11. » **Tables HP2020 CKD-13;** see page 429 for analytical methods. *Incident ESRD patients younger than 70. *Values for cells with ten or fewer patients are suppressed.*

HP2020 CKD-13.1 TARGET: 19.7%

Increase the proportion of patients receiving a kidney transplant within three years of end-stage renal disease

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
All	20.2	20.0	19.4	19.1	18.4	18.4	17.8	17.9	17.3	16.7	16.2
American Indian or Alaskan Native only	10.6	11.6	9.9	15.8	8.6	11.6	8.8	9.3	8.8	10.1	9.9
Asian only	21.7	19.6	18.8	19.7	19.6	21.7	22.4	20.6	18.3	18.7	17.3
Native Hawaiian or other Pacific Islander only	14.6	13.8	15.6	9.0	14.7	14.4	13.6	13.7	10.3	10.9	12.1
Black or African American only	9.8	9.9	9.7	9.9	8.9	9.7	9.3	10.1	9.6	9.1	9.0
White only	27.4	27.0	26.2	25.2	24.4	23.8	23.2	22.7	22.1	21.3	20.4
2 or more races	*	*	*	*	*	*	*	*	17.2	16.1	14.2
Hispanic or Latino	17.0	17.0	15.1	15.3	14.9	14.6	14.6	13.9	13.9	13.7	12.9
Not Hispanic or Latino	20.7	20.5	20.2	19.9	19.0	19.1	18.4	18.5	17.7	17.2	16.8
Black or Af Am only, not Hisp/Latino	9.8	9.9	9.7	10.0	8.9	9.7	9.3	10.0	9.5	8.9	8.9
White only, not Hispanic or Latino	29.4	29.0	28.8	27.7	26.9	26.5	25.6	25.1	24.3	23.7	23.0
Male	22.1	22.0	21.1	20.6	19.8	20.0	19.4	19.3	18.7	18.1	17.0
Female	17.8	17.6	17.4	17.3	16.6	16.3	15.8	16.1	15.5	14.9	15.0
<18	74.7	75.1	76.0	73.4	73.0	74.5	76.1	74.3	74.3	75.0	75.4
0-4	73.8	76.3	80.9	76.8	75.8	79.7	78.1	78.2	73.3	75.3	73.3
5-11	84.2	82.0	79.0	76.5	81.8	79.2	82.0	82.6	79.5	79.4	85.0
12-17	70.7	71.3	73.3	70.8	67.9	70.8	73.0	69.7	72.6	73.6	72.8
18-44	34.8	33.8	32.6	31.5	30.2	29.8	28.4	28.5	26.7	25.7	24.4
18-24	45.8	44.5	42.8	44.3	42.6	39.5	41.4	39.9	36.8	35.1	33.0
25-44	33.6	32.6	31.5	30.1	28.8	28.7	26.9	27.2	25.5	24.6	23.4
45-64	16.0	16.2	15.7	15.9	15.3	15.1	14.9	14.9	14.7	14.2	13.8
45-54	21.0	20.9	20.1	20.2	19.5	18.5	18.2	18.2	17.2	16.7	16.6
55-64	12.1	12.4	12.0	12.4	11.9	12.5	12.3	12.4	13.0	12.4	11.9
65+	4.9	5.3	6.0	6.2	6.4	7.4	7.7	8.0	7.7	8.3	8.1
65-69	4.9	5.3	6.0	6.2	6.4	7.4	7.7	8.0	7.7	8.3	8.1



HP2020 CKD-13.2

Increase the proportion of patients who receive a preemptive transplant at the start of ESRD

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	2.8	2.9	3.0	2.8	3.1	3.2	3.4	3.4	3.3	3.2	3.3
American Indian or Alaskan Native only	0.8	0.9	0.9	1.5	0.7	0.8	1.4	1.1	1.1	1.6	0.8
Asian only	2.9	2.4	3.0	2.8	2.6	2.7	2.7	2.9	3.1	2.8	3.4
Native Hawaiian or other Pacific Islander only	0.8	1.1	1.6	0.8	0.9	0.9	1.5	2.1	3.0	2.3	1.3
Black or African American only	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	1.1
White only	4.3	4.4	4.5	4.2	4.6	4.7	4.8	4.9	4.7	4.4	4.5
2 or more races						1.6	2.6	1.3	2.3	3.0	3.3
Hispanic or Latino	1.2	1.3	1.4	1.3	1.4	1.3	1.8	1.7	1.8	1.8	1.8
Not Hispanic or Latino	3.1	3.2	3.3	3.1	3.2	3.4	3.5	3.7	3.6	3.3	3.4
Black or Af Am only, not Hisp/Latino	0.7	0.7	0.8	0.8	0.7	0.8	0.9	1.0	1.0	1.0	1.1
White only, not Hispanic or Latino	4.9	5.1	5.3	4.9	5.1	5.4	5.6	5.8	5.6	5.1	5.2
Male	2.9	3.0	3.1	2.9	3.1	3.2	3.5	3.5	3.3	3.2	3.2
Female	2.7	2.8	3.0	2.8	3.1	3.2	3.2	3.3	3.5	3.2	3.3
<18	17.6	18.2	17.0	15.2	14.9	17.8	17.4	16.9	16.0	18.7	16.5
0-4	14.0	16.3	10.7	14.1	15.0	14.4	11.8	15.5	8.5	10.4	10.3
5-11	21.5	19.0	24.7	22.3	17.2	22.2	24.0	25.1	26.0	26.7	26.4
12-17	16.8	18.5	15.0	12.5	14.0	17.1	17.1	14.3	15.0	19.5	15.7
18-44	5.3	5.2	5.3	4.6	5.1	4.7	5.2	5.0	4.9	4.7	4.6
18-24	7.3	7.3	6.9	7.4	7.4	6.4	8.1	6.8	6.3	6.6	7.1
25-44	5.1	5.0	5.1	4.3	4.8	4.5	4.9	4.8	4.7	4.5	4.4
45-64	2.2	2.4	2.5	2.5	2.7	2.9	3.0	3.2	3.1	2.8	3.0
45-54	3.1	3.3	3.5	3.2	3.4	3.7	3.7	4.0	3.8	3.5	3.7
55-64	1.5	1.7	1.8	1.9	2.2	2.3	2.4	2.7	2.6	2.4	2.5
65+	0.6	0.7	0.8	1.0	1.1	1.4	1.6	1.5	1.7	1.6	1.9
65-69	0.6	0.7	0.8	1.0	1.1	1.4	1.6	1.5	1.7	1.6	1.9

HP2020 CKD-14

Reduce deaths in persons with end-stage renal disease

Since 2000, the overall death rate among prevalent patients on dialysis has fallen 17 percent, from 233 deaths per 1,000 patient years to 193 in 2010 — approaching the HP2020 target of 190.8. By race, the rate ranges from 137 among Asians to 228 among whites; by ethnicity, it is 142 among Hispanics and Latinos and 203 among those not in either group.

The rate of mortality in the first three months of ESRD has fallen from its peak of 388 in 2003, but, at 354 in 2010, remains a distance from the HP2020 target of 319.9 deaths per 1,000 patient years at risk. The highest rate by race occurs among whites, at 414 compared to 147 among American Indians/Alaskan Natives, 212 among Asians, and 243 among blacks/African Americans.

The HP2020 goal of 81.3 cardiovascular deaths per 1,000 patient years was met in 2010, with a rate of 79.9. The rate has fallen 31 percent overall since 2000, and 35–41 percent for Asians and American Indians/Alaskan Natives. By race, the rate is highest among whites, at 93 compared to 62–64 among blacks/African Americans, American Indians/Alaskan Natives, and Asians.

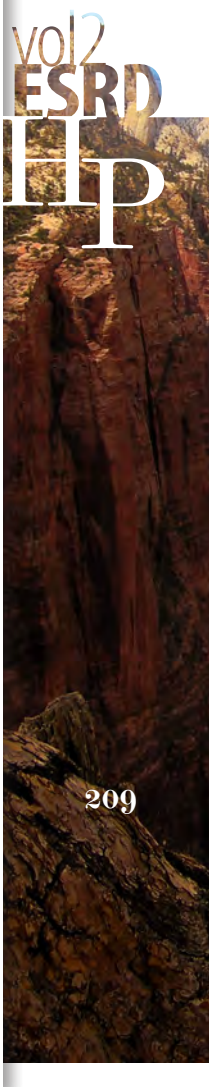
For patients with a functioning transplant, the overall rate of mortality remained stable in 2010, at 32.3 deaths per 1,000 patient years — slightly above the HP2020 goal of 29.4. By race, mortality ranges from 17.4 among Asians to 48.7 among American Indians/Alaskan Natives.

The rate of cardiovascular mortality among transplant patients has fallen 29 percent since 2010, but, at 5.6 deaths per 1,000 patient years, still remains above the HP2020 target of 4.5. **» Tables HP2020 CKD-14;** see page 429 for analytical methods. *Period prevalent dialysis patients; unadjusted (14.1, 14.3). Incident dialysis patients; unadjusted (14.2). Period prevalent transplant patients; unadjusted (14.4–5). *Values for cells with ten or fewer patients are suppressed.*

HP2020 CKD-14.1 TARGET: 190.8 deaths per 1,000 patient years

Reduce the total death rate for persons on dialysis

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	232.6	234.4	232.5	231.4	227.2	223.4	219.4	211.2	204.2	199.1	192.5
American Indian or Alaskan Native only	206.0	206.4	195.6	190.5	182.9	181.3	172.4	165.2	169.3	172.4	150.7
Asian only	171.0	173.1	162.5	175.1	166.7	170.4	160.4	156.0	144.1	145.4	137.0
Native Hawaiian or other Pacific Islander only	169.1	162.2	177.6	169.5	166.5	154.7	164.8	162.6	148.8	155.8	153.8
Black or African American only	181.0	186.5	182.6	182.7	182.1	178.7	173.4	166.8	160.6	156.3	149.0
White only	279.3	279.4	278.8	275.4	268.4	264.5	260.2	249.6	241.0	234.1	228.3
2 or more races						354.2	253.6	190.9	191.7	183.4	176.1
Hispanic or Latino	185.5	186.5	185.0	184.4	178.0	173.8	165.8	155.7	150.4	149.0	141.5
Not Hispanic or Latino	239.4	241.8	240.0	239.0	235.4	232.0	228.9	221.3	214.3	208.8	202.7
Black or Af Am only, not Hisp/Latino	181.2	186.7	182.6	182.8	181.9	178.7	173.3	167.1	160.6	156.5	148.8
White only, not Hispanic or Latino	300.4	301.5	301.7	299.6	293.4	290.5	288.6	279.4	272.4	265.1	261.0
Male	226.6	228.1	225.7	226.4	223.3	219.4	215.5	208.2	202.0	198.6	191.2
Female	239.2	241.6	240.3	237.0	231.7	228.1	224.0	214.7	206.8	199.7	194.0
<18	42.3	46.7	40.1	52.3	41.8	37.0	40.8	41.6	33.5	33.0	47.6
0-4	141.2	151.5	112.9	113.4	93.7	83.7	80.4	94.7	91.5	79.8	100.2
5-11	*	48.1	*	74.7	51.3	35.9	39.2	37.2	36.9	40.5	51.3
12-17	24.4	20.8	31.1	30.7	26.9	26.5	31.4	29.3	15.9	15.3	24.8
18-44	89.1	89.8	92.1	89.5	86.2	84.0	81.6	77.5	73.2	71.5	65.1
18-24	41.6	49.5	46.6	51.8	53.2	49.3	48.5	46.4	41.5	38.8	36.1
25-44	93.1	93.2	95.9	92.7	88.9	86.9	84.3	80.1	75.9	74.3	67.5
45-64	174.6	177.0	172.7	174.1	170.4	163.6	162.8	154.7	148.4	145.0	139.3
45-54	141.0	147.4	141.8	141.1	139.1	135.5	134.2	128.4	120.0	117.2	110.5
55-64	202.6	201.9	198.4	201.0	195.4	185.3	184.4	174.4	169.2	165.1	159.5
65+	350.4	350.3	347.1	342.1	337.0	335.3	327.3	317.5	309.0	300.3	292.2
65-74	293.0	289.8	285.6	281.1	275.0	270.9	260.1	249.5	244.5	239.8	231.0
75-84	401.7	404.4	396.8	388.5	383.8	381.5	374.9	363.4	351.9	338.4	330.5
85+	575.1	560.8	566.4	549.6	532.2	535.6	523.2	519.0	497.9	480.8	471.6



HP2020 CKD-14.2 TARGET: 319.9 deaths per 1,000 patient years at risk

Reduce the death rate in dialysis patients within the first three months of initiation of renal replacement therapy

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	377.2	382.5	382.5	388.3	383.8	378.7	372.3	365.2	361.3	353.6	353.5
American Indian or Alaskan Native only	299.9	185.0	145.9	203.4	212.0	205.5	158.4	171.8	233.1	157.9	146.5
Asian only	194.3	233.8	229.0	230.1	226.5	256.4	216.6	237.9	198.0	211.3	211.8
Native Hawaiian or other Pacific Islander only	173.2	204.9	180.7	185.1	185.4	172.1	219.9	184.1	161.6	206.2	157.2
Black or African American only	272.6	273.1	265.0	278.4	273.9	272.2	264.4	253.4	250.8	246.8	242.8
White only	442.6	445.6	450.6	453.9	445.7	434.7	429.4	424.4	420.4	411.5	414.4
2 or more races						419.6	303.6	289.3	328.2	177.5	263.2
Hispanic or Latino	273.4	277.6	250.2	269.2	255.3	259.4	231.9	237.6	225.1	215.3	221.5
Not Hispanic or Latino	393.7	397.4	402.3	406.8	403.9	397.4	395.0	386.3	384.5	377.2	376.9
Black or Af Am only, not Hisp/Latino	271.5	273.4	264.6	278.3	274.3	271.2	264.4	253.9	250.0	246.0	242.0
White only, not Hispanic or Latino	475.4	479.2	491.8	493.5	488.0	476.7	479.7	473.2	475.0	466.3	470.7
Male	372.0	382.5	376.3	387.0	383.8	375.0	367.9	366.1	362.1	357.7	350.1
Female	383.2	382.6	389.9	389.9	383.9	383.4	378.0	364.0	360.3	348.3	358.0
<18	67.9	*	*	56.7	83.0	78.3	78.5	*	61.0	62.8	64.3
0-4	*	*	*	*	*	275.4	*	*	*	*	174.3
5-11	*	*	*	*	*	*	*	*	*	*	*
12-17	*	*	*	*	*	*	*	*	*	*	*
18-44	103.0	102.5	104.8	105.1	105.6	104.8	99.4	94.9	99.5	103.3	93.7
18-24	61.1	69.9	59.6	69.2	79.9	55.8	83.0	62.3	57.1	53.4	61.8
25-44	107.2	105.9	109.6	108.9	108.3	110.2	101.1	98.5	104.1	108.5	97.0
45-64	212.6	219.3	211.3	219.5	213.6	216.8	208.4	200.5	207.3	207.1	204.5
45-54	161.6	163.8	169.6	169.1	169.7	178.6	156.9	158.3	170.9	162.9	155.6
55-64	250.1	260.6	241.9	255.5	244.7	243.1	244.3	228.9	231.3	235.9	234.9
65+	579.6	581.8	583.3	592.5	589.5	579.3	576.4	570.7	556.1	539.9	541.5
65-74	434.7	432.7	428.5	423.5	424.2	417.8	408.0	407.7	405.9	391.3	392.7
75-84	679.7	676.2	678.3	682.6	680.8	659.8	663.2	651.9	618.6	613.2	614.4
85+	1,012.9	1,038.9	994.3	1,067.2	1,019.4	998.6	997.9	971.7	959.3	900.9	914.2

HP2020 CKD-14.3 TARGET: 81.3 deaths per 1,000 patient years at risk

Reduce the cardiovascular death rate for persons on dialysis

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	116.2	117.9	114.6	112.3	107.4	100.7	95.2	89.9	85.2	82.6	79.9
American Indian or Alaskan Native only	104.7	103.8	91.5	88.7	83.3	77.6	72.6	69.1	60.5	68.1	61.9
Asian only	96.3	97.2	88.3	96.4	85.6	88.2	72.4	70.9	68.0	69.6	62.8
Native Hawaiian or other Pacific Islander only	107.1	100.0	108.4	102.4	90.5	76.9	90.7	82.2	73.6	83.9	82.4
Black or African American only	87.6	90.4	88.7	86.7	85.1	81.0	77.5	72.4	69.6	67.1	63.5
White only	140.9	142.2	138.3	134.8	127.5	118.7	111.1	105.0	98.4	95.0	93.0
2 or more races						*	88.5	83.9	81.7	73.6	74.2
Hispanic or Latino	94.5	97.3	93.1	90.0	85.7	81.5	75.3	70.0	67.0	67.4	64.4
Not Hispanic or Latino	119.3	121.0	118.0	116.0	111.1	104.1	98.7	93.6	88.7	85.6	83.0
Black or Af Am only, not Hisp/Latino	87.7	90.4	88.6	86.8	84.9	80.9	77.4	72.4	69.5	67.1	63.5
White only, not Hispanic or Latino	150.9	152.9	149.1	146.4	138.8	129.1	121.7	116.2	109.3	105.0	103.8
Male	114.7	117.0	113.9	112.4	108.1	101.3	96.1	90.8	87.0	84.9	81.7
Female	117.9	118.8	115.5	112.2	106.6	100.1	94.0	88.8	83.1	79.8	77.7
<18	10.0	17.5	12.4	11.0	13.1	14.9	15.5	10.2	9.1	14.1	11.6
0-4	*	60.6	*	*	*	*	*	*	*	*	*
5-11	*	*	*	*	*	*	*	*	*	*	*
12-17	*	*	*	*	*	14.3	14.6	*	*	*	*
18-44	39.2	40.3	41.3	39.6	38.6	37.3	35.5	32.7	31.1	30.9	29.1
18-24	15.2	20.6	19.1	23.5	24.6	23.2	19.1	18.1	15.1	17.1	18.3
25-44	41.2	41.9	43.2	40.9	39.7	38.5	36.8	34.0	32.4	32.1	30.0
45-64	88.5	89.3	86.3	84.6	81.2	75.5	73.4	68.5	65.3	63.8	61.1
45-54	70.4	72.6	69.1	66.9	64.0	61.0	59.9	57.0	53.1	52.1	47.7
55-64	103.5	103.3	100.6	99.0	94.9	86.8	83.5	77.1	74.3	72.2	70.6
65+	176.3	177.9	171.7	167.7	159.6	149.8	139.3	132.8	125.5	120.5	117.3
65-74	148.7	149.7	142.9	139.1	133.0	123.4	114.7	108.0	104.3	101.1	96.9
75-84	201.9	203.6	195.0	189.9	179.7	169.9	156.3	150.6	138.9	131.6	130.6
85+	278.7	273.7	274.8	262.7	243.2	226.0	213.5	201.6	189.8	182.6	175.2

HP2020 CKD-14.4 TARGET: 29.4 deaths per 1,000 patient years at risk

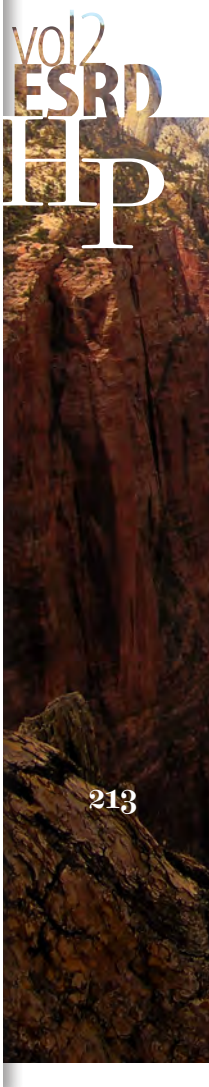
Reduce the total death rate for persons with a functioning kidney transplant

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	34.5	35.6	33.9	34.5	33.0	33.7	33.1	32.5	31.4	32.6	32.3
American Indian or Alaskan Native only	39.0	42.8	38.3	39.0	35.0	40.9	44.9	36.7	38.7	59.4	48.7
Asian only	19.6	20.3	23.8	19.8	21.5	22.6	20.6	25.4	20.9	17.9	17.4
Native Hawaiian or other Pacific Islander only	32.1	30.8	33.8	30.5	33.0	33.5	21.1	13.9	20.2	27.2	21.2
Black or African American only	38.1	39.1	37.5	38.4	35.5	36.4	35.7	32.5	31.7	32.0	32.4
White only	34.4	35.2	33.8	34.1	33.0	33.5	33.3	33.4	31.6	33.4	33.2
2 or more races						*	*	*	*	*	*
Hispanic or Latino	28.0	28.4	24.5	23.5	23.9	25.5	27.9	24.0	24.8	24.6	24.3
Not Hispanic or Latino	35.2	36.4	35.0	35.9	34.2	34.8	33.9	33.7	32.3	33.8	33.6
Black or Af Am only, not Hisp/Latino	38.2	39.4	37.9	38.2	35.7	36.5	36.0	32.4	31.9	31.9	32.7
White only, not Hispanic or Latino	34.9	35.9	34.7	35.6	34.2	34.6	33.9	34.9	32.7	35.1	34.8
Male	35.9	37.6	35.5	35.9	35.0	36.1	35.1	34.6	32.9	34.1	34.3
Female	32.5	32.5	31.4	32.5	30.2	30.2	30.4	29.6	29.2	30.4	29.3
<18	5.3	5.6	9.2	7.2	4.3	8.2	3.8	*	3.2	4.3	6.1
0-4	*	*	*	*	*	*	*	*	*	*	*
5-11	*	*	*	*	*	*	*	*	*	*	*
12-17	5.5	5.8	8.1	6.9	*	10.0	*	*	*	*	6.1
18-44	15.3	16.9	15.3	13.6	13.2	13.1	12.5	12.1	10.9	10.9	9.9
18-24	7.9	9.6	6.0	6.8	7.8	9.2	9.5	8.7	8.6	8.7	6.9
25-44	16.1	17.6	16.2	14.3	13.8	13.5	12.8	12.4	11.1	11.1	10.3
45-64	41.3	41.0	37.7	38.1	34.9	35.1	34.1	31.6	30.4	30.1	29.0
45-54	32.4	32.2	30.2	28.9	25.9	26.9	26.5	23.6	23.4	23.5	19.9
55-64	54.0	53.6	48.0	50.0	45.9	44.6	42.5	40.0	37.4	36.5	37.5
65+	97.3	93.9	89.6	91.6	87.8	85.5	81.4	81.5	74.7	77.7	76.3
65-74	91.5	87.7	83.8	83.1	79.8	78.0	72.2	72.2	64.5	67.6	66.7
75-84	146.0	142.0	131.4	150.9	135.7	126.2	130.9	125.3	121.4	122.5	114.8
85+	*	*	*	*	240.3	237.5	139.2	237.3	164.8	136.3	175.0

HP2020 CKD-14.5 TARGET: 4.5 deaths per 1,000 patient years at risk

Reduce the cardiovascular death rate in persons with a functioning transplant

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All	7.9	8.1	7.3	7.5	7.4	6.9	6.6	6.5	5.4	5.6	5.6
American Indian or Alaskan Native only	12.7	*	*	*	*	8.8	10.5	8.0	*	10.0	*
Asian only	*	5.1	7.4	4.0	3.4	3.5	4.8	5.2	3.5	*	2.7
Native Hawaiian or other Pacific Islander only	*	*	*	*	*	*	*	*	*	*	*
Black or African American only	9.5	10.2	9.0	9.6	9.2	8.5	8.0	7.3	5.9	6.8	6.5
White only	8.0	8.3	7.5	7.7	7.5	6.9	6.6	6.7	5.5	5.7	5.7
2 or more races						*	*	*	*	*	*
Hispanic or Latino	7.2	7.2	7.0	6.0	6.3	5.8	6.4	4.9	4.8	4.4	4.1
Not Hispanic or Latino	8.0	8.2	7.4	7.7	7.6	7.1	6.7	6.8	5.5	5.7	5.8
Black or Af Am only, not Hisp/Latino	9.5	10.3	9.1	9.6	9.1	8.7	8.1	7.2	6.0	6.7	6.5
White only, not Hispanic or Latino	8.0	8.4	7.4	7.9	7.7	7.0	6.5	7.0	5.6	5.9	6.1
Male	8.5	9.0	7.8	7.9	8.2	7.5	7.1	7.3	5.9	5.7	6.0
Female	7.1	6.9	6.6	7.0	6.3	6.0	5.9	5.4	4.6	5.4	4.9
<18	*	*	*	*	*	*	*	*	*	*	*
0-4	*	*	*	*	*	*	*	*	*	*	*
5-11	*	*	*	*	*	*	*	*	*	*	*
12-17	*	*	*	*	*	*	*	*	*	*	*
18-44	3.8	3.9	3.5	3.2	3.2	3.0	2.7	2.8	2.3	2.0	1.8
18-24	*	*	*	*	*	*	*	2.6	*	*	*
25-44	3.9	4.1	3.7	3.3	3.5	3.1	2.8	2.8	2.4	2.1	1.9
45-64	10.0	9.7	8.4	8.8	8.3	7.2	7.3	6.8	5.6	5.3	5.4
45-54	8.2	8.8	6.4	6.9	7.1	5.5	5.7	5.7	4.4	4.4	3.6
55-64	12.6	11.1	11.3	11.1	9.8	9.2	9.2	7.9	6.9	6.1	7.2
65+	18.6	19.6	17.6	17.8	17.3	16.7	14.0	14.3	10.8	12.7	11.8
65-74	17.2	19.0	16.7	15.8	16.2	15.8	12.2	12.6	9.9	11.3	10.9
75-84	28.6	24.1	24.3	31.8	24.2	20.7	24.4	22.7	15.3	19.6	15.5
85+	*	*	*	*	*	*	*	*	*	*	*



RECOMMENDED CARE AMONG PATIENTS WITH DIABETES & CKD

patients with diagnosed diabetes who obtain an annual urinary urine albumin measurement, 2010 (diabetes-12)

» all · 38.8%

» American Indian/Alaskan Native · 23.4% » Asian · 42.1% » black/African American · 37.1% » white · 38.9%

ACEI/ARB TREATMENT

patients with diabetes & CKD who receive treatment with an ACEI or ARB, 2010 (CKD-5)

» all · 72.6%

» American Indian/Alaskan Native · 73.3% » Asian · 81.2% » black/African American · 75.0% » white · 71.2%

ESRD INCIDENCE

rate per million population of new cases of end-stage renal disease, 2010 (CKD-8)

» all · 350

» American Indian/Alaskan Native · 452 » Asian · 332 » Native Hawaiian/Pacific Islander · 2,453

» black/African American · 956 » white · 283

KIDNEY FAILURE DUE TO DIABETES

rate per million population of new cases of end-stage renal disease due to diabetes, 2010 (CKD-9.1)

» all · 151

» American Indian/Alaskan Native · 321 » Asian · 159 » Native Hawaiian/Pacific Islander · 1,525

» black/African American · 417 » white · 124

NEPHROLOGIST CARE

patients receiving at least 12 months of nephrologist care prior to initiation, 2010 (CKD-10)

» all · 29.4%

» American Indian/Alaskan Native · 24.1% » Asian · 29.5% » Native Hawaiian/Pacific Islander · 24.8%

» black/African American · 25.4% » white · 31.1%

VASCULAR ACCESS

adult incident hemodialysis patients with a maturing AV fistula or using one as their primary vascular access, 2010 (CKD-11.3)

» all · 33.6%

» American Indian/Alaskan Native · 40.8% » Asian · 36.9% » Native Hawaiian/Pacific Islander · 32.5%

» black/African American · 31.9% » white · 34.1%

TRANSPLANTATION

patients wait-listed or receiving a deceased donor kidney within one year of ESRD initiation in 2009 (CKD-12)

» all · 17.3%

» American Indian/Alaskan Native · 11.1% » Asian · 32.1% » Native Hawaiian/Pacific Islander · 18.0%

» black/African American · 14.0% » white · 18.4%

MORTALITY

overall mortality (deaths per 1,000 patient years at risk) among patients on dialysis, 2010 (CKD-14.1)

» all · 193

» American Indian/Alaskan Native · 151 » Asian · 137 » Native Hawaiian/Pacific Islander · 154

» black/African American · 149 » white · 228

INCIDENCE, PREVALENCE, PATIENT CHARACTERISTICS, & MODALITY

In 2010, the number of new patients starting therapy on hemodialysis declined for the first time in more than three decades. The population initiating on peritoneal dialysis, in contrast, grew for the second year in a row, and now accounts for 6.6 percent of patients with a known dialysis modality. This change may foreshadow those to come under the new bundled payment system, with its clear incentives for this form of home dialysis. Total incident dialysis cases rose 0.27 percent in 2010, to 114,083, while 2,863 patients received a preemptive transplant as their first ESRD modality; a total of 116,946 patients began ESRD therapy in 2010.

The rate of new ESRD cases per million population, which has been relatively stable since 2000, fell 2.0 percent in 2010, to 348. Growth continues to be driven by a relatively linear increase in the number of patients age 45–64; growth in the population age 65 and older, in contrast, has slowed considerably, but a slight upturn is present among those age 65–74, which could reflect the emergence of the post-World War II baby boomers into retirement age.

The incidence of ESRD in the black/African American population has finally started to decline, overall and for ESRD due to diabetes. Among those age 20–39, however, differences between whites and blacks/African Americans continue to be dramatic, with rates among the latter up to 3.8 times greater. Rates are also considerably higher for blacks/African Americans age 60 and older than for their white counterparts, though the gap is beginning to narrow.

The December 31, 2010 prevalent population included 383992 patients on hemodialysis and 29,733 on peritoneal dialysis, as well as 179,361 with a functioning kidney transplant; the total treated ESRD population thus rose to 593,086 — growth of 4 percent from 2009, which is the smallest increase in 30 years. The rate of prevalent ESRD cases reached 1,752 per million population, an increase of 1.1 percent from 2009, and also the slowest growth in the last three decades.

Insurance coverage in the dialysis population continues to change, with more incident dialysis patients now covered by Medicare Advantage. Private insurance, in contrast, is dominant among patients who receive a preemptive kidney transplant. In the 2010 prevalent population, 84 percent of hemodialysis patients and 79 percent of those on peritoneal dialysis had some type of Medicare coverage, compared to just 65 percent of those with a transplant.

Nephrology care prior to ESRD continues to be a concern. Since the 2005 introduction of the new Medical Evidence form (2728), with fields addressing pre-ESRD care, there has been little progress made in this area (pre-ESRD data, however, should be interpreted with caution because of the potential for misreporting). Forty-three percent of new ESRD patients in 2010, for example, had not seen a nephrologist prior to beginning therapy. And among these patients, 88 percent of those on hemodialysis began therapy with a catheter, compared to 54 percent of those who had received a year or more of nephrology care. Among those with a year or more of pre-ESRD nephrologist care, in contrast, 26 percent began therapy with a fistula — eight times higher than the rate among non-referred patients.

Data on patient care at the start of ESRD therapy show that the percentage of patients receiving an erythropoiesis stimulating agent (ESA) prior to initiation continues to decline, reaching just 20 percent in 2010 compared to one-third

Here and there awareness is growing that man, far from being the overlord of all creation, is himself part of nature, subject to the same cosmic forces that control all other life. Man's future welfare and probably even his survival depend upon his learning to live in harmony, rather than in combat, with these forces.

RACHEL CARSON,
"Essay on the Biological Sciences"

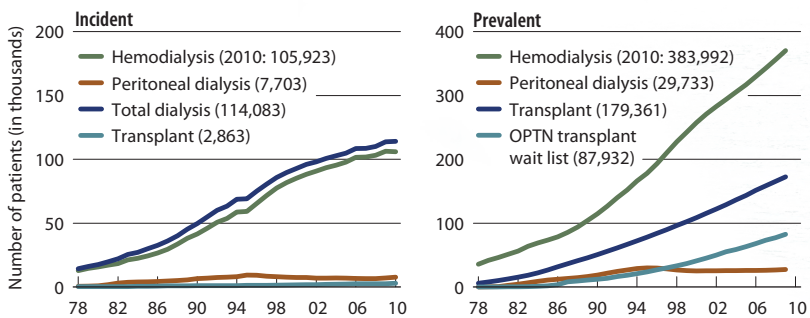
in the early part of the decade. This may reflect concern over potential adverse events when hemoglobin levels are targeted to a level above 12 g/dl. The mean hemoglobin at initiation of ESRD treatment is now 9.73 g/dl. These changes place different demands on care after the initiation of dialysis, and may alter the likelihood of a patient receiving a blood transfusion. The balance between cardiovascular risk with a hemoglobin greater than 12 g/dl and the risk of transfusion with lower hemoglobin levels needs to be addressed by patients and their physicians, particularly in the case of patients contemplating a kidney transplant, for whom sensitization from blood transfusions is to be avoided if at all possible.

The percentage of dialysis patients beginning therapy with an estimated glomerular filtration rate (eGFR, calculated with the CKD-EPI formula) above 15 ml/min/1.73 m^2 continues to rise. It is not clear if this progressive increase is the result of severe comorbidity or a simple numerical starting point based on the ability to calculate the eGFR. Hopefully, symptoms and complications of uremia are still the primary indications for starting renal replacement therapy rather than a simple number, one which has been brought into question in recent years in controlled trials of early versus later dialysis initiation.

Biochemical data, collected on the Medical Evidence form since 2005, show that 57 percent of new patients in 2010 had an albumin less than the lower limit of normal, and 55 percent had a hemoglobin lower than 10 g/dl. Total cholesterol was greater than 200 mg/dl in 16 percent of patients, while 28 percent had an LDL level greater than 100 mg/dl, and 58 percent had an HDL level less than 40 mg/dl. Among patients with diabetes, 28 percent had a hemoglobin A1c level greater than 7 percent.

Recent changes and new incentives in the bundled prospective payment system for dialysis patients, introduced in January, 2011, may alter several characteristics of the incident and prevalent populations — particularly, due to cost incentives, the mix of peritoneal dialysis and hemodialysis patients. It is unclear how the expansion of peritoneal dialysis will affect patient outcomes, and how the new incentives will impact the emerging daily home hemodialysis population; provider incentives for this therapy are less clear, particularly as related to training. A more detailed assessment of the bundled payments is presented in Chapter Ten, and in future ADRs the USRDS will continue to assess the impact of this payment system on the ESRD population. » **Figure 1.1;** see page 429 for analytical methods. *Incident & December 31 point prevalent ESRD patients.*

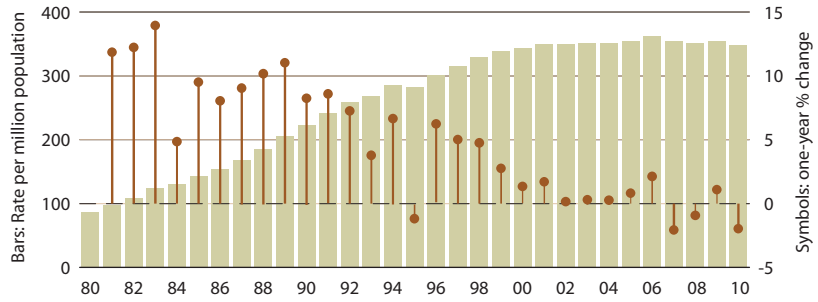
vol 2
1.1 **Incident & prevalent patient counts (USRDS), by modality**



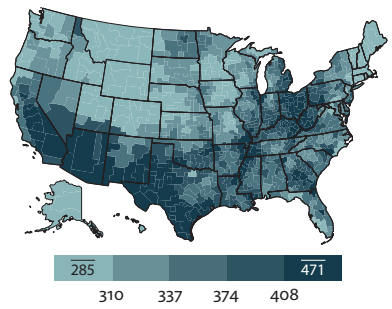
After a 1.1 percent increase in 2009, the adjusted incident rate of end-stage renal disease fell 2.0 percent in 2010, to 348 per million population. Since 2000, changes in rates have shown little variation, ranging from -2.1 percent to 2.1 percent. » **Figure 1.2;** see page 429 for analytical methods. *Incident ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

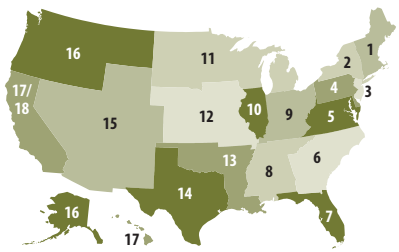
In 2010, the adjusted incident rate of ESRD was 348 per million population, averaging 471 in the upper quintile. The highest adjusted rates occur in the Ohio Valley, portions of Texas and California, and the southwestern states. (Rates are not adjusted for ethnicity.) » **Figure 1.3;** see page 429 for analytical methods. *Incident ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

vol 2
1.2 Adjusted incident rates of ESRD & annual percent change



vol 2
1.3 Geographic variations in adj. inc. rates of ESRD per million pop., 2010, by HSA





Network 1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Network 2	New York
Network 3	New Jersey, Puerto Rico, Virgin Islands
Network 4	Delaware, Pennsylvania
Network 5	Maryland, Virginia, Washington D.C., West Virginia
Network 6	Georgia, North Carolina, South Carolina
Network 7	Florida
Network 8	Alabama, Mississippi, Tennessee
Network 9	Indiana, Kentucky, Ohio
Network 10	Illinois
Network 11	Michigan, Minnesota, North Dakota, South Dakota, Wisconsin
Network 12	Iowa, Kansas, Missouri, Nebraska
Network 13	Arkansas, Louisiana, Oklahoma
Network 14	Texas
Network 15	Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming
Network 16	Alaska, Idaho, Montana, Oregon, Washington
Network 17	American Samoa, Northern California, Guam, Hawaii
Network 18	Southern California

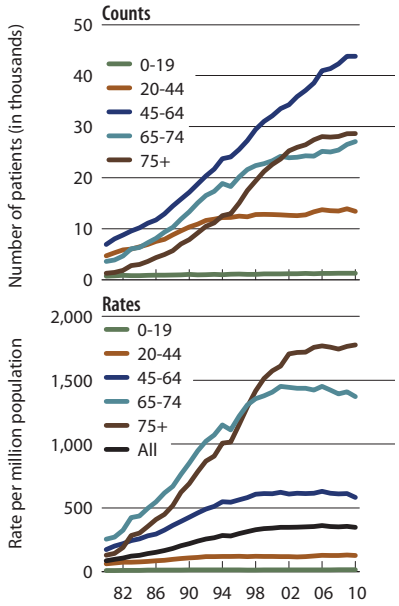
vol 2
1.a Patient demographics & adjusted rates, by ESRD network: incident dialysis patients, 2010

	All pts	% of total	Rate per million	Mean age	% DM	% White	% Af Am	% N Am	% Asian	% Hisp.
1	3,624	3.2	233.7	65.6	40.6	82.9	14.2	0.3	2.4	8.0
2	6,915	6.1	329.4	64.4	41.3	61.0	31.3	0.4	5.6	13.7
3	4,803	4.2	353.5	64.1	51.2	69.5	26.3	0.1	3.6	37.6
4	5,161	4.5	364.0	65.1	41.6	73.3	24.9	0.1	1.5	3.4
5	6,471	5.7	371.3	62.7	40.2	49.1	46.4	0.1	2.9	2.5
6	9,450	8.3	365.9	61.0	42.0	43.1	54.8	0.6	1.3	2.0
7	7,576	6.6	379.8	64.7	41.4	67.3	30.2	0.1	1.9	15.4
8	6,111	5.4	410.8	60.6	41.8	49.7	49.6	0.3	0.4	0.6
9	9,058	7.9	382.3	64.2	44.8	76.5	22.5	0.0	0.8	1.6
10	4,890	4.3	356.9	63.6	38.8	64.3	31.7	0.0	3.4	11.1
11	7,393	6.5	305.7	64.0	40.9	72.2	22.8	2.4	2.4	3.4
12	4,242	3.7	292.9	63.1	40.7	75.8	20.9	0.9	1.5	3.2
13	4,767	4.2	408.5	60.9	45.5	55.3	38.8	4.6	1.2	2.5
14	9,694	8.5	365.0	60.2	53.8	72.7	24.5	0.4	2.3	40.8
15	5,518	4.8	260.2	61.7	49.3	77.1	8.7	9.2	4.3	25.6
16	3,426	3.0	229.7	63.2	43.4	82.5	6.3	3.6	7.5	7.2
17	5,645	5.0	333.2	62.0	51.8	57.2	12.6	1.0	28.3	21.6
18	9,328	8.2	372.7	62.7	50.9	73.3	13.3	0.3	12.7	40.7
Unk	11	0.0	.	41.6	9.1	0.0	9.1	0.0	18.2	0.0
All	114,083	100.0	339.9	62.8	44.8	65.9	27.9	1.2	4.6	14.5

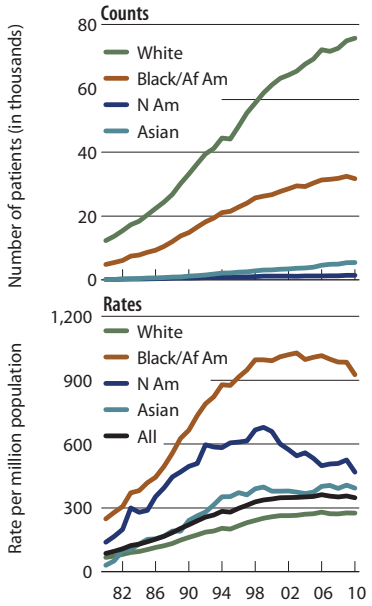
With an overall rate for incident dialysis patients of 340 per million population in 2010, rates by network range from 230 in Network 16 to 411 in Network 8. The distribution of patients by race continues to vary widely across the country. Blacks/African Americans, for example, constitute just 6.3 percent of the new dialysis population in Network 16, but 50–55 percent of patients in Networks 6 and 8. » **Table 1.a;** see page 429 for analytical methods. *Incident dialysis patients. Adj: age/gender/race; ref: 2005 patients. "." Zero values in this cell.*

incident counts & adjusted rates

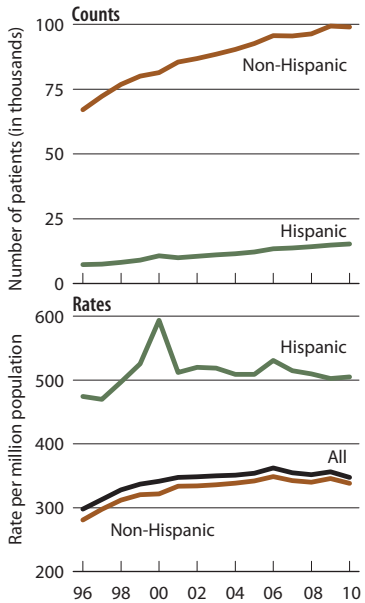
vol 2 1.4 **Incident counts & adjusted rates of ESRD, by age**



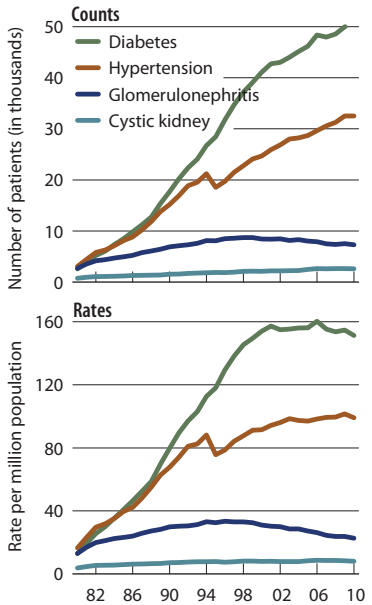
vol 2 1.5 **Incident counts & adjusted rates of ESRD, by race**



vol 2 1.6 **Incident counts & adjusted rates of ESRD, by Hispanic ethnicity**



vol 2 1.7 **Incident counts & adjusted rates of ESRD, by primary diagnosis**

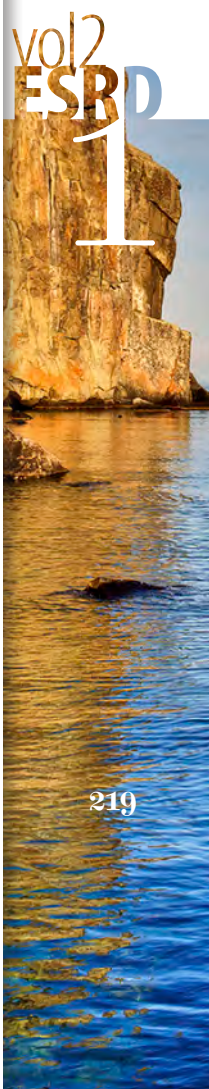


Since 2000, the adjusted incident rate of ESRD has grown 12.2 percent for patients age 75 and older, to 1,773 per million population in 2010, while rates for those age 0–19 and 20–44 have increased 9.1 and 6.3 percent, respectively, to 15.5 and 128. Rates for patients age 45–64 and 65–74, in contrast, though rising slightly during the decade, are now 5.3 and 3.1 percent lower than in 2000, at 581 and 1,368 per million, respectively.

By race, rates for blacks/African Americans and Native Americans in 2010 were 924 and 465 per million population, respectively — 3.4 and 0.5 times greater than the rate of 276 found among whites. Since 2000, the rate of new ESRD cases has grown 6.1 percent among whites and 2.5 percent among Asians, while decreasing 7.0 percent in the black/African American population.

Thirteen percent of new ESRD patients in 2010 were Hispanic, a rate unchanged from those of the previous two years. While their rate of ESRD fell 1.7 percent, to 501, it remains 1.5 times greater than that seen among non-Hispanics.

With the exception of an uptick in 2006, the rate of new ESRD cases caused by diabetes has remained quite stable since 2000, reaching 152 per million population in 2010. The rate of ESRD due to hypertension, while down 2.2 percent in 2010, is 7.7 percent higher than the 2000 rate, at 99, while the rate of ESRD due to glomerulonephritis has fallen 27 percent, to 22.7. » **Figures 1.4–7;** see page 429 for analytical methods. *Incident ESRD patients. Adj: gender/race (1.4), age/gender (1.5–6), age/gender/race (1.7); ref: 2005 ESRD patients.*

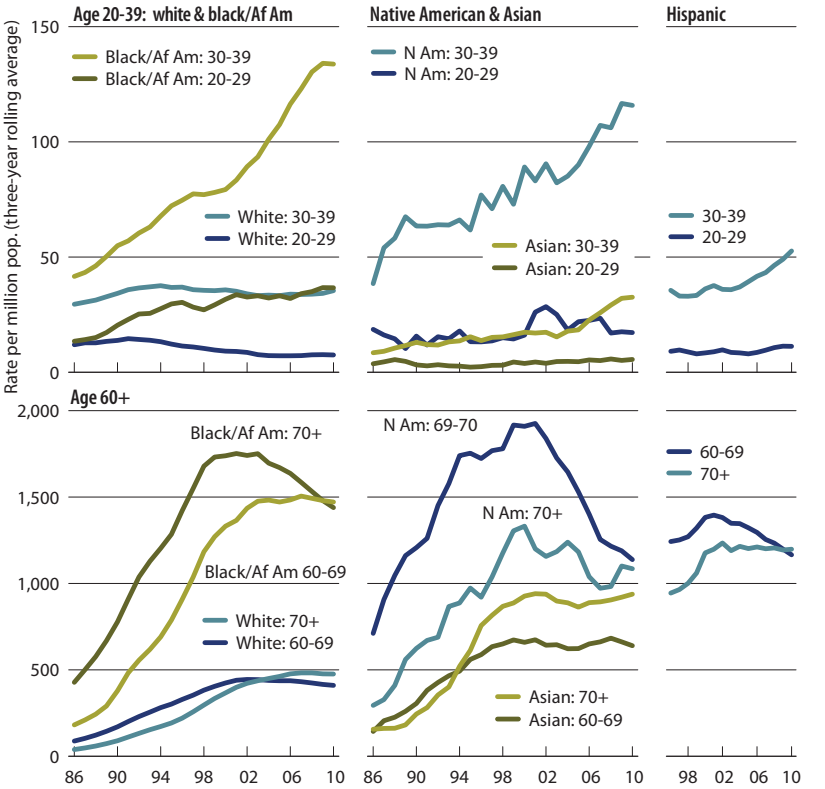


Both the rates of incident ESRD caused by diabetes and their growth over time continue to vary widely by age and race/ethnicity. Among whites age 30–39, for example, the incident rate (adjusted for gender) has fallen just 1.0 percent since 2000, and in 2010 was 35.4 per million population. For blacks/African Americans of the same age, in contrast, the rate has increased 69 percent since 2000, to reach 133.8. The Native American population has seen a rise of 30.1 percent for this age group over the same time period, reaching 116 per million in 2010. And while rates of new ESRD cases among Asians remain comparatively low, among those age 30–39 they have nearly doubled since 2000, reaching 32.6 per million population in 2010.

Different patterns are seen among older populations. Among whites age 60–69, the rate of incident ESRD due to diabetes has fallen 3.6 percent since 2000, in contrast to a 29 percent increase in those age 70 and older. In blacks/African Americans, the rate for those age 60–69 has fallen 17.2 percent since 2000, while rates have decreased 40.4 and 18.4 percent, respectively, in Native Americans age 60–69 and those 70 and older. The rate for Hispanics age 60–69 has fallen 15.7 percent since 2000, to 1,166 in 2010, but has now surpassed the 2010 rate of 1,138 found in Native Americans of the same age. » **Figure 1.8;** see page 429 for analytical methods. *Incident ESRD patients; rates are three-year rolling averages. Adj: gender; ref: 2005 ESRD patients.*

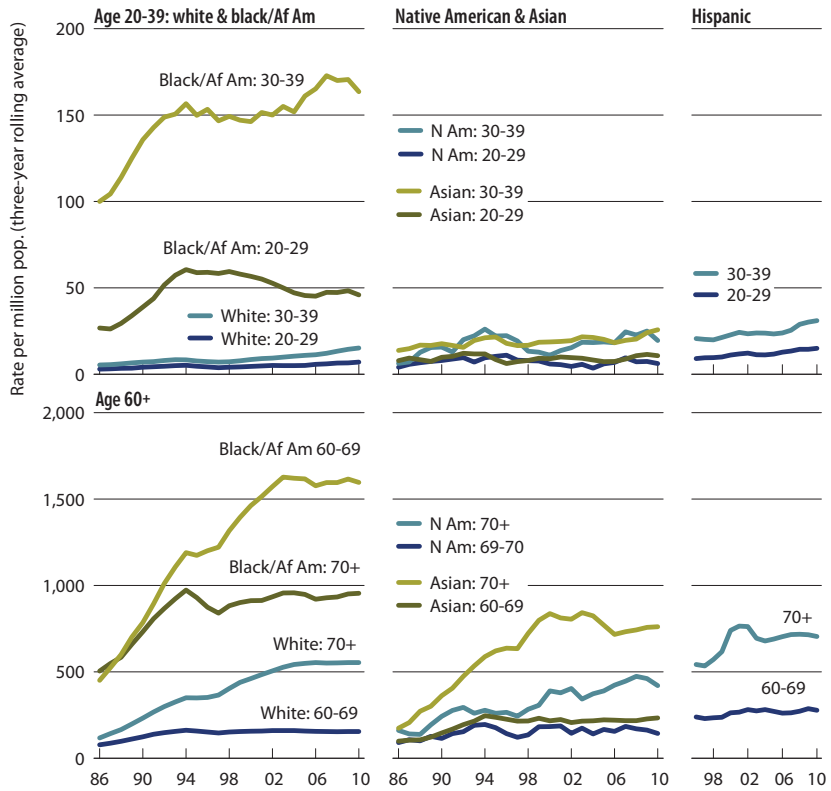
vol 2
1.8

Adjusted incident rates of ESRD due to diabetes, by age, race, & ethnicity



vol 2
1.9

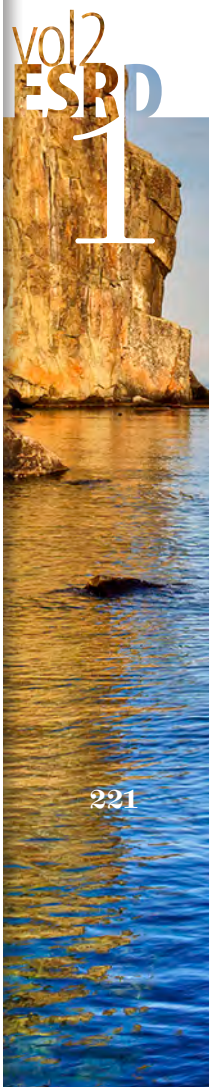
Adjusted incident rates of ESRD due to hypertension, by age, race, & ethnicity



As with diabetic ESRD, there are significant disparities by age, race, and ethnicity in the incidence of ESRD due to hypertension. Among whites age 30–39, for example, the rate per million population (adjusted for gender) rose 78 percent to between 2000 and 2010, to reach 15.3. The rate for blacks/African Americans of the same age rose at a far slower pace of 11.8 percent, but reached nearly 164 per million population — nearly 11 times greater than that of their white counterparts.

Between 2000 and 2010, rates rose 19.8 and 9.2 percent in whites and blacks/African Americans age 70 and older, to reach 554 and 1,597. The rate increased 7.6 percent among Native Americans of the same age, reaching 420, but fell almost 22 percent in those age 60–69, to 143.6.

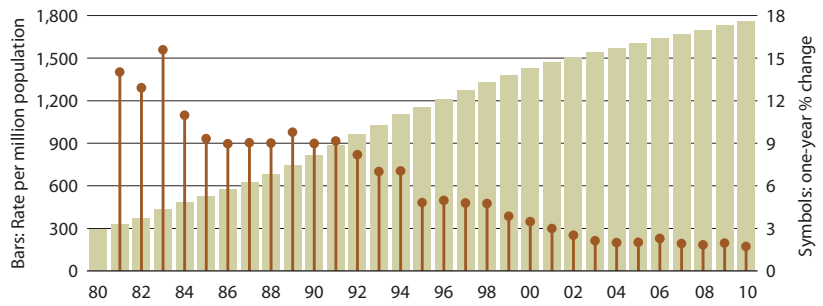
The rate for blacks/African Americans age 60–69 was 955 per million population in 2010, 6.2 percent higher than the rate of 155 found in whites of the same age. » **Figure 1.9;** see page 429 for analytical methods. *Incident ESRD patients; rates are three-year rolling averages. Adj: gender; ref: 2005 ESRD patients.*



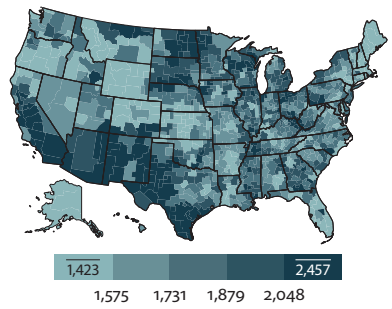
The adjusted rate of prevalent cases of end-stage renal disease rose 1.7 percent in 2010 — slightly lower than the 1.9 percent growth in 2009 — to 1,763 per million population. This rate is 21 percent higher than that seen in 2000. The annual rate of increase has remained between 1.7 and 2.3 percent since 2004. » **Figure 1.10;** see page 429 for analytical methods. *December 31 point prevalent ESRD patients. Adj: age/gender/race; ref: 2005 ESRD patients.*

In 2010, the rate of prevalent ESRD was 1,752 per million population. Patterns generally follow those found in the incident population, with an additional pocket of higher rates in the Dakotas and Minnesota. Rates in the upper quintile average 2,457. (Rates are not adjusted for ethnicity.) » **Figure 1.11;** see page 429 for analytical methods. *Dec. 31 point prev. pts. Adj: age/gender/race; ref: 2005 ESRD pts.*

vol 2
1.10 **Adjusted prevalent rates of ESRD & annual percent change**



vol 2
1.11 **Geographic variations in adj. prev. rates of ESRD per million pop., 2010, by HSA**



vol 2
1.b **Patient demographics & adjusted rates, by ESRD network: December 31 point prevalent dialysis patients, 2010**

	All pts	% of total	Rate/ million	Mean age	% DM	% White	% B/Af Am	% N Am	% Asian	% Hisp.
1	12,921	3.1	809	64.3	39.6	74.2	21.6	0.2	3.3	9.8
2	26,492	6.4	1,267	62.7	40.6	51.2	40.5	0.5	6.0	15.3
3	16,874	4.1	1,258	62.8	47.5	60.5	33.6	0.1	3.7	36.8
4	17,696	4.3	1,206	62.9	41.0	62.3	35.5	0.1	1.7	4.3
5	23,639	5.7	1,336	61.0	39.2	35.8	60.2	0.1	2.9	3.5
6	39,450	9.5	1,497	59.2	40.8	30.8	67.0	0.6	1.2	2.6
7	24,218	5.8	1,174	61.7	40.8	54.9	42.2	0.3	2.0	16.1
8	23,331	5.6	1,537	59.3	40.6	37.2	61.6	0.5	0.5	0.8
9	29,183	7.0	1,209	62.1	44.0	64.7	34.2	0.1	0.8	2.1
10	17,219	4.2	1,251	61.8	39.2	54.2	41.7	0.1	3.4	13.6
11	25,140	6.1	1,022	62.8	41.5	62.3	31.8	3.1	2.6	4.2
12	14,578	3.5	983	61.8	41.0	66.7	30.3	1.0	1.5	4.7
13	16,490	4.0	1,371	59.2	42.8	42.3	51.3	5.1	1.1	2.9
14	38,400	9.3	1,405	59.3	53.1	67.0	30.0	0.3	2.1	44.2
15	19,651	4.7	918	60.9	52.2	70.9	11.3	13.2	4.4	29.6
16	11,600	2.8	775	61.3	42.7	77.1	9.1	4.3	9.3	10.3
17	22,482	5.4	1,299	61.4	49.9	50.6	15.4	0.9	31.9	23.3
18	35,629	8.6	1,408	61.0	48.6	70.3	15.6	0.5	13.1	46.9
Unk	20	0.0	.	43.6	5.0	5.0	10.0	0.0	25.0	5.0
All	415,013	100.0	1,218	61.2	44.1	56.0	36.8	1.5	5.1	16.7

vol 2
1.c **Patient demographics & adjusted rates, by ESRD network: December 31 point prevalent transplant patients, 2010**

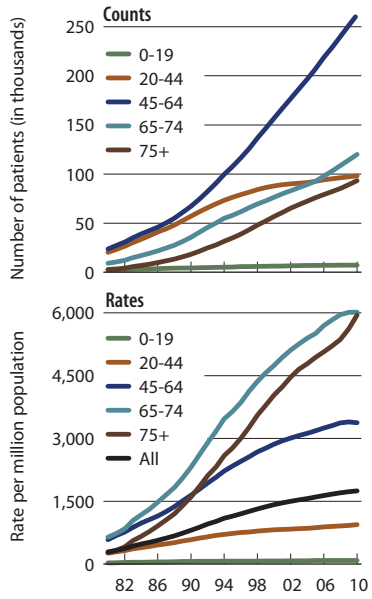
	All pts	% of total	Rate/ million	Mean age	% DM	% White	% B/Af Am	% N Am	% Asian	% Hisp.
1	8,626	4.8	548.1	53.0	20.2	80.9	12.1	0.3	5.4	8.4
2	11,798	6.6	558.3	52.5	20.1	65.2	23.1	0.8	8.2	17.8
3	5,158	2.9	452.2	52.3	22.8	68.2	22.3	0.4	5.9	31.2
4	10,310	5.8	707.9	53.3	22.5	71.5	21.1	0.4	5.1	3.6
5	11,108	6.2	639.0	52.7	21.9	54.5	37.0	0.7	6.0	4.6
6	10,828	6.0	428.4	51.2	23.2	56.0	39.6	0.9	3.0	2.7
7	9,369	5.2	469.8	53.6	22.0	70.0	24.1	0.5	4.1	18.1
8	8,021	4.5	548.0	51.1	20.9	63.1	34.2	0.4	1.8	1.1
9	12,542	7.0	530.1	52.3	25.1	78.8	17.3	0.2	2.8	1.7
10	7,762	4.3	549.5	51.4	23.5	65.0	25.5	0.6	6.2	15.0
11	18,789	10.5	789.4	52.9	27.3	81.1	12.8	1.8	3.7	3.4
12	8,375	4.7	584.4	52.2	23.0	81.3	14.5	0.8	3.0	4.9
13	5,330	3.0	458.1	51.5	24.2	61.5	32.8	3.0	2.2	3.0
14	12,555	7.0	464.0	50.7	25.3	76.2	17.3	0.5	4.7	37.6
15	9,460	5.3	455.3	52.1	28.5	83.3	5.4	6.0	4.9	21.6
16	6,586	3.7	451.3	52.9	23.9	82.6	6.0	2.4	8.7	7.4
17	9,577	5.3	578.9	52.1	21.6	63.1	8.9	0.9	24.6	21.2
18	12,746	7.1	511.4	50.6	19.7	72.9	10.9	0.5	14.6	38.9
Unk	421	0.2	.	43.9	0.0	8.6	3.1	6.4	44.9	0.0
All	179,361	100.0	537.5	52.1	23.2	71.3	19.7	1.1	6.5	13.5

In 2010, the overall rate for December 31 point prevalent dialysis patients was 1,218 per million population. The percentage of prevalent dialysis patients with ESRD caused by diabetes ranges from 40 in Networks 1, 5, and 10 to 52–53 in Networks 14 and 15. » **Table 1.b;** see page 429 for analytical methods. *December 31 point prevalent dialysis patients. Adj: age/gender/race; ref: 2005 patients. "." Zero values in this cell.*

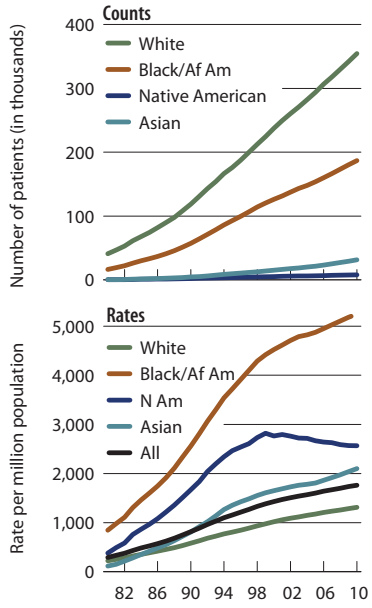
For December 31, 2010 point prevalent transplant patients, the adjusted rate per million population is lowest in Network 6, at 428, and greatest in Network 11, at 789. As in the incident population, racial disparities persist. In Network 6, for example, blacks/African Americans account for 67 percent of prevalent dialysis patients, but only 39.6 percent of the prevalent transplant population. » **Table 1.c;** see page 429 for analytical methods. *December 31 point prevalent transplant patients. Adj: age/gender/race; ref: 2005 patients. "." Zero values in this cell.*

prevalent counts & adjusted rates

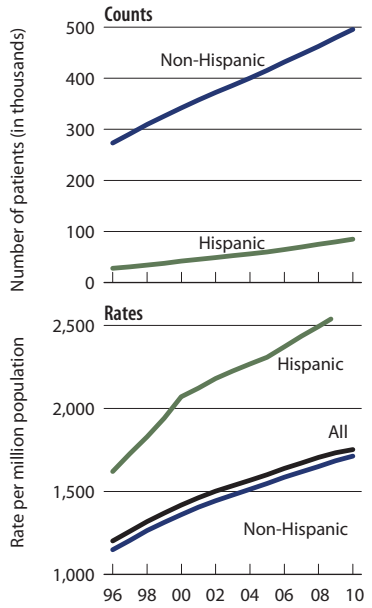
vol 2 1.12 **Prevalent counts & adjusted rates of ESRD, by age**



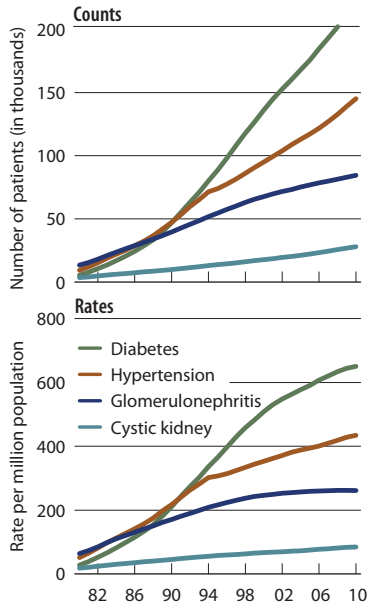
vol 2 1.13 **Prevalent counts & adjusted rates of ESRD, by race**



vol 2 1.14 **Prevalent counts & adjusted rates of ESRD, by Hispanic ethnicity**



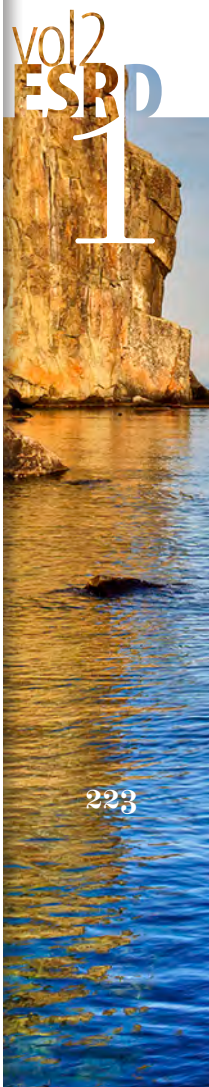
vol 2 1.15 **Prevalent counts & adjusted rates of ESRD, by primary diagnosis**



Reaching 6,068 per million population in 2010, the adjusted rate of prevalent ESRD for patients age 65–74 has increased 27 percent since 2000, while the rate among those age 75 and older has grown 44 percent, to 5,865. Among those age 20–44 and 45–64, in contrast, growth has been 14 and 19 percent, respectively, to 940 and 3,402 per million.

By race, rates of prevalent ESRD remain greatest in the black/African American and Native American populations, at 5,242 and 2,566 per million population in 2010, compared to 1,311 and 2,101 among whites and Asians. The rate among Hispanics reached 2,606 in 2010, 1.5 times greater than that in the non-Hispanic population.

Rates of ESRD due to diabetes and hypertension rose 1.8 and 2.1 percent, respectively, in 2010, to 656 and 437 per million population. ESRD caused by cystic kidney disease rose 1.8 percent, to 85 per million, and ESRD due to glomerulonephritis remained stable, at 263. » **Figures 1.12–15;** see page 429 for analytical methods. *December 31 point prevalent ESRD patients. Adj: gender/race (1.12); age/gender (1.13–14); age/gender/race (1.15); ref: 2005 ESRD patients.*



In 2010, 103,874 new patients began ESRD therapy on hemodialysis, 7,586 were placed on peritoneal dialysis, and 2,572 received a preemptive transplant (these data exclude patients with missing demographic information). Rates per million population were 316, 23.3, and 7.9, respectively.

Past studies have suggested high mortality and significant movement between modalities in the first 90 days after ESRD initiation. The total number of 2010 incident patients with a known modality fell 11.4 percent between initiation and day 90. The hemodialysis population at day 90 was 13 percent smaller than at initiation; the peritoneal dialysis and transplant populations, in contrast, gained 5 and 22 percent, respectively.

Between initiation and day 90, the rate per million population for hemodialysis fell from 316 to 273, while the rate for transplant rose from 7.9 to 9.7, and that for peritoneal dialysis rose from 23.3 to 24.6.

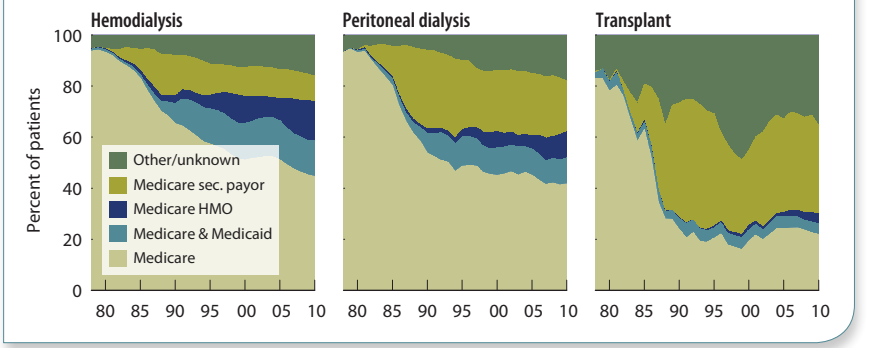
At one year, the total number of patients with a known modality was 16.6 percent smaller than at day 90, and 26 percent smaller than at initiation. The rate per million population fell to 220 for hemodialysis, 20.8 for peritoneal dialysis, and 15.7 for transplant. » **Table 1.d;** see page 429 for analytical methods. *Incident ESRD patients, 2010; unknowns dropped. Adj: age, gender, race. Ref: 2005 ESRD patients.*

vol 2 **1.d** **Incident counts & adjusted rates of ESRD at initiation, day 90, & one year, by modality, age, gender, race, ethnicity, & primary diagnosis, 2010**

	At initiation						At day 90						At one year					
	Number of patients			Rate/million population			Number of patients			Rate/million population			Number of patients			Rate/million population		
	HD	PD	Tx	HD	PD	Tx	HD	PD	Tx	HD	PD	Tx	HD	PD	Tx	HD	PD	Tx
0-19	676	418	202	7.9	5.1	2.3	595	420	246	6.9	5.1	2.9	423	274	485	4.8	3.3	5.7
20-44	11,527	1,272	605	109.7	12.1	5.6	10,591	1,377	784	100.5	13.1	7.2	9,465	1,295	1,454	89.7	12.3	13.7
45-64	39,092	3,261	1,310	520.5	42.4	16.4	35,120	3,442	1,601	467.6	44.5	19.9	30,077	2,956	2,381	399.7	38.0	29.7
65-74	25,056	1,558	415	1,270.9	75.6	18.7	21,423	1,624	463	1,093.3	78.6	20.6	16,864	1,370	650	864.6	65.8	29.5
75+	27,523	1,077	40	1,707.5	61.4	2.0	22,208	1,134	53	1,384.7	64.6	2.6	15,711	841	75	978.8	46.9	3.9
Male	59,174	4,237	1,494	403.0	28.0	9.5	51,182	4,543	1,841	346.8	30.0	11.7	40,997	3,804	2,986	275.3	25.1	19.1
Female	44,700	3,349	1,078	248.6	19.5	6.4	38,755	3,454	1,306	215.8	20.2	7.8	31,543	2,932	2,059	176.0	17.2	12.6
White	68,273	5,399	1,842	247.6	20.1	7.0	57,210	5,715	2,325	207.8	21.3	8.9	44,014	4,765	3,787	160.4	17.8	14.7
Black/Af Am	29,787	1,667	232	871.5	45.0	6.0	27,374	1,712	291	795.0	46.1	7.4	23,881	1,490	560	683.3	39.6	14.3
N Am	1,254	70	65	427.0	20.6	17.2	1,165	87	67	394.5	26.1	17.5	1,031	89	84	345.8	27.1	21.4
Asian	4,560	450	433	332.2	29.6	25.6	4,188	483	464	301.7	31.9	27.4	3,614	392	614	256.3	25.4	36.4
Hispanic	14,157	892	224	470.5	24.5	5.6	12,802	965	282	420.7	26.3	6.8	10,867	837	520	350.4	23.2	12.1
Non-Hisp.	89,717	6,694	2,348	305.3	23.4	8.5	77,135	7,032	2,865	263.2	24.6	10.4	61,673	5,899	4,525	211.3	20.7	16.6
Diabetes	46,820	3,009	476	141.0	9.1	1.5	42,308	3,213	610	127.3	9.7	1.9	35,115	2,680	1,157	105.4	8.1	3.6
HTN	30,324	1,903	283	92.3	5.8	0.8	26,527	2,024	385	80.7	6.2	1.1	21,209	1,722	721	64.6	5.3	2.2
GN	5,759	1,000	531	17.9	3.1	1.7	5,280	1,042	636	16.4	3.3	2.0	4,615	854	1,053	14.3	2.7	3.4
Cystic kidney	1,672	437	481	5.2	1.4	1.5	1,558	456	540	4.9	1.4	1.7	1,425	377	686	4.5	1.2	2.2
Oth. urologic	1,377	99	63	4.2	0.3	0.2	1,159	96	80	3.5	0.3	0.3	923	95	112	2.8	0.3	0.4
Oth. cause	13,443	829	499	41.5	2.6	1.5	9,561	848	613	29.5	2.7	1.9	6,520	757	933	20.2	2.4	2.9
Unk./missing	4,479	309	239	13.7	1.0	0.7	3,544	318	283	10.9	1.0	0.9	2,733	251	383	8.4	0.8	1.2
All	103,874	7,586	2,572	315.8	23.3	7.9	89,937	7,997	3,147	273.2	24.6	9.7	72,540	6,736	5,045	220.1	20.8	15.7

Forty-five percent of new hemodialysis patients in 2010 were covered solely by Medicare, 14 percent had dual Medicare/Medicaid coverage, and 15.6 percent were covered by a Medicare HMO provider. Medicare covered 42 and 22 percent of new peritoneal dialysis and transplant patients, while 10.2 and 4.3 percent were dually-enrolled, and 10.3 and 3.9 percent had HMO coverage. » **Figure 1.16;** see page 429 for analytical methods. *Incident ESRD patients; peritoneal dialysis consists of CAPD & CCPD only.*

vol 2 **1.16** **Incident patient distribution, by first modality & payor**

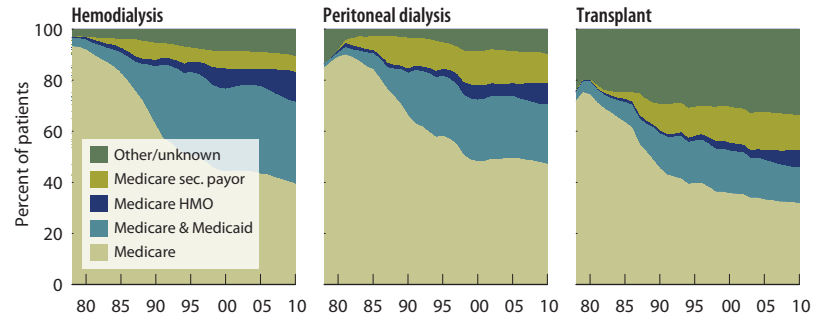


vol 2
1.e Prevalent counts & adjusted rates of ESRD, by modality, age, gender, race, ethnicity, & primary diagnosis, 2010

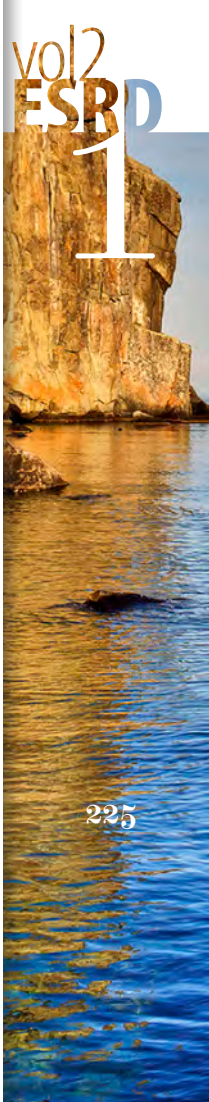
	Number of patients			Rate per million population		
	HD	PD	Tx	HD	PD	Tx
0-19	1,355	900	5,094	15.4	10.8	59.7
20-44	49,429	6,007	42,572	469.9	57.3	409.9
45-64	157,520	12,987	90,938	2,088.7	166.0	1,140.4
65-74	85,871	5,605	28,275	4,450.1	268.0	1,343.4
75+	82,177	3,768	7,257	5,252.9	214.1	394.6
Male	209,456	15,519	103,554	1,399.3	101.8	664.6
Female	166,896	13,748	70,582	920.2	80.2	422.2
White	208,434	19,356	126,059	756.9	72.2	479.6
Black/African Am	143,862	7,586	35,034	4,109.3	199.5	925.6
Native American	5,666	351	1,941	1,895.7	107.0	560.3
Asian	18,390	1,974	11,102	1,297.0	126.9	673.7
Hispanic	59,294	3,778	21,990	1,920.9	102.1	579.0
Non-Hispanic	317,058	25,489	152,146	1,083.5	89.4	541.1
Diabetes	168,582	9,980	41,006	500.5	29.9	124.7
Hypertension	109,265	7,512	28,234	328.7	22.9	85.2
Glomerulonephritis	34,527	4,833	44,958	106.6	15.1	140.5
Cystic kidney	9,179	1,560	17,170	28.1	4.8	51.8
Other urologic	6,530	576	5,791	20.1	1.8	18.5
Other cause	34,334	3,652	26,320	106.0	11.5	83.6
Unknown/missing	13,935	1,154	10,657	42.5	3.6	33.2
All	376,352	29,267	174,136	1,132.5	89.6	537.5

On December 31, 2010, more than 376,000 ESRD patients were receiving hemodialysis therapy, 29,267 were being treated with peritoneal dialysis, and 174,136 had a functioning graft. Rates of ESRD in the prevalent population continue to be highest among blacks/African Americans, at 4,109 per million population for hemodialysis, 199.5 for peritoneal dialysis, and 925.6 for transplant. Prevalent rates for Asian patients on peritoneal dialysis or with a transplant are higher than those of their Native American counterparts. At 1,896, however, the rate of Native Americans receiving hemodialysis is 46 percent greater than that found in the Asian population, and more than double that found in whites. » **Table 1.e;** see page 429 for analytical methods. *December 31 point prevalent ESRD patients, 2010; unknowns dropped. Adj: age, gender, race. Ref: 2005 ESRD patients*

vol 2
1.17 Prevalent patient distribution, by modality & payor



Nine of ten prevalent hemodialysis patients had some type of Medicare coverage in 2010, with 39 percent covered solely by Medicare, and 32 percent under Medicare/Medicaid. In the transplant population, in contrast, nearly one-third were covered solely by Medicare. Transplant patients younger than 65 and not disabled lose their entitlement after three years with a functioning graft. Coverage by non-Medicare insurers continues to increase in the dialysis population, in 2010 reaching 10.7 and 10.0 percent for hemodialysis and peritoneal dialysis patients, respectively. » **Figure 1.17;** see page 429 for analytical methods. *December 31 prevalent ESRD patients; peritoneal dialysis consists of CAPD & CCPD only.*



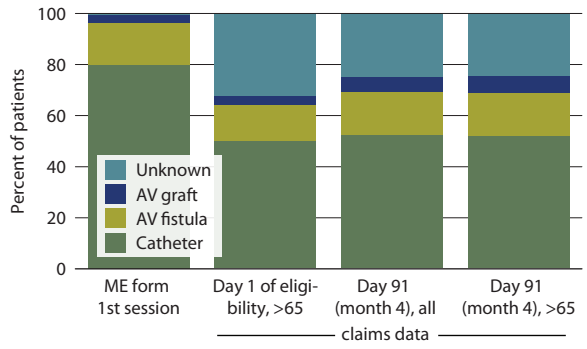
Forty-three percent of patients starting ESRD therapy in 2010 had not seen a nephrologist prior to initiation. Of these patients, 89 percent initiated with a catheter and only 3 percent with a mature fistula; 13 percent had a maturing internal access. Patients with more than one year of pre-ESRD nephrologist care, in contrast, were far more likely to initiate with a mature fistula, at 26.3 percent. » **Table 1.f;** see page 429 for analytical methods. *Incident ESRD patients, 2010.*

Data from the Medical Evidence form indicate that nearly 80 percent of 2010 incident hemodialysis patients initiated treatment with a catheter as their vascular access, 16.3 percent started with an arteriovenous (AV) fistula, and 3.2 percent initiated with an AV graft. By month four (day 91) of treatment, claims data show rates of catheter, AV fistula, and AV graft use were 52.6, 16.7, and 5.9 percent, respectively. » **Figure 1.18;** see page 429 for analytical methods. *Incident hemodialysis patients, July–December, 2010.*

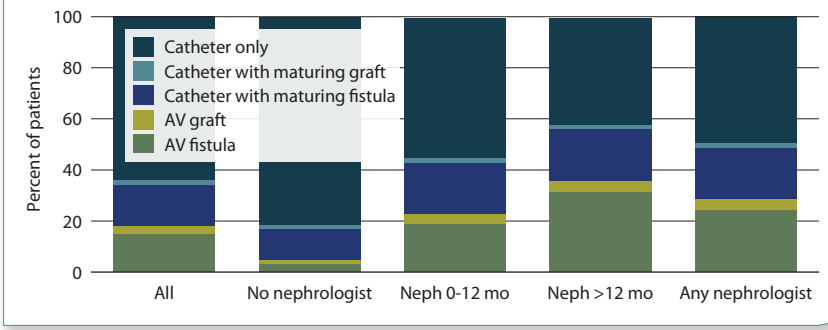
vol 2 **1.f** **Pre-ESRD nephrologist care (column percent), 2010**

	None	0–12 mo.	>12 mo.
All	43.0	31.7	25.4
Mean age (yrs)	61.6	62.7	63.7
0-19	1.1	1.2	1.4
20-44	13.6	11.3	9.6
45-64	39.7	38.4	36.4
65-74	21.9	24.2	25.8
75+	23.7	24.9	26.7
Female	42.8	43.4	42.8
Race			
White	63.2	65.7	70.6
Black/Af Am	29.6	27.6	23.3
Native American	1.2	1.4	1.1
Asian	4.9	5.2	4.9
Hispanic	17.0	13.4	11.1
Access at initiation			
Catheter	88.9	68.0	53.5
Fistula	3.2	16.9	26.3
Graft	1.2	3.4	4.0
Maturing fistula	11.3	17.9	17.1
Maturing graft	1.7	2.5	2.0
ESA use	2.0	31.5	41.8
Dietary care	0.2	14.1	17.1
eGFR			
<5	9.5	5.2	5.1
5-<10	35.4	36.4	38.4
10-<15	28.6	36.1	36.7
≥15	19.5	20.1	18.5
DM (comorbidity)	49.4	56.9	55.8
Primary diagnosis			
Diabetes	38.9	49.1	46.9
Hypertension	28.9	28.0	26.9
Glomerulonephritis	4.7	6.6	8.9
Cystic kidney	0.9	2.2	4.6

vol 2 **1.18** **Vascular access use at initiation & on day of eligibility, 2010**



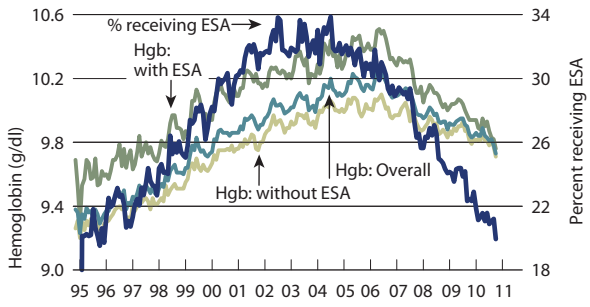
vol 2 **1.19** **Access use at first outpatient hemodialysis, by pre-ESRD nephrology care, 2010**



Among hemodialysis patients who have seen a nephrologist for more than a year prior to starting ESRD therapy, 41.8 percent initiate treatment using a catheter; these patients have the greatest likelihood at initiation of having an arteriovenous fistula (AV) or maturing fistula, at 31.3 and 20.1 percent, respectively. Patients with no pre-ESRD nephrology care most frequently start treatment with a catheter, at 81 percent, while only 18.4 percent initiate with either a mature or maturing AV fistula or graph. » **Figure 1.19;** see page 429 for analytical methods. *Incident hemodialysis patients, 2010.*

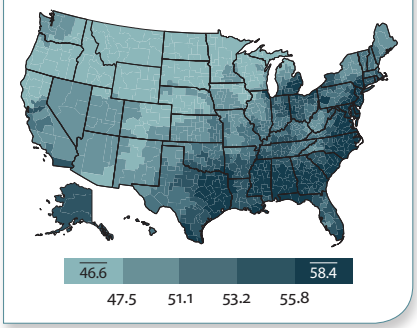
In the incident ESRD population, the mean hemoglobin at initiation has continued to fall from its peak in 2006, reaching 9.73 g/dl overall, 9.76 for patients receiving pre-ESRD treatment with an erythropoiesis stimulating agent (ESA), and 9.71 for patients without ESA treatment. At the end of 2010, 20 percent of new patients had received a pre-ESRD ESA. » **Figure 1.20;** see page 429 for analytical methods. *Incident ESRD patients.*

vol 2
1.20 Mean hemoglobin at initiation, by pre-ESRD ESA treatment



The percentage of patients initiating dialysis with a hemoglobin less than 10 g/dl is highest in parts of Texas and states along the Gulf Coast and Atlantic Seaboard, averaging 58.4 percent in the upper quintile. » **Figure 1.21;** see page 429 for analytical methods. *Incident ESRD patients.*

vol 2
1.21 Variations in the % of patients initiating dialysis with hemoglobin <10 g/dl, 2010



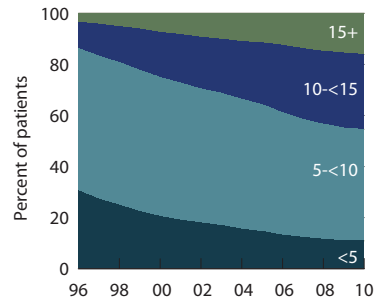
vol 2
1.g Percent of patients initiating dialysis with laboratory values outside the test's normal limit, by age, gender, race, ethnicity, & primary diagnosis, 2010

	Serum albumin	Hemoglobin <10 g/dl	Total cholesterol >200 mg/dl	LDL >100 mg/dl	HDL <40 mg/dl	Triglycerides >150 mg/dl	A1c* >7%
Age	54.9	59.6	26.2	43.3	57.1	44.8	34.3
20-44	57.6	56.2	18.8	31.7	58.2	42.4	32.2
45-64	56.8	54.1	12.9	23.5	59.0	36.8	26.8
65-74	57.8	51.7	8.8	19.3	56.3	28.5	18.6
75+							
Gender	55.6	53.4	13.1	25.8	65.2	36.6	28.0
Male	58.7	56.9	20.5	32.1	46.9	40.7	28.2
Female							
Race	56.4	52.0	14.6	25.6	62.0	41.0	28.8
White	58.6	62.4	19.8	35.0	49.0	30.7	26.1
Black/Af Am	66.8	55.3	12.4	23.7	54.2	40.3	33.9
Native American	53.2	52.9	17.6	29.5	51.9	41.1	27.1
Asian	59.2	57.1	17.1	29.3	59.4	43.7	31.7
Hispanic							
Primary diagnosis	61.8	56.6	15.4	26.6	58.5	39.0	35.6
Diabetes	51.5	53.6	14.3	28.0	55.9	32.5	14.0
Hypertension	49.0	51.1	26.2	38.8	53.9	46.9	9.4
Glomerulonephritis	22.7	35.4	16.2	32.3	55.7	41.0	4.5
Cystic kidney	56.9	55.0	16.1	28.3	57.8	38.3	28.1
All	56.9	55.0	16.1	71.0	57.8	38.3	28.1

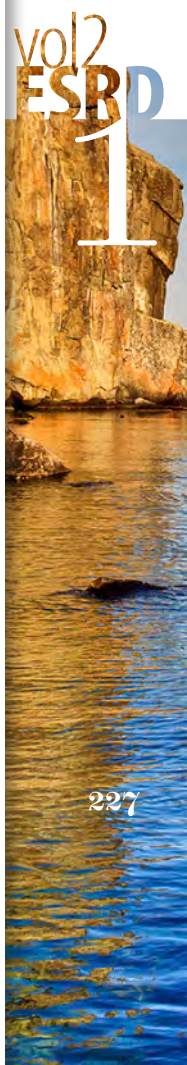
eGFR: ml/min/1.73 m²; serum albumin < lab lower limit.
*A1c data include only patients with diabetes as their primary diagnosis or as a comorbidity.

The likelihood of starting dialysis with laboratory values outside the normal limit is, with few exceptions, similar across demographic and disease categories. Overall, 56.9 percent of patients start treatment with a serum albumin below the test's lower limit, and 55 percent have a hemoglobin less than 10 g/dl. Sixteen percent initiate with a total cholesterol greater than 200 mg/dl, 28.3 percent have low density lipid (LDL) measurements more than 100 mg/dl, and 58 percent have high density lipid (HDL) levels below the Adult Treatment Panel (ATP) III target of 40 mg/dl. Triglyceride levels above 150 mg/dl occur in 38.3 percent of incident patients, and 28 percent have a glycosylated hemoglobin (A1c) level above the recommended maximum of 7 percent. » **Table 1.g;** see page 429 for analytical methods. *Incident ESRD patients, 2010.*

vol 2
1.22 Patient distribution at initiation, by eGFR (ml/min/1.73 m²)



Comparisons of estimated glomerular filtration rates (eGFRs) at the initiation of ESRD therapy indicate that patients are starting treatment sooner than in the past. In 2010, 29 percent initiated treatment with an eGFR of 10–<15 ml/min/1.73 m², compared to 17.7 percent in 2000. And 16 percent started with an eGFR of 15 or greater, in contrast to 7.4 percent in 2000. » **Figure 1.22;** see page 429 for analytical methods. *Incident ESRD patients.*



INCIDENT COUNTS & RATES

number of new ESRD patients, 2010 (Figures 1.5–7)

» white · 75,690 » black/African American · 31,739 » Native American · 1,390 » Asian · 5,462
» Hispanic · 15,284 » non-Hispanic · 98,997
» diabetes · 50,356 » hypertension · 32,537 » glomerulonephritis · 7,312 » cystic kidney disease · 2,605

adjusted rates of incident ESRD, 2010 (per million population; Figures 1.5–7)

» overall · 348
» white · 275 » black/African American · 924 » Native American · 465 » Asian · 389
» Hispanic · 501 » non-Hispanic · 338
» diabetes · 152 » hypertension · 99 » glomerulonephritis · 22.7 » cystic kidney disease · 8.1

INCIDENT RATES & RACIAL DIFFERENCES

adjusted incident rates of ESRD due to diabetes (per million population; Figure 1.8)

white	» age 20–29 · 7.6	» age 30–39 · 35	» age 60–69 · 410	» age 70+ · 476
black/African American	· 37	· 134	· 1,440	· 1,472
Native American	· 17	· 116	· 1,138	· 1,086
Asian	· 5.6	· 33	· 641	· 938
Hispanic	· 11	· 53	· 1,166	· 1,198

adjusted incident rates of ESRD due to hypertension (per million population; Figure 1.9)

white	» age 20–29 · 7.1	» age 30–39 · 15	» age 60–69 · 155	» age 70+ · 554
black/African American	· 46	· 164	· 955	· 1,597
Native American	· 6.3	· 20	· 144	· 420
Asian	· 10.8	· 26	· 233	· 761
Hispanic	· 15.1	· 31	· 278	· 706

PREVALENT COUNTS & RATES

number of prevalent ESRD patients, 2010 (Figures 1.13–15)

» white · 354,460 » black/African American · 186,785 » Native American · 7,968 » Asian · 31,528
» Hispanic · 85,202 » non-Hispanic · 495,539
» diabetes · 219,794 » hypertension · 145,182 » glomerulonephritis · 84,521 » cystic kidney disease · 27,960

adjusted rates of prevalent ESRD, 2010 (per million population; Figures 1.13–15)

» overall · 1,763
» white · 1,311 » black/African American · 5,242 » Native American · 2,566 » Asian · 2,101
» Hispanic · 2,606 » non-Hispanic · 1,717
» diabetes · 656 » hypertension · 437 » glomerulonephritis · 263 » cystic kidney disease · 85

INCIDENT & PREVALENT MODALITY

adjusted rates of ESRD at initiation, day 90, & one year, 2010 (per million population; Table 1.d)

at initiation	» hemodialysis · 316	» peritoneal dialysis · 23.3	» transplant · 7.9
at day 90	· 273	· 24.6	· 9.7
at one year	· 220	· 20.8	· 15.7

PATIENT CHARACTERISTICS

patients using an erythropoiesis stimulating agent at initiation, by pre-ESRD nephrologist care, 2010 (Table 1.f)

» no nephrology care · 2.0% » 0–12 months · 32% » more than 12 months · 42%

patients with hemoglobin less than 10 g/dl at initiation, 2010 (Table 1.g)

» overall · 55%
» white · 52% » black/African American · 62% » Native American · 55% » Asian · 53% » Hispanic · 57%

Redwood National Park, California

CLINICAL INDICATORS & PREVENTIVE CARE

Over the past decade, improvements in ESRD care have been addressed by several organizations. Most notable is CMS's assessment of provider performance under the ESRD Clinical Performance Measures (CPM) project, which looks at the implementation of guidelines from the National Kidney Foundation's Dialysis Outcomes Quality Initiative (KDOQI). KDOQI targets for dialysis therapy, vascular access, and clinical indicators are shown on the next page, along with targets based on practice guidelines and safety issues. The CPM project is currently undergoing transition to a full web-based data entry system, including monthly laboratory data from providers. There have been challenges in implementing the system, but by the summer of 2012 most providers should be entering data. Until that time, some elements traditionally reported under the CPM program will not be up to date.

Views of anemia treatment continue to evolve, as safety concerns about targeting hemoglobin levels above 12 g/dl emerge from clinical trials. Reflecting these changes, there has been a dramatic shift since 2006 in patient distribution by mean monthly hemoglobin. By the end of 2010, 10.2 percent of patients in a single month had a hemoglobin less than 10 g/dl, up from levels of just above 6 percent in the middle of the decade. The percentage of patients with a hemoglobin greater than 12 g/dl has fallen from a peak of 50.7 in February, 2007, to 21.1 at the end of 2010. And a range of 10–12 g/dl is now reached by 69 percent of patients, a number last seen in 1998. Based on results from randomized clinical trials, these changes should reduce the risk of adverse cardiovascular events and strokes.

Anemia correction in patients treated with erythropoiesis stimulating agents (ESAs) has also changed. At six months after initiation, mean hemoglobin levels in these patients are now 11.35 g/dl, lower than the 11.99 noted in 2002, but the ESA doses used to achieve these levels are higher than in 2002, particularly in the first three months after initiation. It is not clear why such high doses are being used to achieve a lower hemoglobin level, but these differences imply that the current use of ESAs is now considerably less effective than in the past. Alternatively, providers have been pushing too hard to correct hemoglobin levels, and in 2010 still had incentives to use higher does. They appear to cut back the dose when hemoglobin levels exceed 11.5 g/dl, using doses similar to those of 2002 by the fourth month of dialysis treatment.

The new bundled prospective payment system for dialysis patients, implemented in January, 2011, will substantially change incentives for ESA use. Recent changes in the FDA label for ESAs may also impact achieved hemoglobin levels. In the most recent change, implemented in June, 2011, the actual target range for hemoglobin level was eliminated, with dosing changes based on hemoglobin levels below 10 g/dl and on the reduction or interruption of ESA therapy when levels exceed 11 g/dl. Unfortunately, little guidance is provided on how long a dose should be held, when to restart dosing, and whether an absolute stoppage reduces not only the risk of higher hemoglobin levels but also that of levels below 10 g/dl.

We are still in transition from the notion of man as master of the earth to the notion of man as a part of it.

WALLACE STEGNER, "A Capsule History of Conservation"

Data on iron dosing practices show an increased use of IV iron products, and large doses given in the first six months of dialysis treatment, practices which may also change under the new dialysis payment system.

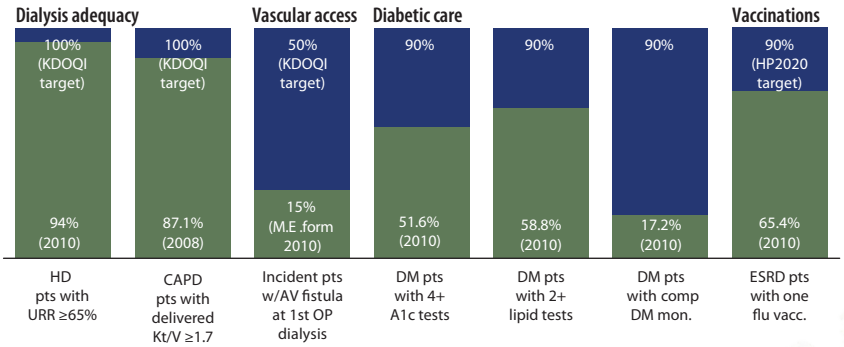
Comprehensive patient care has long been a focus of the ADR. Among diabetic patients, there continues to be slow but steady progress in the use of glycemic control monitoring, lipid monitoring, and eye examinations, although only 17.2 percent of prevalent patients received all three types of care in 2009–2010. Influenza vaccination rates have again begun to improve, reaching 65 percent among prevalent patients in 2010 — still, however, below the HP2020 target of 90 percent. And there has been progress in the pneumococcal pneumonia vaccination rate, which reached 25.8 percent in 2008–2009.

Vascular access has received increased attention since the release of data on high catheter use at initiation and on increasing rates of hospitalization due to infection in the first months of therapy. The CMS Fistula First program has worked to increase the use of arteriovenous (AV) fistulas, with their lower complication rates and associated costs. Just 36 percent of 2010 incident hemodialysis patients, however, had an AV access either in use or maturing at the first outpatient dialysis treatment. In July, 2010, CMS began requiring the reporting of monthly data on vascular access use; as these data become available, the USRDS will examine prevalent access use and transitions in vascular access during the first months of dialysis.

As long recognized, catheters are associated with the highest rates of infectious complications among patients on dialysis, and fistulas the lowest — particularly important when considering, as shown in Chapter Three, that such complications are a major source of morbidity. This year we show that hospitalizations due to vascular access infections are again declining. There has, however, been a steady rise in those for bacteremia/sepsis; because this growth has occurred across modalities, it is possible that shifts in coding practice may be at play. From this perspective it seems that data on overall infections are more useful, as they are less vulnerable to changing classifications and payment incentives for hospitals.

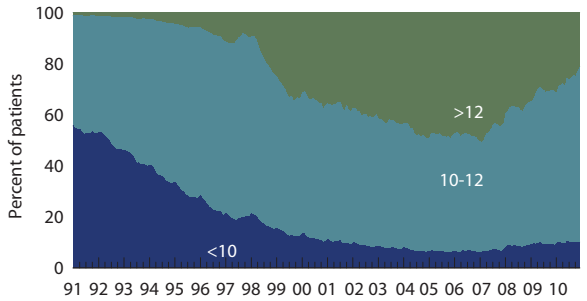
» **Figure 2.1;** see page 431 for analytical methods.

vol 2
2.1 **Quality indicators: percentage of patients meeting clinical & preventive care guidelines**

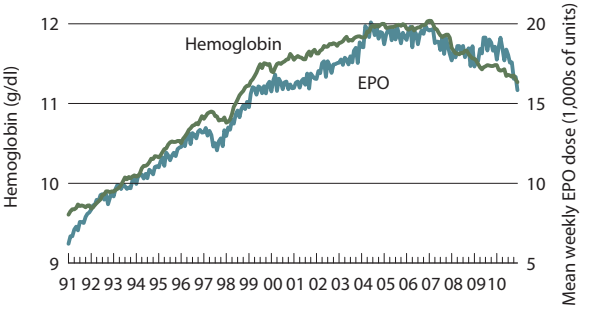


At the end of 2010, slightly more than two-thirds of prevalent dialysis patients had a mean monthly hemoglobin of 10–12 mg/dl. The mean EPO dose per week fell each month within the year, ending at 15,829 in the month of December, while the mean hemoglobin at that time was 11.3 g/dl. » **Figures 2.2–3;** see page 431 for analytical methods. *Period prevalent dialysis patients.*

vol 2
2.2 Patient distribution, by mean monthly hemoglobin (g/dl)



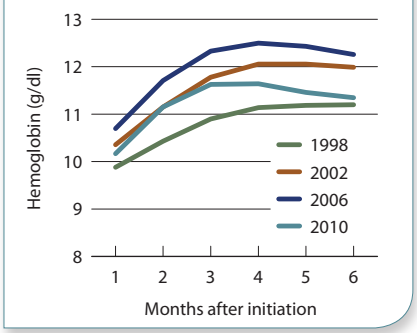
vol 2
2.3 Mean monthly hemoglobin & mean EPO dose per week



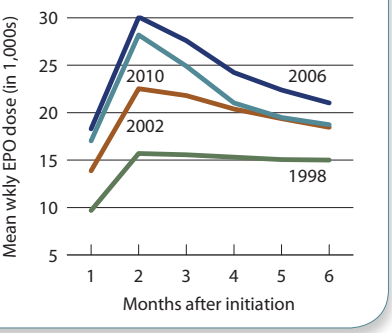
When compared to 2006 incident patients, those starting dialysis in 2010 did so with lower hemoglobins one month post-initiation, at 10.7 and 10.2 g/dl, respectively. At six months, mean hemoglobin levels were within recommended levels, at 11.4 mg/dl.

The mean EPO dose per week at six months after initiation was 18,734 units in 2010, compared to 21,046 in 2006. » **Figures 2.4–5;** see page 431 for analytical methods. *Incident dialysis patients; EPO doses in Figure 2.5 adjusted for inpatient days.*

vol 2
2.4 Mean monthly hemoglobin after initiation, by year

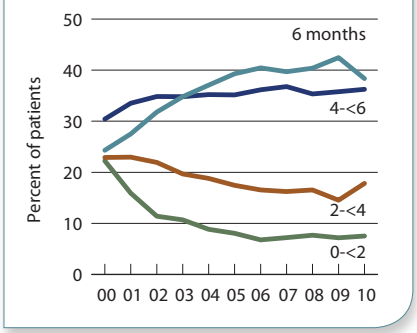


vol 2
2.5 Mean EPO dose per week after initiation, by year

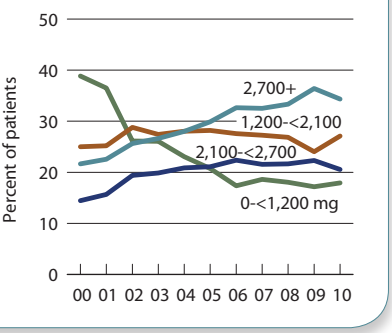


In 2010, the proportion of incident dialysis patients receiving IV iron in each of the first six months of dialysis fell 4 percentage points, to 38.4 percent. Thirty-four percent of EPO-treated patients received total IV iron doses of 0–<1,200, 1,200–<2,100, and 2,100–<2,700 mg, respectively. » **Figures 2.6–7;** see page 431 for analytical methods. *Incident dialysis patients.*

vol 2
2.6 Months with IV iron in the first six months of dialysis (EPO-treated patients)



vol 2
2.7 Total IV iron dose in the first six months of dialysis (EPO-treated patients)

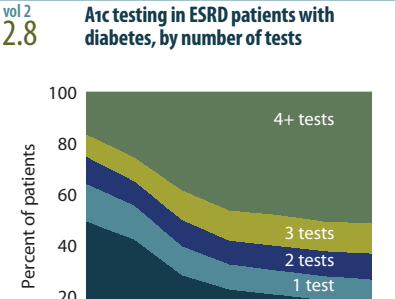


The American Diabetes Association recommends that patients with diabetes receive 2–4 glycosylated hemoglobin (A1c) tests per year, depending on changes in therapy and the attainment of treatment goals. In 2009–2010, 74 percent of diabetic ESRD patients received two or more A1c tests in a year, up from just 36 percent in 1997–1998.

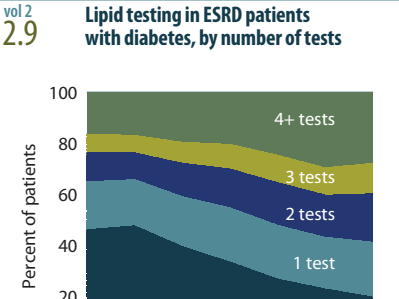
Patients with diabetes are generally predisposed to lipid abnormalities, putting them at risk for cardiovascular disease. Ideally, fasting lipid profiles should be measured at least once per year in normal adults, and more often in those with high-risk lipid values. In 1997–1998, just 35 percent of ESRD patients with diabetes had at least two annual lipid tests; this improved to 59 percent in 2009–2010.

While many patients with diabetes suffer from problems with vision due to cataracts, glaucoma, or retinopathy, frequent eye examinations continue to be uncommon among ESRD patients with diabetes. In 2009–2010, only one in five received two or more tests in a year. » **Figures 2.8–10;** see page 431 for analytical methods. *Point prevalent Medicare ESRD patients with diabetes, age 18–75.*

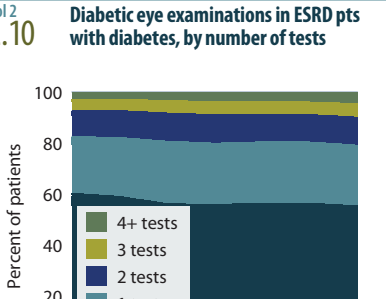
vol 2 **2.8** **A1c testing in ESRD patients with diabetes, by number of tests**



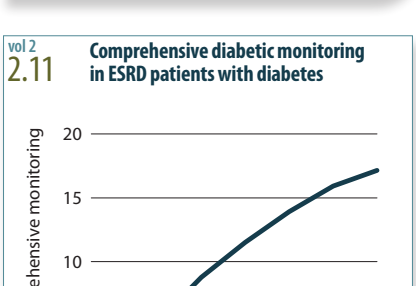
vol 2 **2.9** **Lipid testing in ESRD patients with diabetes, by number of tests**



vol 2 **2.10** **Diabetic eye examinations in ESRD pts with diabetes, by number of tests**



vol 2 **2.11** **Comprehensive diabetic monitoring in ESRD patients with diabetes**



Comprehensive diabetic monitoring includes at least four A1c tests, two lipid profile tests, and one eye examination yearly. While the rate of comprehensive monitoring has been increasing over time, in 2009–2010 only 17 percent of prevalent ESRD patients with diabetes received this testing. » **Figure 2.11;** see page 431 for analytical methods. *Point prevalent Medicare ESRD patients with diabetes, age 18–75.*

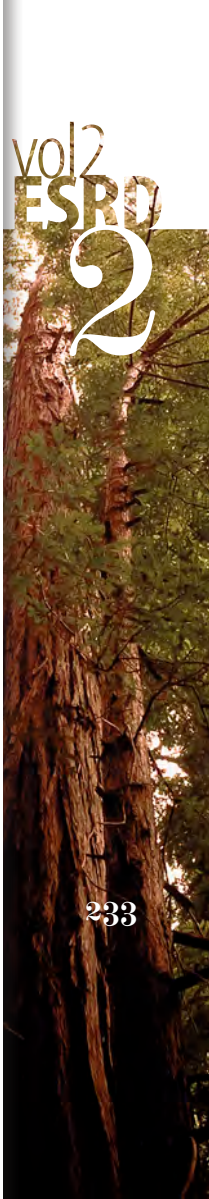
vol 2 **2.a** **Vaccination rates (percent), by age, race/ethnicity, & modality**

	Influenza			Pneumococcal pneumonia			Hepatitis B (3 per year)		
	2000	2005	2010	1999-00	2004-05	2009-10	2000	2005	2010
0–19	15.3	30.6	38.1	4.6	6.0	12.4	0.9	0.8	1.5
20-44	31.8	46.3	55.9	9.1	15.2	23.3	2.8	3.9	5.1
45-64	41.6	55.3	64.0	11.0	18.7	25.4	3.7	5.1	6.5
65-74	51.3	63.3	68.3	12.7	21.4	26.3	5.0	6.3	8.2
75+	54.3	67.6	73.1	13.5	22.5	27.7	6.0	8.3	10.8
White	48.6	62.0	67.6	11.9	19.7	23.7	4.2	6.0	8.2
Blk/Af Am	40.5	54.7	62.7	10.9	18.8	26.9	3.7	5.3	6.6
N Am	36.3	51.7	69.5	13.3	19.9	28.6	3.7	5.3	8.0
Asian	38.8	57.0	66.7	10.2	16.7	25.0	2.9	3.6	4.1
Hispanic	38.6	53.7	64.6	10.2	19.6	27.8	5.8	6.5	8.2
HD	48.4	62.7	70.1	12.3	21.7	30.1	5.3	7.4	9.7
PD	39.3	55.9	67.2	11.0	18.3	26.1	4.0	4.7	7.1
Transplant	28.9	40.6	48.6	8.2	11.7	12.2	0.3	0.3	0.5
All	44.0	58.0	65.4	11.3	19.2	25.6	4.1	5.7	7.4

Rates of reported influenza vaccinations continue to improve overall, reaching 65.4 percent in 2010, but remain noticeably lower in children than in adults. By modality, rates are highest in dialysis patients.

Overall, just over one in four ESRD patients received a vaccination for pneumococcal pneumonia in 2009–2010.

Dialysis patients should begin a series of three hepatitis B vaccinations soon after initiating therapy. The percentage receiving three vaccinations in a year remains low, with an overall rate of just 7.4 in 2010. » **Table 2.a;** see page 431 for analytical methods. *ESRD patients initiating treatment at least 90 days before tracking period: September 1–December 31 for influenza, a two-year period for pneumococcal pneumonia, yearly for hepatitis B; patients alive on the period's last day, & vaccinations tracked during the period.*



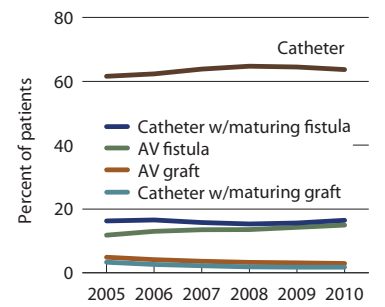
At their first outpatient hemodialysis session, nearly 64 percent of 2010 incident patients used a catheter alone as their vascular access — similar to rates in the previous two years. Eighty-two percent were using either a catheter alone or a catheter with a maturing arteriovenous fistula or graft. Fifteen percent of new patients now begin therapy with a fistula, compared to 12 percent in 2005. » **Figure 2.12;** see page 431 for analytical methods. *Incident hemodialysis patients.*

In 2010, among both whites and blacks/African Americans, the percentage of hemodialysis patients starting ESRD with an arteriovenous fistula or graft varied across the county. In the lower quintile, an average of 14.1–14.6 percent initiated treatment with an internal access; means in the upper quintile were 23.3–23.8 percent.

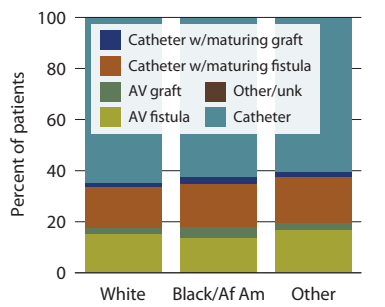
By location, patients residing in the Pacific Northwest, Alaska, and New England were the most likely to initiate dialysis with an internal access. » **Figure 2.14;** see page 431 for analytical methods. *Incident hemodialysis patients, 2010.*

At the start of ESRD therapy in 2010, 65 percent of white hemodialysis patients were using a catheter alone, compared to 62 percent of blacks/African Americans and 60 percent of patients of other races. Arteriovenous fistula use at initiation varies from 13.7 percent among blacks/African Americans to 16.9 percent among patients of other races. » **Figure 2.13;** see page 431 for analytical methods. *Incident hemodialysis patients, 2010.*

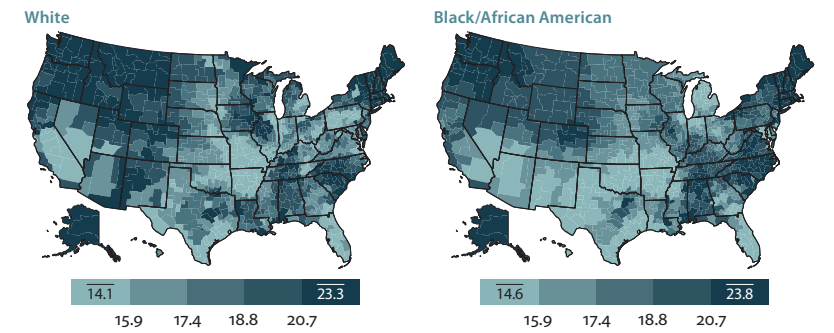
vol 2 **2.12** **Vascular access at first outpatient dialysis**



vol 2 **2.13** **Vascular access use at initiation, by race, 2010**



vol 2 **2.14** **Geographic variations in the percent of hemodialysis patients using an internal access at initiation, by race & HSA, 2010**



vol 2
2.b Access use in prevalent hemodialysis patients, by age, gender, & race/ethnicity (ESRD CPM data; percent)

	Catheter			AV fistula			AV graft		
	1999	2004	2007	1999	2004	2007	1999	2004	2007
20-44	10.9	15.0	15.0	35.8	47.2	60.9	52.7	37.8	24.1
45-64	11.7	18.0	17.4	28.8	37.5	53.4	59.1	44.5	29.1
65-74	15.4	19.3	18.8	21.3	33.9	53.5	63.2	46.8	27.7
75+	19.4	24.4	20.9	21.4	34.9	53.3	58.9	40.7	25.8
Male	11.0	14.5	13.3	37.8	49.0	64.2	50.9	36.5	22.5
Female	15.8	22.7	22.9	16.6	27.5	44.3	67.3	49.8	32.8
White	13.8	19.0	17.9	31.2	42.1	60.1	54.6	38.9	21.9
Blk/Af Am	12.9	19.2	18.6	23.2	31.1	46.5	63.6	49.7	34.9
N Am	9.5	10.3	15.1	40.5	55.2	64.3	50.0	34.5	20.6
Asian	8.6	10.7	11.3	31.1	50.4	59.7	59.8	38.9	28.6
Hispanic	12.8	16.4	14.2	29.1	41.1	58.9	57.4	42.5	26.8
All	13.2	18.5	17.7	27.9	38.6	55.0	58.5	42.9	27.2

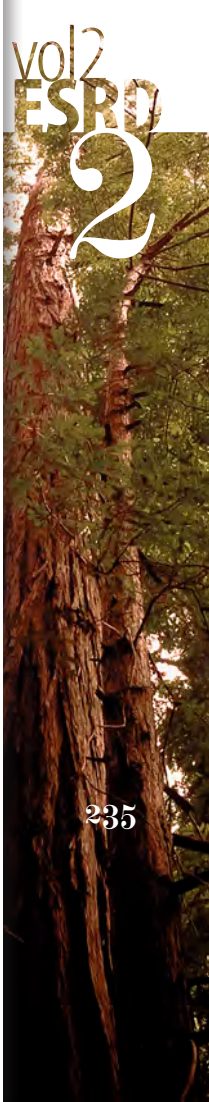
As reported in the 2011 USRDS Annual Data Report, catheter use among prevalent adult hemodialysis patients remained at 18–19 percent between 2003 and 2007 (the most recent year of available CPM data). Overall, arteriovenous fistula use during this period increased from 38.6 to 55.0 percent, while use of arteriovenous grafts fell from 42.9 to 27.2 percent. » **Table 2.b;** see page 431 for analytical methods. *Prevalent hemodialysis patients age 20 & older; ESRD CPM data.*

vol 2
2.c Access events & complications in prevalent dialysis patients (ESRD CPM data; rate per patient year)

	Catheter			AV fistula			AV graft			Peritoneal dial. device		
	1998	2003	2007	1998	2003	2007	1998	2003	2007	1998	2003	2007
Events												
Replace with same type of access	0.50	0.85	0.86	0.04	0.03	0.01	0.08	0.05	0.04	0.07	0.04	0.03
Replace with HD catheter				0.17	0.15	0.12	0.29	0.30	0.24	0.50	0.41	0.36
Replace with internal HD device	0.09	0.14	0.16							0.60	0.51	0.44
Revision				0.09	0.05	0.05	0.24	0.17	0.11			
Removal	0.24	0.36	0.22	0.02	0.02	0.01	0.08	0.05	0.04	0.13	0.12	0.11
Complications												
Infection of access	1.24	1.67	1.45	0.24	0.22	0.18	0.44	0.42	0.39	0.46	0.51	0.56
Sepsis	1.65	2.89	2.32	0.43	0.54	0.52	0.67	0.74	0.61	0.49	0.52	0.44
Angioplasty				0.16	0.28	0.47	0.49	0.77	1.10			
Declot				0.06	0.08	0.12	0.15	0.38	0.48			
Peritonitis (PD patients only)										0.65	0.63	0.61

Among prevalent adult hemodialysis patients in 2007 (the most recent year of available CPM data), the most common access-related event was replacement with a catheter, at 0.86 events per year for patients already using a catheter, and 0.12 and 0.24, respectively, for those with an arteriovenous (AV) fistula or graft. Sepsis is more common than infection, regardless of access type. In 2007, for example, the rate of sepsis among catheter patients was 1.6 times higher than the rate of infection; among AV fistula patients, the rate was three times higher.

In peritoneal dialysis patients, the rate of access replacement with another peritoneal access has decreased by a factor of two since 1998, while rates of replacement with an internal hemodialysis access or hemodialysis catheter have each fallen, but to a lesser degree. Rates of peritonitis have declined slightly since 1998, while rates of access infection have increased from 0.46 to 0.56; since 2003, the rate of sepsis has fallen from 0.52 to 0.44. » **Table 2.c;** see page 431 for analytical methods. *Catheter, fistula, & graft: prevalent hemodialysis patients age 20 & older, ESRD CPM & claims data. Peritoneal dialysis device: prevalent peritoneal dialysis patients age 20 & older.*



ANEMIA TREATMENT

mean monthly hemoglobin after initiation, 2010 (mg/dl; Figure 2.4)

» month 1 » 10.2 » month 2 · 11.2 » month 3 · 11.6 » month 4 · 11.6 » month 5 · 11.5 » month 6 · 11.4

mean EPO dose per week after initiation, 2010 (units; Figure 2.5)

» month 1 · 17,043 » month 2 · 28,209 » month 3 · 24,905 » month 4 · 21,035 » month 5 · 19,510 » month 6 · 18,734

PREVENTIVE CARE

diabetic patients receiving recommended testing, 2009–2010 (percent with two or more tests in a year; Figures 2.8–10)

» A1c · 74% » lipid testing · 59% » eye examinations · 21%

vaccination rates, by age (Table 2.a)

influenza, 2010	» age 0–19 · 39%	» 20–44 · 56%	» 45–64 · 63%	» 65–74 · 68%	» 75+ · 71%
pneumococcal pneumonia, 2009–2010	· 11%	· 24%	· 26%	· 26%	· 28%
hepatitis B, 2010	· 8%	· 17%	· 20%	· 24%	· 30%

VASCULAR ACCESS

vascular access at first outpatient dialysis, 2010 (Figure 2.12)

» catheter · 64% » catheter with maturing AV fistula · 16.4% » catheter with maturing AV graft · 1.8%
» AV fistula · 15% » AV graft · 2.9%

arteriovenous fistula use at initiation, 2010 (Figure 2.13)

» white · 15.4% » black/African American · 13.7% » other race · 16.9%

3

Arches National Park, Utah

HOSPITALIZATION

The Annual Data Report has increasingly focused on cause-specific hospitalization as an important morbidity surveillance issue. This year we continue to explore the significant increases in rates of hospitalization due to infection in the ESRD population, rates which remain 31 percent greater than those of 1994. Despite repeated presentation of these rates in the past seven Annual Data Reports, this issue remains unaddressed.

Of particular concern are the rates of hospitalization for infection in the hemodialysis population, which have increased 43 percent since 1994 (in contrast, for example, to a 50 percent decrease in vascular access hospitalizations). Hospitals have made significant progress in using less costly settings to address vascular access interventions, but equivalent progress in lowering the rate of infectious complications is lacking. The use of dialysis catheters continues to have the largest associated risk, a finding well known in the dialysis community.

In the peritoneal dialysis population the overall rate of hospitalization for infection has changed little over time. Admissions for peritonitis, in contrast, have fallen, and in 2010 were close to those for vascular access infections in the hemodialysis population, which have shown an encouraging decline since 2005. Caution is needed, however, in interpreting this trend. Rising rates of hospitalization for bacteremia/sepsis across modalities may reflect a major shift in hospital billing practices, making comparisons over time more challenging. From this perspective, the overall infection rates provide a better measure of progress.

Clear progress has been made in the total number hospital days per person year, which has dropped almost a full day per year in the hemodialysis population. This shift has important implications for dialysis providers, as a greater number of outpatient treatments, with their associated revenue, enhance options to leverage costs. With the new bundled payment system, begun in January, 2011, additional incentives to reduce hospitalization may further reduce the total hospital days per year.

These data look at hospitalization as a single, isolated event. Next we look at data on rehospitalization, overall and by major organ systems, within 30 days of a hospital discharge. Not surprisingly, rates of rehospitalization for ESRD patients are double those in the general Medicare population. Particularly striking is the 36 percent all-cause rehospitalization rate among hemodialysis patients, and the fact that the highest rates — reaching 43 percent — occur among patients age 20–44. Among patients with an index hospitalization for cardiovascular disease, almost half of the rehospitalizations are related to that primary indication.

Remote from universal nature and living by complicated artifice, man in civilization surveys the creature through the glass of his knowledge and sees thereby a feather magnified and the whole image in distortion. We patronize them for their incompleteness, for their tragic fate of having taken form so far below ourselves. And therein do we err. For the animal shall not be measured by man. They move finished and complete, gifted with the extension of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings: they are other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth.

HENRY BESTON,
The Outermost House

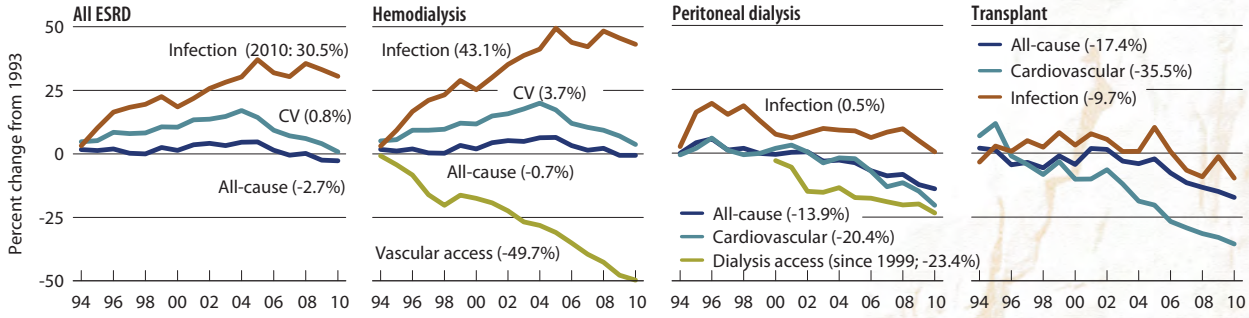
The highest rates of rehospitalization after a cardiovascular event occur among patients with an acute myocardial infarction or congestive heart failure; rates are lower among those originally hospitalized for a stroke or dysrhythmia.

Interestingly, rates of rehospitalization have changed little over the past decade. It is not clear exactly what type of care is delivered at the index hospitalization to treat the noted condition, and what additional therapy might be given after the initial discharge. Given that fluid overload, congestive heart failure, and vascular access complications are major complications for hemodialysis patients, these findings provide important information on areas for improvement.

These findings clearly illustrate some of the high costs associated with the ESRD population. A major effort is needed to determine areas that can be addressed to reduce this significant source of morbidity.

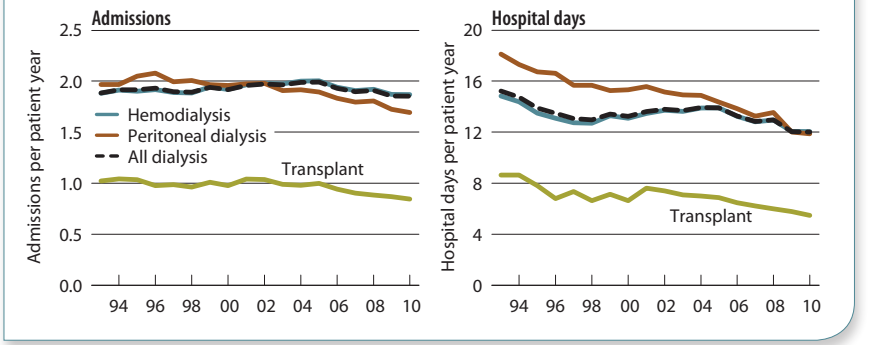
We conclude this chapter by looking at admission rates by interdialytic interval, following up on our 2011 publication in the *New England Journal of Medicine*. In comparison to that study, which used the sample cohort from the Clinical Performance Measures (CPM) quality monitoring system, we here use data on the entire Medicare hemodialysis population, with reported dates for each dialysis treatment since 2010. This allows us to define the day of the week each hemodialysis session occurs, and to link the days to cause-specific hospitalization events. This more inclusive approach yields the same results, showing the highest event rates after the long interdialytic interval, and dramatizing the issues associated with thrice weekly hemodialysis. A comparable study of peritoneal dialysis and daily home hemodialysis population is underway and will be reported in next year's ADR. » **Figure 3.1;** see page 432 for analytical methods. *Period prevalent ESRD patients; adjusted for age, gender, race, & primary diagnosis; ref: ESRD patients, 2005.*

vol 2
3.1 **Change in adjusted all-cause & cause-specific hospitalization rates, by modality**

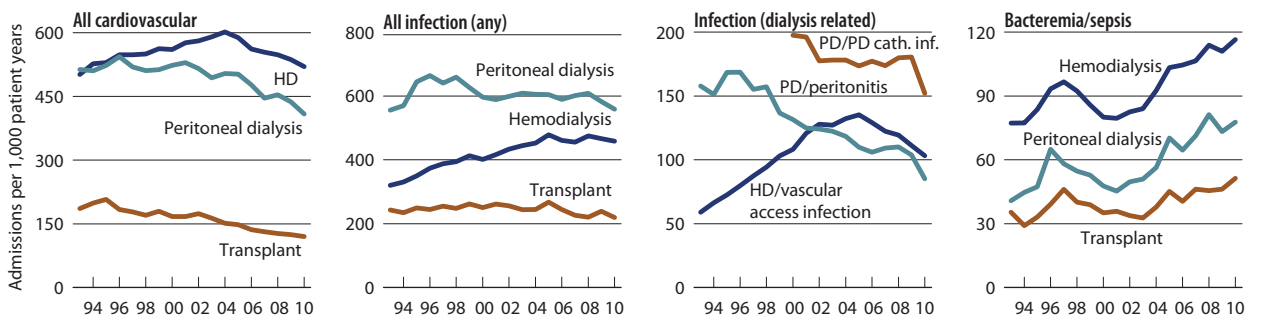


In 2010, admissions per patient year for hemodialysis patients were nearly identical to those in 1993, at 1.9. Rates for peritoneal dialysis and transplant patients, in contrast, have fallen 13.9 and 17.4 percent. Hospital days per patient year have fallen to 12 for both hemodialysis and peritoneal dialysis patients, and to 5.5 for those with a transplant. » **Figure 3.2;** see page 432 for analytical methods. *Period prevalent ESRD patients. Adj: age/gender/race/primary diagnosis; ref: ESRD patients, 2005.*

vol 2
3.2 Adjusted hospital admission rates & days, by modality



vol 2
3.3 Adjusted hospitalization rates, by principal diagnosis & modality



Adjusted cardiovascular admission rates for hemodialysis patients peaked in 2004, at 601 per 1,000 patient years, and have since fallen 13.5 percent. In the same period, rates for peritoneal dialysis and transplant patients fell 19 and 21 percent, respectively. Rates remain lowest for patients with a transplant, at 120 in 2010.

Peritoneal dialysis patients have the highest rate of admission for any infection, at 558 per 1,000 patient years in 2010, yet this rate is 16 percent lower than the 663 seen in 1996. The admission rate for peritonitis among these patients has been falling since the mid-1990s, from a peak of 169 in 1995 to 85 in 2010, and rates of admission for a peritoneal catheter infection have declined 23 percent since 2000, falling to 152 per 1,000 in 2010. Among hemodialysis patients, admissions for vascular access infection rose steadily until 2005, but since have fallen 24 percent, to 103 in 2010. Admissions for bacteremia/sepsis remain highest for hemodialysis patients, at 116 per 1,000 patient years in 2010. » **Figure 3.3;** see page 432 for analytical methods. *Period prevalent ESRD patients. Adj: age/gender/race/primary diagnosis; ref: ESRD patients, 2005.*

vol 2
3.a Unadjusted & adjusted all-cause & cause-specific hospitalization rates (per patient year) in hemodialysis patients

	All		Cardiovascular		Infection (overall)		Vascular access inf.	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
1999-2000	1.94	1.95	0.57	0.58	0.41	0.41	0.11	0.10
2001-2002	1.98	1.99	0.59	0.59	0.43	0.43	0.12	0.12
2003-2004	2.00	2.00	0.61	0.61	0.45	0.45	0.13	0.13
2005-2006	1.99	1.99	0.59	0.59	0.47	0.47	0.13	0.13
2007-2008	1.93	1.93	0.56	0.56	0.47	0.47	0.12	0.12
2009-2010	1.88	1.88	0.54	0.54	0.47	0.46	0.11	0.11
2009-2010								
Age: 20-44	1.90	2.10	0.45	0.49	0.45	0.48	0.15	0.15
45-64	1.82	1.81	0.51	0.50	0.44	0.44	0.11	0.11
65-74	1.92	1.88	0.58	0.57	0.47	0.46	0.09	0.09
75+	1.95	1.97	0.60	0.59	0.51	0.51	0.09	0.09
Male	1.75	1.75	0.51	0.51	0.43	0.43	0.09	0.09
Female	2.05	2.03	0.57	0.57	0.51	0.50	0.12	0.12
White	1.91	1.90	0.54	0.53	0.49	0.49	0.10	0.10
Black/Af Am	1.90	1.93	0.55	0.56	0.44	0.45	0.12	0.12
Other race	1.54	1.52	0.43	0.43	0.40	0.39	0.08	0.08
Hispanic	1.80	1.79	0.51	0.51	0.46	0.46	0.10	0.10
Diabetes	2.08	2.12	0.59	0.59	0.52	0.52	0.11	0.11
Hypertension	1.77	1.76	0.56	0.56	0.41	0.41	0.10	0.10
Glomerulonephritis	1.55	1.62	0.42	0.46	0.37	0.39	0.10	0.09
Other	1.77	1.78	0.43	0.45	0.48	0.48	0.11	0.11

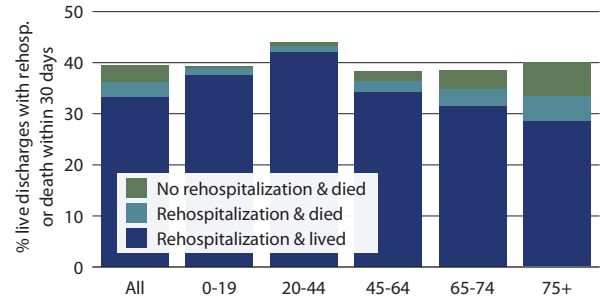
Adjusted all-cause and cause-specific hospitalization rates per patient year among hemodialysis patients have changed little since 1999–2000. In 2009–2010, adjusted rates were 1.88 and 0.54 for all-cause and cardiovascular hospitalizations, and 0.46 and 0.11, respectively, for hospitalizations due to infection (overall) and to vascular access infection. Patients who are older, female, black/African American, or have diabetes as their primary cause of renal failure generally have the highest rates of hospitalization — overall and for cause-specific conditions. » **Table 3.a;** see page 432 for analytical methods. *Period prevalent hemodialysis patients age 20 & older. Adj: age/gender/race/primary diagnosis; rates by one factor adjusted for the remaining three; ref: hemodialysis patients, 2005.*

Among hemodialysis patients prevalent in 2010, 36.3 percent of discharges from an all-cause hospitalization were followed by a rehospitalization within 30 days. The rehospitalization rate decreases as mortality increases in the older age groups, illustrating the competing risks of mortality and rehospitalization, as death precludes the opportunity for readmission. Rates of death without rehospitalization, for example, were highest in patients age 75 and older, at 7 percent, while these patients had the lowest rehospitalization rates, at 34 percent. Young adults age 20–44 and pediatric patients age 0–19 had the highest rates of rehospitalization — 43 and 39 percent of their discharges, respectively, were followed by a readmission within 30 days. For the combined endpoint of rehospitalization and/or death, the highest rates were again among patients age 20–44, at 44 percent. And the rehospitalization rate exceeded the rate of the combined endpoint even in patients age 75 and older, at 40 percent. These data suggest that the observed elevated rehospitalization rates among younger versus older groups may not be entirely attributable to the competing risk of mortality.

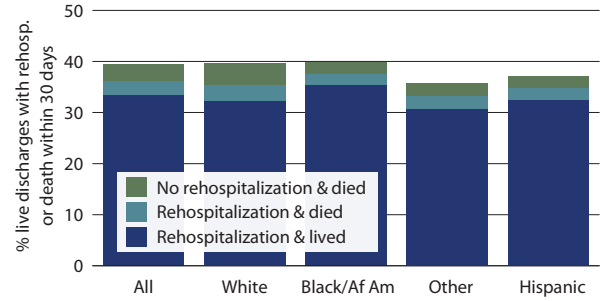
By race, the highest rates for rehospitalization or rehospitalization/death were among blacks/African Amercans, at 38 and 40 percent, respectively, while the lowest occurred among patients of races other than white or black/African American, at 33 and 36 percent.

Among hemodialysis patients in 2010, 37 percent of discharges from cardiovascular hospitalizations were followed by a rehospitalization within 30 days, compared to 34 and 31 percent of hospitalizations for overall infection or vascular access infection. » **Figures 3.4–6;** see page 432 for analytical methods. *Period prevalent hemodialysis patients, all ages, 2010; unadjusted. Includes live hospital discharges from January 1 to December 1, 2010.*

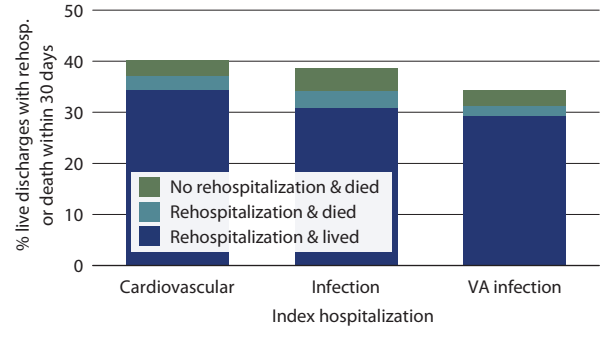
vol 2 **3.4** **All-cause rehospitalization or death 30 days after live hospital discharge, by age, 2010**



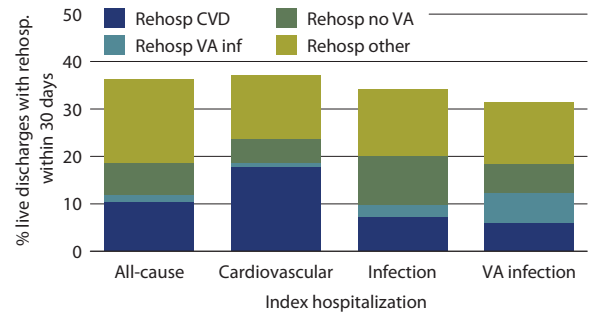
vol 2 **3.5** **All-cause rehospitalization or death 30 days after live hospital discharge, by race/ethnicity, 2010**



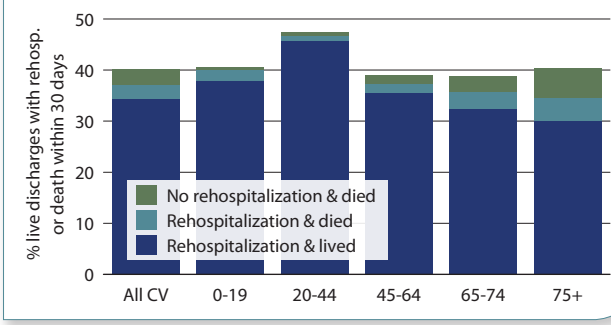
vol 2 **3.6** **All-cause rehospitalization or death 30 days after live hospital discharge, by cause-specific index hospitalization, 2010**



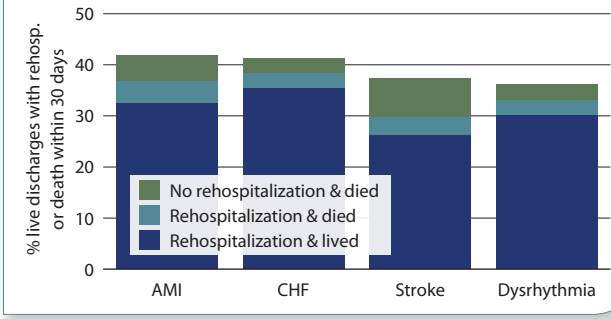
vol 2
3.7 **Cause-specific rehospitalization 30 days after live hospital discharge, by cause-specific index hospitalization, 2010**



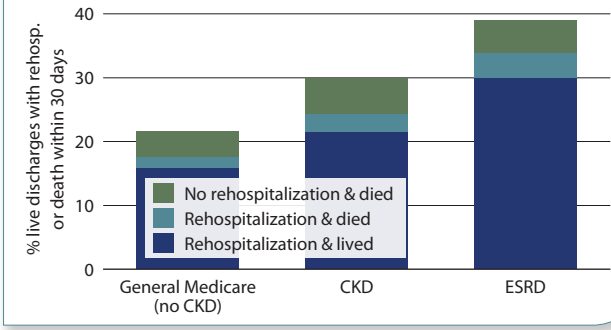
vol 2
3.8 **All-cause rehospitalization or death 30 days after live hospital discharge from cardiovascular index hospitalization, by age, 2010**



vol 2
3.9 **All-cause rehospitalization or death 30 days after live hospital discharge, by cause-specific CV index hospitalization, 2010**



vol 2
3.10 **All-cause rehospitalization or death within 30 days after live hospital discharge in patients age 66 & older, by population, 2010**



In the 30 days following a live hospital discharge from a cardiovascular index hospitalization in 2010, 48 percent of rehospitalizations were for cardiovascular issues. Rehospitalization for overall infection and vascular access infection, respectively, followed 13 and 6 percent of discharges from index hospitalizations of the same category, compared to 8 percent and less than 2 percent of discharges from all-cause index hospitalizations.

Rehospitalization rates following discharge from a cardiovascular index hospitalization were highest among the youngest patients. In those age 0–19 and 20–44, for example, 40 and 47 percent of discharges were followed by a rehospitalization within 30 days. These rates mirror those for all-cause index hospitalizations (Figure 3.4), but their values are greater. As with the all-cause rates, the 30-day rehospitalization rates following a cardiovascular index hospitalization among patients younger than age 45 were comparable to or greater than rates of the combined endpoint of rehospitalization and/or mortality among even the oldest patients, at 40 percent.

For cardiovascular index hospitalizations, the highest rehospitalization rates were after discharge from hospitalizations for myocardial infarction and CHF, at 37–38 percent, while the lowest rates occurred following discharge after stroke, at 30 percent. It is important to note, however, that the highest 30-day mortality rates also occurred following index hospitalization for stroke (11 percent), suggesting that the competing risk of mortality may contribute to this lower rehospitalization rate.

Among the general Medicare population without CKD, and among those with CKD or ESRD, rehospitalization rates within 30 days were 18, 24, and 34 percent, respectively, while those for death and/or rehospitalization were 22, 30, and 39 percent. » **Figures 3.7–10;** see page 432 for analytical methods. *Period prevalent hemodialysis patients, all ages, 2010, unadjusted; includes live hospital discharges from January 1 to December 1, 2010 (3.7–9). January 1, 2010 point prevalent Medicare patients age 66 & older on December 31, 2009 (3.10).*

Maintenance hemodialysis is typically delivered three times a week, and concern has emerged that the two-day, or "long," interval may be associated with higher than expected rates of adverse outcomes. To explore this issue, we here present data on hospitalization rates by different days of the hemodialysis week among prevalent adult hemodialysis patients in 2010.

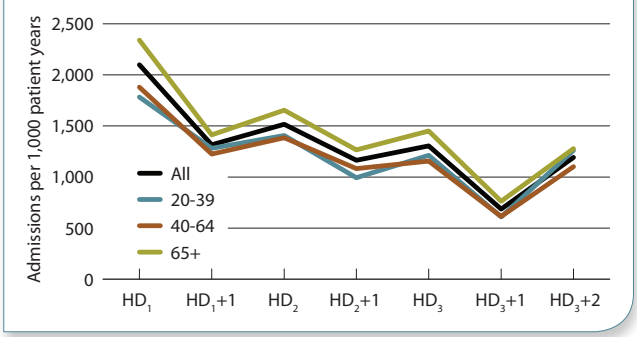
In the framework of the "hemodialysis week," HD_1, for example, is defined as Monday for patients dialyzed on Monday, Wednesday, and Friday (MWF) and as Tuesday for those treated on Tuesday, Thursday, and Saturday (TTS). $HD_3 + 2$, the second day of the long interval, is Sunday for MWS and Monday for TTS.

As shown in Figure 3.11, hospitalization rates in the overall population are highest, at 2,101 per 1,000 patient years, on the day following the long interval (HD_1), and a downward sawtooth pattern is apparent thereafter, with an opposing direction of changes on any pair of successive days and a decline when any pair separated by two days is studied.

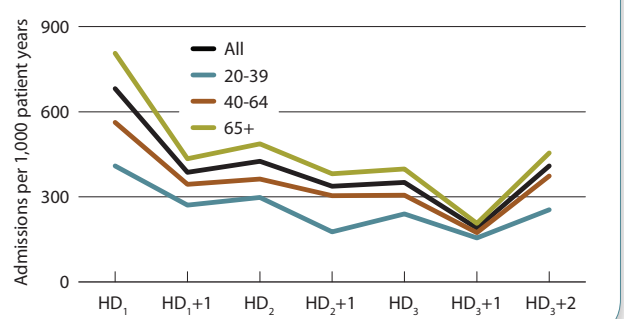
This pattern is replicated across age groups. Figures 3.12 and 3.13 show corresponding analyses for hospitalization rates attributed to cardiovascular disease and infection, respectively, and show patterns similar to those seen with all-cause hospitalization. » **Figures 3.11–13;** see page 432 for analytical methods.

January 1, 2010 point prevalent Medicare HD patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule; HD_1, HD_2, & HD_3 are the first, second, & third hemodialysis sessions. Rates for all patients are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age are adjusted for the other four factors. Ref: all included HD patients in 2010.

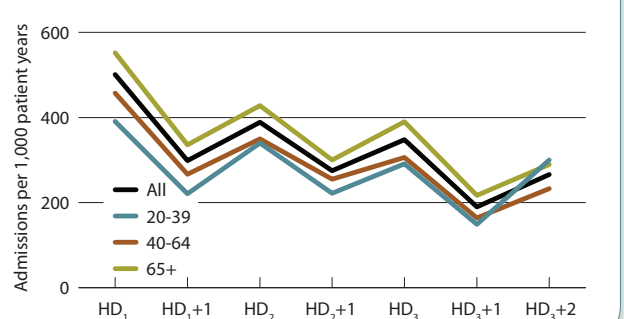
vol 2
3.11 Annualized all-cause admission rates on different days of the dialysis week, by age, 2010



vol 2
3.12 Annualized cardiovascular admission rates on different days of the dialysis week, by age, 2010



vol 2
3.13 Annualized rates of admission for infection on different days of the dialysis week, by age, 2010



vol 2
3.b Annualized all-cause admission rates (per 1,000 patient years) on days after the long & short interdialytic intervals & on days without dialysis, 2010

	Events on day after long interdialytic interval	Events on day after short interdialytic interval	Events on days without dialysis
All patients	2,101	1,412	1,093
Age: 20-39	1,784	1,312	1,040
40-64	1,881	1,272	1,009
≥ 65	2,341	1,555	1,184
Male	1,975	1,313	1,035
Female	2,267	1,539	1,169
White	2,204	1,447	1,134
Black/Af Am	1,982	1,404	1,065
Other	1,868	1,187	913
Hispanic	2,079	1,326	1,077
Diabetes	2,327	1,588	1,226
Hypertension	1,989	1,329	1,004
Glomerulonephritis	1,770	1,176	975
Other	1,949	1,272	1,001
ESRD duration			
< 4 years	2,073	1,361	1,064
≥ 4 years	2,127	1,465	1,123

Day of the dialysis week

HD_1	Monday for patients on a Monday–Wednesday– Friday schedule; Tuesday for patients on a Tuesday–Thursday–Saturday schdule.
HD_1+1	Tuesday or Wednesday for the respective shedules.
HD2	Wednesday or Thursday, respectively.
HD_2+1	Thursday or Friday, respectively.
HD3	Friday or Saturday, respectively.
HD_3+1	Saturday or Sunday, respectively.
HD_3+2	Sunday or Monday, respectively.

Interdialytic intervals

1. Day after long interdialytic interval: Monday for patients with a Monday–Wednesday–Friday dialysis schedule; Tuesday for patients with a Tuesday–Thursday–Saturday dialysis schedule.
2. Day after short interdialytic interval: Wednesday and Friday for patients with a Monday–Wednesday–Friday dialysis schedule; Thursday and Saturday for patients with a Tuesday–Thursday–Saturday dialysis schedule.
3. Days without dialysis: Other respective weekdays.

This table summarizes all-cause hospitalization rates on three types of days of the hemodialysis week: after the single long-interval dialysis day, after the two short-interval days, and on the four days without dialysis. In 2010, rates were 2,101 per 1,000 patient years for the first category, 1,412 for the second, and 1,093 for the third. Additional analyses, performed in subgroups defined by age, gender, race, ethnicity, and primary diagnosis, show temporal patterns similar to those seen in the overall patient population. » **Table 3.b;** see page 432 for analytical methods. *January 1, 2010 point prevalent Medicare hemodialysis patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule. Rates for all patients & groups by ESRD duration are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age, gender, & primary diagnosis are adjusted for the other four factors. Rates by race & ethnicity are adjusted for age, gender, & primary diagnosis. Ref: all included hemodialysis patients in 2010.*

OVERALL HOSPITALIZATION

adjusted admissions & hospital days per patient year, 2010 (Figure 3.2)

admissions	» all dialysis · 1.85	» hemodialysis · 1.87	» peritoneal dialysis · 1.69	» transplant · 0.84
hospital days	· 12.0	· 12.1	· 11.9	· 5.5

REHOSPITALIZATION

all–cause rehospitalization or death 30 days after live hospital discharge, by age, 2010 (percent; Figure 3.4)

no rehospitalization, died	» all · 3.28	» 0–19 · 0.34	» 20–44 · 0.77	» 45–64 · 1.91	» 65–74 · 3.64	» 75+ · 6.65
rehospitalization, died	· 2.83	· 1.34	· 1.03	· 2.03	· 3.26	· 4.78
rehospitalization, lived	· 33.4	· 37.7	· 42.3	· 34.4	· 31.6	· 28.7

all–cause rehospitalization or death 30 days after live hospital discharge, by race/ethnicity, 2010 (percent; Figure 3.5)

no rehospitalization, died	» all · 3.28	» white · 4.16	» black/African American · 2.17	» other · 2.42	» Hispanic · 2.21
rehospitalization, died	· 2.83	· 3.29	· 2.25	· 2.43	· 2.26
rehospitalization, lived	· 33.4	· 32.3	· 35.4	· 30.8	· 32.6

all–cause rehospitalization or death 30 days after live hospital discharge, age 66 & older, 2010 (percent; Figure 3.10)

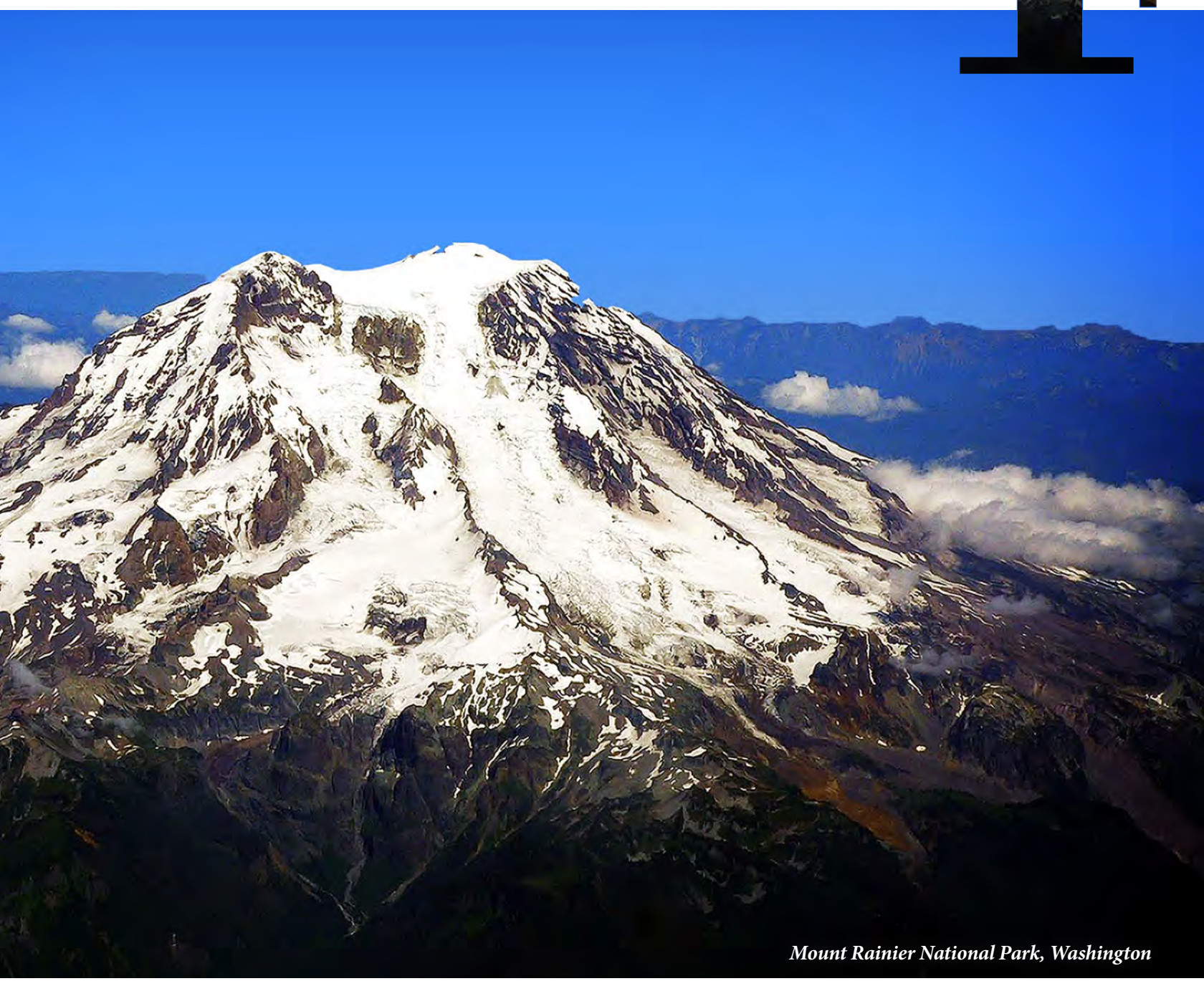
no rehospitalization, died	» general population (no CKD) · 4.0	» CKD · 5.6	» ESRD · 5.0
rehospitalization, died	· 1.8	· 2.8	· 3.9
rehospitalization, lived	· 15.9	· 21.5	· 30.0

ADMISSION RATES BY INTERDIALYTIC INTERVAL

annualized all-cause admission rates on different days of the dialysis week, by age (per 1,000 patient years; Figure 3.11)

day of week HD_1 (Monday or Tuesday)	» all · 2,101	» 20–39 · 1,783	» 40–64 · 1,881	» 65+ · 2,341
day of week HD_2 (Wednesday or Thursday)	· 1,517	· 1,407	· 1,386	· 1,656
day of week HD_3 (Friday or Saturday)	· 1,305	· 1,214	· 1,157	· 1,453

4



Mount Rainier National Park, Washington

CARDIOVASCULAR DISEASE

This year's chapter on cardiovascular disease in ESRD patients covers a number of topics new to the ADR. The Cardiovascular Special Studies Center (CVSSC) has, for example, examined sudden cardiac death (SCD) in past ADRs, describing its epidemiology and preventative treatment — notably the use of implantable cardioverter defibrillators (ICDs). In this ADR we present new data on the occurrence of SCD in incident dialysis patients.

It has been appreciated for many years that the mortality rate in patients starting dialysis is considerably higher than in the prevalent dialysis population, but few data have been available on cause-specific mortality, particularly on SCD. On the next page we show that, despite the heightened rate of SCD in incident patients, the overall contribution of arrhythmic mechanisms as a percentage of attributable mortality is actually lower in incident than in prevalent patients. Twenty-four percent of incident patient deaths are attributed to arrhythmic mechanisms, compared to 30 percent in the prevalent population.

Another important issue is the relative imprecision of the method used to estimate SCD rates. In the 2006 ADR, we presented a new method designed to increase the level of precision above that obtained by using only data from the ESRD Death Notification form (CMS-2746). Here we illustrate long-term temporal trends in SCD, comparing the "new" or "complex" (Pun et al.) method to the "old" or "simple" method.

Expanding the analyses of prior ADRs on the epidemiology of SCD, we frame these data with information on new therapies designed to reduce the risk of SCD. We have previously looked at the use of ICDs and cardiac resynchronization-defibrillator devices (CRT-Ds), and at survival in the ESRD population following their implantation. The use in ESRD patients of wearable cardioverter defibrillators (WCDs), a "niche" therapy available in the U.S. for a decade, has, however, received little attention. In this ADR we present the first long-term survival data for a small number of dialysis patients who have received WCDs.

One long-time interest of the CVSSC is the persistently high mortality following AMI in dialysis patients. Despite improvements in survival after AMI in the general population, the two-year mortality rate among 2008 dialysis patients was 71.5 percent, nearly identical to the 73 percent reported fourteen years ago (Herzog et al.). Later in the chapter we examine fatal versus non-fatal AMI in ESRD patients; the estimation of fatal and non-fatal cardiovascular endpoints is an important issue on which there has been little data published.

Non-invasive and invasive cardiac evaluations are an important component of the care of ESRD patients, with respect both to diagnosis and treatment in dialysis patients and to the pre-transplant evaluation of renal transplant candidates. Guideline 1.1a of the National Kidney Foundation KDOQI Clinical Practice Guidelines for Cardiovascular Disease in Dialysis Patients recommends that a resting echocardiogram "be performed in all patients at the initiation of dialysis (pediatric or adult), once the patient has achieved dry weight, ideally within one to three months of dialysis initiation." We present data addressing the use of echocardiography in incident dialysis patients, and on stress testing and angiography in incident dialysis patients and patients wait-listed for a renal transplant.

Finally, a key component of the treatment of cardiovascular disease in ESRD patients is their medical therapy. On the last spread we look at medication use and at survival associated with treatment. » **Figure 4.1;** see page 435 for analytical methods.
Incident & prevalent dialysis patients, 2008–2010.

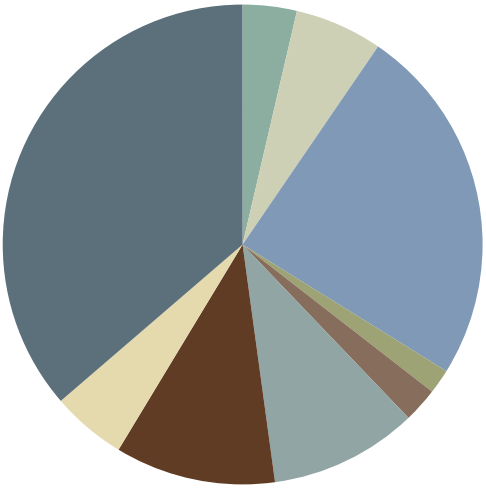
Wilderness is not a luxury but a necessity of the human spirit.

EDWARD ABBEY, *Desert Solitaire*

vol 2
4.1

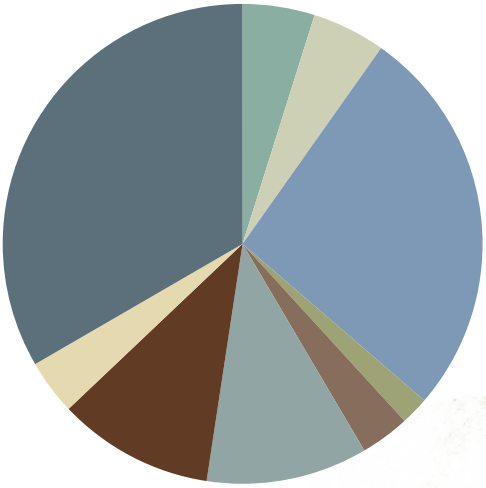
Causes of death in incident & prevalent dialysis patients, 2008–2010

Incident dialysis patients: first 180 days



- AMI: 3.6%
- CHF: 5.9%
- Arrhythmia/cardiac arrest: 24.3%
- Other cardiac: 1.7%
- CVA: 2.3%
- Infection: 10.0%
- Withdrawal: 10.8%
- Malignancy: 5.0%
- All other: 36.3%

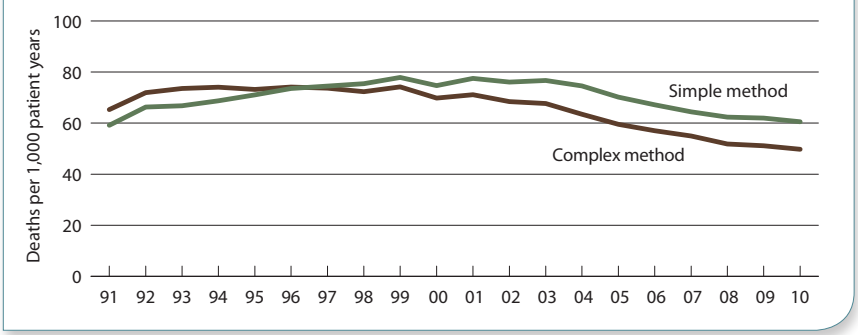
Prevalent dialysis patients



- AMI: 4.9%
- CHF: 5.0%
- Arrhythmia/cardiac arrest 26.5%
- Other cardiac: 1.9%
- CVA: 3.3%
- Infection: 10.9%
- Withdrawal: 10.5%
- Malignancy: 3.7%
- All other: 33.4%

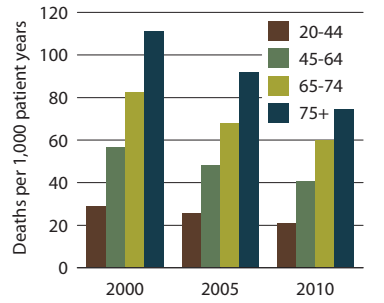
This figure uses the old/simple method and the new/complex method to estimate SCD rates in prevalent dialysis patients. The complex method yields a consistently lower rate for the past decade, an important consideration in clinical trial design. One important factor in this difference is the number of patients withdrawn from dialysis, a major cause of death which does not figure in clinical trials in the general population. » **Figure 4.2;** see page 435 for analytical methods. *Period prevalent dialysis patients, age 20 & older.*

vol 2 **4.2** **Rates of sudden cardiac death in prevalent dialysis patients, by method of estimation**

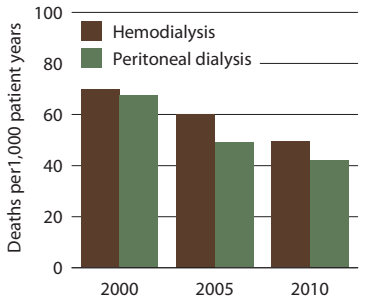


Between 2000 and 2010, the rate of SCD in hemodialysis patients fell from 70 to 50 per 1,000 patient years, a decline mirrored in the peritoneal dialysis population. The largest absolute decline has occurred in the populations at highest risk of sudden cardiac death — those of older age, white race, or with diabetes. In patients 75 or older, for example, the rate fell from 111 to 75. There are many potential explanations for this striking temporal trend, but one possible contributor is the rapid expansion in the use of beta blockers. » **Figures 4.3–6;** see page 435 for analytical methods. *Period prevalent dialysis patients, age 20 & older; unadjusted, & using the complex method.*

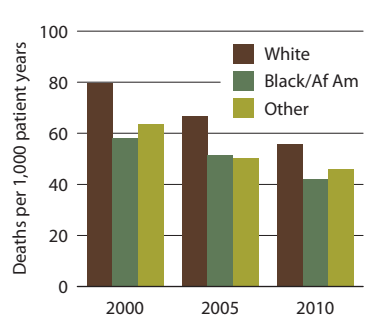
vol 2 **4.3** **Rates of sudden cardiac death in prevalent dialysis patients, by age**



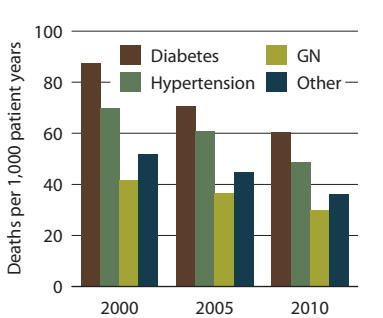
vol 2 **4.4** **Rates of sudden cardiac death in prevalent dialysis patients, by modality**



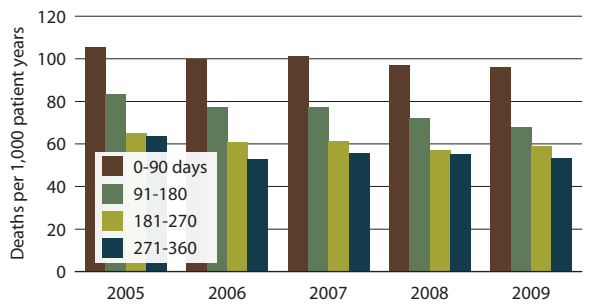
vol 2 **4.5** **Rates of sudden cardiac death in prevalent dialysis patients, by race**



vol 2 **4.6** **Rates of sudden cardiac death in prevalent dialysis patients, by primary diagnosis**

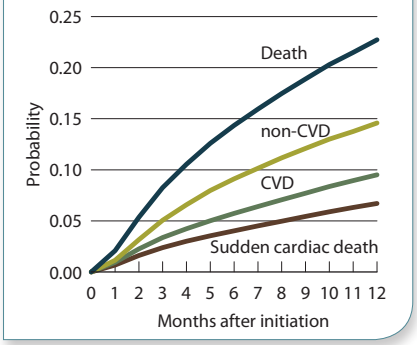


vol 2 **4.7** **Rates of sudden cardiac death following initiation of treatment in incident dialysis patients**

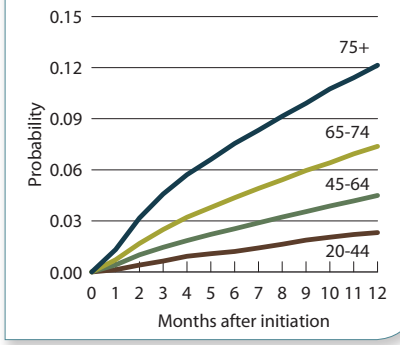


In comparison to the marked reduction in SCD in prevalent dialysis patients (Figures 4.3–6), the reduction in the rates of SCD in the first 90 days of therapy is relatively modest. Between 2005 and 2009 this rate fell only 10 percent, from 105 to 96. The first 90 days after dialysis initiation constitute a period of heightened SCD risk. » **Figure 4.7;** see page 435 for analytical methods. *Incident dialysis patients age 20 & older; unadjusted, & using the simple method.*

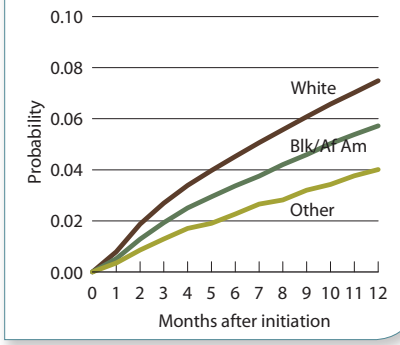
vol 2 **4.8** **Probability of death in incident dialysis patients, by cause of death, 2009**



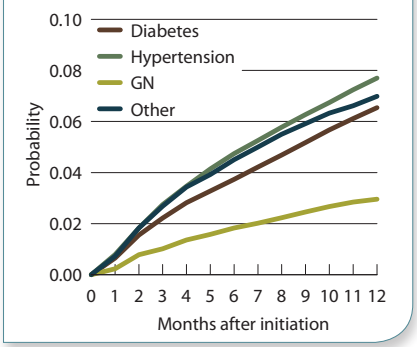
vol 2 **4.9** **Probability of sudden cardiac death in incident dialysis patients, by age, 2009**



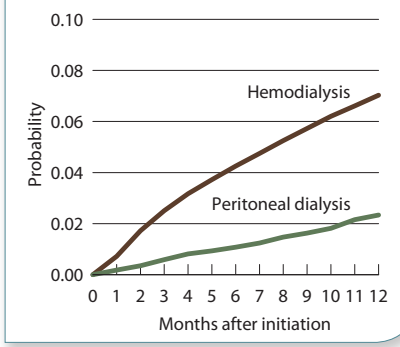
vol 2 **4.10** **Probability of sudden cardiac death in incident dialysis patients, by race, 2009**



vol 2 **4.11** **Prob. of sudden cardiac death in incident dialysis pts, by primary diagnosis, 2009**

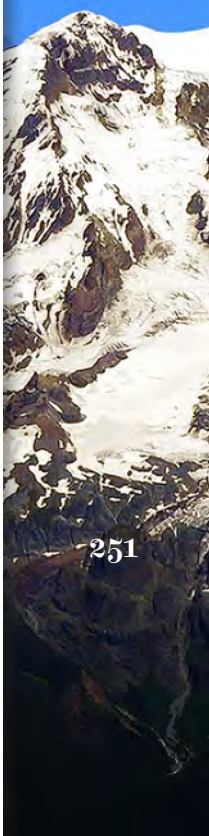


vol 2 **4.12** **Probability of sudden cardiac death in incident dialysis pts, by modality, 2009**

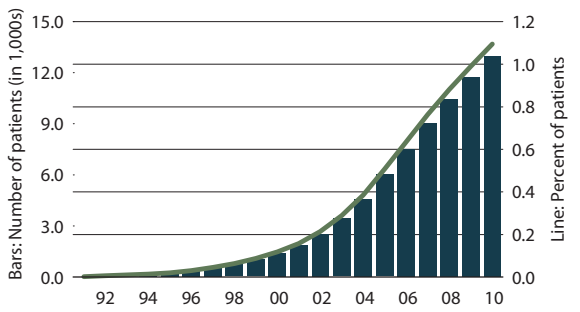


Even with the heightened risk of SCD in incident patients, the majority of deaths in the first year of dialysis are non-cardiovascular. White patients, not surprisingly, have the highest risk by race of SCD; it is surprising, however, that patients with diabetic ESRD do not have the highest risk by diagnosis, as they do in the prevalent population.

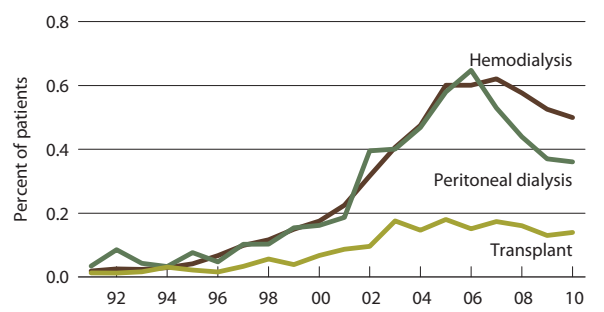
While the risk of SCD is fairly uniform for peritoneal dialysis patients in the first year of therapy, the first 90 days are a period of increased risk for hemodialysis patients. It is tempting to attribute this difference to the acute hemodynamic stress associated with hemodialysis initiation and the much larger acute potassium shifts accompanying thrice-weekly hemodialysis in patients who may have been chronically hyperkalemic before initiation. It would be very interesting if data of this type were also available on patients receiving frequent or long-duration dialysis, as a lower risk of SCD in incident dialysis patients might be anticipated. » **Figures 4.8–12;** see page 435 for analytical methods. *Incident dialysis patients age 20 & older; simple method.*



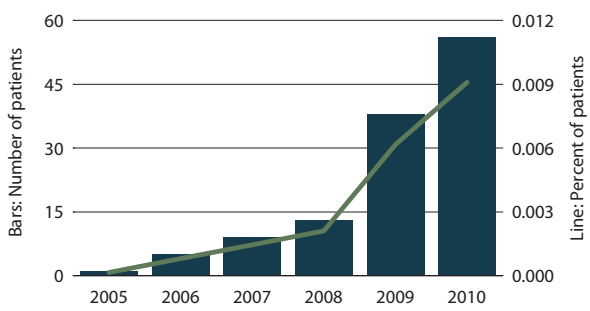
vol 2
4.13 **Cumulative number & percent of dialysis patients receiving ICDs/CRT-Ds**



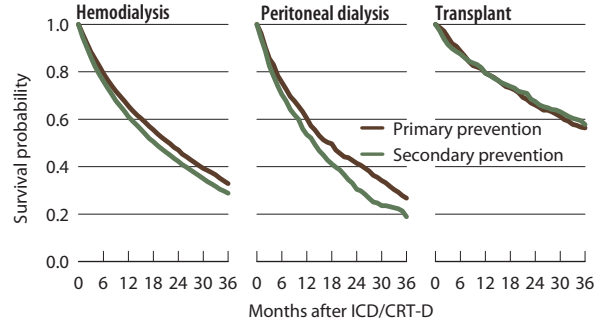
vol 2
4.14 **Patients receiving ICDs/CRT-Ds, by modality**



vol 2
4.15 **Cumulative number & percent of dialysis patients using a wearable cardioverter defibrillator**



vol 2
4.16 **All-cause survival following implantation of first ICD/CRT-D, by modality, 1999–2010**

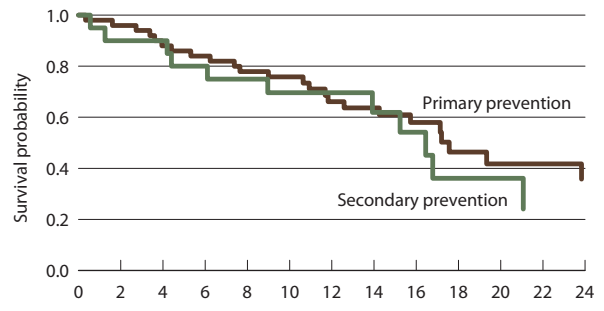


Figures 4.13–14 document both the increasing numbers of dialysis patients receiving ICD/CRT-D devices and the overall decline in use after 2006, similar to that seen in the general population. From 1991 through 2010, we estimate that 12,984 unique dialysis patients received an ICD/CRT-D device, with 3,191 of these patients receiving a CRT-D device.

Two-year mortality in dialysis patients after the implantation of ICDs/CRT-Ds is high, reaching 53 percent following implantation for primary prevention and nearly 58 percent after implantation for secondary prevention. The two-year mortality for a transplant patient in the primary prevention group, in contrast, is 34 percent.

While WCDs have been used in over 60,000 U.S. patients in the last decade, there are few data on the use of this device in dialysis patients. Figures 4.15 and 4.17 present data on these patients and their associated survival. » **Figures 4.13–17;** see page 435 for analytical methods. *Period prevalent patients: dialysis patients (4.13); dialysis & transplant patients in each year (4.14); dialysis patients (4.15); dialysis & transplant patients receiving their first ICDs/CRT-Ds in 1999–2010 (4.16); dialysis patients receiving their first WCDs in 2005–2010 (4.17).*

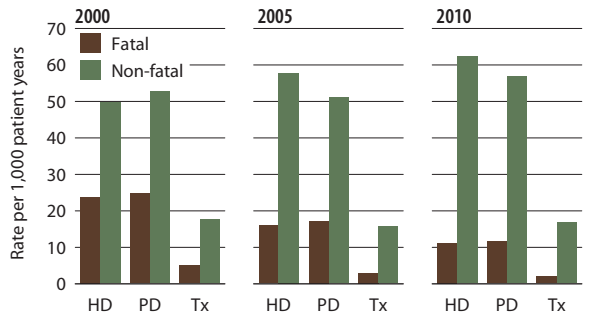
vol 2
4.17 **All-cause survival in dialysis patients using first wearable cardioverter defibrillator (WCD), 2005–2010**



vol 2
4.a Rates (per 1,000 patient years) of cardiovascular events & procedures

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AMI															
Hemodialysis	53.8	56.5	61.8	70.0	73.6	77.4	80.9	80.5	76.4	73.9	70.2	70.9	75.0	72.3	73.6
Peritoneal dialysis	66.0	67.9	72.7	74.3	77.6	79.3	79.9	76.7	72.1	68.4	65.7	68.1	67.3	67.7	68.6
Transplant	20.0	20.4	21.8	22.0	22.6	23.1	23.6	23.3	21.2	18.8	16.5	16.9	18.3	17.4	18.8
CVA/TIA															
Hemodialysis	174.5	179.6	181.4	178.7	186.1	192.6	200.6	200.9	212.6	205.8	201.3	199.9	206.7	201.7	205.2
Peritoneal dialysis	158.0	162.9	160.6	152.7	151.9	157.4	157.6	144.2	152.7	142.7	140.0	129.6	139.1	137.4	139.9
Transplant	47.0	51.5	52.2	50.0	51.8	53.2	56.8	22.9	59.9	60.9	58.5	58.3	66.4	65.0	70.5
Peripheral arterial disease															
Hemodialysis	477.7	462.0	463.6	454.3	460.8	474.7	483.5	478.6	502.5	503.5	492.2	490.9	515.6	511.2	525.6
Peritoneal dialysis	317.5	312.1	307.8	297.0	303.4	304.0	303.5	293.5	312.6	303.3	285.4	282.0	281.4	280.8	284.2
Transplant	119.3	123.7	123.7	122.3	130.1	132.4	140.3	74.2	144.8	146.0	141.1	141.4	152.6	149.7	161.4
Congestive heart failure															
Hemodialysis	554.8	573.3	578.8	574.9	583.0	611.6	636.4	643.3	682.0	688.9	677.7	681.1	686.0	677.4	696.3
Peritoneal dialysis	410.7	396.2	402.6	383.9	397.0	393.9	393.4	392.3	421.2	404.3	409.2	385.5	362.9	352.7	359.2
Transplant	102.5	112.3	121.8	126.1	133.7	138.3	145.2	65.6	152.3	153.1	144.5	142.5	153.6	150.6	163.3
Revascularization: PCI															
Hemodialysis	17.8	18.9	21.4	23.9	25.7	29.0	31.3	33.5	36.5	37.3	37.4	34.0	35.3	36.5	38.2
Peritoneal dialysis	17.9	19.5	22.1	25.3	27.2	29.9	32.4	35.8	39.5	38.6	41.2	36.9	38.6	41.5	41.5
Transplant	10.8	11.9	12.6	12.1	12.8	13.1	14.2	14.2	15.3	14.2	13.3	12.1	12.7	12.1	13.6
Revascularization: CABG															
Hemodialysis	11.9	12.7	12.5	13.3	13.6	12.7	13.3	12.6	12.0	11.5	10.7	10.9	10.5	10.7	10.5
Peritoneal dialysis	15.2	15.3	15.2	13.8	16.2	15.9	16.6	15.0	14.5	16.3	14.4	13.3	14.2	14.7	14.8
Transplant	7.1	6.9	7.7	7.1	6.5	6.7	6.2	5.8	5.2	5.1	4.4	3.9	4.0	3.5	3.9

vol 2
4.18 Rates of fatal & non-fatal acute myocardial infarction, by modality



vol 2
4.19 Two-year cumulative probability of death in dialysis patients following an AMI

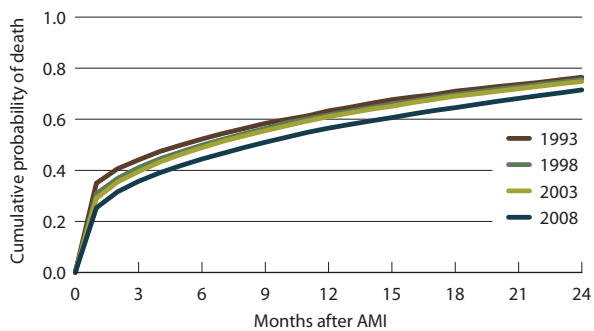
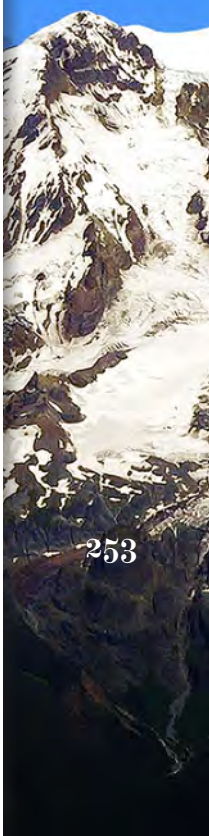


Table 4.a presents a 15-year temporal analysis of cardiovascular conditions and cardiac revascularization procedures in ESRD patients, showing congestive heart failure and peripheral arterial disease as the two conditions with the highest prevalent rates.

Figures 4.18–19 provide new data on the epidemiology of AMI in ESRD patients, showing, for example, the apparent, counterintuitive occurrence of declining rates of fatal AMI and the simultaneous growth in rates of non-fatal AMI. It is tempting to attribute the increase in non-fatal AMI to the use of increasingly more sensitive biomarkers for diagnosis, such as cardiac troponins. The decline in fatal AMI may also be related to improvements in cardiovascular outcomes in ESRD patients, as well as to changing definitions (described in the appendix).

Since 1993, outcomes for dialysis patients after AMI have been consistently poor. One cause for optimism, however, is the improvement in 30-day mortality, from 35 percent in 1993 to 25 percent in 2008. While initial treatment has probably improved patient outcomes, much attention needs to be directed to long-term (i.e., post-discharge) treatment and survival. » **Table 4.a & Figures 4.18–19;** see page 435 for analytical methods.

Point prevalent ESRD patients on January 1 of each year, age 20 & older; unadjusted (4.a & 4.18). Period prevalent dialysis patients with first AMI in the year, unadjusted (4.19).



This table is a snapshot of echocardiography use in 2010 incident dialysis patients, intended to frame the 2005 KDOQI guideline. Because of Medicare eligibility, claims data for the first 90 days following dialysis initiation are available only for patients age 65 and older. Approximately half of these patients receive an echocardiogram in the first year after initiation of dialysis. In patients younger than 65 (including pediatric patients), about one in four receive an echocardiogram in the period from 90 days to one year after dialysis initiation. » **Table 4.b;** see page 435 for analytical methods. *Incident dialysis patients, 2010.*

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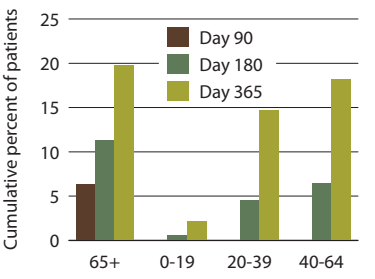
4.b **Percent of incident dialysis patients receiving first echocardiograms, 2010**

	Total	First 90 days		Day 90 to 1 year	
	N	N	Percent	N	Percent
Age 65+	32,733	9,548	29.2	6,437	19.7
0-19	413			91	22.0
20-39	3,900			995	25.5
40-64	22,248			5,800	26.1
Age 65+					
White	24,189	7,069	29.2	4,785	19.8
Black/Af Am	6,916	2,011	29.1	1,368	19.8
Other	1,628	468	28.7	284	17.4

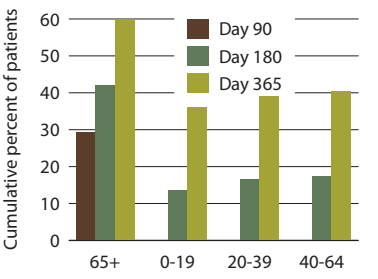
Among 2010 incident dialysis patients age 65 and older, the cumulative percentage receiving an echocardiogram in the first year reached 60 percent, compared to 20 and 14 percent for stress tests and invasive coronary angiography, but only 0.2 percent for non-invasive angiography. The very low rate of non-invasive CT coronary angiography use probably reflects both the new Medicare reimbursement for this procedure and the technical difficulty of performing it in dialysis patients, due to the large burden of coronary calcification. » **Figures 4.20–23;** see page 435 for analytical methods. *Incident dialysis patients, 2010.*

cardiovascular procedure use in incident dialysis patients

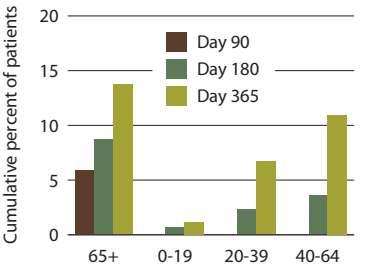
vol 2
4.20 **Incident dialysis patients receiving a stress test, by age**



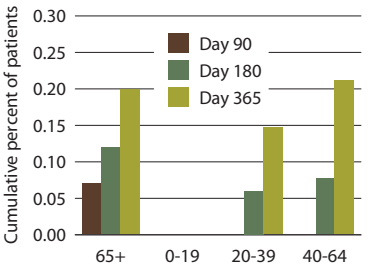
vol 2
4.21 **Incident dialysis patients receiving an echocardiogram, by age**



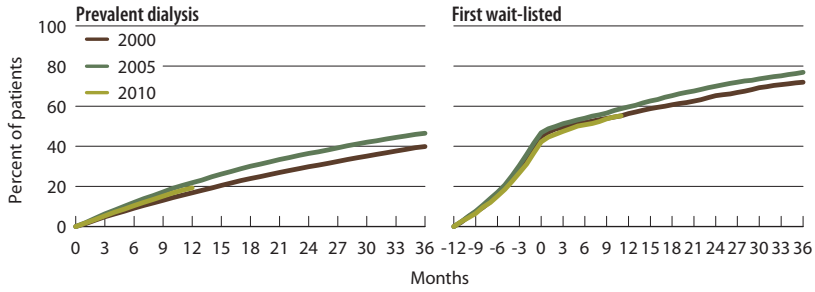
vol 2
4.22 **Incident dialysis patients receiving coronary angiography, by age**



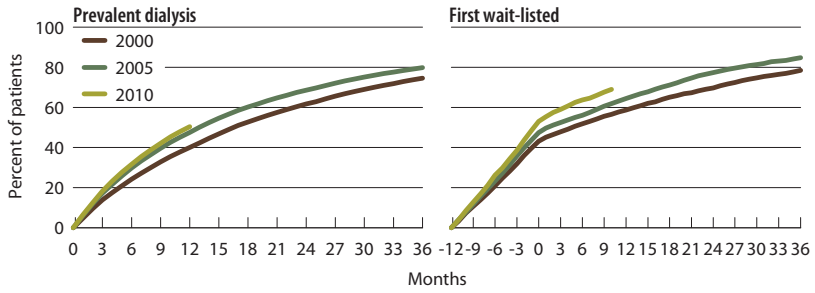
vol 2
4.23 **Incident dialysis patients receiving non-invasive coronary angiography, by age**



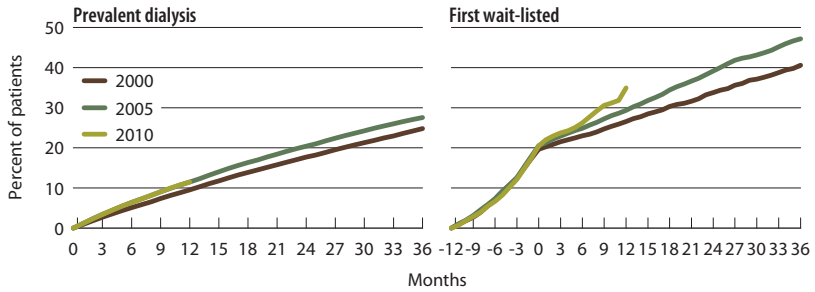
vol 2
4.24 **Cumulative percent of prevalent dialysis & pre-renal transplant patients receiving a stress test**



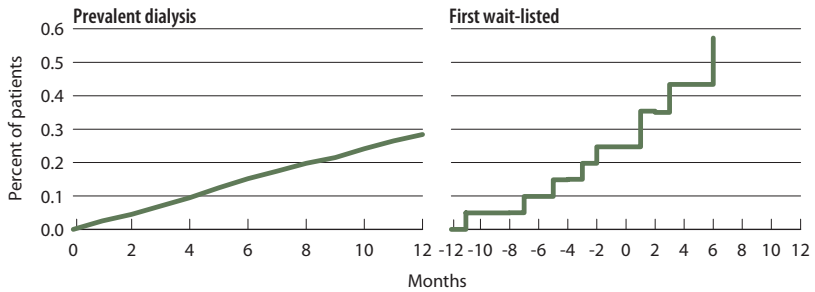
vol 2
4.25 **Cumulative percent of prevalent dialysis & pre-renal transplant patients receiving an echocardiogram**



vol 2
4.26 **Cumulative percent of prevalent dialysis & pre-renal transplant patients receiving coronary angiography**



vol 2
4.27 **Cumulative percent of prevalent dialysis & pre-renal transplant patients receiving non-invasive coronary angiography, 2010**

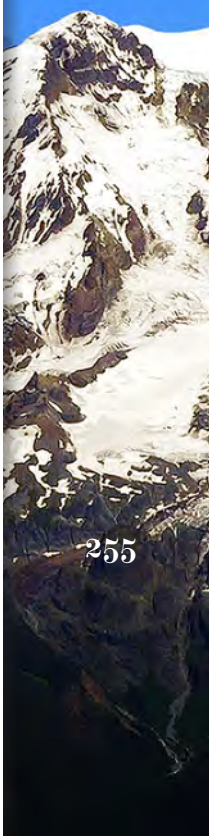


In 2000, approximately 17 percent of prevalent dialysis patients received a stress test in the first year of therapy, compared to 22 percent in 2005 and 19 percent in 2010. Forty-two percent of patients wait-listed for a transplant in 2010 had a stress test in the year prior to listing, a modest reduction from the 47 percent seen in patients listed in 2005.

The use of echocardiography, in contrast, has been on the rise. In prevalent dialysis patients, the cumulative percentage receiving an echocardiogram has increased from 40 percent in 2000 to 48 and 51 percent in 2005 and 2010. In the year prior to wait-listing for a transplant, the number has increased from 43 percent in 2000 to 48 percent in 2005 and 53 percent in 2010. With the small decline in the use of stress testing in dialysis patients, one explanation might be an increase in the use of coronary angiography, but data here show that very few prevalent dialysis patients or patients wait-listed for a transplant receive non-invasive CT coronary angiograms.

One issue related to the use of angiography in the screening of renal transplant candidates has been the issue of preemptive transplantation. Patients with declining renal function not yet requiring dialysis therapy may be considered for both preemptive renal transplantation or, lacking an available kidney donor, "preemptive" wait-listing. It is likely that concerns related to the risk of contrast nephropathy, and the precipitation of AKI requiring emergency dialysis, still temper the use of diagnostic coronary angiography in patients being screened for renal transplantation but who do not yet require dialysis. » **Figures 4.24–27;** see page 435 for analytical methods.

Point prevalent dialysis patients & Medicare enrollees wait-listed for the first time.



vol 2
4.c Cardiovascular disease & pharmacological interventions, by diagnosis & modality (row percent)

	2007 N	ACEI/ARB	Beta blocker	Clopid-ogrel	Warfarin	Statin	Amio darone	2010 N	ACEI/ARB	Beta blocker	Clopid-ogrel	Warfarin	Statin	Amio-darone
CHF														
Hemodialysis	56,199	43.5	56.7	17.4	12.2	33.1	5.3	59,664	46.6	66.0	21.7	14.0	42.7	6.3
Peritoneal dialysis	1,924	41.2	57.9	16.6	12.3	37.0	5.0	1,934	45.2	67.2	21.2	13.1	48.6	6.7
Transplant	3,811	41.4	70.0	14.5	17.3	50.4	4.1	4,792	42.2	76.3	16.7	19.4	58.5	4.5
AMI														
Hemodialysis	4,271	56.3	75.0	47.2	11.5	54.8	7.3	4,986	55.5	76.9	51.2	13.2	61.9	7.7
Peritoneal dialysis	200	47.5	78.5	53.5	9.5	56.5	8.5	216	52.8	78.2	61.1	12.5	69.9	6.0
Transplant	264	54.2	84.8	49.2	18.6	69.7	3.8	348	48.6	87.1	54.0	14.9	77.6	5.5
PAD														
Hemodialysis	47,291	39.5	51.6	19.3	12.2	34.8	4.3	50,148	41.9	59.3	23.9	13.6	43.6	5.0
Peritoneal dialysis	1,578	36.9	49.3	22.6	9.5	41.0	3.9	1,584	40.6	56.4	26.8	11.1	53.2	3.3
Transplant	4,387	39.9	59.9	15.3	13.2	51.0	2.1	5,237	41.5	67.6	19.7	13.9	58.0	2.2
CVA/TIA														
Hemodialysis	20,229	43.5	55.8	23.2	12.7	37.8	4.7	20,293	46.4	63.4	27.2	13.5	47.8	5.2
Peritoneal dialysis	719	41.6	55.5	23.9	11.0	47.0	4.5	787	46.0	59.2	27.2	14.4	51.5	4.1
Transplant	1,738	40.5	61.4	20.9	15.8	54.1	2.2	2,076	41.2	66.6	22.6	16.9	63.3	2.9
AFIB														
Hemodialysis	18,938	35.6	55.3	15.8	34.5	33.2	15.8	21,975	37.2	62.9	18.9	38.8	43.2	17.8
Peritoneal dialysis	625	31.0	55.0	16.3	39.8	38.7	17.8	791	33.9	63.8	15.4	43.4	50.7	19.2
Transplant	1,870	37.7	65.1	9.0	47.8	47.0	10.2	2,840	42.6	74.4	10.3	54.0	58.2	11.9
ICD/CRT-D														
Hemodialysis	734	55.3	72.8	29.3	19.6	45.6	13.1	610	58.0	76.6	30.3	22.1	47.5	17.4
Peritoneal dialysis	31	54.8	77.4	19.4	19.4	41.9	19.4	26	53.8	88.5	19.2	11.5	53.8	26.9
Transplant	48	56.3	89.6	27.1	33.3	60.4	8.3	46	52.2	87.0	26.1	34.8	76.1	15.2
Revascularization: PCI														
Hemodialysis	3,507	55.0	76.0	83.1	9.5	60.5	5.2	4,214	54.8	77.4	83.5	9.6	67.8	5.6
Peritoneal dialysis	197	49.7	72.6	85.8	4.1	59.9	6.1	217	47.5	74.2	82.0	6.5	71.4	2.8
Transplant	296	49.7	76.4	86.5	12.2	70.6	3.4	407	49.9	82.1	83.3	8.1	76.9	1.2
Revascularization: CABG														
Hemodialysis	615	58.0	77.2	32.2	10.1	64.7	17.6	687	55.7	83.3	38.3	12.4	70.6	17.2
Peritoneal dialysis	38	57.9	84.2	34.2	21.1	65.8	21.1	54	46.3	81.5	44.4	9.3	70.4	20.4
Transplant	51	58.8	82.4	31.4	15.7	68.6	17.6	73	50.7	90.4	28.8	27.4	83.6	31.5
No cardiac event														
Hemodialysis	55,043	44.2	51.8	8.2	6.8	28.3	1.0	63,847	46.9	58.1	9.4	6.6	33.9	1.1
Peritoneal dialysis	6,320	43.5	47.5	5.4	3.6	33.7	0.6	6,840	49.0	55.9	5.9	4.3	39.7	0.6
Transplant	27,035	41.9	53.9	3.7	4.7	47.6	0.4	31,699	41.8	58.6	4.7	4.8	51.1	0.3

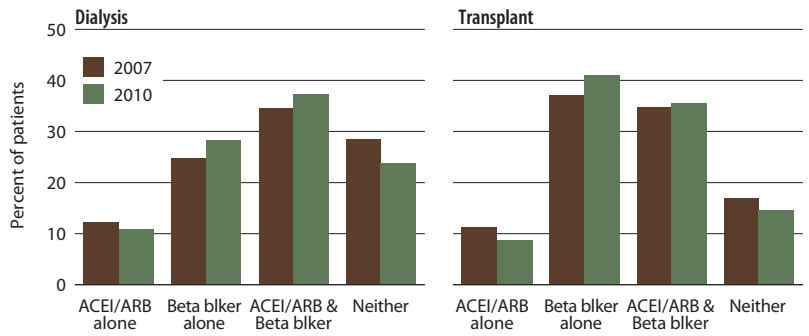
Two-thirds of dialysis patients diagnosed with CHF in 2010 received a beta blocker, while 47 percent of hemodialysis patients with this diagnosis received an ACEI/ARB. Beta blockers were used by more than three-quarters of ESRD patients with an AMI during 2010 and, remarkably, by 58 percent of hemodialysis patients with no cardiovascular diagnosis or intervention. At least with respect to medical therapy with beta blockers, if therapeutic nihilism in dialysis patients is not dead, it would certainly appear to be moribund. This is not to say that ESRD patients uniformly receive therapies to the same degree as patients in the general population, but, at least with respect to certain evidence-based therapies, such as beta blockers, the gap in utilization is markedly smaller than it was a decade ago.

The use of warfarin in hemodialysis patients with atrial fibrillation remains relatively low, perhaps reflecting concerns related to hemorrhagic risk in these patients. And given the relative paucity of data on amiodarone therapy in this population, the rates of amiodarone use for atrial fibrillation are perhaps higher than would be expected.

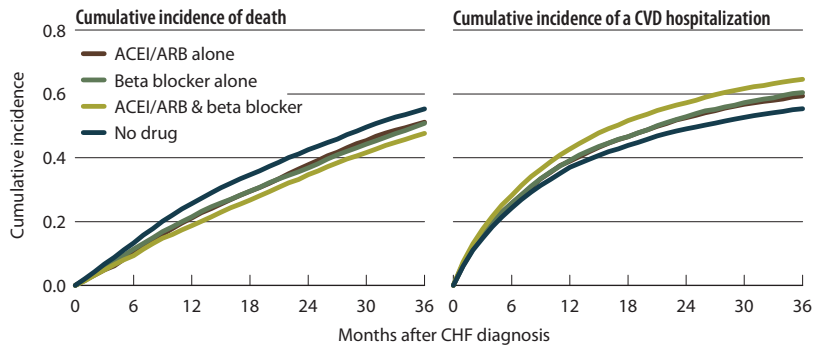
Finally, despite the publication of the 4D and AURORA trials, there has been no discernible reduction in the use of statin therapy in U.S. dialysis patients. To the contrary, even in those without identified prevalent cardiovascular illness, 28 percent of hemodialysis patients and 34 percent of peritoneal dialysis patients in 2007 received statins, compared to 34 and 40 percent in 2010. In the population qualifying for secondary prevention (e.g., those with an AMI), the use of statin therapy in hemodialysis patients increased from 55 percent in 2007 to 62 percent in 2010. » **Table 4.c;** see page 435 for analytical methods.

January 1 point prevalent patients with Medicare Parts A, B, & D enrollment, with a first cardiovascular diagnosis or procedure in the year.

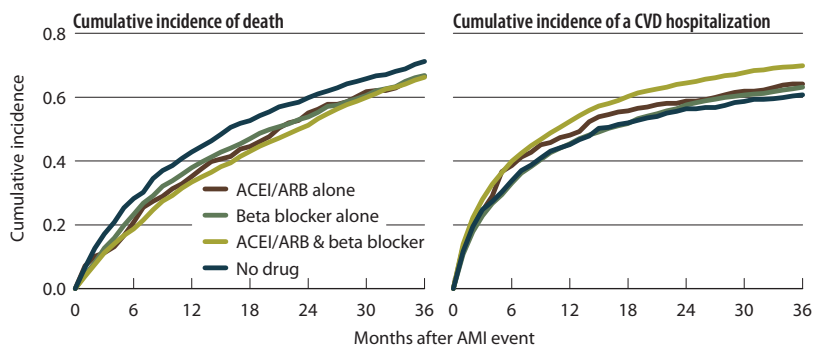
vol 2
4.28 **Cardiac drug use in ESRD patients following a diagnosis of CHF or AMI**



vol 2
4.29 **Cumulative incidence of death or CVD hospitalization in ESRD patients following a diagnosis of CHF, 2007–2010**



vol 2
4.30 **Cumulative incidence of death or CVD hospitalization in ESRD patients following a diagnosis of AMI, 2007–2010**

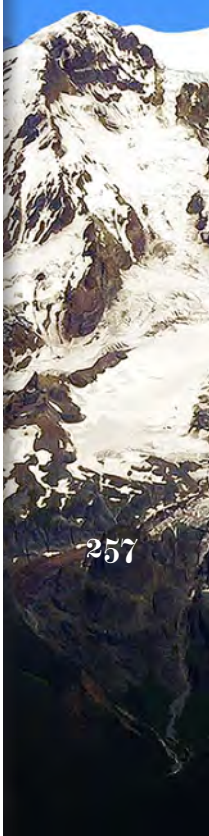


After AMI or a diagnosis of CHF, the number of ESRD patients receiving a beta blocker rose from 59 percent in 2007 to 65 percent in 2010. Use of ACEIs/ARBs declined slightly.

Data on the incidence of death and cardiovascular hospitalization following AMI or a diagnosis of CHF should be interpreted with caution, as there may be an element of selection bias. It is interesting to note, however, that the highest risk of death occurs in patients receiving no therapy. After a diagnosis of CHF, mortality among patients receiving combined therapy with ACEIs/ARBs and beta blockers was 19 percent, compared to 26 percent among those receiving no therapy; following AMI, these rates were 33 and 43 percent.

Different patterns occur for cardiovascular disease hospitalizations. It is possible that the increased incidence of hospitalizations may paradoxically relate in part to improved survival in patients receiving these beneficial therapies. » **Figures 4.28–30;** see page 435 for analytical methods.

January 1 point prevalent ESRD patients with Medicare Parts A, B, & D enrollment, with a first diagnosis of CHF or AMI in the year.



CARDIOVASCULAR OUTCOMES

outcomes at two years following a diagnosis of CHF (cumulative incidence; Figure 4.29)

death	» ACEI/ARB · 0.38	» beta blocker · 0.37	» both · 0.35	» neither · 0.43
cardiovascular hospitalization	· 0.53	· 0.53	· 0.57	· 0.49

outcomes at two years following a diagnosis of AMI (cumulative incidence; Figure 4.30)

death	» ACEI/ARB · 0.55	» beta blocker · 0.54	» both · 0.51	» neither · 0.60
cardiovascular hospitalization	· 0.59	· 0.58	· 0.64	· 0.56

MEDICATION USE

pharmalogical intervention following a diagnosis of CHF, 2010 (percent of patients on medication; Table 4.c)

hemodialysis	» ACEI/ARB · 46.6	» beta blocker · 66.0	» clopidogrel · 21.7	» statin · 42.7
peritoneal dialysis	· 45.2	· 67.2	· 21.2	· 48.6
transplant	· 42.2	· 76.3	· 16.7	· 58.5

pharmalogical intervention following a diagnosis of AMI, 2010 (percent of patients on medication; Table 4.c)

hemodialysis	» ACEI/ARB · 55.6	» beta blocker · 76.9	» clopidogrel · 51.2	» statin · 61.9
peritoneal dialysis	· 52.8	· 78.2	· 61.1	· 69.9
transplant	· 48.6	· 87.1	· 54.0	· 77.6

pharmalogical intervention following a diagnosis of CVA/TIA (percent of patients on medication; Table 4.c)

hemodialysis	» ACEI/ARB · 46.4	» beta blocker · 63.4	» clopidogrel · 27.2	» statin · 47.8
peritoneal dialysis	· 46.0	· 59.2	· 27.2	· 51.5
transplant	· 41.2	· 66.6	· 22.6	· 63.3

5

Mount McKinley, Denali National Park, Alaska

MORTALITY

Assessing mortality in the ESRD population is a unique challenge, in that two sources of death records are available to the USRDS Coordinating Center (CC).

Universal reporting to CMS of ESRD patient deaths is required as a condition of coverage for dialysis units and transplant centers. Since all ESRD patients have Social Security numbers, the CC can also link patients to the National Death Index files, which are added to the Medicare and Social Security enrollment databases. The USRDS was formerly able to report deaths only from day 90 of treatment, as Medicare did not cover services for those younger than 65; now, however, the comprehensive tracking of all ESRD patient deaths allows the USRDS to identify all deaths occurring after the first outpatient dialysis session.

Between 1993 and 2003 there was little improvement in first-year death rates in the ESRD population. Between 2003 and 2009, however, these rates fell more than 14 percent, while second-year death rates declined 16.5 percent. Month-by-month mortality rates in the first year of hemodialysis have shown similar improvements, overall and for deaths due to cardiovascular disease and infection. Progress has been made as well in mortality due to infection, and to a greater extent than seen with cardiovascular deaths. Mortality due to other causes, in contrast, has increased since 1999, a finding which requires further investigation. Still striking are the high rates of all-cause mortality in the early months of therapy, and the fact that mortality in the dialysis population remains ten times greater than among Medicare patients of similar age without kidney disease.

In the prevalent population, mortality rates have declined nearly 25 percent over the last two decades, and 19 percent since 2000.

Despite these improvements, however, only 51 percent of dialysis patients, and 82 percent of those who receive a preemptive transplant, are still alive three years after the start of ESRD therapy — numbers that help illustrate the extreme vulnerability of these patients when compared to the general population. Among dialysis patients age 65 and older, for example, mortality is twice as high as for patients in the general population who have diabetes, cancer, congestive heart failure, CVA/TIA, or AMI.

Patients with kidney disease are clearly at a high risk of death and, as shown in the hospitalization data, have very high event rates as well. In Chapter Three

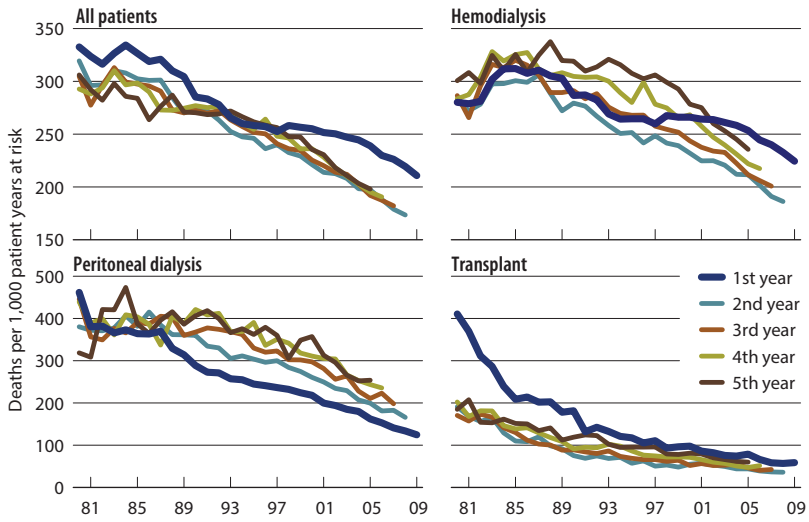
Our dead never forget the beautiful world that gave them being. They still love its winding rivers, its great mountains and its sequestered vales, and they ever yearn in tenderest affection over the lonely-hearted living, and often return to visit and comfort them.

CHIEF SEATTLE

we examine hospitalization rates by interdialytic interval; here we look at the interval in terms of mortality. Deaths due to infection, for example, peak on the day after the first run of the week. Thrice-weekly treatment may be inadequate for addressing the critical problems of persistent fluid overload, hypertension, and left ventricular hypertrophy. Recent publication of the Frequent Hemodialysis Trial (NEJM Nov 2010), comparing treatment of three days per week to that of six days, demonstrated significant reductions in left ventricular hypertrophy and hyperphosphatemia among patients receiving more frequent therapy. Mortality comparisons still need to be considered, as do questions of how more frequent sessions might be implemented across the country. In the meantime, there should be a focus on improving care and outcomes through medication interventions and reductions in the use of dialysis catheters, with their high rates of associated complications. » **Figure 5.1;** see page 438 for analytical methods. *Incident ESRD patients. Adj: age/gender/race/primary diagnosis; ref: incident ESRD patients, 2005.*

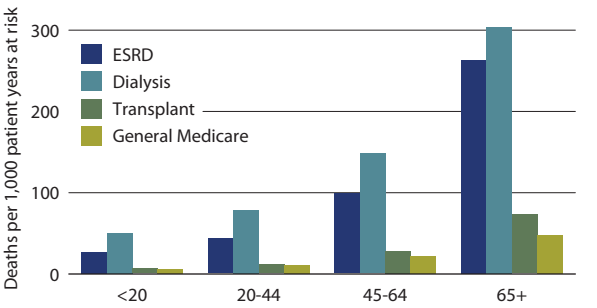
vol 2
5.1

Adjusted all-cause mortality rates (from day 90), by modality & year of treatment

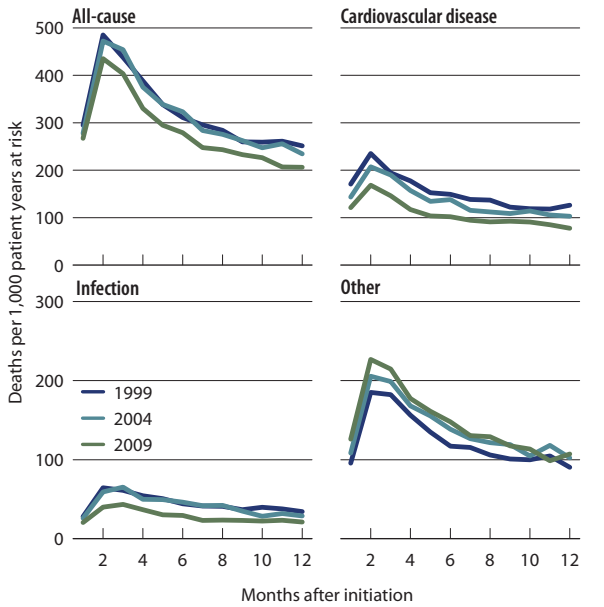


Adjusted rates of all-cause mortality are 6.3–8.2 times greater for dialysis patients than for individuals in the general population. For renal transplant patients, rates approach those of the general population, yet remain 1.1–1.5 times higher. Rates rise by age, reaching 264 per 1,000 patient years at risk for ESRD patients age 65 and older, and 304 for dialysis patients of the same age. » **Figure 5.2;** see page 438 for analytical methods. *Prevalent ESRD & general Medicare (non-ESRD) patients. Adj: gender/race; ref: Medicare patients, 2010.*

vol 2 **5.2** **Adjusted all-cause mortality in the ESRD & general populations, by age, 2010**

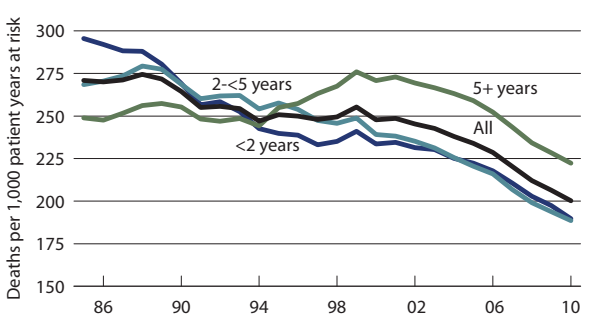


vol 2 **5.3** **Adjusted all-cause & cause-specific mortality (from day one) in the first year of hemodialysis**



In the first year of hemodialysis, all-cause mortality and mortality due to cardiovascular disease or to other causes peak in month two following initiation, then fall. For incident hemodialysis patients in 2009, for example, all-cause mortality reached 435 deaths per 1,000 patient years at risk in month two, then fell to 206 in month 12. Cardiovascular mortality peaked at 169, and decreased to 78. Mortality due to infection peaks in months 2 and 3, at 40–43 per 1,000 patient deaths. » **Figure 5.3;** see page 438 for analytical methods. *Incident hemodialysis patients defined on the day of dialysis onset, without the 60-day rule. Adj: age/gender/race/Hispanic ethnicity/primary diagnosis; ref: incident hemodialysis patients, 2005.*

vol 2 **5.4** **Adjusted all-cause mortality in prevalent hemodialysis patients, by vintage**



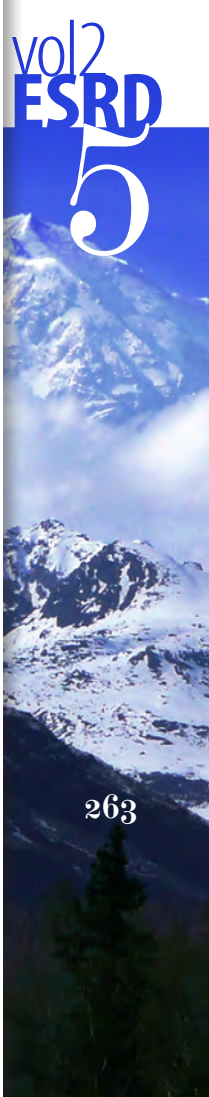
Through the 1980s, patients newer to dialysis had higher mortality rates than those on treatment for five years or more. This trend began to change in the early 1990s, and in 2010 the rate of 222 per 1,000 patient years in patients receiving hemodialysis therapy for five or more years was 17 percent higher than the rate of 190 in patients treated for less than two years. » **Figure 5.4;** see page 438 for analytical methods. *Period prevalent hemodialysis patients. Adj: age/gender/race/primary diagnosis; ref: hemodialysis patients, 2005.*

vol 2
5.a Adjusted survival probabilities, from day one, in the ESRD population

	6 months	12 months	24 months	36 months	48 months	60 months
Dialysis						
1997	0.84	0.75	0.59	0.47	0.38	0.30
1999	0.84	0.74	0.60	0.48	0.38	0.31
2001	0.84	0.75	0.60	0.49	0.40	0.32
2003	0.84	0.74	0.61	0.50	0.40	0.33
2005	0.84	0.75	0.62	0.51	0.42	0.35
Hemodialysis						
1997	0.84	0.74	0.59	0.47	0.38	0.30
1999	0.84	0.74	0.59	0.48	0.38	0.31
2001	0.83	0.74	0.60	0.49	0.39	0.32
2003	0.83	0.74	0.60	0.49	0.40	0.33
2005	0.84	0.74	0.61	0.51	0.42	0.35
Peritoneal dialysis						
1997	0.89	0.80	0.62	0.49	0.37	0.29
1999	0.90	0.80	0.63	0.50	0.39	0.31
2001	0.91	0.82	0.67	0.54	0.43	0.34
2003	0.92	0.84	0.69	0.56	0.45	0.37
2005	0.93	0.86	0.72	0.60	0.49	0.41
Transplant						
1997	0.91	0.88	0.83	0.77	0.72	0.65
1999	0.92	0.89	0.85	0.79	0.73	0.67
2001	0.93	0.90	0.85	0.80	0.74	0.68
2003	0.94	0.91	0.86	0.81	0.76	0.71
2005	0.94	0.91	0.87	0.82	0.78	0.73
2005 cohort						
Dialysis	0.84	0.75	0.62	0.51	0.42	0.35
Hemodialysis	0.84	0.74	0.61	0.51	0.42	0.35
Peritoneal dialysis	0.93	0.86	0.72	0.60	0.49	0.41
Transplant	0.94	0.91	0.87	0.82	0.78	0.73
0-19	0.92	0.88	0.82	0.75	0.70	0.66
20-44	0.94	0.90	0.81	0.74	0.68	0.62
45-64	0.90	0.83	0.71	0.61	0.52	0.44
65-74	0.83	0.73	0.58	0.46	0.35	0.27
75+	0.73	0.59	0.42	0.29	0.20	0.14
Male	0.85	0.75	0.62	0.51	0.42	0.35
Female	0.84	0.75	0.62	0.51	0.43	0.36
White	0.83	0.74	0.59	0.48	0.39	0.32
Black/African American	0.86	0.77	0.64	0.55	0.46	0.39
Other	0.89	0.82	0.71	0.62	0.54	0.46
Diabetes	0.86	0.76	0.61	0.49	0.39	0.32
Hypertension	0.85	0.77	0.64	0.54	0.45	0.38
Glomerulonephritis	0.89	0.83	0.73	0.63	0.55	0.48
Other	0.78	0.68	0.56	0.47	0.40	0.34

While six- and twelve-month survival probabilities have remained stable since 1997 in the hemodialysis population, they have improved somewhat for both peritoneal dialysis and transplant patients. Five-year survival has improved across all modalities — from 0.30 to 0.35 for hemodialysis, from 0.29 to 0.41 for peritoneal dialysis, and from 0.65 to 0.73 for transplant.

In the 2005 incident cohort, survival over the first five years of therapy is consistently highest in the transplant population and among younger patients, blacks/African Americans (compared to whites), and patients with a primary diagnosis of glomerulonephritis (compared to patients with diabetes or hypertension). » **Table 5.a;** see page 438 for analytical methods. *Incident dialysis patients defined on the day of dialysis onset, without the 60-day rule, from day one of dialysis to December 31, 2010; transplant patients receiving a first transplant in the calendar year, followed from day of transplant to December 31, 2010. Adj: age/gender/race/Hispanic ethnicity/primary diagnosis; ref: incident ESRD patients, 2005.*



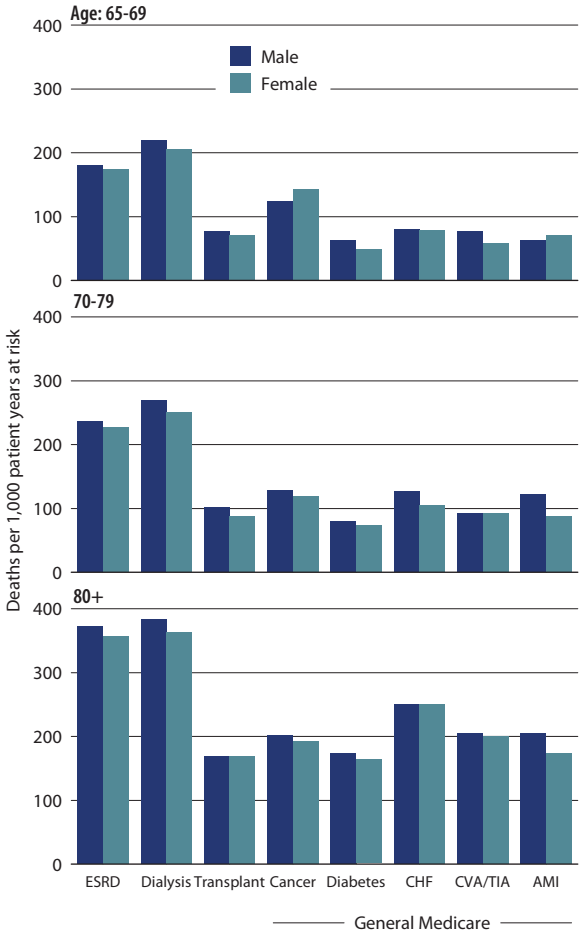
vol 2
5.b Unadjusted & adjusted mortality rates in the ESRD & general populations, age 65 & older, (per 1,000 patient years at risk)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Unadjusted																
ESRD	321	322	318	322	325	317	315	309	302	297	292	282	271	261	254	245
Dialysis	336	339	337	342	347	340	339	336	330	327	325	316	306	298	292	283
Transplant	99	94	87	99	93	98	94	90	92	88	86	82	82	75	78	77
General Medicare																
Cancer	151	150	146	142	139	138	132	128	125	121	122	119	117	115	113	111
Diabetes	92	93	93	94	94	90	87	85	82	77	79	76	74	74	71	71
CHF	205	205	208	208	206	208	202	197	196	189	192	191	190	196	183	189
CVA/TIA	155	156	156	158	154	153	151	145	143	134	137	135	133	133	125	129
AMI	148	149	149	155	155	157	156	152	153	149	150	148	145	155	146	153
Adjusted																
ESRD	377	371	361	361	363	356	354	344	329	323	291	300	290	281	280	270
Dialysis	386	381	372	373	377	370	368	359	345	337	311	320	311	304	303	294
Transplant	186	188	198	204	174	207	184	174	175	177	139	151	138	127	150	116
General Medicare																
Cancer	246	240	228	228	225	215	204	204	190	184	183	180	174	166	169	160
Diabetes	164	158	155	158	151	143	140	134	131	119	120	118	111	112	107	104
CHF	198	193	193	189	184	180	174	168	165	154	155	153	153	152	144	144
CVA/TIA	160	162	157	158	155	151	153	144	141	132	133	129	132	127	120	121
AMI	157	154	149	156	160	148	149	141	140	131	130	135	133	134	127	134

Since 1995, unadjusted mortality among prevalent ESRD patients has fallen 23.7 percent, to 245 deaths per 1,000 patient years. Mortality adjusted for age, gender, race, and comorbidity (defined in the previous year), however, has fallen 28.4 percent, to 270. In the dialysis population, the unadjusted rate has fallen 15.6 percent, to 283, while the adjusted rate is now 23.7 percent lower than in 1995, falling to 294 in 2010. » **Table 5.b;** see page 438 for analytical methods. *January 1 point prevalent ESRD & general Medicare patients age 65 & older. Adj: age/gender/race/comorbidity; ref: ESRD patients, 2005.*

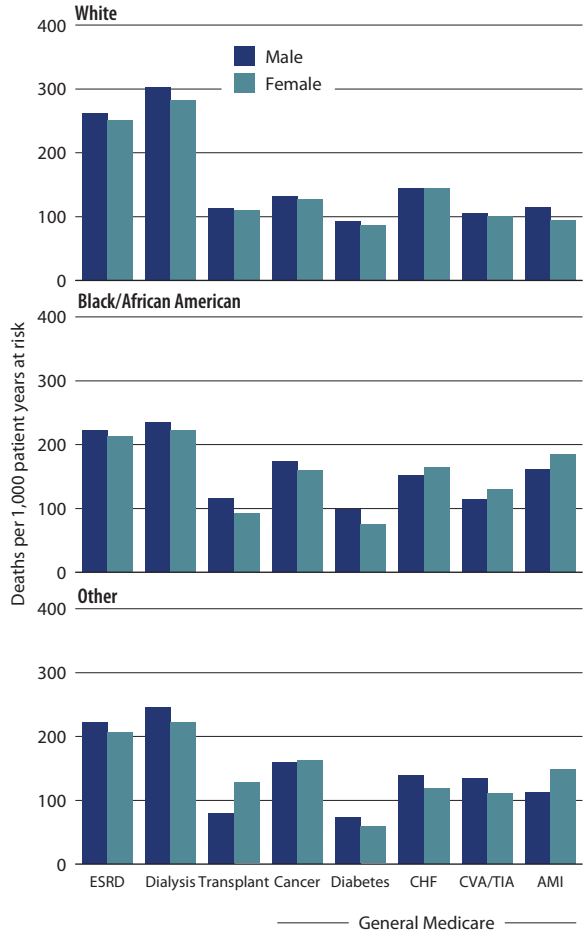
vol 2
5.5

Adjusted all-cause mortality in the ESRD & general populations, by age & gender, 2010



vol 2
5.6

Adjusted all-cause mortality in the ESRD & general populations, by race & gender, 2010



Adjusted rates of mortality in the prevalent ESRD population age 65 and older rise, not surprisingly, by age, are commonly greater in men than in women, and are 2–3 times greater for dialysis patients than for those with a transplant. In the transplant population, rates among patients age 65–79 are lower than rates of mortality among patients with cancer in the general Medicare population.

By race, the contrast in mortality rates between dialysis and transplant patients is even more pronounced. Rates among white and black/African American women on dialysis, for example, are 2.6 and 2.4 times greater than those seen in their counterparts with a transplant. For black/African American transplant patients of both genders, mortality is most often lower than that among patients with cancer, congestive heart failure, or acute myocardial infarction in the general population. » **Figures 5.5–6;** see page 438 for analytical methods. *January 1, 2010, point prevalent ESRD & general Medicare patients age 65 & older. Adj: age/gender/race/comorbidity; ref: 2010 ESRD patients.*

Maintenance hemodialysis is typically delivered three times a week, and concern has emerged that the two-day, or "long," interval may be associated with higher than expected rates of adverse outcomes. To explore this issue, we look here at mortality rates by different days of the hemodialysis week among prevalent adult hemodialysis patients in 2010.

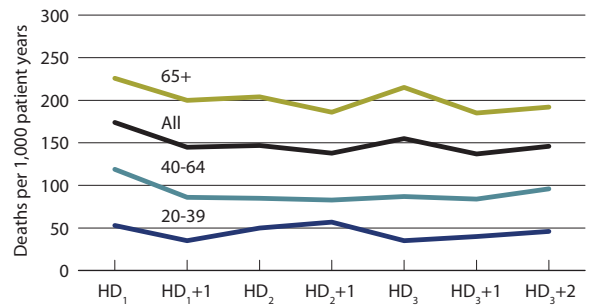
In the framework of the "hemodialysis week," HD_1, for example, is defined as Monday for patients dialyzed on Monday, Wednesday, and Friday (MWF) and as Tuesday for those treated on Tuesday, Thursday, and Saturday (TTS). $HD_3 + 2$, the second day of the long interval, is Sunday for MWS and Monday for TTS.

Mortality rates in the overall population are highest, at 174 per 1,000 patient years, on the day following the long interval (HD1), and a sawtooth pattern is apparent, with rates declining and increasing every two days thereafter. This pattern is replicated in patients age 65 and older, with rates varying between 185 and 226, but some differences are seen in younger age groups.

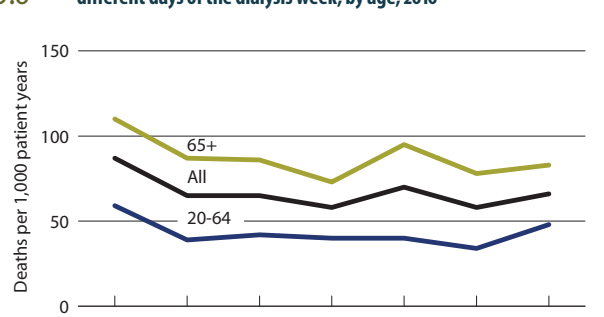
In patients age 20–39, mortality rates are highest on $HD_2 + 1$ (57), lowest on HD_3 (35), and the sawtooth pattern is absent. For ages 40–64, rates are substantially higher on HD_1 (119), stable between $HD_1 + 1$ (86) and $HD_3 + 1$ (84), and intermediate on $HD_3 + 2$ (96).

Figures 5.8 and 5.9 show corresponding analyses for mortality rates attributed to cardiovascular disease and infection. Rates are highest on HD_1 (87) for cardiovascular disease, and on $HD_1 + 1$ (17.7) for infection. » **Figures 5.7–9;** see page 438 for analytical methods. *January 1, 2010 point prevalent Medicare hemodialysis patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule; HD_1, HD_2, & HD_3, are the first, second, & third hemodialysis sessions. Rates for all patients are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age are adjusted for the other four factors. Ref: all included hemodialysis patients in 2010.*

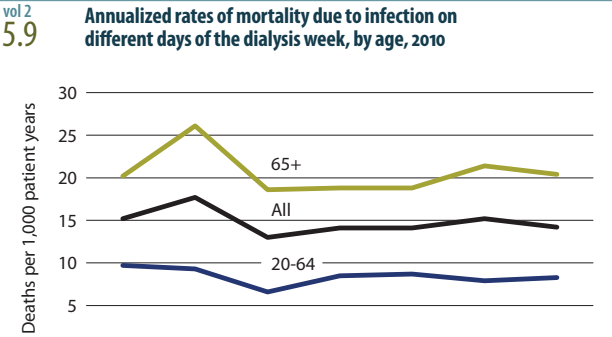
vol 2 5.7 **Annualized all-cause mortality rates on different days of the dialysis week, by age, 2010**



vol 2 5.8 **Annualized cardiovascular mortality rates on different days of the dialysis week, by age, 2010**



vol 2 5.9 **Annualized rates of mortality due to infection on different days of the dialysis week, by age, 2010**



vol 2
5.c **Annualized all-cause mortality rates (per 1,000 patient years) on days after the long & short interdialytic intervals & on days without dialysis, 2010**

	Events on day after long interdialytic interval	Events on day after short interdialytic interval	Events on days without dialysis
All patients	174	151	142
Age: 20-39	53	43	44
40-64	119	86	88
≥65	226	209	191
Male	175	154	141
Female	172	148	143
White	191	169	162
Black/Af Am	147	123	107
Other	130	119	112
Hispanic	127	108	114
Diabetes	193	161	152
Hypertension	168	154	137
Glomerulonephritis	126	125	122
Other	156	132	131
ESRD duration			
< 4 years	155	140	129
≥ 4 years	199	167	159

Day of the dialysis week

HD_1	Monday for patients on a Monday–Wednesday– Friday schedule; Tuesday for patients on a Tuesday–Thursday–Saturday schdule.
HD_1+1	Tuesday or Wednesday for the respective shedules.
HD2	Wednesday or Thursday, respectively.
HD_2+1	Thursday or Friday, respectively.
HD3	Friday or Saturday, respectively.
HD_3+1	Saturday or Sunday, respectively.
HD_3+2	Sunday or Monday, respectively.

Interdialytic intervals

1 Day after long interdialytic interval: Monday for patients with a Monday–Wednesday–Friday dialysis schedule; Tuesday for patients with a Tuesday–Thursday–Saturday dialysis schedule.

2 Day after short interdialytic interval: Wednesday and Friday for patients with a Monday–Wednesday–Friday dialysis schedule; Thursday and Saturday for patients with a Tuesday–Thursday–Saturday dialysis schedule.

3 Days without dialysis: Other respective weekdays.

Here we summarize all-cause mortality rates on three types of days of the hemodialysis week: after the single long interval dialysis day, after the two short interval days, and on the four days without dialysis. Mortality rates in 2010 were 174 for the first category, 151 for the second, and 142 for the third.

Analyses of subgroups defined by age, gender, race, ethnicity, and cause of ESRD show similar patterns except for patients age 20–39 (with rates of 53, 43, and 44 in the three categories) and those age 40–64 (119, 86, and 88). For all subgroups, however, rates are highest on the day after the long interval. » **Table 5.c;** see page 438 for analytical methods. *January 1, 2010 point prevalent Medicare hemodialysis patients alive on January 31. Includes patients age 20 & older receiving hemodialysis three times weekly on a Monday–Wednesday–Friday or Tuesday–Thursday–Saturday schedule. Rates for all patients, & groups by ESRD duration, are adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis; rates by age, gender, & primary diagnosis are adjusted for the other four factors. Rates by race & ethnicity are adjusted for age, gender, & primary diagnosis. Ref; all included hemodialysis patients in 2010.*

MORTALITY & SURVIVAL

adjusted all-cause first-year mortality (from day 90, per 1,000 patient years at risk; Figure 5.1)

» hemodialysis · 225 » peritoneal dialysis · 125 » transplant · 59

adjusted all-cause fifth-year mortality (from day 90, per 1,000 patient years at risk; Figure 5.1)

» hemodialysis · 236 » peritoneal dialysis · 254 » transplant · 60

adjusted all-cause mortality in the ESRD & general populations, 2010 (per 1,000 patient years at risk; Figure 5.2)

age <20	» ESRD · 27	» dialysis · 51	» transplant · 7.0	» general Medicare · 6.2
age 20–44	· 43.9	· 78.7	· 12.0	· 11.3
age 45–64	· 99	· 148.5	· 28.4	· 22.0
age 65+	· 264	· 304	· 73.4	· 48.1

adjusted all-cause & cause specific mortality from day one in the first year of hemodialysis, 2010 (per 1,000 patient years at risk; Figure 5.3)

month two after initiation	» all-cause · 435	» cardiovascular disease · 169	» infection · 40	
month 12 after initiation	» all-cause · 206	· 78	· 21	

adjusted all-cause mortality in prevalent hemodialysis patients, by vintage, 2010 (per 1,000 patient years at risk; Figure 5.4)

» <2 years · 190 » 2–<5 years · 189 » 5+ years · 222

adjusted five-year survival probabilities among incident ESRD patients, 2010 (from day one; Table 5.a)

» dialysis · 0.35 » hemodialysis · 0.35 » peritoneal dialysis · 0.41 » transplant · 0.73

» age 0–19 · 0.66 » 20–44 · 0.62 » 45–64 · 0.44 » 65–74 · 0.27 » 75+ · 0.14

» male · 0.35 » female · 0.36

» white · 0.32 » black/African American · 0.39 » other race · 0.46

primary diagnosis » diabetes · 0.32 » hypertension · 0.38 » glomerulonephritis · 0.48 » other · 0.34

MORTALITY IN THE GENERAL & ESRD POPULATIONS

mortality rates in prevalent patients age 65 & older, 2010 (per 1,000 patient years at risk; Table 5.b)

unadjusted » ESRD · 245 » dialysis · 283 » transplant · 77

adjusted for age, gender, race, & comorbidity » ESRD · 270 » dialysis · 294 » transplant · 116

MORTALITY RATES BY INTERDIALYTIC INTERVAL

annualized all-cause mortality rates on different days of the dialysis week, by age (per 1,000 patient years; Figure 5.7)

day of week HD_1 (Monday or Tuesday)	» all · 174	» 20–39 · 53	» 40–64 · 119	» 65+ · 226
day of week HD_2 (Wednesday or Thursday)	· 147	» 20–39 · 50	· 85	· 204
day of week HD_3 (Friday or Saturday)	· 155	» 20–39 · 35	· 87	· 215

6

Grand Canyon National Park, Arizona

PART D PRESCRIPTION DRUG COVERAGE IN ESRD PATIENTS

Of the almost 50 million Medicare beneficiaries (eligible because of age, disability, or ESRD) over 28 million were enrolled in a Medicare Part D plan in December, 2010. Before 2006, patients enrolled in Medicare obtained drug coverage through various insurance plans, state Medicaid programs, or pharmaceutical-assistance programs, received samples from physicians, or paid out-of-pocket. After 2006, however, the majority obtained Part D coverage. Sixty percent of general Medicare patients, and 69 percent of Medicare-covered ESRD patients, were enrolled in Part D in 2010, with enrollment at 74, 64, and 56 percent in the hemodialysis, peritoneal dialysis, and transplant populations, respectively.

Part D benefits can be managed through a stand-alone PDP or through a Medicare Advantage (MA) plan, which provides medical as well as prescription benefits. ESRD patients are precluded from entering an MA plan if they are not already enrolled in one when they reach ESRD. Most data presented in this chapter encompass both types of plans. Medicare-enrolled ESRD patients obtain outpatient medication benefits through Part B, Part D, retiree drug subsidy plans, or other creditable coverage, including employer group health plans, Veterans Administration benefits, Medicaid wrap-around programs, and state kidney programs. Some also pay out-of-pocket for plan expenses and copayments, over-the-counter medications, and low-cost generic agents at retailers.

The proportion of Medicare-covered ESRD patients with no known source of drug coverage is highest in the peritoneal dialysis and transplant populations. Given that many of these patients are employed, it is likely that some have sources of prescription drug coverage not tracked by Medicare.

Prior to the start of the Medicare Part D program in 2006, patients dually-enrolled in Medicare and Medicaid received prescription benefits under state Medicaid programs. The Part D program, however, offers a substantial low-income subsidy (LIS) benefit to enrollees with limited assets and income, including those who are dually-enrolled. The LIS provides full or partial waivers for many out-of-pocket cost-sharing requirements, including premiums, deductibles, and copayments, and provides full or partial coverage during the coverage gap ("donut hole").

Compared to the 37 percent of Part D-enrolled general Medicare patients receiving LIS benefits, higher proportions (73, 63, and 61 percent, respectively) of hemodialysis, peritoneal dialysis, and transplant patients qualify for the LIS. By race, white dialysis patients are the least likely and blacks/African Americans, Hispanics, and patients of other races the most likely to have LIS benefits.

Not surprisingly, cardiovascular agents comprise three of the five most frequently prescribed Part D medication classes in dialysis patients. Phosphate binders are first in terms of both frequency of use and net costs, as sevelamer carbonate and hydrochloride are not available in generic form.

In 2010, Medicare-covered Part D costs for hemodialysis, peritoneal dialysis, and transplant patients ranged from $4,961 to $5,537 per person per year. Between 2007 and 2010, total net payments grew 42 and 38 percent, respectively, for hemodialysis and peritoneal dialysis patients, compared to only 25 percent for general Medicare patients; for kidney transplant patients, in contrast, growth was only 16 percent.

In the Grand Canyon, Arizona has a natural wonder which, so far as I know, is in kind absolutely unparalleled throughout the rest of the world. Keep this great wonder of nature as it is. You cannot improve it. The ages have been at work on it, and man can only mar it.

THEODORE ROOSEVELT, impromptu speech at the Grand Canyon on May 6, 1903

Although the percentage increase in Part D enrollment between 2007 and 2010 was similar between general Medicare and dialysis patients, more dialysis patients receive the LIS, making each patient, on average, more expensive to Medicare. Part D costs for hemodialysis and peritoneal dialysis patients with the LIS were $7,366 and $8,651 per patient per year in 2010, respectively, compared to $3,985 for general Medicare patient with the LIS.

For Medicare-enrolled patients, the Medicare Part D program works in concert with Medicare Part B, which covers medications administered in physician offices (e.g., erythropoiesis stimulating agents (ESAs) in CKD patients), those administered during hemodialysis (e.g., ESAs, intravenous vitamin D and iron products, IV antibiotics, and resuscitative medications), and most immunosuppressant medications required in the three-year period following a Medicare-covered kidney transplant. Medicare-covered transplant patients lose eligibility for Part B benefits after three years, but, if they become Medicare-eligible due to age or disability, they become eligible for lifetime Part B immunosuppressant coverage. Patients with a kidney transplant not covered by Medicare, but who become Medicare-eligible due to age or disability, can enroll in and receive their immunosuppressant medications through Part D. Prescription drugs not covered for beneficiaries under Part B may be covered by Part D, but coverage depends on whether the drug is included on the plan formulary.

In 2010, per person per year (PPPY) combined Part B and Part D costs reached $15,300, $12,700, and $11,900 for Medicare Part D-covered hemodialysis, peritoneal dialysis, and transplant patients with the LIS, compared to $7,700, $5,400, and $5,400 for their non-LIS counterparts. From 2009 to 2010, PPPY Part B costs fell for all ESRD patients, likely due in part to a decline in ESA use, to the new availability of several generic products for mycophenolate and tacrolimus, and to shifts in tier placement for some Part D medications. Part D PPPY costs continued to increase in both hemodialysis and peritoneal dialysis patients with and without the LIS, but fell in transplant patients with the LIS. » **Figure 6.1;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, 2010. Therapeutic classification based on the Medi-Span's generic product identifier (GPI) therapeutic classification system.*

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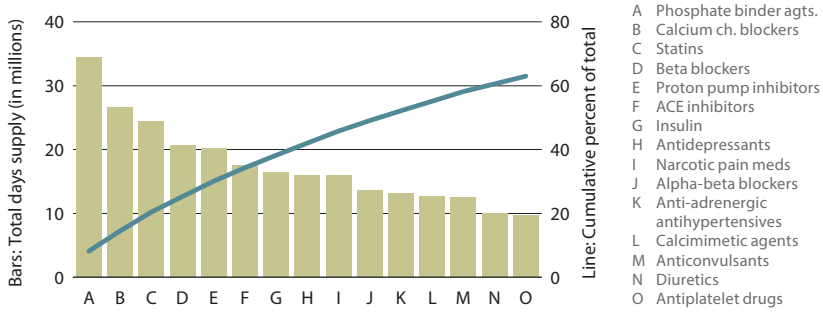
Top 15 drug classes used by Part D-enrolled dialysis patients, by days supply, 2010

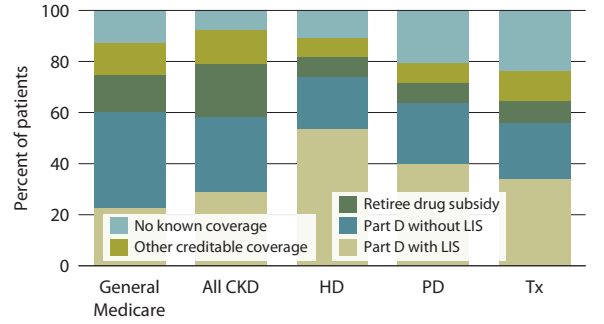


Terms used in the Part D analyses are described at the end of this chapter. Comparisons to the overall ESRD population can be found in Volume One, Chapter Five.

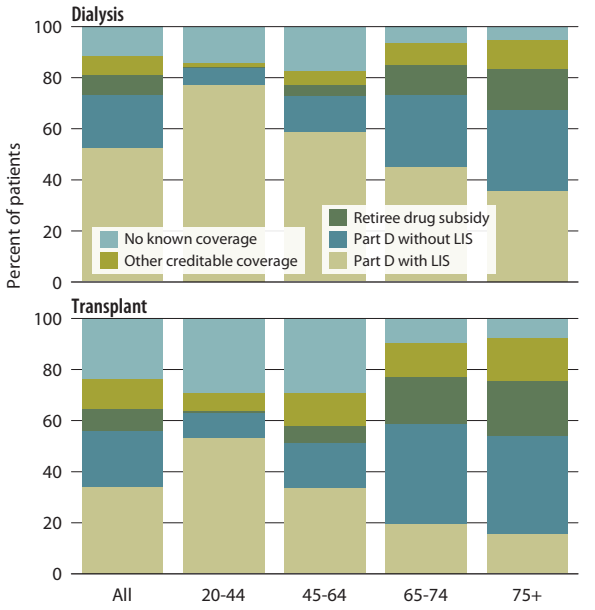
Patients with Medicare coverage can enroll in Medicare Part D for prescription drug coverage. Seventy-seven and 64 percent of hemodialysis and peritoneal dialysis patients were enrolled in Part D in 2010, compared to 56–60 percent of general Medicare patients (with or without CKD) and transplant patients.

Compared to general Medicare and CKD patients enrolled in Part D, a higher proportion of Part D-enrolled hemodialysis, peritoneal dialysis, and transplant patients (73, 63, and 61 percent compared to 37–50 percent) receive the low-income subsidy (LIS). A higher percentage of patients on peritoneal dialysis or with a transplant have no known prescription drug coverage, but many of these patients are employed and may have coverage that is not tracked by Medicare. » **Figure 6.2;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, 2010.*

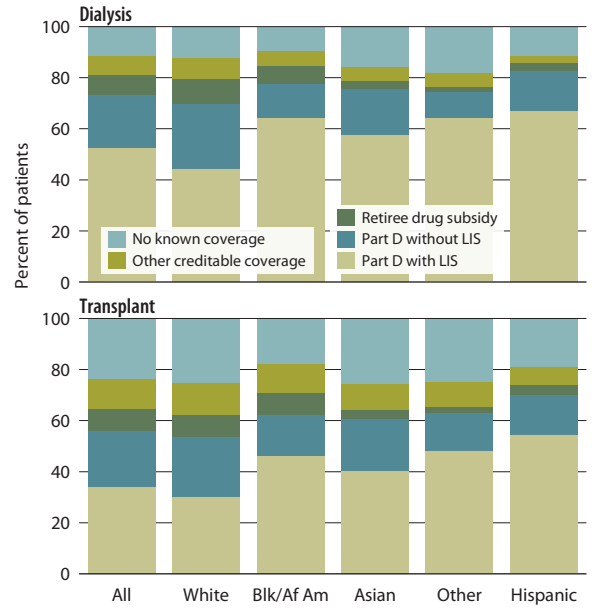
vol 2 **6.2** **Sources of prescription drug coverage in Medicare ESRD enrollees compared to gen. Medicare & Medicare-enrolled CKD populations, 2010**



vol 2 **6.3** **Sources of prescription drug coverage in Medicare ESRD enrollees, by age & modality, 2010**



vol 2 **6.4** **Sources of prescription drug coverage in Medicare ESRD enrollees, by race/ethnicity & modality, 2010**



Sources of prescription drug coverage in ESRD patients vary widely by age and race. In each age category, for example, transplant patients are markedly less likely than those on dialysis to receive the low income subsidy (LIS). Younger patients on either modality have the highest Part D enrollment, and the monotonic decrease with age in the percentage of patients with the LIS is striking — three in four dialysis patients age 20–44 with Part D receive LIS assistance, in contrast to just 36 percent of patients age 75 and older.

By race, the proportion of dialysis patients enrolled in Part D varies from 70 percent among whites to 78 and 83 percent among blacks/African Americans and Hispanics. Eighty-three and 81 percent of blacks/African Americans and Hispanics with Part D coverage have the LIS, compared to 63 percent of whites, and blacks/African Americans treated with dialysis are the least likely to have no known prescription drug coverage. Enrollment in Part D is lowest among transplant patients, reaching 62 and 70 percent, for example, among blacks/African Americans and Hispanics compared to 78–83 percent for their counterparts on dialysis. And among transplant patients, blacks/African Americans and Hispanics are more likely to receive the LIS, at 75–77 percent compared to 56 and 67 percent among whites and Asians. » **Figures 6.3–4;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, 2010.*

Part D enrollment patterns

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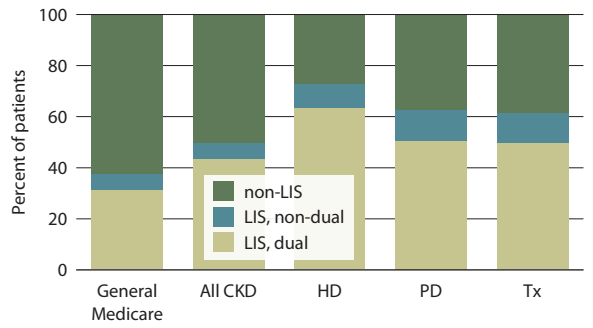
Patients enrolled in Part D, by dual eligibility & low income subsidy (LIS) status, 2010



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6.a

Medicare Part D enrollees with or without the low income subsidy (LIS; percent), by age & race, 2010

	General Medicare		CKD		Hemodialysis		Peritoneal dialysis		Transplant	
	Part D w/LIS	Part D w/o LIS	Part D w/LIS	Part D w/o LIS	Part D w/LIS	Part D w/o LIS	Part D w/LIS	Part D w/o LIS	Part D w/LIS	Part D w/o LIS
White										
All ages	30.6	69.4	41.2	58.8	64.0	36.0	55.1	44.9	56.1	43.9
20-44	90.0	10.0	93.5	6.5	91.5	8.5	88.8	11.2	83.8	16.2
45-64	65.3	34.7	78.4	21.7	77.4	22.6	64.9	35.1	61.2	38.9
65-74	18.8	81.3	34.7	65.3	55.3	44.7	27.6	72.4	26.7	73.3
75+	25.4	74.6	36.8	63.2	42.9	57.1	21.6	78.2	21.4	78.6
Black/Af Am										
All ages	66.6	33.4	78.9	21.1	82.7	17.3	78.4	21.6	74.4	25.7
20-44	93.7	6.4	95.5	4.5	93.6	6.4	91.7	8.3	86.8	13.2
45-64	81.6	18.4	87.7	12.3	85.6	14.4	76.8	23.2	74.4	25.6
65-74	51.8	48.2	72.7	27.4	73.5	26.5	51.4	48.6	53.6	46.4
75+	61.4	38.6	77.5	22.5	73.5	26.5	49.0	51.0	56.7	43.3
Asian										
All ages	70.5	29.6	86.5	13.5	77.0	23.0	63.7	36.3	66.5	33.5
20-44	91.6	8.4	93.8	6.3	87.9	12.1	78.4	21.6	83.6	16.4
45-64	74.9	25.1	85.7	14.3	78.5	21.5	64.8	35.2	68.8	31.2
65-74	65.3	34.8	86.7	13.3	72.1	27.9	49.4	50.6	51.4	48.6
75+	73.4	26.6	86.3	13.7	75.6	24.4	58.7	41.3	55.6	44.4
Other race										
All ages	62.4	37.6	79.9	20.1	82.1	17.9	77.1	22.9	77.0	23.0
20-44	87.3	12.7	93.2	6.8	92.7	7.3	88.7	11.3	85.9	14.1
45-64	71.4	28.6	86.0	14.0	85.9	14.1	78.2	21.8	78.4	21.6
65-74	54.7	45.3	75.3	24.7	76.9	23.1	60.5	39.5	63.8	36.2
75+	61.0	39.0	80.0	20.0	72.0	28.0	53.9	46.1	57.3	42.7

Patients dually-enrolled in Medicaid and Medicare qualify for the LIS, and, if they do not choose a plan, are automatically enrolled in a Medicare Part D plan. Sixty-four percent of hemodialysis patients with Part D coverage are dually-eligible LIS beneficiaries, compared to 32 percent of the general Medicare population. An additional but smaller proportion of patients (6–12 percent) receive the LIS after an application documenting low income and resources.

Overall, 73 percent of Part D-enrolled hemodialysis patients received LIS benefits in 2010, compared to 63 percent of peritoneal dialysis and 61 percent of transplant patients, 50 percent of those with CKD, and 37 percent of general Medicare patients. Within each race, receipt of the LIS generally decreases with age until age 75 and older, when an uptick is seen for general Medicare and CKD patients. In the peritoneal dialysis population, in contrast, with the exception of Asian patients, the decrease in receipt of the LIS continues to the oldest patien ts. Transplant patients show a reverse trend, with the percentage receiving the LIS generally increasing with age.

» **Figure 6.5 & Table 6.a;** see page 439 for analytical methods.

Point prevalent Medicare enrollees alive on January 1.

CMS provides prescription drug plans (PDPs) with guidance on structuring a "standard" Part D PDP. In 2010, for example, beneficiaries shared costs with the PDP (as co-insurance or copayments) until the combined total reached $2,830 during the initial coverage period. After reaching this level, beneficiaries went into the coverage gap, or "donut hole," where they paid 100 percent of costs. New in 2010, patients reaching the coverage gap also received a $250 rebate as a first step towards phasing out the coverage gap. In 2010, beneficiaries who obtained a yearly out-of-pocket drug cost of $4,550 reached the catastrophic coverage phase, in which they paid only a small copayment for their drugs until the end of the year.

PDPs have the latitude to structure their plans differently from what is presented here; companies offering nonstandard plans must show that their coverage is at least actuarially equivalent to the standard plan. Many have developed plans with no deductibles or with drug copayments instead of the 25 percent co-insurance, and some plans provide generic and/or brand name drug coverage during the coverage gap. The website listed below contains more details on drug copayment, co-insurance, and deductible amounts for beneficiaries with full and non-full dual eligibility and with full or partial subsidies. » **Table 6.b**. *Information from http://www.q1medicare.com/PartD-The-2010-Medicare-Part-D-Outlook.php.*

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6.b **Medicare Part D benefit parameters for defined standard benefit, 2006–2010**

	2006	2007	2008	2009	2010
Deductible After the deductible is met, beneficiary pays 25% of covered costs up to total prescription costs meeting the initial coverage limit.	$250	$265	$275	$295	$310
Initial coverage limit Coverage gap (donut hole) begins at this point. (The beneficiary pays 100% of prescription costs up to the out-of-pocket threshold.)	$2,250	$2,400	$2,510	$2,700	$2,830
Total covered Part D drug out-of-pocket spending including the coverage gap Catastrophic coverage starts after this point.	$5,100.00	$5,451,25	$5,726.25	$6,153.75	$6,440.00 plus a $250 rebate
Out-of-pocket threshold This is the total out-of-pocket costs including the donut hole.	$3,600	$3,850	$4,050	$4,350	$4,550
2010 example					
$310 (deductible)	$250.00	$265.00	$275.00	$295.00	$310.00
+ (($2,830 – $310) * 25%) (initial coverage)	$500.00	$533.75	$558.75	$601.25	$630.00
+ (($6,440 – $2,830) * 100%) (coverage gap)	$2,850.00	$3,051.25	$3,216.25	$3,453.75	$3,610.00
= $4,550 (maximum out-of-pocket costs prior to catastrophic coverage, excluding plan premium)	$3,600.00	$3,850.00	$4,050.00	$4,350.00	$4,550.00
Catastrophic coverage benefit					
Generic/preferred multi-source drug	$2.00	$2.15	$2.25	$2.40	$2.50
Other drugs	$5.00	$5.35	$5.60	$6.00	$6.30

Part D enrollment increased between 2006 and 2010 in the general Medicare population and among Medicare-covered patients with identified CKD, dialysis patients, and kidney transplant patients. Growth was greatest in the peritoneal dialysis and transplant populations, at 4 and 5 percent, and lowest for CKD patients, at 1.2 percent; enrollment increased 2.7 percent for hemodialysis patients. » **Table 6.c.;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1 of each year.*

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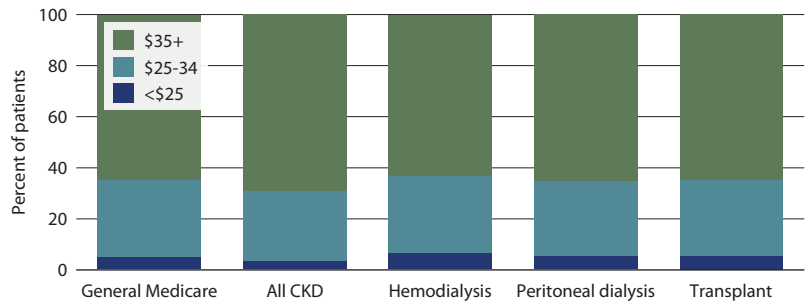
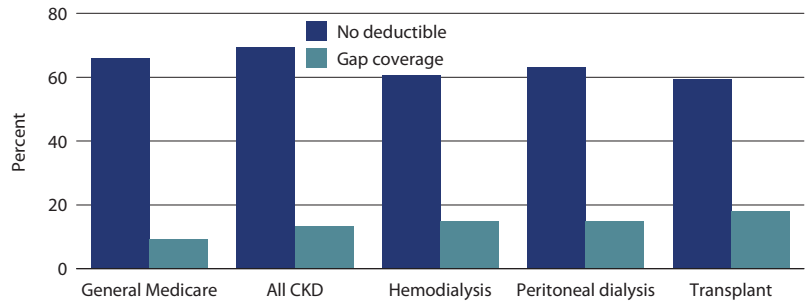
6.c **General Medicare, CKD, & ESRD patients enrolled in Part D (percent)**

	General Medicare	All CKD	Hemodialysis	Peritoneal dialysis	Transplant
2006	54.6	55.1	68.4	56.2	47.9
2007	57.0	57.2	71.2	59.6	51.0
2008	58.6	57.7	72.4	61.2	53.2
2009	59.8	58.2	73.2	62.2	54.8
2010	60.4	58.4	73.9	63.7	56.0

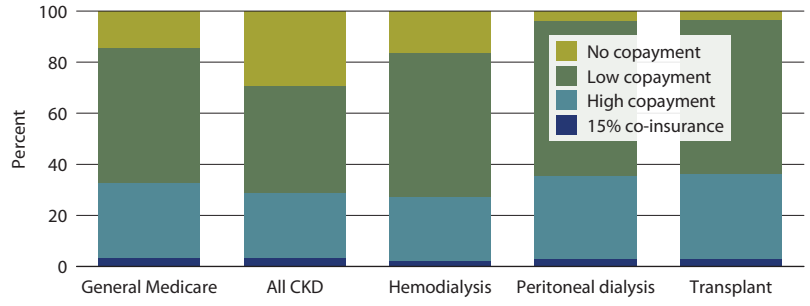
vol 2 6.6 **Part D non-LIS enrollees with specified monthly premium, 2010**



vol 2 6.7 **Part D non-LIS enrollees with gap coverage or no deductible, 2010**



vol 2 6.8 **Part D LIS enrollees with specified co-insurance/copayment, 2010**

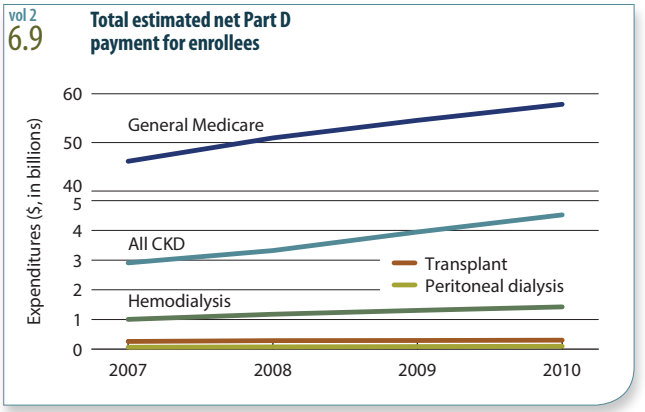


Patients without the low income subsidy (LIS) pay monthly premiums; the weighted average premium for Medicare Part D stand-alone PDPs increased from $25.93 in 2006 to $37.25 in 2010 (http://facts.kff.org/). In 2010, fewer than 6 percent of general Medicare patient and Medicare-enrolled CKD, dialysis, and transplant patients had a monthly premium below $25, while 63–69 percent had premiums over $35.

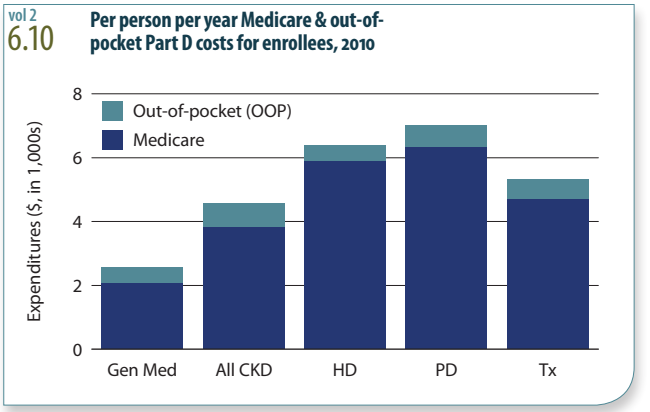
The percentage of Part D non-LIS enrollees with no deductible is higher in the general Medicare and identified CKD populations than among dialysis and transplant patients, at 66–69 compared to 59–63; the percentage of patients with no deductible has declined since 2008 (2011 USRDS ADR). In 2010, most PDPs (80 percent) did not offer gap or "donut hole" coverage (http://www.kff.org/medicare/8008.cfm). Gap coverage is more common among dialysis and transplant patients, at 15–18 percent compared to 9 percent in the general Medicare population.

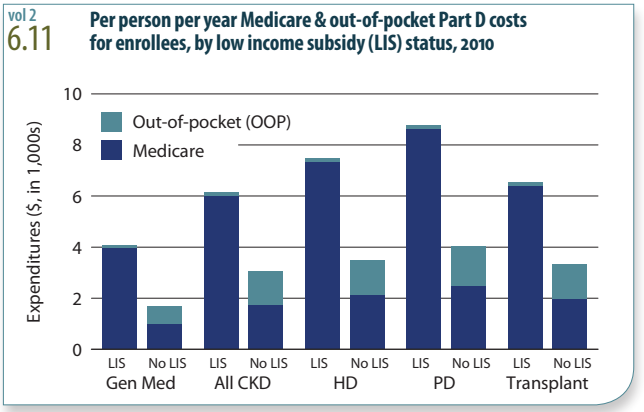
Most Part D enrollees with the LIS (full-benefit dual-eligible patients) do not pay monthly premiums, but non-institutionalized patients with the LIS do pay drug copayments or co-insurance based on income and assets. Seventy-two percent of hemodialysis patients with the LIS have low or no copayments for their Part D medications, compared to 63–67 percent of peritoneal dialysis, transplant, and general Medicare patients; these rates are all lower than in 2008. Only 2–4 percent pay 15 percent co-insurance for their medications. Even those patients with high copayments (25–33 percent of patients in 2010) paid a maximum of just $2.50 per generic and $6.30 for branded medication. » **Figures 6.6–8;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, excluding those in Medicare Advantage Part D plans.*

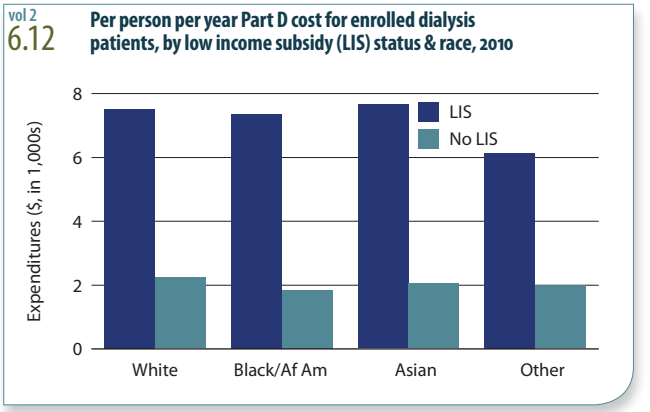
Total net Part D payment for patients with identified kidney disease (hemodialysis, peritoneal dialysis, and transplant patients, and CKD patients not on dialysis) was $6.4 billion in 2010, up from $4.2 billion in 2007, and accounting for 10 percent of total Part D prescription drug costs. These costs do not include costs of drugs billed to Part B, including intradialytic medications (ESAs, IV vitamin D, iron) and immunosuppressants. Between 2007 and 2010, Part D costs rose 16, 38, 42, and 56 percent for transplant, peritoneal dialysis, hemodialysis, and CKD patients, respectively, compared to 25 percent in the general Medicare population. » **Figure 6.9;** see page 439 for analytical methods. *All patients enrolled in Part D.*



At $4,580, $5,326, $6,379, and $7,022 per person per year (PPPY) in CKD, kidney transplant, hemodialysis, and peritoneal dialysis patients, respectively, the total cost of medications covered by Medicare Part D is 1.8–2.7 times higher in CKD and ESRD patients than in the general Medicare population. Proportional to total Part D costs, however, out-of-pocket costs are lower in ESRD patients, representing 7 percent of PPPY costs for hemodialysis patients, 10 percent for peritoneal dialysis patients, and 11 percent for those with a transplant, compared to 16 percent for CKD patients and 19 percent in the general Medicare population. » **Figure 6.10;** see page 439 for analytical methods. *All patients enrolled in Part D.*



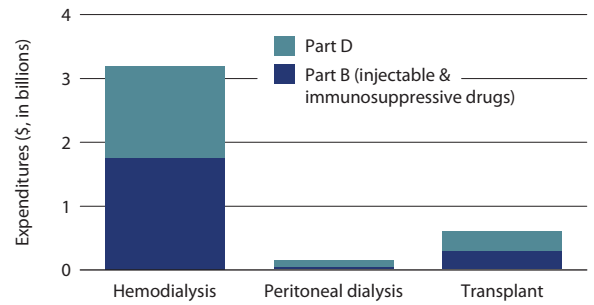




Across populations, total Part D medication costs are approximately twice as high in patients with the LIS benefit than in those without. In the LIS population, however, out-of-pocket costs represent only 2–3 percent of these total expenditures, compared to 39–43 percent in each of the non-LIS populations. Regardless of LIS status, total PPPY Part D costs are 1.8–2.4 times greater for patients with ESRD than for those in the general Medicare population. » **Figure 6.11;** see page 439 for analytical methods. *All patients enrolled in Part D.*

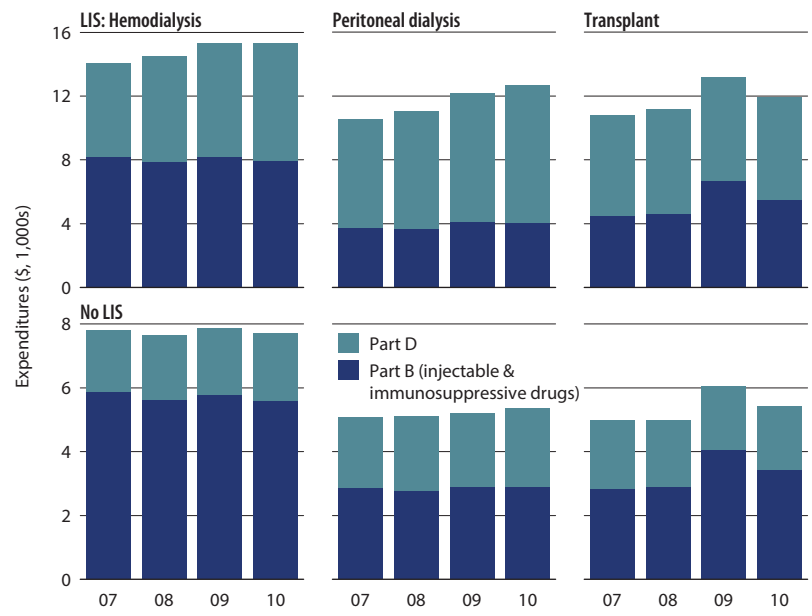
Among dialysis patients with LIS benefits, Part D costs per person per year are $7,360–$7,661 for whites, blacks/African Americans, and Asians, compared to $6,142 for patients of other races. There is no wide variation in costs for non-LIS populations. » **Figure 6.12;** see page 439 for analytical methods. *Period prevalent dialysis patients enrolled in Part D.*

vol 2
6.13 **Total Part B & Part D medication costs, by modality, 2010**



Medicare Part D covers most medications taken by ESRD patients at home, while Medicare Part B covers those administered during dialysis (e.g., erythropoiesis stimulating agents and IV vitamin D) as well as immunosuppressive medications for patients with Medicare-covered transplants. In 2010, Part D costs for ESRD patients reached $1.83 billion, while Part B costs were $2.12 billion. » **Figure 6.13;** see page 439 for analytical methods. *Period prevalent ESRD patients.*

vol 2
6.14 **Total per person per year Medicare costs for Part B- & Part D-covered medications, by low income subsidy (LIS) status, modality, & year**



In 2010, hemodialysis, peritoneal dialysis, and kidney transplant patients with LIS benefits had combined Part B and Part D medication costs of $15,311, $12,724, and $11,904 per person per year (PPPY), respectively. Regardless of LIS status, combined costs were greatest in hemodialysis patients.

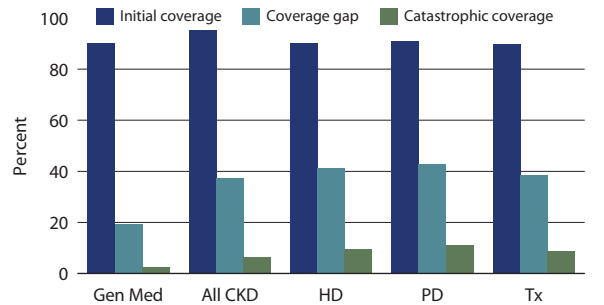
Part B PPPY costs declined from 2009 to 2010 for all ESRD patients, likely due in part to a decline in the use of erythropoiesis stimulating agents, to the availability of several generic products for mycophenolate and tacrolimus that entered the market from mid-2008 through 2010, and to possible shifts in tier placement for some Part D medications. » **Figure 6.14;** see page 439 for analytical methods. *Period prevalent ESRD patients.*

Part D enrollees who do not have the low income subsidy (LIS) may encounter three coverage phases, depending on total and out-of-pocket (OOP) costs per year. In 2010, patients with total Part D drug costs up to $2,830 fell into the initial coverage phase, while those with costs over that amount entered the coverage gap ("donut hole"), in which they were responsible for 100 percent of drug costs minus a $250 rebate given in 2010. Patients whose total OOP costs reached $4,550 then entered the catastrophic coverage phase, in which they paid only a fraction of overall drug costs.

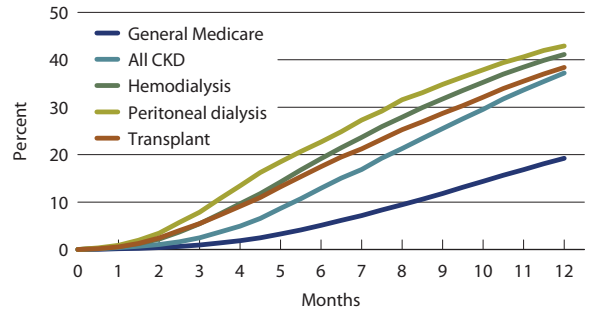
In 2010, 37–43 percent of non-LIS CKD, hemodialysis, peritoneal dialysis, and transplant patients reached the coverage gap, and 7–11 percent reached catastrophic coverage, compared to 19 and 2 percent, respectively, in the general Medicare population. In all populations, the percentage reaching the coverage gap and catastrophic coverage was lower in 2010 than in 2008.

On average, peritoneal dialysis patients reach the coverage gap sooner than CKD or other ESRD patients, while general Medicare patients take the longest. Twenty-two to 26 percent of ESRD patients who reach the coverage gap will subsequently attain catastrophic coverage, compared to 18 percent in the CKD population and 12.5 percent of general Medicare patients. ESRD and CKD patients thus reach catastrophic coverage much faster than do general Medicare patients. » **Figures 6.15–17;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, excluding those in employer-sponsored & national PACE Part D plans.*

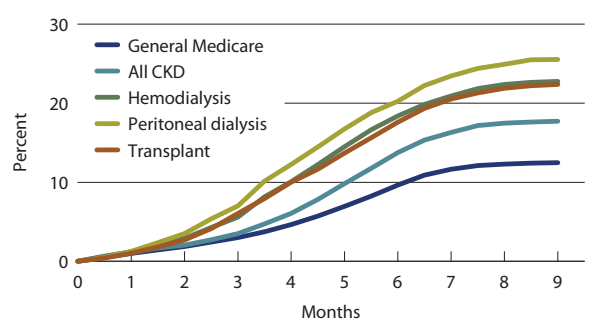
vol 2 **6.15** **Part D non-LIS enrollees who reach each coverage phase, 2010**



vol 2 **6.16** **Cumulative percent of Part D non-LIS enrollees who reach the coverage gap, 2010**



vol 2 **6.17** **Cumulative percent of Part D non-LIS enrollees who reach catastrophic coverage after reaching the coverage gap, 2010**



vol 2 6.d **Twelve-month probability (percent) of reaching the coverage gap in Part D non-LIS enrollees, by modality, 2010**

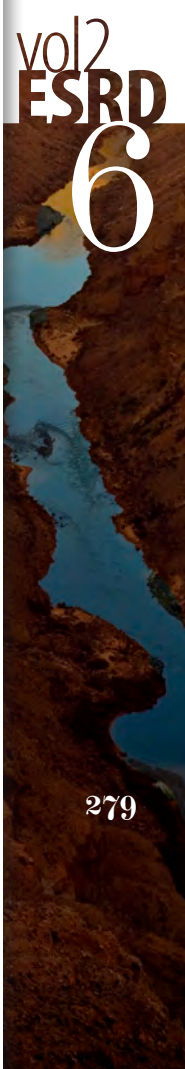
	General Medicare	Hemodialysis	Peritoneal dialysis	Transplant
All	19.2	41.2	42.9	38.4
20-44	16.8	27.9	31.1	18.4
45-64	23.7	40.4	41.1	37.0
65-74	16.7	45.3	48.0	46.1
75+	21.6	39.7	42.0	38.3
Male	18.6	38.2	41.7	37.5
Female	19.7	45.7	44.6	39.8
White	19.8	43.2	44.2	39.8
Black/African American	14.2	35.3	35.9	32.4
Asian	12.9	42.3	46.4	34.5
Other	14.8	39.5	27.9	34.6
Hispanic	15.4	34.2	38.2	31.7
Hypertension	27.9	41.3	43.3	39.4
CVD	32.1	41.4	42.5	47.5
Diabetes	36.3	43.4	46.9	50.6
Cancer	28.1	41.7	49.2	47.0

The twelve-month probability of non-LIS Part D enrollees reaching the coverage gap is 38–43 percent across ESRD modalities, but varies by demographic characteristic. Patients age 20–44, males, and blacks/African Americans are the least likely to reach the gap; by comorbidity, patients with diabetes reach it at a higher rate than do those with other diagnoses. » **Table 6.d;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, excluding those in employer-sponsored & national PACE Part D plans.*

vol 2 6.e **Part D-covered prescription fills per person per month in Part D non-LIS enrollees, by modality, 2010**

	Hemodialysis	Peritoneal dialysis	Transplant
Patients who do not reach the coverage gap	2.60	2.74	2.76
Patients who reach coverage gap, but not catastrophic coverage			
During initial coverage period	4.82	4.74	5.39
During coverage gap	4.47	4.37	5.11
Patients who reach catastrophic coverage			
During initial coverage period	6.22	5.98	7.02
During coverage gap	6.51	6.07	7.43
During catastrophic coverage	7.02	6.78	7.97

Number, fill rate, and prescription cost influence whether patients stay in the initial coverage phase or progress to the coverage gap and then to catastrophic coverage. Among those who reach one of the latter two phases, transplant patients have the highest fill rate. Among those who reach the gap but do not get to catastrophic coverage, the fill rate declines once the gap is reached. This could be due either to a reduction in medication adherence or to a decision to obtain medications outside the Part D plan, and it is a pattern not seen in patients who reach catastrophic coverage. In these patients, the fill rate rises as each phase is reached. Patients with a higher number of Part D medications could be incentivized to fill prescriptions in order to reach this phase more quickly, as their out-of-pocket expenses then decrease dramatically. » **Table 6.e;** see page 439 for analytical methods. *Point prevalent Medicare enrollees alive on January 1, excluding those in employer-sponsored & national PACE Part D plans.*



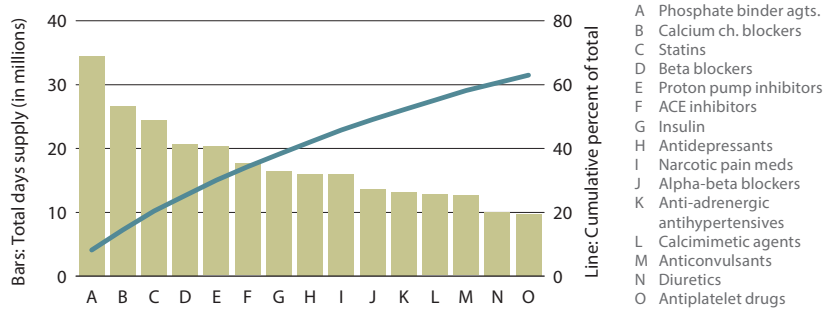
Positioning of the top Part D medications used by dialysis patients changed between 2008 (shown in the 2011 ADR) and 2010. Amlodipine has become the most frequently used drug, after being at fourth place in 2008. Sevelamer hydrochloride has dropped off the list as use has transitioned to sevelamer carbonate, now in fourth place. Use of calcium acetate and cinacalcet increased somewhat from 2008 to 2010, while use of lanthanum carbonate has declined. Together, sevelamer carbonate and hydrochloride maintain their status as the top medications, by cost, used by dialysis patients in 2010, with cinacalcet keeping second place. Use of carvediol has grown since 2008. As illustrated by days supply, medication use is a combination of use in the individual patient multiplied by the number of patients in the prevalent dialysis population, which continues to increase. » **Table 6.f;** see page 439 for analytical methods. *Part D claims for all dialysis patients, 2010.*

Phosphate binders are the most frequently prescribed Part D medication class in dialysis patients, and are also first in terms of net cost, as sevelamer carbonate and hydrochloride are not available as generics. Calcimimetic agents are ranked twelfth for frequency of use, but second in terms of total net cost, as cinacalcet is not generically available. Insulin comprised 3.9 percent of overall Part D drug use and 3.5 percent of Part D drug costs in dialysis patients in 2010. And not surprisingly, cardiovascular agents comprised three of the five most frequently used Part D medication classes in dialysis patients in 2010. » **Figures 6.18–19;** see page 439 for analytical methods. *Part D claims for all dialysis patients, 2010. Therapeutic classification based on MediSpan's generic product identifier (GPI) therapeutic classification system.*

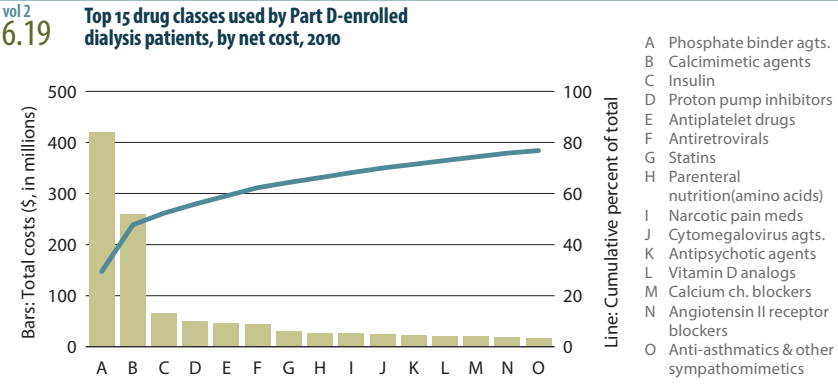
vol 2 6.f **Top 15 drugs used by Part D-enrolled dialysis patients, by days supply & net cost, 2010**

By days supply Generic name	Total days supply	By net cost Generic name	Total days supply	Total cost (dollars)
Amlodipine	19,476,423	Cinacalcet	12,948,729	260,023,205
Insulin	19,185,188	Sevelamer carbonate	15,723,597	235,623,936
Metoprolol	18,897,578	Sevelamer HCL	5,580,405	96,695,276
Sevelamer carbonate	15,723,597	Insulin	19,185,188	76,032,463
Simvastatin	15,547,902	Lanthanum carbonate	2,790,692	63,996,592
Calcium acetate	14,777,969	Calcium acetate	14,777,969	51,855,070
Lisinopril	14,425,980	Clopidogrel bisulfate	10,529,417	48,746,816
Cinacalcet	12,948,729	Esomeprazole	4,916,511	27,757,642
Omeprazole	12,265,329	Atorvastatin	6,102,510	20,658,562
Carvedilol	11,904,875	Pantoprazole	3,992,742	14,284,534
Clonidine	11,349,738	Doxercalciferol	855,446	14,108,077
Levothyroxine	10,570,307	Valsartan	4,562,564	12,885,699
Clopidogrel bisulfate	10,529,417	Pioglitazone	2,130,208	12,426,793
Furosemide	9,888,422	Nifedipine	6,588,609	11,260,004
Warfarin	8,170,035	Clonidine	11,349,738	10,202,044

vol 2 6.18 **Top 15 drug classes used by Part D-enrolled dialysis patients, by days supply, 2010**



vol 2 6.19 **Top 15 drug classes used by Part D-enrolled dialysis patients, by net cost, 2010**



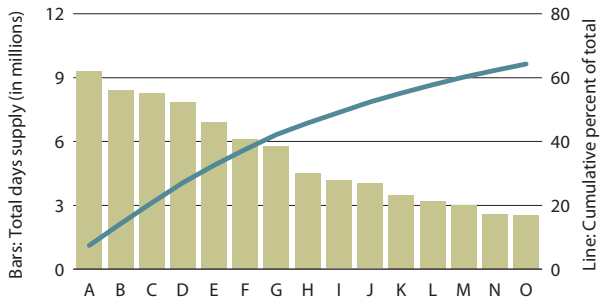
Among transplant patients, prednisone (a generic immunosuppressant) was the most frequently used medication in 2010, followed by metoprolol and insulin; these ranks are unchanged since 2008. Trimethoprim-sulfamethoxazole, used for prophylaxis against *pneumocystis carinii* pneumonia, dropped from sixth to seventh place. No trade name immunosuppressant made the top 15 list in terms of frequency, not surprising given that most are covered under Medicare Part B.

In terms of costs, insulin therapies moved from fourth place to second. The use of valganciclovir, employed for prophylaxis against cytomegalovirus, rose slightly, and maintained its first position by cost — not surprising, as it has no available generic. The immunosuppressants mycophenolate mofetil, sirolimus, cyclosporine, and mycophenolate sodium appear on the list by cost, implying that their costs are relatively higher than the frequency of their use. Although generic products became available starting in 2009, tacrolimus remained on the top cost list in 2010. Epoetin alfa and darbepoetin alfa, trade name products not among the most frequently used medications, were among those with the greatest cost, though their use has declined substantially since 2008. » **Table 6.g;** see page 439 for analytical methods. *Part D claims for all kidney transplant patients, 2010.*

vol 2 **6.g** **Top 15 drugs used by Part D-enrolled transplant patients, by days supply & net cost, 2010**

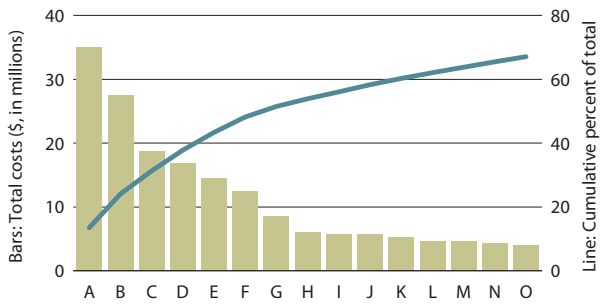
By days supply Generic name	Total days supply	By net cost Generic name	Total days supply	Total cost (dollars)
Prednisone	7,547,599	Valganciclovir	982,135	45,474,908
Metoprolol	6,690,222	Insulin	6,497,226	28,914,728
Insulin	6,497,226	Tacrolimus	1,192,352	15,799,835
Amlodipine	5,202,017	Cinacalcet	862,809	15,790,929
Furosemide	4,184,856	Esomeprazole	1,666,478	9,430,347
Omeprazole	4,079,765	Mycophenolate mofetil	1,184,242	8,940,645
Trimethoprim/ sulfamethoxazole	4,040,453	Atorvastatin	2,830,453	8,685,651
Simvastatin	4,006,447	Epoetin alfa	197,966	6,086,743
Lisinopril	2,944,375	Clopidogrel bisulfate	1,376,772	5,917,211
Atorvastatin	2,830,453	Pantoprazole	1,190,918	4,307,687
Clonidine hydrochloride	2,405,996	Sirolimus	191,171	3,933,897
Levothyroxine	2,309,616	Mycophenolate sodium	229,983	3,432,389
Nifedipine	2,050,584	Darbepoetin alfa	71,610	3,226,774
Allopurinol	1,721,115	Pioglitazone	576,497	3,227,370
Calcitriol	1,694,629	Cyclosporine	686,376	3,092,528

vol 2 **6.20** **Top 15 drug classes used by Part D-enrolled transplant patients, by days supply, 2010**



A Statins
B Calcium ch. blockers
C Beta blockers
D Corticosteroids
E Proton pump inhibitors
F Insulin
G Diuretics
H ACE inhibitors
I Antidepressants
J Immunosuppressive agents
K Anti-adrenergic antihypertensives
L Sulfamethoxazole-trimethoprim
M Narcotic pain meds
N Anticonvulsants
O Alpha-beta blockers

vol 2 **6.21** **Top 15 drug classes used by Part D-enrolled transplant patients, by net cost, 2010**



A Immunosuppressive agents
B Insulin
C Cytomegalovirus agts.
D Proton pump inhibitors
E Calcimimetic agents
F Statins
G Erythropoiesis stimulating agents
H Antiplatelet drugs
I Calcium ch. blockers
J Narcotic pain meds
K Antipsychotics
L Antidepressants
M Antiretrovirals
N Angiotensin II receptor blockers
O Anticonvulsants

By class, immunosuppressants were tenth on the list in terms of Part D medication use among kidney transplant patients during 2010, but second in terms of cost, even though generic products for tacrolimus and mycophenolate mofetil became available during 2008–2010. Statins were first, representing 7.4 percent of Part D medication use (by days supply) in transplant patients, but only 4.8 percent of cost. Cardiovascular medication classes comprised seven of the top fifteen categories in terms of use. Insulin was fifth on the list based on days supply, but second on the list in terms of cost, most likely reflecting use of trade name products. » **Figures 6.20–21;** see page 439 for analytical methods. *Part D claims for all kidney transplant patients, 2010. Therapeutic classification based on Medi-Span's generic product identifier (GPI) therapeutic classification system.*

MEDICARE PART D ENROLLMENT PATTERNS

sources of prescription drug coverage among Medicare enrollees, 2010 (Figure 6.2)

Part D with low income subsidy	» general Medicare · 23%	» all CKD · 29%	» HD · 54%	» PD · 40%	» TX · 34%
Part D without low income subsidy	· 38%	· 29%	· 20%	· 24%	· 22%
retiree drug subsidy	· 14%	· 21%	· 8.2%	· 8.1%	· 8.5%

Patients enrolled in Part D, 2010 (Figure 6.5)

LIS (dual)	» general Medicare · 32%	» all CKD · 44%	» HD · 64%	» PD · 51%	» transplant · 50%
LIS (non-dual)	· 5.9%	· 5.9%	· 9%	· 12%	· 11.5%
non-LIS	· 63%	· 50%	· 27%	· 37%	· 39%

OVERALL COSTS OF PART D ENROLLMENT

total estimated Part D net payment for enrollees, 2010 (Figure 6.9)

» hemodialysis · $1.43 billion » peritoneal dialysis · $98 million » transplant · $306 million

per person per year Part D costs for enrollees, 2008 (Figure 6.10)

Medicare costs	» hemodialysis · $5,910	» peritoneal dialysis · $6,344	» transplant · $4,725
out-of-pocket costs	· $468	· $678	· $602

total per person per year Medicare & out-of-pocket Part D costs for enrollees, 2008 (Figure 6.11)

patients with low income subsidy (LIS)	» hemodialysis · $7,488	» peritoneal dialysis · $8,795	» transplant · $6,547
patients with no LIS	· $3,500	· $4,042	· $3,342

COVERAGE PHASE ANALYSES FOR PART D ENROLLEES

Part D non-LIS enrollees who reach the coverage gap, 2010 (Figure 6.16)

at 12 months » general Medicare 19% » all CKD · 37% » HD · 41% » PD · 43% » transplant · 38%

Part D non-LIS enrollees who reach catastrophic coverage after reaching the coverage gap, 2010 (Figure 6.17)

at 9 months » general Medicare 12.5% » all CKD · 18% » HD · 23% » PD · 26% » transplant · 22%

terms used in the Part D analyses

Low income subsidy (LIS) For Medicare beneficiaries with limited income and/or assets, the costs of participation in Medicare Part D may be reduced by the LIS. Beneficiaries who are dually eligible for Medicare and Medicaid are automatically granted the LIS, while beneficiaries who are not dually eligible may apply for it. While the LIS may take eight different levels, with monthly premiums and copayments either eliminated or reduced, all dually eligible beneficiaries pay no monthly premiums.

Creditable coverage Prescription drug coverage that is actuarially equivalent to the standard Part D benefit, as defined annually by CMS. Beneficiaries with creditable coverage may forgo participation in Medicare Part D without having to pay increased monthly premiums upon future enrollment. Examples of creditable coverage include the Federal Employee Health Benefits Program, TRICARE, VA Health Care Benefits, State Pharmacy Assistance Programs (SPAPs), and private insurance that is eligible for the retiree drug subsidy. Private insurance for the working aged may or may not be creditable.

Retiree drug subsidy (RDS) A program designed to encourage employers to continue to provide prescription drug coverage to retirees eligible for Medicare Part D. Under the program, employers receive a tax-free rebate equal to 28 percent of covered prescription drug costs incurred by their retirees. The program is relatively simple to administer, but may ultimately be more costly than providing employees a type of Part D plan known as an "employer group waiver plan." Following passage of the Patient Protection and Affordable Care Act, the tax-free status of the subsidy is due to expire on December 31, 2012.

Fills per person Each prescription drug purchase constitutes a fill. Fills per person are calculated from the quotient of cumulative fills in a population and the number of people in that population.

Total days supply Each prescription drug is disbursed with sufficient quantity to administer for a set number of days, so long as instructions are followed (i.e., so long as adherence is perfect). Total days supplied equals the cumulative number of days supplied through all fills of a particular medication in a population.

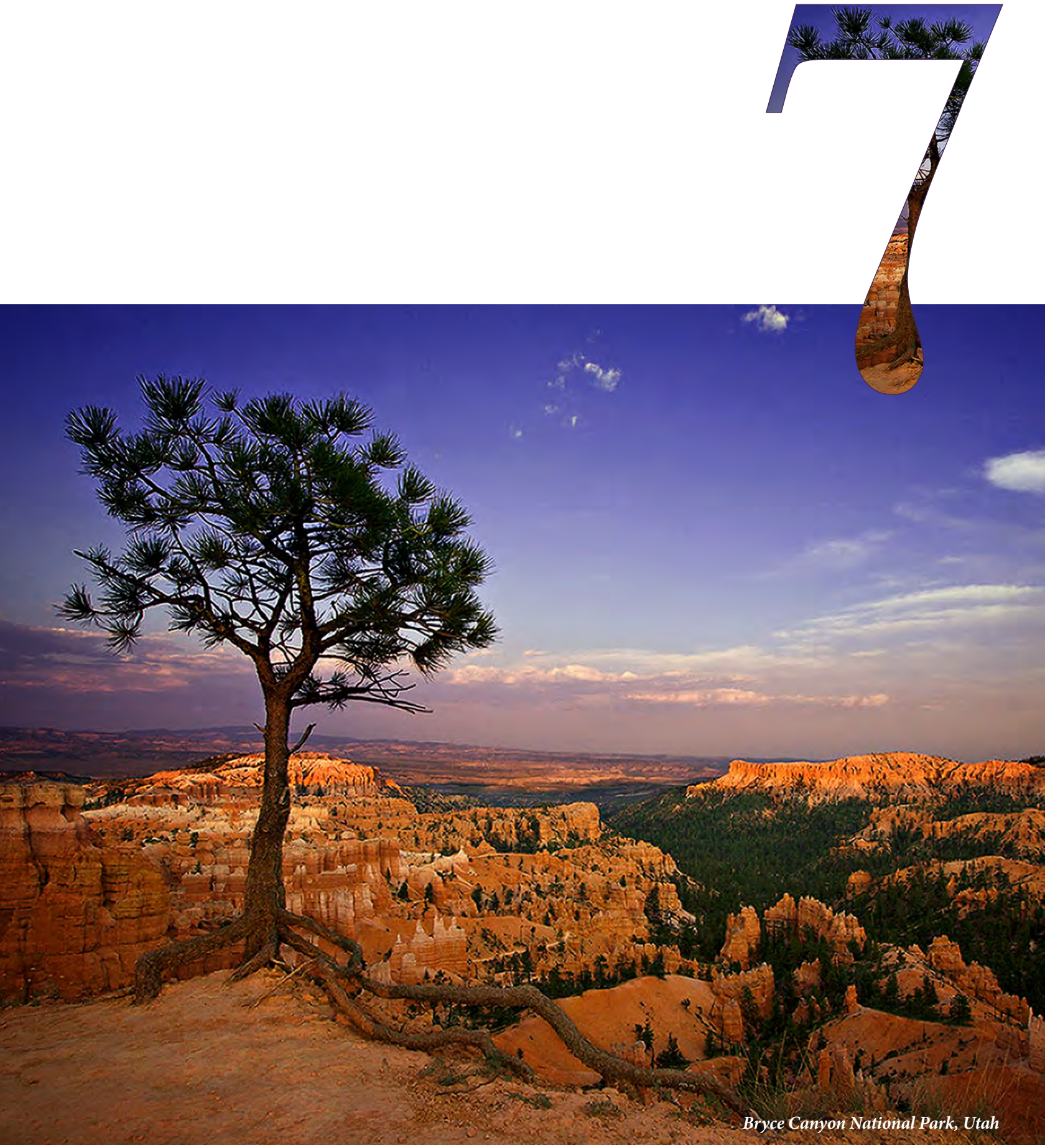
Deductible At the beginning of each calendar year, each non-LIS Part D enrollee is responsible for 100 percent of gross drug costs up to a set amount (i.e., the deductible), at which point cost sharing begins. In the standard benefit, the deductible was $250, $265, and $275 in 2006, 2007, and 2008, respectively.

Initial coverage period The interval following the deductible phase, but preceding the coverage gap. During this time, the Part D enrollee without the LIS is normally responsible for 25 percent of gross drug costs (in the standard benefit).

Coverage gap The interval following the initial coverage period, but preceding catastrophic coverage. During this time, non-LIS Part D enrollees are normally responsible for 100 percent of gross drug costs (in the standard benefit). In 2010, the Affordabl e Health Care Act made several changes to Medicare Part D to reduce the effect of the coverage gap, so that it phases out by 2020. In 2010, non-LIS enrollees received a $250 rebate from Medicare to partially cover costs during the coverage gap. In 2011, non-LIS enrollees were given a 50 percent discount on the total price of brand name drugs and a 7 percent reduction in cost of generic medications while in the gap.

Catastrophic coverage The interval following the coverage gap. During this time, the Part D enrollee without the LIS is normally responsible for 5 percent of gross drug costs (in the standard benefit).

Medicare Advantage Part D plans (MA-PDs) Medicare Part D plans that are offered only to participants in Medicare Part C.



Bryce Canyon National Park, Utah

TRANSPLANTATION

In 2010, the most recent year of available data, 16,843 kidney transplants were performed in patients age 20 and older in the United States — 135 more than in the previous year. There were 85 fewer living donor transplants performed in 2010 compared to 2009, a decrease of 1.4 percent, compared with a 2.0 percent increase in deceased donor transplants. Among patients age 19 and younger, 935 kidney transplants were performed in 2010, 90 fewer than in the previous year.

The number of adult candidates on the waiting list with certified kidney failure continues to increase, growing 6 percent in 2010 to reach 75,807 patients on December 31 (Reference Table E.3); 36 percent of these patients were inactive. Among active listings, 8 percent were listed at more than one transplant center. The rate of new ESRD cases declined 1.1 percent from 2009 to 2010. Twenty-two percent of new ESRD patients in 2009 were added to the waiting list or received a transplant within one year of ESRD certification, a number remaining fairly stable over the past two decades. The percentage of adult candidates who receive a deceased donor transplant within three years of listing varies by candidate blood type, from 20 percent for those with Type O to 47 percent of those with Type AB.

Rates of deceased donation remained flat in 2010, at 21.8 donors per million population, and at 2.4 donations per 1,000 deaths in 2009–2010 combined. With the number of candidates awaiting transplant continuing to increase, transplant rates per 100 dialysis patient years continue to decline, in 2010 reaching 2.4 and 1.3 for deceased and living donor transplants, respectively.

One-year all-cause graft failure continues to reach all-time low levels, at 9 percent for recipients of first-time, deceased donor transplants, and 3 percent for recipients of first-time, living donor transplants in 2009. Five-year all-cause graft failure rates also continue to fall, reaching 29 and 17 percent in deceased and living donor recipients. In 2010, delayed graft function was reported in 23 and 3 percent of deceased and living donor transplants. The rate varies, from 22 percent for standard criteria donors to 28 percent and 41 percent, respectively, for expanded criteria donors and donations after cardiac death.

Attention continues to focus on reducing the incidence of acute rejection and other post-transplant metabolic, cardiovascular, and infectious complications, and on improving long-term outcomes. The incidence of acute rejection episodes during the first year post-transplant, reported in 11 and 10 percent of deceased and living donor recipients in 2009, has declined approximately 50 percent over the past decade. New-onset diabetes following transplant, however, remains common, with over 40 percent of adult, non-diabetic, Medicare-covered recipients having evidence of diabetes by the end of the third year after transplant. Thirty-one percent of non-diabetic transplant recipients with Medicare Part D coverage have claims for insulin during the first six months post-transplant, while 10 percent have claims for sulfonylureas.

Congestive heart failure remains the leading cause of cardiovascular hospitalization during the first two years post-transplant. Among recipients who die with a functioning transplant, cardiovascular disease continues to be the leading cause of death, accounting for 30 percent of deaths, followed by infectious causes and malignancies at 21 and 9 percent. Urinary tract infections are the leading cause of hospitalization due to infection in the first post-transplant year. And in the three years post-transplant, lymphoproliferative disorders are reported in 0.5 and 1.6 percent of adult and pediatric Medicare-covered recipients.

Among all transplant recipients alive with a functioning transplant at the beginning of 2010, 56 percent were enrolled in a Part D prescription drug plan, compared to 44 percent of those receiving a transplant during the year. Reflecting

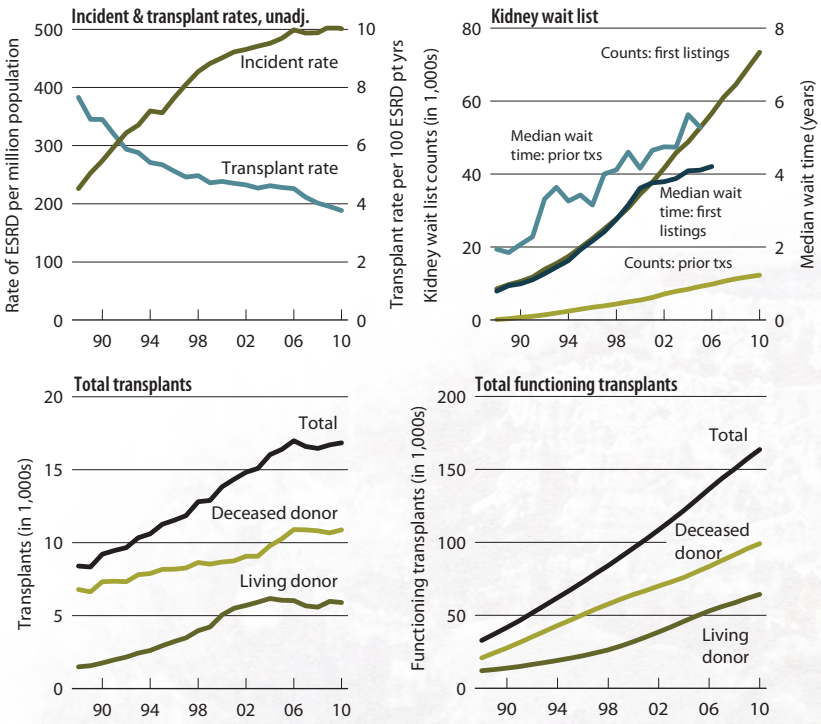
This monster of a land, this mightiest of nations, this spawn of the future, turns out to be the macrocosm of microcosm me.

JOHN STEINBECK
Travels with Charley

continued attention to the prevention of cardiovascular events, beta blockers are prescribed for 75 and 71 percent of deceased and living donor recipients, respectively, during the first six months post-transplant. ACE inhibitors are prescribed for 23 and 22 percent, dihydropyridine calcium channel blockers for 65 and 58 percent, and loop diuretics for 44 and 27 percent. Approximately 41 percent of transplant recipients with Part D coverage have claims for statins during the first six months post-transplant, and 90 percent of recipients age 35 or older at transplant have a lipid screening performed during the first year. Targeting post-transplant cardiovascular complications will continue to yield improvements in recipient outcomes.

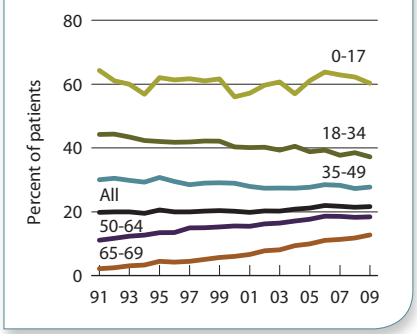
Medicare prescription drug costs, including all Part D costs as well as Part B costs for injectable and immunosuppressive drugs, reached $10,000 per transplant patient per year in 2010. Metoprolol, an antihypertensive agent, was the most common medication prescribed in each of the first three years post-transplant. The highest costs to Medicare during the first year post-transplant were for valganciclovir, recommended by the KDIGO Guidelines for Care of the Kidney Transplant Recipients (Guideline 13.2.1) for chemoprophylaxis of CMV infection during the first three months post-transplant and for six weeks following treatment with a T-cell depleting antibody. Use of valganciclovir during years two and three is reduced, although it remains the top medication by cost during year two and the fourth medication by cost during year three post-transplant. » **Figure 7.1;** see page 440 for analytical methods. *Unadjusted incident & transplant rates: limited to ESRD patients age 20 & older, thus yielding a computed incident rate higher than the overall rate presented elsewhere in the Annual Data Report. Wait list counts: patients age 20 & older listed for a kidney or kidney-pancreas transplant on December 31 of each year. Wait time: patients age 20 & older entering wait list in the given year. Transplant counts: patients age 20 & older as known to the USRDS.*

vol 2
7.1 **Trends in transplantation: unadjusted rates, wait list, & total & functioning transplants, patients age 20 & older**

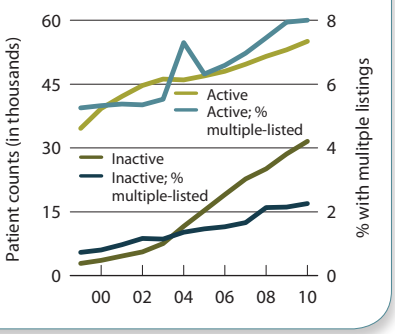


Sixty percent of pediatric patients age 0–17 starting ESRD therapy in 2009 were wait-listed or received a deceased donor transplant within one year, compared to 28 percent of those age 35–49. At the end of 2010, there were 55,060 active patients on the wait list for a kidney or kidney-pancreas transplant, and 31,560 inactive patients. » **Figures 7.2–3;** see page 440 for analytical methods. *Incident ESRD pts younger than 70 (7.2). Patients age 18 & older listed for a kidney or kidney-pancreas transplant on December 31 of each year (7.3).*

vol 2 **7.2** **Pts wait-listed or receiving any transplant within one year of initiation, by age**

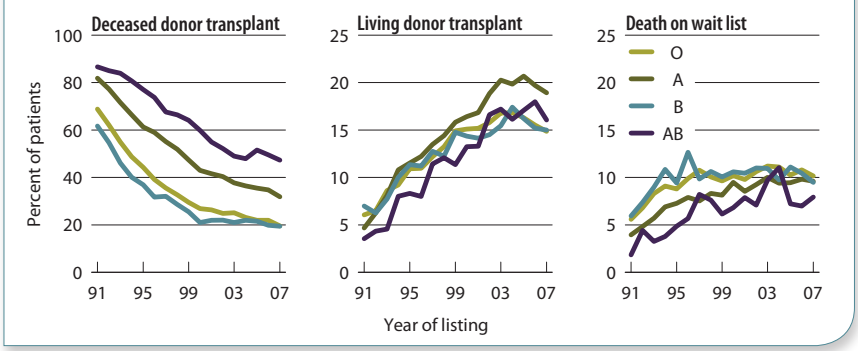


vol 2 **7.3** **Wait list counts & multiple listings**



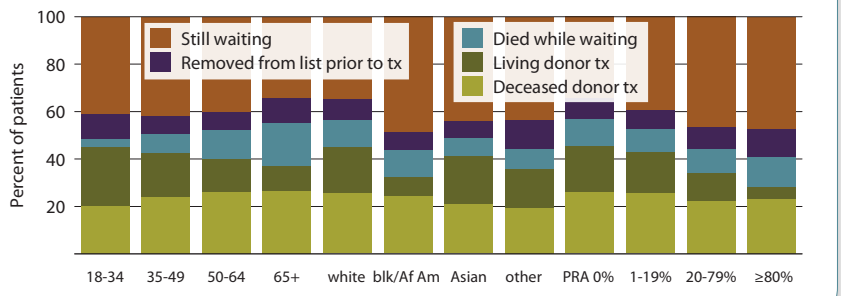
The percentage of adult patients receiving a deceased donor transplant within three years of listing has fallen considerably since 1991, and varies by blood type. It continues to be highest for those of blood type AB — at 47 percent for patients listed in 2007 — and lowest for those of type O or B, at 20 percent. The percentage receiving a living donor transplant has been rising, and varies little by blood type. » **Figure 7.4;** see page 440 for analytical methods. *Patients age 18 & older listed for a first-time kidney or kidney-pancreas transplant.*

vol 2 **7.4** **Outcomes for wait-listed adult patients within three years of listing, by blood type**



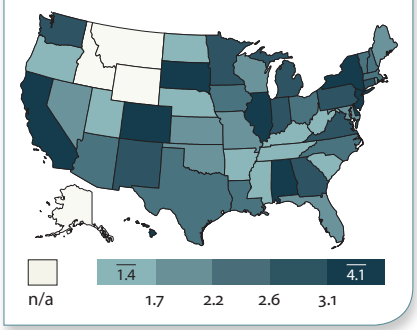
Of patients listed in 2007, 20 percent of whites and Asians received a living donor transplant within three years, compared to just 8.0 percent of blacks/African Americans. Forty-four and 49 percent of Asians and blacks/African Americans were still waiting after three years, rates considerably higher than the 35 percent among whites. » **Figure 7.5;** see page 440 for analytical methods. *Pts age 18 & older listed for a first-time, kidney-only tx in 2007; transplanted patients may have subsequent outcomes in the three-year follow-up period.*

vol 2 **7.5** **Outcomes for first-time wait-listed patients three years after listing in 2007, by age, race, & PRA**

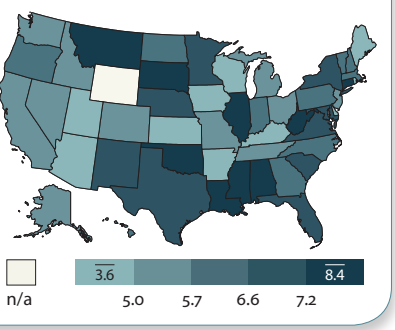


Median wait times for patients transplanted in 2010 exceeded four years in Alabama, Hawaii, New Jersey, California, and South Dakota; the median was 2.6. Adjusted mortality among wait-listed patients in 2010 was 6.2 deaths per 100 person years of waiting, and reached 9.2 in Louisiana. » **Figures 7.6–7;** see page 440 for analytical methods. *Pts age 18+ receiving a first-time, deceased-donor, kidney-only tx in 2010 (7.6). Pts age 18+, listed for a kidney or kidney-pancreas tx as of Jan. 1, 2010; see appendix for adjustments (7.7).*

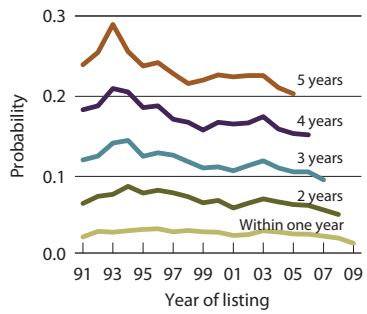
vol 2 **7.6** **Unadj. median wait times (years) for adults tx'ed in 2010, by state of tx center**



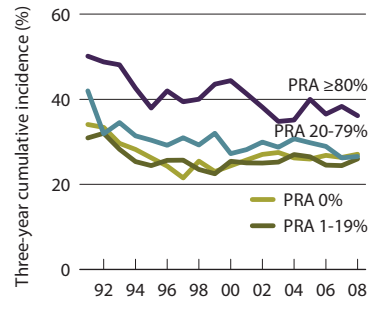
vol 2 **7.7** **Adj. mortality rates (per 100 person yrs of waiting) for wait-listed pts, by state, 2010**



vol 2
7.8 **Likelihood of dying while awaiting transplant**

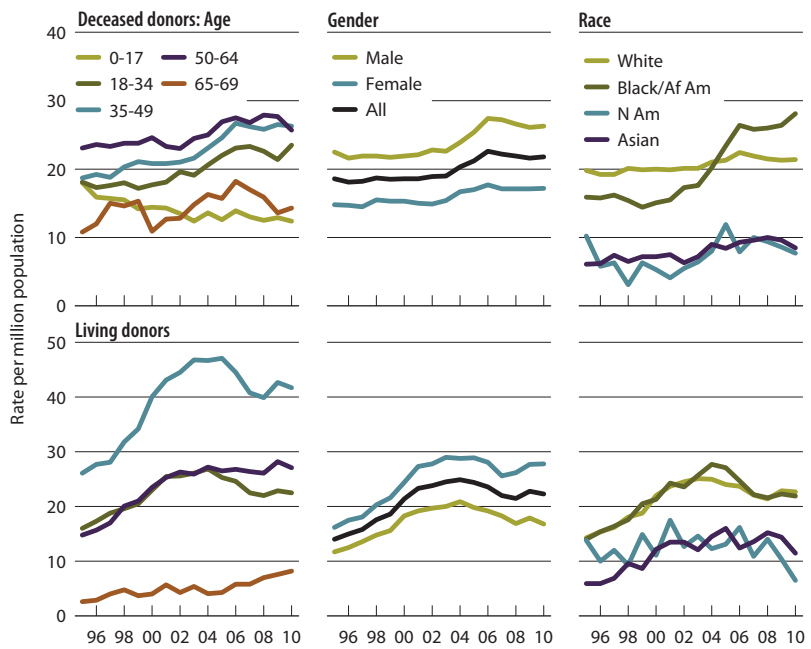


vol 2
7.9 **Three-year cumulative incidence of transfusion in wait-listed pts, by PRA**



For first-time transplant candidates, the probability of dying within one or five years while awaiting a transplant continued a downward trend in 2009, falling to 0.02 and 0.20. Transfusions are most common among patients who are highly sensitized at the time of transplant (PRA of 80 percent or higher). » **Figures 7.8–9;** see page 440 for analytical methods. *Pts age 18 & older, listed for a first-time kidney or kidney-pancreas tx (7.8); pts age 18 & older with Medicare primary coverage & first listed for a kidney tx in the given year (7.9).*

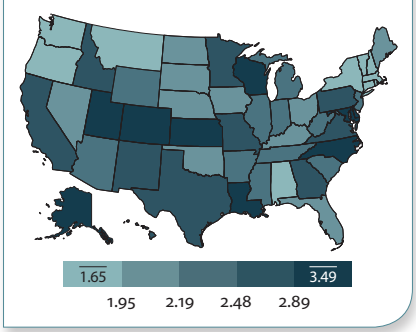
vol 2
7.10 **Donation rates, by age, gender, & race**



In 2010, rates of kidney donation from deceased donors reached 26 per million population in recipients age 35–64, and 26.3 and 17.2, respectively, in males and females. Since 2005, rates by race have been highest in blacks/African Americans, reaching 28.1 in 2010, compared to just 7.7 and 8.5 among Native Americans and Asians.

Rates of donations from living donors are noticably higher among patients age 35–49, reaching 47 per million population in the middle of the decade, and 42 in 2010. By race, rates in 2010 were 6.5 and 11.5 per million among Native Americans and Asians, and 22–23 among whites and blacks/African Americans. » **Figure 7.10;** see page 440 for analytical methods. *Donors younger than 70 whose organs are eventually transplanted.*

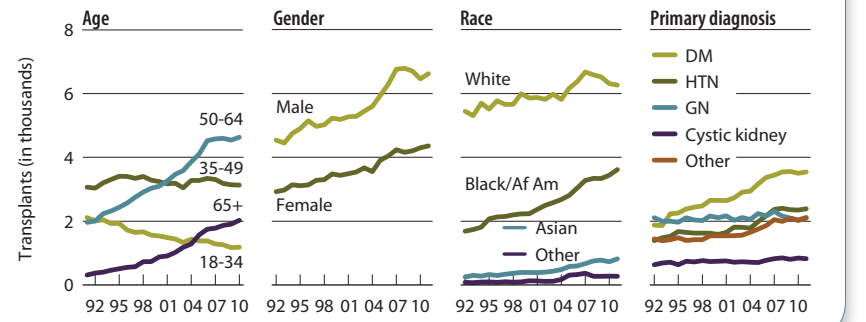
vol 2
7.11 **Deceased donor donations (per 1,000 deaths), by state, 2009–2010**



In 2009–2010, the overall rate of donations from deceased donors was 2.4 per 1,000 deaths. Rates by state were greater than 3 per 1,000 deaths in Alaska, Delaware, Kansas, Utah, Maryland, Wisconsin, and Colorado, and less than 1.75 in Montana, New Hampshire, Oregon, Rhode Island, and Vermont. » **Figure 7.11;** see page 440 for analytical methods. *Deaths from July 1, 2009 to July 1, 2010.*

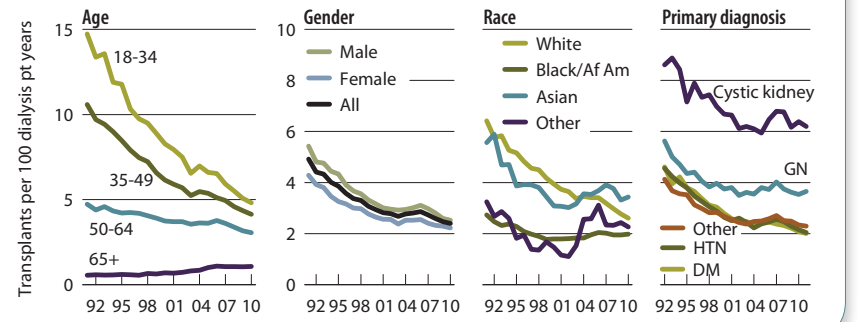
Since 2000, the number of deceased donor transplants among patients age 65 and older has more than doubled, to 2,031, and there has been an increase of 50 percent among patients age 50–64. Among those age 18–34, in contrast, transplants have fallen 23 percent, to 1,187. Among blacks/African Americans and Asians, the number of transplants has grown 53 and 111 percent, respectively. » **Figure 7.12;** see page 440 for analytical methods. *Pts age 18 & older. Includes kidney-alone & kidney-pancreas transplants.*

vol 2
7.12 Deceased donor transplants, by age, gender, race, & primary diagnosis



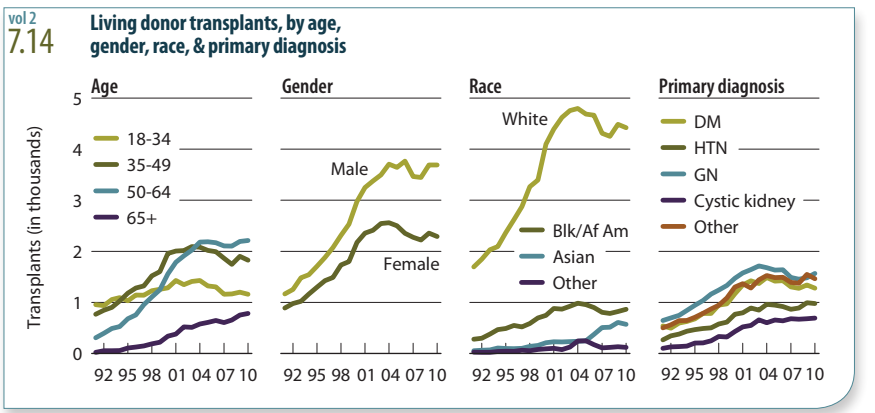
The adjusted deceased donor transplant rate has increased 54 percent since 2000 for patients age 65 and older, while falling 42 percent for those age 18–34. By race, the rate is down 34 percent among whites, while rising 11 percent for blacks/African Americans and Asians. » **Figure 7.13;** see page 440 for analytical methods. *Patients age 18 & older. Adj: age/gender/race/ethnicity/primary diagnosis (rates by one factor adjusted for remaining four).*

vol 2
7.13 Adjusted transplant rates, by age, gender, race, & primary diagnosis: deceased donors



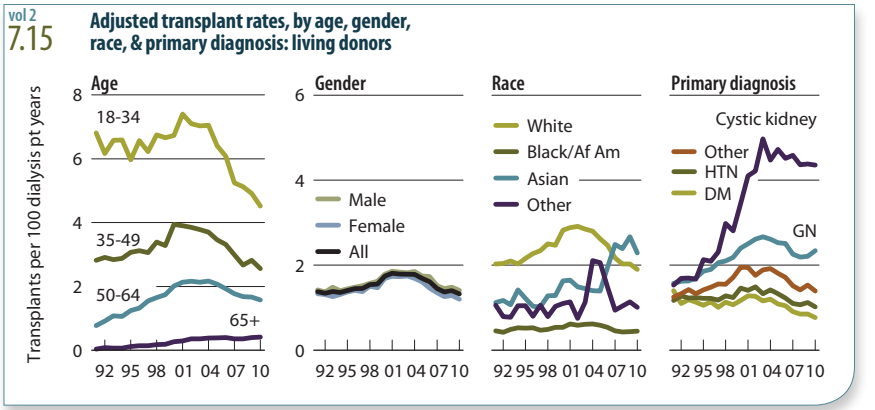
Among patients younger than 50, the number of living donor transplants has fallen 7–10 percent since 2000. For those age 50–64, in contrast, the number is now 42 percent higher, and for patients age 65 and older it has more than doubled. Living donor transplants among whites and blacks/African Americans have increased 8 and 16 percent, respectively, in this period, and have more than doubled among Asians. » **Figure 7.14;** see page 440 for analytical methods. *Patients age 18 & older. Includes kidney-alone & kidney-pancreas transplants.*

vol 2
7.14 Living donor transplants, by age, gender, race, & primary diagnosis

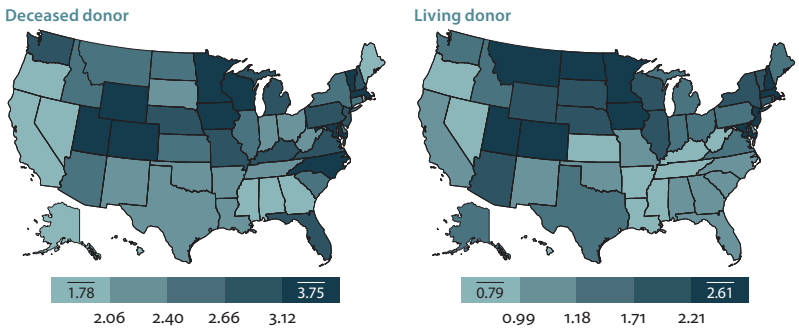


Rates of living donor transplants peaked at the beginning of the decade, and have since fallen for many patient groups. As with deceased donor transplants, rates by race are now greatest in the Asian population, reaching 2.3 per 100 dialysis patient years in 2010 — 41 percent higher than in 2000. » **Figure 7.15;** see page 440 for analytical methods. *Patients age 18 & older. Adj: age/gender/race/ethnicity/primary diagnosis (rates by one factor adjusted for remaining four).*

vol 2
7.15 Adjusted transplant rates, by age, gender, race, & primary diagnosis: living donors

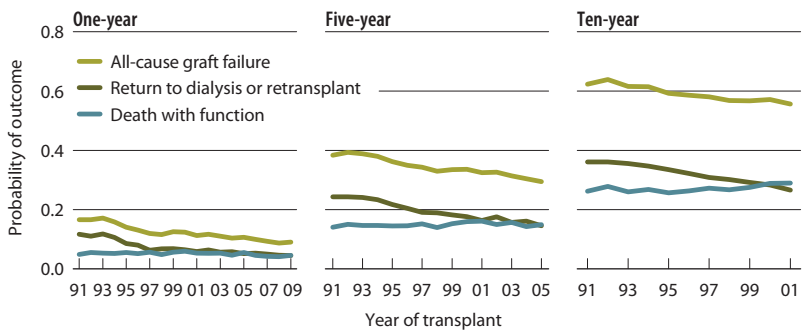


vol 2
7.16 Adjusted transplant rates (per 100 dialysis patient years) by state of patient residence & donor type, 2010



In 2010, the national rate of deceased donor transplantation was 2.6 per 100 dialysis patient years. The highest rates were seen among residents of Vermont, Colorado, and Wyoming, with rates of 3.6 to 6.8. The rate of living donor transplantation was 1.5 nationally, and above 3.1 in Minnesota and North Dakota. » **Figure 7.16;** see page 440 for analytical methods. *Patients age 18 & older. Adj: age/gender/race/primary diagnosis; ref: prevalent dialysis patients, 2010.*

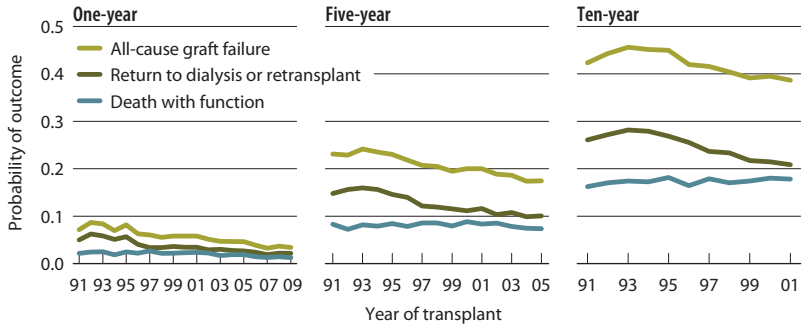
vol 2
7.17 Outcomes: deceased donor transplants



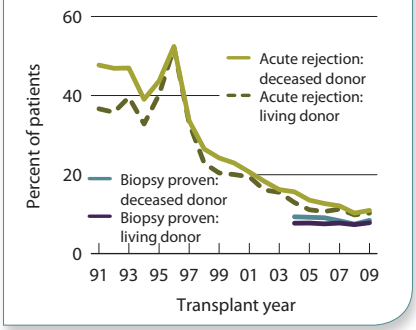
Among patients who received a deceased donor kidney transplant in 2009, the probability of all-cause graft failure in the first year following transplant was 0.09, compared to 0.03 in those receiving a transplant from a living donor. The one-year graft and survival advantage experienced by living donor transplant recipients continues at five and ten years post-transplant, with probabilities of 0.17 and 0.39 compared to 0.29 and 0.56 in those receiving a deceased donor transplant.

The probability of returning to dialysis or being retransplanted has lessened for both deceased and living donor recipients. For transplants performed between 1992 and 2001, the probability of return to dialysis by ten years post-transplant fell 26 and 23 percent, respectively. In contrast, the probability of death with function at ten years post-transplant has increased approximately 10 percent in both populations. » **Figures 7.17–18;** see page 440 for analytical methods. *Patients age 18 & older receiving a first-time, kidney-only transplant; unadjusted.*

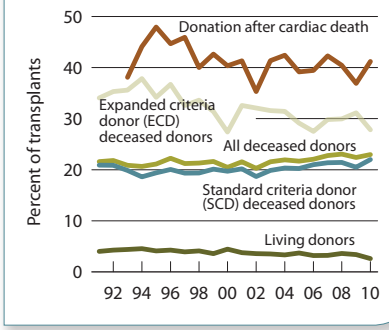
vol 2
7.18 Outcomes: living donor transplants



vol 2
7.19 Acute rejection within the first year post-transplant



vol 2
7.20 Transplants with delayed graft function (DGF), by donor type

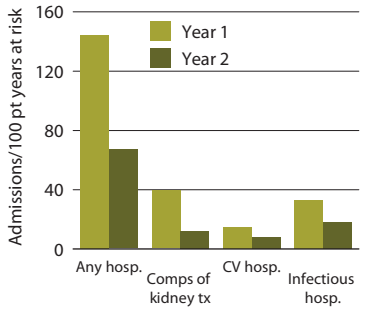


The percentage of transplant patients experiencing an acute rejection has declined steadily over the past decade, and three-fourths of reported acute rejections are biopsy-proven. In 2010, delayed graph function was reported in 2.6 percent of transplants from living donors, compared to 22, 28, and 41 percent of SCDs, ECDs, and donations after cardiac death. » **Figures 7.19–20;** see page 440 for analytical methods. *Patients age 18 & older with a functioning graft at discharge.*

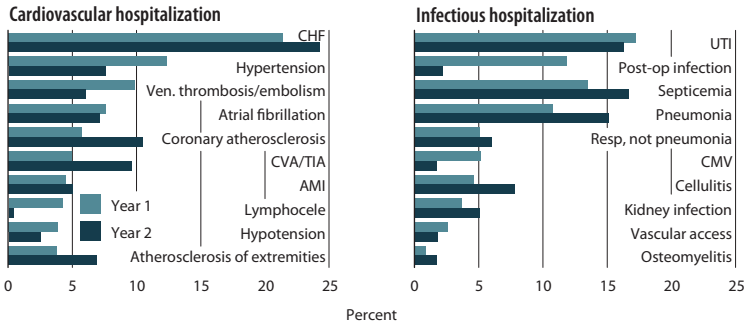
In the second year post-transplant, hospitalization rates for adult recipients are 54 percent lower than in the first year, at 67 admissions per 100 patient years. Admissions due to transplant complications fall 69 percent, to 12.1, while admissions due to cardiovascular causes and to infection fall 45 and 46 percent, to 8.2 and 18.1. » **Figure 7.21;** see page 440 for analytical methods. *First-time, kidney-only transplant recipients, age 18 & older, transplanted in 2008; ref: transplant patients, 2005.*

In the first year after transplant, 21 percent of cardiovascular hospitalizations are due to congestive heart failure; this number rises in the second year, to 24 percent. Hospitalizations for coronary atherosclerosis and CVA/TIA also increase, from 5.8 and 5.0 percent, respectively, in year one to 10.5 and 9.7 percent in year two. Urinary tract infection, septicemia, and pneumonia are the most common diagnoses among transplant patients admitted for infection, at 15–16 percent in the second year after transplant. » **Figure 7.22;** see page 440 for analytical methods. *First-time, kidney-only transplant recipients, age 18 & older, with Medicare primary payor coverage, transplanted in 2006–2008.*

vol 2 **7.21** **Hospitalization rates in the first & second years post-transplant, 2008**

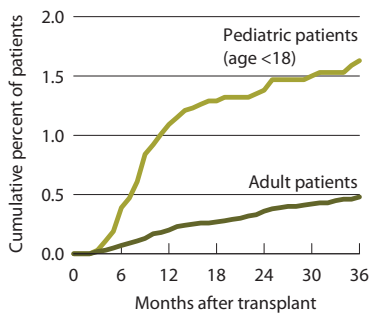


vol 2 **7.22** **Primary diagnoses of cardiac & infectious hospitalizations in the first & second years post-transplant**

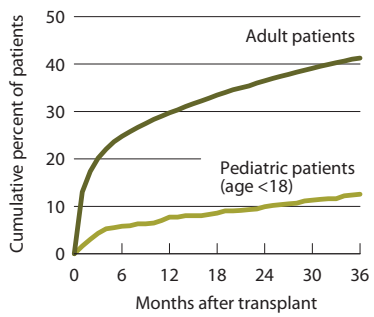


At 36 months after transplant, the cumulative incidence of post-transplant lymphoproliferative disorder (PTLD) is more than three times greater among pediatric patients than among adults, at 1.63 percent compared to 0.48. Adults, in contrast, have a higher incidence of post-transplant diabetes, reaching 41 percent at 36 months, compared to 13 percent among pediatric patients. » **Figures 7.23–24;** see page 441 for analytical methods. *Patients receiving a first-time, kidney-only transplant, 2003–2007 combined.*

vol 2 **7.23** **Cumulative incidence of post-transplant lymphoproliferative disorder (PTLD)**

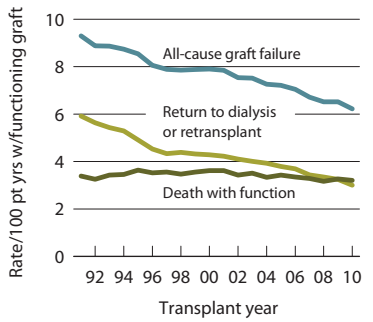


vol 2 **7.24** **Cumulative incidence of post-transplant diabetes**

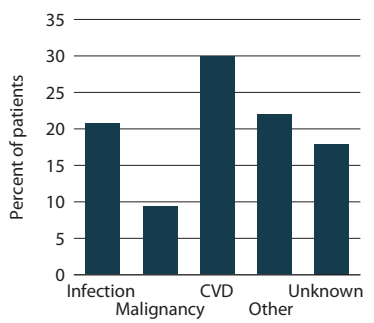


The overall graft failure rate among adult transplant recipients fell to 6.2 per 100 patient years in 2010, while the rate of failure requiring dialysis or retransplantation fell to 3.0. Cardiovascular disease and infection are the main cause of death for 30 and 21 percent of adult patients who die with a functioning graft. » **Figures 7.25–26;** see page 441 for analytical methods. *Pts age 18+ at transplant; adj: age/gender/race (7.25). First-time, kidney-only transplant recipients, age 18+, 2006–2010, who died with functioning graft (7.26).*

vol 2 **7.25** **Adjusted rates of outcomes after transplant**

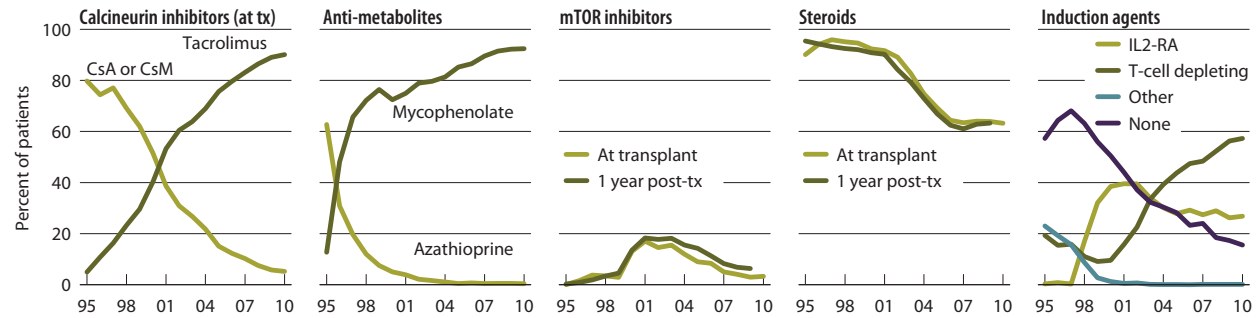


vol 2 **7.26** **Causes of death with function, 2006–2010**

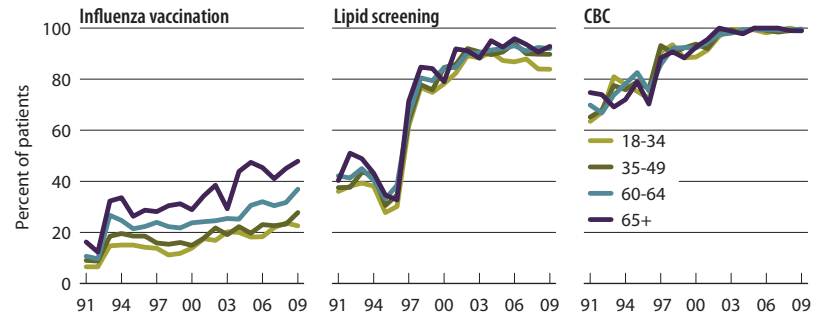


Ninety percent of patients transplanted in 2010 used tacrolimus as their initial calcineurin inhibitor, and mycophenolate has almost completely replaced azathioprine as the anti-metabolite used in new transplant recipients. Use of mTOR inhibitors, both initially and post-transplant, has changed little, while steroid use seems to be stabilizing. Use of T-cell depleating and IL2-RA induction agents showed a negligible increased in 2010. » **Figure 7.27;** see page 441 for analytical methods. *Patients age 18 & older receiving a first-time, kidney-only transplant. CSA: cyclosporine A; CSM: cyclosporine microemulsion.*

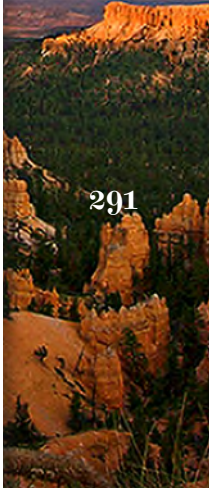
vol 2
7.27 **Immunosuppression use**



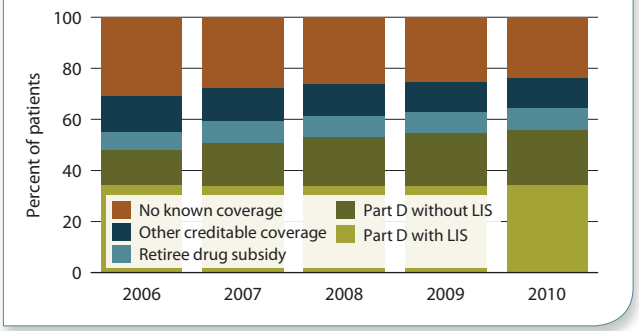
vol 2
7.28 **Follow-up care & screening in the first 12 months post-transplant, by age**



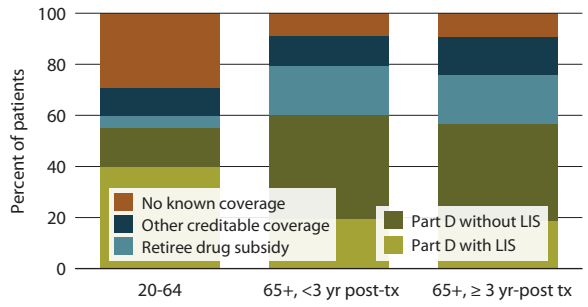
In 2009, 23 percent of recipients age 18–34 received an influenza vaccination in the 12 months post-transplant, compared to 37 percent of those age 60–64, and 48 percent of those age 65 and older. Lipid screening rates range from 84 percent in the youngest adults to 92–93 percent in those age 60 and older. Since 2003, nearly all recipients have received a CBC test in the year after transplant. » **Figure 7.28;** see page 441 for analytical methods. *Patients age 18 & older, with Medicare primary payor coverage, receiving a first-time, kidney-only transplant.*



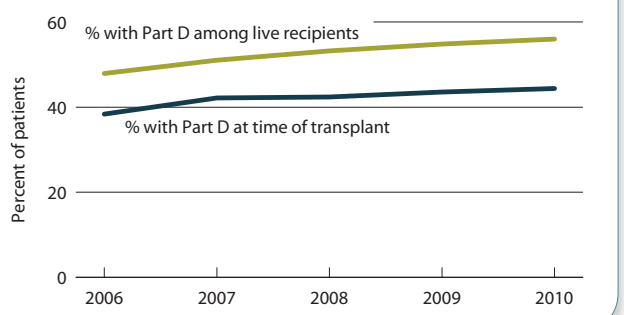
vol 2
7.29 Sources of prescription drug coverage in kidney transplant recipients



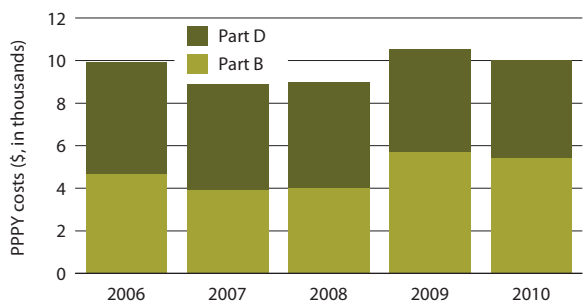
vol 2
7.30 Sources of prescription drug coverage in kidney transplant recipients, by age & years post-transplant (age 65+)



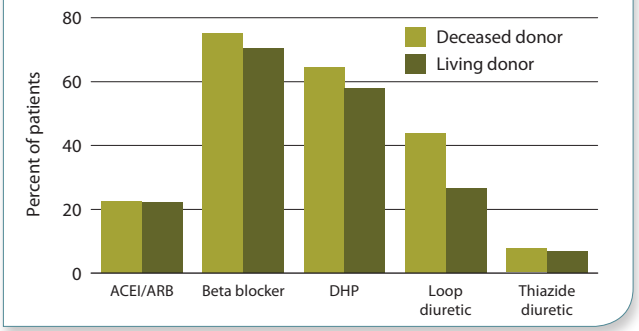
vol 2
7.31 Transplant recipients enrolled in Part D



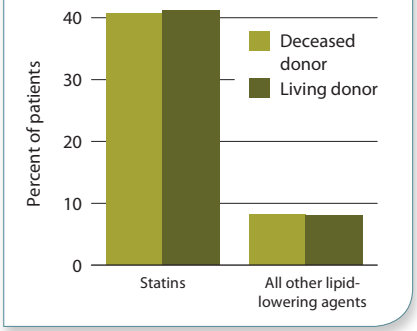
vol 2
7.32 Total Part B & Part D medication costs per person per year (PPPY) in kidney transplant recipients



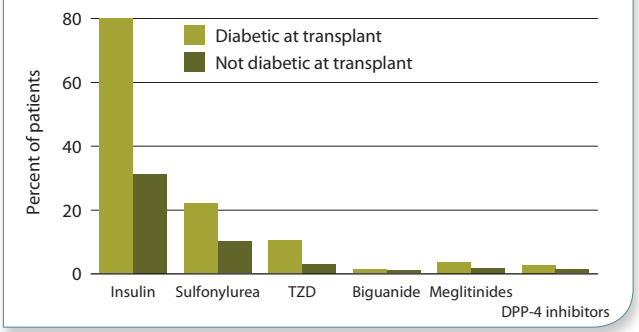
vol 2
7.33 Cardiovascular medication use in the first six months post-transplant, 2008–2010 (Part D data)



vol 2
7.34 Medications for lipid control in the first 6 months post-tx, 2008–2010 (Part D data)



vol 2
7.35 Medications for diabetes control in the first six months post-transplant, 2008–2010 (Part D data)



» **Figures 7.29–35;** see page 441 for analytical methods. *7.29–30: Point prevalent Medicare-enrolled transplant recipients alive on January 1. 7.31: Medicare-enrolled transplant recipients. 7.32: Period prevalent transplant patients; includes all Part B & Part D costs for injectable & immunosuppressive drugs for calendar years 2006–2010. 7.33–35: Patients age 18 & older receiving a first-time, kidney-only transplant between January 1, 2008 & June 30, 2010, who remain alive with function, & who have Medicare Part D coverage for six months post-transplant.*

Part D medications in kidney transplant recipients

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7.a Top 15 medications used by Part D-enrolled kidney recipients transplanted in 2007, by days supply

Year 1 (2007 tx, n=17,478)	days supply	Year 2, n=16,221	days supply	Year 3, n=15,551	days supply
Metoprolol tartrate	837,466	Metoprolol tartrate	971,827	Metoprolol tartrate	899,486
Sulfamethoxazole/trimethoprim	821,055	Sulfamethoxazole/trimethoprim	785,021	Insulin regular, human	756,665
Amlodipine besylate	608,887	Insulin regular, human	768,476	Prednisone	703,262
Insulin regular, human	605,076	Amlodipine besylate	642,724	Amlodipine besylate	613,562
Valganciclovir hydrochloride	511,240	Prednisone	585,395	Sulfamethoxazole/trimethoprim	455,960
Clonidine HCl	427,646	Omeprazole	400,065	Omeprazole	439,090
Furosemide	348,484	Furosemide	391,181	Simvastatin	410,455
Sevelamer HCl	333,817	Atorvastatin calcium	372,285	Furosemide	393,483
Prednisone	325,863	Clonidine HCl	346,789	Atorvastatin calcium	342,796
Nifedipine	315,436	Simvastatin	312,978	Lisinopril	321,464
Atorvastatin calcium	308,241	Nifedipine	304,991	Clonidine HCl	305,833
Cinacalcet HCl	302,288	Pantoprazole sodium	279,568	Nifedipine	270,908
Omeprazole	272,421	Lisinopril	263,551	Levothyroxine sodium	241,404
Pantoprazole sodium	242,264	Famotidine	262,765	Pantoprazole sodium	209,770
Famotidine	238,466	Levothyroxine sodium	233,243	Famotidine	205,251

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7.b Top 15 medications used by Part D-enrolled kidney recipients transplanted in 2007, by days supply & cost

Year 1 (2007 tx, n=17,478)	days supply	cost ($)	Year 2, n=16,221	days supply	cost ($)	Year 3, n=15,551	days supply	cost ($)
Valganciclovir hydrochloride	511,240	19,378,257	Valganciclovir hydrochloride	219,703	9,448,638	Insulin regular, human	756,665	3,118,123
Cinacalcet HCl	302,288	4,914,595	Insulin tegular, human	768,476	2,773,441	Cinacalcet HCl	137,093	2,431,925
Sevelamer HCl	333,817	4,874,633	Cinacalcet HCl	158,589	2,626,572	Tacrolimus anhydrous	146,933	2,125,449
Insulin regular, human	605,076	1,784,213	Tacrolimus anhydrous	153,712	2,590,869	Valganciclovir hydrochloride	46,607	2,016,824
Epoetin alfa	34,891	1,149,713	Mycophenolate mofetil	104,911	1,729,031	Mycophenolate mofetil	98,464	1,348,384
Tacrolimus anhydrous	58,856	1,068,910	Esomeprazole mag trihydrate	220,582	1,099,050	Esomeprazole mag trihydrate	193,938	1,017,276
Esomeprazole mag trihydrate	198,789	923,789	Atorvastatin calcium	372,285	1,019,139	Atorvastatin calcium	342,796	959,288
Pantoprazole sodium	242,264	912,792	Epoetin alfa	27,441	958,019	Pantoprazole sodium	209,770	704,086
Lanthanum carbonate	70,586	911,533	Pantoprazole sodium	279,568	940,790	Epoetin alfa	16,858	521,435
Amlodipine besylate	608,887	881,814	Lansoprazole	126,568	689,142	Lansoprazole	86,625	496,004
Atorvastatin calcium	308,241	823,422	Nifedipine	304,991	538,412	Clopidogrel bisulfate	127,275	478,822
Mycophenolate mofetil	50,010	801,330	Darbepoetin alfa in polysorbat	10,060	476,595	Tamsulosin HCl	145,157	448,922
Lansoprazole	142,714	709,711	Mycophenolate sodium	33,503	444,535	Nifedipine	270,908	436,630
Nifedipine	315,436	600,525	Clopidogrel bisulfate	123,852	443,161	Mycophenolate sodium	27,997	406,624
Ganciclovir	31,430	567,921	Omeprazole	400,065	405,819	Omeprazole	439,090	387,225

In 2010, 56 percent of kidney transplant patients were enrolled in Medicare Part D: 34 percent with the low income subsidy (LIS), and 22 percent without. Transplant patients age 65 and older are less likely to have the LIS than those age 20–64, at 19 and 40 percent, respectively. Since 2006, the proportion of recipients enrolled in Part D has increased from 38 to 44 percent at the time of transplant, and from 48 to 56 percent among living recipients.

In 2010, total Part B per person per year medication costs for transplant patients were slightly higher than those for Part D, at $5,420 and $4,580, respectively.

Data on cardiovascular medication use in the first six months after transplant show that both living and deceased donor transplant recipients are more likely to receive a beta blocker or dihydropyridine calcium channel blocker than an ACE inhibitor or angiotension receptor blocker; loop diuretics, however, are far more widly used in deceased donor recipients, at 44 versus 26 percent. Recipients are more likely to use statins than other types of lipid lowering medications, and 80 percent of those with diabetes at the time of transplant use insulin compared to 22 and 10.5 percent, respectively, using sufonylureas or TZDs.

Among those transplanted in 2007, metoprolol tartrate was the most frequently used medication in the first three years post-transplant. Valganciclovir hydrochloride was the most costly medicationin the first two years post-transplant, and insulin the most costly in year three. » **Tables 7.a–b;** see page 441 for analytical methods. *Patients enrolled in Medicare Part D & transplanted in 2007. Costs are estimated Medicare payment, defined as the sum of plan covered payment amount & low income subsidy amount. "Year 1" is the period from transplant to one year later. Years 2 & 3 are similarly defined.*

TRANSPLANT

kidney transplants in patients age 20 & older, 2010 (Figure 7.1)

» deceased donor · 10,891 » living donor · 5,898

wait-listed patients receiving a deceased donor transplant within three years of listing in 2007, by blood type (%; Figure 7.4)

» type O · 19.6 » type A · 31.9 » type B · 19.5 » type AB · 47.3

deceased donor transplants, 2010 (Figure 7.12)

» white · 6,267 » black/African American · 3,617 » Asian · 821 » other race · 272

living donor transplants, 2010 (Figure 7.14)

» white · 4,423 » black/African American · 866 » Asian · 574 » other race · 124

WAIT LIST

patients waiting for a transplant three years after listing in 2007 (percent; Figure 7.5)

» white · 34.5 » black/African American · 48.6 » Asian · 43.8 » other race · 43.4

probability of dying while awaiting transplant (percent; Figure 7.8)

» within 1 year · 1.7 » 2 years · 5.3 » 3 years · 9.6 » 4 years · 15.2 » 5 years · 20.3

DONATION

rate of kidney donation, 2010 (per million population; Figure 7.10)

deceased donors » white · 21.4 » black/African American · 28.1 » Native American · 7.7 » Asian · 8.5
living donors · 22.7 · 21.9 » Native American· 6.5 » Asian · 11.5

adjusted rate of deceased donor transplants, 2010 (per 100 dialysis patient years; Figure 7.13)

» white · 2.6 » black/African American · 2.0 » Asian · 3.4 » other race · 2.3

adjusted rate of living donor transplants, 2010 (per 100 dialysis patient years; Figure 7.15)

» white · 1.9 » black/African American · 0.5 » Asian · 2.3 » other race · 1.0

OUTCOMES

probability of graft failure or death (Figures 7.17–18)

» deceased donors » one-year · 9.1% » five-year · 29.5% » ten-year · 55.6%
» living donors · 3.4% · 17.4% · 17.8%

cumulative incidence of post-transplant lymphoproliferative disorder at 36 months after transplant (Figure 7.23)

» pediatric patients · 1.63% » adult patients · 0.48%

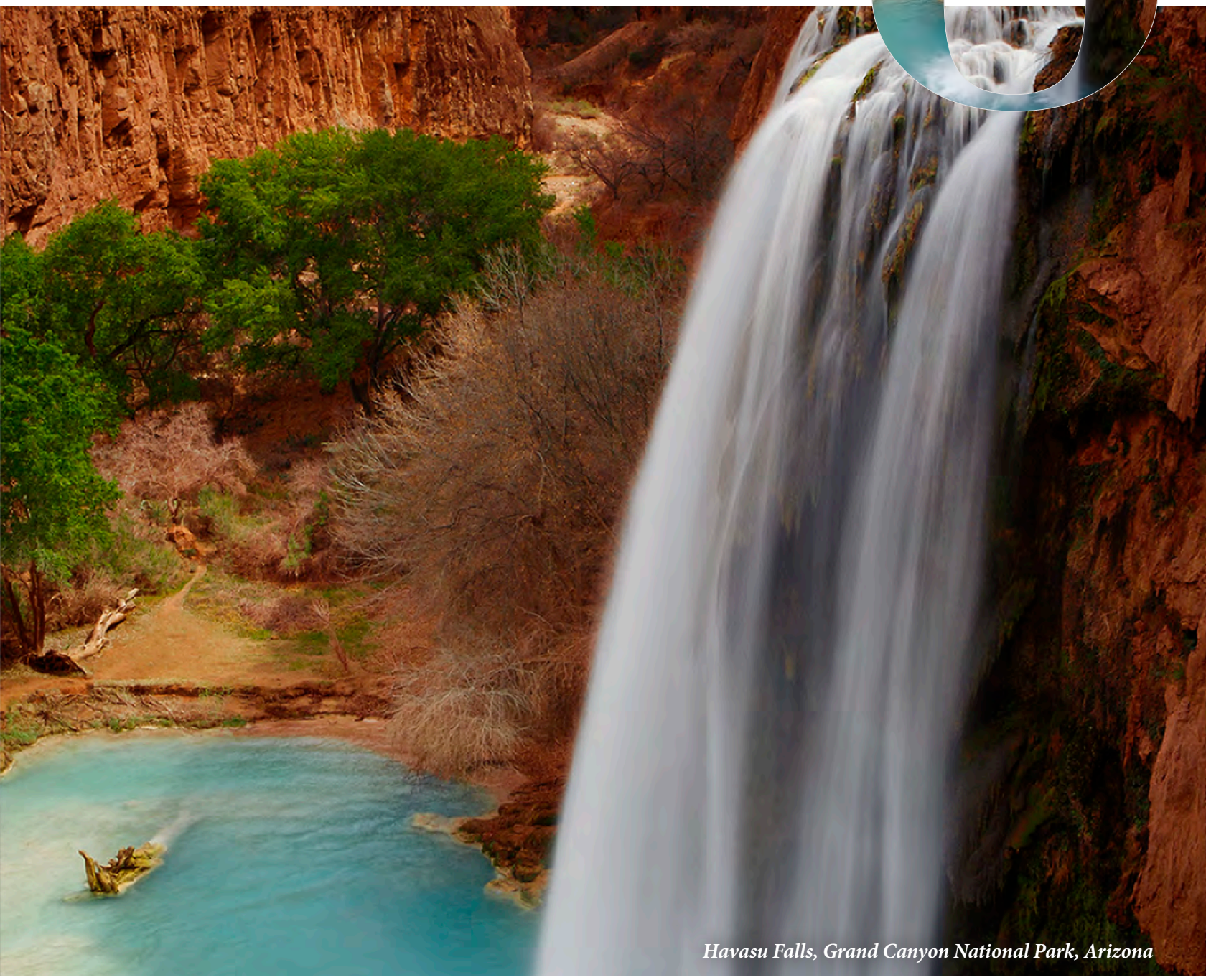
cumulative incidence of post-transplant diabetes at 36 months after transplant (Figure 7.24)

» pediatric patients · 12.6% » adult patients · 41.3%

causes of death with a functioning graft (Figure 7.26)

» infection · 20.8% » malignancy · 9.4% » CVD · 29.9%

8



Havasu Falls, Grand Canyon National Park, Arizona

PEDIATRIC ESRD

Pediatric end-stage renal disease patients pose unique challenges to parents, providers, and the healthcare system, which must address not only the disease itself, but the many extra-renal manifestations that affect patients' lives and families. On the next spread we detail the causes of kidney failure in children, using data from the Medical Evidence form (2728). The leading causes are cystic/hereditary and congenital disorders, which account for 32 percent of pediatric ESRD cases, while 26 percent are caused by glomerular diseases, and 11 percent by secondary causes of glomerulonephritis, including vasculitis.

Even more striking are the simplest measures of outcomes in the first year of therapy. Thirty-eight percent of patients receive a transplant in the first year, while 4 percent die; neither of these rates has altered over the past decade. Considerable progress, however, has been made in the first-year mortality rate among patients with primary glomerular diseases, falling from 2.1 to 1.1 percent. But both the transplant and mortality rates among patients with congenital/hereditary/cystic diseases — the most common diagnoses — remain unchanged.

In this chapter we highlight the considerable degree of morbidity in pediatric patients, manifested not only in overall hospitalization rates, but in rates of repeated hospitalizations. Almost 35 percent of children with ESRD are rehospitalized within 30 days of discharge. As with the adult population (discussed in Chapter Three), this rate has not changed in a decade. Rates of hospitalization related to infection are highest in the youngest patients and in those on peritoneal dialysis, while hospitalizations due to bacteremia/sepsis are most frequent in the youngest patients on hemodialysis — an area of major concern. Hospitalizations due to pneumonia are greatest in transplant patients younger than ten, a finding which suggests that the low rates of pneumonia vaccinations may be an area to target.

Next we compare rates over time, allowing us to focus providers' attention on areas which may need to be prioritized for greater prevention efforts. Between the periods of 2000–2004 and 2005–2010, overall hospitalization rates rose 29 percent for children younger than ten, and 17 percent for those age 15–19; hospitalizations in the hemodialysis and peritoneal dialysis populations rose 18–19 percent. Hospitalizations for cardiovascular causes rose 38 percent in the youngest children, and 47 percent in the oldest. Cardiovascular hospitalizations have increased the most in patients on hemodialysis and in those with a transplant, rising 49 and 56 percent, respectively, compared to 10 percent among those treated with peritoneal dialysis. And rates of hospitalization due to infection have increased 32 percent among patients younger than 10.

In similar analyses of mortality, adjusted rates show small increases in mortality in those younger than ten and those age 15–19, in contrast to a 31 percent decline among those age 10–14. These overall changes, however, are not reflected in rates of cardiovascular mortality, which have increased across all age groups in the hemodialysis population, and risen 17 percent for those on peritoneal dialysis; the rate among transplant patients, in contrast, has fallen 24 percent. More detailed analyses need to be developed on the specific causes of hospitalization, including congestive heart failure and arrhythmias. These complications are of

A child's world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood. If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength.

RACHEL CARSON,
The Sense of Wonder

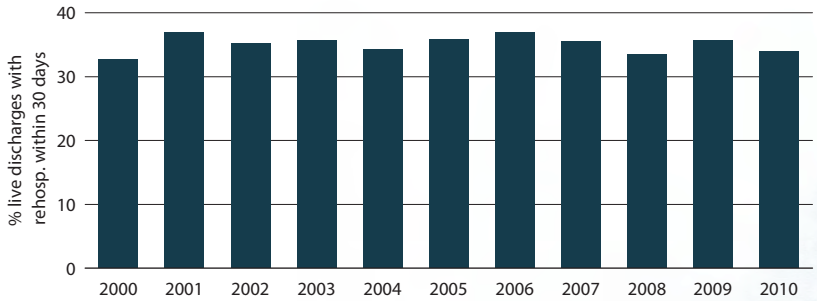
particular concern in pediatric patients, in whom fluid overload and hypertension are major clinical problems. Also needed are analyses of medication use specific to these areas of morbidity.

Influenza and pneumococcal pneumonia can, of course, lead to increased hospitalization rates and higher risks of mortality. Rates of vaccination against these diseases have improved in the pediatric population, but still remain far below recommended levels, at less than half the rates seen in the adult population. There also continue to be disparities in vaccination rates by modality, with hemodialysis patients more likely to be vaccinated than children on peritoneal dialysis. This year we present new data on the various types of pneumococcal pneumonia vaccines.

Data on trends in incidence and prevalence are presented later in this year's chapter, as we wanted to ensure that data on hospitalization were given high priority by providers, policy makers, and regulators. There are a few trends that merit particular attention. Rates of incidence due to cystic/hereditary/congenital diseases, for instance, appear to be increasing. This trend, which may be related to earlier diagnosis and better treatment (allowing children to survive to ESRD), needs to be investigated, but the small numbers pose many challenges. There also appears to be a real decline in ESRD due to glomerular disease, a trend noted in adults as well. The high use of kidney protective medications needs to be assessed to provide insight into this area. And the decrease in incidence among black/African American patients is parallel to a rise in rates among patients of other races, suggesting that reclassification may have occurred.

Overall, the most striking findings related to pediatric ESRD patients continue to center on the extreme vulnerability of patients younger than ten. Issues of infection control, which could lower the rate of complications, need to be addressed. This year we also show that cardiovascular mortality has increased, and should be addressed as well. In past ADRs we have noted issues of uncontrolled hypertension and heart failure, and of sudden death, which remain issues of concern. None of these are new challenges, but the community will need to assess them and develop new approaches to improving outcomes in this vulnerable population.
» **Figure 8.1;** see page 442 for analytical methods. *ESRD patients age 0–19. Adj: gender/race/primary diagnosis; ref: discharges in 2005.*

vol 2
8.1 **Adjusted all-cause rehospitalization rates in pediatric patients 30 days after live hospital discharge**



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8.a Distribution of reported incident ESRD pediatric patients, by primary diagnosis, 2001–2005 (period A) & 2006–2010 (period B)

	Total pts		% of inc pts		Median age		% male		White		African Am		Other race		% tx first year		% dying first year	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
All ESRD, (reference)	6,505	6,711	100	100	14	14	56.8	57.5	64.7	67.4	24.9	19.2	10.4	13.4	38.2	38.2	4.1	4.0
Diabetes	59	133	0.9	2.1	16	2	52.5	59.4	57.6	66.9	39.0	26.3	3.4	6.8	11.9	4.5	25.4	17.3
DM w/renal manifestations Type 2	36	97	0.6	1.5	13	0	58.3	59.8	61.1	69.1	33.3	23.7	5.6	7.2	13.9	3.1	33.3	20.6
DM w/renal manifestations Type 1	23	36	0.4	0.6	18	18	43.5	58.3	52.2	61.1	47.8	33.3	0.0	5.6	8.7	8.3	13.0	8.3
Glomerulonephritis (GN)	1,640	1,501	26.1	23.2	16	16	55.7	53.4	58.8	64.5	31.3	27.0	9.9	8.5	33.2	34.0	2.1	1.1
GN (histologically not examined)	335	268	5.3	4.2	17	18	57.0	58.6	59.1	72.4	24.5	20.5	16.4	7.1	26.6	20.1	3.3	1.1
Focal glomer. sclerosis, focal sclerosis GN	839	790	13.3	12.2	15	15	58.2	53.7	52.1	58.5	40.9	34.2	7.0	7.3	33.4	39.7	1.9	1.3
Membranous nephropathy	36	37	0.6	0.6	16	17	41.7	45.9	52.8	56.8	30.6	29.7	16.7	13.5	44.4	29.7	0.0	0.0
Membranopro. GN type 1, diffuse MPGN	90	78	1.4	1.2	16	16	54.4	44.9	81.1	64.1	14.4	17.9	4.4	17.9	36.7	43.6	3.3	0.0
Dense deposit disease, MPGN type 2	33	27	0.5	0.4	13	14	27.3	51.9	90.9	88.9	3.0	0.0	6.1	11.1	30.3	25.9	0.0	3.7
IgA nephropathy, Berger's	124	135	2.0	2.1	17	18	60.5	59.3	71.0	71.9	12.9	15.6	16.1	12.6	45.2	34.1	0.8	0.0
IgM nephropathy	*	17	0.1	0.3	16	16	71.4	70.6	28.6	64.7	42.9	29.4	28.6	5.9	28.6	23.5	0.0	0.0
With lesion of rapidly progressive GN	89	50	1.4	0.8	14	13	38.2	36.0	66.3	72.0	25.8	14.0	7.9	14.0	33.7	16.0	3.4	2.0
Post infectious GN, SBE	14	22	0.2	0.3	15	14	71.4	63.6	64.3	63.6	28.6	31.8	7.1	4.5	35.7	13.6	0.0	0.0
Other proliferative GN	73	77	1.2	1.2	15	15	50.7	39.0	67.1	76.6	24.7	19.5	8.2	3.9	31.5	37.7	1.4	2.6
Secondary GN/vasculitis	706	732	11.2	11.3	16	16	31.0	32.1	53.7	64.8	36.0	27.0	10.3	8.2	17.3	14.8	5.5	4.5
Lupus erythematosus (SLE nephritis)	400	379	6.4	5.9	17	17	21.8	21.6	35.5	48.0	52.3	42.5	12.3	9.5	9.8	6.1	6.8	5.8
Henoch-Schonlein syndrome	29	30	0.5	0.5	13	17	55.2	53.3	79.3	90.0	10.3	6.7	10.3	3.3	41.4	33.3	0.0	3.3
Scleroderma	*	*	0.1	0.1	17	17	50.0	40.0	66.7	100	16.7	0.0	16.7	0.0	16.7	20.0	50.0	0.0
Hemolytic uremic syndrome	123	133	2.0	2.1	6	6	43.9	48.9	76.4	81.2	13.8	12.0	9.8	6.8	31.7	24.8	4.1	5.3
Polyarteritis	*	16	0.1	0.2	14	13	22.2	12.5	100	62.5	0.0	6.3	0.0	31.3	11.1	6.3	0.0	0.0
Wegener's granulomatosis	54	53	0.9	0.8	15	15	53.7	47.2	74.1	90.6	20.4	7.5	5.6	1.9	18.5	20.8	3.7	0.0
Nephropathy due to drug abuse	*	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other vasculitis and its derivatives	47	64	0.7	1.0	12	15	23.4	37.5	72.3	71.9	21.3	20.3	6.4	7.8	25.5	25.0	2.1	1.6
Goodpasture's syndrome	26	34	0.4	0.5	17	17	46.2	29.4	92.3	91.2	7.7	2.9	0.0	5.9	19.2	23.5	3.8	2.9
Secondary GN, other	12	18	0.2	0.3	11	17	41.7	50.0	75.0	94.4	8.3	0.0	16.7	5.6	25.0	27.8	0.0	5.6
Interstitial nephritis/pyelonephritis	452	335	7.2	5.2	14	15	51.5	51.3	80.5	78.2	13.3	7.5	6.2	14.3	46.5	52.8	1.8	5.7
Analgesic abuse	*	*	0.0	0.0	16	17	66.7	50.0	100	0.0	0.0	0.0	0.0	100	33.3	0.0	0.0	0.0
Radiation nephritis	*	*	0.0	0.0	18	11	50.0	50.0	100	100	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0
Lead nephropathy	*	*	0.0	0.0	19	14	100	100	0.0	100	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nephropathy caused by other agents	41	35	0.7	0.5	13	15	56.1	54.3	82.9	85.7	17.1	2.9	0.0	11.4	46.3	40.0	9.8	22.9
Gouty nephropathy	*	*	.	0.0	.	0	.	100	.	100	.	0.0	.	0.0	.	0.0	.	100
Nephrolithiasis	*	13	0.1	0.2	12	16	55.6	30.8	77.8	69.2	22.2	0.0	0.0	30.8	77.8	69.2	0.0	0.0
Acquired obstructive uropathy	72	38	1.1	0.6	13	15	81.9	76.3	68.1	73.7	23.6	13.2	8.3	13.2	48.6	44.7	1.4	5.3
Chronic pyeloneph., reflux nephropathy	238	169	3.8	2.6	14	15	40.3	46.2	84.9	79.9	8.4	3.6	6.7	16.6	44.1	61.5	1.3	1.8
Chronic interstitial nephritis	75	68	1.2	1.1	14	15	53.3	51.5	78.7	80.9	13.3	14.7	8.0	4.4	54.7	45.6	0.0	5.9
Acute interstitial nephritis	*	*	0.1	0.0	6	11	80.0	66.7	60.0	0.0	40.0	66.7	0.0	33.3	0.0	33.3	0.0	33.3
Urolithiasis	*	*	0.0	0.0	14	19	50.0	100	100	0.0	0.0	100	0.0	0.0	50.0	0.0	0.0	0.0
Other disorders of calcium metabolism	*	*	0.1	0.0	17	11	25.0	0.0	75.0	50.0	25.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0
Hypertensive/large vessel disease	309	326	4.9	5.0	17	17	56.0	61.3	48.2	58.3	40.8	34.4	11.0	7.4	22.0	18.4	5.5	6.4
Unspecified with renal failure	289	310	4.6	4.8	18	17	56.4	61.0	46.0	57.4	42.6	35.5	11.4	7.1	21.1	17.1	5.2	6.8
Renal artery stenosis	*	*	0.1	0.1	14	14	66.7	62.5	77.8	62.5	22.2	12.5	0.0	25.0	55.6	50.0	0.0	0.0
Renal artery occlusion	*	*	0.1	0.1	0	11	33.3	60.0	88.9	80.0	0.0	20.0	11.1	0.0	11.1	40.0	22.2	0.0
Cholesterol emboli, renal emboli	*	*	0.0	0.0	16	7	50.0	100	50.0	100	50.0	0.0	0.0	0.0	50.0	33.3	0.0	0.0

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8.a Distribution of reported incident ESRD pediatric patients, by primary diagnosis, 2001–2005 (period A) & 2006–2010 (period B)

	Total pts		% of inc pts		Median age		% male		White		African Am		Other race		% tx first year		% dying first year	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Cystic/heriditary/congenital diseases	2,018	2,260	32.1	35.0	10	10	68.0	67.5	73.6	73.9	17.1	13.5	9.3	12.6	49.5	49.2	3.1	3.2
Polycystic kidneys, adult (dominant)	32	37	0.5	0.6	14	15	56.3	51.4	84.4	70.3	12.5	18.9	3.1	10.8	65.6	48.6	0.0	0.0
Polycystic, infantile (recessive)	128	146	2.0	2.3	9	3	57.8	48.6	71.9	77.4	13.3	13.7	14.8	8.9	57.0	42.5	4.7	13.7
Med. cystic dis., inc. nephronophthisis	104	109	1.7	1.7	13	12	39.4	41.3	82.7	86.2	5.8	1.8	11.5	11.9	65.4	71.6	1.9	0.0
Tuberous sclerosis	*	*	0.1	0.1	17	18	50.0	33.3	75.0	50.0	25.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0
Hereditary nephritis, Alport's syndrome	127	139	2.0	2.2	16	16	83.5	83.5	71.7	64.0	20.5	20.9	7.9	15.1	40.9	52.5	0.8	0.0
Cystinosis	62	57	1.0	0.9	12	13	56.5	50.9	87.1	87.7	8.1	3.5	4.8	8.8	79.0	73.7	0.0	0.0
Primary oxalosis	*	18	0.2	0.3	6	4	70.0	55.6	60.0	77.8	10.0	11.1	30.0	11.1	60.0	61.1	0.0	0.0
Fabry's disease	*	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Congenital nephrotic syndrome	135	125	2.1	1.9	2	2	61.5	60.0	71.9	74.4	14.8	12.8	13.3	12.8	45.9	54.4	8.1	6.4
Drash syndrome, mesangial sclerosis	12	29	0.2	0.4	2	1	66.7	51.7	58.3	86.2	8.3	10.3	33.3	3.4	8.3	37.9	16.7	6.9
Cong. obst. of ureterpelvic junction	47	53	0.7	0.8	9	13	80.9	88.7	61.7	67.9	25.5	18.9	12.8	13.2	44.7	45.3	2.1	1.9
Cong. obst. of uretrovesical junction	11	45	0.2	0.7	15	11	90.9	88.9	72.7	77.8	18.2	8.9	9.1	13.3	63.6	46.7	0.0	0.0
Other congenital obstructive uropathy	497	484	7.9	7.5	10	10	81.9	82.9	69.2	71.5	23.1	15.5	7.6	13.0	47.9	43.6	2.8	1.9
Renal hypoplasia/dysplasia/oligoneph.	700	744	11.1	11.5	10	10	60.1	63.6	74.7	72.7	16.0	13.7	9.3	13.6	46.0	48.1	3.0	3.2
Prune belly syndrome	90	85	1.4	1.3	7	7	98.9	97.6	77.8	70.6	20.0	14.1	2.2	15.3	53.3	51.8	2.2	3.5
Other (cong. malformation syndromes)	55	183	0.9	2.8	15	13	56.4	54.6	81.8	79.8	9.1	9.3	9.1	10.9	47.3	49.7	5.5	3.3
Neoplasms/tumors	128	132	2.0	2.0	13	14	50.8	49.2	70.3	69.7	20.3	13.6	9.4	16.7	32.0	32.6	18.8	20.5
Renal tumor (malignant)	41	29	0.7	0.4	5	5	46.3	48.3	61.0	65.5	24.4	31.0	14.6	3.4	12.2	17.2	24.4	20.7
Urinary tract tumor (malignant)	*	*	0.0	.	15	.	100	.	0.0	.	100	.	0.0	.	0.0	.	0.0	.
Renal tumor (benign)	*	*	.	0.0	.	1	.	0.0	.	100	.	0.0	.	0.0	.	0.0	.	50.0
Urinary tract tumor (benign)	*	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Renal tumor (unspecified)	*	*	0.0	0.0	8	18	0.0	0.0	100	0.0	0.0	0.0	0.0	100	0.0	100	0.0	0.0
Urinary tract tumor (unspecified)	*	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lymphoma of kidneys	*	*	.	0.0	.	18	.	100	.	100	.	0.0	.	0.0	.	0.0	.	100
Multiple myeloma	*	*	0.0	0.1	0	0	100	60.0	100	80.0	0.0	20.0	0.0	0.0	0.0	0.0	100	40.0
Other immunoproliferative neoplasms (including light chain nephropathy)	*	*	.	0.0	.	9	.	50.0	.	50.0	.	0.0	.	50.0	.	0.0	.	0.0
Amyloidosis	*	*	0.0	0.0	12	10	33.3	33.3	66.7	66.7	0.0	0.0	33.3	33.3	33.3	0.0	33.3	33.3
Complications of tx'ed organ, unspec.	*	*	0.1	0.0	17	16	40.0	50.0	80.0	50.0	0.0	50.0	20.0	0.0	40.0	50.0	20.0	0.0
Complications of transplanted kidney	36	*	0.6	0.1	16	17	55.6	71.4	75.0	71.4	16.7	14.3	8.3	14.3	61.1	85.7	0.0	0.0
Complications of transplanted liver	27	15	0.4	0.2	13	15	51.9	46.7	74.1	53.3	22.2	6.7	3.7	40.0	33.3	60.0	29.6	0.0
Complications of transplanted heart	*	28	0.1	0.4	14	15	66.7	50.0	83.3	75.0	16.7	10.7	0.0	14.3	33.3	42.9	16.7	21.4
Complications of transplanted lung	*	*	.	0.0	.	15	.	66.7	.	66.7	.	0.0	.	33.3	.	33.3	.	33.3
Complications of tx'ed bone marrow	*	25	0.0	0.4	12	15	50.0	48.0	50.0	92.0	50.0	8.0	0.0	0.0	0.0	8.0	50.0	24.0
Complications of transplanted pancreas	*	*	0.0	.	11	.	100	.	100	.	0.0	.	0.0	.	0.0	.	0.0	.
Complications of transplanted intestine	*	*	0.0	.	15	.	0.0	.	0.0	.	100	.	0.0	.	0.0	.	0.0	.
Comps of other specified tx'ed organ	*	*	0.0	0.1	12	14	0.0	42.9	100	28.6	0.0	0.0	0.0	71.4	0.0	71.4	100	28.6
Miscellaneous conditions	423	408	6.7	6.3	13	13	58.2	57.6	63.8	66.7	28.8	19.9	7.3	13.5	34.5	34.6	8.7	8.3
Sickle cell disease/anemia	19	11	0.3	0.2	18	18	78.9	81.8	10.5	9.1	89.5	90.9	0.0	0.0	15.8	18.2	21.1	0.0
Sickle cell trait/other sickle cell	*	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Post partum renal failure	*	13	0.1	0.2	18	18	0.0	7.7	60.0	76.9	40.0	15.4	0.0	7.7	20.0	23.1	0.0	0.0
AIDS nephropathy	49	27	0.8	0.4	15	18	49.0	55.6	10.2	11.1	83.7	88.9	6.1	0.0	0.0	0.0	14.3	18.5
Traumatic or surgical loss of kidney(s)	14	14	0.2	0.2	6	9	78.6	50.0	78.6	78.6	14.3	7.1	7.1	14.3	42.9	50.0	7.1	7.1
Hepatorenal syndrome	*	*	0.0	0.1	13	4	33.3	16.7	33.3	100	66.7	0.0	0.0	0.0	66.7	0.0	66.7	66.7
Tubular necrosis (no recovery)	111	145	1.8	2.2	2	10	51.4	61.4	76.6	78.6	16.2	11.7	7.2	9.7	15.3	17.9	11.7	9.7
Other renal disorders	222	192	3.5	3.0	13	13	62.2	58.9	73.4	66.1	18.0	14.1	8.6	19.8	52.7	53.6	4.5	5.2
Etiology uncertain	552	629	8.8	9.7	15	15	55.4	61.0	64.1	72.7	23.2	16.2	12.7	11.1	29.0	33.4	2.9	2.5
Missing	218	255	3.5	3.9	12	13	64.2	62.7	55.0	18.8	10.1	3.5	34.9	77.6	85.8	76.1	5.0	2.0

» **Table 8.a;** see page 442 for analytical methods. *Incident ESRD patients age 0–19. *Values for cells with ten or fewer patients are suppressed. "." Zero values in this cell.*

For pediatric hemodialysis and peritoneal dialysis (PD) patients prevalent in 2007–2010, unadjusted rates of hospitalization for infection are highest in those age 0–4, at 1,130 per 1,000 patient years; in all age groups the lowest rates occur in pediatric patients with a transplant. By race, overall rates are highest in blacks/African Americans and lowest in whites, at 560 and 429, respectively.

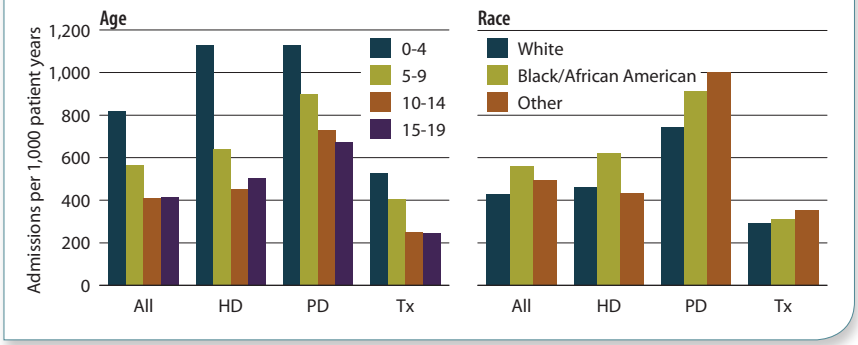
Hemodialysis patients age 0–9 have higher rates of admission for infection due to an internal device then do PD patients, and infection is more common in younger patients. For blacks/African Americans on dialysis, admission rates due to infection from an internal device are higher compared to whites, at 272 and 234, respectively.

Rates of hospitalization for bacteria/septicemia are highest in hemodialysis patients. By race, they tend to be higher in blacks/African Americans compared to whites or patients of other races.

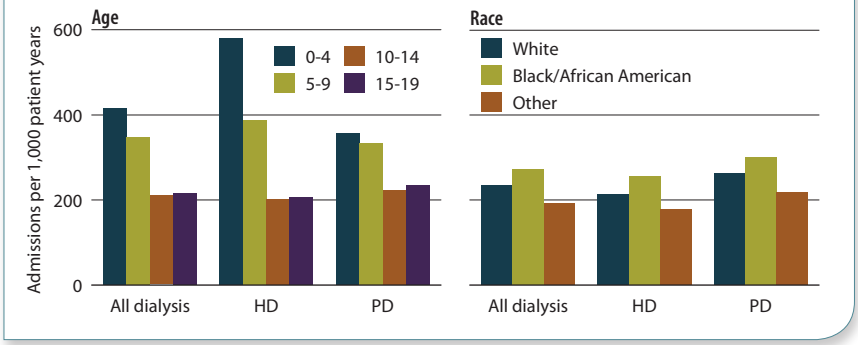
Rates of admission for respiratory infection (including pneumonia) overall are highest in patients age 0–4, at 161, and in patients of race other than white or black/African American, at 124.

The rate of vascular access infections in children on hemodialysis is higher in those using a catheter compared to those using an AV fistula or graph, at 1.7 vs. 14.6 percent. » **Figures 8.2–6;** see page 442 for analytical methods. *Period prevalent ESRD (8.2, 8.4–5) & dialysis (8.3) patients, & point prevalent hemodialysis patients (8.6), age 0–19; rates for 8.2–5 are unadjusted. In Figure 8.3,"infection due to internal device" includes those related to a vascular access device or peritoneal dialysis catheter.*

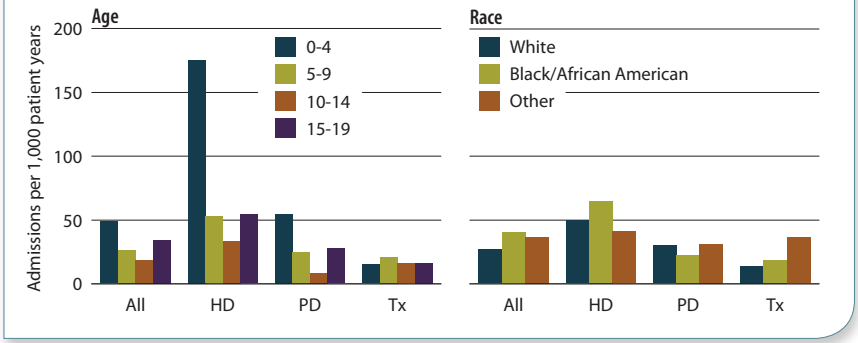
vol 2 **8.2** **Unadjusted rates of hospitalization for any infection in pediatric patients, by modality, age, & race, 2007–2010**



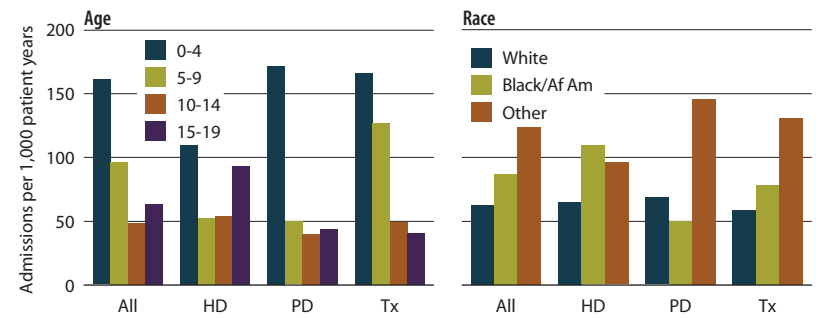
vol 2 **8.3** **Unadjusted rates of hospitalization for infection due to internal device in pediatric patients, by modality, age, & race, 2007–2010**



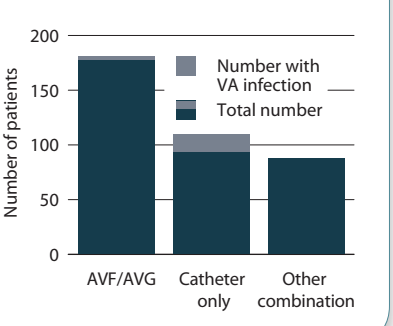
vol 2 **8.4** **Unadjusted rates of hospitalization for bacteremia/septicemia in pediatric patients, by modality, age, & race, 2007–2010**



vol 2 **8.5** **Unadjusted rates of hospitalization for respiratory infection (including pneumonia) in pediatric patients, by modality, age, & race, 2007–2010**



vol 2 **8.6** **Infections in pediatric patients by vascular access use, July–December, 2010**

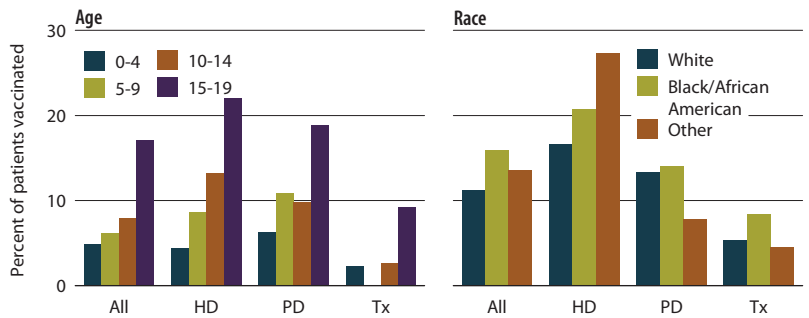


vol 2
8.7

Influenza vaccination rates in pediatric patients, by modality, age, & race, 2007–2010

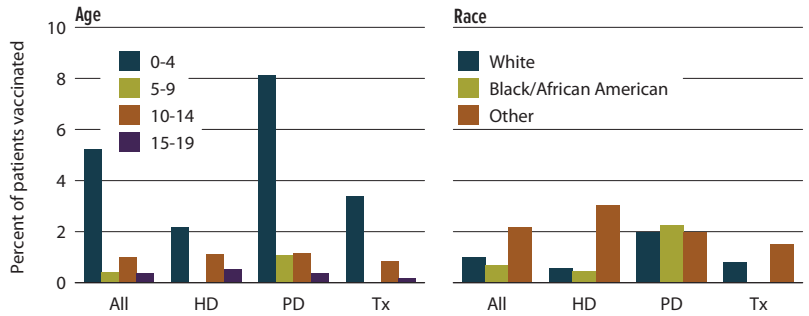
vol 2
8.8

Pneumovax vaccination rates in pediatric patients, by modality, age, & race, 2007–2010



vol 2
8.9

Prevnar vaccination rates in pediatric patients, by modality, age, & race, 2007–2010



Rates of vaccination against influenza in the pediatric ESRD population have improved, but remain below recommended levels. In 2007–2010, approximately one-third of children age 14 or younger received a vaccination. Rates are highest in those age 15–19, at nearly 40 percent, and vary little by race. In older patients, rates are generally higher in those on hemodialysis compared to those on peritonal dialysis or with a transplant.

In 2007–2010, pneumovax vaccination rates were highest overall in children age 15–19, at 17 percent, and were just 8 percent or below in those 14 and younger. When compared to white children, rates in blacks/African Americans tend to be higher, at 11.2 versus 15.9 percent, respectively.

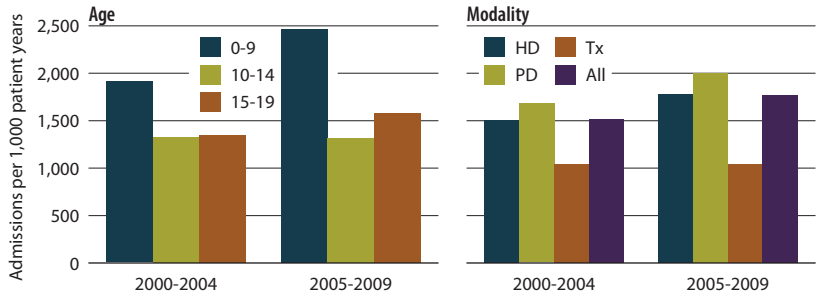
The use of Prevnar is most common in children age 0–4 who are on peritoneal dialysis. Use varies little by race, at 1.0 and 0.7 percent, respectively, in whites and blacks/African Americans. » **Figures 8.7–9;** see page 442 for analytical methods. *Point prevalent ESRD patients age 0–19 prior to January 1 of the two-year study period & alive through December 31 of the second year, 2007–2008 & 2009–2010.*

Between 2000–2004 and 2005–2009, one-year adjusted all-cause hospitalization rates per 1,000 patient years increased 29 and 17 percent, respectively, in patients age 0–9 and 15–19; in patients age 10–14, in contrast, rates fell one percent. By modality, rates rose 18–19 percent for dialysis patients and remained stable in those with a transplant; overall, all-cause hospitalization rates increased 16 percent between the two time periods.

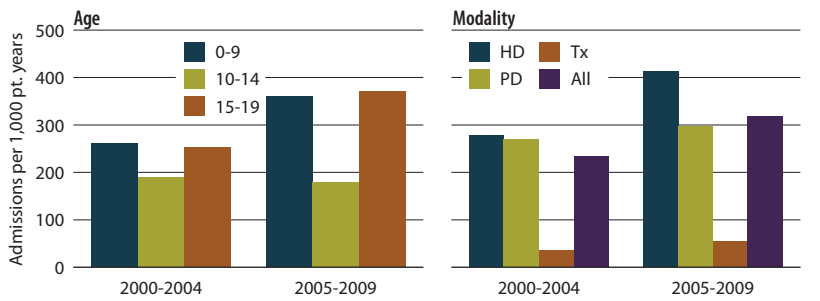
Cardiovascular hospitalization rates increased 38 and 47 percent, respectively, in children age 0–9 and 15–19, but fell 6 percent in those age 10–14. Rates rose 49 and 56 percent in hemodialysis and transplant patients, but just 10 percent in patients on peritoneal dialysis. Overall, rates increased 36 percent between the two periods.

Rates of hospitalization for infection increased 32 and 9 percent in patients age 0–9 and 15–19, and fell 9 percent in those age 10–14. By modality, rates increased 12, 8, and 15 percent, respectively, for hemodialysis, peritoneal dialysis, and transplant patients; the overall rate rose 12 percent. » **Figures 8.10–12;** see page 442 for analytical methods. *Incident ESRD patients age 0–19, 2000–2009. Adjusted for gender, race, & primary diagnosis. Ref: incident ESRD patients age 0–19, 2004–2005. Included patients survived the first 90 days after ESRD initiation & are followed from day 90.*

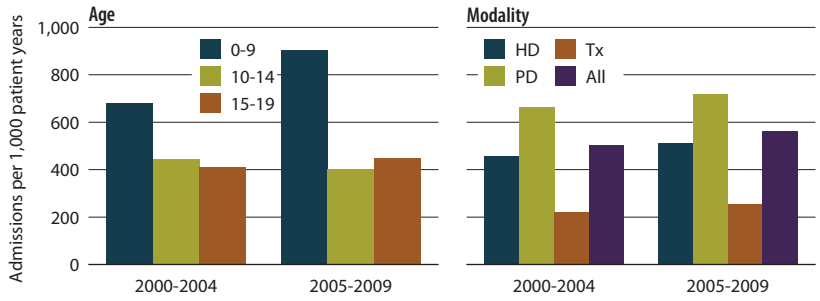
vol 2 **8.10** **One-year adjusted all-cause hospitalization rates in pediatric patients (from day 90), by age & modality**



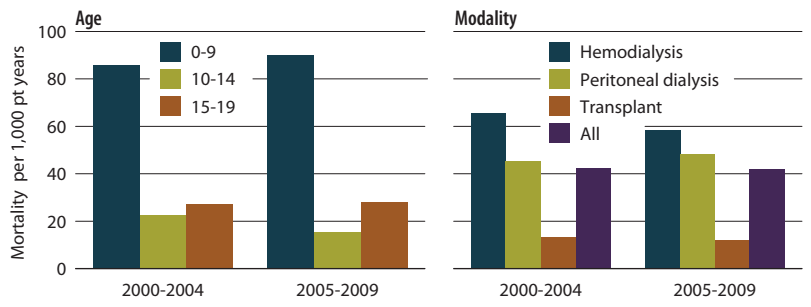
vol 2 **8.11** **One-year adjusted cardiovascular hospitalization rates in pediatric patients (from day 90), by age & modality**



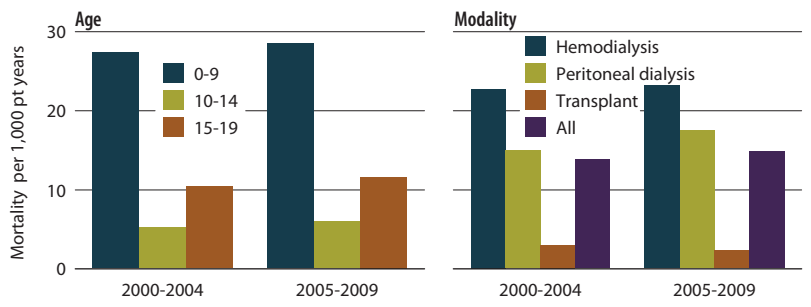
vol 2 **8.12** **One-year adjusted rates of hospitalization for infection in pediatric patients (from day 90), by age & modality**



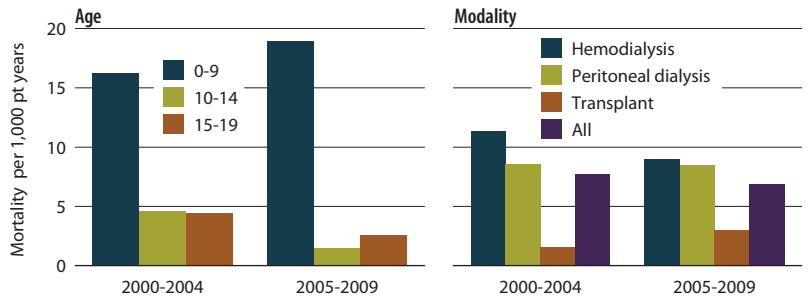
vol 2
8.13 One-year adjusted all-cause mortality rates in pediatric patients (from day one), by age & modality



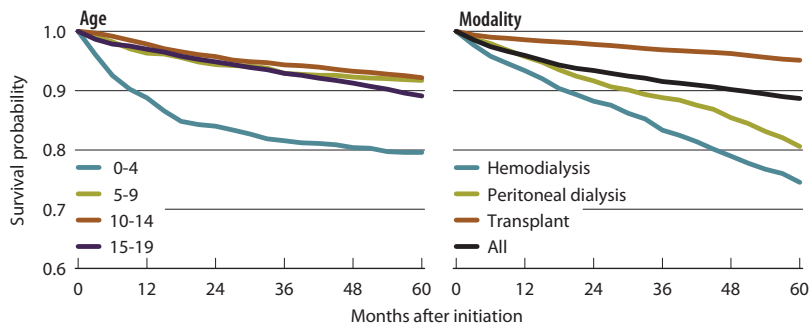
vol 2
8.14 One-year adjusted cardiovascular mortality rates in pediatric patients (from day one), by age & modality



vol 2
8.15 One-year adjusted rates of mortality due to infection in pediatric patients (from day one), by age & modality



vol 2
8.16 Adjusted five-year survival in pediatric patients (from day one), by age & modality, 2001–2005



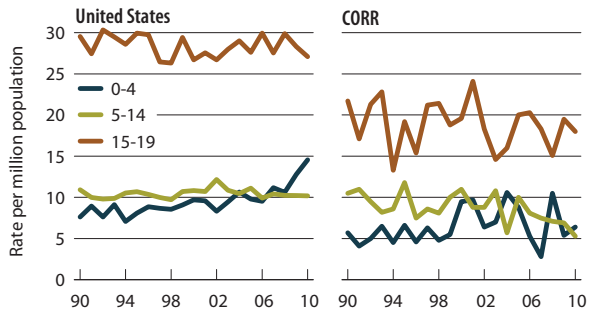
The one-year adjusted all-cause mortality rate in children age 0–9 was 89.8 per 1,000 patient years in 2005–2009, nearly six times higher than the rate in patients age 10–14, and slightly more than three times higher than for patients age 15–19. The rate for children on hemodialysis was 58.2, compared to 48.0 and 11.9, respectively, for those on peritoneal dialysis or with a transplant.

In 2005–2009, the one-year adjusted cardiovascular mortality rate in children age 0–9 was 28.5 per 1,000 patient years, 4.8 and 2.5 times higher, respectively, than for ages 10–14 and 15–19. Children on hemodialysis have higher cardiovascular mortality than those on peritoneal dialysis, at 23.2 versus 17.5, while children with a transplant have the greatest survival advantage, with a mortality rate of 2.3.

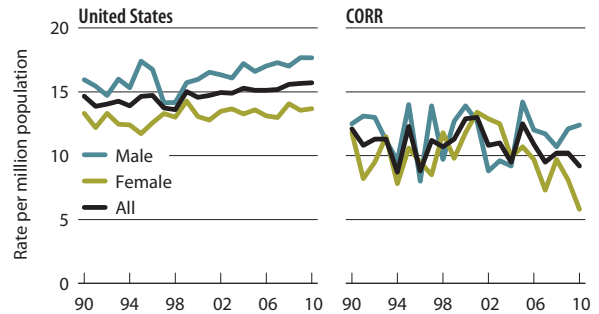
The rate of mortality due to infection is highest in patients age 0–9, at 18.9 per 1,000 patient years in 2005–2009, compared to 1.4 and 2.5, respectively, in children age 10–14 and 15–19. And by modality, rates for children on hemodialysis and peritoneal dialysis are similar, at 9.0 and 8.4 — three times higher than those found in children with a transplant.

For patients beginning ESRD therapy in 2001–2005, the overall probability of surviving five years was 0.89. By age, the five-year survival probability ranged from 0.80 for ages 0–4 to 0.92 in those age 5–14; in children age 15–19, the survival probability was 0.89. By modality, the highest five-year survial probability occurs in children with a transplant, at 0.95 compared to 0.75 and 0.81, respectively, in those treated with hemodialysis or peritoneal dialysis. » **Figures 8.13–16;** see page 443 for analytical methods. *Incident dialysis & transplant patients defined at the onset of dialysis or the day of transplant without the 60-day rule; followed to December 31, 2010. Adjusted for age, gender, race, Hispanic ethnicity, & primary diagnosis. Ref: incident ESRD patients age 0–19, 2004–2005.*

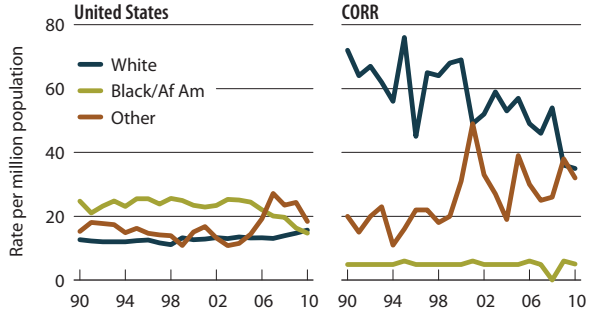
vol 2 8.17 **Incident rates of pediatric ESRD in the United States & Canada, by age**



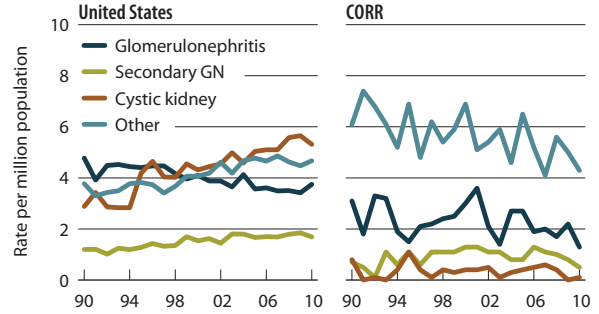
vol 2 8.18 **Incident rates of pediatric ESRD in the United States & Canada, by gender**



vol 2 8.19 **Incident rates of pediatric ESRD in the United States & Canada, by race**



vol 2 8.20 **Incident rates of pediatric ESRD in the United States & Canada, by primary diagnosis**



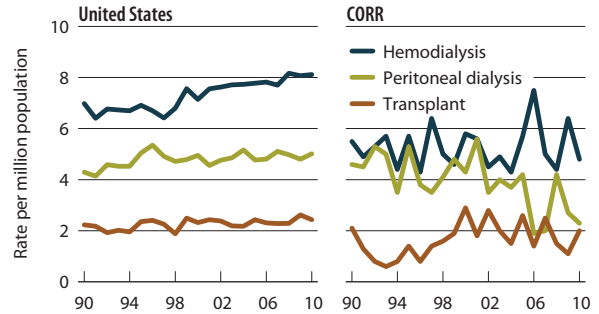
Here we present data graciously sent by CORR, the Canadian Organ Replacement Register. Together with U.S. data, these data provide a perspective on pediatric ESRD in North America, and allow comparisons of incidence, prevalence, patient characteristics, and modalities of therapy. The USRDS sincerely thanks the Canadian registry and providers for their efforts.

In 2010, the incident rate of ESRD per million population was 16.0 for U.S. children compared to 9.2 for children in Canada. In both countries the rate is higher for adolescents age 15–19 compared to younger children; in the U.S., however, the rate for adolescents is 51 percent greater than for their Canadian counterparts, at 27 per million population.

By race, incident rates for whites are 35 and 16, respectively in Canada and the U.S., and 32 and 18 in children of other races. The extremely low rate of 5 per million among black children in Canada, compared to 15 per million in black/African American children in the U.S., likely reflects differences in ethnic group composition between the two countries.

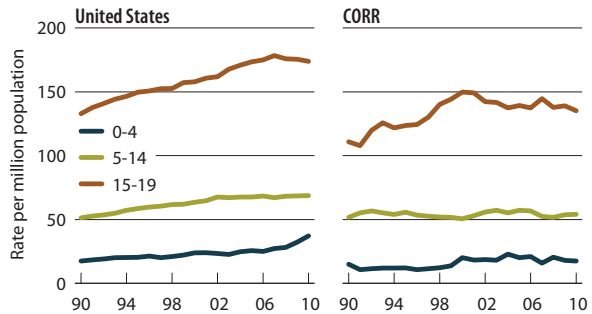
In the U.S., cystic kidney disease is the most common cause of ESRD in children, with a rate that has increased to 5.3 per million population; in Canada, in contrast, the rate is only 0.1, the lowest rate by primary diagnosis.

vol 2 8.21 **Incident rates of pediatric ESRD in the United States & Canada, by modality**

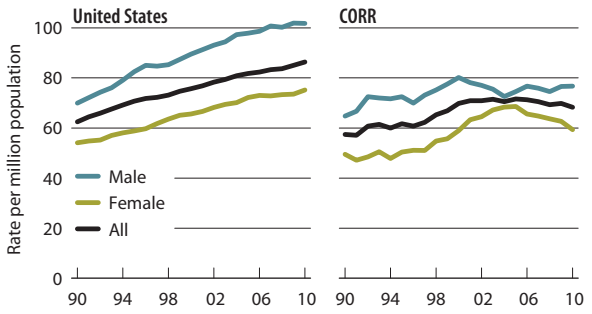


By modality, hemodialysis is the most common therapy for pediatric patients in both countries, with an incident rate of 8.0 per million population in the U.S. and 4.8 in Canada. Use of peritoneal dialysis among incident pediatric patients in Canada has been declining over the past decade. **» Figures 8.17–21;** see page 443 for analytical methods. *Incident ESRD patients age 0–19; unadjusted.*

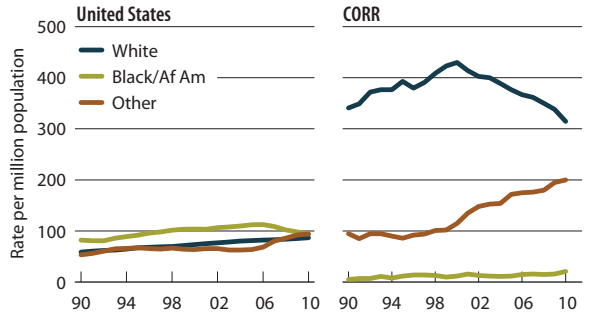
vol 2 **8.22** **Prevalent rates of pediatric ESRD in the United States & Canada, by age**



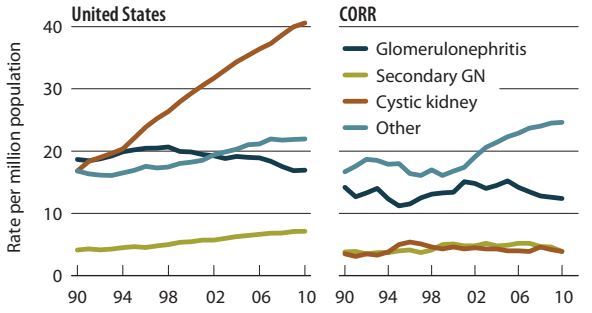
vol 2 **8.23** **Prevalent rates of pediatric ESRD in the United States & Canada, by gender**



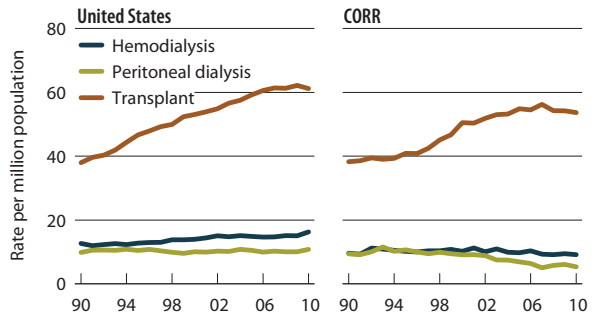
vol 2 **8.24** **Prevalent rates of pediatric ESRD in the United States & Canada, by race**



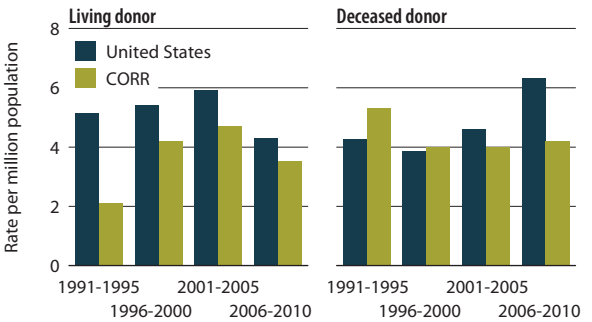
vol 2 **8.25** **Prevalent rates of pediatric ESRD in the United States & Canada, by primary diagnosis**



vol 2 **8.26** **Prevalent rates of pediatric ESRD in the United State & Canada, by modality**



vol 2 **8.27** **Pediatric first transplant rates in the United States & Canada, by donor type**



The prevalent rate of ESRD per million population in 2010 reached 86.0 for U.S. children and 68.3 for children in Canada. As seen with incident rates, rates of prevalent ESRD are highest in children age 15–19 and in males compared to females. The rate is four times higher in white children in Canada than in their U.S. counterparts, while the rate of ESRD due to cystic kidney disease is ten times greater in the U.S. Rates of ESRD due to glomerulonephritis and secondary glomerulonephritis are higher in the U.S. as well, at 16.9 versus 12.4 and 7.1 versus 3.9 per million population.

Kidney transplantation is the most common mode of therapy for both U.S. and Canadian children with ESRD. Living donor transplant rates for U.S. children in 2006–2010 were 4.3 per million population, compared to 3.5 in Canadian children; rates of deceased donor transplants were 6.3 and 4.2 per million, respectively. » **Figures 8.22–27;** see page 443 for analytical methods. *December 31 point prevalent patients age 0–19, unadjusted. First transplant rates in Figure 8.27 include cases in which a kidney was simultaneously transplanted in combination with another organ.*

Because data have been unavailable, use of prescription medications in children with ESRD has received little attention. As of 2006, however, medication use can now be assessed in children covered by Medicare based on their Part D prescription drug use.

Reported comorbidity and complications in children include persistent hypertension, left ventricular hypetrophy (LVH), and heart failure with cardiomyopathy, and are far too common. The use of cardio-protective medications, however, appears to be similar to that of the adult population.

In 2010, 40 percent of children were using ACEI/ARBs compared to 45 percent of adults; 35 percent of children on dialysis used beta blockers, compared to 52–56 percent of their adult counterparts (see Table 4.c in Chapter Four). Despite comparable use of cardiovascular drugs, and declining rates of hospitalization in adults, hospitalization rates for children are on the rise (Figure 8.11), findings which may suggest inadequate treatment of CVD in children. » **Table 8.b;** see page 443 for analytical methods. *Period prevalent ESRD patients with Medicare Part D, 2009–2010.*

vol 2 **8.b** **Antihypertensive medication use in pediatric patients with ESRD, by age & modality (column %)**

	ACEI/ARB	Beta blocker	Calcium chnel blkr	Diuretics	Alpha-agonist	Vaso-dilator
All patients						
Dialysis	39.9	35.0	45.8	45.8	45.8	13.0
Transplant	23.2	30.2	60.8	60.8	60.8	4.5
Age <6						
Dialysis	26.5	21.1	35.2	35.2	35.2	7.4
Transplant	12.1	11.7	55.7	55.7	55.7	2.2
Age 6-14						
Dialysis	41.1	29.0	48.8	48.8	48.8	9.6
Transplant	24.4	25.2	64.5	64.5	64.5	6.4
Age >14						
Dialysis	42.4	39.6	47.2	47.2	47.2	15.2
Transplant	25.5	37.1	60.5	60.5	60.5	4.2

Children appear to receive less intranvenous anemia treatment than adults, with more than 85 percent of adult patients receiving IV iron, compared to 61 percent of children. Vitamin D therapy appears to be a combination of IV vitamin D analogs and oral therapy, and may reflect the fact that peritoneal dialysis patients receive oral medications and those on hemodialysis receive them by IV.

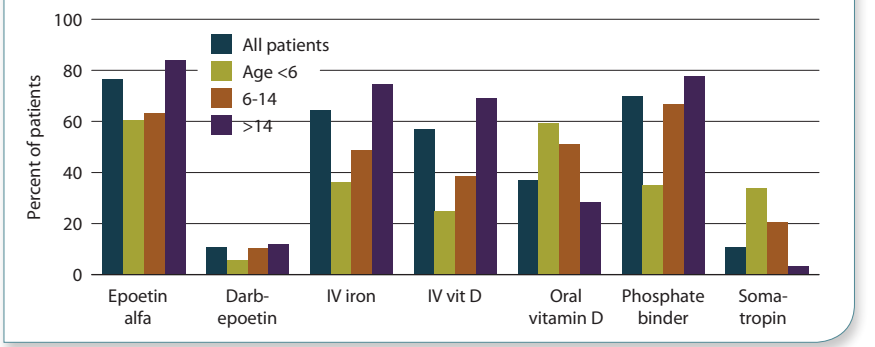
Growth hormone therapy, an area reported previously by the USRDS and others, is used in less than 30 percent of children under age 6, and by only one in five of those age 6–14.

These rates stand out sharply in light of the very high prevalence of short stature and poor growth in children with kidney disease, as shown in the USRDS 2009 Annual Data Report (Volume Two, Figure 8.1). » **Table 8.c & Figure 8.28;** see page 443 for analytical methods. *Period prevalent ESRD patients with Medicare Part D, 2009–2010. IV vitamin D dose in paricalcitol-equivalent units.*

vol 2 **8.c** **Average dose per week of injectable medications in pediatric dialysis patients, by age**

	Epoetin alfa IUs/week	Darbepoetin mcg/week	IV iron mg/week	Pericalcitol IV vit D mcg/week
All patients	14,615	44.4	82.2	16.0
Age <6	7,115	34.2	66.1	10.7
6–14	9,025	36.2	64.2	12.5
>14	16,472	48.3	86.2	16.7

vol 2 **8.28** **Use of injectables & oral medications in pediatric dialysis patients, by age**



vol 2 8.d **Top 25 drugs used in pediatric ESRD patients, sorted by total days supply, 2009–2010**

Dialysis Generic name	Total days supply	Transplant Generic name	Total days supply
Sevelamer	121,409	Sulfamethoxazole-Trimethoprim	201,368
Amlodipine	96,633	Amlodipine	177,744
Calcitriol	77,784	Prednisone or Prednisolone	168,680
Cinacalcet	64,755	Valganciclovir	127,089
Calcium acetate	62,678	Omeprazole	66,711
Clonidine	61,667	Ranitidine	52,745
Lisinopril	55,928	Tacrolimus	46,794
Nifedipine	39,063	Famotidine	43,731
Enalapril	35,938	Atenolol	38,993
Labetalol	32,710	Clonidine	36,913
Metoprolol	32,571	Labetalol	36,299
Somatropin	29,418	Lisinopril	35,639
Omeprazole	29,194	Nystatin	35,560
Carvedilol	25,898	Nifedipine	34,021
Minoxidil	20,827	Lansoprazole	32,106
Benzocaine	20,378	Calcitriol	32,023
Levetiracetam	20,337	Enalapril	31,971
Prednisone	20,145	Mycophenolate	31,618
Lansoprazole	19,538	Furosemide	26,174
Ranitidine	18,904	Esomeprazole	23,725
Atenolol	17,242	Nitrofurantoin	22,730
Levothyroxine	16,976	Metoprolol	18,659
Sulfamethoxazole-Trimethoprim	16,431	Oxybutynin	17,702
Paricalcitol	14,346	Levothyroxine	17,402
Metoclopramide	14,058	Metoclopramide	16,270

vol 2 8.e **Top 25 drugs used in pediatric ESRD patients, sorted by percentage of patients with at least one fill, 2009–2010**

Dialysis Generic name	Percent	Transplant Generic name	Percent
Sevelamer (carbonate or hydrochloride)	47.9	Sulfamethoxazole-Trimethoprim	72.5
Amlodipine	33.2	Valganciclovir	59.7
Calcitriol	31.1	Prednisone or Prednisolone	54.7
Calcium acetate	27.7	Amlodipine	50.5
Cinacalcet	24.6	Amoxicillin	33.9
Amoxicillin	24.3	Nystatin	32.6
Hydrocodone-Acetaminophen	23.0	Omeprazole	21.1
Lisinopril	20.1	Ranitidine	20.1
Clonidine	19.9	Ciprofloxacin	18.8
Azithromycin	16.8	Hydrocodone-Acetaminophen	18.6
Cephalexin	15.8	Azithromycin	17.0
Mupirocin	15.2	Amoxicillin-Potassium clavulanate	16.8
Nifedipine	13.6	Cephalexin	15.7
Prednisone or Prednisolone	13.2	Famotidine	15.7
Enalapril	13.2	Furosemide	15.5
Sulfamethoxazole-Trimethoprim	12.6	Clonidine	14.8
Omeprazole	12.3	Tacrolimus	13.7
Ciprofloxacin	12.2	Nifedipine	13.5
Polyethylene glycol 3350	12.1	Calcitriol	13.3
Benzocaine-Benzethonium	11.8	Lansoprazole	13.1
Sodium polystyrene sulfonate	11.6	Cefdinir	12.9
Metoprolol	11.4	Labetalol	12.6
Labetalol	11.3	Oseltamivir	12.3
Somatropin	10.7	Lisinopril	12.2
Oxycodone-Acetaminophen	10.6	Acetaminophen-Codeine	12.0

Sevelamer (carbonate or hydrochloride), a drug to treat high phosphorus levels, was used by 47.9 percent of pediatric dialysis patients who had at least one prescription fill in 2009–2010; amlodipine, calcitriol, calcium acetate and cinacalcet were used by 33.2, 31.1, 27.7, and 24.6 of patients, respectively.

In children with a transplant, sulfamethoxazole-trimethoprim, an antibacterial, is used in nearly three of four patients, while more than 50 percent of patients had at least one fill of valganciclovir, or prednisone or prednisolone. Amlodipine, and amoxicillin round out the top five medications used by pediatric transplant recipients. » **Tables 8.d–e;** see page 443 for analytical methods. *Period prevalent ESRD patients with Medicare Part D, 2009–2010. For Table 8.d, each prescription drug is disbursed with sufficient quantity to administer for a set number of days, so long as instructions are followed (i.e., so long as adherence is perfect). Total days supplied equals the cumulative number of days supplied through all fills of a particular medication in a population.*

INFECTIONS

unadjusted rates of hospitalization for any infection, 2007–2010 (per 1,000 patient years; Figure 8.2)

age 0–4	» all · 818	» hemodialysis · 1,130	» peritoneal dialysis · 1,130	» transplant · 526
age 5–9	· 565	· 643	· 897	· 405
age 10–14	· 410	· 453	· 729	· 252
age 15–19	· 416	· 504	· 674	· 244
whites	· 429	· 463	· 744	· 291
blacks/African Amercans	· 560	· 622	· 913	· 310

VACCINATIONS

influenza vaccination rates, 2007–2010 (percent; Figure 8.7)

age 0–4	» all · 29.8	» hemodialysis · 30.3	» peritoneal dialysis · 27.6	» transplant · 31.3
age 5–9	· 33.0	· 29.9	· 33.9	· 33.8
age 10–14	· 30.3	· 37.5	· 29.5	· 26.5
age 15–19	· 39.5	· 49.5	· 44.3	· 26.6
whites	· 36.6	· 45.8	· 37.2	· 30.2
black/African Americans	· 35.5	· 44.6	· 35.0	· 23.5

HOSPITALIZATION AND MORTALITY

one-year adjusted all-cause hospitalization rates in pediatric patients (per 1,000 patient years; Figure 8.10)

2000–2004 » overall · 1,519 » age 0–9 · 1,915 » age 10–14 · 1,329 » age 15–19 · 1,347
» hemodialysis · 1,511 » peritoneal dialysis · 1,683 » transplant · 1,043

2005–2009 » overall · 1,768 » age 0–9 · 2,469 » age 10–14 · 1,316 » age 15–19 · 1,580
» hemodialysis · 1,781 » peritoneal dialysis · 2,000 » transplant · 1,041

one-year adjusted cardiovascular hospitalization rates in pediatric patients (per 1,000 patient years; Figure 8.11)

2000–2004 » overall · 235 » age 0–9 · 261 » age 10–14 · 191 » age 15–19 · 253
» hemodialysis · 278 » peritoneal dialysis · 270 » transplant · 36

2005–2009 » overall · 319 » age 0–9 · 360 » age 10–14 · 180 » age 15–19 · 371
» hemodialysis · 413 » peritoneal dialysis · 297 » transplant · 56

adjusted five-year survival probabilities, 2001–2005 (from day one; Figure 8.16)

» overall · 0.89
» age 0–4 · 0.80 » age 5–9 · 0.92 » age 10–14 · 0.92 » age 15–19 · 0.89
» hemodialysis · 0.75 » peritoneal dialysis · 0.81 » transplant · 0.95

PEDIATRIC ESRD IN THE UNITED STATES AND CANADA

prevalent rates per million population (Figures 8.17–21)

overall » U.S. · 86.0 » Canada · 68.3

age » U.S. » 0–4 · 37 » 5–14 · 69 » 15–19 · 174
» Canada » 0–4 · 17.5 » 5–14 · 54.0 » 15–19 · 135.1

race » U.S. » white · 16 » black/African American · 15 » other · 18
» Canada » white · 35 » black · 5 » other · 32

primary diagnosis » U.S. » GN · 3.8 » secondary GN · 1.7 » cystic kidney · 5.3
» Canada » GN · 1.3 » secondary GN · 0.5 » cystic kidney · 0.1

9

Monument Valley, Navaho Tribal Park, Utah

REHABILITATION/QUALITY OF LIFE & NUTRITION SPECIAL STUDIES

The Comprehensive Dialysis Study (CDS) was a joint effort between the Nutrition Special Studies Center (SSC) and the Rehabilitation/Quality of Life SSC, enrolling incident dialysis patients between September 1, 2005, and June 1, 2007 from a stratified random sample of dialysis facilities throughout the U.S.

All participants were asked to respond to a patient questionnaire (PQ) by telephone, focusing on physical activity and quality of life, and patients initiating dialysis in a prespecified subset of facilities were also asked to respond to a brief food frequency questionnaire (FFQ) and to provide baseline and quarterly serum samples. A total of 1,678 participants were enrolled from 296 facilities, of whom 399 participated in the nutrition substudy.

In this chapter the Rehabilitation/Quality of Life SSC examines early awareness of peritoneal dialysis and transplant as treatment options among CDS participants.

The Nutrition SSC then looks at health status among participants, examining data on physical activity, frailty, sleep issues, depression, and dietary intake. These results emphasize a subset of what was collected in the CDS. These data can be used to explore relationships among nutritional intake, markers of nutritional status and inflammation, and physical activity, functioning, symptoms and health-related quality of life. In addition, linkage with the broader USRDS datasets will allow for prospective analyses of the associations of these parameters with outcomes such as hospitalization and survival.

Table 9.a lists elements of the patient activity and quality of life questionnaire, Figure 9.1 illustrates the distribution of study participants, and Table 9.b shows their sociodemographic characteristics. CDS participants were slightly younger than the overall population of patients who started dialysis in 2005 and had a slightly greater percentage of patients initiating on peritoneal dialysis (10 percent). » **Figure 9.1 & Tables 9.a–b;** see page 443 for analytical methods. *CDS participants who started treatment between June 1, 2005 & June 1, 2007.*

What is life? It is the flash of a firefly in the night. It is the breath of a buffalo in the wintertime. It is the little shadow which runs across the grass and loses itself in the sunset.

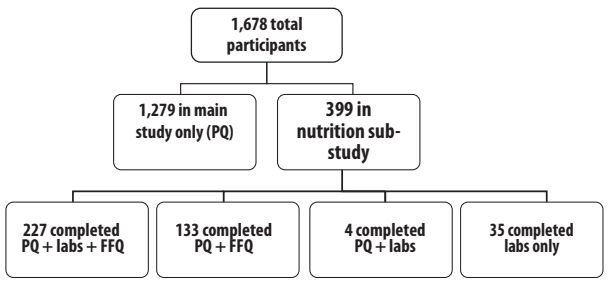
CROWFOOT

vol 2 **9.a** **Patient activity & quality of life questionnaire**

Patient criteria	
Sociodemographics	Age, sex, race, ethnicity, educational status, smoking status
Treatment characteristics	Dialysis modality, dialysis access type, treatment time
Patient-reported health status	SF-12
Quality of life	KDQOL symptoms, effects of kidney disease, burden of kidney disease, cognitive function, other symptoms (restless legs, sleep, postdialysis fatigue)
Satisfaction with care	KDQOL satisfaction with care
Physical activity	Human Activity Profile
Usual activity/exercise	Physical Activity Score
Depressed mood	PHQ-2 2-item depression screener
Employment status	Working for pay, able to work, Social Security disability status
Pre-ESRD treatment	BP and cholesterol lowering medications, modality choice
Transplant discussion	Transplant discussed since dialysis started

Abbreviations SF-12: Medical Outcomes Study Short Form 12 item questionaire; KDQL: Kidney Disease Quality of Life Instrument; PHQ-2: Patient Health Questionaire -2

vol 2 **9.1** **Distribution of CDS participants**



Comprehensive Dialysis Study

Peritoneal dialysis (PD), a home-based, self-care therapy, and kidney transplantation are renal replacement therapy (RRT) options with potential rehabilitation and quality of life advantages for ESRD patients compared to in-center hemodialysis (HD). Both are associated with survival outcomes similar or superior to survival on in-center HD. Wider use of both options would also be cost-effective for Medicare's ESRD program.

Patients' lack of early information about PD and kidney transplantation may, however, limit their consideration of these treatment options. PD was used by only 6.1 percent of dialysis patients in 2009, compared to 17 percent in 1979, soon after the therapy was introduced. Individuals who are potentially eligible candidates for kidney transplantation may not pursue this option because of fears and reservations about the transplant procedure and about what is needed to successfully manage life with a transplant.

One goal of the 2010 Medicare Improvements for Patients and Providers Act, in the Kidney Disease Education (KDE) benefit, is to provide comprehensive information about treatment options to Stage 4 chronic kidney disease patients in advance of their need to begin RRT.

The Comprehensive Dialysis Study (CDS), a USRDS special study, asked a national sample of patients who had recently begun regular dialysis whether PD and kidney transplantation had been discussed with them before they began RRT. Overall, of dialysis patients initiating between June 1, 2005 and June 1, 2007, 61 and 50 percent, respectively, were informed of peritoneal dialysis or transplant as treatment options. Using survey responses from patients who participated in the CDS, the study went on to explore predictors and outcomes of patients' early awareness of PD and kidney transplantation.

Variables associated with patient-reported early discussion of these treatment options were examined. Patients' survey responses were then linked with their treatment modality history information in the USRDS standard analysis files. Findings are summarized first for early awareness of PD, then for early awareness of kidney transplantation. Patients whose data are summarized here started regular dialysis before the KDE benefit was enacted and therefore do not provide a "test" of the effectiveness of the KDE benefit. However, data from CDS participants may provide a benchmark to use in new research, in order to gauge changes in modality selection that may be associated with the KDE benefit.

The sampling frame for the CDS was obtained by selecting outpatient dialysis units from clinics in the April 2005 Dialysis Facility Compare database of the Centers for Medicare and Medicaid Services (CMS), after merging with information from the USRDS ESRD Facility File. The list of dialysis units was sorted by ESRD Network, by adjacent states within Network, and by the size measure of annual incident patients per facility (SAS PROC SURVEYSELECT). A sample of 335 facilities was selected using equal probability systematic random sampling. Systematic random sampling in conjunction with the sorted facility list yielded implicit geographical stratification (Network and state within Network) for the sample facilities. The selected units matched the total population of clinics closely on number of patients and dialysis stations, facility type (freestanding, hospital-based), dialysis chain/non-chain affiliation, dialysis modalities offered (PD, HD), and ESRD Network.

Eligibility for the CDS required that participants had no prior transplantation or other RRT before their current start of dialysis as their regular treatment for ESRD. Patients age 18 and older who initiated chronic dialysis between June 1, 2005 and June 1, 2007 at one of the selected dialysis clinics were identified to the USRDS Coordinating Center by the CMS Standard Information Management System when they had been receiving chronic dialysis for at least two months but no more than three months. Patient lists were provided monthly to the USRDS Coordinating Center, which then contacted patients to request their participation in the study. Patients who consented were asked to participate in a structured interview administered by professional interviewers using a computer-assisted telephone interviewing system.

Interviewed patients numbered 1,643, and they had each been on dialysis approximately four months. They were affiliated with 296 different dialysis clinics, located across all 18 ESRD Networks and in all states except Alaska and Vermont. CDS participants were, on average, somewhat younger and healthier than the overall population of patients who started dialysis during the same time period. They were also more likely to be employed.

vol 2 9.b **Sociodemographic characteristics of Comprehensive Dialysis Study participants**

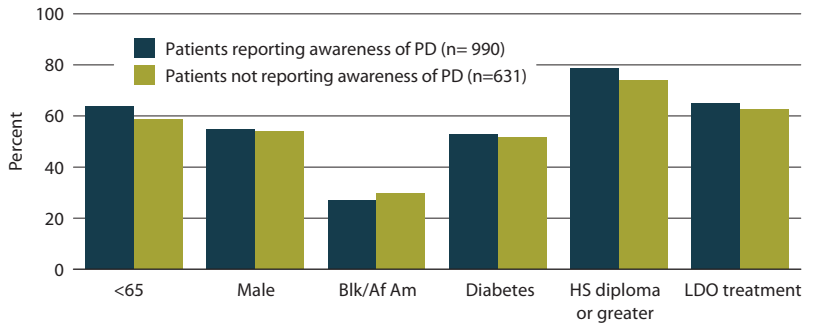
	All participants (n= 1,678) mean age at initiation 59.7 ±14.2		Nutrition study subset (n=399) mean age at initiation 60.9 ±13.8	
	N	Percent	N	Percent
<40	143	8.5	27	6.8
40–49	234	13.9	49	12.3
50–59	442	26.3	102	25.6
60–69	415	24.7	105	26.3
70+	444	26.5	116	29.1
Male	923	55.0	206	51.6
White	1,148	68.4	270	67.7
Black/Af Am	480	28.6	109	27.3
Asian	34	2.0	17	4.3
Other	16	1.0	3	0.8
Hispanic	240	14.3	53	13.3
Hemodialysis	1,561	93.0	359	90.0

Patients reporting early (pre-dialysis) awareness of PD (n=990) and those not (n=631) were generally similar in age, gender, race, presence of diabetes, education level, and treatment in a facility owned by a large dialysis organization (LDO). Patients who said that PD had been discussed with them pre-dialysis, however, were more likely to be employed (among patients younger than 65) and to have received pre-dialysis nephrologist care.

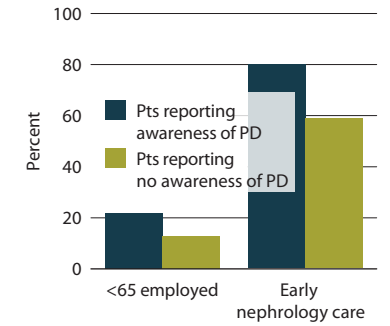
Overall, 7 percent of CDS participants started on PD as their initial modality, and 99 percent of these individuals remained on this modality 90 days after the start of treatment. Patients with early awareness of peritoneal dialysis, however, were more likely than those without it to start on the modality, at 11 versus 2 percent, respectively.

The proportions of patients initiating peritoneal dialysis in LDO and non-LDO clinics were similar, at 10.8 and 11.2 percent, respectively. And among the LDOs, DaVita had the highest proportion of patients initiating on PD, at 15 percent compared to 8.2–8.3 percent in units owned by Fresenius or DCI. » **Figures 9.2–4;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

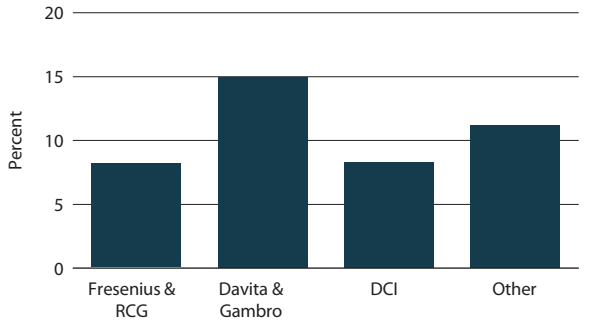
vol 2 **9.2** **Patients reporting or not reporting early awareness (pre-dialysis) of peritoneal dialysis, by age, gender, race, diabetes, education, & treatment site**



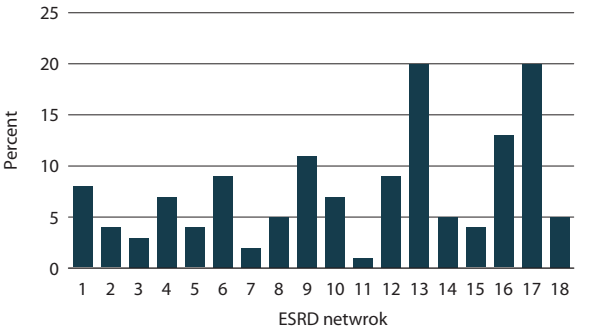
vol 2 **9.3** **Pts reporting or not reporting awareness of PD, by employment, & neph care**



vol 2 **9.4** **Peritoneal dialysis selection among CDS participants, by dialysis unit ownership**



vol 2 **9.5** **Peritoneal dialysis selection among CDS participants, by ESRD network**

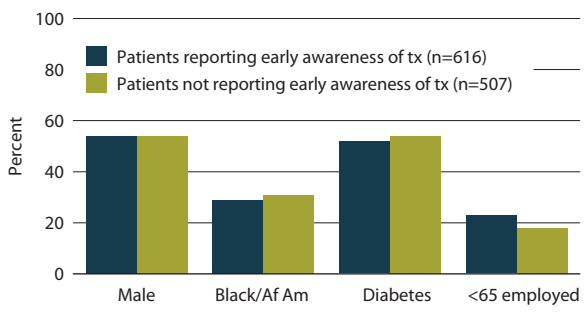


Although more use of PD might be expected in less populated areas that require patients to travel greater distances to a dialysis clinic, no association was found between increasing rurality of dialysis facility location and patients' selection of PD. Variation in PD use was, however, evident across ESRD Networks.

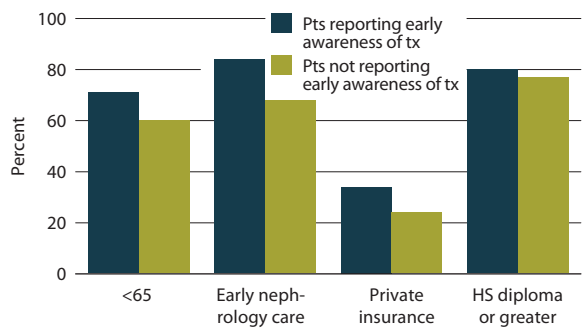
Previous research has shown that dialysis units in which patients are less likely to have received pre-dialysis nephrology care tend to be clustered geographically, and differences in the availability of pre-dialysis care may contribute to geographic variation in PD selection.

Geographic variation in pre-ESRD care may be related to inadequate dissemination of evidence-based practice guidelines and ambiguities in the state of clinical practice. Low detection rates of chronic kidney disease by primary care physicians and limited availability of nephrology manpower are additional possibilities. Geographic variation in availability of pre-ESRD care could be targeted by ESRD Networks for quality improvement initiatives. » **Figure 9.5;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2
9.6 **Patients reporting or not reporting early awareness of kidney transplantation, by patient characteristics & employment status**



vol 2
9.7 **Patients reporting or not reporting early awareness of kidney transplantation, by age, care, insurance status, & education**



In order to focus on patients most likely to be eligible for transplantation, the CDS study group was restricted to 1,123 patients reported on the Medical Evidence form to be "informed of kidney transplant options." Patients reported not informed because of being "medically unfit," "unsuitable due to age," etc. were not considered.

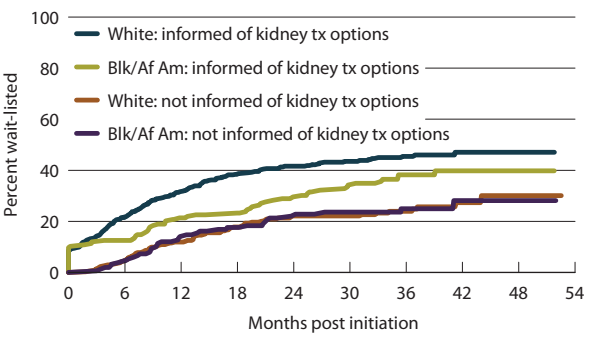
Among potentially eligible candidates for transplantation, patients who reported early (pre-dialysis) awareness of kidney transplantation (n=616) and those who did not (n=507) were generally similar in gender, race, diabetes, and employment status (among patients younger than 65). Thus, black/African American and white patients were equally likely to recall that kidney transplantation had been discussed with them prior to dialysis.

Patients who said that kidney transplantation had been discussed with them pre-dialysis were on average younger, more likely to have received pre-dialysis nephrology care, to have private health insurance, and to have a high school diploma or greater. » **Figures 9.6–7;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

Examination of time to wait listing shows that both black/African American and white patients who had early exposure to information about kidney transplantation were more likely to be wait-listed compared with their same race peers who did not report this early exposure. At the same time, white patients were significantly more likely to be wait-listed than blacks/African Americans. The differential early discussion/race effects on wait listing were not explained by other patient characteristics, nor by geographic region of the country.

Being wait listed or receiving a deceased donor transplant within one year of ESRD initiation is a Healthy People 2010/2020 objective. Among blacks/African Americans, 21.1 percent who reported pre-dialysis discussion of kidney transplantation were wait-listed or transplanted within one year, compared to 13.8 percent who did not report that kidney transplantation was discussed with them pre-dialysis; among whites, the numbers were 31.3 and 11.5 percent, respectively. These data again demonstrate that early awareness of transplant was beneficial for both blacks/African Americans and whites, but that whites were more likely to experience early wait-listing or transplantation. » **Figure 9.8 & Table 9.c;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2 **9.8** **Time to wait listing in patients with early awareness of kidney transplant options**

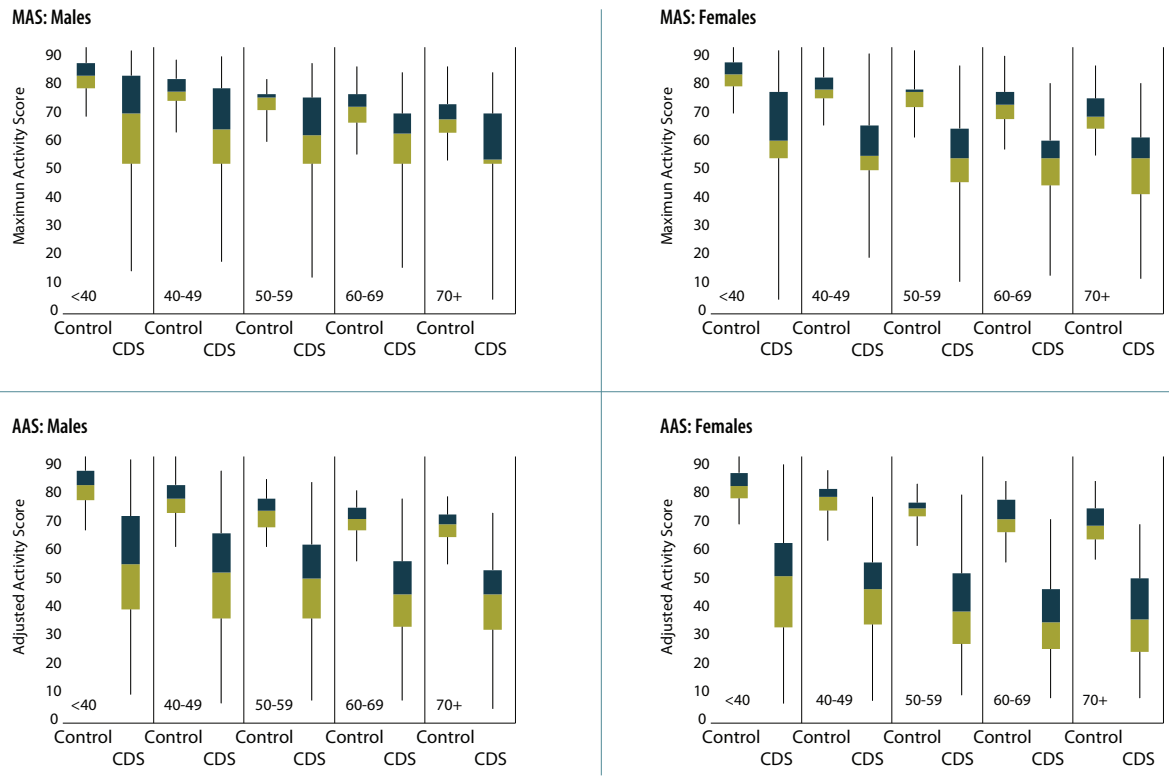


vol 2 **9.c** **Patients wait-listed or who received a deceased donor kidney transplant within one year of ESRD initiation**

	Black/Af Am pts. wait-listed/transplanted within one year	White pts wait-listed/transplanted within one year
Transplant options discussed pre dialysis	21.1%	31.3%
Transplant options not discussed pre dialysis	13.8%	11.5%

vol 2
9.9

Adjusted & maximum activity scores (AAS & MAS) in CDS participants



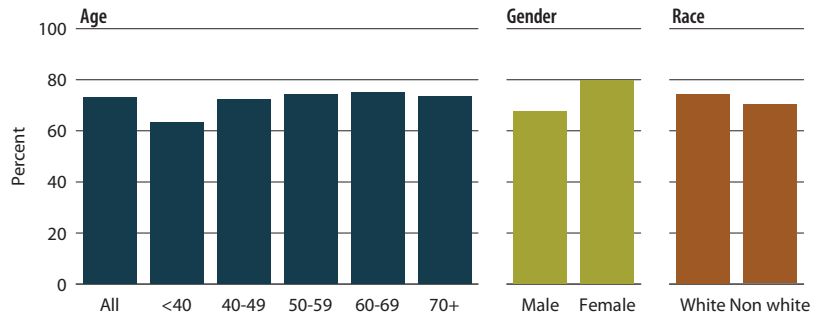
Here and in the next spread the Nutrition Special Studies Center presents data on physical activity (measured using the Human Activity Profile (HAP)), patient frailty using data on physical activity level, self-reported physical functioning, and exhaustion), insomnia, restless legs syndrome (RLS), and depression. Data are also presented from a sub-study of the CDS, which provides information about usual dietary intake using the Block 2000 Brief Food Frequency Questionaire.

CDS participants were asked in the HAP questionaire to report whether they are "still doing," have "stopped doing," or "never did" 94 activities ranked according to estimated energy expenditure, and ranging from getting in and out of chairs or bed without assistance to running or jogging three miles in 30 minutes or less. Two scores are generated from the HAP, a Maximum Activity Score (MAS) and an Adjusted Activity Score (AAS). The MAS is the highest oxygen-demanding activity that the respondent still performs, and is indicative of the respondent's current maximum activity level. The AAS is calculated by subtracting from the MAS the total number of activities that are less demanding than the MAS but that the respondent is no longer doing, and is reflective of an individual's usual daily activity level.

Among CDS participants, self-reported physical activity was extremely low when compared with control data from healthy individuals. The median maximum activity score (MAS) for male CDS participants in all age groups was considerably below the 25th percentile for healthy men, and for women the median MAS for CDS participants was consistently below the first percentile for healthy individuals. The adjusted activity score (AAS) of CDS participants, representative of usual daily activity, was even lower relative to control data, with the 75th percentile for men in all age groups below the 25th percentile for the general population, and the 75th percentile for women in the CDS below the first percentile at all ages. » **Figure 9.9;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007. The boxes represent the 25th to 75th percentiles with the line in the center indicating the 50th percentile. Lines above and below extend to the 99th and 1st percentile, respectively. In each figure, scores are shown by age group, beginning with age <40 and progressing by decade to age 70 & older. Within each age group, control data are represented on the left and CDS participants' data are plotted on the right.*

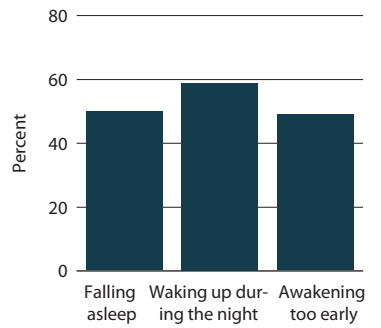
Seventy-three percent of CDS participants were considered frail and even among participants younger than 40 years, the prevalence of frailty was 63 percent. As expected, women were more likely to be frail. There was little difference in the proportion of frail individuals based on age, a finding that differed from previous cohorts using slightly different definitions of frailty. Whites were slightly but not statistically more likely to be frail than non-white patients. » **Figure 9.10;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007. A frailty phenotype was constructed using data on physical activity level, self-reported physical functioning, & exhaustion.One point was given for self-reported physical activity (from the HAP) in the lowest quintile of the general population based on age, one point for a Physical Function score on the SF-12 of <75, & one point for responding "a little of the time" or "none of the time" when asked how much of the time during the past four weeks they thought they had a lot of energy. Patients with two or more points were considered frail.*

vol 2 **9.10** **CDS participants classified as frail, by age, gender, & race**



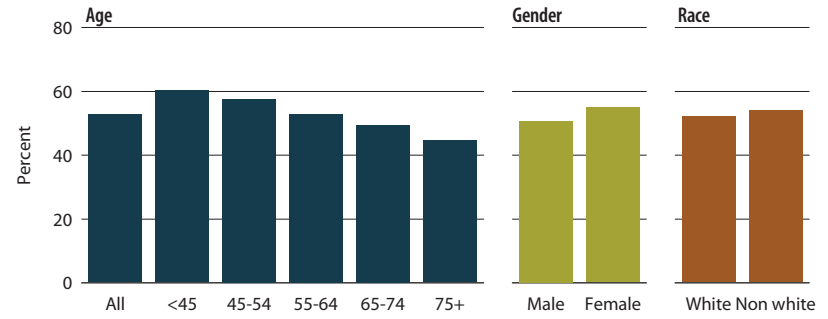
Approximately half of CDS respondents indicated at least moderate difficulty with each aspect of sleep quality — 50 percent having trouble falling asleep, 59 percent waking up during the night, and 49 percent awakening too early. » **Figure 9.11;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2 **9.11** **Frequency & severity of individual insomnia symptoms in CDS participants**



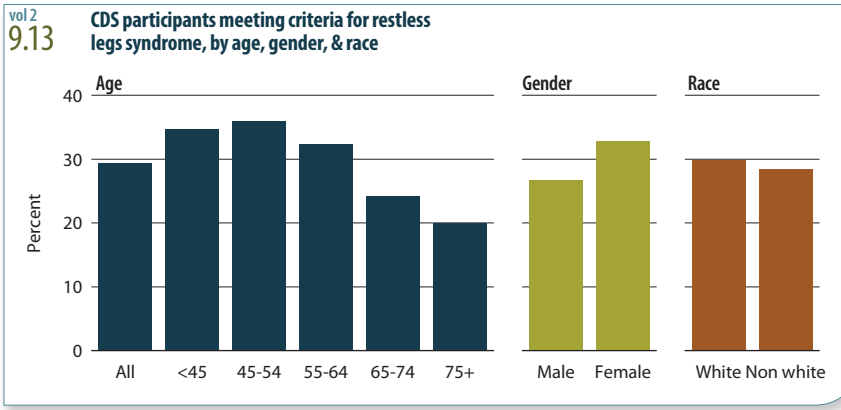
Here we show the distribution of CDS participants with at least one severe symptom of insomnia all or most of the time. Differences based on gender and race were minor, but insomnia was significantly more common among younger than among older CDS participants. » **Figure 9.12;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2 **9.12** **CDS participants with at least one severe symptom of insomnia, by age, gender, & race**



Overall, 29 percent of CDS respondents met the criteria for restless legs syndrome. There were differences in the prevalence of restless legs based on age and gender, with women and younger participants more likely to be affected. There were no significant differences in prevalence of restless legs syndrome based on race. » **Figure 9.13;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

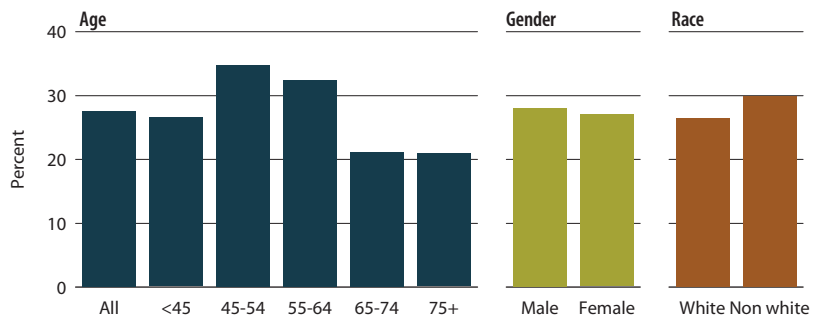
vol 2 **9.13** **CDS participants meeting criteria for restless legs syndrome, by age, gender, & race**



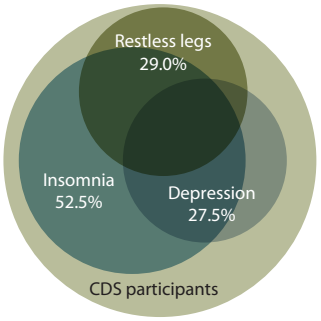
Twenty-seven percent of CDS participants met the criterion for depression (a score of 3 or greater on the two-item Patient Health Questionnaire-2), and as with restless legs, younger participants were more likely to be affected. There were, however, no clear differences based on gender or race. » **Figure 9.14;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

Eighty percent of patients with depression also reported insomnia, restless leg syndrome (RLS) or both; 70 percent of RLS sufferers also reported depression and/or insomnia; and 57 percent of patients with insomnia also reported depression and/or RLS. These results highlight the heavy burden of symptoms among patients with ESRD and the potential for interdependence among symptom complexes. » **Figure 9.15;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

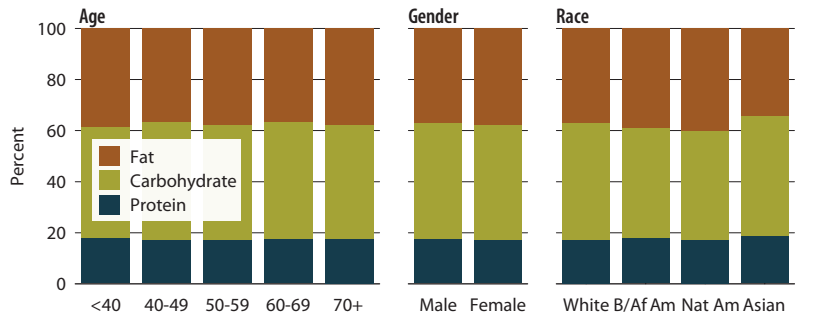
vol 2 **9.14** **CDS participants meeting criteria for depression, by age, gender, & race**



vol 2 **9.15** **Frequency of symptom complexes in CDS participants**

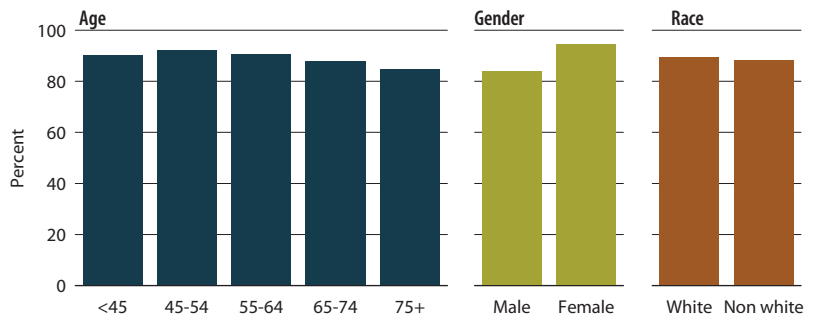


vol 2 **9.16** **Among CDS participants, percentage of dietary intake from protein, carbohydrate, or fat sources, by age, gender, & race**



On average, CDS participants derived 37.4 percent of their calories from fat, 45 percent from carbohydrates, and 17.6 percent from protein, a diet that is higher in fat than currently recommended ranges. Group differences based on age, gender, and race were small and statistically insignificant. » **Figure 9.16;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

vol 2 **9.17** **CDS participants who were 25-OH vitamin D deficient, by age, gender, & race**



Among all subgroups, 25-OH vitamin D levels were low. Eighty-nine percent of patients, for instance, were vitamin D deficient with concentrations of less than 20 ng/ml. Women were statistically more likely to be vitamin D deficient than men, but there were no significant differences based on age or race. » **Figure 9.17;** see page 443 for analytical methods. *Incident dialysis patients who started treatment June 1, 2005 to June 1, 2007.*

EARLY AWARENESS OF PD & TRANSPLANT AS TREATMENT OPTIONS

patients reporting (n=990) early awareness (pre-dialysis) of peritoneal dialysis (percent; Figure 9.2)

» <65 · 64 » male · 55 » blk/Af Am · 27 » diabetes · 53 » high school education+ · 79 » treatment in LDO facility · 65

patients not reporting (n=631) early awareness (pre-dialysis) of peritoneal dialysis (percent; Figure 9.2)

» <65 · 59 » male · 54 » blk/Af Am · 30 » diabetes · 52 » high school education+ · 74 » treatment in LDO facility · 63

peritoneal dialysis selection among CDS participants, by dialysis unit ownership (percent; Figure 9.4)

» Fresenius/RCG · 8.2 » DaVita/Gambro · 15 » DCI · 8.3 » other · 11.2

HEALTH STATUS

CDS participants classified as frail (percent; Figure 9.10)

» all · 73.3 » age <40 · 63.4 » age 40–49 · 72.6 » age 50–59 · 74.6 » age 60–69 · 75.3 » age 70+ · 73.7
» male · 68.0 » female · 79.9
» white · 74.6 » non-white · 70.3

CDS participants with at least one severe symptom of insomnia (percent; Figure 9.12)

» all · 52.7 » age <45 · 60.4 » age 45–54 · 57.6 » age 55–64 · 53.0 » age 65–74 · 49.5 » age 75+ · 44.7
» male · 50.7 » female · 55.0
» white · 52.2 » non-white · 54.0

CDS participants meeting criteria for depression (percent; Figure 9.14)

» all · 27.6 » age <45 · 26.6 » age 45–54 · 34.7 » age 55–64 · 32.5 » age 65–74 · 21.2 » age 75+ · 21.0
» male · 28.0 » female · 27.0
» white · 26.5 » non-white · 30.0

CDS participants who were 25-OH vitamin D deficient (percent; Figure 9.17)

» age <45 · 90.0 » age 45–54 · 92.1 » age 55–64 · 90.4 » age 65–74 · 87.8 » age 75+ · 84.8
» male · 83.8 » female · 94.6
» white · 89.4 » non-white · 88.2

10

Arches National Park, Utah

ESRD PROVIDERS

At the end of 2010, 127,207 prevalent patients were being treated by Fresenius in 1,779 units; 118,142 were receiving care in one of DaVita's 1,646 units; and 13,176 patients were being treated by Dialysis Clinic Inc. (DCI), with 215 units. These three providers manage the majority of the 5,869 dialysis units across the United States. Small dialysis organizations (SDOs), comprising 20–199 units, treated 48,548 patients in 626 units, while independent and hospital-based providers treated 57,241 and 37,740 patients in 823 and 780 units, respectively. Between 2005 and 2010, growth in the number of dialysis units across End-Stage Renal Disease Networks was as low as 1.8 and 2.4 percent in Networks 13 and 2 and as high as 38 percent in Network 9.

The new, "bundled" prospective payment system began in January, 2011. While the rest of the chapter presents data through 2010, in figures on this new system we examine data from the third quarter of 2010 through the second quarter of 2011. We present early data on adoption of the system by providers, and on their changing practices in use of the newly bundled intravenous medications. Adoption has been fairly widespread, with nearly all of the facilities owned by large dialysis organizations opting in, along with 93 percent of the units owned by small dialysis organizations, 78 percent of independent facilities, and 59 percent of hospital-based facilities.

Between September, 2010 and September, 2011, the percentage of patients with at least one transfusion event increased from 2.4 to 3.0, a relative increase of 24 percent. Some providers are associated with a significant increase in transfusion rates over the one-year time period (the percentage of patients with at least one transfusion event rose from 2.2 to 3.2 in DaVita units, a relative increase of 46 percent), while others show minimal changes (4 and 7 percent in Fresenius and hospital-based units, respectively). This increase is a potiential concern, particularly in terms of transplant candidates. It is, however, too early to assess what impact it will have on the transplant waiting list or on calculated panel reactive antibodies. Overall, it is unlikely that transplantation rates would be affected, since in 2010 there were nearly 18,000 transplants and more than 87,000 individuals on the waiting list. These areas will be assessed in more detail in the 2013 ADR.

Consistent with changes in FDA labeling for target hemoglobin levels and in CMS payment policies, the distribution of patients by hemoglobin level has shifted. The Quality Improvement Program, which in 2011 had measures for hemoglobin levels below 10 g/dl and above 12 g/dl, and for a urea reduction ratio of greater than 65 percent, was changed for 2012 with elimination of the below 10 g/dl measure. Given the FDA label changes in 2011, eliminating the prior hemoglobin range of 10–12 g/dl, it is unclear how these changes might impact hemoglobin levels and transfusion rates.

This year we again examine preventive care services delivered by providers, focusing on diabetic care and vaccinations. Glycemic control (A1c) testing in diabetic patients differs by unit affiliation, with 62–66 percent of patients in Fresenius, DaVita, SDO, and independent units receiving four or more A1c tests during 2009–2010, compared to 39–41 percent of patients in hospital-based and DCI units. Just 52–67 percent of diabetic patients on dialysis receive two or more

Those who dwell, as scientists or laymen, among the beauties of the earth are never alone or weary in life... Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts.

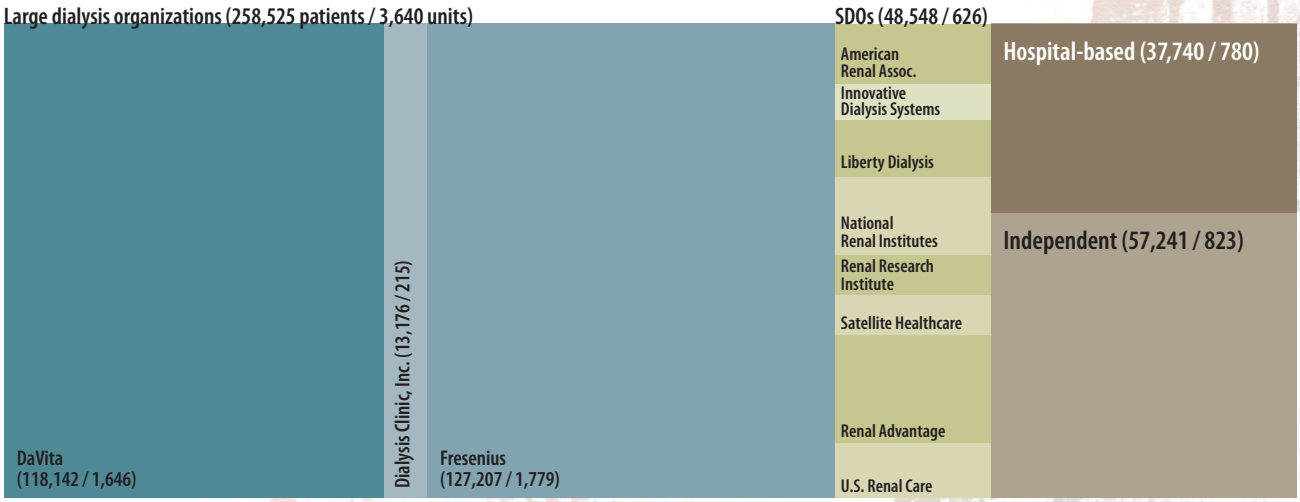
RACHEL CARSON
Sense of Wonder

lipid tests, and fewer than one in three in chain-affiliated units are tested four or more times; those treated in an independent or SDO unit are more likely to receive four or more tests than their counterparts in chain-owned or hospital-based units. These practice patterns may change based on results from the SHARP study, demonstrating reduced atherosclerotic events when patients are treated with a combination lipid lowering therapy (Lancet, June 2011). Eye examinations are another important preventive care tool, used to detect diabetic retinopathy. Fewer than one in four prevalent dialysis patients with diabetes received an eye exam in 2009–2010.

We conclude with an analysis of mortality and hospitalization ratios. Standardized hospitalization ratios (SHRs) and standardized mortality ratios (SMRs) in 2010 were similar across providers with the exception of hospital-based units, in which the SMR was 10.6 percent higher than the national average. Some of this may be explained by the fact that hospital-based units often treat some of the sickest patients; these differences, however, still merit further investigation.

Detailed comparisons provide a clearer picture of the variations within the LDOs, SDO, and hospital-based units. Among the three LDOs, for example, DCI and DaVita had the lowest SMRs in 2010, and were not significantly different from one another. DCI continues to have the lowest SHR — in 2010, 10 percent lower than those of the other LDOs. Among the SDOs, grouped by geographic region, the highest SHR occurs in the West North Central region. And in the hospital-based units, the 2010 SMR in the East South Central region was 41 percent higher than the national average, while the ratios in the South Atlantic and West South Central regions were each 31 percent higher. » **Figure 10.1;** see page 444 for analytical methods.
CMS Annual Facility Survey, 2010.

vol 2
10.1 **Distribution of patients, by unit affiliation, 2010**

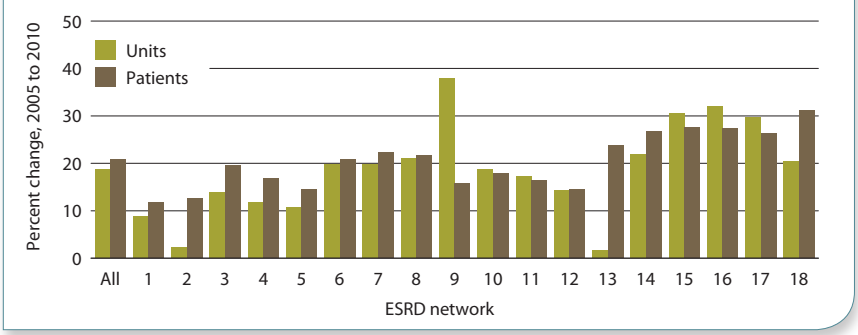


Between 2005 and 2010, the number of dialysis units grew 38 percent in Network 9, and 31–32 percent in Networks 15 and 16. In Networks 13 and 2, in contrast, the number of units rose only 1.8 and 2.4 percent. Growth in the number of patients ranged from 12 percent in Network 1 to 31 percent in Network 18.

In 2010, Fresenius and DaVita were the largest dialysis providers, with close to 60 percent of all dialysis units and patients; units owned by DCI totaled 215, with just 3.3 percent of the total dialysis population. Small dialysis organizations (SDOs) — defined as those with 20–199 dialysis units — accounted for 11–12 percent of units and patients, and independently owned facilities accounted for 14 percent. Hospital-based facilities represented 13 percent of all dialysis units, and accounted for 9.4 percent of the dialysis population.

» **Figures 10.2–3;** see page 444 for analytical methods. *CMS Annual Facility Survey.*

vol 2
10.2 Percent change in the number of dialysis units & patients, 2005 to 2010, by ESRD network



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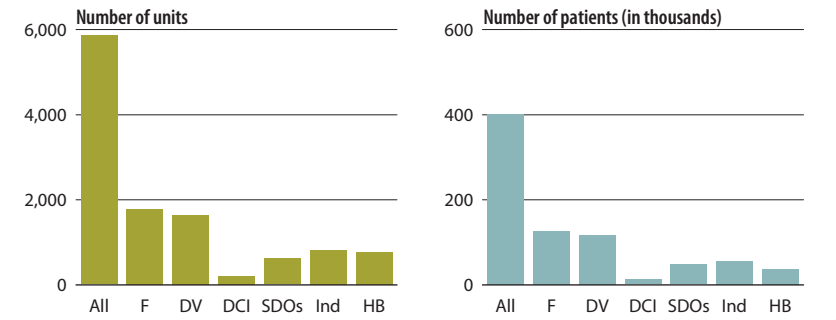
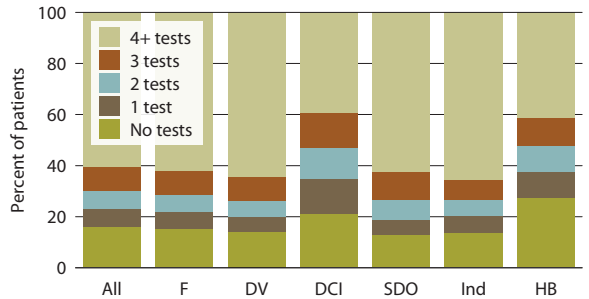
10.3 Dialysis unit & patient counts, by unit affiliation, 2010



Unit affiliation

All	All units
F	Fresenius
DV	DaVita
DCI	Dialysis Clinic, Inc.
SDOs	Small dialysis organizations (defined as 20–199 dialysis units; unit classification assigned by the USRDS)
Ind	Independent units
HB	Hospital-based units

vol 2
10.4 **Glycosylated hemoglobin (A1c) testing in diabetic dialysis patients, by unit affiliation & number of tests, 2009–2010**



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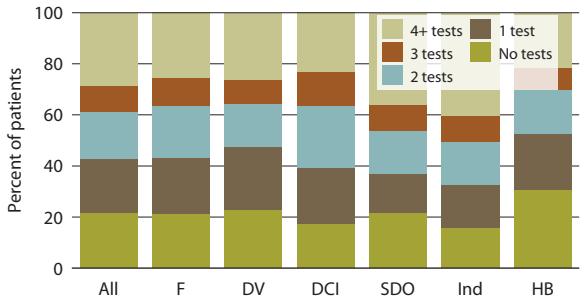
10.5 **Lipid testing in diabetic dialysis patients, by unit affiliation & number of tests, 2009–2010**



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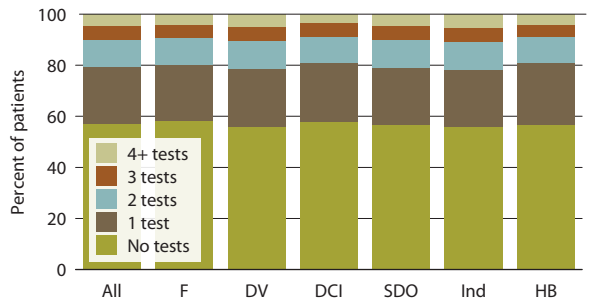
10.6 **Diabetic eye examinations in diabetic dialysis patients, by unit affiliation & number of tests, 2009–2010**

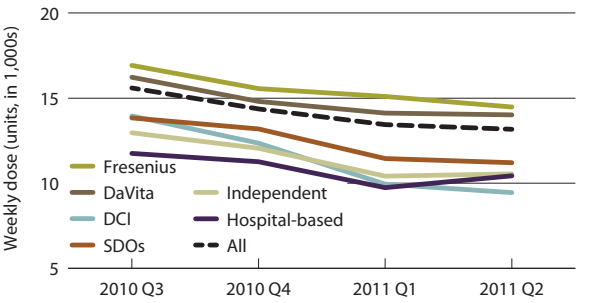


Overall, 60 percent of prevalent dialysis patients with diabetes received four or more glycosylated hemoglobin (A1c) tests in 2009–2010. Patients in units owned by DCI were the least likely to receive four or more tests, at 39 percent. Fifty-seven percent of diabetic patients receive two or more lipid tests annually; and patients in SDOs, independent units, and hospital-based units are more likely to receive two or more tests than their counterparts in corporate owned facilities. Across unit affiliations, 57 percent of diabetic patients did not receive a diabetic eye examination during 2009–2010. » **Figures 10.4–6;** see page 444 for analytical methods. *Point prevalent dialysis patients with diabetes as the primary cause of ESRD or as a comorbidity listed on the Medical Evidence form, age 18–75, 2009–2010.*

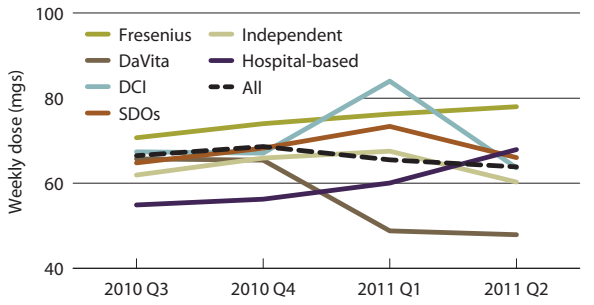
vol 2
10.a Distribution of providers opting into the new dialysis composite rate

	Number of facilities	Number opting for bundle	Percent of facilities	Percent of patients
All providers	6,167	5,285	85.7	95.3
DaVita	1,609	1,605	99.8	100.0
DCI	209	209	100.0	100.0
Fresenius	1,765	1,757	99.5	99.9
Hospital-based	571	337	59.0	70.1
Independent	767	601	78.4	82.2
SDO	619	574	92.7	92.3

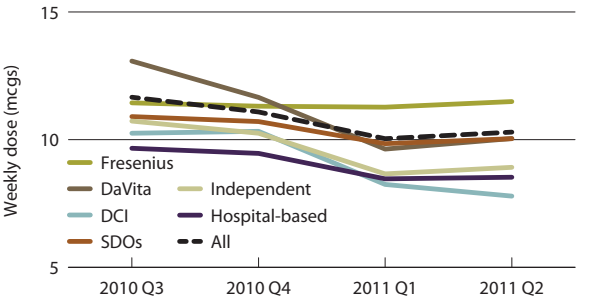
vol 2
10.7 EPO use in providers opting into the new dialysis bundle, 2010–2011



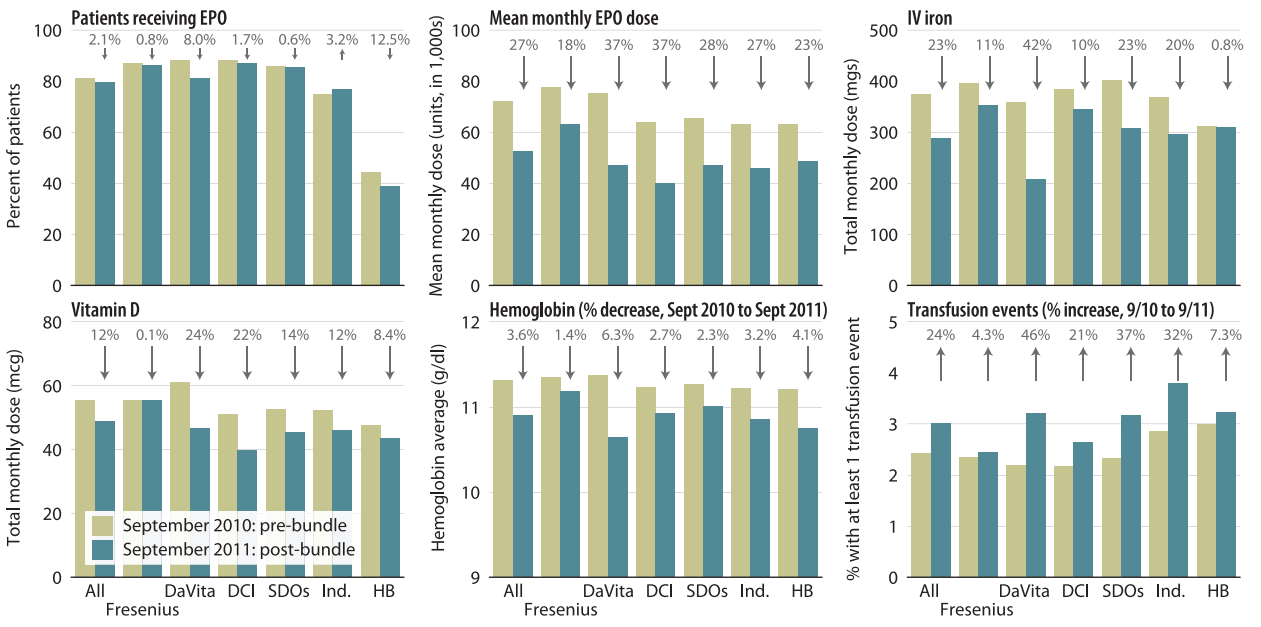
vol 2
10.8 IV iron use in facilities opting into the new dialysis bundle, 2010–2011



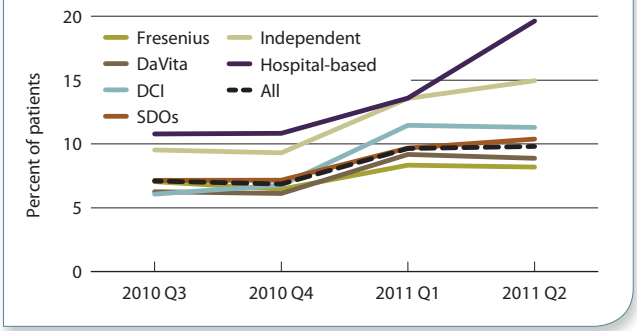
vol 2
10.9 IV vitamin D use in facilities opting into the new dialysis bundle, 2010–2011



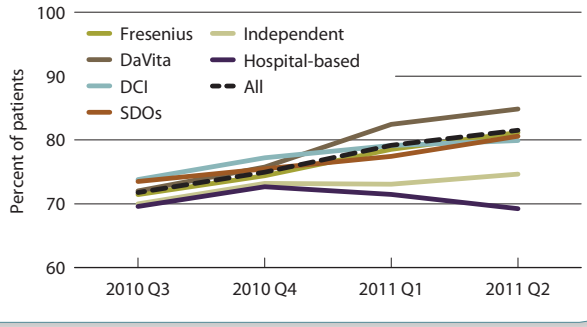
vol 2
10.10 Percentage of patients receiving EPO, total monthly dose of anemia treatment therapeutics, average hemoglobin levels, & transfusion events, pre- & post- dialysis bundle, by unit affiliation



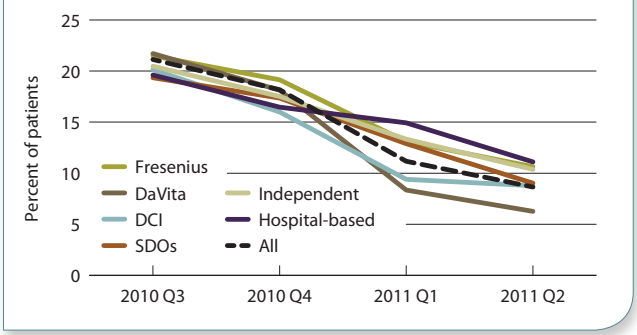
vol 2
10.11 **Patients with hemoglobin level <10 g/dl in facilities opting into the new dialysis bundle, 2010–2011**



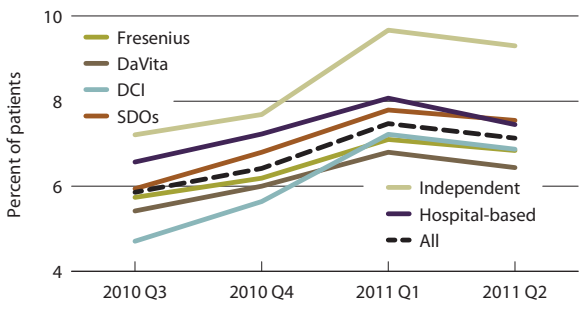
vol 2
10.12 **Patients with hemoglobin levels of 10–12 g/dl in facilities opting into the new dialysis bundle, 2010–2011**



vol 2
10.13 **Patients with hemoglobin levels of >12 g/dl in facilities opting into the new dialysis bundle, 2010–2011**



vol 2
10.14 **Patients with a transfusion event in facilities opting into the new dialysis bundle, 2010–2011**



Here we examine care under the new Prospective Payment System for dialysis, or "bundle," which took effect in January, 2011, and show changes between the last two quarters of September, 2010 and the first two quarters of September, 2011. The three largest dialysis providers — Fresenius, DaVita, and DCI — adopted the bundled payment system in virtually all of their units, while 59 percent of the 571 hospital-based units opted into the system.

The greatest change in weekly iron dosing was among DaVita units, in which doses fell 27 percent in the first half of 2011. IV vitamin D dosing declined in all facilities, but to a greater extent in units owned by DaVita and DCI, with decreases of 14 and 25 percent, respectively.

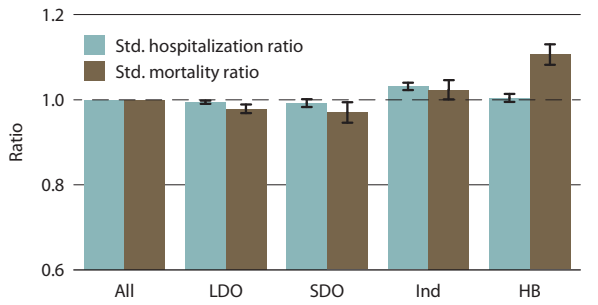
Figure 10.10 illustrates changes in the percentage of patients receiving EPO, in the use of anemia therapeutics, in hemoglobin levels, and in transfusion events.

Between September, 2010 and September, 2011, the percentage of patients receiving EPO fell 2.1 percent overall, 8.0 percent in DaVita units, and 12.5 percent in hospital-based units (the low use of EPO in these latter units can be explained by their frequent use of DPO for anemia treatment). EPO doses fell 27.1 percent overall, and 37 percent in DaVita and DCI units, compared to 18 percent in units owned by Fresenius. IV iron doses dropped 23 percent overall, and 42 percent in DaVita units; doses declined only 1 percent in hospital-based units. Vitamin D doses declined 12 percent across all providers and 22–24 percent in DaVita and DCI units.

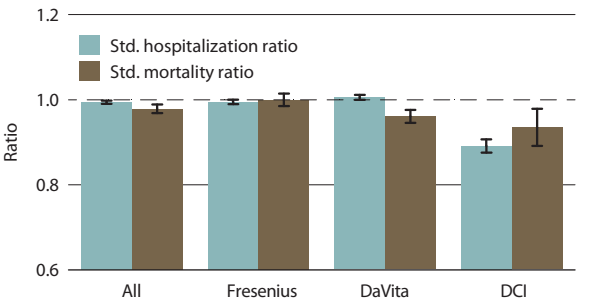
Overall hemoglobin levels fell an average of 0.4 g/dl, or 3.6 percent — 0.7 g/dl (6.3 percent) in DaVita facilities and 0.2 g/dl (1.4 percent) in units owned by Fresenius. Transfusion events increased 24 percent across all units; Fresenius and hospital-based units had the smallest increases, of 4.3 and 7.3 percent, respectively, compared to increases of 46 and 37 percent in DaVita and SDO facilities.

The percentage of patients with a hemoglobin level below 10 g/dl increased the most in hospital-based units, reaching 19 percent in the second quarter of 2011, and more patients had levels of 10–12 g/dl over the quarterly period than previously noted. DaVita had the largest increase, reaching 85 percent of patients in the second quarter of 2011, but, as previously noted, also saw the greatest decrease in average hemoglobin level among providers. Over the one-year period, there was a consistent decline in the percentage of patients with hemoglobin levels exceeding 12 g/dl, from 19.6 to 11.1 percent in hospital-based units and from 21.7 to 6.3 percent in units owned by DaVita; the overall change among providers was from 21.1 to 8.7 percent. » **Table 10.a & Figures 10.7–14;** see page 444 for analytical methods. *Period prevalent dialysis patients 2010 & 2011; with the exception of Figure 10.10 (which includes all facilities), only facilities defined as opting in the new bundle are included. In 10.10, only patients with a dialysis claim during the month are included in graphs showing patients receiving EPO & those with a transfusion event.*

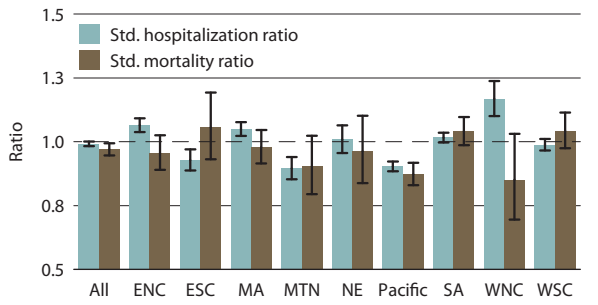
vol 2 **10.15** **All-cause standardized hospitalization & mortality ratios, by unit affiliation, 2010**



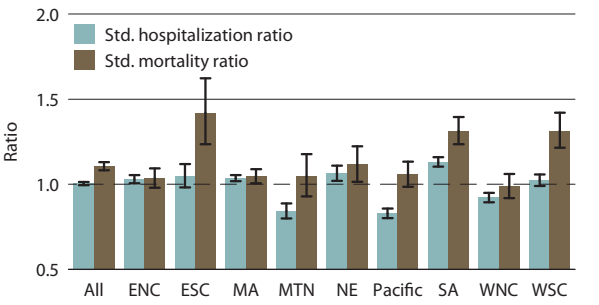
vol 2 **10.16** **All-cause standardized hospitalization & mortality ratios in large dialysis organizations, 2010**



vol 2 **10.17** **All-cause standardized hospitalization & mortality ratios in small dialysis organizations, by U.S. Census Division, 2010**



vol 2 **10.18** **All-cause hospitalization & mortality ratios in hospital-based dialysis units, by U.S. Census Division, 2010**



u.s. census divisions

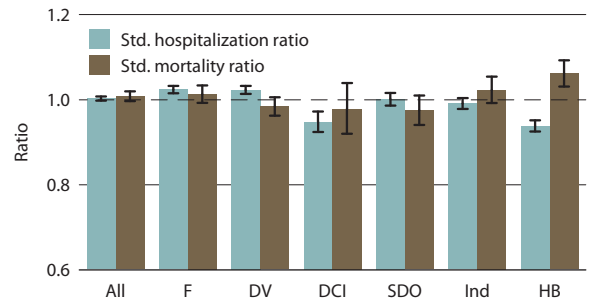
For 2010, standardized hospitalization ratios (SHRs) are almost equal in small and large dialysis organizations (SDOs and LDOs), as are standardized mortality ratios (SMRs). Independent facilities have the highest SHR, and hospital-based facilities the highest SMR. By unit affiliation among the LDOs, DCI continues to have the lowest ratios for both hospitalization and mortality.

Within the SDOs, two U.S. Census Divisions — East North Central and Middle Atlantic — have statistically significant higher SHRs; the East South Central, Mountain, and Pacific divisions have statistically significant lower ones. The overall mortality ratio in the SDOs is less than one and statistically significant, as is the SMR in the Pacific division. Among hospital-based units, the Mountain, Pacific, and West North Central divisions have lower SHRs, while the Middle Atlantic, New England, and South Atlantic divisions each have higher SHRs and SMRs. » **Figures 10.15–18;** see page 444 for analytical methods. *January 1 point prevalent hemodialysis patients, 2010, with Medicare as primary payor (SHRs); January 1 point prevalent hemodialysis patients, 2010 (SMRs). SHRs & SMRs are calculated based on national hospitalization & death rates. Adj: age/gender/race/dialysis vintage.*

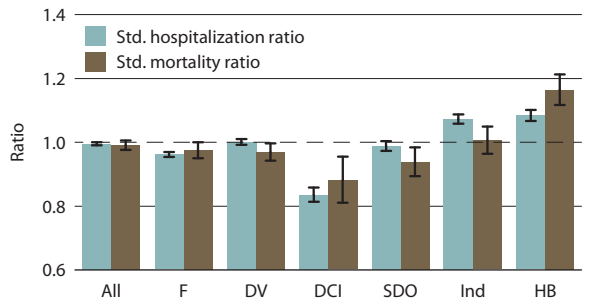
ESRD PROVIDERS

standardized hospitalization & mortality ratios

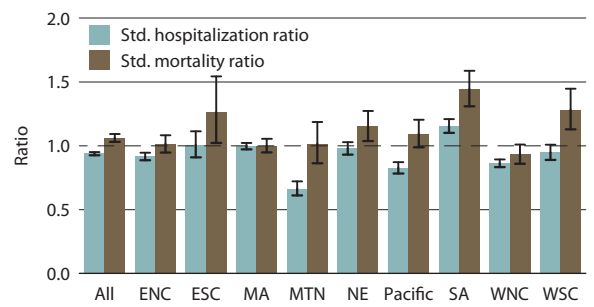
vol 2
10.19 All-cause standardized hospitalization & mortality ratios, by unit affiliation, 2010: whites



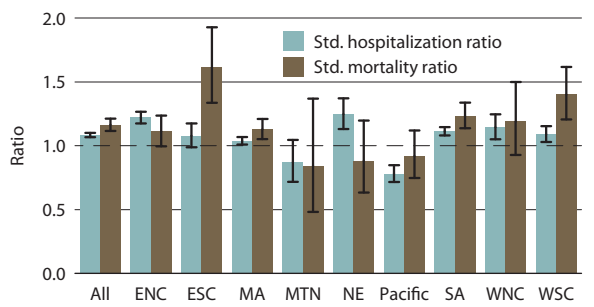
vol 2
10.20 All-cause standardized hospitalization & mortality ratios, by unit affiliation, 2010: blacks/African Americans



vol 2
10.21 All-cause standardized hospitalization & mortality ratios in hospital-based dialysis units, by U.S. Census Division, 2010: whites



vol 2
10.22 All-cause standardized hosp. & mortality ratios in hospital-based dialysis units, by U.S. Census Division, 2010: blacks/African Americans



In units owned by Fresenius and DaVita, white patients have statistically significant higher SHRs, while black/African American patients have statistically significant lower SHRs in Fresenius units and DCI units, and lower SMRs in DaVita and DCI units and in the SDOs. In hospital-based units, SHRs are lower than one and statistically significant for whites, but higher than one for blacks/African Americans.

Among hospital-based dialysis units in the South Atlantic division, white patients have a statistically significant higher SHR, as do blacks/African Americans in the East North Central, Middle Atlantic, New England, South Atlantic, West North Central, and West South Central divisions. In the Pacific division, the SHR is lower than one for both whites and blacks/African Americans. SMRs greater than one and statistically significant are reported for both white and black/African American patients in the East South Central, South Atlantic, and West South Central divisions. » **Figures 10.19–22;** see page 444 for analytical methods. *January 1 point prevalent hemodialysis patients, 2010, with Medicare as primary payor (SHRs); January 1 point prevalent hemodialysis patients, 2010 (SMRs). SHRs & SMRs are calculated based on national hospitalization & death rates. Adj: age/ gender/race/dialysis vintage.*

Unit affiliation

All	All units
F	Fresenius
DV	DaVita
DCI	Dialysis Clinic, Inc.
SDOs	Small dialysis organizations (defined as 20–199 dialysis units; unit classification assigned by the USRDS)
Ind	Independent units
HB	Hospital-based units

PROVIDER GROWTH

patient distribution, by unit affiliation, 2010 (Figure 10.1)

» large dialysis organizations · 64.3% » small dialysis organizations · 12.1% » independent · 14.2% » hospital-based · 9.4%

dialysis unit counts, by unit affiliation, 2010 (Figure 10.3)

» all · 5,869 » Fresenius · 1,779 » DaVita · 1,646 » DCI · 215 » SDOS · 626 » independent · 823 » hospital-based · 780

dialysis patients, by unit affiliation, 2010 (Figure 10.3)

» all · 402,054 » Fresenius · 127,207 » DaVita · 118,142 » DCI · 13,176
» SDOS · 48,548 » independent · 57,241 » hospital-based · 37,740

PREVENTIVE CARE

diabetic dialysis patients with four or more A1c tests annually, 2009–2010 (Figure 10.4)

» overall · 60% » Fresenius · 62% » DaVita · 65% » DCI · 39% » SDO · 63% » independent · 66% » hospital-based · 41%

diabetic dialysis patients with two or more lipid tests annually, 2009–2010 (Figure 10.5)

» overall · 57% » Fresenius · 57% » DaVita · 57% » DCI · 52% » SDO · 61% » independent · 63% » hospital-based · 67%

TREATMENT UNDER THE NEW DIALYSIS COMPOSITE RATE

change in the percentage of patients receiving EPO pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · -2.1 » Fresenius · -0.8 » DaVita · -8.0% » DCI · -1.7 » SDOS · -0.6% » independent · -3.2% » hospital-based · -12.5%

change in total monthly dose of EPO pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · -27% » Fresenius · -18% » DaVita · -37% » DCI · -37 » SDOS · -28% » independent · -27% » hospital-based · -23%

change in total monthly dose of IV iron pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · -23% » Fresenius · -11% » DaVita · -42% » DCI · -10 » SDOS · -23% » independent · -20% » hospital-based · -0.8%

change in total monthly dose of IV vitamin D pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · -12% » Fresenius · -0.1% » DaVita · -24% » DCI · -22 » SDOS · -14% » independent · -12% » hospital-based · -8.4%

decrease in hemoglobin level pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · -3.6% » Fresenius · -1.4% » DaVita · -6.3% » DCI · -2.7 » SDOS · -2.3% » independent · -3.2% » hospital-based · -4.1%

increase in transfusion events pre- & post-dialysis bundle: September 2010 to September 2011 (Figure 10.10)

» all · 24% » Fresenius · 4.3% » DaVita · 46% » DCI · 21 » SDOS · 37% » independent · 32% » hospital-based · 7.3%

STANDARDIZED HOSPITALIZATION & MORTALITY RATIOS

all-cause standardized hospitalization ratios, 2010 (Figure 10.15)

» all · 1.00 » LDOS · 0.99 » SDOS · 0.99 » independent · 1.03 » hospital-based · 1.00

all-cause standardized mortality ratios, 2010 (Figure 10.15)

» all · 1.00 » LDOS · 0.98 » SDOS · 0.97 » independent · 1.02 » hospital-based · 1.11

all-cause standardized hospitalization ratios in large dialysis organizations, 2010 (Figure 10.16)

» all · 0.98 » Fresenius · 1.00 » DaVita · 1.01 » DCI · 0.89

11

Crater Lake National Park, Oregon

COSTS OF ESRD

Total Medicare spending in 2010 rose 6.5 percent, to $522.8 billion. Expenditures for ESRD rose 8.0 percent, to $32.9 billion. These numbers include the new Medicare Part D prescription drug benefit, as the USRDS Coordinating Center now receives up-to-date data on Part D use in the ESRD population.

These expenditures cover 488,938 patients in the prevalent Medicare ESRD population, along with 105,436 non-Medicare patients; these latter patients cost an additional estimated $14.5 billion (data from Table p.a in the Précis).

Medicare HMO costs for ESRD rose to $3.38 billion in 2010, 7.1 percent higher than in 2009. This annual increase is the lowest since 2003, when the new Medicare hierarchical payment model, with disease burden risk adjusters, was implemented for Medicare Advantage (HMOs). Fee-for-service Medicare inpatient expenditures per person per year (PPPY) rose nearly 5.3 percent in 2010, down from their 18 percent growth in 2008, while PPPY costs by modality remained nearly stable, rising just 1.4 percent for hemodialysis patients. Interestingly, there were large increases across modalities in 2007–2008, from 8.9 percent for peritoneal dialysis patients to 7.7 percent for both hemodialysis and transplant patients. These year-to-year variations will need more complete assessment — including consideration of cause-specific hospitalizations — to define their exact source. With 2010 the last year before the start of the new bundled prospective payment system, some providers may have reduced expenditures in the months prior to January 1, 2011, in anticipation of the changing incentives.

Recent attention to therapies using erythropoiesis stimulating agents (ESAs) has raised awareness of their costs to the healthcare system. After increasing each year since 1992 (including growth of 11–19 percent in 2002–2004) to reach nearly $2 billion, Medicare ESA costs were stable in 2004–2008, rose 4.9 percent in 2009, and changed little in 2010. Costs for IV vitamin D rose 12 percent in 2008, 3.7 percent in 2009, and 2.2 percent in 2010, reaching $519 million. And IV iron costs rose 6.6 percent in 2010, reaching a new high of $304 million.

The Average Sale Price payment system for injectables was introduced in 2004, as investigations showed that many providers had very profitable discount agreements, accounting for significant margins paid under the Medicare system. The composite rate payment was thus rebased, and the margins generated for injectables were addressed by allowing providers to receive only 6 percent above the sale price, monitored under quarterly reporting to CMS. There have been other

How novel and original must be each new man's view of the universe — for though the world is so old — and so many books have been written — each object appears wholly undescribed to our experience — each field of thought wholly unexplored — The whole world is an America — a New World.

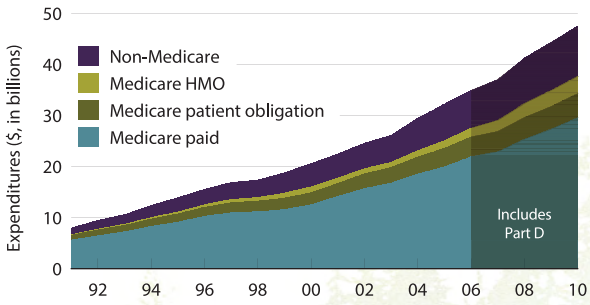
HENRY DAVID THOREAU
Journals

changes in ESA payment policies as well, including limited billing when hemoglobin levels are greater than 13 g/dl for three months. These alterations, along with changes in package insert warnings regarding ESA safety, have led to reductions in both ESA dosing and hemoglobin levels, as noted in earlier chapters. Changes under the new bundled payment system have further reduced costs to the Medicare system.

This year we again examine racial differences in expenditure patterns, and look at costs by modality in matched hemodialysis and peritoneal dialysis populations. These analyses explore how racial differences in service utilization in the outpatient dialysis setting may be an important consideration in the new bundled payment system, and how variations in expenditure structures for hemodialysis and peritoneal dialysis may impact the way in which providers choose to adopt peritoneal dialysis. Overall, costs for care of white and black/African American peritoneal dialysis patients were $5,885 and $6,334 less per year than that of matched hemodialysis patients, while ESA costs were $2,441 and $1,908 lower. These differences provide clear incentives under the bundled payment system to consider the use of peritoneal dialysis in appropriate patients.

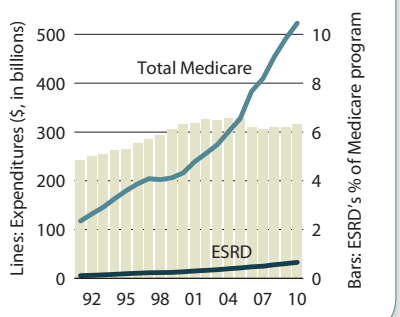
The last spread of the chapter provides expanded information on use of the Part D Medicare prescription drug benefit in the ESRD population, addressing the most frequent claims for medications, rank order by frequency and cost, and differences in use between the dialysis and transplant populations. » **Figure 11.1;** see page 445 for analytical methods. *Period prevalent ESRD patients. Includes Part D.*

vol 2
11.1 **ESRD expenditures, by payor**

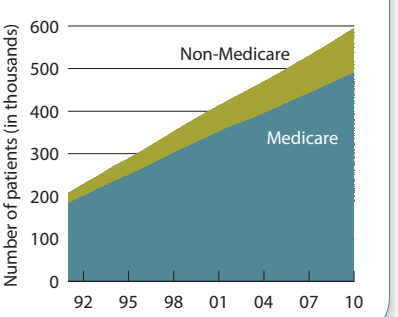


Total Medicare costs rose 6.5 percent in 2010, to $523 billion; costs for ESRD increased 8.0 percent, to $33 billion, accounting for 6.3 percent of the Medicare budget. The estimated number of point prevalent Medicare ESRD patients grew 3.2 percent between 2009 and 2010, to nearly 489,000, while the non-Medicare ESRD population rose 7.1 percent, to 105,436. » **Figures 11.2–3;** see page 445 for analytical methods. *Includes Part D (11.2). December 31 point prevalent ESRD patients (11.3).*

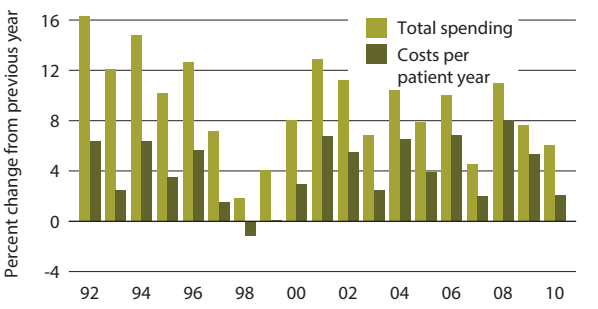
vol 2 **11.2** **Costs of the Medicare & ESRD programs**



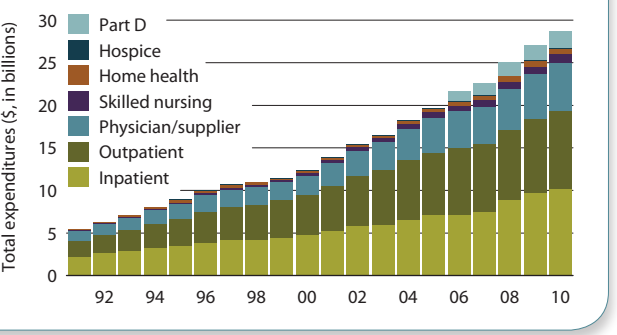
vol 2 **11.3** **Estimated numbers of point prevalent ESRD patients**



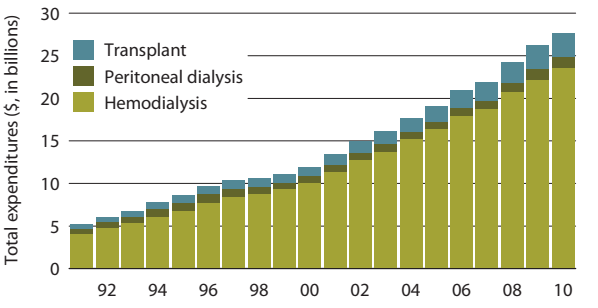
vol 2 **11.4** **Annual percent change in Medicare ESRD spending**



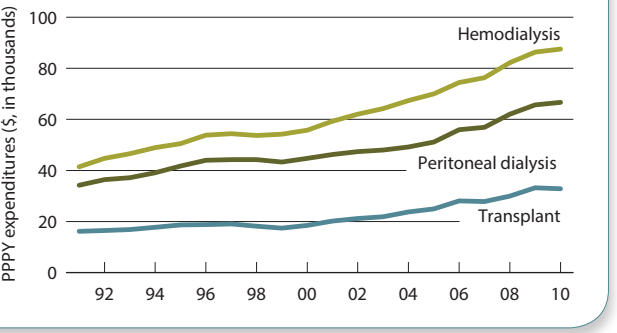
vol 2 **11.5** **Total Medicare dollars spent on ESRD, by type of service**



vol 2 **11.6** **Total Medicare ESRD expenditures, by modality**



vol 2 **11.7** **Total Medicare ESRD expenditures per person per year, by modality**



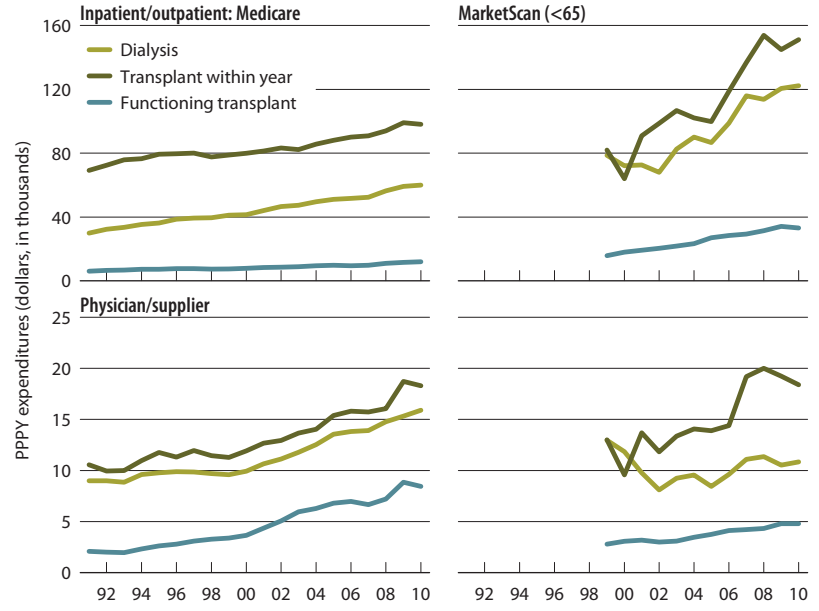
Total Medicare costs for ESRD patients increased 6.1 percent between 2009 and 2010, compared to a 2.0 percent increase in costs per person per year. This growth was lower than that seen in 2009, at 7.6 and 5.3 percent, respectively.

In 2010, 38 percent of Medicare's ESRD dollars were spent on inpatient services, 34 percent on outpatient care, 21 percent on physician/supplier costs, and 7.2 percent on Part D prescription drugs. Part D costs for ESRD patients reached $1.92 billion in 2010, 11 percent higher than in the previous year.

Total Medicare expenditures for peritoneal dialysis patients rose 7.8 percent in 2010, compared to increases of 5.8 and 2.5 percent for hemodialysis and transplant, respectively. Costs reached $23.6 billion for hemodialysis, and $1.28 and $2.8 billion for peritoneal dialysis and transplant.

Per person per year Medicare ESRD costs rose just 1.4 and 1.7 percent for hemodialysis and peritoneal dialysis in 2010, to $87,561 and $66,751, while transplant costs fell 1.1 percent, to $32,914. » **Figures 11.4–7;** see page 445 for analytical methods. *Total Medicare ESRD costs from claims data; includes all Medicare as primary payor claims as well as amounts paid by Medicare as secondary payor (11.4–5). Period prevalent ESRD patients; patients with Medicare as secondary payor are excluded (11.6–7).*

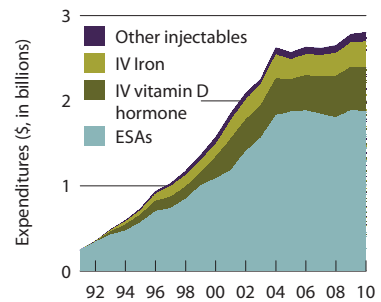
vol 2
11.8 Per person per year inpatient/outpatient & physician/supplier net costs for Medicare & MarketScan (EGHP) patients with ESRD



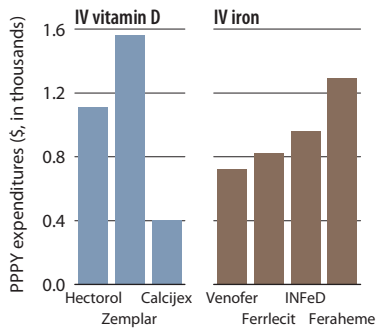
Inpatient/outpatient costs per person per year (PPPY) for MarketScan patients with a transplant during 2010 rose 4.3 percent from the previous year, to $151,190, 54 percent more than the $97,935 incurred by their Medicare counterparts, for whom costs fell 1.0 percent. Costs for MarketScan patients with a functioning graft in 2010 were 3.0 percent lower than in 2009, at $33,101 — 2.8 times higher, however, than the $11,975 reported for Medicare patients.

In 2010, physician/supplier PPPY costs for patients with a transplant during the year fell 4.3 percent for MarketScan patients, to $18,396; costs for their Medicare counterparts fell 2.2 percent, to $18,308. » **Figure 11.8;** see page 445 for analytical methods. *Medicare: period prevalent ESRD patients; MarketScan: period prevalent ESRD patients age 64 & younger.*

vol 2
11.9 Total Medicare spending for injectables

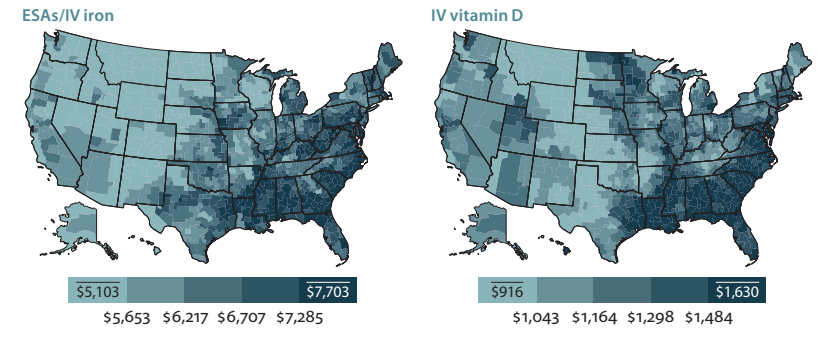


vol 2
11.10 Per person per year (PPPY) costs for injectables, 2010



Of the $2.8 billion spent in 2010 on injectables for dialysis patients, ESAs accounted for 67 percent, or $1.87 billion. The proportions of total costs for IV vitamin D, IV iron, and other injectables were 18.5, 10.9 and 3.8 percent, or $519 million, $304 million, and $106 million, respectively. PPPY costs for Feraheme, an IV iron injectable introduced in 2009, reached $1,293 in 2010, compared to $974 for INFeD. » **Figures 11.9–10;** see page 445 for analytical methods. *Period prevalent dialysis patients.*

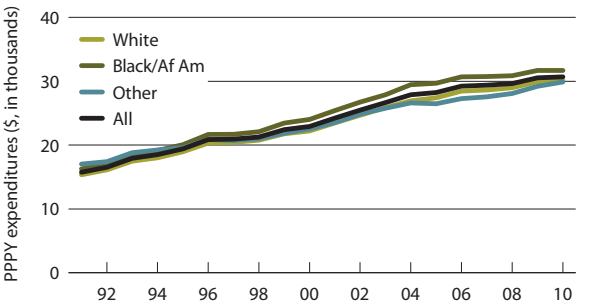
vol 2
11.11 Unadjusted per person per year costs (dollars) for injectables, by HSA, 2010



Per person per year costs for erythropoiesis stimulating agents (ESAs) and IV iron, and costs for IV vitamin D, both show a distinct geographic pattern, with costs highest along the Gulf Coast and the Eastern Seaboard, and lowest in the western half of the country. Costs average $7,703 and $1,630, respectively, in the upper quintile. » **Figure 11.11;** see page 445 for analytical methods. *Period prevalent dialysis patients, 2010; unadjusted.*

Total per person per year outpatient expenditures in the prevalent dialysis population do not vary widely by race. In 2010, for example, costs were $30,106 for white patients, $31,651 for blacks/African Americans, and $29,834 for patients of other races. » **Figure 11.12;** see page 445 for analytical methods. *Period prevalent dialysis patients.*

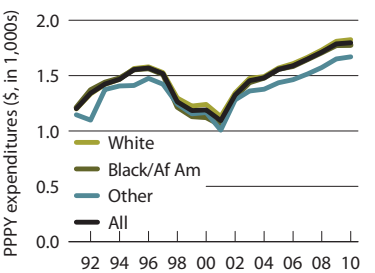
vol 2
11.12 Total per person per year outpatient expenditures, by race



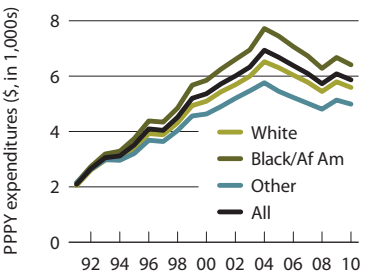
outpatient costs for laboratory tests & injectables

In the prevalent dialysis population, per person per year (PPPY) costs for laboratory tests in 2010 were slightly higher for whites than for blacks/African Americans, at $1,825 and $1,775, respectively. Costs for erythropoiesis stimulating agents (ESAs) were 14.7 percent higher for blacks/African Americans than for whites, at $6,423 and $5,600. IV iron costs were similar among whites and blacks/African Americans, at $804 and $826; IV vitamin D costs, in contrast, were 73.5 percent higher in blacks/African Americans than in whites, at $1,592 and $918. Overall PPPY costs for IV antibiotics remained stable between 2009 and 2010, at just over $13. Costs for all other injectables were $197 PPPY overall and $224 and $167, respectively, in whites and blacks/African Americans. » **Figures 11.13–18;** see page 445 for analytical methods. *Period prevalent dialysis patients.*

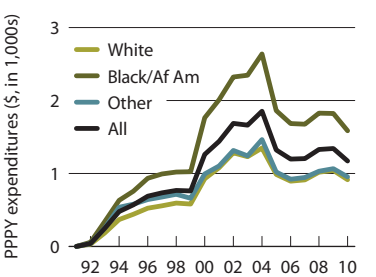
vol 2
11.13 Per person per year expenditures for laboratory tests, by race



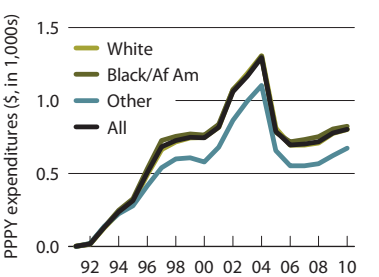
vol 2
11.14 Per person per year expenditures for ESAs, by race



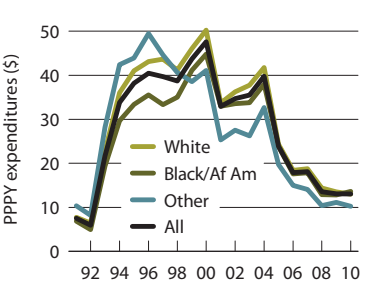
vol 2
11.15 Per person per year expenditures for IV vitamin D, by race



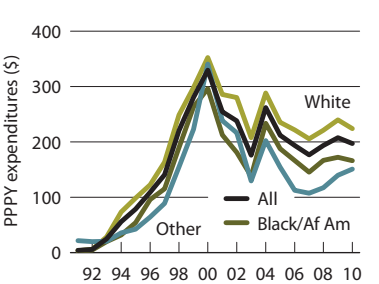
vol 2
11.16 Per person per year expenditures for IV iron, by race



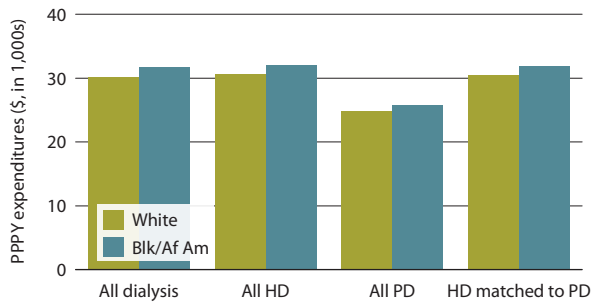
vol 2
11.17 Per person per year expenditures for IV antibiotics, by race



vol 2
11.18 Per person per year expenditures for other injectables, by race



vol 2
11.19 **Total per person per year outpatient expenditures, by dialysis modality & race, 2010**



Since peritoneal dialysis (PD) patients are younger than hemodialysis patients and have less comorbidity, we developed a matched hemodialysis (HD) population, thus allowing direct cost analyses. Hemodialysis patients matched to the PD population generally have costs similar to those of the unmatched patients. In 2010, per person per year (PPPY) outpatient dialysis expenditures were 5.1 percent higher in blacks/African Americans than in whites, at $31,651 and $30,106, respectively. By modality, costs for hemodialysis are generally 24–25 percent higher than those sustained by peritoneal patients in both matched and unmatched populations.

PPPY costs for laboratory tests are greater in both matched (hemodialysis to peritoneal dialysis) and unmatched hemodialysis populations compared to those for patients on peritoneal dialysis. In unmatched populations, for example, costs for hemodialysis patients are 4.0 percent greater for whites, and 4.2 percent greater for blacks/African Americans. In matched populations, costs are 2.6 and 4.2 percent greater, respectively.

Costs for erythropoiesis stimulating agents (ESAs) are higher for hemodialysis patients than for peritoneal dialysis patients, and higher in blacks/African Americans than in whites. In unmatched populations, ESA costs for hemodialysis compared to peritoneal dialysis are 73 and 41 percent higher in whites and blacks/African Americans, respectively; costs for hemodialysis patients matched to peritoneal patients are 74 and 41 percent higher.

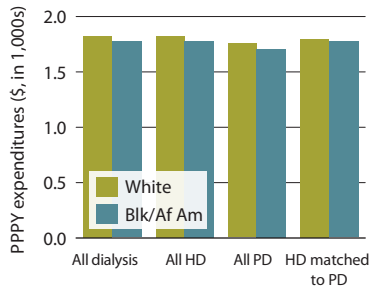
Expenditures for IV vitamin D are 59 percent greater for blacks/African Americans than for whites in matched dialysis populations.

Intravenous iron costs are 4–5 times higher for matched and unmatched hemodialysis patients when compared to peritoneal patients.

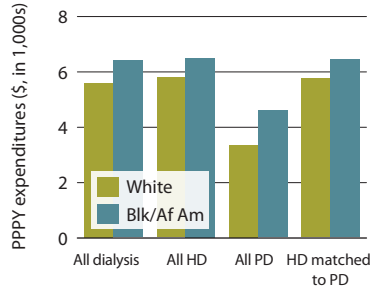
In matched hemodialysis patients, PPPY costs for IV antibiotics for whites and blacks/African Americans are $11.99 and $15.77, respectively, compared to those on peritoneal dialysis, at $12.15 and $18.19. » **Figures 11.19–25;** see page 445 for analytical methods. *Period prevalent dialysis patients, 2010.*

outpatient costs for laboratory tests & injectables

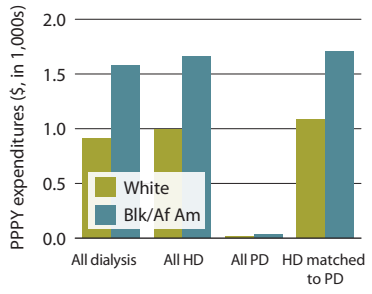
vol 2
11.20 **PPPY expenditures for laboratory tests, by dialysis modality & race, 2010**



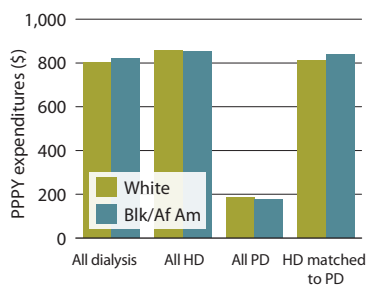
vol 2
11.21 **PPPY expenditures for ESAs, by dialysis modality & race, 2010**



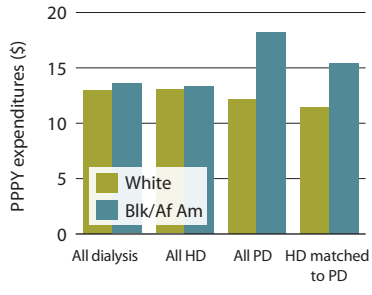
vol 2
11.22 **PPPY expenditures for IV vitamin D, by dialysis modality & race, 2010**



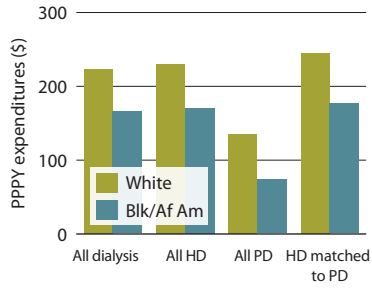
vol 2
11.23 **PPPY expenditures for IV iron, by dialysis modality & race, 2010**



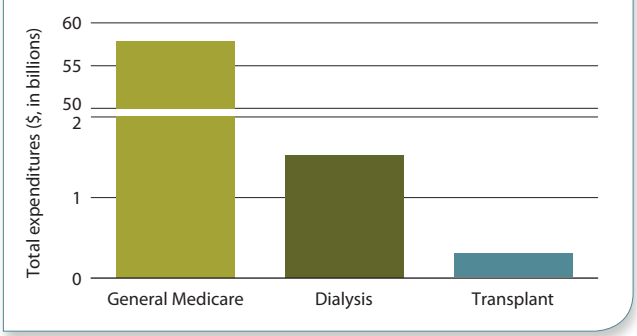
vol 2
11.24 **PPPY expenditures for IV antibiotics, by dialysis modality & race, 2010**



vol 2
11.25 **PPPY expenditures for other injectables, by dialysis modality & race, 2010**

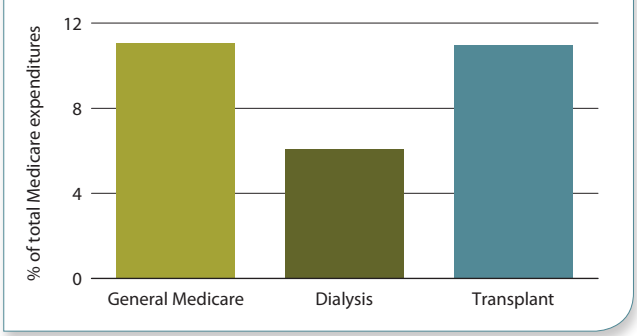


vol 2 **11.26** **Total Part D net costs in the general Medicare & ESRD populations, 2010**



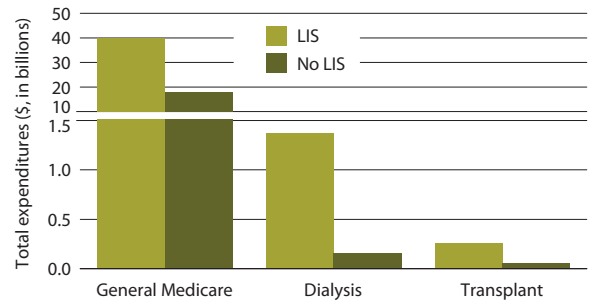
Total Part D net costs for dialysis and transplant patients in 2010 reached $1.5 billion and $306 million — 2.6 and 0.5 percent of total Medicare Part D costs, respectively. » **Figure 11.26;** see page 445 for analytical methods. *Part D-enrolled general Medicare patients from the 5 percent sample & period prevalent dialysis & transplant patients, 2010.*

vol 2 **11.27** **Part D costs as a part of total Medicare expenses in the general Medicare & ESRD populations, 2010**



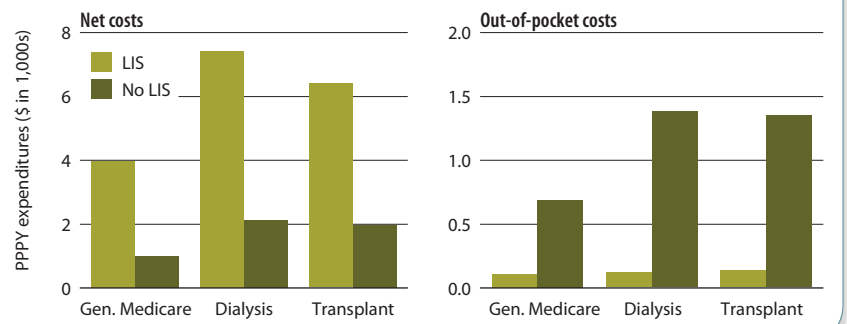
Costs for Part D medications in general Medicare and transplant patients represent a nearly equal portion of their overall Medicare costs, at 11.1 and 11.0 percent, respectively. Costs for dialysis patients, in contrast, are just 6.1 percent of their total Medicare expenditures. » **Figure 11.27;** see page 445 for analytical methods. *Part D-enrolled general Medicare patients from the 5 percent sample & period prevalent dialysis & transplant patients, 2010. Values are Part D costs as percent of total Medicare costs.*

vol 2
11.28 Total Part D net costs, by low income subsidy (LIS) status & modality, 2010



In 2010, costs for patients with the low income subsidy (LIS) accounted for 69 percent of total Part D net costs in the general Medicare population. In the dialysis and transplant populations, in contrast, they accounted for 90 and 84 percent, respectively. » **Figure 11.28;** see page 445 for analytical methods. *Part D-enrolled general Medicare patients from the 5 percent sample & period prevalent dialysis & transplant patients, 2010.*

vol 2
11.29 Total per person per year Part D net & out-of-pocket costs, 2010



Per person per year (PPPY) net Part D costs are much higher for LIS and non-LIS ESRD patients than costs incurred by patients in the general Medicare population. Among dialysis and transplant patients with the LIS, for example, net Part D costs in 2010 were $7,424 and $6,407, respectively, compared to costs of $3,985 in the general Medicare population. In patients with no LIS, Part D costs were noticeably lower, at $2,133 for dialysis, $1,978 for transplant, and $1,010 in the general population.

Out-of-pocket Part D costs for patients with LIS status are a fraction of those realized by patients without the LIS, at 1.7–2.8 percent of net costs compared to 65–68 percent. » **Figure 11.29;** see page 445 for analytical methods. *Part D-enrolled general Medicare patients from the 5 percent sample & period prevalent dialysis & transplant patients, 2010. Net pay is estimated as the sum of Medicare covered amount & LIS amount.*

Overall, Part B medications account for 10.1 percent of per person per month (PPPM) Part A and B costs. Costs for branded medications far exceed those for generics. Branded medication use averages 1.8 prescriptions per month, at a cost of $465.19, while PMPM costs for an average 4.3 generic prescriptions are $96.12.

For branded and generic medications, average prescriptions per month vary little by age. Medication use is slightly less in younger populations, yet costs per month are generally higher. By gender, prescriptions for branded and generic medications average 1.7 and 4.1, respectively, per month in males, and 2.0 and 4.6 in females.

Average prescriptions per month for branded medications are highest in Asians, at 2.2, and with costs of $521.27; whites tend to use more generic drugs, averaging 4.6 prescriptions per month at a cost of $98.11. » **Table 11.a;** see page 445 for analytical methods. *Medicare Part D-enrolled period prevalent dialysis patients with Medicare as primary payor.*

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11.a **Variation in total Medicare per person per month (PPPM) spending & number of monthly Part D prescriptions, by age, gender, race, ethnicity, & LIS status, 2010**

	N	Parts A & B non-drug ($)	Part B drug ($)	Part D branded med N/month	Branded med $/month	Generic med N/month	Generic med $/month	Total $
All	250,140	6,303	713	1.8	465.19	4.3	96.12	7,577
LIS	192,156	6,393	724	2.0	550.04	4.5	110.90	7,778
Non-LIS	57,984	5,979	673	1.3	158.65	3.8	42.74	6,854
20–44	38,026	5,496	771	1.5	565.78	3.7	99.42	6,932
LIS	35,999	5,548	776	1.6	589.06	3.8	102.97	7,017
Non-LIS	2,027	4,546	672	0.6	140.67	2.3	34.61	5,393
45–64	100,270	6,063	734	1.9	540.10	4.4	104.03	7,441
LIS	86,024	6,161	736	2.1	597.73	4.6	114.00	7,609
Non-LIS	14,246	5,446	716	1.1	177.28	3.4	41.26	6,381
65–74	60,404	6,749	698	1.9	389.99	4.6	91.14	7,928
LIS	40,062	7,050	705	2.2	495.18	4.8	112.77	8,363
Non-LIS	20,342	6,103	685	1.4	164.49	4.0	44.77	6,997
75+	50,212	6,969	639	1.8	305.65	4.5	82.02	7,996
LIS	28,858	7,359	646	2.1	420.49	4.8	109.42	8,535
Non-LIS	21,354	6,411	630	1.4	140.98	4.0	42.73	7,224
Male	129,428	6,123	692	1.7	457.50	4.1	92.16	7,365
LIS	95,206	6,178	697	1.9	556.53	4.2	108.54	7,541
Non-LIS	34,222	5,955	674	1.2	154.49	3.6	42.05	6,825
Female	120,709	6,497	735	2.0	473.46	4.6	100.38	7,806
LIS	96,948	6,606	750	2.1	543.59	4.8	113.24	8,013
Non-LIS	23,761	6,014	672	1.4	164.59	4.1	43.74	6,894
White	136,403	6,394	669	1.9	433.81	4.6	98.11	7,595
LIS	92,403	6,520	675	2.2	552.28	4.9	121.26	7,869
Non-LIS	44,000	6,105	656	1.4	163.72	4.1	45.32	6,970
Blk/Af Am	97,281	6,288	787	1.7	501.42	4.0	94.10	7,670
LIS	85,386	6,367	793	1.8	550.18	4.1	102.05	7,812
Non-LIS	11,895	5,702	746	0.9	141.71	3.0	35.46	6,625
Asian	11,405	5,735	598	2.2	521.27	4.1	97.37	6,952
LIS	9,816	5,809	600	2.3	576.99	4.3	106.78	7,093
Non-LIS	1,589	5,260	584	1.4	159.68	3.2	36.32	6,040
Other	5,051	5,611	608	1.7	421.43	3.8	83.17	6,723
LIS	4,551	5,686	612	1.8	448.83	3.9	88.40	6,835
Non-LIS	500	4,903	568	1.3	162.45	3.2	33.73	5,667
Hispanic	39,302	6,255	615	2.0	477.93	4.1	98.20	7,446
LIS	35,525	6,322	618	2.1	514.24	4.2	104.41	7,559
Non-LIS	3,777	5,595	590	1.1	122.98	3.2	37.48	6,345

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11.b Medicare Parts B & D per person per month costs ($) for ESRD-related medications, by age, gender, race, ethnicity, & LIS status, 2010

	Part B	Part D					
	ESAs	Iron	Vitamin D	Other	Oral vit D	Phos. binder	Calcimimetics	Total
All	507.22	68.61	103.77	10.78	29.52	331.92	99.10	1,150.92
LIS	516.73	68.71	108.60	10.96	34.38	395.65	118.98	1,254.01
Non-LIS	472.84	68.26	86.30	10.15	11.95	101.66	27.27	778.43
20–44	556.53	66.65	113.36	11.54	58.25	448.30	153.85	1,408.48
LIS	560.33	67.10	113.92	11.78	60.13	467.13	159.91	1,440.30
Non-LIS	487.21	58.32	103.10	7.20	23.94	104.51	43.27	827.55
45–64	520.86	68.48	112.66	10.30	31.57	392.74	120.10	1,256.71
LIS	523.30	69.02	114.43	10.41	34.32	436.74	132.96	1,321.18
Non-LIS	505.48	65.13	101.50	9.61	14.24	115.73	39.12	850.81
65–74	496.10	69.93	98.79	10.25	18.95	260.33	68.88	1,023.24
LIS	503.33	70.17	104.80	10.46	21.93	332.58	88.81	1,132.09
Non-LIS	480.61	69.43	85.91	9.77	12.56	105.44	26.16	789.88
75+	453.25	69.55	83.07	11.27	11.81	188.03	44.56	861.53
LIS	462.90	68.85	89.69	11.30	14.22	258.37	63.20	968.52
Non-LIS	439.40	70.56	73.58	11.23	8.36	87.15	17.82	708.11
Male	485.87	68.63	104.60	8.62	29.04	340.24	99.00	1,136.00
LIS	490.44	68.39	110.10	8.81	34.50	418.33	122.88	1,253.44
Non-LIS	471.91	69.35	87.76	8.03	12.32	101.31	25.96	776.65
Female	530.15	68.59	102.88	13.11	30.03	322.98	99.20	1,166.95
LIS	542.86	69.02	107.12	13.10	34.26	373.13	115.11	1,254.59
Non-LIS	474.16	66.71	84.21	13.16	11.42	102.15	29.15	780.97
White	481.58	68.35	80.51	11.99	27.91	315.69	74.37	1,060.41
LIS	489.76	68.20	84.16	12.38	34.69	408.71	96.24	1,194.13
Non-LIS	462.95	68.69	72.19	11.09	12.48	103.61	24.52	755.53
Blk/Af Am	553.09	70.63	136.99	9.66	31.36	339.97	132.88	1,274.58
LIS	557.98	70.85	137.27	10.03	34.30	373.88	145.94	1,330.26
Non-LIS	516.98	68.99	134.97	6.91	9.62	89.78	36.55	863.79
Asian	430.24	57.56	79.52	7.45	36.16	440.51	84.94	1,136.38
LIS	433.77	57.97	81.16	7.09	39.06	486.78	94.32	1,200.14
Non-LIS	407.28	54.88	68.90	9.78	17.39	140.29	24.09	722.62
Other	426.61	60.31	92.38	9.91	19.28	340.89	91.20	1,040.57
LIS	430.21	60.54	93.43	9.44	20.29	364.82	97.58	1,076.30
Non-LIS	392.56	58.12	82.51	14.38	9.75	114.76	30.87	702.94
Hispanic	436.33	64.24	91.64	6.80	30.05	386.45	81.14	1,096.65
LIS	438.59	64.26	92.14	6.94	32.18	416.55	87.47	1,138.13
Non-LIS	414.32	64.07	86.75	5.45	9.16	92.15	19.25	691.15

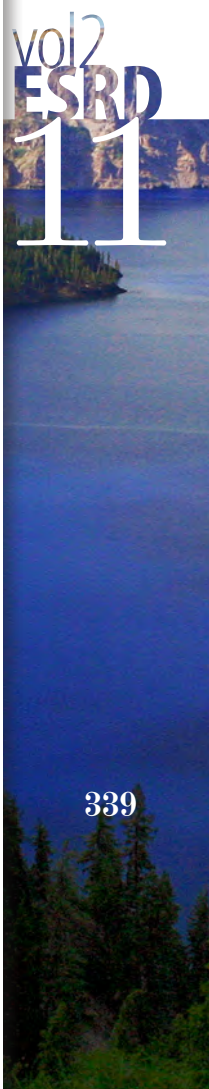
ESAs, iron, vitamin D, and other injectables were included in the bundle as of January 1, 2011; calcimimetics and phosphate binders, currently in Part D, will be included on January 1, 2014.

In 2010, erythropoiesis stimulating agents (ESAs) accounted for nearly 75 percent of PPPM Part B medication costs, at $507.22; costs for iron and vitamin D were $68.61 and $103.77, respectively.

Younger patients have higher costs for ESAs and vitamin D, while the reverse is true for iron. By gender, women tend to have higher PPPM costs for ESAs compared to men, but costs for iron and vitamin D are comparable.

By race/ethnicity, costs for ESAs are highest in blacks/African Americans, at $553.09, compared to costs of $481.58, $430.24, and $436.33 in whites, Asians, and Hispanics.

For Part D medications, PPPM costs overall are highest for phospate binders, at $391.92, while those for oral vitamin D and calcimimetics are $29.52 and $99.10, respectively. Costs for phosphate binders tend to be highest in older patients, males, and Asians and Hispanics. » **Table 11.b;** see page 445 for analytical methods. *Medicare Part D-enrolled period prevalent dialysis patients with Medicare as primary payor.*



OVERALL COSTS OF ESRD & INJECTABLES

ESRD spending, by payor, 2010 (Figure 11.1)

» Medicare paid · $29.6 billion » Medicare patient obligation · $4.7 billion
» Medicare HMO · $3.4 billion » non-Medicare · $9.8 billion

total Medicare dollars spent on ESRD, by type of service, 2010 (Figure 11.5)

» overall · $28.7 billion
» inpatient · 38% » outpatient · 34% » physician/supplier · 21% » Part D · 7%

total Medicare expenditures for ESRD, by modality, 2010 (Figure 11.6)

» hemodialysis · $23.6 billion » peritoneal dialysis · $1.28 billion » transplant · $2.8 billion

total Medicare expenditures per person per year, 2010 (Figure 11.7)

» hemodialysis · $87,561 » peritoneal dialysis · $66,751 » transplant · $32,914

total Medicare spending for injectables, 2010 (Figure 11.9)

» overall · $2.8 billion » erythropoiesis stimulating agents · $1.87 billion » IV vitamin D · $519 million
» IV iron · $304 million » other injectables · $106 million

RACIAL DIFFERENCES IN SPENDING

total per person per year outpatient expenditures, 2010 (Figure 11.12)

» overall · $30,679
» white · $30,106 » black/African American · $31,651 » other race · $29,834

per person per year outpatient expenditures for erythropoiesis stimulating agents, 2010 (Figure 11.14)

» overall · $5,875
» white · $5,600 » black/African American · $6,423 » other race · $4,987

per person per year outpatient expenditures for IV vitamin D, 2010 (Figure 11.15)

» overall · $1,178
» white · $918 » blacks/African American · $1,592 » other race · $957

MATCHED & UNMATCHED DIALYSIS POPULATIONS

total per person per year outpatient expenditures, 2010 (Figure 11.19)

all dialysis » white · $30,106 » black/African American · $31,651
HD matched to PD » white · $30,620 » black/African American · $32,092

MEDICARE PART D COSTS

total Part D ESRD costs, 2010 (Figure 11.26)

» dialysis · $1.52 billion » transplant · $305 million

per person per year Part D net & out-of-pocket costs, 2010 (Figure 11.29)

	» general Medicare	» dialysis	» transplant
net costs, LIS	· $3,895	· $7,424	· $6,407
net costs, no LIS	· $1,010	· $2,133	· $1,978
out-of-pocket costs, LIS	· $110	· $122	· $139
out-of-pocket costs, no LIS	· $688	· $1,382	· $1,352

12

Mesa Verde National Park, Colorado

INTERNATIONAL COMPARISONS

This international chapter has expanded each year as more countries participate in the collaborative effort to collate data for the public health surveillance of end-stage renal disease. This year, we report data from 41 regions and countries which have graciously sent data to the USRDS. Such information not only allows for international comparisons, but provides a context for data on the multiple ethnic and racial groups which constitute the diverse population of the U.S. The USRDS is well aware of the considerable challenges each country faces in gathering its data, and sincerely thanks the registries and providers for their efforts.

Reported rates of incident ESRD across the globe show important trends; rates have slowed in some countries, while rising or remaining stable in others. The U.S., Taiwan, and Japan continue to have some of the highest rates, at 369, 361, and 288 per million population in 2010. In Mexico, rates in Morelos (2009) and Jalisco reached 597 and 425, respectively.

In Taiwan, the prevalence of ESRD reached 2,584 per million in 2010, while rates of 2,260 and 1,870 were reported in Japan and the U.S.

More than one in two new ESRD patients in Jalisco (Mexico), Singapore, Malaysia, Morelos (Mexico), and New Zealand are reported to have diabetes. In Taiwan, Malaysia, and the United States, rates of diabetes in patients age 65–74 were 771, 767, and 609 per million population in 2010, and rates for U.S. patients age 75 or older were 543 per million.

Hemodialysis continues to be the most common mode of therapy worldwide, evidenced by data showing that, in over 70 percent of reporting countries, at least 80 percent of patients are on this mode of therapy. In Hong Kong, Mexico (Morelos, and Jalisco), in contrast, peritoneal dialysis is used by 76, 58, and 51 percent of patients, respectively. And home dialysis therapy is provided to 17.7 and 9.1 percent of patients in New Zealand and Australia.

Renal transplant rates are many times a reflection not only of a country's healthcare system, but of cultural diversities and beliefs. As an example, transplant rates are less than 10 per million population in countries such as Malaysia, Russia, Romania, Bosnia/Herzegovina, Thailand, and Bangladesh, in contrast to rates above 60 in Jalisco (Mexico) and above 50 in the United States, Portugal, Norway, the UK, and the Netherlands. Rates of functioning grafts reach 608 and 580 per million population in Norway and the U.S., but are less than 50 in Boznia/Herzegovina, Russia, Romania, and Morelos (Mexico).

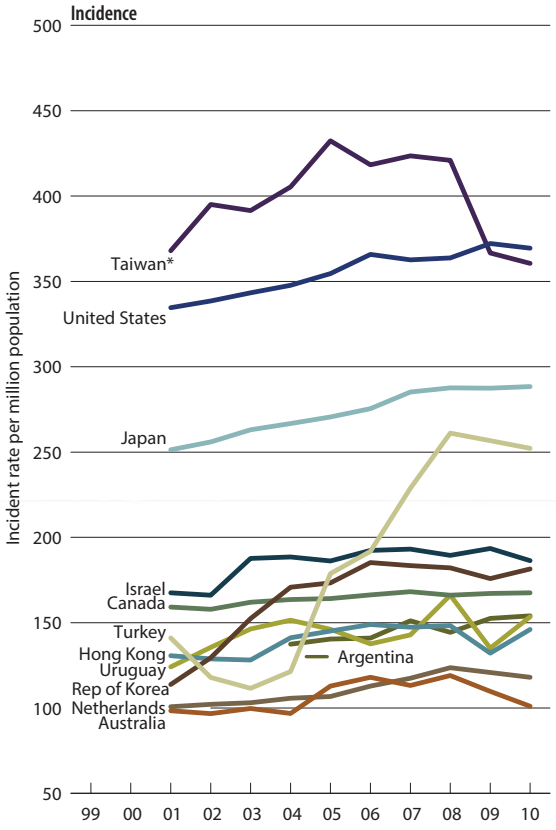
We invite all renal registries to participate in our international data collection, and wish to thank all currently participating registries for their willingness to provide data on their ESRD programs, giving us a worldwide perspective on patients with ESRD. » **Figure 12.1;** see page 447 for analytical methods. *All rates unadjusted. Data from Argentina (2005–2007), Japan, & Taiwan are dialysis only. *Downturn in incident rates is due to changes in criteria for incidence & to changes in the payment system.*

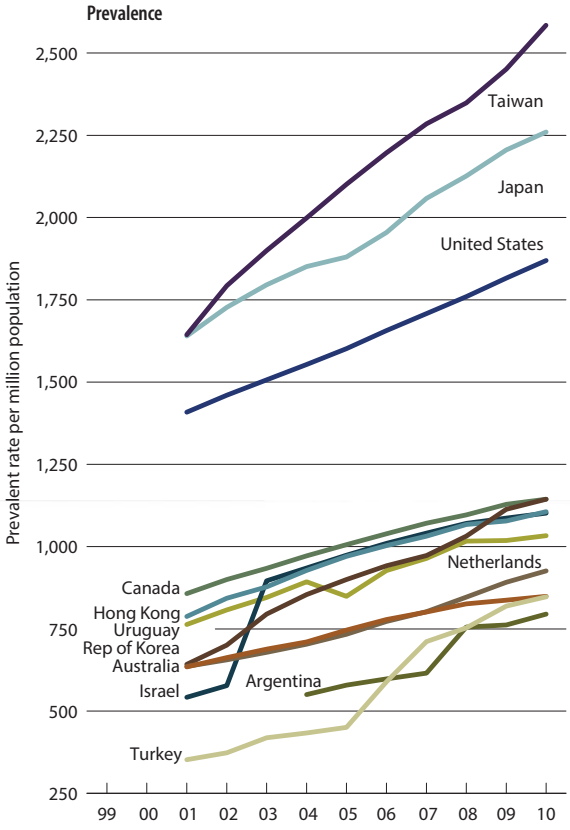
she knows

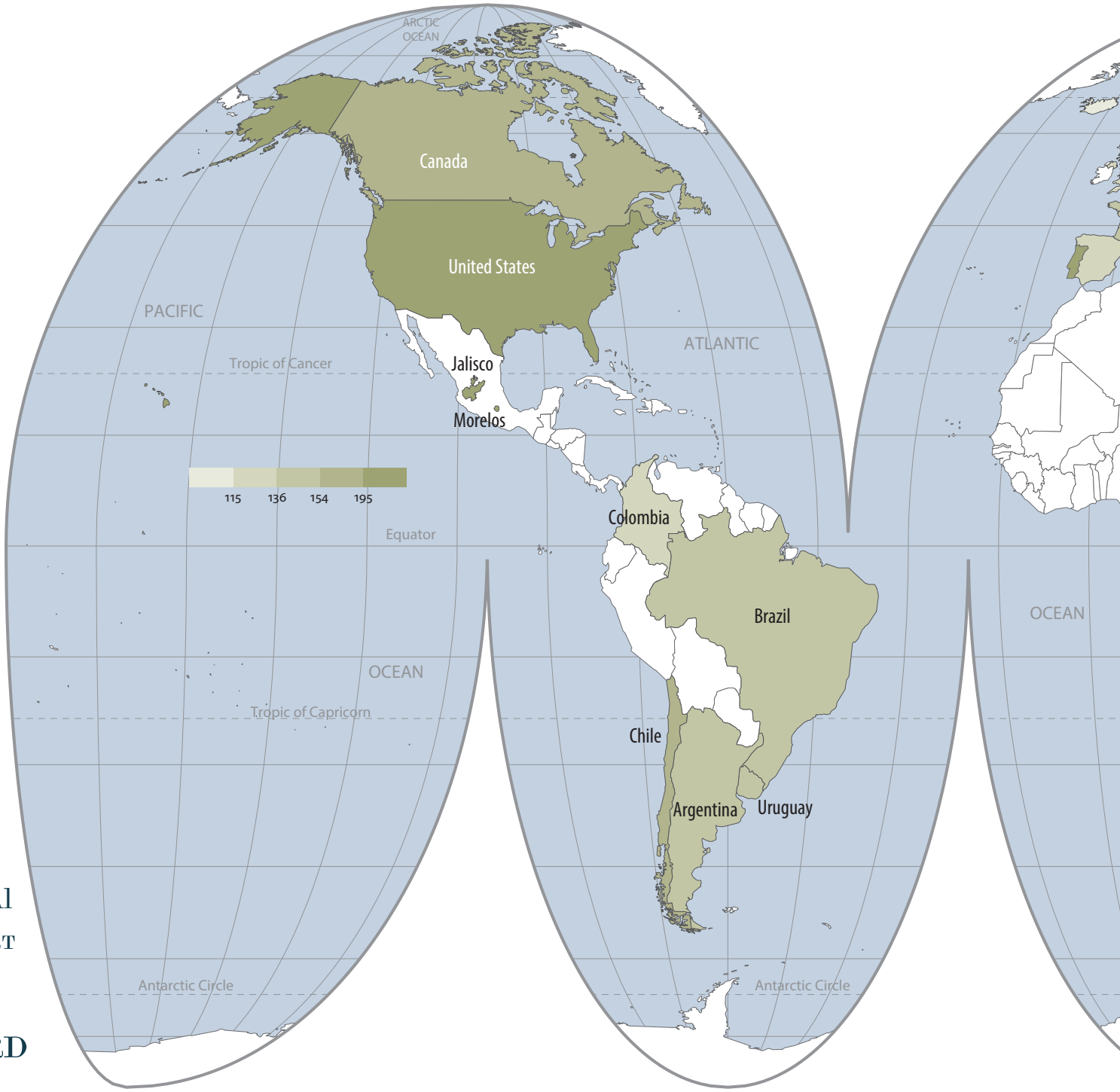
she is a part of the
pond she lives in,
the tall trees are her children,
the birds that swim above her
are tied to her by an
unbreakable string.

MARY OLIVER,
"The turtle"

vol 2
12.1 **Comparison of unadjusted ESRD incidence & prevalence worldwide**







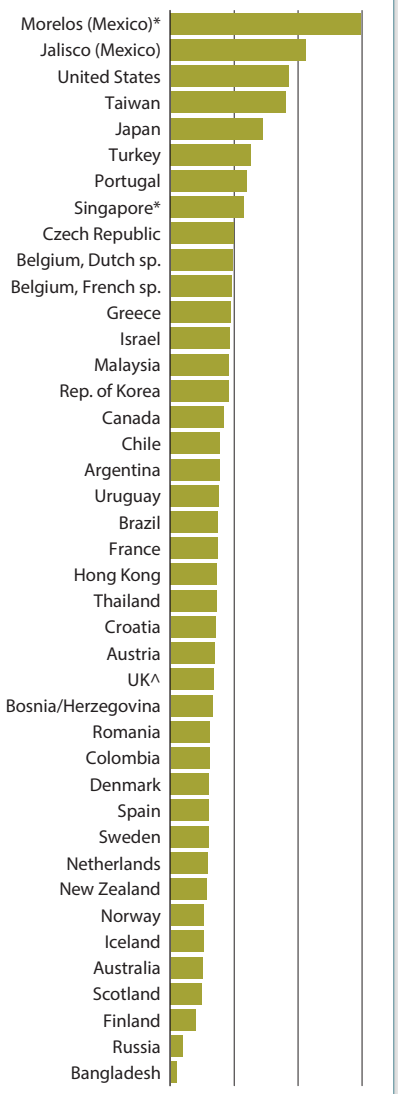
INTERNATIONAL COMPARISONS

worldwide view of the incidence of ESRD

vol 2
12.2 **Geographic variations in the incidence of ESRD (per million population), 2010**

» **Figure 12.2;** see page 447 for analytical methods. *Data presented only for countries from which relevant information was available. All rates unadjusted. Latest data for Singapore & Morelos (Mexico), are for 2009. Data for France include 23 regions. Data for Belgium & for England/Wales/Northern Ireland do not include patients younger than 18.*

vol 2 **12.3** **Incidence of ESRD, 2010**



Data presented only for countries from which relevant information was available; "." signifies data not reported. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger than 18. *Latest data for Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

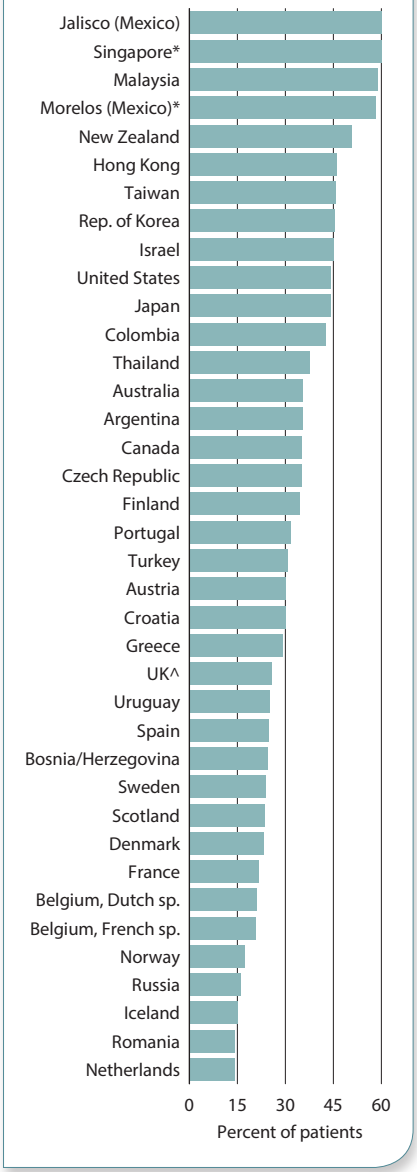
vol 2 **12.a** **Incidence of ESRD, by year (per million population)**

	2005	2006	2007	2008	2009	2010
Argentina	140	141	151	144	153	154
Australia	113	118	113	119	110	101
Austria	154	160	154	150	151	139
Bangladesh	8	8	13	13	13	20
Belgium, Dutch speaking	183	192	190	193	207	195
Belgium, French speaking	177	187	187	191	197	192
Bosnia/Herzegovina	104	133	151	149	143	133
Brazil	177	185	140	148	99	150
Canada	164	166	168	166	167	168
Chile	135	141	144	153	153	156
Colombia	101	126	146	107	103	145
Croatia	144	142	153	153	156	142
Czech Republic	175	186	185	182	181	198
Denmark	121	119	147	126	133	121
Finland	97	87	94	95	84	81
France	140	144	141	148	151	149
Greece	194	198	192	201	205	190
Hong Kong	145	149	147	148	132	146
Iceland	67	69	84	72	88	104
Israel	186	192	193	189	193	186
Jalisco (Mexico)	302	346	372	400	419	425
Japan	271	275	285	288	287	288
Rep. of Korea	173	185	184	182	176	181
Malaysia	121	138	150	168	175	183
Morelos (Mexico)	.	.	553	557	597	.
Netherlands	107	113	117	124	121	118
New Zealand	111	119	111	116	135	115
Norway	99	100	113	113	116	104
Portugal	.	.	.	232	240	239
Romania	94	75	90	97	109	124
Russia	24	28	.	35	35	40
Scotland	125	116	114	108	106	99
Singapore	241	241	268	248	230	.
Spain	126	128	121	128	129	121
Sweden	121	130	128	123	127	121
Taiwan	432	418	424	421	367	361
Thailand	110	139	159	100	123	146
Turkey	179	192	229	261	257	252
U.K., England, Wales & N Ireland	111	115	140	141	140	136
United States	355	366	363	364	372	369
Uruguay	146	138	143	166	135	153

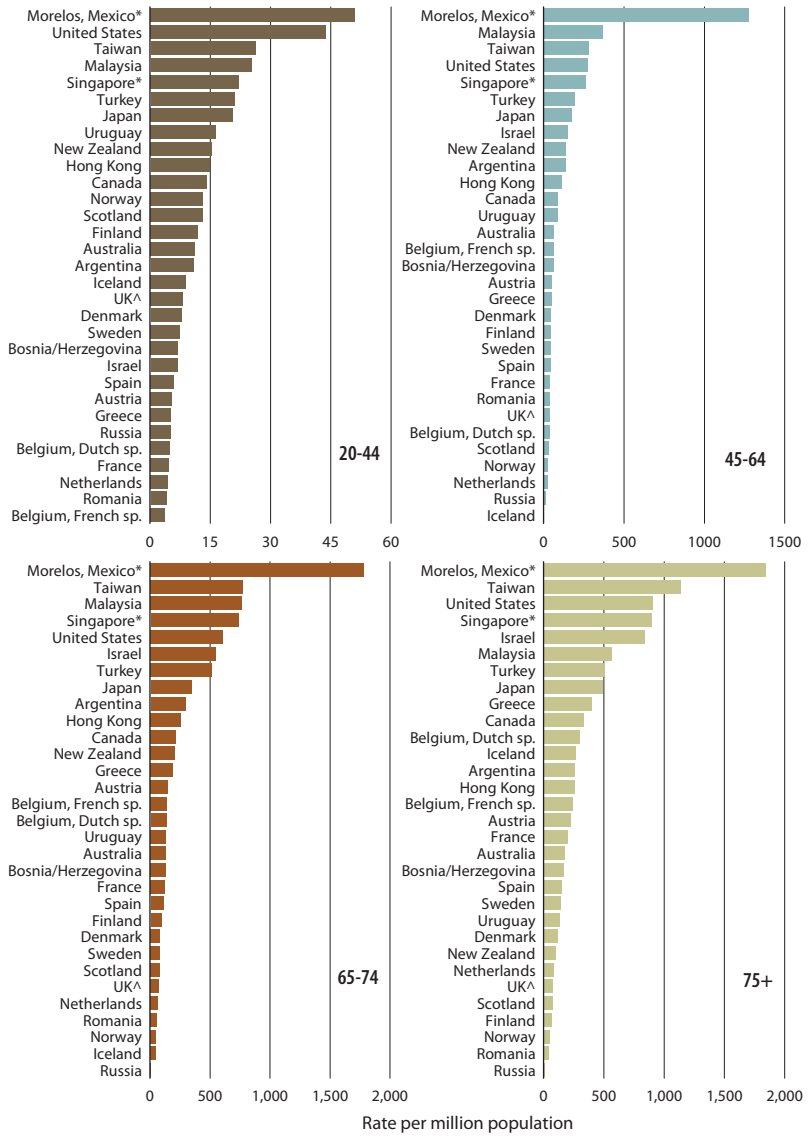
Incident rates of reported ESRD in 2009 were 597 per million population in Morelos (Mexico), followed by 2010 reportings from Jalisco (Mexico), the United States, Taiwan, and Japan at 425, 369, 3361 and 288, respectively. Rates of less than 100 per million were reported in Scotland, Finland, Russia, & Bangladesh. As stated in previous ADRs, it is important to note the distinction between the incidence of treatment guided by available funding, and the incidence of the disease itself. An affluent nation may allow elderly patients and those with diabetes to receive hemodialysis, for example, while developing nations may restrict treatment to younger, healthier patients.

» **Figure 12.3 & Table 12.a;** see page 447 for analytical methods.

vol 2 12.4 **Percentage of incident patients with ESRD due to diabetes, 2010**



vol 2 12.5 **Incident rates of ESRD due to diabetes, by age, 2010**

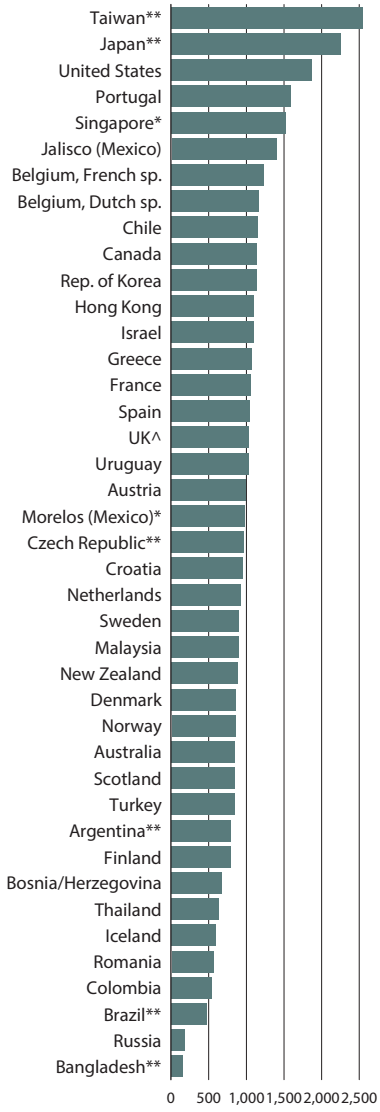


In 2009 and 2010, diabetes was the primary cause of ESRD in 51–63 percent of new patients in Jalisco (Mexico), Singapore, Malaysia, Morelos (Mexico), and New Zealand. Hong Kong, Taiwan, the Repulic of Korea, Israel, the United States, Japan, and Colombia all reported rates of ESRD incidence due to diabetes of greater than 40 percent. Countries reporting rates below 20 percent included Norway, Russia, Iceland, Romania, and the Netherlands.

Incident rates of ESRD due to diabetes rise with increasing age. In 2009, Morelos (Mexico) reported a rate of 1,786 in those age 65–74, more than two time higher than the rates of 771, 767, and 609 reported by Taiwan, Malaysia, and the United States in 2010. Rates in the United States were 44, 367, and 543, respectively, for those age 20–44, 45–64, and 75 and older. » **Figures 12.4–5;** see page 447 for analytical methods.

Data presented only for countries from which relevant information was available. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger than 18. *Latest data for Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

vol 2 **12.6** **Prevalence of ESRD, 2010**



vol 2 **12.b** **Prevalent counts and rates of ESRD, by year (per million population)**

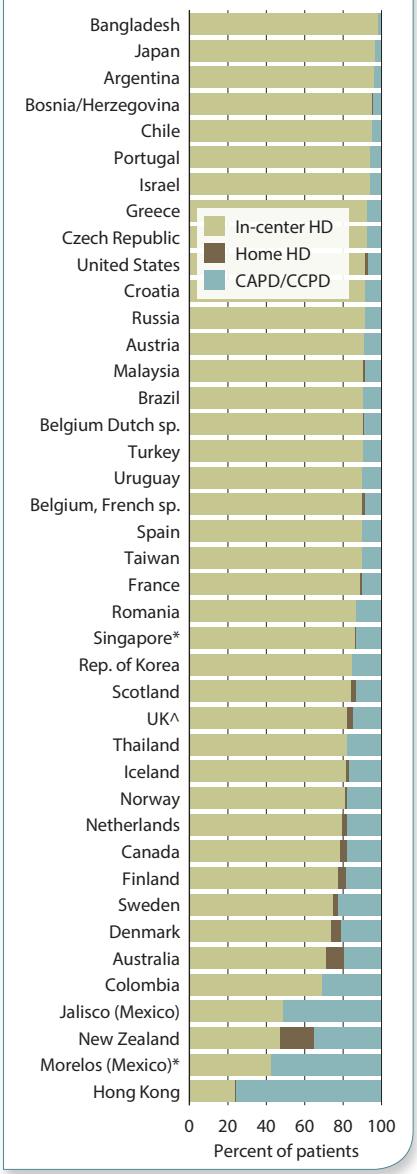
	Prevalent counts					Prevalent rates				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Argentina	23,306	24,218	30,035	30,580	31,885	598	615	756	762	795
Australia	16,112	16,842	17,660	18,317	18,972	778	801	826	837	849
Austria	7,512	7,731	7,898	8,194	8,355	909	934	948	981	996
Bangladesh	12,864	15,089	16,963	21,067	24,618	88	101	113	137	158
Belgium, Dutch sp.	6,300	6,531	6,793	7,100	7,322	1,033	1,064	1,098	1,140	1,166
Belgium, French sp.	4,768	4,983	5,207	5,452	5,712	1,071	1,111	1,151	1,194	1,237
Bosnia & Herzegov.	2,115	2,306	2,441	2,477	2,587	552	602	637	646	675
Brazil	73,605	87,044	77,589	92,091	91,314	398	466	415	481	479
Canada	33,898	35,274	36,548	38,074	39,056	1,039	1,071	1,097	1,128	1,144
Chile	15,353	16,360	17,856	18,849	19,854	930	986	1,065	1,109	1,161
Colombia	.	.	20,239	19,846	24,760	.	.	455	441	544
Croatia	3,799	3,932	4,009	4,124	4,257	856	886	904	930	959
Czech Republic	4,752	5,190	5,633	9,536	10,218	462	500	538	908	970
Denmark	4,295	4,592	4,685	4,771	4,810	782	832	844	855	867
Finland	3,829	3,953	4,086	4,169	4,242	727	747	769	781	791
France	34,835	49,679	54,761	59,549	67,271	963	954	996	1,039	1,060
Greece	10,994	11,343	11,664	12,034	12,212	986	1,013	1,038	1,067	1,080
Hong Kong	6,930	7,171	7,460	7,580	7,857	1,003	1,031	1,067	1,078	1,106
Iceland	147	161	167	173	190	484	518	526	543	597
Israel	7,125	7,472	7,826	8,134	8,400	1,010	1,041	1,071	1,087	1,102
Jalisco (Mexico)	6,357	6,865	7,218	9,222	9,916	929	986	1,030	1,314	1,402
Japan	249,718	262,968	271,471	281,212	289,415	1,954	2,058	2,126	2,205	2,260
Rep. of Korea	46,730	48,675	51,989	56,396	58,860	942	973	1,032	1,114	1,144
Malaysia	16,805	18,825	21,116	23,278	25,411	626	692	767	834	899
Morelos (Mexico)	.	13,146	13,928	14,734	15,383	.	878	939	978	.
Netherlands	12,623	13,146	13,928	14,734	15,383	772	802	847	891	926
New Zealand	3,245	3,354	3,454	3,680	3,820	775	793	809	862	895
Norway	3,510	3,692	3,893	4,073	4,195	753	784	816	843	858
Portugal	.	.	14,965	16,011	16,788	.	.	1,407	1,505	1,590
Romania	6,578	7,935	9,089	10,810	12,085	305	368	422	503	564
Russia	18,486	.	22,234	24,246	26,327	130	.	157	173	186
Scotland	4,011	4,177	4,262	4,360	4,434	784	812	825	839	849
Singapore	4,936	5,165	5,439	5,692	.	1,400	1,442	1,493	1,524	.
Spain	35,462	41,546	44,067	39,708	47,632	961	956	995	1,034	1,046
Sweden	7,725	7,929	8,062	8,281	8,525	851	867	874	891	909
Taiwan	50,255	52,462	54,101	56,671	59,856	2,197	2,285	2,348	2,451	2,584
Thailand	17,967	26,457	31,496	35,110	40,845	286	420	497	553	639
Turkey	42,992	50,221	53,859	59,443	62,471	589	711	753	819	847
UK^	40,101	40,413	42,829	44,887	46,682	723	923	970	1,008	1,039
United States	496,592	516,875	537,465	559,448	580,741	1,656	1,708	1,760	1,816	1,870
Uruguay	3,073	3,204	3,389	3,407	3,468	927	964	1,016	1,019	1,033

Data presented only for countries from which relevant information was available; "." signifies data not reported. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger than 18. **Argentina (2005–2007), Bangladesh, Brazil, Czech Republic (2005–2008), Japan, & Taiwan are dialysis only. *Latest data for Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

Taiwan and Japan continued to report the highest rates of prevalent ESRD, at 2,584 and 2,260 per million population, respectively, in 2010. The next highest rate was reported by the United States, at 1,870, followed by Portugal, Singapore (2009), and Jalisco (Mexico) at 1,590, 1,524, and 1,402. The lowest rates were reported by Bangladesh and Russia, at 158 and 186.

» **Figure 12.6 & Table 12.b;** see page 447 for analytical methods.

vol 2 **12.7** **Percent distribution of prevalent dialysis patients, by modality, 2010**



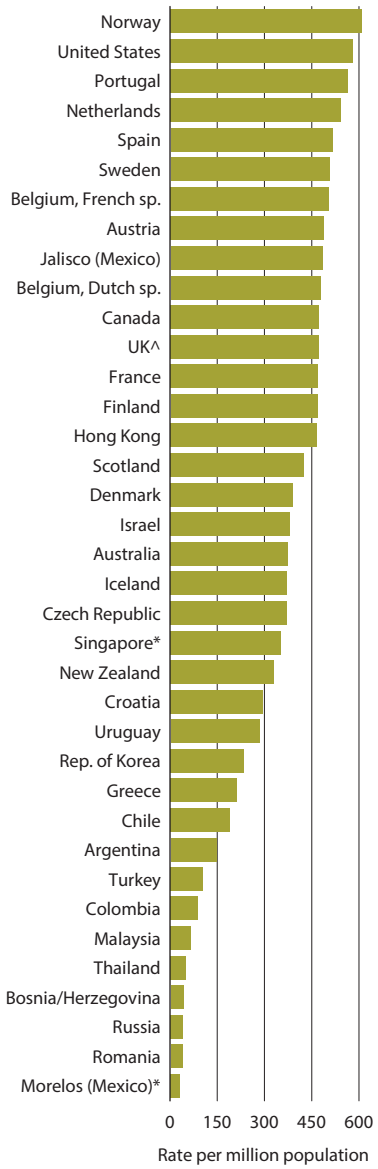
vol 2 **12.c** **Percent distribution of prevalent dialysis patients, by modality & year**

	Hemodialysis					Home hemodialysis					Peritoneal dialysis				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Argentina	96.0	96.1	96.0	96.0	95.8	0.0	0.0	0.0	0.0	0.0	4.0	3.9	4.0	4.0	4.2
Australia	68.2	68.3	68.6	69.6	71.4	9.6	9.8	9.4	9.3	9.1	22.1	22.0	22.1	21.1	19.5
Austria	90.8	91.2	91.0	91.0	91.0	0.2	0.1	0.0	0.0	0.0	9.0	8.7	8.9	8.9	9.0
Bangladesh	99.6	98.4	98.3	98.3	98.3	0.0	0.0	0.0	0.0	0.0	0.4	1.6	1.7	1.7	1.7
Belg/Dutch sp.	89.1	89.2	89.7	89.6	90.4	0.2	0.2	0.3	0.4	0.4	10.7	10.6	10.1	10.0	9.2
Belgium, Fr. Sp.	89.2	90.5	90.8	90.3	90.0	1.3	1.2	1.3	1.2	1.4	9.5	8.3	7.9	8.5	8.6
Bosnia/Herzegov.	95.3	95.2	95.1	94.9	95.2	0.0	0.1	0.0	0.0	0.0	4.7	4.7	4.9	5.0	4.8
Brazil	90.8	89.4	89.6	92.3	90.6	0.0	0.0	0.0	0.0	0.0	9.2	10.6	10.4	7.7	9.4
Canada	78.9	78.6	78.4	78.4	78.4	2.8	3.0	3.3	3.5	3.7	18.4	18.4	18.3	18.1	17.9
Chile	95.0	95.2	95.3	95.3	95.1	0.0	0.0	0.0	0.0	0.0	5.0	4.8	4.7	4.7	4.9
Colombia	63.9	63.4	68.0	68.2	68.7	0.0	0.0	0.0	0.0	0.0	36.1	36.6	32.0	31.8	31.3
Croatia	91.6	92.8	91.8	91.0	91.5	0.0	0.0	0.0	0.0	0.0	8.4	7.2	8.2	9.0	8.5
Czech Republic	92.4	92.3	91.8	92.0	92.1	0.0	0.0	0.0	0.0	0.0	7.6	7.7	8.2	8.0	7.9
Denmark	72.0	71.8	72.9	73.7	74.0	4.1	3.7	4.1	4.4	4.7	23.9	24.5	23.0	21.9	21.3
Finland	76.0	75.8	74.4	75.0	77.5	2.9	3.8	3.9	3.7	4.0	21.2	20.4	21.7	21.3	18.5
France	85.4	87.4	87.8	88.5	88.5	2.0	1.6	1.3	1.2	1.0	12.6	11.1	10.8	10.3	10.5
Greece	91.5	91.7	91.7	92.0	92.3	0.0	0.0	0.0	0.0	0.0	8.4	8.3	8.3	7.9	7.7
Hong Kong	18.8	19.8	20.4	21.5	23.5	0.0	0.2	0.4	0.6	0.9	81.1	80.0	79.2	77.9	75.6
Iceland	70.6	72.1	76.2	86.9	81.7	0.0	1.6	1.6	0.0	1.4	29.4	26.2	22.2	13.1	16.9
Israel	91.9	92.9	93.6	93.3	93.8	0.0	0.0	0.0	0.0	0.0	8.1	7.1	6.4	6.7	6.2
Jalisco (Mexico)	29.5	34.2	40.4	41.5	48.7	0.0	0.0	0.0	0.0	0.0	70.5	65.8	59.6	58.5	51.3
Japan	96.8	96.7	96.8	96.7	96.7	0.1	0.1	0.1	0.1	0.1	3.2	3.3	3.1	3.2	3.2
Rep. of Korea	78.4	80.2	81.0	83.1	84.4	0.0	0.0	0.0	0.0	0.0	21.6	19.8	19.0	16.9	15.6
Malaysia	90.2	89.9	90.0	90.3	90.6	1.1	1.0	1.0	1.0	1.0	8.7	9.1	9.1	8.7	8.4
Morelos (Mexico)	.	40.6	43.2	42.4	.	.	0.0	0.0	0.0	.	.	59.4	56.8	57.6	.
Netherlands	74.8	76.0	77.4	79.1	79.5	2.3	2.3	2.5	2.5	2.7	22.9	21.7	20.1	18.4	17.9
New Zealand	45.5	48.2	48.1	48.4	47.2	16.1	15.8	15.7	16.5	17.7	38.3	36.0	36.2	35.0	35.0
Norway	80.5	80.6	83.4	80.7	81.3	0.4	0.3	0.3	0.5	0.7	19.1	19.1	16.4	18.8	18.0
Portugal	.	.	94.8	94.4	93.9	.	.	0.0	0.0	0.0	.	.	5.2	5.6	6.1
Romania	80.6	81.8	82.9	84.5	86.4	0.0	0.0	0.0	0.0	0.0	19.4	18.2	17.1	15.5	13.6
Russia	91.0	.	91.0	91.3	91.4	0.0	.	0.0	0.0	0.0	9.0	.	9.0	8.7	8.6
Scotland	79.0	80.7	82.4	83.5	84.3	1.7	1.9	2.3	2.5	2.4	19.3	17.5	15.4	14.0	13.3
Singapore	81.1	82.5	85.6	86.3	.	0.1	0.1	0.1	0.1	.	18.8	17.4	14.4	13.6	.
Spain	90.1	89.4	90.6	90.6	89.8	0.2	0.1	0.3	0.2	0.2	9.7	10.5	9.2	9.2	10.0
Sweden	75.5	73.0	73.3	73.6	74.8	2.6	2.9	2.8	2.7	2.8	21.9	24.2	23.9	23.6	22.4
Taiwan	92.4	91.5	90.8	89.7	89.6	0.0	0.0	0.0	0.0	0.0	7.6	8.5	9.2	10.3	10.4
Thailand	95.8	94.5	90.5	84.1	81.9	0.0	0.0	0.0	0.0	0.0	4.2	5.5	9.5	15.9	18.1
Turkey	88.7	88.1	87.4	89.6	90.4	0.0	0.0	0.0	0.0	0.0	11.3	11.9	12.5	10.4	9.6
UK^	78.6	79.2	81.2	82.2	82.3	2.0	2.0	2.1	2.5	3.0	19.4	18.8	16.6	15.3	14.7
United States	91.9	92.0	92.0	91.9	91.5	0.7	0.9	1.0	1.2	1.3	7.3	7.1	6.9	6.9	7.2
Uruguay	92.6	90.6	91.1	90.8	90.1	0.0	0.0	0.0	0.0	0.0	7.4	9.4	8.9	9.2	9.9

Data presented only for countries from which relevant information was available; "." signifies data not reported. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger 18, respectively. *Latest data for Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

In Hong Kong, 75 percent of prevalent dialysis patients were treated with CAPD/CCPD in 2010. More than half of prevalent dialysis patients in Jalisco (Mexico) and Morelos (Mexico) use this therapy, as do 35 percent of those treated in New Zealand. In-center hemodialysis remains the most common mode of therapy worldwide; in New Zealand and Australia, however, 17.7 and 9.1 percent of patients, respectively, use home hemodialysis. » **Figure 12.7 & Table 12.c;** see page 447 for analytical methods.

vol 2 **12.8** **Prevalent rates of functioning grafts, 2010**



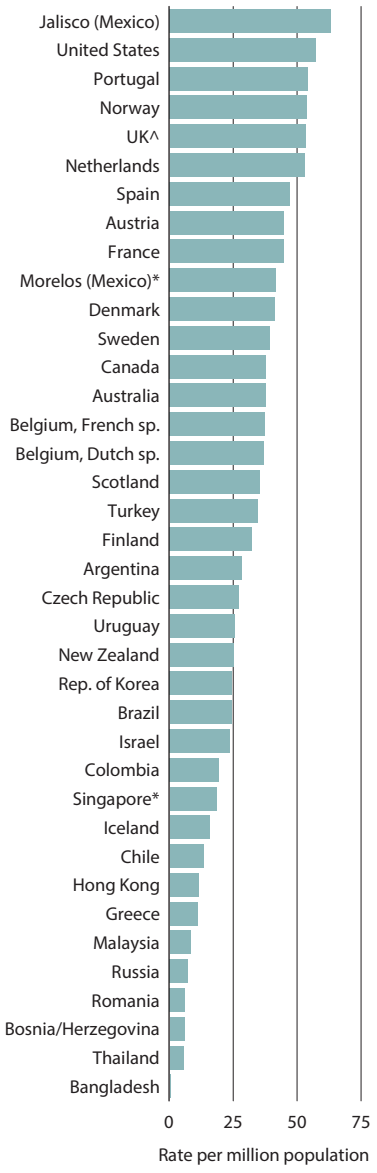
Data presented only for countries from which relevant information was available; "." signifies data not reported. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger than 18. *Latest data for Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

vol 2 **12.d** **Prevalent rates of functioning grafts, by year (per million population)**

	2005	2006	2007	2008	2009	2010
Argentina	.	.	.	132	128	147
Australia	322	331	338	351	361	375
Austria	428	439	456	460	476	489
Belgium, Dutch speaking	405	423	439	453	465	477
Belgium, French speaking	410	434	453	470	485	505
Bosnia & Herzegovina	33	32	32	40	44	42
Canada	393	409	428	442	459	473
Chile	157	165	175	189	191	191
Colombia	.	.	.	61	60	89
Croatia	166	188	205	231	261	296
Czech Republic	.	.	.	.	359	370
Denmark	267	318	334	348	365	390
Finland	418	434	445	449	459	468
France	390	409	407	427	458	470
Greece	182	192	202	214	216	213
Hong Kong	387	410	420	443	460	467
Iceland	276	316	319	324	349	371
Israel	337	358	372	386	383	381
Jalisco (Mexico)	315	352	399	436	458	484
Rep. of Korea	188	196	202	213	225	234
Malaysia	64	66	65	65	66	66
Morelos (Mexico)	.	.	42	34	32	.
Netherlands	397	419	446	478	508	543
New Zealand	300	298	303	316	324	330
Norway	525	537	552	573	591	608
Portugal	.	.	.	484	545	566
Romania	15	20	22	29	34	40
Russia	25	29	.	34	38	41
Scotland	361	369	386	405	417	426
Singapore	317	330	341	348	352	.
Spain	386	445	453	505	495	516
Sweden	439	454	469	486	498	506
Thailand	25	20	57	36	46	50
Turkey	21	58	80	109	102	104
U.K., England, Wales & N Ireland	271	288	428	458	477	473
United States	486	508	527	545	562	580
Uruguay	132	210	235	256	273	284

Reported prevalent rates of functioning grafts were greatest in Norway, the United States, and Portugal, at 608, 580, and 566 per million population in 2010. Countries and regions reporting rates above 400 per million include the Netherlands, Spain, Sweden, Belgium (both French- and Dutch-speaking), Austria, Jalisco (Mexico), Canada, the UK, France, Finland, Hong Kong, and Scotland. Bosnia/Herzegovina, Russia, Romania, and Morelos (Mexico) reported rates below 50 per million population in 2010. » **Figure 12.8 & Table 12.d;** see page 447 for analytical methods.

vol 2 **12.9** **Transplant rates, 2010**



Data presented only for countries from which relevant information was available; "." signifies data not reported. All rates unadjusted. ^UK: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Belgium & England/Wales/Northern Ireland do not include patients younger than 18. *Latest data for the Singapore & Morelos (Mexico) are for 2009. Data for France include 13 regions in 2005, 15 regions in 2006, 18 regions in 2007, 20 regions in 2008 & 2009, & 23 regions in 2010.

vol 2 **12.e** **Transplant rates, by year (per million population)**

	2005	2006	2007	2008	2009	2010
Argentina	19.1	21.7	23.0	25.1	26.4	28.4
Australia	30.6	31.0	29.3	38.0	35.3	37.9
Austria	45.9	47.9	43.7	39.5	47.4	44.7
Bangladesh	0.4	0.2	0.5	0.5	0.6	0.6
Belgium, Dutch speaking	28.4	39.7	43.3	39.9	39.3	36.8
Belgium, French speaking	37.6	39.3	40.8	36.7	36.8	37.5
Bosnia & Herzegovina	11.5	6.8	8.4	9.1	7.0	6.0
Brazil	18.4	17.8	18.5	20.2	22.2	24.3
Canada	32.7	38.4	39.5	38.3	37.7	37.9
Chile	17.2	18.5	17.1	16.8	15.1	13.5
Colombia	11.9	14.9	14.8	16.1	18.9	19.5
Czech Republic	38.0	41.6	38.0	31.9	34.0	27.2
Denmark	32.7	30.8	30.3	34.8	40.3	41.3
Finland	31.8	39.7	32.3	28.0	32.8	32.4
France	36.6	39.9	45.1	44.9	43.3	44.6
Greece	23.7	22.2	21.9	23.9	14.9	11.1
Hong Kong	8.6	9.6	9.5	11.2	13.5	11.4
Iceland	33.7	26.3	22.5	15.8	22.0	15.7
Israel	43.4	43.2	37.7	33.1	28.6	23.7
Jalisco (Mexico)	55.7	52.2	59.3	54.3	58.1	63.2
Rep. of Korea	15.5	18.8	18.5	22.7	24.5	24.6
Malaysia	6.2	11.1	8.2	9.2	9.8	8.3
Morelos (Mexico)	.	.	54.6	44.5	41.8	.
Netherlands	43.1	41.0	51.0	47.0	50.0	52.8
New Zealand	22.5	21.5	29.1	28.6	28.0	25.2
Norway	49.5	45.5	55.2	58.3	60.5	53.8
Portugal	.	.	.	49.4	55.7	54.3
Romania	4.7	5.3	2.8	7.3	6.3	6.1
Russia	2.8	2.9	.	5.5	5.9	7.3
Scotland	29.2	26.4	37.7	42.2	41.6	35.4
Singapore	19.6	24.1	23.2	20.0	18.5	.
Spain	67.3	48.2	47.3	48.3	49.8	47.3
Sweden	43.2	40.5	42.3	45.6	42.2	39.3
Thailand	.	3.6	5.9	5.4	4.8	5.5
Turkey	4.5	11.6	18.6	18.1	26.3	34.5
U.K., England, Wales & N Ireland	30.0	34.1	45.0	49.2	51.8	53.3
United States	59.0	60.6	58.2	57.2	57.8	57.5
Uruguay	35.4	42.8	28.9	37.5	35.0	25.6

Jalisco (Mexico), the United States, Portugal, Norway, the UK, and the Netherlands reported transplant rates of 63.2, 57.5, 54.3, 53.8, 53.3, and 52.8, respectively, per million population in 2010. Rates were less than 10 per million, in contrast, in Malaysia, Russia, Romania, Bosnia and Herzegovina, Thailand, and Bangladesh. » **Figure 12.9 & Table 12.e;** see page 447 for analytical methods.

highest rates of reported incident ESRD, 2010 (per million population; Figure 12.3)

» Moreles (Mexico) · 597 (2009) » Jalisco (Mexico) · 425 » U.S. · 369 » Taiwan · 361

incident patients with ESRD due to diabetes, 2010 (percent; Figure 12.4)

» Jalisco (Mexico) · 63 » Singapore (2009) · 61 » Malaysia · 59 » Morelos (Mexico, 2009) · 58

highest rates of reported prevalent ESRD, 2010 (per million population; Figure 12.6)

» Taiwan · 2,584 » Japan · 2,260 » U.S · 1,870

prevalent rates of a functioning graft, 2010 (per million population; Figure 12.8)

» Norway · 608 » U.S. · 580 » Portugal · 566 » Netherlands · 543

transplant rates, 2010 (per million population; Figure 12.9)

» Jalisco (Mexico) · 63 » United States · 58 » Portugal · 54 » Norway · 54 »UK · 53 » the Netherlands · 53

Tables

Grand Prismatic Spring, Yellowstone National Park, Wyoming

It began in mystery, and it will end in mystery, but what a savage and beautiful country lies in between.

DIANE ACKERMAN,
A Natural History of the Senses

Both the CKD and ESRD volumes now include only selected tables of particular interest, and data for some early years are omitted from the printed tables. Excel files of the complete tables are available on our website, www.usrds.org, and on the CD included with this book.

The following symbols are used throughout these tables
* Values for cells with ten or fewer patients are suppressed. " . " Zero values in this cell.
† CMS begin collecting Hispanic ethnicity data on April 1995: cells for years prior to 1996 have therefore been left blank.
Adjusted rates use the 2005 ESRD cohort as reference (represented by outlined columns in tables).

Table A.1

Incident counts of reported ESRD: all patients

by age, gender, race, ethnicity, & primary diagnosis

	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	140	150	166	193	203	178	198	233	209	198	237	224	278	312
5-9	103	152	147	153	150	182	147	148	146	128	130	148	150	152
10-14	214	246	283	308	311	338	338	322	337	297	313	283	293	299
15-19	442	544	569	575	587	584	624	648	622	673	627	692	645	632
20-29	2,083	2,635	2,692	2,713	2,714	2,580	2,549	2,638	2,734	2,763	2,836	2,806	2,905	2,826
30-39	3,309	4,887	5,750	5,822	5,756	5,805	5,735	5,797	5,908	6,028	5,901	5,998	6,211	5,977
40-49	3,689	6,276	8,988	10,996	11,058	11,325	11,625	11,944	12,124	12,650	12,352	12,258	12,702	12,412
50-59	5,501	8,362	11,955	16,879	17,780	18,230	19,162	19,854	20,678	21,973	22,066	22,484	22,929	22,756
60-64	3,950	6,138	8,003	10,076	10,481	10,579	11,269	11,653	11,951	12,430	12,972	13,478	14,302	14,842
65-69	3,928	7,244	9,313	11,508	11,878	11,806	12,171	12,309	12,234	12,725	12,816	13,193	14,030	14,224
70-74	3,483	6,265	9,373	12,394	12,887	12,707	12,452	12,567	12,547	12,851	12,694	12,737	13,009	13,406
75-79	2,302	4,610	7,211	11,574	11,958	12,234	12,497	12,380	12,534	12,724	12,240	12,133	12,230	12,290
80-84	1,025	2,397	4,157	7,455	7,769	8,751	8,910	9,249	9,740	9,868	9,908	9,874	9,969	9,937
85+	360	962	1,785	3,900	4,288	4,684	5,004	5,241	5,521	5,812	6,132	6,420	6,793	6,828
Unknown	*	*	*	.	.	.	.	.	.	*	*	*	27	53
0-19	899	1,092	1,165	1,229	1,251	1,282	1,307	1,351	1,314	1,296	1,307	1,347	1,366	1,395
20-44	7,132	10,639	12,539	13,274	13,178	13,128	13,138	13,402	13,758	14,023	13,854	13,791	14,297	13,863
45-64	11,400	17,659	24,849	33,212	34,611	35,391	37,202	38,484	39,637	41,821	42,273	43,233	44,752	44,950
65-74	7,411	13,509	18,686	23,902	24,765	24,513	24,623	24,876	24,781	25,576	25,510	25,930	27,039	27,630
75+	3,687	7,969	13,153	22,929	24,015	25,669	26,411	26,870	27,795	28,404	28,280	28,427	28,992	29,055
Unknown	*	*	*	.	.	.	.	.	.	*	*	*	27	53
Male	16,560	27,310	37,138	50,603	52,623	54,330	55,634	57,985	59,581	62,086	62,377	63,646	66,061	66,650
Female	13,974	23,559	33,254	43,943	45,197	45,653	47,040	46,998	47,700	49,036	48,847	49,084	50,407	50,288
Unknown	*	.	*	.	.	.	*	.	*	*	*	*	*	*
White	20,792	33,829	44,669	61,833	63,950	65,019	66,414	68,507	70,183	73,249	72,854	73,788	76,235	77,030
Black/Af Am	8,724	14,993	21,609	26,761	27,807	28,703	29,583	29,390	30,500	31,505	31,678	32,013	32,634	32,018
Native American	307	603	885	1,202	1,176	1,148	1,137	1,204	1,226	1,229	1,280	1,318	1,440	1,422
Asian	602	1,294	2,289	3,253	3,450	3,602	3,767	3,897	4,157	4,778	5,117	5,202	5,682	5,853
Other/unknown	111	150	941	1,497	1,437	1,511	1,780	1,985	1,219	362	296	410	482	623
†Hispanic				12,548	11,798	12,530	13,325	13,697	13,900	14,820	15,136	15,696	16,289	16,823
†Non-Hispanic				81,998	86,022	87,453	89,356	91,286	93,385	96,303	96,089	97,035	100,184	100,123
Diabetes	8,707	18,156	29,325	42,444	44,164	44,469	45,662	46,756	47,452	49,446	49,099	49,758	51,161	51,636
Hypertension	8,265	15,387	18,838	25,097	26,333	27,313	28,591	28,770	29,087	29,881	30,823	31,562	32,853	32,861
Glomerulonephritis	5,110	7,087	8,306	8,698	8,648	8,741	8,451	8,607	8,222	8,031	7,621	7,532	7,645	7,428
Cystic kidney	1,227	1,580	1,931	2,196	2,269	2,252	2,305	2,344	2,526	2,662	2,647	2,688	2,669	2,630
Other urologic	1,179	1,308	2,045	2,733	2,768	2,931	2,814	2,859	2,167	1,674	1,550	1,575	1,592	1,585
Other cause	3,551	4,876	7,158	9,130	9,338	9,942	10,195	10,829	12,335	13,748	14,141	14,277	14,813	14,940
Unknown cause	1,547	1,919	2,480	3,747	3,978	3,931	4,032	4,095	4,644	4,824	4,627	4,403	4,262	3,963
Missing disease	950	556	310	501	322	404	631	723	852	857	717	936	1,478	1,903
U.S.	29,952	49,872	69,379	93,239	96,451	98,537	101,012	103,258	105,577	109,284	109,394	110,797	114,422	114,584
U.S. territories	31	62	104	136	145	173	167	166	169	206	206	234	243	271
Puerto Rico	390	611	835	1,097	1,173	1,214	1,286	1,292	1,233	1,326	1,366	1,374	1,396	1,484
Foreign	20	41	35	40	28	34	33	23	28	34	27	23	17	18
Unknown	143	283	40	34	23	25	183	244	278	273	232	303	395	589
All	30,536	50,869	70,393	94,546	97,820	99,983	102,681	104,983	107,285	111,123	111,225	112,731	116,473	116,946

Table A.1 (continued)

Incident counts of reported ESRD: all patients: U.S. only, with unknowns dropped

by age, gender, race, ethnicity, & primary diagnosis

	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	133	144	159	186	185	162	185	211	195	190	225	215	259	294
5-9	101	146	145	149	144	175	133	135	136	121	122	139	138	142
10-14	207	239	268	296	297	326	313	292	316	281	301	277	279	277
15-19	430	525	550	542	564	550	582	612	593	653	608	664	628	595
20-29	2,029	2,564	2,619	2,576	2,598	2,430	2,400	2,465	2,601	2,692	2,773	2,741	2,829	2,731
30-39	3,234	4,762	5,617	5,642	5,550	5,608	5,473	5,501	5,747	5,908	5,771	5,866	6,061	5,798
40-49	3,591	6,085	8,737	10,676	10,777	10,981	11,222	11,487	11,783	12,380	12,117	11,990	12,406	12,042
50-59	5,357	8,108	11,568	16,315	17,196	17,656	18,464	19,142	20,090	21,530	21,611	22,005	22,438	22,162
60-64	3,859	5,986	7,781	9,730	10,165	10,251	10,873	11,250	11,652	12,161	12,675	13,178	13,975	14,489
65-69	3,856	7,152	9,072	11,206	11,574	11,501	11,823	11,975	11,934	12,491	12,578	12,929	13,758	13,926
70-74	3,433	6,186	9,231	12,139	12,630	12,440	12,162	12,312	12,311	12,666	12,489	12,514	12,761	13,158
75-79	2,268	4,550	7,100	11,399	11,749	12,040	12,266	12,155	12,346	12,567	12,067	11,958	12,039	12,103
80-84	1,012	2,370	4,097	7,353	7,672	8,631	8,769	9,111	9,608	9,757	9,818	9,785	9,872	9,824
85+	351	949	1,758	3,860	4,242	4,622	4,927	5,169	5,466	5,751	6,078	6,349	6,725	6,740
0-19	871	1,054	1,122	1,173	1,190	1,213	1,213	1,250	1,240	1,245	1,256	1,295	1,304	1,308
20-44	6,946	10,351	12,228	12,810	12,737	12,636	12,561	12,732	13,317	13,722	13,562	13,485	13,940	13,434
45-64	11,124	17,154	24,094	32,129	33,549	34,290	35,871	37,113	38,556	40,949	41,385	42,295	43,769	43,788
65-74	7,289	13,338	18,303	23,345	24,204	23,941	23,985	24,287	24,245	25,157	25,067	25,443	26,519	27,084
75+	3,631	7,869	12,955	22,612	23,663	25,293	25,962	26,435	27,420	28,075	27,963	28,092	28,636	28,667
Male	16,177	26,676	36,169	49,161	51,128	52,775	53,844	56,146	58,108	60,931	61,203	62,381	64,694	65,038
Female	13,684	23,090	32,533	42,908	44,215	44,598	45,748	45,671	46,670	48,217	48,030	48,229	49,474	49,243
White	20,369	33,143	44,106	61,059	63,143	64,200	65,395	67,598	69,191	72,066	71,619	72,571	74,944	75,690
Black/Af Am	8,616	14,827	21,499	26,660	27,682	28,555	29,432	29,247	30,335	31,282	31,472	31,786	32,431	31,739
Native American	304	600	884	1,202	1,176	1,148	1,135	1,204	1,222	1,209	1,264	1,304	1,411	1,390
Asian	572	1,196	2,213	3,148	3,342	3,470	3,630	3,768	4,030	4,591	4,878	4,949	5,382	5,462
†Hispanic				10,731	9,926	10,551	11,093	11,489	12,153	13,457	13,732	14,260	14,822	15,284
†Non-Hispanic				81,338	85,417	86,822	88,499	90,328	92,625	95,691	95,501	96,350	99,346	98,997
Diabetes	8,513	17,712	28,459	41,118	42,778	43,029	44,059	45,172	46,185	48,393	47,998	48,603	49,987	50,356
Hypertension	8,142	15,196	18,538	24,708	25,914	26,876	28,042	28,246	28,697	29,638	30,566	31,295	32,545	32,537
Glomerulonephritis	4,995	6,915	8,118	8,445	8,404	8,473	8,172	8,309	8,035	7,901	7,490	7,405	7,536	7,312
Cystic kidney	1,206	1,551	1,899	2,141	2,216	2,198	2,249	2,287	2,482	2,632	2,622	2,665	2,641	2,605
Other urologic	1,151	1,259	1,979	2,664	2,712	2,866	2,760	2,802	2,118	1,639	1,515	1,540	1,556	1,544
Other cause	3,500	4,812	7,035	8,920	9,159	9,735	9,981	10,593	12,147	13,603	13,992	14,135	14,666	14,796
Unknown cause	1,485	1,848	2,406	3,639	3,871	3,840	3,892	3,955	4,582	4,787	4,589	4,359	4,231	3,924
Missing disease	869	473	268	434	289	356	437	453	532	555	461	608	1,006	1,207
All	29,861	49,766	68,702	92,069	95,343	97,373	99,592	101,817	104,778	109,148	109,233	110,610	114,168	114,281
Patients dropped	675	1,103	1,691	2,477	2,477	2,610	3,089	3,166	2,507	1,975	1,992	2,121	2,305	2,665

Table A.2

Incident rates of reported ESRD

per million population, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	7.5	7.6	8.1	9.7	9.6	8.3	9.4	10.7	9.8	9.5	11.2	10.6	12.8	14.6
5-9	6.1	8.1	7.5	7.3	7.1	8.8	6.8	6.9	7.0	6.2	6.2	7.0	6.8	7.0
10-14	12.2	13.9	14.0	14.3	14.2	15.3	14.6	13.6	14.9	13.4	14.4	13.4	13.5	13.4
15-19	23.0	29.5	29.9	26.7	27.6	26.7	28.0	29.0	27.6	29.9	27.6	29.9	28.3	27.1
20-29	47.3	63.4	69.0	67.1	67.3	62.4	61.0	61.7	64.2	65.4	66.6	65.1	66.6	63.8
30-39	85.9	113.6	125.2	130.7	129.4	132.2	131.1	134.1	141.8	146.9	143.8	146.2	150.9	144.3
40-49	139.8	192.4	230.9	249.8	247.7	248.8	251.5	255.3	261.1	275.0	271.5	271.3	283.0	276.5
50-59	242.6	371.0	462.0	520.5	526.6	521.1	528.9	529.2	534.6	552.5	545.8	544.0	543.5	525.9
60-64	353.8	563.5	767.5	895.7	912.8	886.7	891.6	886.0	886.9	898.6	863.8	858.9	866.7	852.9
65-69	412.7	709.6	909.3	1,176.6	1,210.4	1,193.2	1,202.6	1,188.8	1,161.1	1,183.6	1,146.6	1,115.1	1,137.7	1,112.7
70-74	456.8	770.8	1,038.4	1,370.1	1,431.7	1,421.7	1,402.7	1,432.6	1,431.0	1,464.3	1,430.8	1,404.3	1,396.1	1,410.9
75-79	411.5	740.2	1,058.5	1,532.4	1,575.9	1,611.7	1,635.9	1,629.1	1,654.2	1,687.5	1,630.6	1,627.9	1,650.3	1,654.9
80-84	299.5	602.0	907.5	1,475.2	1,493.1	1,630.2	1,624.3	1,648.0	1,712.3	1,727.5	1,726.4	1,707.6	1,723.6	1,708.5
85+	131.6	310.2	477.6	905.6	983.7	1,058.0	1,103.2	1,137.1	1,164.6	1,181.9	1,206.1	1,221.9	1,253.0	1,218.2
0-19	12.4	14.7	14.6	14.6	14.7	14.9	14.9	15.3	15.1	15.1	15.2	15.6	15.7	15.7
20-44	73.4	103.4	118.6	123.1	122.1	121.2	120.8	122.5	128.4	132.4	130.9	130.2	134.6	129.3
45-64	249.4	370.4	456.3	514.7	520.2	514.1	521.2	523.2	527.2	544.4	537.0	538.0	545.3	535.4
65-74	432.4	736.7	970.2	1,269.9	1,316.6	1,302.0	1,296.4	1,301.0	1,284.0	1,310.1	1,272.5	1,240.8	1,248.9	1,240.0
75+	314.2	598.7	869.3	1,355.2	1,399.7	1,476.2	1,495.3	1,507.5	1,543.2	1,563.1	1,542.6	1,537.4	1,557.1	1,541.6
Male	139.8	219.2	277.8	355.1	365.5	373.7	378.0	390.4	400.2	415.5	413.4	417.3	429.0	427.6
Female	112.0	180.5	239.1	298.6	304.8	304.6	309.8	306.6	310.5	317.8	313.6	312.0	317.2	313.2
White	100.8	158.3	200.1	264.8	271.9	274.7	278.1	285.6	290.5	300.5	296.7	298.7	306.7	307.9
Black/Af Am	301.6	483.8	635.2	725.8	743.0	756.3	770.1	754.8	772.2	784.8	777.9	774.2	778.8	752.3
Native American	177.0	291.4	362.0	402.9	380.8	359.4	343.5	351.9	344.5	328.6	330.7	328.2	341.8	325.2
Asian	102.0	158.4	230.4	264.7	268.9	267.9	269.7	269.8	278.0	305.4	313.4	307.4	324.0	319.7
†Hispanic				300.9	267.2	273.2	277.0	276.8	282.5	301.7	297.3	298.4	300.5	300.8
†Non-Hispanic				330.0	344.7	348.7	353.9	359.4	366.8	377.1	374.5	375.9	385.9	382.9
Diabetes	35.8	71.0	106.9	145.7	150.1	149.6	151.9	154.3	156.3	162.2	159.3	159.8	162.9	162.8
Hypertension	34.2	60.9	69.6	87.6	90.9	93.4	96.7	96.5	97.1	99.3	101.5	102.9	106.1	105.2
Glomerulonephritis	21.0	27.7	30.5	29.9	29.5	29.5	28.2	28.4	27.2	26.5	24.9	24.4	24.6	23.6
Cystic kidney	5.1	6.2	7.1	7.6	7.8	7.6	7.8	7.8	8.4	8.8	8.7	8.8	8.6	8.4
Other urologic	4.8	5.0	7.4	9.4	9.5	10.0	9.5	9.6	7.2	5.5	5.0	5.1	5.1	5.0
Other cause	14.7	19.3	26.4	31.6	32.1	33.8	34.4	36.2	41.1	45.6	46.4	46.5	47.8	47.8
Unknown cause	6.2	7.4	9.0	12.9	13.6	13.4	13.4	13.5	15.5	16.0	15.2	14.3	13.8	12.7
Missing disease	3.7	1.9	1.0	1.5	1.0	1.2	1.5	1.5	1.8	1.9	1.5	2.0	3.3	3.9
All	125.5	199.4	258.0	326.3	334.6	338.5	343.3	347.7	354.6	365.8	362.6	363.7	372.2	369.4

Table A.2 (continued)

Incident rates of reported ESRD

per million population, by age, gender, race, ethnicity, & primary diagnosis

ADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	7	8	8	10	10	8	9	11	10	9	11	11	13	15
5-9	6	8	7	7	7	9	7	7	7	6	6	7	7	7
10-14	12	14	14	14	14	15	14	13	15	13	14	13	13	13
15-19	23	29	29	26	27	26	27	28	26	29	27	29	28	27
20-29	48	63	67	66	66	61	60	61	63	64	65	63	64	62
30-39	91	118	128	130	129	131	130	133	140	144	141	143	147	141
40-49	154	214	252	262	258	258	259	262	265	278	273	271	281	274
50-59	272	415	523	584	588	574	578	574	574	589	578	574	570	548
60-64	411	638	852	971	997	966	973	966	968	977	939	929	931	911
65-69	472	819	1,021	1,289	1,319	1,297	1,307	1,288	1,258	1,278	1,243	1,211	1,237	1,206
70-74	526	890	1,209	1,532	1,589	1,588	1,556	1,566	1,558	1,588	1,559	1,524	1,522	1,529
75-79	483	883	1,260	1,756	1,798	1,840	1,854	1,827	1,857	1,877	1,820	1,810	1,830	1,826
80-84	389	752	1,130	1,779	1,771	1,936	1,912	1,936	2,002	2,011	2,000	1,963	1,990	1,957
85+	197	441	668	1,203	1,298	1,396	1,457	1,475	1,510	1,518	1,566	1,573	1,595	1,535
0-19	12	14	14	14	14	14	14	15	14	14	14	15	15	15
20-44	81	109	119	120	119	118	118	119	125	129	128	128	132	128
45-64	283	428	549	614	621	607	610	607	607	620	603	598	599	581
65-74	499	854	1,115	1,411	1,454	1,442	1,431	1,427	1,408	1,433	1,401	1,367	1,380	1,368
75+	356	692	1,019	1,580	1,622	1,724	1,741	1,746	1,790	1,802	1,796	1,782	1,805	1,773
Male	171	266	332	414	422	428	428	437	442	453	445	443	449	441
Female	119	187	243	290	293	290	292	286	287	292	285	280	282	275
White	105	162	201	260	265	265	266	271	273	281	274	273	277	275
Black/Af Am	420	668	879	994	1,011	1,018	1,024	991	1,000	1,005	987	970	967	924
Native American	290	498	609	664	603	575	544	556	526	486	492	490	499	465
Asian	153	242	354	379	379	378	372	365	370	395	399	383	398	389
†Hispanic				596	516	524	524	515	515	537	521	516	509	501
†Non-Hispanic				323	335	335	337	339	342	349	342	340	345	338
Diabetes	41	81	119	155	158	156	156	156	156	160	155	153	154	152
Hypertension	40	68	76	92	95	96	99	98	97	98	99	99	101	99
Glomerulonephritis	23	30	33	31	30	30	29	29	27	26	24	24	24	23
Cystic kidney	6	7	8	8	8	8	8	8	8	9	9	9	8	8
Other urologic	5	5	8	10	10	10	10	10	7	5	5	5	5	5
Other cause	16	20	28	33	33	35	35	36	41	45	46	45	46	46
Unknown cause	7	8	10	13	14	14	14	14	16	16	15	14	13	12
Missing disease	4	2	1	2	1	1	2	2	2	2	1	2	3	4
All	142	222	283	344	349	350	351	352	355	362	354	351	355	348

Table A.3

Incident rates of reported diabetic ESRD

per million population, by age, gender, race, & ethnicity

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	*	*	*	*	*	*	*	*	*	*	*	*	1.2	1.4
5-9	.	*	.	.	*	*	.	.	.	.	.	.	.	*
10-14	*	*	*	.	*	*	.	*	*	*	.	*	*	*
15-19	*	0.8	*	*	*	*	*	*	*	0.6	0.5	0.5	*	*
20-29	12.6	15.6	13.8	12.8	12.2	10.4	10.5	10.6	10.7	10.6	12.0	11.8	11.6	11.8
30-39	30.1	37.4	40.7	42.3	40.6	41.4	41.5	44.7	43.8	48.1	48.3	48.3	51.7	51.0
40-49	46.4	74.9	93.6	102.4	100.9	101.7	102.4	103.7	107.2	116.8	111.7	114.9	121.8	121.8
50-59	89.4	176.4	246.3	291.2	291.9	285.1	287.0	285.8	286.4	289.9	279.7	280.3	279.1	266.7
60-64	119.6	262.7	420.5	520.5	540.8	512.3	506.7	499.6	502.8	505.1	482.6	477.1	471.9	459.5
65-69	121.9	283.5	456.7	645.6	672.8	646.0	653.5	648.4	623.5	635.1	600.9	588.5	585.5	566.1
70-74	94.3	251.6	448.2	662.6	686.7	682.5	680.0	685.7	693.2	709.3	692.8	663.3	658.7	667.4
75-79	67.0	179.1	348.5	617.7	639.1	650.7	672.2	676.4	683.6	691.1	672.0	663.0	677.7	693.7
80-84	34.9	100.6	212.6	442.8	474.3	517.0	496.4	530.5	554.1	577.9	591.7	568.6	567.1	582.4
85+	6.4	35.6	77.4	188.2	212.4	226.8	244.7	254.3	249.9	280.9	284.0	298.5	300.7	304.2
0-19	0.2	0.3	0.2	0.2	0.1	0.2	*	*	0.2	0.2	0.2	0.2	0.4	0.5
20-44	23.4	32.8	36.8	38.6	37.7	36.3	37.5	38.4	39.4	42.9	42.2	42.2	44.4	43.8
45-64	88.2	171.1	237.3	279.8	282.6	276.5	276.3	276.6	278.0	283.4	275.1	277.3	279.6	273.3
65-74	109.6	269.3	452.7	653.8	679.4	663.3	665.9	665.6	655.3	668.5	641.6	621.0	617.0	609.3
75+	43.6	122.2	240.4	455.7	480.2	501.3	507.6	521.0	528.1	544.4	538.9	529.7	533.2	543.4
Male	36.0	67.8	102.5	146.6	152.7	155.1	158.2	165.1	168.8	176.3	174.9	177.0	182.2	182.7
Female	35.5	74.0	111.1	144.9	147.6	144.3	145.8	143.8	144.2	148.5	144.3	143.2	144.3	143.5
White	28.6	56.1	82.9	118.4	121.2	120.5	122.7	126.1	127.4	132.4	130.4	130.2	133.1	134.4
Black/Af Am	84.0	168.0	253.7	311.5	327.2	329.3	332.0	326.4	333.5	341.1	331.5	333.4	334.7	326.0
Native American	109.4	193.3	261.3	297.3	272.6	260.7	253.3	256.0	232.9	219.3	222.7	224.2	234.0	224.1
Asian	28.0	55.4	99.8	124.9	128.8	123.9	125.4	128.7	132.6	148.8	145.5	147.9	153.6	152.4
†Hispanic				178.5	161.7	163.3	168.0	168.1	167.0	176.7	174.6	177.7	177.2	179.3
†Non-Hispanic				141.0	148.4	147.5	149.3	152.0	154.5	159.6	156.6	156.5	160.2	159.5
All	35.8	71.0	106.9	145.7	150.1	149.6	151.9	154.3	156.3	162.2	159.3	159.8	162.9	162.8

ADJUSTED														
0-4	*	*	*	*	*	*	*	*	*	*	*	*	1.2	1.4
5-9	.	*	.	.	*	*	.	.	.	.	.	.	.	*
10-14	*	*	*	.	*	*	.	*	*	*	.	*	*	*
15-19	*	0.8	*	*	*	*	*	*	*	0.5	0.5	0.5	*	*
20-29	12.3	15.0	13.4	12.7	12.3	10.5	10.7	10.7	10.7	10.5	11.7	11.6	11.4	11.5
30-39	30.3	37.5	40.7	42.2	40.3	41.2	41.4	44.4	43.4	47.5	47.4	47.2	50.6	50.0
40-49	50.4	82.3	101.0	107.3	104.9	105.4	105.2	105.9	108.7	117.6	111.9	114.5	120.9	120.5
50-59	101.9	197.8	280.0	327.0	327.0	315.2	314.3	309.8	307.6	308.3	295.9	295.7	292.7	277.8
60-64	142.9	300.9	469.8	564.4	591.0	559.4	553.8	545.2	548.9	549.0	523.3	515.0	504.9	488.9
65-69	146.1	335.7	519.8	710.9	737.3	704.0	712.0	705.9	676.7	687.1	651.1	641.5	638.2	613.4
70-74	116.0	298.3	530.8	747.9	770.5	769.9	761.0	756.8	759.3	773.3	760.0	722.5	722.9	726.5
75-79	86.4	220.9	438.0	719.0	741.9	754.8	775.2	768.4	780.1	776.4	758.5	746.5	758.0	772.9
80-84	52.8	129.8	278.4	543.6	570.6	635.8	595.5	640.2	659.8	687.3	693.8	665.8	670.9	683.8
85+	11.3	55.4	112.4	261.3	287.5	303.4	323.5	347.0	336.2	369.6	381.0	393.6	401.0	393.6
0-19	0.2	0.3	0.2	0.2	0.1	0.2	*	*	0.2	0.2	0.2	0.2	0.4	0.5
20-44	25.1	33.8	36.3	37.2	36.3	35.1	36.3	37.2	38.2	41.8	41.3	41.6	44.0	43.6
45-64	101.9	199.3	289.6	339.2	344.6	332.2	328.9	325.2	324.6	326.9	312.6	311.3	309.0	297.6
65-74	131.0	317.0	525.3	729.4	753.9	737.0	736.5	731.4	718.0	730.2	705.5	682.0	680.5	669.9
75+	50.2	135.4	276.3	508.0	533.3	564.7	564.7	585.2	592.0	611.1	611.1	602.0	610.0	616.8
Male	43.6	82.1	122.8	169.5	175.1	175.8	176.5	181.9	183.1	188.7	184.6	183.6	186.0	184.0
Female	38.9	78.7	116.0	143.4	144.5	139.4	139.1	135.7	134.3	136.8	131.2	128.5	127.9	125.3
White	29.8	57.8	84.3	117.2	119.2	117.2	118.1	120.2	120.1	123.7	120.2	118.5	119.7	119.4
Black/Af Am	119.7	241.8	367.6	440.5	458.7	456.0	451.2	437.0	439.5	442.6	424.5	419.8	416.1	400.4
Native American	188.8	339.2	454.3	488.6	440.4	420.6	404.5	404.0	355.4	323.1	330.3	331.2	342.6	317.5
Asian	48.3	89.9	160.6	185.1	187.3	178.1	175.6	177.9	177.6	195.4	188.5	187.1	191.9	187.3
†Hispanic				366.4	327.1	329.8	331.2	326.6	318.5	328.5	318.9	319.5	310.6	307.6
†Non-Hispanic				138.8	144.9	142.2	142.1	143.1	143.6	146.9	142.1	140.0	141.6	139.1
All	41.3	80.5	119.3	155.3	158.4	155.8	156.0	156.4	156.3	160.2	155.1	153.2	154.0	151.7

Table A.3 (continued)

Incident rates of reported diabetic ESRD: CDC diabetic population

per million population, by age, gender, race, & ethnicity

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-44	2,209	2,603	2,719	1,875	1,765	1,718	1,763	1,651	1,499	1,582	1,566	1,518	1,496	1,395
45-64	1,579	3,084	3,934	3,369	3,235	3,055	2,966	2,830	2,734	2,728	2,538	2,404	2,339	2,285
65-74	1,090	2,736	4,205	4,380	4,262	3,994	3,849	3,729	3,609	3,589	3,370	3,213	3,116	3,069
75+	485	1,596	2,574	3,928	3,892	3,792	3,602	3,598	3,478	3,492	3,327	3,188	2,968	2,897
Male	1,547	2,849	3,669	3,466	3,325	3,229	3,142	3,152	3,079	3,141	3,017	2,835	2,708	2,595
Female	1,227	2,535	3,458	3,382	3,315	3,114	3,030	2,787	2,600	2,567	2,387	2,301	2,239	2,215
White	1,130	2,199	2,974	2,972	2,850	2,662	2,576	2,476	2,386	2,426	2,307	2,173	2,078	2,047
Black/Af Am	2,310	4,746	5,919	5,868	5,930	5,932	5,728	5,361	5,013	4,905	4,700	4,560	4,451	4,153
Other	3,750	4,080	3,867	2,706	2,558	2,733	2,929	3,326	2,836	2,640	2,316	2,340	2,486	2,467
†Hispanic				4,607	4,080	4,074	4,024	3,891	3,600	3,669	3,418	3,276	3,033	2,991
†Non-Hispanic				3,269	3,222	3,055	2,962	2,844	2,727	2,725	2,579	2,451	2,382	2,310
All	1,365	2,672	3,554	3,423	3,320	3,172	3,086	2,968	2,834	2,845	2,690	2,564	2,474	2,409
ADJUSTED														
0-44	2,277	2,765	2,858	1,911	1,777	1,702	1,744	1,633	1,451	1,528	1,504	1,487	1,452	1,340
45-64	1,669	3,144	3,761	3,316	3,208	3,064	2,953	2,790	2,697	2,691	2,517	2,371	2,312	2,248
65-74	1,208	2,865	4,469	4,487	4,353	4,107	3,956	3,863	3,650	3,627	3,406	3,256	3,152	3,090
75+	515	1,947	2,702	4,148	4,207	4,156	3,969	3,868	3,775	3,682	3,554	3,341	3,123	3,030
Male	1,624	2,926	3,739	3,596	3,470	3,380	3,257	3,242	3,173	3,217	3,110	2,939	2,800	2,665
Female	1,356	2,699	3,379	3,307	3,238	3,051	2,960	2,738	2,543	2,498	2,312	2,227	2,172	2,145
White	1,180	2,215	3,012	2,941	2,803	2,606	2,522	2,431	2,353	2,394	2,269	2,136	2,038	2,002
Black/Af Am	2,333	4,903	5,852	6,145	6,343	6,389	6,023	5,510	5,278	5,103	4,923	4,728	4,622	4,310
Other	3,066	4,926	4,816	3,077	2,905	3,030	3,234	3,594	3,007	2,817	2,461	2,487	2,578	2,599
†Hispanic				4,847	4,171	4,300	4,226	4,183	3,883	3,892	3,644	3,519	3,255	3,191
†Non-Hispanic				3,262	3,211	3,030	2,925	2,812	2,711	2,710	2,556	2,425	2,350	2,277
All	1,484	2,809	3,554	3,437	3,341	3,198	3,090	2,971	2,834	2,839	2,687	2,563	2,472	2,394

Table A.5

Incident rates of reported ESRD, 2008–2010 combined

per million population, by age & primary diagnosis

	Unadjusted rates										Rates adjusted for: gender							
	Male	Black				Female	Black					Black				Race		Gender
	White	Af Am	N Am	Asian	Hisp.	White	Af Am	N Am	Asian	Hisp.	White	Af Am	N Am	Asian	Hisp.	Male	Female	& race
0-4	16	14	*	22	12	18	10	5	.	11	9	9	13	9	*	17	10	13
5-9	7	4	*	19	7	7	7	4	*	12	9	6	7	4	*	16	8	7
10-14	13	16	*	27	20	13	12	12	*	23	16	11	12	14	15	25	18	12
15-19	28	37	28	42	45	27	23	37	19	43	40	23	26	37	24	42	42	25
20-29	53	162	53	75	78	68	40	161	56	58	65	59	46	164	56	66	72	64
30-39	115	547	201	149	166	178	75	348	191	103	109	121	95	445	196	126	138	148
40-49	229	1,038	499	330	396	329	144	630	379	182	241	212	184	828	438	257	323	268
50-59	472	1,919	875	651	1,028	607	304	1,248	686	410	647	408	391	1,611	797	536	864	511
60-64	776	2,835	1,375	1,157	1,689	933	553	2,145	1,228	670	1,218	693	663	2,485	1,307	912	1,453	811
65-69	1,086	3,468	1,683	1,499	2,243	1,247	713	2,805	1,686	937	1,472	902	897	3,131	1,686	1,213	1,853	1,072
70-74	1,451	4,026	1,752	1,918	2,531	1,629	903	3,240	1,994	1,217	1,716	1,115	1,172	3,626	1,883	1,558	2,118	1,367
75-79	1,881	4,442	2,260	2,343	2,859	2,040	1,048	3,524	1,845	1,547	1,909	1,256	1,457	3,975	2,052	1,937	2,377	1,641
80-84	2,182	4,510	2,184	2,968	2,955	2,321	1,070	3,386	1,794	1,948	1,835	1,255	1,616	3,937	1,990	2,447	2,383	1,779
85+	1,949	3,631	1,902	2,859	2,509	2,056	684	2,246	968	1,603	1,348	800	1,306	2,932	1,429	2,216	1,917	1,417
0-19	17	19	15	28	21	16	13	15	11	22	18	13	14	16	13	25	20	14
20-44	104	448	178	139	149	155	70	307	158	93	104	109	87	389	179	117	132	131
45-64	476	1,832	850	665	940	607	319	1,243	691	402	622	421	415	1,659	847	574	896	534
65-74	1,241	3,699	1,710	1,676	2,364	1,409	796	2,993	1,813	1,057	1,578	995	1,034	3,379	1,785	1,385	1,985	1,219
75+	1,993	4,288	2,167	2,645	2,816	2,133	935	3,111	1,607	1,684	1,744	1,106	1,460	3,615	1,824	2,200	2,226	1,612
Diabetes	154	340	225	182	196	178	112	324	230	123	159	141	119	412	330	189	313	140
Hypertension	95	322	38	91	71	134	62	240	34	64	48	93	70	355	62	102	109	101
GN	26	50	26	40	23	31	15	33	19	30	15	19	19	46	29	37	24	23
Other cause	86	129	51	60	48	99	60	106	41	49	38	71	67	140	64	62	63	76
All	361	841	340	373	338	442	249	702	323	266	261	324	304	768	332	317	300	382
All (age adjusted)	357	1,127	528	493	630	426	213	806	451	308	410	275	275	954	485	390	509	341

Table A.7

Incidence of reported ESRD, by primary diagnosis, 2006–2010 combined

by detailed primary diagnosis

ROW PERCENT	Total patients	% inc.	Median age	Age 0-19	20-64	65+	% male	% Black White	Af Am	N Am	Asian	Hisp.	% Tx 1st yr	Died 1st yr
All ESRD, (reference)	568,498	100.0	64.0	1.2	50.5	48.4	56.4	65.6	28.1	1.2	4.7	13.9	4.8	22.2
Diabetes	251,099	44.6	63.0	0.1	53.6	46.3	54.5	65.5	27.5	1.8	5.1	18.7	2.5	20.6
Diabetes with renal manifestations, Type 2	227,740	40.5	64.0	0.0	51.2	48.8	54.4	65.1	27.7	1.8	5.2	19.2	1.6	21.1
Diabetes with renal manifestations, Type 1	23,359	4.2	51.0	0.2	77.7	22.1	55.4	69.5	25.3	1.3	3.8	13.7	10.9	15.5
Glomerulonephritis	37,604	6.7	54.0	4.0	66.0	30.0	61.4	67.2	23.9	1.2	7.4	13.5	14.7	10.5
Glomerulonephritis (GN; histologically not examined)	13,034	2.3	58.0	2.1	59.8	38.1	60.7	68.1	22.2	1.2	8.3	16.7	8.8	13.6
Focal glomerulosclerosis, focal sclerosing GN	12,078	2.1	51.0	6.5	69.4	24.0	61.2	58.9	35.6	1.0	4.4	10.8	16.6	7.4
Membranous nephropathy	2,399	0.4	59.0	1.5	60.2	38.2	65.8	67.4	27.9	0.9	3.6	11.8	11.2	11.3
Membranoproliferative GN type 1, diffuse MPGN	1,565	0.3	55.0	5.0	69.5	25.6	59.3	73.2	19.3	1.4	5.8	12.7	16.7	11.8
Dense deposit disease, MPGN type 2	142	0.0	46.0	19.0	55.6	25.4	52.8	82.4	9.9	1.4	6.3	15.5	22.5	9.9
IgA nephropathy, Berger's (by immunofluorescence)	4,789	0.9	45.0	2.8	83.3	13.9	66.9	74.1	6.3	2.0	17.3	13.9	30.7	4.4
IgM nephropathy (by immunofluorescence)	316	0.1	47.0	5.4	70.3	24.4	61.4	75.0	12.0	0.9	12.0	13.6	26.9	6.0
With lesion of rapidly progressive GN	1,149	0.2	63.0	4.4	49.1	46.6	49.7	81.9	12.9	1.6	3.2	12.0	4.5	19.3
Post-infectious GN, SBE	590	0.1	59.0	3.7	58.1	38.1	67.5	82.0	12.5	2.0	3.2	9.2	6.9	21.0
Other proliferative GN	1,542	0.3	58.0	5.0	59.8	35.2	52.9	78.0	16.5	1.2	4.1	13.2	10.1	16.1
Secondary GN/vasculitis	11,711	2.1	49.0	6.3	69.1	24.6	34.0	64.1	29.8	1.2	4.7	14.2	7.4	16.4
Lupus erythematosus (SLE nephritis)	5,507	1.0	38.0	6.9	86.3	6.8	18.6	42.3	49.3	1.2	7.0	18.8	9.4	10.5
Henoch-Schonlein syndrome	126	0.0	39.0	23.8	56.3	19.8	62.7	84.9	7.9	0.0	7.1	11.9	25.4	11.9
Scleroderma	589	0.1	58.0	0.8	66.7	32.4	23.3	79.5	16.8	1.0	2.5	8.5	1.7	35.7
Hemolytic uremic syndrome	669	0.1	45.0	19.9	59.3	20.8	37.5	80.0	16.0	0.6	3.3	6.6	9.1	16.6
Polyarteritis	278	0.0	68.0	5.8	37.1	57.2	40.6	86.3	7.6	2.9	2.9	11.9	4.3	23.0
Wegener's granulomatosis	1,778	0.3	64.0	3.0	48.1	48.9	55.4	90.9	6.1	1.0	2.0	9.0	6.3	20.9
Nephropathy due to heroin abuse and related drugs	205	0.0	46.0	0.0	95.6	4.4	74.1	55.1	42.9	1.0	0.5	20.0	0.5	18.5
Other vasculitis and its derivatives	1,280	0.2	65.0	5.0	43.4	51.6	45.6	84.0	10.7	1.8	3.3	13.0	5.0	23.8
Goodpasture's syndrome	653	0.1	58.0	5.2	57.4	37.4	43.0	89.3	6.9	1.1	2.6	8.1	3.8	15.9
Secondary GN, other	626	0.1	57.0	2.9	63.9	33.2	60.1	70.8	25.4	1.0	2.9	11.5	5.8	20.4
Interstitial nephritis/pyelonephritis	17,006	3.0	65.0	2.0	47.6	50.4	58.0	82.6	12.9	0.6	3.7	8.2	7.6	22.9
Analgesic abuse	908	0.2	65.0	0.2	48.1	51.7	46.3	84.0	11.3	0.9	3.6	8.3	5.6	19.8
Radiation nephritis	239	0.0	67.0	0.8	43.9	55.2	49.8	86.6	10.9	0.8	1.7	7.1	4.2	31.0
Lead nephropathy	22	0.0	65.0	4.5	45.5	50.0	86.4	45.5	54.5	0.0	0.0	0.0	9.1	9.1
Nephropathy caused by other agents	2,695	0.5	63.0	1.3	53.8	44.9	54.1	83.1	13.3	0.5	3.0	6.1	8.5	25.0
Gouty nephropathy	208	0.0	63.0	0.5	52.4	47.1	70.7	52.4	18.8	0.5	27.9	10.1	8.7	21.2
Nephrolithiasis	959	0.2	64.0	1.4	50.4	48.3	54.0	84.2	8.2	0.4	7.1	8.8	8.3	17.1
Acquired obstructive uropathy	5,104	0.9	69.0	0.7	38.0	61.3	76.3	83.2	13.9	0.7	2.0	10.6	2.0	27.9
Chronic pyelonephritis, reflux nephropathy	1,547	0.3	47.0	10.9	64.4	24.6	42.0	85.5	7.2	1.0	6.0	11.4	25.0	11.4
Chronic interstitial nephritis	3,535	0.6	65.0	1.9	47.5	50.6	49.1	81.7	13.7	0.4	4.2	5.6	9.8	20.6
Acute interstitial nephritis	1,410	0.3	66.0	0.2	47.2	52.6	49.1	81.2	16.2	0.5	2.1	6.2	1.9	25.2
Urolithiasis	225	0.0	61.0	0.4	58.2	41.3	58.2	81.3	11.6	0.0	7.1	11.1	6.2	14.7
Other disorders of calcium metabolism	154	0.0	61.0	1.3	59.7	39.0	48.1	81.2	15.6	0.0	3.2	7.1	13.0	18.8
Hypertensive/large vessel disease	157,978	28.1	69.0	0.2	39.6	60.2	57.9	59.4	36.1	0.5	3.9	9.5	2.2	24.4
Unspecified with renal failure	149,310	26.5	69.0	0.2	40.9	58.9	58.0	57.7	37.8	0.5	4.0	9.8	2.2	24.0
Renal artery stenosis	5,525	1.0	76.0	0.1	16.3	83.5	51.8	89.1	8.5	0.3	2.0	4.0	1.4	31.5
Renal artery occlusion	1,059	0.2	73.0	0.5	24.9	74.6	56.2	87.1	10.4	0.8	1.8	4.6	1.2	33.1
Cholesterol emboli, renal emboli	2,084	0.4	74.0	0.1	15.1	84.8	64.2	92.5	5.0	0.2	2.3	3.4	0.7	30.7
Cystic/heriditary/congenital diseases	18,144	3.2	51.0	12.5	67.9	19.6	56.9	79.8	13.4	0.7	5.9	11.6	28.9	5.5
Polycystic kidneys, adult type (dominant)	12,755	2.3	54.0	0.3	76.3	23.4	54.2	80.2	13.6	0.5	5.6	9.5	26.3	5.1
Polycystic, infantile (recessive)	245	0.0	14.0	59.6	36.3	4.1	50.6	77.6	14.7	0.4	7.3	14.7	41.2	10.2
Medullary cystic disease, including nephronophthisis	296	0.1	29.0	36.8	51.0	12.2	47.0	82.1	6.8	1.0	10.1	12.8	50.3	5.4
Tuberous sclerosis	194	0.0	60.0	3.1	55.2	41.8	44.3	84.0	13.9	0.0	2.1	7.7	6.2	21.1
Hereditary nephritis, Alport's syndrome	810	0.1	35.0	17.2	74.4	8.4	66.7	83.6	8.8	0.9	6.3	11.0	37.4	1.7
Cystinosis	93	0.0	17.0	61.3	28.0	10.8	49.5	91.4	2.2	0.0	6.5	11.8	59.1	4.3
Primary oxalosis	65	0.0	39.0	27.7	56.9	15.4	56.9	83.1	9.2	1.5	4.6	7.7	35.4	12.3
Fabry's disease	87	0.0	47.0	0.0	92.0	8.0	83.9	82.8	9.2	0.0	8.0	13.8	36.8	2.3
Congenital nephrotic syndrome	317	0.1	32.0	39.4	47.6	12.9	55.2	71.0	21.1	0.6	6.9	21.1	31.2	11.0
Drash syndrome, mesangial sclerosis	113	0.0	58.0	25.7	38.9	35.4	61.1	83.2	15.0	0.0	0.9	13.3	14.2	21.2
Congenital obstruction of ureterpelvic junction	182	0.0	37.0	29.1	57.1	13.7	62.1	79.7	15.4	2.2	2.2	11.0	19.2	8.2
Congenital obstruction of uretrovesical junction	154	0.0	27.0	29.2	65.6	5.2	72.7	79.9	12.3	1.9	5.2	14.3	35.1	2.6
Other congenital obstructive uropathy	1,124	0.2	24.0	43.1	44.7	12.3	73.6	77.5	14.4	1.7	6.0	16.9	29.8	7.3
Renal hypoplasia, dysplasia, oligonephronia	1,006	0.2	13.0	74.0	21.6	4.5	61.1	73.9	14.7	1.9	8.7	25.4	41.1	4.2
Prune belly syndrome	116	0.0	11.0	73.3	23.3	3.4	96.6	73.3	15.5	1.7	7.8	20.7	45.7	5.2
Other (congenital malformation syndromes)	587	0.1	29.0	31.2	58.8	10.1	57.9	80.2	11.4	1.0	7.2	17.4	34.8	5.8

Table A.7 (continued)

Incidence of reported ESRD, by primary diagnosis, 2006–2010 combined

by detailed primary diagnosis

ROW PERCENT	Total patients	% inc.	Median age	Age 0-19	20-64	65+	% male	% Black White	Af Am	N Am	Asian	Hisp.	% Tx 1st yr	Died 1st yr
Neoplasms/tumors	13,685	2.4	67.0	1.0	37.4	56.9	64.2	79.8	17.2	0.7	2.3	7.4	3.4	42.4
Renal tumor (malignant)	2,279	0.4	69.0	1.3	34.8	63.9	72.9	82.7	15.3	0.6	1.4	6.1	1.6	29.6
Urinary tract tumor (malignant)	739	0.1	73.0	0.0	26.4	73.6	82.5	83.5	13.9	0.7	1.9	7.0	0.1	50.2
Renal tumor (benign)	95	0.0	70.0	2.1	33.7	64.2	65.3	82.1	12.6	0.0	5.3	9.5	5.3	16.8
Urinary tract tumor (benign)	46	0.0	71.0	0.0	32.6	67.4	84.8	93.5	6.5	0.0	0.0	10.9	2.2	23.9
Renal tumor (unspecified)	272	0.0	70.0	0.7	31.6	67.6	67.3	78.3	16.9	1.1	3.7	7.4	4.8	30.9
Urinary tract tumor (unspecified)	164	0.0	72.0	0.0	28.7	71.3	74.4	83.5	14.0	1.2	1.2	12.8	0.0	45.7
Lymphoma of kidneys	187	0.0	66.0	1.1	46.5	52.4	74.9	84.0	12.3	1.1	1.6	8.6	1.1	48.7
Multiple myeloma	5,618	1.0	69.0	0.1	37.5	62.4	58.2	75.5	21.8	0.6	2.1	7.5	0.0	54.6
Other immuno prolif. neoplasms (inc. light chain neph.)	693	0.1	68.0	0.3	40.1	59.6	61.6	81.4	15.4	0.9	2.2	6.1	1.0	40.3
Amyloidosis	1,338	0.2	65.0	0.2	47.6	52.2	58.8	81.8	15.5	0.4	2.0	9.7	2.9	39.1
Complications of transplanted organ	2,254	0.4	59.0	3.9	66.3	29.8	65.6	83.8	11.2	1.0	4.0	7.0	15.9	26.7
Complications of transplanted organ, unspecified	24	0.0	59.0	8.3	58.3	33.3	66.7	79.2	8.3	4.2	8.3	12.5	20.8	8.3
Complications of transplanted kidney	142	0.0	53.0	4.9	78.2	16.9	60.6	66.2	14.1	1.4	18.3	23.2	26.8	15.5
Complications of transplanted liver	941	0.2	58.0	1.6	73.2	25.2	61.3	87.4	8.4	1.2	3.1	7.8	17.3	24.8
Complications of transplanted heart	753	0.1	62.0	3.7	54.2	42.1	76.6	81.5	15.1	0.9	2.4	4.6	12.1	28.8
Complications of transplanted lung	230	0.0	58.0	1.3	72.6	26.1	53.9	89.1	8.3	0.0	2.6	1.3	13.5	31.7
Complications of transplanted bone marrow	111	0.0	45.0	22.5	66.7	10.8	58.6	83.8	12.6	0.0	3.6	6.3	17.1	37.8
Complications of transplanted pancreas	14	0.0	59.0	0.0	71.4	28.6	42.9	92.9	7.1	0.0	0.0	0.0	7.1	21.4
Complications of transplanted intestine	11	0.0	48.0	0.0	72.7	27.3	54.5	81.8	9.1	9.1	0.0	0.0	18.2	27.3
Complications of other specified transplanted organ	28	0.0	52.0	25.0	50.0	25.0	75.0	71.4	10.7	0.0	17.9	10.7	28.6	25.0
Miscellaneous conditions	33,298	5.9	63.0	1.2	52.3	46.4	60.4	72.0	24.8	0.7	2.4	8.1	4.1	35.7
Sickle cell disease/anemia	493	0.1	43.0	2.2	93.1	4.7	51.7	4.1	95.3	0.0	0.4	2.8	3.0	26.4
Sickle cell trait and other sickle cell (HbS/Hb other)	23	0.0	54.0	0.0	87.0	13.0	43.5	4.3	95.7	0.0	0.0	0.0	0.0	26.1
Post-partum renal failure	110	0.0	30.0	11.8	87.3	0.9	2.7	64.5	30.9	0.0	4.5	20.9	10.9	5.5
AIDS nephropathy	3,834	0.7	45.0	0.7	95.5	3.8	66.8	13.1	86.0	0.2	0.4	6.8	0.4	26.8
Traumatic or surgical loss of kidney(s)	625	0.1	66.0	2.2	45.1	52.6	67.2	82.2	14.4	0.5	2.4	7.2	4.6	25.1
Hepatorenal syndrome	2,929	0.5	56.0	0.2	78.1	21.7	65.4	83.0	11.2	2.0	3.6	14.7	17.8	59.7
Tubular necrosis (no recovery)	17,443	3.1	68.0	0.8	41.4	57.7	58.3	82.0	15.3	0.6	1.9	7.3	0.7	36.3
Other renal disorders	7,841	1.4	67.0	2.4	43.3	54.2	60.7	78.0	17.3	0.7	4.0	8.5	8.5	31.5
Etiology uncertain	22,081	3.9	66.0	2.8	44.9	52.2	58.7	72.8	21.3	0.8	5.0	13.1	5.7	27.7
Missing	5,892	1.0	61.0	4.3	54.0	41.7	58.3	42.1	21.8	2.0	9.6	0.0	25.0	27.1

Table A.7 (continued)

Incidence of reported ESRD, by primary diagnosis, 2006–2010 combined

by detailed primary diagnosis

COLUMN PERCENT	Total patients	Counts White	Black/ Af Am	N Am	Asian	Percent White	Black/ Af Am	N Am	Asian	Hispanic
All ESRD, (reference)	568,498	373,156	159,848	6,689	26,632	100.0	100.0	100.0	100.0	100.0
Diabetes	251,099	164,536	69,058	4,481	12,688	44.4	43.6	68.2	48.7	59.6
Diabetes with renal manifestations, Type 2	227,740	148,303	63,157	4,169	11,798	40.0	39.8	63.4	45.3	55.6
Diabetes with renal manifestations, Type 1	23,359	16,233	5,901	312	890	4.4	3.7	4.7	3.4	4.1
Glomerulonephritis	37,604	25,283	8,998	461	2,781	6.8	5.7	7.0	10.7	6.5
Glomerulonephritis (GN; histologically not examined)	13,034	8,878	2,897	150	1,081	2.4	1.8	2.3	4.1	2.8
Focal glomerulosclerosis, focal sclerosing GN	12,078	7,111	4,299	118	526	1.9	2.7	1.8	2.0	1.7
Membranous nephropathy	2,399	1,616	670	22	87	0.4	0.4	0.3	0.3	0.4
Membranoproliferative GN type 1, diffuse MPGN	1,565	1,146	302	22	91	0.3	0.2	0.3	0.3	0.3
Dense deposit disease, MPGN type 2	142	117	14	*	*	0.0	0.0	0.0	0.0	0.0
IgA nephropathy, Berger's (by immunofluorescence)	4,789	3,551	301	95	830	1.0	0.2	1.4	3.2	0.8
IgM nephropathy (by immunofluorescence)	316	237	38	*	38	0.1	0.0	0.0	0.1	0.1
With lesion of rapidly progressive GN	1,149	941	148	18	37	0.3	0.1	0.3	0.1	0.2
Post-infectious GN, SBE	590	484	74	12	19	0.1	0.0	0.2	0.1	0.1
Other proliferative GN	1,542	1,202	255	19	63	0.3	0.2	0.3	0.2	0.3
Secondary GN/vasculitis	11,711	7,512	3,487	138	554	2.0	2.2	2.1	2.1	2.1
Lupus erythematosus (SLE nephritis)	5,507	2,331	2,713	65	386	0.6	1.7	1.0	1.5	1.3
Henoch-Schonlein syndrome	126	107	*	0	*	0.0	0.0	0.0	0.0	0.0
Scleroderma	589	468	99	*	15	0.1	0.1	0.1	0.1	0.1
Hemolytic uremic syndrome	669	535	107	*	22	0.1	0.1	0.1	0.1	0.1
Polyarteritis	278	240	21	*	*	0.1	0.0	0.1	0.0	0.0
Wegener's granulomatosis	1,778	1,617	108	17	36	0.4	0.1	0.3	0.1	0.2
Nephropathy due to heroin abuse and related drugs	205	113	88	*	*	0.0	0.1	0.0	0.0	0.1
Other vasculitis and its derivatives	1,280	1,075	137	23	42	0.3	0.1	0.4	0.2	0.2
Goodpasture's syndrome	653	583	45	*	17	0.2	0.0	0.1	0.1	0.1
Secondary GN, other	626	443	159	*	18	0.1	0.1	0.1	0.1	0.1
Interstitial nephritis/pyelonephritis	17,006	14,046	2,198	104	635	3.8	1.4	1.6	2.4	1.8
Analgesic abuse	908	763	103	*	33	0.2	0.1	0.1	0.1	0.1
Radiation nephritis	239	207	26	*	*	0.1	0.0	0.0	0.0	0.0
Lead nephropathy	22	*	12	0	0	0.0	0.0	0.0	0.0	0.0
Nephropathy caused by other agents	2,695	2,239	359	14	82	0.6	0.2	0.2	0.3	0.2
Gouty nephropathy	208	109	39	*	58	0.0	0.0	0.0	0.2	0.0
Nephrolithiasis	959	807	79	*	68	0.2	0.0	0.1	0.3	0.1
Acquired obstructive uropathy	5,104	4,249	707	37	100	1.1	0.4	0.6	0.4	0.7
Chronic pyelonephritis, reflux nephropathy	1,547	1,322	111	16	93	0.4	0.1	0.2	0.4	0.2
Chronic interstitial nephritis	3,535	2,887	484	15	147	0.8	0.3	0.2	0.6	0.3
Acute interstitial nephritis	1,410	1,145	228	*	29	0.3	0.1	0.1	0.1	0.1
Urolithiasis	225	183	26	0	16	0.0	0.0	0.0	0.1	0.0
Other disorders of calcium metabolism	154	125	24	0	*	0.0	0.0	0.0	0.0	0.0
Hypertensive/large vessel disease	157,978	93,859	57,075	756	6,138	25.3	36.0	11.5	23.5	19.0
Unspecified with renal failure	149,310	86,084	56,391	726	5,962	23.2	35.6	11.0	22.9	18.5
Renal artery stenosis	5,525	4,925	470	17	110	1.3	0.3	0.3	0.4	0.3
Renal artery occlusion	1,059	922	110	*	19	0.2	0.1	0.1	0.1	0.1
Cholesterol emboli, renal emboli	2,084	1,928	104	*	47	0.5	0.1	0.1	0.2	0.1
Cystic/heriditary/congenital diseases	18,144	14,474	2,428	132	1,072	3.9	1.5	2.0	4.1	2.7
Polycystic kidneys, adult type (dominant)	12,755	10,233	1,732	65	711	2.8	1.1	1.0	2.7	1.5
Polycystic, infantile (recessive)	245	190	36	*	18	0.1	0.0	0.0	0.1	0.0
Medullary cystic disease, including nephronophthisis	296	243	20	*	30	0.1	0.0	0.0	0.1	0.0
Tuberous sclerosis	194	163	27	0	*	0.0	0.0	0.0	0.0	0.0
Hereditary nephritis, Alport's syndrome	810	677	71	*	51	0.2	0.0	0.1	0.2	0.1
Cystinosis	93	85	*	0	*	0.0	0.0	0.0	0.0	0.0
Primary oxalosis	65	54	*	*	*	0.0	0.0	0.0	0.0	0.0
Fabry's disease	87	72	*	0	*	0.0	0.0	0.0	0.0	0.0
Congenital nephrotic syndrome	317	225	67	*	22	0.1	0.0	0.0	0.1	0.1
Drash syndrome, mesangial sclerosis	113	94	17	0	*	0.0	0.0	0.0	0.0	0.0
Congenital obstruction of ureterpelvic junction	182	145	28	*	*	0.0	0.0	0.1	0.0	0.0
Congenital obstruction of uretrovesical junction	154	123	19	*	*	0.0	0.0	0.0	0.0	0.0
Other congenital obstructive uropathy	1,124	871	162	19	68	0.2	0.1	0.3	0.3	0.2
Renal hypoplasia, dysplasia, oligonephronia	1,006	743	148	19	88	0.2	0.1	0.3	0.3	0.3
Prune belly syndrome	116	85	18	*	*	0.0	0.0	0.0	0.0	0.0
Other (congenital malformation syndromes)	587	471	67	*	42	0.1	0.0	0.1	0.2	0.1

Table A.7 (continued)

Incidence of reported ESRD, by primary diagnosis, 2006–2010 combined

by detailed primary diagnosis

COLUMN PERCENT	Total patients	Counts White	Black/ Af Am	N Am	Asian	Percent White	Black/ Af Am	N Am	Asian	Hispanic
Neoplasms/tumors	13,685	10,917	2,351	93	314	2.9	1.5	1.4	1.2	1.3
Renal tumor (malignant)	2,279	1,884	349	14	32	0.5	0.2	0.2	0.1	0.2
Urinary tract tumor (malignant)	739	617	103	*	14	0.2	0.1	0.1	0.1	0.1
Renal tumor (benign)	95	78	12	0	*	0.0	0.0	0.0	0.0	0.0
Urinary tract tumor (benign)	46	43	*	0	0	0.0	0.0	0.0	0.0	0.0
Renal tumor (unspecified)	272	213	46	*	*	0.1	0.0	0.0	0.0	0.0
Urinary tract tumor (unspecified)	164	137	23	*	*	0.0	0.0	0.0	0.0	0.0
Lymphoma of kidneys	187	157	23	*	*	0.0	0.0	0.0	0.0	0.0
Multiple myeloma	5,618	4,240	1,224	33	116	1.1	0.8	0.5	0.4	0.5
Other immuno prolif. neoplasms (inc. light chain neph.)	693	564	107	*	15	0.2	0.1	0.1	0.1	0.1
Amyloidosis	1,338	1,095	208	*	27	0.3	0.1	0.1	0.1	0.2
Complications of transplanted organ	2,254	1,889	253	22	90	0.5	0.2	0.3	0.4	0.2
Complications of transplanted organ, unspecified	24	19	*	*	*	0.0	0.0	0.0	0.0	0.0
Complications of transplanted kidney	142	94	20	*	26	0.0	0.0	0.0	0.1	0.0
Complications of transplanted liver	941	822	79	11	29	0.2	0.0	0.2	0.1	0.1
Complications of transplanted heart	753	614	114	*	18	0.2	0.1	0.1	0.1	0.0
Complications of transplanted lung	230	205	19	0	*	0.1	0.0	0.0	0.0	0.0
Complications of transplanted bone marrow	111	93	14	0	*	0.0	0.0	0.0	0.0	0.0
Complications of transplanted pancreas	14	13	*	0	0	0.0	0.0	0.0	0.0	0.0
Complications of transplanted intestine	11	*	*	*	0	0.0	0.0	0.0	0.0	0.0
Complications of other specified transplanted organ	28	20	*	0	*	0.0	0.0	0.0	0.0	0.0
Miscellaneous conditions	33,298	23,965	8,271	226	792	6.5	5.2	3.4	3.0	3.4
Sickle cell disease/anemia	493	20	470	0	*	0.0	0.3	0.0	0.0	0.0
Sickle cell trait and other sickle cell (HbS/Hb other)	23	*	22	0	0	0.0	0.0	0.0	0.0	0.0
Post-partum renal failure	110	71	34	0	*	0.0	0.0	0.0	0.0	0.0
AIDS nephropathy	3,834	501	3,297	*	16	0.1	2.1	0.1	0.1	0.3
Traumatic or surgical loss of kidney(s)	625	514	90	*	15	0.1	0.1	0.0	0.1	0.1
Hepatorenal syndrome	2,929	2,432	329	59	105	0.7	0.2	0.9	0.4	0.5
Tubular necrosis (no recovery)	17,443	14,308	2,676	106	335	3.9	1.7	1.6	1.3	1.6
Other renal disorders	7,841	6,118	1,353	51	314	1.7	0.9	0.8	1.2	0.8
Etiology uncertain	22,081	16,082	4,699	180	1,095	4.3	3.0	2.7	4.2	3.7
Missing	5,892	2,482	1,283	118	563	0.7	0.8	1.8	2.2	0.0

Table B.1

Point prevalent counts of reported ESRD: all patients

patients alive on December 31 of each year, by age, gender, race, ethnicity, & primary diagnosis

	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	283	344	409	475	486	488	483	536	556	535	586	600	691	797
5-9	427	711	816	897	925	944	972	1,001	1,016	1,023	1,014	1,036	1,068	1,125
10-14	862	1,168	1,536	1,794	1,825	1,923	1,892	1,889	1,874	1,913	1,876	1,900	1,899	1,889
15-19	1,985	2,402	2,874	3,306	3,393	3,469	3,642	3,785	3,919	3,990	4,111	4,079	4,052	4,000
20-29	10,665	13,707	15,636	16,794	16,818	16,790	16,877	17,141	17,475	17,818	18,172	18,654	18,993	19,178
30-39	18,538	28,168	37,208	41,658	42,097	42,485	42,668	42,666	43,019	43,462	43,767	43,976	44,260	44,401
40-49	18,095	32,277	52,592	69,154	71,619	73,865	76,039	78,285	79,866	82,028	83,338	84,924	86,860	88,609
50-59	21,675	33,490	53,639	82,812	89,149	94,539	100,117	106,358	113,400	119,105	123,802	128,580	133,187	137,633
60-64	12,595	19,845	29,128	40,447	42,903	45,980	49,195	52,014	54,764	58,760	63,782	68,583	73,961	79,548
65-69	11,024	20,103	30,873	40,376	42,571	44,317	46,337	48,456	50,468	53,518	57,000	60,450	64,060	67,112
70-74	8,568	16,036	28,060	37,608	39,123	40,597	41,776	43,209	44,449	46,463	48,387	50,624	52,786	55,438
75-79	5,470	10,951	19,739	30,765	32,156	33,788	34,974	36,023	37,223	38,194	39,221	40,119	41,539	43,369
80-84	2,256	5,541	10,866	18,013	19,720	21,571	23,123	24,416	25,630	26,476	27,467	28,446	29,520	30,593
85+	746	2,096	4,650	8,883	9,825	10,823	11,916	13,105	14,338	15,607	16,731	18,071	19,506	20,682
Unknown	14	*	*	.	.	.	.	.	.	*	*	*	*	.
0-19	3,557	4,625	5,635	6,472	6,629	6,824	6,989	7,211	7,365	7,461	7,587	7,615	7,710	7,811
20-44	38,100	58,582	77,829	89,943	91,330	92,292	93,249	94,370	95,605	97,030	98,148	99,122	100,139	101,245
45-64	43,468	68,905	110,374	160,922	171,256	181,367	191,647	202,094	212,919	224,143	234,713	245,595	257,122	268,124
65-74	19,592	36,139	58,933	77,984	81,694	84,914	88,113	91,665	94,917	99,981	105,387	111,074	116,846	122,550
75+	8,472	18,588	35,255	57,661	61,701	66,182	70,013	73,544	77,191	80,277	83,419	86,636	90,565	94,644
Unknown	14	*	*	.	.	.	.	.	.	*	*	*	*	.
Male	62,013	100,916	155,220	214,960	226,503	238,099	248,874	260,484	272,259	285,236	297,695	310,472	323,904	337,441
Female	51,182	85,915	132,805	178,021	186,106	193,479	201,134	208,398	215,734	223,654	231,556	239,567	248,471	256,920
Unknown	*	12	*	*	*	*	*	*	*	*	*	*	*	13
White	75,939	121,169	179,227	240,959	253,122	264,254	274,852	286,521	298,264	311,161	323,035	334,988	347,732	360,289
Black/Af Am	33,555	57,972	93,268	126,781	132,292	138,189	143,914	148,733	154,452	160,888	167,487	174,268	181,305	187,864
Native American	1,101	2,199	3,815	5,421	5,717	5,912	6,077	6,333	6,558	6,812	7,131	7,361	7,700	8,085
Asian	1,912	4,815	10,037	15,789	17,035	18,305	19,544	20,811	22,148	23,990	25,977	28,080	30,436	32,862
Other/unknown	696	688	1,680	4,032	4,444	4,919	5,624	6,486	6,575	6,042	5,625	5,347	5,211	5,274
†Hispanic				48,045	51,773	55,785	59,920	64,134	68,171	72,820	77,854	82,924	88,060	93,510
†Non-Hispanic				344,937	360,837	375,794	390,091	404,750	419,826	436,073	451,401	467,120	484,324	500,864
Diabetes	20,961	48,018	90,483	139,515	148,563	156,711	164,537	172,656	180,475	189,211	197,749	206,527	215,757	224,722
Hypertension	25,661	47,975	75,069	96,366	100,882	105,510	110,519	115,001	119,257	123,748	129,016	134,564	141,042	147,174
Glomerulonephritis	26,964	40,600	55,768	69,291	71,392	73,482	75,195	77,273	78,959	80,603	81,963	83,540	85,018	86,499
Cystic kidney	6,901	10,091	14,058	18,140	18,936	19,751	20,629	21,518	22,582	23,765	24,881	26,154	27,288	28,345
Other urologic	4,223	6,262	8,485	11,899	12,444	13,025	13,445	13,773	13,575	13,393	13,142	13,107	13,131	13,220
Other cause	14,429	21,771	30,991	40,273	41,942	43,733	45,346	47,343	50,431	53,950	57,129	59,873	62,640	65,402
Unknown cause	7,493	8,514	10,410	14,174	15,026	15,784	16,487	17,140	18,181	19,355	20,300	20,938	21,446	21,958
Missing disease	6,571	3,612	2,763	3,324	3,425	3,583	3,853	4,180	4,537	4,868	5,075	5,341	6,062	7,054
U.S.	111,231	183,274	283,351	387,385	406,839	425,573	443,669	462,098	480,849	501,232	521,156	541,498	563,332	584,544
U.S territories	69	168	347	565	594	652	678	701	705	765	824	890	932	1,018
Puerto Rico	1,352	2,194	3,172	3,953	4,100	4,255	4,405	4,615	4,789	5,077	5,338	5,586	5,848	6,145
Foreign	87	151	286	351	351	360	365	375	368	361	358	343	326	315
Unknown	464	1,056	871	728	726	739	894	1,095	1,286	1,458	1,579	1,727	1,946	2,352
All	113,203	186,843	288,027	392,982	412,610	431,579	450,011	468,884	487,997	508,893	529,255	550,044	572,384	594,374
Total lost-to-followup	3,608	4,608	5,826	7,974	8,649	9,299	10,139	10,943	11,899	13,027	14,220	15,670	17,439	19,425
Recovery of renal function	647	2,173	4,845	8,467	9,531	10,755	12,050	13,595	15,289	17,095	19,235	21,430	23,947	26,224
All with lost-to-followup & recovery of renal function	117,458	193,624	298,698	409,423	430,790	451,633	472,200	493,422	515,185	539,015	562,710	587,144	613,770	640,023

Table B.1 (continued)

Point prevalent counts of reported ESRD patients: U.S. only, with unknowns dropped

patients alive on December 31 of each year, by age, gender, race, ethnicity, & primary diagnosis

	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	274	333	397	459	463	456	447	492	512	501	552	570	651	751
5-9	416	692	790	866	888	911	933	951	967	965	952	962	992	1,048
10-14	843	1,140	1,494	1,747	1,777	1,865	1,818	1,800	1,778	1,806	1,773	1,814	1,811	1,789
15-19	1,949	2,329	2,792	3,216	3,298	3,350	3,513	3,638	3,756	3,838	3,949	3,903	3,877	3,800
20-29	10,447	13,398	15,298	16,321	16,333	16,246	16,268	16,439	16,734	17,107	17,514	18,002	18,363	18,533
30-39	18,097	27,528	36,492	40,731	41,095	41,397	41,453	41,338	41,681	42,124	42,402	42,656	42,942	43,048
40-49	17,619	31,428	51,447	67,684	70,096	72,281	74,302	76,365	77,857	80,004	81,329	82,872	84,757	86,396
50-59	21,126	32,626	52,251	80,667	86,868	92,122	97,462	103,458	110,433	116,194	120,928	125,715	130,271	134,536
60-64	12,359	19,396	28,389	39,353	41,728	44,744	47,839	50,545	53,256	57,208	62,139	66,895	72,210	77,704
65-69	10,815	19,797	30,312	39,427	41,567	43,261	45,208	47,225	49,161	52,242	55,704	59,084	62,650	65,600
70-74	8,410	15,819	27,663	36,899	38,378	39,757	40,894	42,260	43,517	45,508	47,405	49,603	51,691	54,275
75-79	5,367	10,796	19,508	30,311	31,635	33,256	34,368	35,391	36,581	37,566	38,590	39,465	40,822	42,657
80-84	2,208	5,460	10,718	17,798	19,484	21,309	22,824	24,087	25,277	26,102	27,096	28,062	29,133	30,177
85+	716	2,062	4,593	8,767	9,701	10,682	11,771	12,932	14,171	15,427	16,542	17,862	19,278	20,427
0-19	3,482	4,494	5,473	6,288	6,426	6,582	6,711	6,881	7,013	7,110	7,226	7,249	7,331	7,388
20-44	37,184	57,214	76,242	87,916	89,182	89,948	90,634	91,459	92,608	94,080	95,237	96,235	97,261	98,277
45-64	42,464	67,162	107,635	156,840	166,938	176,842	186,690	196,686	207,353	218,557	229,075	239,905	251,282	261,940
65-74	19,225	35,616	57,975	76,326	79,945	83,018	86,102	89,485	92,678	97,750	103,109	108,687	114,341	119,875
75+	8,291	18,318	34,819	56,876	60,820	65,247	68,963	72,410	76,029	79,095	82,228	85,389	89,233	93,261
Male	60,521	98,542	151,753	209,727	220,901	232,050	242,228	253,233	264,773	277,772	290,172	302,809	316,015	329,098
Female	50,125	84,262	130,391	174,519	182,410	189,587	196,872	203,688	210,908	218,820	226,703	234,656	243,433	251,643
White	74,513	118,694	176,057	237,414	249,446	260,469	270,855	282,385	293,914	306,471	318,053	329,714	342,160	354,460
Black/Af Am	33,222	57,395	92,660	126,180	131,687	137,562	143,272	148,061	153,734	160,083	166,604	173,329	180,330	186,785
Native American	1,086	2,176	3,792	5,402	5,699	5,894	6,057	6,315	6,536	6,774	7,080	7,300	7,613	7,968
Asian	1,825	4,539	9,635	15,250	16,479	17,712	18,916	20,160	21,497	23,264	25,138	27,122	29,345	31,528
†Hispanic				42,443	45,698	49,192	52,681	56,282	60,125	64,843	69,869	74,895	79,934	85,202
†Non-Hispanic				341,803	357,613	372,445	386,419	400,639	415,556	431,749	447,006	462,570	479,514	495,539
Diabetes	20,549	46,982	88,572	136,097	144,876	152,761	160,160	167,941	175,707	184,575	193,113	201,831	211,003	219,794
Hypertension	25,289	47,316	74,020	94,929	99,349	103,845	108,666	112,971	117,187	121,735	127,042	132,609	139,053	145,182
Glomerulonephritis	26,369	39,726	54,630	67,728	69,755	71,738	73,354	75,300	76,953	78,603	79,975	81,544	83,047	84,521
Cystic kidney	6,826	9,979	13,866	17,879	18,658	19,457	20,308	21,156	22,207	23,387	24,501	25,774	26,906	27,960
Other urologic	4,120	6,101	8,293	11,655	12,188	12,752	13,176	13,500	13,294	13,101	12,853	12,819	12,845	12,919
Other cause	14,264	21,525	30,572	39,670	41,286	43,017	44,604	46,509	49,583	53,096	56,251	58,990	61,733	64,469
Unknown cause	7,138	8,182	10,030	13,665	14,474	15,208	15,848	16,437	17,500	18,696	19,656	20,309	20,834	21,361
Missing disease	6,091	2,993	2,161	2,623	2,725	2,859	2,984	3,107	3,250	3,399	3,484	3,589	4,027	4,535
All	110,646	182,804	282,144	384,246	403,311	421,637	439,100	456,921	475,681	496,592	516,875	537,465	559,448	580,741
Patients dropped	2,557	4,039	5,883	8,736	9,299	9,942	10,911	11,963	12,316	12,301	12,380	12,579	12,936	13,633

Table B.2

Point prevalent rates of reported ESRD

patients alive on December 31 of each year, per million population, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	15	17	20	24	24	23	23	25	26	25	27	28	32	37
5-9	25	38	40	43	44	46	48	49	50	49	48	48	49	51
10-14	50	65	77	84	84	87	85	84	84	86	85	88	88	86
15-19	104	133	150	158	161	162	168	171	174	175	178	176	176	174
20-29	244	333	404	424	421	415	410	409	410	413	418	426	431	431
30-39	472	649	815	947	964	984	1,002	1,014	1,032	1,048	1,057	1,063	1,069	1,071
40-49	678	974	1,332	1,569	1,599	1,629	1,658	1,695	1,727	1,785	1,831	1,883	1,940	1,991
50-59	960	1,483	2,061	2,521	2,611	2,678	2,742	2,805	2,885	2,958	3,021	3,076	3,123	3,160
60-64	1,136	1,828	2,804	3,578	3,677	3,767	3,844	3,913	3,993	4,056	4,140	4,252	4,362	4,461
65-69	1,145	1,968	3,040	4,131	4,330	4,444	4,543	4,641	4,720	4,854	4,937	4,989	5,092	5,154
70-74	1,113	1,943	3,117	4,174	4,368	4,564	4,737	4,915	5,045	5,237	5,375	5,496	5,598	5,762
75-79	962	1,737	2,866	4,070	4,239	4,444	4,595	4,743	4,907	5,060	5,234	5,391	5,589	5,825
80-84	644	1,368	2,347	3,516	3,735	3,986	4,178	4,325	4,490	4,605	4,746	4,898	5,076	5,238
85+	265	660	1,229	2,045	2,235	2,418	2,612	2,799	2,965	3,115	3,232	3,382	3,537	3,638
0-19	50	62	71	78	79	81	82	84	85	86	87	87	88	89
20-44	390	567	739	844	855	864	872	881	893	908	919	929	937	945
45-64	952	1,442	2,008	2,471	2,545	2,610	2,672	2,730	2,795	2,870	2,943	3,020	3,101	3,174
65-74	1,131	1,957	3,076	4,152	4,348	4,501	4,633	4,766	4,867	5,025	5,129	5,208	5,309	5,413
75+	708	1,374	2,304	3,386	3,573	3,783	3,952	4,102	4,256	4,383	4,518	4,658	4,825	4,987
Male	520	804	1,158	1,507	1,572	1,636	1,692	1,752	1,814	1,885	1,950	2,017	2,086	2,154
Female	408	655	953	1,209	1,252	1,289	1,327	1,361	1,397	1,435	1,473	1,511	1,554	1,594
White	368	564	795	1,026	1,071	1,111	1,148	1,189	1,230	1,274	1,313	1,353	1,396	1,438
Black/Af Am	1,155	1,853	2,715	3,411	3,511	3,621	3,723	3,795	3,885	3,986	4,088	4,192	4,302	4,399
Native American	620	1,040	1,524	1,780	1,814	1,814	1,801	1,812	1,809	1,806	1,816	1,802	1,812	1,833
Asian	315	585	982	1,254	1,298	1,341	1,379	1,416	1,456	1,521	1,588	1,658	1,742	1,821
†Hispanic				1,166	1,206	1,251	1,292	1,332	1,372	1,428	1,487	1,542	1,596	1,653
†Non-Hispanic				1,383	1,440	1,493	1,541	1,590	1,642	1,697	1,748	1,801	1,859	1,913
Diabetes	86	187	331	480	506	529	550	571	592	616	638	661	685	708
Hypertension	106	188	276	335	347	359	373	384	395	406	420	434	451	467
Glomerulonephritis	110	158	204	239	244	248	252	256	259	262	264	267	270	272
Cystic kidney	29	40	52	63	65	67	70	72	75	78	81	84	87	90
Other urologic	17	24	31	41	43	44	45	46	45	44	42	42	42	42
Other cause	60	86	114	140	144	149	153	158	167	177	186	193	200	208
Unknown cause	30	33	37	48	51	53	54	56	59	62	65	66	68	69
Missing disease	25	12	8	9	10	10	10	11	11	11	12	12	13	15
All	463	727	1,053	1,355	1,409	1,460	1,507	1,553	1,602	1,656	1,708	1,760	1,816	1,870

Table B.2 (continued)

Point prevalent rates of reported ESRD

patients alive on December 31 of each year, per million population, by age, gender, race, ethnicity, & primary diagnosis

ADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	15	17	20	24	24	23	22	24	25	25	27	28	32	37
5-9	24	37	40	42	44	46	47	49	49	49	47	47	48	51
10-14	50	64	76	83	83	86	84	83	83	85	85	87	87	86
15-19	102	131	147	155	157	159	164	167	169	171	174	173	173	172
20-29	243	327	396	418	418	413	408	406	405	407	411	417	422	423
30-39	491	667	822	942	958	978	995	1,005	1,020	1,033	1,038	1,043	1,049	1,053
40-49	740	1,066	1,424	1,632	1,653	1,675	1,696	1,724	1,748	1,797	1,836	1,880	1,932	1,979
50-59	1,073	1,662	2,319	2,812	2,892	2,936	2,980	3,027	3,088	3,145	3,193	3,234	3,267	3,290
60-64	1,323	2,113	3,173	3,980	4,091	4,199	4,288	4,350	4,425	4,487	4,565	4,655	4,740	4,815
65-69	1,334	2,318	3,531	4,661	4,851	4,955	5,052	5,150	5,230	5,379	5,479	5,540	5,651	5,714
70-74	1,304	2,338	3,805	4,869	5,056	5,261	5,424	5,581	5,679	5,865	6,008	6,139	6,250	6,421
75-79	1,152	2,125	3,548	4,914	5,075	5,278	5,427	5,566	5,725	5,865	6,041	6,197	6,400	6,641
80-84	829	1,765	3,060	4,453	4,677	4,991	5,214	5,322	5,470	5,579	5,727	5,888	6,081	6,252
85+	375	948	1,763	2,844	3,103	3,327	3,565	3,756	3,952	4,131	4,278	4,440	4,603	4,702
0-19	48	62	71	76	77	78	79	81	82	82	83	84	85	86
20-44	425	588	735	821	833	842	851	861	875	892	905	918	930	940
45-64	1,074	1,655	2,355	2,870	2,943	2,998	3,048	3,091	3,143	3,198	3,248	3,303	3,358	3,402
65-74	1,319	2,328	3,668	4,765	4,953	5,108	5,238	5,366	5,455	5,622	5,744	5,839	5,950	6,068
75+	785	1,613	2,790	4,070	4,285	4,532	4,736	4,881	5,049	5,191	5,348	5,508	5,695	5,865
Male	624	957	1,355	1,702	1,759	1,812	1,855	1,899	1,943	1,996	2,040	2,083	2,128	2,169
Female	440	692	985	1,200	1,231	1,255	1,279	1,298	1,318	1,342	1,362	1,382	1,406	1,425
White	385	582	807	1,018	1,056	1,087	1,115	1,146	1,175	1,207	1,233	1,258	1,285	1,311
Black/Af Am	1,603	2,560	3,724	4,526	4,614	4,709	4,789	4,823	4,878	4,951	5,028	5,103	5,181	5,242
Native American	967	1,673	2,464	2,766	2,793	2,763	2,725	2,714	2,670	2,640	2,630	2,591	2,571	2,566
Asian	419	812	1,354	1,651	1,690	1,731	1,760	1,782	1,809	1,862	1,916	1,974	2,040	2,101
†Hispanic				2,083	2,137	2,196	2,242	2,284	2,325	2,388	2,453	2,511	2,558	2,606
†Non-Hispanic				1,366	1,410	1,448	1,482	1,515	1,550	1,587	1,618	1,650	1,686	1,717
Diabetes	99	213	369	513	535	551	565	579	592	607	620	632	645	656
Hypertension	129	220	310	356	365	373	382	389	395	401	409	418	428	437
Glomerulonephritis	122	172	218	248	251	254	255	258	259	260	261	262	262	263
Cystic kidney	33	46	58	67	69	70	71	73	75	77	79	81	83	85
Other urologic	18	26	32	42	43	45	46	46	45	43	42	41	41	40
Other cause	62	89	118	143	147	151	154	159	167	176	184	190	196	202
Unknown cause	34	36	41	50	52	54	55	56	59	62	64	65	65	66
Missing disease	29	13	9	10	10	10	10	11	11	11	11	11	13	14
All	526	815	1,155	1,429	1,471	1,508	1,540	1,570	1,602	1,638	1,670	1,700	1,733	1,763

Table B.3

Point prevalent rates of reported diabetic ESRD

patients alive on December 31 of each year, per million population, by age, gender, race, & ethnicity

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	*	1	*	*	*	*	.	.	*	*	*	*	2	4
5-9	*	*	*	*	*	*	*	*	*	*	*	.	.	*
10-14	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15-19	1	1	2	1	1	1	1	1	1	1	1	1	1	1
20-29	28	41	40	34	33	30	28	27	26	26	27	28	28	28
30-39	101	156	198	213	210	209	209	211	211	213	215	216	219	222
40-49	129	248	383	460	472	481	492	503	511	533	547	567	592	612
50-59	209	453	762	1,017	1,055	1,087	1,112	1,137	1,176	1,201	1,221	1,239	1,255	1,260
60-64	262	625	1,192	1,712	1,791	1,838	1,860	1,889	1,929	1,953	1,987	2,040	2,082	2,110
65-69	243	626	1,277	2,016	2,142	2,204	2,270	2,325	2,351	2,418	2,450	2,461	2,507	2,518
70-74	187	550	1,172	1,868	1,987	2,100	2,204	2,317	2,411	2,516	2,577	2,627	2,651	2,739
75-79	126	365	858	1,560	1,673	1,780	1,876	1,959	2,039	2,110	2,203	2,280	2,392	2,503
80-84	59	208	499	1,032	1,148	1,269	1,351	1,435	1,501	1,579	1,665	1,750	1,813	1,897
85+	12	68	184	415	466	529	579	655	706	765	824	877	928	985
0-19	1	1	1	1	0	0	0	0	0	0	0	0	1	1
20-44	71	122	165	181	182	181	181	183	183	186	188	191	193	195
45-64	204	441	738	990	1,027	1,059	1,083	1,107	1,137	1,168	1,198	1,231	1,267	1,293
65-74	218	592	1,228	1,945	2,068	2,155	2,239	2,321	2,378	2,462	2,506	2,533	2,569	2,612
75+	80	248	582	1,108	1,204	1,301	1,377	1,453	1,513	1,574	1,647	1,710	1,781	1,860
Male	88	183	323	487	518	548	575	604	634	666	697	728	759	789
Female	84	191	338	473	494	510	525	539	551	567	581	596	613	628
White	67	143	248	363	385	403	419	438	455	474	492	510	528	546
Black/Af Am	214	471	843	1,183	1,230	1,282	1,323	1,357	1,395	1,440	1,480	1,526	1,573	1,613
Native American	279	572	919	1,136	1,162	1,163	1,162	1,172	1,163	1,151	1,149	1,137	1,141	1,151
Asian	48	127	275	405	432	449	467	486	508	544	571	607	643	677
†Hispanic				556	581	607	631	654	671	700	730	763	794	825
†Non-Hispanic				469	495	517	536	557	578	601	621	642	664	684
All	86	187	331	480	506	529	550	571	592	616	638	661	685	708

ADJUSTED														
0-4	*	1	*	*	*	*	.	.	*	*	*	*	2	4
5-9	*	*	*	*	*	*	*	*	*	*	*	.	.	*
10-14	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15-19	1	1	2	1	1	1	1	1	1	1	1	1	1	1
20-29	27	39	39	34	34	31	29	27	26	25	26	28	28	27
30-39	100	156	197	210	208	208	208	210	209	211	212	212	215	220
40-49	137	265	403	474	484	491	500	509	515	535	547	565	589	607
50-59	241	518	871	1,149	1,182	1,203	1,217	1,233	1,262	1,280	1,294	1,306	1,316	1,314
60-64	320	745	1,372	1,921	2,011	2,066	2,092	2,113	2,149	2,169	2,196	2,236	2,261	2,275
65-69	304	765	1,514	2,299	2,420	2,476	2,544	2,603	2,626	2,701	2,741	2,754	2,802	2,805
70-74	233	689	1,467	2,221	2,339	2,462	2,560	2,663	2,744	2,844	2,910	2,963	2,991	3,083
75-79	172	472	1,111	1,929	2,055	2,167	2,266	2,350	2,434	2,491	2,592	2,664	2,778	2,885
80-84	92	290	692	1,354	1,483	1,638	1,739	1,823	1,889	1,975	2,061	2,162	2,227	2,322
85+	18	99	272	595	676	750	812	909	976	1,050	1,127	1,193	1,249	1,308
0-19	1	1	1	1	0	0	0	0	0	0	0	0	1	1
20-44	76	124	160	172	173	173	174	177	178	182	186	189	193	196
45-64	239	521	897	1,199	1,240	1,266	1,283	1,297	1,321	1,341	1,357	1,378	1,399	1,408
65-74	269	727	1,491	2,260	2,380	2,469	2,552	2,633	2,685	2,773	2,825	2,858	2,896	2,944
75+	94	287	692	1,293	1,405	1,518	1,606	1,694	1,766	1,839	1,927	2,006	2,085	2,171
Male	106	219	383	557	587	612	633	656	678	703	724	744	764	781
Female	92	205	355	473	488	497	505	511	517	524	530	536	543	549
White	71	148	253	362	380	394	407	420	432	445	457	466	477	487
Black/Af Am	306	683	1,223	1,668	1,716	1,763	1,794	1,811	1,835	1,866	1,891	1,920	1,948	1,968
Native American	484	1,000	1,595	1,874	1,893	1,869	1,852	1,846	1,803	1,758	1,736	1,702	1,677	1,661
Asian	79	203	427	586	618	633	646	660	678	711	732	762	791	819
†Hispanic				1,117	1,157	1,198	1,225	1,253	1,268	1,299	1,333	1,366	1,393	1,419
†Non-Hispanic				464	484	500	512	526	539	553	564	575	587	597
All	99	213	369	513	535	551	565	579	592	607	620	632	645	656

Table B.3 (continued)

Point prevalent rates of reported diabetic ESRD: CDC diabetic population

patients alive on December 31 of each year, per million population, by age, gender, race, & ethnicity

UNADJUSTED	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-44	6,728	9,729	12,209	8,782	8,500	8,510	8,488	7,856	6,969	6,846	6,979	6,844	6,473	6,202
45-64	3,659	7,995	12,414	12,124	11,956	11,886	11,808	11,501	11,342	11,388	11,157	10,789	10,703	10,912
65-74	2,185	6,042	11,392	13,031	12,975	13,016	13,001	13,080	13,211	13,387	13,433	13,338	13,159	13,341
75+	906	3,291	6,323	9,615	9,825	9,910	9,818	10,098	10,016	10,143	10,207	10,325	9,967	9,974
Male	3,791	7,727	11,632	11,566	11,339	11,460	11,476	11,587	11,618	11,923	12,072	11,703	11,334	11,258
Female	2,919	6,593	10,585	11,104	11,149	11,059	10,959	10,491	9,984	9,843	9,665	9,620	9,548	9,738
White	2,671	5,653	8,921	9,142	9,074	8,921	8,833	8,626	8,557	8,719	8,740	8,531	8,268	8,336
Black/Af Am	5,922	13,453	19,833	22,438	22,444	23,225	22,993	22,437	21,126	20,866	21,147	21,016	21,062	20,678
Other	8,315	10,905	12,061	9,540	9,562	10,883	11,958	13,682	12,082	10,956	10,053	10,396	11,041	11,587
†Hispanic				14,633	14,950	15,416	15,379	15,409	14,735	14,788	14,544	14,289	13,790	13,968
†Non-Hispanic				10,900	10,766	10,724	10,667	10,449	10,230	10,280	10,256	10,069	9,889	9,928
All	3,296	7,088	11,060	11,329	11,244	11,260	11,219	11,034	10,782	10,850	10,823	10,646	10,445	10,517

ADJUSTED														
20-44	6,925	10,209	12,846	9,074	8,773	8,677	8,621	7,851	6,874	6,731	6,854	6,801	6,357	6,053
45-64	3,859	8,161	11,789	11,827	11,794	11,896	11,724	11,322	11,165	11,215	11,045	10,625	10,562	10,704
65-74	2,397	6,370	12,283	13,583	13,409	13,582	13,555	13,853	13,467	13,612	13,577	13,572	13,382	13,488
75+	978	4,162	6,695	10,476	11,139	11,323	11,356	11,211	11,220	10,934	11,164	11,025	10,756	10,714
Male	3,998	7,858	12,010	12,070	11,928	12,131	12,030	11,964	11,946	12,171	12,383	12,054	11,699	11,572
Female	3,199	7,006	10,220	10,758	10,862	10,861	10,754	10,330	9,744	9,555	9,330	9,270	9,228	9,390
White	2,826	5,672	9,221	9,169	9,079	8,929	8,851	8,593	8,525	8,678	8,673	8,431	8,152	8,215
Black/Af Am	5,950	13,920	19,629	23,381	23,824	24,748	24,020	22,968	22,117	21,704	22,066	21,750	21,837	21,430
Other	6,923	12,973	14,659	10,669	10,764	11,958	13,123	14,656	12,796	11,689	10,572	11,011	11,441	12,248
†Hispanic				15,128	15,120	15,964	15,935	16,280	15,647	15,604	15,506	15,282	14,904	15,055
†Non-Hispanic				10,937	10,792	10,752	10,675	10,419	10,214	10,258	10,209	9,987	9,790	9,832
All	3,587	7,421	11,109	11,382	11,355	11,452	11,349	11,103	10,782	10,809	10,790	10,605	10,427	10,457

Table B.7

Prevalence of reported ESRD, by primary diagnosis, 2010

patients alive on December 31 of each year, by detailed primary diagnosis

ROW PERCENT	Total patients	Percent prevalent	Median age	Age 0-19	20-64	65+	% male	% White	Black Af Am	N Am	Asian	Hispanic
All ESRD, (reference)	594,374	100.0	59.0	1.3	62.1	36.5	56.8	60.6	31.6	1.4	5.5	15.1
Diabetes	224,417	38.5	62.0	0.0	57.8	42.2	55.0	61.1	30.7	2.2	5.4	19.7
Diabetes with renal manifestations, Type 2	192,412	33.0	64.0	0.0	53.2	46.8	54.8	59.1	32.2	2.4	5.8	21.2
Diabetes with renal manifestations, Type 1	32,005	5.5	51.0	0.1	85.4	14.5	56.5	73.5	21.9	1.2	3.1	11.4
Glomerulonephritis	83,248	14.3	52.0	1.7	78.3	20.0	60.7	64.0	25.7	1.3	8.0	14.1
Glomerulonephritis (GN; histologically not examined)	35,241	6.0	53.0	0.6	76.9	22.5	60.4	65.1	23.3	1.3	9.1	16.7
Focal glomerulosclerosis, focal sclerosing GN	24,000	4.1	49.0	3.5	79.2	17.3	60.5	54.4	39.9	0.9	4.1	10.8
Membranous nephropathy	4,131	0.7	58.0	0.7	68.2	31.2	66.7	65.4	29.2	0.8	3.7	12.6
Membranoproliferative GN type 1, diffuse MPGN	3,443	0.6	51.0	2.2	80.8	17.0	58.0	73.4	17.7	1.5	6.9	13.0
Dense deposit disease, MPGN type 2	270	0.0	42.0	11.5	74.4	14.1	48.9	80.0	13.0	1.9	4.4	11.1
IgA nephropathy, Berger's (by immunofluorescence)	9,780	1.7	47.0	0.8	87.7	11.6	66.0	73.1	6.6	2.0	17.3	13.6
IgM nephropathy (by immunofluorescence)	785	0.1	48.0	1.8	83.2	15.0	61.7	71.1	10.7	1.3	16.2	12.9
With lesion of rapidly progressive GN	2,242	0.4	54.0	3.3	66.9	29.8	48.9	75.3	16.4	2.0	5.8	14.8
Post-infectious GN, SBE	588	0.1	53.0	2.6	76.5	20.9	61.1	76.9	16.3	2.7	3.9	11.2
Other proliferative GN	2,768	0.5	52.0	2.9	75.4	21.7	53.0	72.7	20.0	1.2	5.2	13.4
Secondary GN/vasculitis	18,387	3.2	47.0	3.3	81.2	15.5	30.4	60.8	32.0	1.1	5.4	15.2
Lupus erythematosus (SLE nephritis)	10,697	1.8	44.0	1.7	92.1	6.1	17.9	46.0	45.2	1.0	7.0	18.7
Henoch-Schonlein syndrome	384	0.1	37.0	8.3	85.4	6.3	55.7	84.6	7.6	1.0	6.3	11.0
Scleroderma	543	0.1	57.0	0.6	72.9	26.5	20.3	78.3	18.0	0.6	2.4	9.2
Hemolytic uremic syndrome	1,138	0.2	37.0	18.4	71.4	10.3	39.9	78.2	17.7	0.5	2.9	7.0
Polyarteritis	319	0.1	58.0	5.3	55.8	38.9	40.8	82.1	10.7	3.1	3.1	13.4
Wegener's granulomatosis	1,902	0.3	60.0	2.2	59.7	38.2	57.0	90.2	6.4	0.9	2.3	9.8
Nephropathy due to heroin abuse and related drugs	318	0.1	52.0	0.9	87.4	11.6	66.0	46.9	46.5	1.6	4.7	15.6
Other vasculitis and its derivatives	1,361	0.2	59.0	5.0	55.4	39.6	41.2	81.6	11.7	1.9	4.1	13.6
Goodpasture's syndrome	1,057	0.2	54.0	2.6	67.4	30.0	48.2	90.4	6.4	1.0	1.7	8.2
Secondary GN, other	668	0.1	55.0	3.3	71.6	25.1	58.7	64.1	30.1	1.3	4.2	11.4
Interstitial nephritis/pyelonephritis	21,325	3.7	59.0	2.0	62.4	35.6	54.6	80.7	13.4	0.8	4.5	9.9
Analgesic abuse	887	0.2	64.0	0.0	52.6	47.4	44.3	79.5	15.4	0.6	3.9	10.2
Radiation nephritis	152	0.0	64.0	2.0	48.7	49.3	49.3	82.9	14.5	0.7	2.0	4.8
Lead nephropathy	49	0.0	63.0	2.0	53.1	44.9	77.6	32.7	63.3	0.0	4.1	4.0
Nephropathy caused by other agents	2,249	0.4	62.0	1.2	57.2	41.5	52.5	81.0	14.1	0.3	4.2	7.2
Gouty nephropathy	276	0.0	59.0	0.4	64.9	34.8	77.2	55.4	17.8	0.4	25.0	14.0
Nephrolithiasis	1,104	0.2	62.0	1.3	56.3	42.5	50.5	78.5	10.4	0.8	9.1	14.1
Acquired obstructive uropathy	5,234	0.9	64.0	1.5	50.8	47.7	78.7	80.1	15.7	0.9	2.8	11.5
Chronic pyelonephritis, reflux nephropathy	4,199	0.7	45.0	4.9	82.4	12.8	39.5	87.2	6.7	1.0	4.3	11.0
Chronic interstitial nephritis	5,957	1.0	59.0	1.5	64.4	34.1	46.9	79.6	14.7	0.7	4.6	7.9
Acute interstitial nephritis	726	0.1	63.0	0.7	52.6	46.7	49.4	75.3	19.8	0.8	3.4	8.6
Urolithiasis	257	0.0	61.0	0.4	62.3	37.4	58.4	76.3	12.8	0.0	10.1	16.1
Other disorders of calcium metabolism	235	0.0	59.0	0.9	62.1	37.0	47.7	82.1	11.5	0.0	5.5	8.6
Hypertensive/large vessel disease	146,633	25.2	62.0	0.1	54.5	45.4	59.7	47.1	47.0	0.5	4.8	11.4
Unspecified with renal failure	141,358	24.3	62.0	0.1	55.7	44.2	59.8	45.6	48.4	0.5	4.9	11.7
Renal artery stenosis	3,321	0.6	75.0	0.4	24.5	75.0	52.4	84.5	11.3	0.6	3.3	5.1
Renal artery occlusion	708	0.1	71.0	1.3	31.1	67.7	57.1	84.3	12.3	0.7	2.5	6.3
Cholesterol emboli, renal emboli	1,246	0.2	76.0	0.2	11.8	88.0	65.4	91.0	5.4	0.6	2.9	4.3
Cystic/heriditary/congenital diseases	40,875	7.0	54.0	8.5	70.5	21.0	57.9	82.2	12.4	0.7	4.0	10.9
Polycystic kidneys, adult type (dominant)	26,993	4.6	59.0	0.2	70.9	28.9	53.2	82.8	12.2	0.5	4.0	9.2
Polycystic, infantile (recessive)	575	0.1	23.0	41.6	52.9	5.6	50.3	78.8	13.7	1.4	4.3	14.2
Medullary cystic disease, including nephronophthisis	702	0.1	31.0	21.2	71.8	7.0	48.6	84.5	7.0	1.1	6.6	10.0
Tuberous sclerosis	208	0.0	50.0	1.0	77.4	21.6	43.8	76.4	20.2	0.0	2.4	8.2
Hereditary nephritis, Alport's syndrome	2,580	0.4	43.0	4.2	86.8	9.0	72.8	86.4	8.7	1.0	3.2	10.0
Cystinosis	261	0.0	24.0	31.8	64.0	4.2	53.6	91.2	5.4	0.8	2.3	5.5
Primary oxalosis	137	0.0	40.0	19.7	67.2	13.1	53.3	83.9	5.8	2.2	5.1	7.0
Fabry's disease	192	0.0	50.0	0.0	94.8	5.2	87.5	85.4	9.4	0.5	4.2	13.8
Congenital nephrotic syndrome	641	0.1	26.0	40.7	54.8	4.5	57.1	73.2	18.3	0.9	6.4	20.4
Drash syndrome, mesangial sclerosis	119	0.0	34.0	39.5	37.8	22.7	59.7	75.6	19.3	0.0	2.5	13.7
Congenital obstruction of ureterpelvic junction	263	0.0	30.0	25.9	65.8	8.4	73.8	77.6	16.0	1.5	3.0	14.2
Congenital obstruction of uretrovesical junction	165	0.0	28.0	25.5	70.3	4.2	77.0	81.8	10.9	1.8	5.5	13.0
Other congenital obstructive uropathy	3,365	0.6	31.0	24.2	71.6	4.2	76.9	79.4	14.6	1.0	3.7	12.9
Renal hypoplasia, dysplasia, oligonephronia	3,329	0.6	23.0	37.9	60.0	2.1	61.3	79.7	13.8	1.1	4.1	19.0
Prune belly syndrome	363	0.1	20.0	47.9	51.0	1.1	98.1	74.9	20.7	0.8	2.8	16.5
Other (congenital malformation syndromes)	982	0.2	38.0	15.2	76.3	8.6	58.1	83.4	9.5	1.1	5.6	13.9

Table B.7 (continued)

Prevalence of reported ESRD, by primary diagnosis, 2010

patients alive on December 31 of each year, by detailed primary diagnosis

ROW PERCENT	Total patients	Percent prevalent	Median age	Age 0-19	20-64	65+	% male	% White	Black Af Am	N Am	Asian	Hispanic
Neoplasms/tumors	8,319	1.4	63.0	1.5	40.7	45.3	62.6	77.0	18.8	0.8	3.1	10.1
Renal tumor (malignant)	1,662	0.3	68.0	3.2	36.6	60.2	69.7	77.9	19.7	1.0	1.3	6.4
Urinary tract tumor (malignant)	308	0.1	72.0	0.3	25.3	74.4	81.2	80.5	16.2	1.0	2.3	6.0
Renal tumor (benign)	84	0.0	65.0	1.2	47.6	51.2	56.0	76.2	17.9	0.0	4.8	11.5
Urinary tract tumor (benign)	40	0.0	68.0	0.0	37.5	62.5	90.0	85.0	15.0	0.0	0.0	22.1
Renal tumor (unspecified)	186	0.0	68.0	0.5	38.7	60.8	66.7	74.7	20.4	1.1	3.8	7.2
Urinary tract tumor (unspecified)	71	0.0	69.0	0.0	33.8	66.2	64.8	69.0	25.4	1.4	2.8	16.8
Lymphoma of kidneys	72	0.0	65.0	1.4	47.2	51.4	66.7	84.7	15.3	0.0	0.0	7.8
Multiple myeloma	1,713	0.3	67.0	0.2	42.3	57.4	56.9	71.2	25.4	0.8	2.6	7.8
Other immuno prolif. neoplasms (inc. light chain neph.)	337	0.1	67.0	0.3	42.1	57.6	62.9	79.8	16.6	0.9	2.4	7.2
Amyloidosis	874	0.1	64.0	0.2	49.9	49.9	56.9	82.5	14.2	0.7	2.5	13
Complications of transplanted organ	2,972	0.5	55.0	2.2	75.7	22.2	61.1	77.6	16.4	0.8	4.9	13
Complications of transplanted organ, unspecified	154	0.0	54.0	1.3	84.4	14.3	57.1	82.5	13.6	0.6	3.2	10.4
Complications of transplanted kidney	1,161	0.2	50.0	1.4	87.0	11.6	58.4	70.1	21.8	0.7	7.1	18
Complications of transplanted liver	1,016	0.2	58.0	1.6	73.6	24.8	59.5	82.9	12.4	1.1	3.3	12
Complications of transplanted heart	410	0.1	64.0	4.1	48.0	47.8	75.4	81.7	14.4	1.0	2.9	4.2
Complications of transplanted lung	118	0.0	57.0	0.8	72.0	27.1	51.7	86.4	9.3	0.0	4.2	2.2
Complications of transplanted bone marrow	55	0.0	45.0	16.4	67.3	16.4	69.1	85.5	10.9	0.0	3.6	4
Complications of transplanted pancreas	28	0.0	58.0	0.0	82.1	17.9	53.6	71.4	14.3	0.0	10.7	4.6
Complications of transplanted intestine	*	0.0	51.0	0.0	87.5	12.5	62.5	62.5	25.0	12.5	0.0	0
Complications of other specified transplanted organ	22	0.0	46.0	13.6	54.5	31.8	77.3	68.2	18.2	0.0	13.6	6.4
Miscellaneous conditions	18,263	3.1	58.0	2.5	62.1	35.4	59.0	63.0	32.4	0.8	3.4	9
Sickle cell disease/anemia	401	0.1	43.0	0.7	94.3	5.0	54.4	5.5	94.0	0.0	0.5	3
Sickle cell trait and other sickle cell (HbS/Hb other)	29	0.0	48.0	0.0	86.2	13.8	44.8	6.9	93.1	0.0	0.0	4
Post-partum renal failure	181	0.0	38.0	2.2	96.7	1.1	2.8	61.3	29.3	0.6	6.1	20
AIDS nephropathy	3,233	0.6	48.0	0.4	95.6	4.0	69.4	10.2	88.2	0.2	0.5	6
Traumatic or surgical loss of kidney(s)	517	0.1	62.0	3.1	52.6	44.3	65.2	77.6	18.0	0.6	2.7	11
Hepatorenal syndrome	1,205	0.2	58.0	0.2	76.3	23.5	67.0	79.8	12.2	1.8	5.9	14
Tubular necrosis (no recovery)	6,570	1.1	66.0	2.5	44.0	53.6	55.0	78.1	18.2	0.9	2.6	8
Other renal disorders	6,127	1.1	59.0	4.2	58.6	37.3	57.8	74.3	19.1	0.8	5.4	11
Etiology uncertain	21,212	3.6	57.0	2.7	63.2	34.1	58.1	65.8	24.8	1.1	7.0	19
Missing	11,695	2.0	55.0	3.4	71.2	25.4	57.2	59.4	17.6	1.4	7.7	8

Table B.7 (continued)

Prevalence of reported ESRD, by primary diagnosis, 2010

patients alive on December 31 of each year, by detailed primary diagnosis

	Total	Counts				%				
			Black/				Black/			
COLUMN PERCENT	patients	White	Af Am	N Am	Asian	White	Af Am	N Am	Asian	Hispanic
All ESRD, (reference)	594,374	360,289	187,864	8,085	32,862	100.0	100.0	100.0	100.0	100.0
Diabetes	224,417	137,153	68,899	5,004	12,223	38.8	37.1	63.2	38.2	49.6
Diabetes with renal manifestations, Type 2	192,412	113,644	61,881	4,607	11,241	32.2	33.3	58.2	35.2	45.4
Diabetes with renal manifestations, Type 1	32,005	23,509	7,018	397	982	6.7	3.8	5.0	3.1	4.2
Glomerulonephritis	83,248	53,299	21,396	1,049	6,696	15.1	11.5	13.2	21.0	13.8
Glomerulonephritis (GN; histologically not examined)	35,241	22,939	8,221	453	3,197	6.5	4.4	5.7	10.0	7.3
Focal glomerulosclerosis, focal sclerosing GN	24,000	13,056	9,581	209	980	3.7	5.2	2.6	3.1	2.9
Membranous nephropathy	4,131	2,703	1,207	34	154	0.8	0.6	0.4	0.5	0.6
Membranoproliferative GN type 1, diffuse MPGN	3,443	2,527	609	50	237	0.7	0.3	0.6	0.7	0.5
Dense deposit disease, MPGN type 2	270	216	35	*	12	0.1	0.0	0.1	0.0	0.0
IgA nephropathy, Berger's (by immunofluorescence)	9,780	7,149	643	195	1,692	2.0	0.3	2.5	5.3	1.4
IgM nephropathy (by immunofluorescence)	785	558	84	*	127	0.2	0.0	0.1	0.4	0.1
With lesion of rapidly progressive GN	2,242	1,688	367	44	130	0.5	0.2	0.6	0.4	0.4
Post-infectious GN, SBE	588	452	96	16	23	0.1	0.1	0.2	0.1	0.1
Other proliferative GN	2,768	2,011	553	33	144	0.6	0.3	0.4	0.5	0.4
Secondary GN/vasculitis	18,387	11,180	5,893	199	987	3.2	3.2	2.5	3.1	3.2
Lupus erythematosus (SLE nephritis)	10,697	4,920	4,834	108	746	1.4	2.6	1.4	2.3	2.3
Henoch-Schonlein syndrome	384	325	29	*	24	0.1	0.0	0.1	0.1	0.0
Scleroderma	543	425	98	*	13	0.1	0.1	0.0	0.0	0.1
Hemolytic uremic syndrome	1,138	890	201	*	33	0.3	0.1	0.1	0.1	0.1
Polyarteritis	319	262	34	*	*	0.1	0.0	0.1	0.0	0.0
Wegener's granulomatosis	1,902	1,715	121	17	44	0.5	0.1	0.2	0.1	0.2
Nephropathy due to heroin abuse and related drugs	318	149	148	*	15	0.0	0.1	0.1	0.0	0.1
Other vasculitis and its derivatives	1,361	1,110	159	26	56	0.3	0.1	0.3	0.2	0.2
Goodpasture's syndrome	1,057	956	68	11	18	0.3	0.0	0.1	0.1	0.1
Secondary GN, other	668	428	201	*	28	0.1	0.1	0.1	0.1	0.1
Interstitial nephritis/pyelonephritis	21,325	17,217	2,854	161	969	4.9	1.5	2.0	3.0	2.5
Analgesic abuse	887	705	137	*	35	0.2	0.1	0.1	0.1	0.1
Radiation nephritis	152	126	22	*	*	0.0	0.0	0.0	0.0	0.0
Lead nephropathy	49	16	31	0	*	0.0	0.0	0.0	0.0	0.0
Nephropathy caused by other agents	2,249	1,821	316	*	94	0.5	0.2	0.1	0.3	0.2
Gouty nephropathy	276	153	49	*	69	0.0	0.0	0.0	0.2	0.0
Nephrolithiasis	1,104	867	115	*	100	0.2	0.1	0.1	0.3	0.2
Acquired obstructive uropathy	5,234	4,194	824	45	148	1.2	0.4	0.6	0.5	0.7
Chronic pyelonephritis, reflux nephropathy	4,199	3,660	282	43	180	1.0	0.2	0.5	0.6	0.6
Chronic interstitial nephritis	5,957	4,739	874	44	274	1.3	0.5	0.6	0.9	0.6
Acute interstitial nephritis	726	547	144	*	25	0.2	0.1	0.1	0.1	0.1
Urolithiasis	257	196	33	0	26	0.1	0.0	0.0	0.1	0.0
Other disorders of calcium metabolism	235	193	27	0	13	0.1	0.0	0.0	0.0	0.0
Hypertensive/large vessel disease	146,633	69,017	68,961	796	7,076	19.5	37.1	10.1	22.1	18.7
Unspecified with renal failure	141,358	64,479	68,432	764	6,911	18.2	36.8	9.6	21.6	18.3
Renal artery stenosis	3,321	2,807	375	19	111	0.8	0.2	0.2	0.3	0.2
Renal artery occlusion	708	597	87	*	18	0.2	0.0	0.1	0.1	0.1
Cholesterol emboli, renal emboli	1,246	1,134	67	*	36	0.3	0.0	0.1	0.1	0.1
Cystic/heriditary/congenital diseases	40,875	33,606	5,058	278	1,653	9.5	2.7	3.5	5.2	5.0
Polycystic kidneys, adult type (dominant)	26,993	22,339	3,306	131	1,084	6.3	1.8	1.7	3.4	2.8
Polycystic, infantile (recessive)	575	453	79	*	25	0.1	0.0	0.1	0.1	0.1
Medullary cystic disease, including nephronophthisis	702	593	49	*	46	0.2	0.0	0.1	0.1	0.1
Tuberous sclerosis	208	159	42	0	*	0.0	0.0	0.0	0.0	0.0
Hereditary nephritis, Alport's syndrome	2,580	2,229	225	27	83	0.6	0.1	0.3	0.3	0.3
Cystinosis	261	238	14	*	*	0.1	0.0	0.0	0.0	0.0
Primary oxalosis	137	115	*	*	*	0.0	0.0	0.0	0.0	0.0
Fabry's disease	192	164	18	*	*	0.0	0.0	0.0	0.0	0.0
Congenital nephrotic syndrome	641	469	117	*	41	0.1	0.1	0.1	0.1	0.1
Drash syndrome, mesangial sclerosis	119	90	23	0	*	0.0	0.0	0.0	0.0	0.0
Congenital obstruction of ureterpelvic junction	263	204	42	*	*	0.1	0.0	0.1	0.0	0.0
Congenital obstruction of uretrovesical junction	165	135	18	*	*	0.0	0.0	0.0	0.0	0.0
Other congenital obstructive uropathy	3,365	2,673	491	35	126	0.8	0.3	0.4	0.4	0.5
Renal hypoplasia, dysplasia, oligonephronia	3,329	2,654	458	36	137	0.8	0.2	0.5	0.4	0.7
Prune belly syndrome	363	272	75	*	*	0.1	0.0	0.0	0.0	0.1
Other (congenital malformation syndromes)	982	819	93	11	55	0.2	0.1	0.1	0.2	0.1

Table B.7 (continued)

Prevalence of reported ESRD, by primary diagnosis, 2010

patients alive on December 31 of each year, by detailed primary diagnosis

	Total	Counts				%				
			Black/				Black/			
COLUMN PERCENT	patients	White	Af Am	N Am	Asian	White	Af Am	N Am	Asian	Hispanic
Neoplasms/tumors	8,319	6,405	1,566	69	261	1.8	0.8	0.9	0.8	1.0
Renal tumor (malignant)	1,662	1,294	327	16	21	0.4	0.2	0.2	0.1	0.1
Urinary tract tumor (malignant)	308	248	50	*	*	0.1	0.0	0.0	0.0	0.0
Renal tumor (benign)	84	64	15	0	*	0.0	0.0	0.0	0.0	0.0
Urinary tract tumor (benign)	40	34	*	0	0	0.0	0.0	0.0	0.0	0.0
Renal tumor (unspecified)	186	139	38	*	*	0.0	0.0	0.0	0.0	0.0
Urinary tract tumor (unspecified)	71	49	18	*	*	0.0	0.0	0.0	0.0	0
Lymphoma of kidneys	72	61	11	0	0	0.0	0.0	0.0	0.0	0
Multiple myeloma	1,713	1,219	435	13	44	0.3	0.2	0.2	0.1	0.2
Other immuno prolif. neoplasms (inc. light chain neph.)	337	269	56	*	*	0.1	0.0	0.0	0.0	0
Amyloidosis	874	721	124	*	22	0.2	0.1	0.1	0.1	0
Complications of transplanted organ	2,972	2,307	486	25	146	0.7	0.3	0.3	0.5	0
Complications of transplanted organ, unspecified	154	127	21	*	*	0.0	0.0	0.0	0.0	0.3
Complications of transplanted kidney	1,161	814	253	*	82	0.2	0.1	0.1	0.3	0.3
Complications of transplanted liver	1,016	842	126	11	34	0.2	0.1	0.1	0.1	0.1
Complications of transplanted heart	410	335	59	*	12	0.1	0.0	0.1	0.0	0
Complications of transplanted lung	118	102	11	0	*	0.0	0.0	0.0	0.0	0
Complications of transplanted bone marrow	55	47	*	0	*	0.0	0.0	0.0	0.0	0
Complications of transplanted pancreas	28	20	*	0	*	0.0	0.0	0.0	0.0	0
Complications of transplanted intestine	*	*	*	*	0	0.0	0.0	0.0	0.0	0
Complications of other specified transplanted organ	22	15	*	0	*	0.0	0.0	0.0	0.0	0
Miscellaneous conditions	18,263	11,513	5,914	139	614	3.3	3.2	1.8	1.9	2
Sickle cell disease/anemia	401	22	377	0	*	0.0	0.2	0.0	0.0	0
Sickle cell trait and other sickle cell (HbS/Hb other)	29	*	27	0	0	0.0	0.0	0.0	0.0	0
Post-partum renal failure	181	111	53	*	11	0.0	0.0	0.0	0.0	0
AIDS nephropathy	3,233	331	2,853	*	17	0.1	1.5	0.1	0.1	0
Traumatic or surgical loss of kidney(s)	517	401	93	*	14	0.1	0.1	0.0	0.0	0
Hepatorenal syndrome	1,205	962	147	22	71	0.3	0.1	0.3	0.2	0
Tubular necrosis (no recovery)	6,570	5,134	1,193	59	168	1.5	0.6	0.7	0.5	1
Other renal disorders	6,127	4,550	1,171	46	331	1.3	0.6	0.6	1.0	1
Etiology uncertain	21,212	13,957	5,269	225	1,479	3.9	2.8	2.8	4.6	5
Missing	11,695	6,942	2,054	165	904	2.0	1.1	2.1	2.8	1

Table C.2

Percent distribution of patients, by prior & current employment status

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

	Full-time		Part-time		Homemaker		Retired (age/prf)		Retired (disab.)		Medical leave		Student		Unemployed	
2002-2004	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current
0-4	*	*	*	*	*	*	4.8	5.1	*	1.9	*	*	15.4	16.2	29.3	34.1
5-9	*	*	*	.	.	.	*	*	*	*	*	*	74.0	82.3	5.4	6.5
10-14	*	*	.	.	.	.	*	*	*	*	.	.	86.5	93.7	2.9	3.1
15-19	5.4	2.4	4.1	3.1	*	*	*	*	0.7	1.2	*	2.0	61.1	63.6	16.4	22.6
20-29	31.9	18.5	6.7	4.7	2.4	2.6	0.4	0.4	6.5	8.9	0.9	8.2	6.5	6.2	31.8	46.4
30-39	35.5	22.7	4.5	3.3	3.1	3.4	0.4	0.5	13.0	16.3	1.0	8.7	0.5	0.5	28.9	40.4
40-49	31.1	21.0	3.5	2.7	2.9	3.1	0.9	1.1	20.0	24.5	1.2	7.5	0.1	0.1	26.7	35.5
50-59	22.6	14.7	2.6	2.1	4.1	4.3	4.6	5.5	29.9	35.2	1.0	6.0	0.0	0.0	21.5	27.5
60-64	12.3	7.3	2.2	1.9	5.5	5.7	18.8	21.6	31.3	36.1	0.6	3.0	*	*	15.8	19.6
65-69	4.7	2.9	1.7	1.6	5.3	5.4	52.0	57.3	14.5	16.3	0.1	0.8	*	*	9.0	11.2
70-74	2.2	1.3	1.3	1.1	5.2	5.4	65.3	71.2	7.3	8.6	0.0	0.4	*	*	6.6	8.3
75-79	1.4	0.6	0.8	0.8	5.4	5.5	70.2	76.3	4.9	6.0	0.0	0.2	.	.	5.7	7.2
80-84	1.0	0.3	0.5	0.5	4.7	4.8	74.0	80.0	4.1	5.0	*	0.1	*	*	5.1	6.3
85+	0.8	0.3	0.4	0.3	4.7	4.7	74.8	80.9	3.4	4.2	*	*	*	*	5.2	6.4
0-19	2.8	1.3	2.0	1.5	*	0.3	1.1	1.2	0.7	1.0	*	1.2	61.5	65.5	13.8	17.7
20-44	34.0	21.7	4.7	3.5	2.8	3.1	0.4	0.6	13.3	16.8	1.1	8.3	1.6	1.5	28.9	40.3
45-64	20.8	13.5	2.6	2.1	4.3	4.5	8.2	9.6	28.9	33.9	0.9	5.3	0.0	0.0	20.6	26.4
65-74	3.4	2.1	1.5	1.4	5.3	5.4	58.8	64.4	10.8	12.4	0.1	0.6	*	*	7.7	9.7
75+	1.2	0.5	0.7	0.6	5.0	5.1	72.4	78.4	4.4	5.3	0.0	0.1	*	*	5.4	6.7
Male	15.8	10.2	2.2	1.9	0.1	0.1	37.6	41.1	17.3	20.4	0.5	3.5	1.0	1.0	13.1	17.6
Female	9.7	5.9	2.0	1.5	9.7	10.1	33.7	37.0	14.2	16.8	0.4	2.8	1.0	1.0	16.4	20.6
White	12.2	7.9	2.1	1.8	5.1	5.3	41.9	45.5	15.0	17.5	0.5	2.9	0.9	1.0	11.2	14.2
Black/Af Am	14.3	8.8	2.0	1.5	2.4	2.5	24.6	28.1	18.4	22.3	0.6	3.8	0.9	1.0	20.4	27.4
N Am/Alas Native	14.3	8.8	2.6	1.7	6.3	6.5	19.8	21.6	19.3	22.5	0.4	3.0	1.2	1.1	25.2	30.4
Asian	17.3	11.5	2.2	2.0	5.9	6.1	33.5	35.8	10.1	12.8	0.4	4.0	1.6	1.6	18.6	22.9
Pacific Islander	18.1	10.6	2.2	1.8	8.4	9.2	30.1	32.5	11.6	13.9	0.6	5.0	1.0	0.9	20.0	23.8
Mid.-east./Arabian	13.5	9.0	2.4	2.0	6.6	7.3	30.3	31.8	10.8	12.9	*	2.5	2.8	3.3	21.3	27.6
Ind. Subcont.	20.3	15.1	2.6	2.0	7.3	7.4	24.1	26.2	10.1	13.3	*	3.4	2.2	2.4	18.4	26.9
Other/multiracial	12.7	8.0	2.0	1.5	7.3	7.5	21.7	23.5	17.0	19.1	0.4	2.8	1.7	1.8	23.2	31.4
Unknown	10.1	6.5	2.1	2.1	3.9	4.1	26.8	30.3	13.9	15.9	*	2.6	*	*	18.8	25.9
Hispanic, Mexican	13.1	6.5	1.9	1.1	8.8	8.8	24.2	24.7	19.1	22.3	0.4	3.2	2.0	2.0	24.7	28.6
Hispanic, other	12.4	7.3	1.8	1.3	6.8	6.9	27.4	29.0	18.2	20.4	0.4	2.7	1.6	1.5	20.4	26.5
Hispanic, non-spec.	8.2	4.7	*	*	5.2	5.2	28.8	30.5	12.4	15.0	*	*	*	*	32.6	36.1
Non-Hispanic	13.1	8.5	2.1	1.8	4.0	4.1	37.4	41.1	15.5	18.4	0.5	3.2	0.9	0.9	13.3	17.7
Unknown	10.0	7.0	3.2	2.2	3.4	3.7	33.8	41.0	10.9	14.1	.	1.9	*	*	10.6	16.4
Diabetes	10.2	6.4	1.6	1.3	5.4	5.5	34.0	37.2	21.1	24.4	0.5	2.4	0.1	0.1	15.0	18.6
Hypertension	10.6	6.4	1.8	1.4	3.8	3.9	44.9	49.2	11.1	13.6	0.3	2.6	0.2	0.2	14.0	18.7
Glomerulonephritis	27.5	19.1	3.8	3.3	3.4	3.7	24.2	26.6	10.2	12.8	0.6	6.2	3.8	3.9	14.5	20.5
Cystic kidney	35.9	29.2	4.7	4.2	4.2	4.5	19.1	21.2	10.3	13.1	1.0	6.3	1.6	1.7	10.5	15.0
Other urologic	14.1	9.4	3.1	2.6	3.8	3.9	39.6	43.0	12.0	14.2	0.5	3.2	3.3	3.4	12.5	16.4
Other cause	15.0	8.8	2.7	1.9	3.9	4.0	31.5	34.4	14.2	17.0	0.7	4.8	3.6	3.8	15.3	20.6
Unknown cause	13.2	7.8	2.4	2.0	4.2	4.3	38.8	42.6	10.7	13.0	0.4	3.1	2.2	2.4	15.3	20.3
Missing	.	.	.	.	.	.	*	*	*	*	.	.	.	.	.	.
All	13.0	8.3	2.1	1.7	4.5	4.6	35.9	39.3	15.9	18.8	0.5	3.2	1.0	1.0	14.6	19.0
Total N	39,576	25,158	6,381	5,158	13,651	14,108	109,015	119,350	48,243	57,015	1,494	9,611	2,997	3,127	44,356	57,712

Table C.2 (continued)

Percent distribution of patients, by prior & current employment status

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

	Full-time		Part-time		Homemaker		Retired (age/pref)		Retired (disab.)		Medical leave		Student		Unemployed	
2005-2007	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current
0-4	2.7	1.7	*	*	*	*	6.3	6.6	3.0	3.4	.	*	23.2	23.3	38.4	39.4
5-9	*	*	.	.	.	.	*	*	*	*	.	*	88.8	89.0	6.5	6.5
10-14	*	*	*	.	*	.	*	*	*	*	.	*	93.3	94.2	3.3	3.5
15-19	5.3	2.8	4.4	2.3	*	0.6	*	*	1.2	1.6	*	2.0	67.9	66.1	19.6	24.0
20-29	34.9	19.0	7.3	4.8	2.3	2.4	0.5	0.5	7.7	9.6	0.9	7.9	6.9	6.2	37.9	49.0
30-39	40.5	24.2	5.1	3.7	2.8	2.9	0.4	0.4	13.8	16.4	1.3	9.0	0.7	0.7	33.7	42.1
40-49	35.6	21.9	4.1	3.1	2.7	2.7	1.0	1.1	21.7	24.8	1.2	7.8	0.2	0.2	31.9	37.9
50-59	27.0	16.3	3.2	2.5	3.5	3.5	5.1	5.4	32.9	36.2	1.1	6.3	0.0	0.0	25.6	29.1
60-64	15.6	8.8	2.4	1.9	5.0	4.9	20.4	21.4	35.7	38.5	0.7	3.4	*	*	18.4	20.3
65-69	6.6	3.6	2.2	1.9	4.7	4.6	55.6	57.3	17.8	18.9	0.2	1.2	*	*	11.2	12.0
70-74	3.2	1.5	1.6	1.3	5.0	4.9	70.9	72.3	9.2	10.0	0.1	0.5	*	*	8.5	9.0
75-79	2.0	0.7	1.0	0.8	4.9	4.7	77.0	78.4	6.3	6.9	0.0	0.2	.	*	7.3	7.7
80-84	1.5	0.4	0.7	0.5	4.9	4.6	80.5	82.0	4.7	5.2	*	0.1	*	*	6.3	6.6
85+	1.3	0.4	0.5	0.4	4.4	4.2	82.5	83.8	3.8	4.3	.	*	*	*	6.2	6.5
0-19	3.3	1.7	2.2	1.1	0.4	0.3	1.5	1.5	1.3	1.6	*	1.2	67.8	67.3	17.8	20.2
20-44	38.3	22.6	5.2	3.8	2.6	2.7	0.5	0.6	14.5	17.1	1.2	8.6	1.8	1.6	34.1	42.5
45-64	24.8	15.0	3.1	2.4	3.8	3.8	9.1	9.5	32.1	35.3	1.0	5.6	0.1	0.1	24.4	27.8
65-74	4.9	2.5	1.9	1.6	4.9	4.7	63.3	64.9	13.5	14.4	0.1	0.8	*	*	9.9	10.5
75+	1.7	0.6	0.8	0.6	4.8	4.6	79.3	80.8	5.2	5.8	0.0	0.2	*	*	6.7	7.0
Male	18.7	11.2	2.5	2.1	0.1	0.1	40.0	41.0	19.5	21.5	0.6	3.7	1.0	1.0	15.9	18.9
Female	12.0	6.7	2.5	1.7	9.2	9.0	36.4	37.3	16.9	18.5	0.5	3.1	1.1	1.1	19.9	22.0
White	14.6	8.7	2.5	2.0	4.8	4.6	44.1	45.1	17.4	19.0	0.5	3.1	1.0	1.0	13.8	15.8
Black/Af Am	17.7	9.8	2.5	1.7	2.2	2.2	26.8	27.5	21.5	23.9	0.7	4.0	1.0	1.0	25.7	29.4
N Am/Alas Native	17.0	9.1	2.9	1.8	5.7	5.6	21.2	21.5	20.1	22.5	0.4	3.6	1.6	1.5	29.1	33.6
Asian	20.3	12.5	2.6	2.1	6.0	5.8	36.0	36.9	10.8	12.7	0.6	4.2	1.4	1.4	21.1	23.9
Pacific Islander	20.9	12.5	2.5	1.8	6.8	6.7	26.6	27.3	14.5	16.7	0.8	4.7	1.2	1.1	25.5	28.4
Mid.-east./Arabian	15.0	9.4	*	*	*	*	31.5	33.9	11.8	11.8	*	*	*	*	22.8	27.6
Ind. Subcont.	22.4	16.0	*	*	*	*	19.9	20.5	12.8	17.3	*	*	*	*	25.0	29.5
Other/multiracial	15.7	9.9	2.6	1.7	6.7	6.7	27.6	28.3	17.3	19.5	0.6	3.1	2.0	2.0	21.2	26.5
Unknown	9.1	4.5	*	*	*	*	28.0	29.2	14.4	17.0	*	*	*	*	31.8	35.2
Hispanic, Mexican	14.9	8.0	1.9	1.5	7.0	7.2	24.5	25.2	19.7	21.7	0.7	3.4	1.9	1.9	23.2	28.4
Hispanic, other	15.3	8.6	2.1	1.7	7.2	7.0	25.1	26.8	18.7	21.9	0.6	2.8	1.6	1.6	18.9	25.7
Hispanic, non-spec.	15.8	7.9	2.3	1.6	7.2	7.1	26.1	26.5	21.0	23.3	0.5	3.3	2.0	1.9	24.7	28.2
Non-Hispanic	15.7	9.4	2.5	2.0	3.6	3.6	40.4	41.3	18.0	19.8	0.6	3.5	0.9	0.9	16.6	19.0
Unknown	12.0	*	*	*	*	*	38.3	42.1	14.2	16.9	.	*	*	*	19.7	23.0
Diabetes	12.5	7.2	1.9	1.5	4.8	4.7	36.5	37.3	24.0	25.9	0.6	2.7	0.1	0.1	18.1	20.1
Hypertension	13.3	7.1	2.3	1.7	3.7	3.6	47.9	49.0	13.5	15.2	0.4	2.8	0.2	0.2	17.1	19.8
Glomerulonephritis	32.3	21.5	4.3	3.6	3.2	3.3	25.4	26.1	11.9	13.8	0.8	6.3	3.8	3.8	16.5	20.8
Cystic kidney	41.9	31.7	5.3	5.3	3.8	3.8	20.2	20.9	11.3	13.0	0.7	6.4	1.7	1.7	13.3	16.6
Other urologic	16.7	10.7	3.5	2.8	2.9	2.7	42.3	43.3	13.9	15.3	0.4	3.3	3.4	3.3	15.1	18.0
Other cause	17.7	9.5	3.2	2.1	3.6	3.5	34.5	35.4	16.2	18.1	0.8	5.2	3.8	3.7	18.4	21.6
Unknown cause	15.6	8.8	2.7	2.1	3.5	3.4	40.8	41.9	13.4	15.1	0.5	3.2	2.5	2.4	19.6	22.6
Missing	*	.	.	.	.	.	*	*	.	.	.	*	.	.	*	*
All	15.7	9.2	2.5	1.9	4.1	4.0	38.4	39.3	18.3	20.2	0.6	3.4	1.1	1.0	17.7	20.2
Total N	51,244	29,956	8,083	6,243	13,438	13,134	125,242	128,225	59,756	65,836	1,842	11,173	3,442	3,356	57,587	65,949

Table C.2 (continued)

Percent distribution of patients, by prior or current employment status

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

	Full-time		Part-time		Homemaker		Retired (age/pref)		Retired (disability)		Medical leave		Student		Unemployed	
2008-2010	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current	prior	current
0-4	3.3	2.4	*	*	*	*	7.9	7.9	3.2	4.0	.	*	30.5	30.4	39.9	39.6
5-9	*	*	.	.	*	*	*	*	*	*	*	.	88.2	88.4	8.7	9.0
10-14	*	.	.	.	.	.	*	*	*	*	.	*	93.8	93.4	4.3	4.3
15-19	4.9	2.0	4.4	3.2	*	*	0.7	0.7	0.6	1.1	*	1.4	70.9	68.5	18.0	22.7
20-29	33.3	17.8	8.3	5.4	2.1	2.2	0.4	0.5	7.1	9.0	1.0	7.9	7.0	6.5	40.8	50.8
30-39	38.1	22.3	5.8	4.0	2.7	2.7	0.5	0.5	13.9	16.4	1.2	8.4	0.8	0.7	37.1	44.9
40-49	35.3	21.5	4.4	3.2	2.4	2.5	0.8	0.9	22.1	24.7	1.1	7.4	0.2	0.2	33.8	39.6
50-59	26.7	16.0	3.5	2.5	3.1	3.1	4.5	4.8	33.3	36.5	1.1	6.1	0.1	0.1	27.7	31.0
60-64	16.7	9.5	2.9	2.4	4.0	3.9	19.3	20.0	36.8	39.5	0.7	3.7	*	*	19.5	21.0
65-69	7.4	3.9	2.4	2.0	3.7	3.6	53.7	55.2	20.7	21.6	0.2	1.3	*	*	11.9	12.4
70-74	3.7	1.7	1.8	1.5	4.0	3.8	71.3	72.4	10.3	11.0	0.1	0.5	*	*	8.8	9.1
75-79	2.4	0.8	1.1	0.9	4.1	3.9	77.7	78.6	7.3	7.9	0.0	0.3	*	*	7.4	7.6
80-84	1.6	0.4	0.7	0.5	4.4	4.1	81.6	82.5	5.2	5.6	*	0.1	*	*	6.6	6.7
85+	1.4	0.3	0.5	0.4	4.1	3.8	83.3	84.2	4.7	5.1	*	0.1	*	*	6.0	6.1
0-19	3.1	1.5	2.2	1.6	0.3	0.3	2.1	2.1	1.1	1.5	*	0.9	69.8	68.6	18.3	20.6
20-44	36.8	21.5	5.8	4.0	2.4	2.5	0.5	0.6	14.5	16.9	1.1	8.1	1.8	1.7	37.0	44.7
45-64	24.7	14.7	3.4	2.6	3.3	3.3	8.7	9.0	32.9	35.8	1.0	5.5	0.1	0.1	26.0	29.1
65-74	5.6	2.8	2.1	1.8	3.9	3.7	62.3	63.5	15.6	16.5	0.1	0.9	*	*	10.4	10.8
75+	1.9	0.6	0.8	0.7	4.2	3.9	80.3	81.3	6.0	6.5	0.0	0.2	*	*	6.8	6.9
Male	18.4	10.7	2.7	2.2	0.1	0.1	39.4	40.1	20.3	22.1	0.6	3.7	1.0	1.0	17.5	20.1
Female	12.3	6.9	2.7	1.9	8.0	7.7	36.4	37.0	18.5	20.1	0.5	3.0	1.1	1.1	20.5	22.3
White	14.6	8.6	2.7	2.1	4.0	3.9	43.2	43.9	18.6	20.2	0.5	3.0	1.0	1.0	15.3	17.2
Black/Af Am	17.7	9.6	2.7	1.8	1.8	1.8	27.3	27.9	22.9	25.0	0.6	4.0	1.0	0.9	25.9	29.0
N Am/Alas Native	16.9	9.3	2.9	2.3	5.2	5.3	20.3	20.9	21.6	23.6	0.4	3.3	1.4	1.3	31.2	34.0
Asian	20.4	12.3	3.2	2.3	5.6	5.4	36.6	37.5	11.4	13.1	0.6	4.1	1.3	1.3	21.0	24.0
Pacific Islander	19.2	11.3	2.4	1.7	5.9	5.7	25.4	26.1	14.8	16.6	1.0	3.9	1.2	1.2	30.1	33.4
Mid.-east./Arabian	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ind. Subcont.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other/multiracial	18.0	10.5	3.0	2.3	5.8	5.5	28.4	29.3	20.1	21.6	0.8	3.3	3.9	4.0	19.8	23.3
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, Mexican	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, non-spec.	16.0	7.9	2.7	1.7	6.3	6.2	24.6	25.0	21.4	23.7	0.6	3.4	1.9	1.9	26.4	30.2
Non-Hispanic	15.7	9.2	2.7	2.1	3.0	2.9	40.3	41.0	19.2	20.8	0.6	3.4	0.9	0.9	17.5	19.5
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Diabetes	13.0	7.2	2.2	1.7	4.0	3.9	35.4	36.1	25.2	27.1	0.5	2.7	0.1	0.1	19.5	21.3
Hypertension	13.6	7.4	2.5	1.9	3.1	3.0	47.2	48.0	14.7	16.2	0.4	2.8	0.2	0.2	18.3	20.5
Glomerulonephritis	31.7	20.9	4.8	3.8	3.0	2.9	25.3	25.8	12.4	14.2	0.8	6.2	4.1	4.0	17.9	22.0
Cystic kidney	41.5	31.7	5.5	4.3	3.2	3.3	20.4	21.0	11.9	13.7	0.9	6.4	1.7	1.7	14.7	17.7
Other urologic	16.5	10.1	3.4	2.5	2.6	2.5	42.9	43.2	15.9	17.7	0.5	4.2	2.5	2.4	15.7	17.3
Other cause	17.0	8.9	3.3	2.3	3.1	3.0	35.6	36.2	17.3	19.1	0.9	5.0	3.9	3.8	18.7	21.4
Unknown cause	15.5	8.3	3.1	2.3	3.0	2.9	41.3	41.9	14.4	16.1	0.5	3.3	2.5	2.4	19.6	22.7
Missing	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
All	15.7	9.0	2.7	2.1	3.5	3.4	38.1	38.8	19.5	21.3	0.6	3.4	1.0	1.0	18.8	21.1
Total N	53,672	30,847	9,345	7,044	11,963	11,600	129,889	132,216	66,600	72,523	1,902	11,473	3,580	3,479	64,041	71,808

Table C.3

Insurance coverage in the incident population (%)

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

2002-2004	Medicaid	Medicare	DVA	EGHP	Other	None	Medicare Advantage	Applying for Medicare
0-4	50.8	9.0	*	33.0	22.5	3.1	.	88.4
5-9	51.2	3.4	*	34.9	19.9	6.5	.	88.8
10-14	44.5	2.2	*	33.3	25.6	7.9	.	89.3
15-19	39.6	2.3	*	31.4	23.4	13.8	.	87.4
20-29	34.2	7.9	0.2	26.5	15.3	25.1	*	88.1
30-39	32.4	14.0	0.4	32.0	13.4	20.5	*	87.1
40-49	30.9	18.3	1.0	32.7	14.8	17.1	*	86.8
50-59	28.0	26.1	2.3	33.4	18.6	11.6	*	84.6
60-64	27.0	34.6	1.7	29.2	23.8	9.4	*	82.8
65-69	24.0	85.4	1.4	16.3	36.1	2.1	*	69.1
70-74	20.6	88.0	1.5	13.7	43.4	1.7	*	67.9
75-79	18.1	89.9	1.3	13.4	47.9	1.5	*	66.8
80-84	16.3	90.7	1.1	11.9	51.7	1.3	*	66.0
85+	17.9	91.5	0.6	10.0	52.3	1.2	*	
0-19	44.0	3.5	*	32.5	23.4	9.7	.	88.2
20-44	32.3	13.8	0.5	31.0	14.2	20.6	*	87.3
45-64	28.2	27.4	1.9	32.1	19.5	11.8	*	84.4
65-74	22.2	86.7	1.4	15.0	39.8	1.9	*	68.5
75+	17.4	90.5	1.1	12.2	50.0	1.4	*	66.4
Male	19.3	54.8	2.4	24.4	32.4	8.9	0.0	76.6
Female	31.2	57.2	0.2	20.7	30.7	6.5	0.0	76.1
White	19.1	61.5	1.3	23.6	38.2	6.0	0.0	75.5
Black/Af Am	34.4	47.1	1.6	21.6	17.8	11.3	*	77.6
N Am/Alas Native	41.4	43.6	1.4	14.4	33.8	7.6	.	89.7
Asian	37.0	46.0	0.6	24.5	24.7	8.6	*	75.2
Pacific Islander	32.4	41.2	1.5	27.4	25.3	8.5	.	78.3
Mid.-east./Arabian	45.1	40.0	*	18.7	18.2	12.2	.	69.3
Ind. Subcont.	33.2	30.0	.	25.9	22.9	14.4	.	74.6
Other/multiracial	30.9	40.7	1.3	13.0	32.2	12.3	.	78.0
Unknown	29.7	47.8	*	14.9	27.3	14.1	.	78.4
Hispanic, Mexican	40.6	40.3	0.9	16.2	17.0	16.9	.	81.7
Hispanic, other	35.3	45.9	1.5	12.6	29.3	9.8	.	77.1
Hispanic, non-spec.	42.5	42.9	*	12.4	15.5	19.7	*	64.8
Non-Hispanic	22.7	57.9	1.4	23.9	33.1	6.9	0.0	75.8
Unknown	18.4	53.2	*	18.2	37.2	10.4	.	80.6
Diabetes	28.7	57.7	1.6	21.5	29.4	6.6	0.0	76.9
Hypertension	22.4	63.4	1.2	18.4	35.1	8.7	*	73.6
Glomerulonephritis	18.8	36.3	1.1	34.0	29.1	10.8	*	80.9
Cystic kidney	13.6	29.6	1.4	46.4	27.5	7.2	*	82.1
Other urologic	21.7	56.8	1.5	23.2	32.8	7.6	.	77.0
Other cause	22.5	49.7	1.3	26.1	33.4	7.6	*	76.9
Unknown cause	21.8	56.2	1.6	19.8	34.2	11.0	*	75.3
Missing	*	*	.	*	.	.	.	*
All	24.7	55.9	1.4	22.7	31.6	7.8	0.0	76.3
Total N	75,141	170,045	4,214	69,088	96,159	23,755	26	232,129

Table C.3 (continued)

Insurance coverage in the incident population (%)

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

2005-2007	Medicaid	Medicare	DVA	EGHP	Other	None	Medicare Advantage	Applying for Medicare
0-4	52.7	10.1	*	35.2	15.2	2.4	*	87.6
5-9	53.8	2.8	.	36.3	16.5	5.8	*	85.3
10-14	47.7	2.6	*	37.5	19.3	5.7	.	86.6
15-19	44.9	1.6	*	31.8	17.0	12.1	*	86.0
20-29	36.0	7.8	0.4	28.2	11.1	24.8	0.2	86.8
30-39	33.1	13.0	0.5	34.4	10.1	19.7	0.5	86.7
40-49	31.9	18.1	0.9	35.3	10.5	17.1	0.6	86.0
50-59	28.6	25.5	2.5	36.3	13.2	11.7	1.2	83.9
60-64	26.7	33.8	2.8	34.1	16.7	8.7	2.0	81.9
65-69	23.7	81.1	1.5	19.9	27.8	1.8	5.5	68.7
70-74	21.0	83.4	1.7	17.7	32.6	1.3	6.5	67.4
75-79	18.5	84.9	1.5	17.1	37.7	1.0	6.6	66.2
80-84	16.1	86.2	1.5	16.3	40.9	0.7	6.3	64.8
85+	17.0	86.9	1.1	14.5	42.9	0.9	5.7	
0-19	47.9	3.5	*	34.2	17.2	8.1	*	86.4
20-44	33.3	13.3	0.6	33.5	10.3	20.2	0.4	86.6
45-64	28.6	26.9	2.3	35.5	13.8	11.6	1.3	83.6
65-74	22.4	82.3	1.6	18.8	30.2	1.5	6.0	68.1
75+	17.4	85.7	1.4	16.3	39.9	0.9	6.3	65.4
Male	20.0	51.6	2.7	28.3	24.4	8.5	3.6	75.9
Female	31.5	54.3	0.3	24.1	23.3	6.4	3.6	75.6
White	20.3	57.2	1.6	27.3	28.7	5.9	4.1	74.8
Black/Af Am	34.0	44.9	1.9	24.8	12.8	11.4	2.4	77.8
N Am/Alas Native	38.8	41.0	2.1	16.5	30.8	7.3	1.0	89.3
Asian	37.0	42.7	0.6	27.2	18.9	7.3	3.0	73.0
Pacific Islander	32.3	34.1	1.6	27.6	21.1	9.8	1.9	78.6
Mid.-east./Arabian	44.9	42.5	.	11.0	27.6	11.8	.	63.0
Ind. Subcont.	35.3	26.3	.	28.2	17.9	14.1	.	75.0
Other/multiracial	32.8	43.3	2.2	19.8	30.9	11.3	4.3	76.5
Unknown	32.2	41.7	*	11.4	20.5	23.5	.	69.3
Hispanic, Mexican	40.2	39.5	0.6	16.2	16.7	17.4	.	77.3
Hispanic, other	34.3	45.1	1.7	12.1	31.0	10.0	.	72.9
Hispanic, non-spec.	38.6	38.0	1.2	17.8	15.5	12.8	5.2	77.8
Non-Hispanic	23.0	55.0	1.8	27.8	25.1	6.7	3.4	75.5
Unknown	29.0	44.8	*	14.2	23.5	23.5	.	63.9
Diabetes	28.8	54.6	1.9	24.9	21.9	6.4	3.7	76.1
Hypertension	22.8	59.7	1.5	22.2	26.8	8.7	4.0	73.7
Glomerulonephritis	19.3	33.4	1.7	39.2	21.6	10.0	2.3	80.0
Cystic kidney	12.8	27.4	1.3	52.2	19.9	7.4	1.8	81.1
Other urologic	22.1	52.3	1.8	26.2	25.2	7.7	3.8	76.4
Other cause	23.1	47.7	1.3	30.4	25.6	7.0	3.1	76.5
Unknown cause	24.3	51.6	1.8	22.5	26.6	10.0	3.2	72.8
Missing	.	.	.	.	*	.	.	*
All	25.1	52.8	1.7	26.4	23.9	7.6	3.6	75.8
Total N	81,765	171,976	5,470	86,174	77,823	24,644	11,609	246,886

Table C.3 (continued)

Insurance coverage in the incident population (%)

incident patients with completed Medical Evidence forms, by age, gender, race, ethnicity, & primary diagnosis

2008-2010	Medicaid	Medicare	DVA	EGHP	Other	None	Medicare Advantage	Applying for Medicare
0-4	54.3	11.6	*	35.5	15.6	2.6	*	85.3
5-9	60.8	3.5	*	31.1	15.8	*	*	85.6
10-14	54.5	2.2	*	32.9	15.4	5.3	*	85.1
15-19	42.0	2.6	*	33.6	18.4	12.5	*	83.9
20-29	37.4	8.0	0.3	26.6	10.5	25.5	0.4	86.4
30-39	34.6	13.4	0.4	31.9	9.2	21.1	0.8	85.9
40-49	33.0	17.7	1.0	33.8	9.7	17.3	1.4	84.8
50-59	30.2	24.9	2.3	34.3	11.7	12.2	2.6	82.9
60-64	25.7	32.0	3.8	33.3	15.6	8.7	4.2	80.9
65-69	22.7	75.6	2.0	18.8	23.1	1.3	11.3	69.3
70-74	20.7	78.1	1.9	16.0	28.3	0.9	12.8	67.2
75-79	17.9	79.8	1.9	15.2	32.3	0.7	13.0	67.1
80-84	16.1	81.8	1.7	14.2	36.3	0.5	12.2	65.8
85+	16.5	82.9	1.4	13.0	38.0	0.4	11.5	
0-19	49.1	4.4	*	33.5	16.9	7.9	0.4	84.6
20-44	34.6	13.3	0.5	31.5	9.6	21.0	0.8	85.6
45-64	29.2	26.2	2.6	33.9	12.6	11.8	2.9	82.6
65-74	21.7	76.8	2.0	17.4	25.7	1.1	12.0	68.3
75+	16.9	81.2	1.7	14.3	35.0	0.6	12.4	66.1
Male	20.6	48.8	3.1	26.4	21.4	8.4	7.1	75.5
Female	31.3	51.5	0.4	22.8	20.4	6.4	7.2	75.4
White	21.0	53.7	1.9	25.3	24.8	6.1	8.1	74.3
Black/Af Am	33.3	43.2	2.3	23.9	11.9	10.9	5.5	77.8
N Am/Alas Native	35.0	41.3	1.6	15.2	32.9	8.3	1.5	87.9
Asian	36.8	41.9	0.7	25.7	17.9	7.2	4.9	73.3
Pacific Islander	30.7	32.4	2.2	25.3	20.2	10.3	3.2	79.6
Mid.-east./Arabian	.	.	.	.	.	.	.	.
Ind. Subcont.	.	.	.	.	.	.	.	.
Other/multiracial	36.4	43.2	1.3	27.2	23.0	8.7	9.8	79.4
Unknown	.	.	.	.	.	.	.	.
Hispanic, Mexican	.	.	.	.	.	.	.	.
Hispanic, other	.	.	.	.	.	.	.	.
Hispanic, non-spec.	39.0	35.3	1.3	16.6	13.3	13.0	8.7	76.9
Non-Hispanic	23.0	52.4	2.1	26.2	22.2	6.6	6.9	75.3
Unknown	.	.	.	.	.	.	.	.
Diabetes	29.0	51.1	2.2	23.0	19.0	6.7	7.6	75.9
Hypertension	23.1	55.8	1.8	21.1	23.3	8.5	7.8	73.9
Glomerulonephritis	19.3	32.1	1.9	37.7	19.7	9.9	4.6	79.2
Cystic kidney	14.6	26.0	1.4	51.4	17.6	7.2	3.3	80.3
Other urologic	21.8	50.5	2.1	24.8	22.7	7.7	7.7	76.0
Other cause	23.1	46.6	1.7	28.9	23.0	6.7	6.3	75.2
Unknown cause	23.3	50.3	2.3	22.6	22.7	9.7	6.6	73.8
Missing	.	.	.	.	.	.	.	.
All	25.3	50.0	2.0	24.9	21.0	7.6	7.1	75.5
Total N	86,167	170,499	6,658	84,750	71,510	25,768	24,349	257,468

Table C.4

Incident patient comorbidity (%)

incident patients with completed Medical Evidence forms (old forms); percent with comorbidity in each year

2002-2006	CHF	ASHD	Other cardiac disease	CVA/TIA	PVD	History of HTN	Ampu-tation	DM on insulin	DM oral med.	DM w/o meds	Diabetic retinopathy	COPD	Current smoker
0-4	6.2	1.5	1.8	1.6	2.3	29.0	*	3.8	1.4	*	*	1.2	1.0
5-9	2.2	*	1.8	*	*	32.5	*	*	*	.	*	*	*
10-14	2.4	*	1.4	*	*	38.7	.	1.2	*	.	*	*	*
15-19	3.5	*	1.2	0.7	0.4	51.2	*	2.1	*	*	*	*	1.7
20-29	8.2	0.4	1.5	1.2	1.5	72.6	0.3	13.8	0.5	0.4	1.8	0.6	5.5
30-39	12.3	1.1	1.6	2.5	3.9	78.6	0.7	23.6	1.7	0.9	3.4	1.2	7.4
40-49	18.8	2.9	2.7	5.0	7.4	81.2	1.2	27.4	3.3	1.5	3.9	3.0	9.4
50-59	27.3	5.8	4.1	8.0	12.2	82.3	1.6	33.0	4.8	1.9	4.5	5.9	7.7
60-64	33.3	7.9	5.2	10.0	15.5	82.1	1.5	33.1	5.6	2.1	4.1	8.9	6.2
65-69	36.6	8.9	5.9	11.6	17.6	82.2	1.2	30.7	5.7	2.0	3.5	10.5	5.0
70-74	39.2	9.9	6.4	12.1	18.5	81.6	1.1	26.9	5.5	2.2	2.6	11.7	4.1
75-79	42.1	10.8	7.1	12.4	19.2	81.5	0.8	22.4	5.2	2.2	2.0	12.6	2.9
80-84	44.3	11.6	7.8	12.6	18.5	81.2	0.6	16.8	5.0	2.1	1.3	11.6	1.8
85+	46.6	11.8	8.4	11.9	16.2	80.2	0.5	11.6	4.1	2.0	0.8	10.6	1.1
0-19	3.5	0.4	1.4	0.8	0.7	42.3	*	2.0	0.4	*	0.2	0.5	1.1
20-44	13.0	1.4	1.8	2.8	4.3	78.1	0.8	22.4	1.9	1.0	3.3	1.4	7.7
45-64	27.9	6.0	4.2	8.2	12.5	82.1	1.5	32.2	4.8	1.9	4.2	6.4	7.6
65-74	37.9	9.4	6.1	11.9	18.1	81.9	1.2	28.8	5.6	2.1	3.0	11.1	4.5
75+	43.7	11.3	7.6	12.4	18.4	81.1	0.7	18.4	4.9	2.2	1.5	11.9	2.2
Male	31.1	8.1	5.6	9.1	15.1	80.0	1.3	24.7	4.7	1.9	3.0	8.8	6.3
Female	33.3	6.7	4.8	9.6	12.9	81.7	0.8	28.1	4.5	1.9	3.2	7.5	4.3
White	34.2	9.0	6.1	9.5	16.4	78.9	1.1	26.5	4.8	1.8	3.3	10.1	5.4
Black/Af Am	28.7	4.7	3.9	9.5	9.8	85.2	1.1	25.9	4.3	2.0	2.6	5.1	6.2
N Am/Alas Native	32.1	6.4	3.5	8.0	17.4	84.6	2.2	38.6	6.0	3.1	6.4	5.2	6.2
Asian	23.7	7.0	4.0	7.6	6.7	81.0	0.5	20.6	7.2	2.3	3.4	2.6	1.7
Pacific Islander	28.2	5.7	3.4	8.3	9.2	84.3	0.9	26.2	6.1	2.4	4.0	3.3	3.0
Mid.-east./Arabian	29.2	.	.	6.9	8.8	72.5	.	17.4	.	.	.	5.0	3.4
Ind. Subcont.	25.4	*	*	6.8	7.9	78.9	.	22.8	*	*	*	2.2	1.0
Other/multiracial	26.8	2.1	1.1	6.3	13.8	79.8	0.3	24.0	1.1	0.4	1.0	2.9	2.5
Unknown	31.6	.	.	8.1	12.6	75.1	.	21.2	.	.	.	7.1	3.5
Hispanic, Mexican	26.4	*	*	6.2	10.7	80.5	.	23.2	*	*	.	2.6	1.9
Hispanic, other	27.9	*	*	6.7	13.6	79.6	.	24.1	.	*	.	3.8	2.1
Hispanic, non-spec.	29.2	18.2	9.9	7.7	13.4	83.0	3.8	38.2	17.1	5.7	13.8	3.6	2.8
Non-Hispanic	32.8	7.7	5.5	9.7	14.4	80.8	1.1	25.9	4.4	1.9	2.8	8.9	5.9
Unknown	35.6	.	.	8.8	19.2	75.0	.	21.3	.	.	.	10.0	5.0
Diabetes	39.2	8.9	5.4	10.8	18.6	83.2	1.9	49.6	7.5	2.4	6.4	7.7	4.5
Hypertension	33.1	7.7	5.7	10.7	14.1	88.7	0.4	7.9	2.5	1.7	0.5	10.1	6.3
Glomerulonephritis	16.0	3.6	3.0	4.7	5.4	79.2	0.2	4.1	1.5	1.2	0.2	5.8	6.5
Cystic kidney	7.9	2.8	2.6	4.4	3.5	82.5	0.1	2.3	1.2	0.7	*	3.5	5.7
Other urologic	16.3	4.9	3.4	5.6	7.2	63.2	0.4	4.8	1.8	1.2	0.2	8.0	6.7
Other cause	22.2	5.7	5.2	5.9	8.0	63.1	0.5	8.4	2.3	1.4	0.4	7.6	5.9
Unknown cause	28.2	6.6	5.9	7.6	9.0	63.2	0.6	8.8	3.0	1.7	0.7	9.4	5.6
Missing	*	*	.	*	*	*	*	*	*	.	.	*	.
All	32.1	7.5	5.2	9.4	14.1	80.8	1.1	26.2	4.6	1.9	3.1	8.2	5.4
Total N	166,988	38,985	27,101	48,625	73,422	420,040	5,682	136,297	23,981	9,793	16,040	42,645	28,100

Table C.4 (continued)

Incident patient comorbidity (%)

incident patients with completed Medical Evidence forms (old form); percent with comorbidity in each year

2002-2006	Malig. neoplasm	Toxic neph.	Alcohol depend.	Drug depend.	Inability to ambulate	Inabilitiy to transfer	Needs assist. daily act.	Institu-tionalized	Instit. assist. living	Instit. nursing home	Instit. other inst.	Non-renal congen. abnormality	None
0-4	2.0	.	*	*	5.6	3.5	4.4	*	*	*	*	2.0	10.5
5-9	1.5	*	*	*	3.1	1.5	2.4	.	.	.	.	2.9	11.5
10-14	1.2	*	*	.	2.1	1.0	1.6	.	.	*	.	1.3	11.0
15-19	0.7	*	*	0.7	1.5	0.8	1.3	*	*	*	*	1.3	10.4
20-29	0.7	0.2	0.7	2.3	1.4	0.5	1.2	0.4	*	0.2	0.2	0.6	3.8
30-39	1.3	0.2	1.8	3.5	1.7	0.6	1.4	0.5	0.1	0.3	0.2	0.3	2.0
40-49	2.3	0.2	3.2	4.0	2.6	0.9	1.9	1.0	0.1	0.9	0.2	0.1	1.2
50-59	4.3	0.2	2.3	1.7	4.2	1.5	2.8	1.5	0.1	1.4	0.2	0.1	0.8
60-64	6.2	0.2	1.5	0.4	4.9	2.0	3.4	1.8	0.1	1.8	0.2	0.0	0.6
65-69	7.7	0.2	1.1	0.2	5.7	2.4	3.8	2.3	0.2	2.2	0.2	0.0	0.5
70-74	9.1	0.2	0.8	0.1	6.2	2.7	4.3	2.7	0.2	2.7	0.2	0.0	0.5
75-79	10.5	0.1	0.6	0.1	6.9	3.0	4.9	3.3	0.3	3.3	0.2	0.0	0.4
80-84	10.9	0.1	0.3	0.0	7.4	3.3	5.7	4.2	0.4	4.0	0.2	0.0	0.4
85+	10.9	0.1	0.2	*	8.8	4.2	7.0	5.5	0.8	5.2	0.2	*	0.5
0-19	1.1	*	0.2	0.3	2.5	1.4	2.0	0.3	*	0.2	*	1.6	10.7
20-44	1.4	0.2	2.1	3.6	1.8	0.6	1.5	0.6	0.1	0.4	0.2	0.3	2.1
45-64	4.5	0.2	2.2	1.7	4.2	1.6	2.8	1.6	0.1	1.5	0.2	0.1	0.8
65-74	8.4	0.2	0.9	0.1	6.0	2.5	4.1	2.5	0.2	2.4	0.2	0.0	0.5
75+	10.7	0.1	0.4	0.1	7.4	3.3	5.6	4.0	0.4	3.9	0.2	0.0	0.4
Male	7.3	0.2	2.0	1.5	4.6	1.9	3.2	2.0	0.2	1.9	0.2	0.1	0.9
Female	5.7	0.1	0.6	0.7	5.8	2.5	4.2	2.6	0.2	2.5	0.2	0.1	0.9
White	7.8	0.2	1.2	0.5	5.3	2.2	3.9	2.5	0.3	2.3	0.2	0.1	1.0
Black/Af Am	4.6	0.1	2.0	2.7	5.0	2.2	3.5	2.1	0.1	2.1	0.2	0.1	0.7
N Am/Alas Native	3.1	*	3.9	1.0	4.0	1.2	3.1	1.1	*	1.1	*	*	0.4
Asian	3.7	0.2	0.2	*	3.8	1.8	3.1	1.3	0.1	1.4	0.1	*	1.6
Pacific Islander	2.6	*	0.6	0.3	3.7	1.5	2.4	0.6	*	0.7	*	*	0.9
Mid.-east./Arabian	2.5	.	*	*	4.5	1.8	.	.	.	.	.	.	.
Ind. Subcont.	1.9	.	*	*	3.2	1.1	.	.	.	.	.	.	.
Other/multiracial	3.1	*	1.0	0.9	4.4	1.5	0.9	0.4	*	0.4	*	*	0.3
Unknown	4.0	.	1.4	1.1	3.6	1.7	.	.	.	.	.	.	.
Hispanic, Mexican	2.3	*	1.1	0.6	3.2	1.1	.	.	.	.	.	.	.
Hispanic, other	3.4	.	0.9	0.8	4.0	1.6	.	.	.	.	.	.	.
Hispanic, non-spec.	3.6	0.3	1.4	0.9	6.6	3.2	10.3	3.4	0.3	3.6	0.3	0.2	4.0
Non-Hispanic	7.1	0.2	1.4	1.2	5.2	2.2	3.7	2.4	0.2	2.3	0.2	0.1	0.9
Unknown	7.8	.	1.6	*	4.9	2.9	.	.	.	.	.	.	.
Diabetes	4.0	0.1	0.8	0.6	6.1	2.4	4.1	2.4	0.2	2.3	0.1	0.0	0.2
Hypertension	6.2	0.1	1.6	1.4	4.3	1.8	3.4	2.4	0.2	2.3	0.2	0.1	0.4
Glomerulonephritis	5.0	0.1	1.6	1.7	2.0	0.7	1.5	0.9	0.1	0.8	0.1	0.1	2.0
Cystic kidney	3.6	*	0.6	0.5	0.9	0.4	0.7	0.4	0.1	0.2	0.1	0.2	2.3
Other urologic	20.1	*	1.5	0.5	6.7	2.7	3.6	2.3	0.3	2.1	0.2	0.5	2.8
Other cause	16.3	0.8	2.9	2.3	5.8	2.8	4.2	2.6	0.2	2.3	0.3	0.3	2.7
Unknown cause	9.0	0.2	2.6	1.7	6.1	2.9	4.3	3.2	0.3	3.1	0.3	0.2	3.8
Missing	.	.	.	.	*	*	.	.	.	.	.	.	.
All	6.6	0.2	1.4	1.1	5.1	2.1	3.7	2.3	0.2	2.2	0.2	0.1	0.9
Total N	34,256	855	7,325	5,882	26,593	11,129	18,986	11,819	1,084	11,270	908	519	4,865

Table C.4 (continued)

Incident patient comorbidity (%)

incident patients with completed Medical Evidence forms (new form); percent with comorbidity in each year

2007-2010	CHF	ASHD	Other cardiac disease	CVA/TIA	PVD	History of HTN	Ampu-tation	DM on insulin	DM oral med.	DM w/o meds	Diabetic retinopathy	COPD	Current smoker
0-4	5.1	2.7	5.7	2.3	2.5	34.0	*	5.7	2.4	1.4	1.2	2.2	*
5-9	2.4	*	3.8	*	*	35.0	*	2.2	.	*	.	.	.
10-14	1.0	*	3.5	*	*	41.7	*	1.1	*	*	*	*	*
15-19	2.6	*	3.6	0.8	*	56.1	*	2.9	0.5	0.4	*	*	1.7
20-29	7.5	1.3	4.1	1.5	1.7	76.8	0.9	17.6	2.0	1.2	5.3	0.7	7.2
30-39	12.2	3.6	5.9	2.8	4.3	83.3	2.3	31.3	4.9	2.7	10.0	1.5	8.0
40-49	19.0	8.4	8.6	5.1	7.6	85.0	3.6	36.6	9.3	4.1	10.8	3.6	10.1
50-59	26.5	15.2	12.5	8.2	11.5	85.5	4.2	42.6	13.1	4.9	11.6	6.7	9.1
60-64	32.1	21.2	16.3	10.1	14.5	85.9	4.1	45.1	15.1	5.3	11.2	9.6	7.1
65-69	35.3	24.7	19.0	11.1	16.5	86.0	3.5	42.4	15.6	5.6	9.2	11.5	5.8
70-74	38.2	27.5	21.3	11.9	17.4	85.9	3.0	38.6	15.8	5.7	7.4	12.8	4.7
75-79	41.5	30.0	23.9	11.7	18.1	85.6	2.1	32.6	15.2	6.0	5.2	13.3	3.2
80-84	43.8	31.9	25.9	11.9	17.9	85.2	1.5	26.1	13.9	5.8	3.5	13.0	2.1
85+	46.7	30.9	27.0	11.3	15.7	85.3	1.1	18.7	11.0	5.2	2.2	11.4	1.1
0-19	2.7	1.0	4.0	1.2	0.9	46.4	0.4	3.0	0.8	0.6	0.5	0.7	1.0
20-44	13.0	4.2	6.1	3.1	4.6	82.5	2.4	29.8	5.5	2.8	9.3	1.8	8.3
45-64	27.2	16.2	13.2	8.4	11.9	85.6	4.1	42.6	13.3	4.9	11.4	7.2	8.8
65-74	36.7	26.1	20.1	11.5	16.9	86.0	3.3	40.6	15.7	5.6	8.3	12.1	5.3
75+	43.5	30.8	25.3	11.7	17.5	85.4	1.7	27.2	13.8	5.7	3.9	12.7	2.3
Male	30.9	22.0	17.8	9.0	14.4	84.3	3.6	34.6	13.0	4.9	8.2	9.2	7.0
Female	32.3	18.6	15.7	9.5	12.2	85.5	2.3	38.4	12.7	5.1	8.7	8.8	5.1
White	32.9	23.6	18.9	9.0	15.3	83.0	3.1	36.0	12.7	4.6	8.7	10.6	5.9
Black/Af Am	29.4	13.8	12.9	10.0	9.9	88.8	3.0	36.5	12.1	5.6	7.1	6.2	7.4
N Am/Alas Native	28.7	18.6	11.2	7.6	17.0	86.9	7.5	51.0	18.6	7.4	19.9	5.1	7.0
Asian	24.6	16.8	13.0	8.0	6.9	86.3	1.0	30.6	18.3	5.8	8.4	3.8	2.1
Pacific Islander	28.5	16.2	15.3	7.7	9.5	85.8	3.8	42.0	20.6	6.2	13.8	4.1	5.0
Mid.-east./Arabian	.	.	.	.	.	.	.	.	.	.	.	.	.
Ind. Subcont.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other/multiracial	28.9	22.0	13.6	9.8	14.6	84.7	3.6	40.1	12.7	4.4	13.0	5.6	4.7
Unknown	.	*	.	.	.	*	.	.	.	.	.	.	.
Hispanic, Mexican	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, other	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, non-spec.	27.2	17.5	11.0	7.2	13.5	85.7	3.8	42.5	17.1	5.0	13.6	3.6	2.7
Non-Hispanic	32.2	21.0	17.9	9.5	13.4	84.6	2.9	35.2	12.2	5.0	7.6	9.9	6.8
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.
Diabetes	38.0	24.5	17.5	10.7	17.8	87.1	5.4	65.5	20.6	5.9	17.3	8.8	5.3
Hypertension	32.5	20.4	18.7	10.3	12.6	91.0	1.2	13.9	7.6	4.8	1.5	10.3	7.0
Glomerulonephritis	15.3	11.5	10.2	4.4	5.5	84.2	0.6	7.1	5.0	3.5	0.8	6.4	7.5
Cystic kidney	7.5	7.9	8.2	4.3	3.0	86.3	0.3	3.7	3.4	2.3	0.3	3.5	6.0
Other urologic	15.9	13.3	11.3	5.3	7.2	70.6	1.2	7.6	5.1	4.0	0.8	8.7	7.7
Other cause	22.8	15.8	16.5	6.0	8.3	69.6	1.3	14.5	6.2	3.7	1.3	9.0	6.7
Unknown cause	27.6	16.7	17.0	8.0	8.5	69.1	1.3	14.1	6.7	4.5	1.5	10.4	6.2
Missing	.	.	.	.	.	.	.	.	.	.	.	.	.
All	31.5	20.5	16.9	9.2	13.5	84.8	3.0	36.2	12.9	5.0	8.4	9.0	6.2
Total N	142,220	92,634	76,231	41,536	60,736	382,656	13,707	163,430	58,123	22,518	37,962	40,696	27,924

Table C.4 (continued)

Incident patient comorbidity (%)

incident patients with completed Medical Evidence forms (new form); percent with comorbidity in each year

2007-2010	Malig. neoplasm	Toxic neph.	Alcohol depend.	Drug depend.	Inability to ambulate	Inabilitiy to transfer	Needs assist. daily act.	Institu-tionalized	Instit. assist. living	Instit. nursing home	Instit. other inst.	Non-renal congen. abnormality	None
0-4	2.9	*	*	*	5.1	3.8	11.5	1.5	*	*	*	8.6	36.5
5-9	3.8	*	.	.	3.6	2.0	7.4	*	.	*	.	8.5	36.4
10-14	1.2	*	.	*	3.0	1.2	5.8	*	.	.	*	6.5	38.4
15-19	1.0	*	*	0.5	1.5	0.7	4.0	0.6	.	*	0.4	4.3	28.4
20-29	1.0	0.6	1.1	3.0	1.7	0.9	4.2	1.2	0.2	0.8	0.5	1.7	10.6
30-39	1.4	0.5	2.1	3.4	2.2	1.0	4.5	1.8	0.2	1.4	0.5	0.7	4.9
40-49	2.5	0.6	3.3	4.0	3.3	1.5	6.1	3.0	0.3	2.5	0.6	0.5	3.0
50-59	4.7	0.5	2.9	2.4	5.2	2.4	8.7	4.8	0.3	4.4	0.5	0.3	2.0
60-64	6.8	0.5	1.8	0.8	6.7	3.2	11.0	6.1	0.4	5.8	0.5	0.2	1.5
65-69	8.8	0.5	1.3	0.3	7.9	4.0	12.5	7.5	0.5	7.4	0.5	0.1	1.3
70-74	10.2	0.4	0.8	0.1	8.6	4.6	14.1	9.0	0.6	8.8	0.5	0.1	1.2
75-79	11.7	0.3	0.6	0.1	9.4	5.2	16.2	10.9	0.8	10.7	0.6	0.1	1.1
80-84	12.5	0.3	0.3	0.1	10.6	5.8	18.5	13.4	1.3	12.9	0.7	0.1	1.1
85+	11.6	0.2	0.2	0.1	12.6	7.1	22.1	16.8	2.2	15.8	0.7	0.1	1.1
0-19	1.7	0.3	*	0.3	2.7	1.5	6.2	0.7	*	0.3	0.4	6.1	33.0
20-44	1.6	0.6	2.1	3.5	2.4	1.1	4.8	2.0	0.2	1.6	0.5	0.9	5.5
45-64	5.1	0.5	2.7	2.2	5.4	2.5	9.0	5.0	0.4	4.6	0.5	0.3	2.0
65-74	9.5	0.4	1.1	0.2	8.2	4.3	13.3	8.3	0.5	8.1	0.5	0.1	1.3
75+	11.9	0.3	0.4	0.1	10.5	5.8	18.3	13.1	1.3	12.6	0.6	0.1	1.1
Male	8.1	0.5	2.3	1.7	6.1	3.0	10.4	6.5	0.5	6.1	0.6	0.3	2.4
Female	6.3	0.5	0.8	0.9	8.1	4.3	13.7	8.5	0.7	8.2	0.5	0.3	2.4
White	8.5	0.5	1.5	0.8	7.3	3.6	12.4	7.8	0.7	7.3	0.6	0.4	2.6
Black/Af Am	5.4	0.3	2.0	2.9	6.6	3.6	10.9	7.0	0.3	6.9	0.5	0.3	1.8
N Am/Alas Native	4.0	0.3	4.4	1.8	5.7	2.3	9.3	4.8	0.3	4.5	0.3	*	1.5
Asian	3.8	0.3	0.3	0.1	5.0	2.7	9.3	4.3	0.4	4.2	0.3	0.2	3.4
Pacific Islander	2.9	0.3	0.7	0.4	5.3	3.0	10.4	3.3	0.3	3.0	0.3	0.4	2.8
Mid.-east./Arabian	.	.	.	.	.	.	.	.	.	.	.	.	.
Ind. Subcont.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other/multiracial	5.9	*	1.4	1.6	5.6	2.3	10.2	5.7	*	5.4	*	*	2.6
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, Mexican	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, other	.	.	.	.	.	.	.	.	.	.	.	.	.
Hispanic, non-spec.	3.6	0.3	1.5	1.0	6.3	3.2	11.2	3.9	0.3	3.8	0.3	0.3	3.2
Non-Hispanic	8.0	0.5	1.7	1.4	7.1	3.6	11.9	7.9	0.7	7.5	0.6	0.3	2.3
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.
Diabetes	4.6	0.2	0.9	0.8	8.0	3.9	13.1	7.6	0.6	7.4	0.5	0.1	0.4
Hypertension	7.1	0.2	1.7	1.6	6.1	3.3	11.4	7.7	0.7	7.3	0.5	0.2	1.2
Glomerulonephritis	5.4	0.3	1.7	1.7	2.5	1.1	5.0	2.7	0.3	2.3	0.4	0.5	6.0
Cystic kidney	3.9	0.1	0.7	0.7	1.2	0.5	2.5	1.2	0.1	1.1	0.2	0.9	6.2
Other urologic	20.8	0.4	1.6	0.8	9.1	4.4	13.2	7.8	0.8	7.0	0.9	1.4	7.7
Other cause	17.1	2.0	3.8	2.5	8.2	4.6	13.4	8.7	0.7	8.1	0.9	1.0	6.8
Unknown cause	9.4	0.6	2.7	1.9	7.5	4.4	12.4	9.3	0.7	8.7	0.9	0.5	8.5
Missing	.	.	.	.	.	.	.	.	.	.	.	.	.
All	7.4	0.5	1.6	1.3	7.0	3.6	11.8	7.4	0.6	7.0	0.5	0.3	2.4
Total N	33,178	2,046	7,406	6,018	31,394	16,048	53,316	33,272	2,759	31,622	2,434	1,452	10,751

Table C.5

Prescribed therapy for hemodialysis patients (item 23 on ME Form)

incident patients with completed Medical Evidence forms

	Sessions per week				Hours per session			
2005-2007	1-2	3	4	5 +	1-2	3	4	5 +
0-4	*	81.4	9.0	6.8	9.6	54.2	34.5	*
5-9	*	87.9	*	*	*	68.1	26.7	*
10-14	4.1	93.0	*	*	4.4	66.7	28.9	*
15-19	2.8	94.8	1.4	0.9	0.8	50.7	48.0	*
20-29	0.6	97.3	1.4	0.6	0.7	35.3	63.0	1.0
30-39	0.8	97.4	1.6	0.2	0.4	32.0	66.0	1.6
40-49	0.9	97.5	1.5	0.2	0.5	32.5	65.7	1.4
50-59	1.1	97.5	1.3	0.1	0.4	33.6	64.7	1.3
60-64	1.1	97.6	1.2	0.1	0.4	34.7	63.8	1.0
65-69	1.3	97.4	1.3	0.1	0.5	36.5	62.2	0.8
70-74	1.6	97.3	1.1	0.0	0.6	38.4	60.3	0.8
75-79	1.7	97.0	1.2	0.1	0.6	41.8	57.1	0.5
80-84	2.5	96.5	1.0	*	0.7	45.3	53.5	0.5
85+	3.1	96.1	0.7	*	1.1	50.5	48.1	0.3
0-19	3.1	92.7	2.8	1.4	2.6	55.2	41.7	0.6
20-44	0.8	97.4	1.5	0.3	0.5	32.9	65.2	1.4
45-64	1.1	97.5	1.3	0.1	0.4	33.7	64.7	1.2
65-74	1.4	97.3	1.2	0.1	0.5	37.4	61.2	0.8
75+	2.3	96.7	1.0	0.0	0.7	44.9	53.9	0.5
Male	1.3	97.2	1.3	0.1	0.5	34.9	63.4	1.2
Female	1.7	97.1	1.1	0.1	0.7	41.1	57.6	0.6
White	1.7	97.1	1.1	0.1	0.6	39.1	59.5	0.8
Black/Af Am	0.8	97.5	1.5	0.1	0.4	32.1	66.2	1.3
N Am/Alas Native	1.3	97.6	1.1	*	*	28.9	70.3	0.4
Asian	2.4	96.5	1.0	*	0.8	60.5	38.3	0.4
Pacific Islander	1.1	97.9	0.9	*	0.7	44.7	53.4	1.2
Other/multiracial	1.1	97.3	1.4	*	*	37.3	61.1	1.1
Unknown	.	100.0	.	.	.	100.0	.	.
Hispanic, non-spec.	1.0	97.7	1.2	0.1	0.5	40.9	58.1	0.5
Non-Hispanic	1.5	97.1	1.2	0.1	0.6	37.2	61.3	1.0
Diabetes	1.2	97.4	1.3	0.1	0.4	35.8	62.7	1.0
Hypertension	1.7	97.1	1.2	0.1	0.7	39.4	59.1	0.8
Glomerulonephritis	1.6	97.1	1.1	0.3	0.6	36.7	61.5	1.1
Cystic kidney	1.9	96.8	0.9	0.4	0.8	39.4	59.0	0.9
Other urologic	2.5	96.5	0.9	*	0.7	40.1	58.6	0.6
Other cause	1.5	97.1	1.2	0.2	0.6	38.6	60.1	0.8
Unknown cause	1.7	97.1	1.1	0.1	0.7	43.2	55.2	0.9
Missing								
All	1.5	97.2	1.2	0.1	0.6	37.7	60.9	0.9
Total N	3,860	255,315	3,225	289	1,473	98,937	159,854	2,425

Table C.5 (continued)

Prescribed therapy for hemodialysis patients (item 23 on ME Form)

incident patients with completed Medical Evidence forms

	Sessions per week				Hours per session			
2008-2010	1-2	3	4	5 +	1-2	3	4	5 +
0-4	*	89.0	*	5.3	7.7	48.3	43.1	*
5-9	*	93.8	*	*	7.5	65.1	27.4	*
10-14	5.0	93.4	*	*	4.2	63.9	31.9	*
15-19	2.5	95.5	1.5	*	1.7	48.2	49.5	*
20-29	0.9	97.4	1.1	0.6	0.4	32.8	65.1	1.7
30-39	0.7	97.6	1.4	0.4	0.5	28.4	69.0	2.1
40-49	0.9	97.4	1.3	0.3	0.5	28.3	69.4	1.8
50-59	0.9	97.6	1.2	0.3	0.4	29.0	69.1	1.5
60-64	1.1	97.6	1.1	0.2	0.4	30.5	67.9	1.2
65-69	1.3	97.5	1.0	0.2	0.5	31.6	66.9	1.1
70-74	1.4	97.5	0.9	0.2	0.5	33.6	65.2	0.7
75-79	1.8	97.2	0.9	0.1	0.6	36.5	62.3	0.6
80-84	2.2	97.0	0.7	0.1	0.6	40.1	58.7	0.5
85+	3.0	96.2	0.7	0.1	1.0	46.7	51.9	0.4
0-19	2.9	94.3	1.8	1.0	3.2	52.4	43.9	0.5
20-44	0.8	97.6	1.3	0.4	0.5	29.0	68.5	2.0
45-64	1.0	97.5	1.2	0.3	0.4	29.5	68.7	1.4
65-74	1.4	97.5	1.0	0.2	0.5	32.6	66.1	0.9
75+	2.2	96.9	0.8	0.1	0.7	40.2	58.6	0.5
Male	1.3	97.4	1.1	0.2	0.5	30.5	67.7	1.3
Female	1.6	97.3	1.0	0.2	0.6	36.6	62.0	0.8
White	1.7	97.1	0.9	0.3	0.6	34.3	64.1	0.9
Black/Af Am	0.6	97.9	1.3	0.1	0.4	27.9	70.1	1.6
N Am/Alas Native	1.3	97.5	1.1	*	0.5	23.9	74.9	0.6
Asian	2.2	96.6	1.0	0.2	0.7	54.9	44.0	0.4
Pacific Islander	1.1	96.6	2.0	*	0.9	40.6	57.4	1.1
Other/multiracial	*	98.1	0.8	*	0.6	32.6	65.6	1.2
Unknown								
Hispanic, non-spec.	1.0	98.0	1.0	0.1	0.5	35.7	63.2	0.6
Non-Hispanic	1.5	97.2	1.0	0.2	0.6	32.7	65.6	1.2
Diabetes	1.2	97.6	1.0	0.2	0.4	31.1	67.2	1.2
Hypertension	1.6	97.1	1.2	0.1	0.6	34.9	63.6	1.0
Glomerulonephritis	1.4	97.3	0.9	0.5	0.6	33.7	64.2	1.4
Cystic kidney	2.2	95.5	0.9	1.4	1.2	35.2	62.3	1.2
Other urologic	2.1	96.8	0.9	0.2	0.6	35.2	63.6	0.6
Other cause	1.5	97.3	0.9	0.3	0.6	34.6	63.8	0.9
Unknown cause	1.4	97.4	0.9	0.3	0.7	35.8	62.4	1.1
Missing								
All	1.4	97.3	1	0.2	0.5	33.1	65.2	1.1
Total N	4,365	303,574	3,234	692	1,688	103,295	203,427	3,455

Table D.1

Percentages & counts of reported ESRD patients: by treatment modality

incident & December 31 point prevalent patients

INCIDENT COUNTS	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Modality														
Dialysis	29,993	49,769	69,171	92,810	95,999	98,049	100,684	102,737	104,881	108,506	108,582	110,100	113,776	114,083
Started with a transplant	543	1,100	1,222	1,736	1,821	1,934	1,997	2,246	2,404	2,617	2,643	2,631	2,697	2,863
Dialysis type														
Center hemodialysis	24,008	40,979	58,343	84,695	87,901	90,484	92,956	94,948	97,278	101,097	101,398	102,696	105,717	105,144
Center self hemodialysis	.	.	51	28	45	53	47	28	31	32	44	50	68	87
Home hemodialysis	398	577	740	414	384	274	435	477	445	420	441	525	572	692
CAPD	4,029	5,910	7,288	5,002	4,973	4,676	4,740	4,723	4,704	4,432	4,157	4,160	4,409	4,848
CCPD	138	611	2,118	2,447	2,495	2,345	2,325	2,369	2,230	2,308	2,361	2,447	2,704	2,855
Other PD	582	661	172	86	71	103	70	60	46	33	28	36	30	30
Uncertain dialysis	838	1,031	459	138	130	114	111	132	147	184	153	186	276	427
All	30,536	50,869	70,393	94,546	97,820	99,983	102,681	104,983	107,285	111,123	111,225	112,731	116,473	116,946

PERCENTAGES														
Modality														
Dialysis	98.2	97.8	98.3	98.2	98.1	98.1	98.1	97.9	97.8	97.6	97.6	97.7	97.7	97.6
Started with a transplant	1.8	2.2	1.7	1.8	1.9	1.9	1.9	2.1	2.2	2.4	2.4	2.3	2.3	2.4
Dialysis type														
Center hemodialysis	80.0	82.3	84.3	91.3	91.6	92.3	92.3	92.4	92.8	93.2	93.4	93.3	92.9	92.2
Center self hemodialysis	.	.	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Home hemodialysis	1.3	1.2	1.1	0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.6
CAPD	13.4	11.9	10.5	5.4	5.2	4.8	4.7	4.6	4.5	4.1	3.8	3.8	3.9	4.2
CCPD	0.5	1.2	3.1	2.6	2.6	2.4	2.3	2.3	2.1	2.1	2.2	2.2	2.4	2.5
Other PD	1.9	1.3	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Uncertain dialysis	2.8	2.1	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

POINT PREVALENT COUNTS														
Modality														
Dialysis	86,597	136,134	209,907	284,154	297,263	309,368	321,044	332,514	344,220	357,399	370,527	384,406	399,963	415,013
Functioning graft	26,606	50,709	78,120	108,828	115,347	122,211	128,967	136,370	143,777	151,494	158,728	165,638	172,421	179,361
Dialysis type														
Center hemodialysis	67,580	111,712	174,635	255,247	268,653	280,857	292,078	303,430	314,753	327,554	339,844	352,669	366,498	378,293
Center self hemodialysis	*	.	506	268	317	272	194	185	139	103	142	154	191	196
Home hemodialysis	5,821	2,987	3,070	2,187	1,887	1,763	1,916	2,059	2,227	2,594	3,217	4,014	4,677	5,503
CAPD	10,541	16,905	22,254	13,339	12,563	11,706	11,419	11,053	10,918	10,563	10,040	9,769	9,458	9,717
CCPD	541	1,975	7,794	11,890	12,733	13,697	14,431	14,785	15,171	15,582	16,242	16,748	17,978	20,016
Other PD	859	480	214	74	72	81	58	50	41	38	28	36	39	31
Uncertain dialysis	1,254	2,075	1,434	1,149	1,038	992	948	952	971	965	1,014	1,016	1,122	1,257
All	113,203	186,843	288,027	392,982	412,610	431,579	450,011	468,884	487,997	508,893	529,255	550,044	572,384	594,374

PERCENTAGES														
Modality														
Dialysis	76.5	72.9	72.9	72.3	72.0	71.7	71.3	70.9	70.5	70.2	70.0	69.9	69.9	69.8
Functioning graft	23.5	27.1	27.1	27.7	28.0	28.3	28.7	29.1	29.5	29.8	30.0	30.1	30.1	30.2
Dialysis type														
Center hemodialysis	78.0	82.1	83.2	89.8	90.4	90.8	91.0	91.3	91.4	91.6	91.7	91.7	91.6	91.2
Center self hemodialysis	0.0	.	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Home hemodialysis	6.7	2.2	1.5	0.8	0.6	0.6	0.6	0.6	0.6	0.7	0.9	1.0	1.2	1.3
CAPD	12.2	12.4	10.6	4.7	4.2	3.8	3.6	3.3	3.2	3.0	2.7	2.5	2.4	2.3
CCPD	0.6	1.5	3.7	4.2	4.3	4.4	4.5	4.4	4.4	4.4	4.4	4.4	4.5	4.8
Other PD	1.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncertain dialysis	1.4	1.5	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table D.10

Incident ESRD patients, 2010, by treatment modality

by age, gender, race, ethnicity, & primary diagnosis

	Center hemo	Center self hemo	Home hemo	CAPD	CCPD	Other PD	Uncertain dialysis	Transplant	All
0-4	97	.	.	13	158	*	*	35	312
5-9	59	.	.	.	47	.	*	45	152
10-14	131	.	*	*	81	.	*	77	299
15-19	403	.	.	26	94	*	*	102	632
20-29	2,340	*	*	188	107	*	18	160	2,826
30-39	5,041	*	23	358	206	*	31	313	5,977
40-49	10,660	*	67	657	381	*	67	572	12,412
50-59	20,074	*	136	1,081	594	*	114	745	22,756
60-64	13,311	*	80	679	352	*	63	349	14,842
65-69	12,952	18	66	586	270	*	54	273	14,224
70-74	12,419	20	83	498	221	*	12	151	13,406
75-79	11,584	12	67	394	169	*	26	36	12,290
80-84	9,463	*	94	245	110	*	14	*	9,937
85+	6,559	*	65	115	65	*	11	.	6,828
Unknown	51	.	.	*	.	.	.	.	53
0-19	690	.	*	45	380	*	17	259	1,395
20-44	11,709	*	62	836	464	*	80	701	13,863
45-64	39,717	17	254	2,127	1,176	*	213	1,438	44,950
65-74	25,371	38	149	1,084	491	*	66	424	27,630
75+	27,606	25	226	754	344	*	51	41	29,055
Unknown	51	.	.	*	.	.	.	.	53
Male	59,971	58	387	2,687	1,618	14	235	1,680	66,650
Female	45,168	29	305	2,161	1,237	16	191	1,181	50,288
Unknown	*	.	.	.	.	.	*	*	*
White	68,964	77	474	3,418	2,067	23	154	1,853	77,030
Black/Af Am	29,844	*	193	1,055	621	*	49	245	32,018
Native American	1,251	*	*	48	22	.	*	96	1,422
Asian	4,740	*	22	320	135	*	19	613	5,853
Other/unknown	345	.	.	*	*	*	204	56	623
Hispanic	15,543	*	41	542	443	*	*	236	16,823
Non-Hispanic	89,601	81	651	4,306	2,412	27	418	2,627	100,123
Diabetes	47,766	23	256	2,007	1,052	*	43	479	51,636
Hypertension	30,320	26	280	1,298	624	*	26	283	32,861
Glomerulonephritis	5,813	*	29	605	414	*	19	537	7,428
Cystic kidney	1,658	*	26	282	158	*	14	483	2,630
Other urologic	1,408	*	*	62	38	*	*	63	1,585
Other cause	13,485	13	68	421	423	*	23	505	14,940
Unknown cause	3,580	*	18	121	115	*	*	116	3,963
Missing cause	1,114	*	*	52	31	*	292	397	1,903
All	105,144	87	692	4,848	2,855	30	427	2,863	116,946

Table D.11

Point prevalent ESRD patients, 2010, by treatment modality

December 31 point prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

	Center hemo	Center self hemo	Home hemo	CAPD	CCPD	Other PD	Uncertain dialysis	Transplant	All
0-4	205	.	*	15	262	*	15	291	797
5-9	82	.	*	.	111	.	*	923	1,125
10-14	234	.	*	11	178	.	13	1,448	1,889
15-19	853	*	13	39	303	.	18	2,772	4,000
20-29	8,784	*	179	359	928	*	89	8,829	19,178
30-39	21,808	17	598	907	1,856	*	144	19,068	44,401
40-49	45,791	37	1,001	1,611	3,165	*	237	36,764	88,609
50-59	80,686	50	1,306	2,414	4,289	*	321	48,561	137,633
60-64	50,600	18	684	1,346	2,453	*	176	24,267	79,548
65-69	45,511	25	582	1,054	2,172	*	91	17,673	67,112
70-74	48,915	19	513	915	1,980	*	64	12,859	65,270
75-79	27,757	*	251	488	1,071	.	38	3,923	33,537
80-84	27,515	*	201	377	837	*	24	1,635	30,593
85+	19,552	*	162	181	411	*	19	348	20,682
Unknown									
0-19	1,374	*	26	65	854	*	54	5,434	7,811
20-44	49,362	47	1,243	1,981	4,165	*	350	44,092	101,245
45-64	158,307	84	2,525	4,656	8,526	12	617	93,397	268,124
65-74	86,689	42	1,021	1,825	3,852	*	148	28,967	122,550
75+	82,561	21	688	1,190	2,619	*	88	7,471	94,644
Unknown									
Male	210,586	108	3,364	5,012	10,760	16	732	106,863	337,441
Female	167,700	88	2,139	4,705	9,256	15	522	72,495	256,920
Unknown	*	.	.	.	.	.	*	*	13
White	208,500	127	3,621	6,268	13,367	15	601	127,790	360,289
Black/Af Am	142,955	60	1,612	2,468	5,142	11	292	35,324	187,864
Native American	5,619	*	48	134	219	.	*	2,053	8,085
Asian	18,877	*	205	791	1,209	*	62	11,707	32,862
Other/unknown	2,342	.	17	56	79	*	292	2,487	5,274
Hispanic	64,565	*	426	1,229	2,915	*	146	24,220	93,510
Non-Hispanic	313,728	188	5,077	8,488	17,101	30	1,111	155,141	500,864
Diabetes	170,875	65	1,749	3,490	6,653	12	221	41,657	224,722
Hypertension	109,146	51	1,395	2,562	5,026	*	173	28,817	147,174
Glomerulonephritis	34,311	33	988	1,527	3,428	*	205	46,005	86,499
Cystic kidney	9,032	11	300	549	1,025	.	51	17,377	28,345
Other urologic	6,567	*	148	180	406	.	22	5,891	13,220
Other cause	34,054	21	715	1,045	2,655	*	158	26,748	65,402
Unknown cause	12,637	*	182	296	742	*	33	8,061	21,958
Missing cause	1,671	*	26	68	81	*	394	4,805	7,054
All	378,293	196	5,503	9,717	20,016	31	1,257	179,361	594,374

Table D.17

Counts of incident ESRD patients, by payor category: all patients

by age, gender, race, ethnicity, & primary diagnosis

	2002							2006						
	M'care	M'care/	MSP			Other/		M'care	M'care/	MSP			Other/	
	FFS	Mcaid	EGHP	Non-EGHP	HMO	unk	All	FFS	Mcaid	EGHP	Non-EGHP	HMO	unk	All
0-4	57	21	39	*	*	58	178	59	14	32	*	.	91	198
5-9	48	25	40	*	.	68	182	35	*	31	.	.	53	128
10-14	104	28	84	.	.	122	338	95	23	45	*	*	132	297
15-19	211	15	145	.	.	213	584	245	36	134	.	.	258	673
20-29	1,115	160	488	*	*	802	2,580	1,196	197	446	*	17	902	2,763
30-39	2,348	540	1,319	16	27	1,555	5,805	2,533	566	1,119	17	80	1,713	6,028
40-49	4,506	1,067	2,687	42	151	2,872	11,325	5,075	1,311	2,611	76	253	3,324	12,650
50-59	7,418	1,850	4,506	103	360	3,993	18,230	8,610	2,252	4,827	146	884	5,254	21,973
60-64	4,731	1,199	2,010	60	398	2,181	10,579	5,354	1,342	2,313	89	756	2,576	12,430
65-69	6,408	2,748	691	88	1,465	406	11,806	6,350	2,726	870	145	2,191	443	12,725
70-74	7,407	2,619	274	127	1,958	322	12,707	6,773	2,571	351	137	2,667	352	12,851
75-79	7,731	2,165	146	146	1,830	216	12,234	7,384	2,118	164	169	2,658	231	12,724
80-84	5,674	1,435	45	99	1,355	143	8,751	6,128	1,490	63	108	1,909	170	9,868
85+	3,069	842	15	38	650	70	4,684	3,702	890	20	76	1,022	102	5,812
Unknown	.	.	.	.	.	.	.	*	.	*	.	.	*	*
0-19	420	89	308	*	*	461	1,282	434	82	242	*	*	534	1,296
20-44	5,401	1,141	2,873	44	86	3,583	13,128	5,793	1,285	2,674	46	200	4,025	14,023
45-64	14,717	3,675	8,137	185	857	7,820	35,391	16,975	4,383	8,642	287	1,790	9,744	41,821
65-74	13,815	5,367	965	215	3,423	728	24,513	13,123	5,297	1,221	282	4,858	795	25,576
75+	16,474	4,442	206	283	3,835	429	25,669	17,214	4,498	247	353	5,589	503	28,404
Unknown	.	.	.	.	.	.	.	*	.	*	.	.	*	*
Male	29,326	5,655	7,564	446	4,499	6,840	54,330	31,750	6,459	7,928	566	6,793	8,590	62,086
Female	21,501	9,059	4,925	283	3,704	6,181	45,653	21,790	9,086	5,099	405	5,645	7,011	49,036
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	*	*
White	35,594	7,668	8,210	508	6,033	7,006	65,019	37,884	8,566	8,640	691	8,833	8,635	73,249
Black/Af Am	13,049	5,750	3,559	201	1,749	4,395	28,703	13,658	5,690	3,647	256	3,063	5,191	31,505
Native American	583	240	110	*	26	181	1,148	599	250	112	*	40	223	1,229
Asian	1,086	886	529	*	362	732	3,602	1,345	1,017	611	16	483	1,306	4,778
Other/unknown	515	170	81	*	33	707	1,511	54	22	17	*	19	247	362
†Hispanic								5,543	2,764	1,306	83	1,853	3,271	14,820
†Non-Hispanic								47,997	12,781	11,721	888	10,585	12,331	96,303
Diabetes	21,926	7,967	5,412	318	3,676	5,170	44,469	22,970	8,273	5,705	421	5,995	6,082	49,446
Hypertension	15,208	4,060	2,290	214	2,758	2,783	27,313	15,933	4,141	2,442	269	3,805	3,291	29,881
Glomerulonephritis	4,138	681	1,861	51	494	1,516	8,741	3,633	622	1,637	53	515	1,571	8,031
Cystic kidney	886	138	734	*	81	407	2,252	1,040	165	819	20	122	496	2,662
Other urologic	1,528	352	361	30	231	429	2,931	852	203	177	14	176	252	1,674
Other cause	4,880	958	1,396	75	659	1,974	9,942	6,501	1,406	1,767	132	1,206	2,736	13,748
Unknown cause	2,105	488	397	27	298	616	3,931	2,312	632	420	48	535	877	4,824
Missing cause	156	70	38	*	*	126	404	299	103	60	14	84	297	857
All	50,827	14,714	12,489	729	8,203	13,021	99,983	53,540	15,545	13,027	971	12,438	15,602	111,123

Table D.17 (continued)

Counts of incident ESRD patients, by payor category: all patients

by age, gender, race, ethnicity, & primary diagnosis

	2010 M'care FFS	M'care/ Mcaid	MSP EGHP	MSP Non-EGHP	MSP HMO	Other/ unk	All
0-4	62	27	36	*	*	183	312
5-9	53	19	21	*	.	58	152
10-14	77	25	40	*	*	155	299
15-19	219	25	98	*	.	289	632
20-29	1,121	190	355	27	22	1,111	2,826
30-39	2,353	569	820	73	104	2,058	5,977
40-49	4,703	1,285	2,114	127	398	3,785	12,412
50-59	8,351	2,547	3,976	292	1,290	6,300	22,756
60-64	5,730	1,533	2,298	194	1,313	3,774	14,842
65-69	6,317	2,764	995	166	3,404	578	14,224
70-74	6,388	2,347	452	193	3,574	452	13,406
75-79	6,338	1,940	169	190	3,305	348	12,290
80-84	5,543	1,481	59	162	2,484	208	9,937
85+	3,959	1,021	26	93	1,548	181	6,828
Unknown	.	.	.	.	.	53	53
0-19	411	96	195	*	*	685	1,395
20-44	5,488	1,265	1,976	147	243	4,744	13,863
45-64	16,770	4,859	7,587	566	2,884	12,284	44,950
65-74	12,705	5,111	1,447	359	6,978	1,030	27,630
75+	15,840	4,442	254	445	7,337	737	29,055
Unknown	.	.	.	.	.	53	53
Male	31,031	6,863	7,164	920	9,739	10,933	66,650
Female	20,180	8,910	4,295	601	7,706	8,596	50,288
Unknown	*	.	.	.	*	*	*
White	36,339	8,871	7,695	1,028	12,192	10,905	77,030
Black/Af Am	12,617	5,455	3,055	439	4,477	5,975	32,018
Native American	670	258	110	23	49	312	1,422
Asian	1,517	1,134	570	26	702	1,904	5,853
Other/unknown	71	55	29	*	26	437	623
†Hispanic	5,562	2,943	1,259	172	2,756	4,131	16,823
†Non-Hispanic	45,652	12,830	10,200	1,349	14,690	15,402	100,123
Diabetes	21,722	8,270	4,956	708	8,291	7,689	51,636
Hypertension	15,887	4,368	2,401	403	5,343	4,459	32,861
Glomerulonephritis	3,098	537	1,282	88	696	1,727	7,428
Cystic kidney	977	155	694	37	171	596	2,630
Other urologic	767	194	171	16	205	232	1,585
Other cause	6,414	1,523	1,489	187	1,979	3,348	14,940
Unknown cause	1,731	455	318	55	578	826	3,963
Missing cause	618	271	148	27	183	656	1,903
All	51,214	15,773	11,459	1,521	17,446	19,533	116,946

Table D.21

Counts of point prevalent ESRD patients, by payor category: all patients

December 31 point prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

	2002							2006						
	M'care	M'care/	MSP			Other/		M'care	M'care/	MSP			Other/	
	FFS	Mcaid	EGHP	Non-EGHP	HMO	unk	All	FFS	Mcaid	EGHP	Non-EGHP	HMO	unk	All
0-4	76	146	97	*	*	163	488	70	186	90	*	*	183	535
5-9	118	230	119	*	*	464	944	83	206	106	11	*	611	1,023
10-14	288	503	209	*	*	912	1,923	198	404	188	*	*	1,104	1,913
15-19	578	917	421	22	12	1,519	3,469	525	1,013	429	21	19	1,983	3,990
20-29	3,244	6,757	1,614	125	160	4,890	16,790	3,019	6,739	1,573	158	277	6,052	17,818
30-39	11,098	14,812	4,738	396	595	10,846	42,485	10,596	14,946	4,604	500	961	11,855	43,462
40-49	22,805	22,348	9,294	649	1,452	17,317	73,865	23,128	25,131	10,003	909	2,303	20,554	82,028
50-59	34,882	24,962	12,866	751	2,741	18,337	94,539	41,256	31,704	15,293	1,047	4,493	25,312	119,105
60-64	19,315	11,882	5,282	279	1,971	7,251	45,980	23,830	14,174	6,587	447	3,107	10,615	58,760
65-69	23,654	12,915	2,151	226	3,816	1,555	44,317	27,930	15,045	2,956	348	5,372	1,867	53,518
70-74	28,064	12,389	639	244	5,704	1,076	48,116	29,884	14,155	998	318	7,650	1,543	54,548
75-79	16,377	5,994	166	98	3,190	444	26,269	17,730	6,859	229	120	4,568	603	30,109
80-84	13,956	4,531	71	71	2,639	303	21,571	16,352	5,470	109	93	3,961	491	26,476
85+	7,005	2,323	18	31	1,266	180	10,823	9,974	3,036	31	49	2,188	329	15,607
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	*	*
0-19	1,060	1,796	846	43	21	3,058	6,824	876	1,809	813	45	37	3,881	7,461
20-44	23,964	31,976	10,379	817	1,361	23,795	92,292	23,233	32,985	10,497	1,085	2,149	27,081	97,030
45-64	67,380	48,785	23,415	1,383	5,558	34,846	181,367	78,596	59,709	27,563	1,976	8,992	47,307	224,143
65-74	47,155	23,477	2,732	447	8,607	2,496	84,914	53,190	27,286	3,874	622	11,787	3,222	99,981
75+	41,901	14,675	313	223	8,008	1,062	66,182	48,680	17,279	449	306	11,952	1,611	80,277
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	*	*
Male	108,428	56,542	22,550	1,951	13,111	35,517	238,099	123,852	67,330	26,176	2,516	19,304	46,058	285,236
Female	73,032	64,167	15,135	962	10,444	29,739	193,479	80,722	71,738	17,020	1,518	15,613	37,043	223,654
Unknown	.	.	.	.	.	*	*	*	.	.	.	.	*	*
White	121,840	56,373	26,211	1,983	15,868	41,979	264,254	136,165	66,009	29,744	2,684	23,120	53,439	311,161
Black/Af Am	51,012	55,064	9,390	806	5,672	16,245	138,189	58,236	61,577	10,876	1,185	8,961	20,053	160,888
Native American	2,076	2,425	340	38	86	947	5,912	2,368	2,798	357	41	170	1,078	6,812
Asian	5,293	5,830	1,549	81	1,801	3,751	18,305	6,508	7,365	2,034	110	2,451	5,522	23,990
Other/unknown	1,239	1,017	195	*	128	2,335	4,919	1,298	1,319	185	14	215	3,011	6,042
†Hispanic								20,272	26,488	3,994	385	5,915	15,766	72,820
†Non-Hispanic								184,303	112,580	39,202	3,649	29,002	67,337	436,073
Diabetes	66,436	49,043	14,328	870	10,284	15,750	156,711	78,250	58,310	15,908	1,139	15,521	20,083	189,211
Hypertension	47,926	32,933	6,194	559	6,659	11,239	105,510	53,847	37,859	7,231	788	9,524	14,499	123,748
Glomerulonephritis	29,241	17,165	7,576	670	2,792	16,038	73,482	29,990	17,755	8,443	920	3,813	19,682	80,603
Cystic kidney	8,807	2,836	2,728	179	842	4,359	19,751	9,816	3,319	3,317	268	1,249	5,796	23,765
Other urologic	5,454	3,250	1,136	115	549	2,521	13,025	5,102	3,318	1,074	141	741	3,017	13,393
Other cause	16,457	11,175	4,403	386	1,612	9,700	43,733	19,534	13,063	5,536	571	2,712	12,534	53,950
Unknown cause	6,343	4,063	1,095	99	759	3,425	15,784	6,933	5,057	1,339	155	1,192	4,679	19,355
Missing cause	796	244	225	35	58	2,225	3,583	1,103	387	348	52	165	2,813	4,868
All	181,460	120,709	37,685	2,913	23,555	65,257	431,579	204,575	139,068	43,196	4,034	34,917	83,103	508,893

Table D.21 (continued)

Counts of point prevalent ESRD patients, by payor category: all patients

December 31 point prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

	2010 M'care FFS	M'care/ Mcaid	MSP EGHP	MSP Non-EGHP	MSP HMO	Other/ unk	All
0-4	77	209	89	*	*	413	797
5-9	79	220	69	11	*	742	1,125
10-14	160	337	138	19	*	1,229	1,889
15-19	432	888	381	36	18	2,245	4,000
20-29	2,756	6,929	1,325	276	358	7,534	19,178
30-39	10,000	15,268	3,761	909	1,198	13,265	44,401
40-49	23,772	27,093	8,966	1,774	3,428	23,576	88,609
50-59	43,608	37,137	14,205	2,459	7,798	32,426	137,633
60-64	30,292	17,755	7,724	1,253	6,350	16,174	79,548
65-69	32,196	16,782	3,681	999	10,131	3,323	67,112
70-74	32,720	15,684	1,282	878	12,534	2,172	65,270
75-79	17,452	7,306	281	396	7,130	972	33,537
80-84	16,888	6,040	118	269	6,548	730	30,593
85+	11,865	3,895	49	179	4,059	635	20,682
Unknown	.	.	.	.	.	.	.
0-19	748	1,654	677	69	34	4,629	7,811
20-44	22,574	33,994	8,729	1,999	2,830	31,119	101,245
45-64	87,854	70,188	27,252	4,672	16,302	61,856	268,124
65-74	59,969	30,150	4,843	1,765	20,658	5,165	122,550
75+	51,152	19,557	568	956	19,744	2,667	94,644
Unknown	.	.	.	.	.	.	.
Male	136,117	76,981	25,922	5,698	33,397	59,326	337,441
Female	86,177	78,561	16,147	3,763	26,170	46,102	256,920
Unknown	*	*	.	.	*	*	13
White	145,361	75,614	28,590	5,612	38,750	66,362	360,289
Black/Af Am	65,277	66,782	10,767	3,451	16,562	25,025	187,864
Native American	2,705	3,134	405	96	233	1,512	8,085
Asian	8,096	9,092	2,179	256	3,808	9,431	32,862
Other/unknown	858	921	128	46	215	3,106	5,274
†Hispanic	22,826	31,970	4,330	1,069	11,032	22,283	93,510
†Non-Hispanic	199,471	123,573	37,739	8,392	48,536	83,153	500,864
Diabetes	85,643	66,508	15,279	3,245	27,475	26,572	224,722
Hypertension	59,082	42,768	7,748	2,098	16,004	19,474	147,174
Glomerulonephritis	30,199	18,056	7,791	1,745	5,685	23,023	86,499
Cystic kidney	11,109	3,814	3,243	534	2,107	7,538	28,345
Other urologic	4,704	3,075	895	234	1,003	3,309	13,220
Other cause	22,734	15,048	5,405	1,186	5,004	16,025	65,402
Unknown cause	7,191	5,425	1,223	333	1,915	5,871	21,958
Missing cause	1,635	849	485	86	375	3,624	7,054
All	222,297	155,543	42,069	9,461	59,568	105,436	594,374

Table E.4

Percent of prevalent dialysis patients wait-listed for a kidney

by age, gender, race, ethnicity, & primary diagnosis

	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<1	.	.	7.1	4.8	8.4	3.5	11.1	8.0	10.1	13.1	10.5	17.3	13.3	8.8	7.3
1-4	3.7	4.4	19.4	21.3	21.9	33.3	23.5	26.7	37.5	31.4	33.6	37.1	34.4	42.1	32.6
5-9	1.8	7.4	22.1	29.0	27.5	32.3	30.1	28.9	31.5	29.8	33.5	35.9	43.2	38.2	32.7
10-17	1.2	6.3	29.3	28.1	30.9	34.2	34.7	35.2	37.9	37.0	36.3	37.7	39.1	37.5	33.7
18-29	1.0	4.9	23.7	29.0	32.3	33.3	35.1	36.9	37.2	36.9	36.7	37.1	37.1	37.4	37.9
30-39	0.6	3.6	18.2	24.1	29.7	30.5	32.1	33.7	34.0	34.4	34.6	34.8	34.7	34.0	33.7
40-49	0.2	2.4	14.1	19.2	23.1	24.0	25.4	26.4	26.6	27.3	27.6	28.7	28.7	29.0	29.4
50-59	0.0	0.8	7.5	12.5	17.7	18.7	19.9	20.9	21.3	21.6	22.1	22.4	22.6	23.0	23.1
60-64	0.0	0.2	3.3	6.6	11.8	13.1	14.3	15.3	16.0	16.4	17.1	18.1	18.6	18.8	19.1
65-69	.	0.1	1.4	3.5	7.2	8.3	9.4	10.5	11.4	12.1	12.8	13.7	14.2	14.9	15.4
70-74	.	0.0	0.4	0.9	2.8	3.3	4.0	4.9	5.4	5.9	6.5	6.9	7.3	8.0	8.5
75-79	.	.	0.1	0.2	0.8	1.0	1.2	1.4	1.7	1.9	2.2	2.5	2.8	3.0	3.2
80-84	.	.	0.0	0.1	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.8	0.8
85+	.	.	.	.	.	.	.	.	.	2.6	2.6	.	.	.	.
0-17	1.3	5.9	25.8	26.2	27.9	31.6	31.6	31.8	34.7	33.6	33.4	35.6	36.6	33.8	28.4
18-44	0.6	3.7	18.6	23.9	28.4	29.3	30.8	32.3	32.5	33.1	33.3	33.7	33.5	33.6	33.6
45-64	0.0	0.8	7.2	12.0	16.9	17.9	19.2	20.2	20.5	20.9	21.4	22.0	22.3	22.5	22.7
65-74	.	0.0	1.0	2.2	5.0	5.8	6.7	7.8	8.4	9.1	9.7	10.4	10.9	11.6	12.2
75+	.	.	0.1	0.1	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.4	1.5	1.6	1.7
Male	0.2	1.4	8.2	11.0	14.0	14.6	15.5	16.3	16.7	17.1	17.5	17.9	18.1	18.4	18.7
Female	0.2	1.4	6.5	8.8	11.5	12.2	13.1	13.9	14.2	14.5	14.9	15.5	15.7	15.9	15.9
White	0.2	1.3	7.6	9.9	12.1	12.6	13.4	14.2	14.5	14.8	15.2	15.7	15.9	16.2	16.5
Black/Af Am	0.3	1.5	6.6	9.7	13.1	14.0	14.8	15.5	15.9	16.3	16.7	17.3	17.5	17.7	17.9
Native American	0.3	1.6	7.8	9.6	10.9	11.9	13.4	14.0	13.6	14.2	14.5	15.1	15.5	14.9	15.0
Asian	0.6	1.6	14.0	15.6	20.7	21.7	23.2	24.4	25.0	25.2	25.2	25.6	25.7	25.7	25.6
†Hispanic	0.4	2.3	12.0	11.3	14.7	15.7	16.7	18.0	18.8	19.4	20.0	20.4	20.5	20.9	20.7
†Non-Hispanic	0.2	1.3	7.1	9.8	12.5	13.2	14.0	14.7	15.0	15.3	15.6	16.1	16.4	16.6	16.8
Diabetes	0.0	0.4	4.7	6.5	9.1	9.7	10.5	11.3	11.7	12.1	12.6	13.2	13.5	13.9	14.3
Hypertension	0.2	1.0	5.3	7.7	10.7	11.4	11.9	12.7	13.1	13.5	13.8	14.1	14.2	14.4	14.6
Glomerulonephritis	0.5	2.7	13.2	18.4	23.7	25.0	26.7	28.1	28.6	29.4	29.9	31.0	31.2	31.5	31.7
Other cause	0.2	1.4	9.0	13.1	16.5	17.5	18.6	19.7	19.9	20.3	20.6	21.4	21.9	22.0	22.2
All	0.2	1.4	7.4	10.0	12.8	13.5	14.4	15.2	15.5	15.9	16.3	16.8	17.0	17.3	17.5

Table E.6

Renal transplants, by donor type

			Living donor relation									
	Deceased	Living (Total)	Related	Distantly related	Spouse/ life partner	Paired exchange	Unrelated directed	Non-directed	Living-Dec'd exchange	Unk.	Unk.	Total
1980	2,579	917	.	.	.	.	.	.	.	917	293	3,789
1981	2,869	1,140	.	.	.	.	.	.	.	1,140	226	4,235
1982	3,405	1,547	.	.	.	.	.	.	.	1,547	162	5,114
1983	3,963	1,713	.	.	.	.	.	.	.	1,713	200	5,876
1984	4,613	1,928	.	.	.	.	.	.	.	1,928	202	6,743
1985	4,946	2,324	.	.	.	.	.	.	.	2,324	239	7,509
1986	5,775	2,859	.	.	.	.	.	.	.	2,859	254	8,888
1987	6,060	2,692	.	.	.	.	.	.	.	2,692	189	8,941
1988	7,276	1,838	1,648	37	40	.	30	*	.	82	132	9,246
1989	7,104	1,919	1,731	31	54	.	31	.	.	72	128	9,151
1990	7,800	2,096	1,774	46	59	.	30	.	.	187	142	10,038
1991	7,747	2,399	2,189	48	59	.	47	.	.	56	128	10,274
1992	7,695	2,543	2,260	71	80	.	77	.	.	55	176	10,414
1993	8,186	2,874	2,458	101	120	.	69	.	.	126	118	11,178
1994	8,380	3,010	2,376	127	134	*	76	.	.	296	116	11,506
1995	8,609	3,395	2,793	181	260	.	155	.	.	*	167	12,171
1996	8,585	3,687	2,842	214	363	.	223	.	*	43	138	12,410
1997	8,621	3,939	3,004	233	380	.	274	.	*	45	126	12,686
1998	9,005	4,423	3,159	296	547	.	362	*	*	56	192	13,620
1999	8,976	4,728	3,290	348	577	.	476	*	*	30	156	13,860
2000	9,036	5,497	3,617	411	669	*	774	20	*	*	111	14,644
2001	9,116	6,042	3,887	468	716	*	926	28	*	*	95	15,253
2002	9,444	6,236	3,848	494	721	*	1,108	54	*	.	78	15,758
2003	9,530	6,472	3,847	478	732	19	1,309	75	*	*	94	16,096
2004	10,236	6,649	3,830	510	803	34	1,383	80	*	*	80	16,965
2005	10,811	6,569	3,696	506	832	27	1,426	69	11	*	86	17,466
2006	11,575	6,433	3,511	492	822	73	1,453	58	22	*	68	18,076
2007	11,450	6,043	3,185	491	798	111	1,286	79	91	*	33	17,526
2008	11,386	5,966	3,045	464	759	226	1,292	81	99	.	65	17,417
2009	11,292	6,389	3,147	497	837	269	1,391	120	126	*	52	17,733
2010	11,446	6,272	2,822	476	814	421	1,442	158	139	.	59	17,777

Table E.9

Renal transplant rates, by donor type

by age, gender, race, ethnicity, & primary diagnosis, per 100 dialysis patient years; unadjusted

ALL	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<1	73.2	52.9	32.2	41.0	35.0	47.6	49.9	47.5	42.5	44.7	50.2	42.4	33.9	36.4	23.5
1-4	36.6	68.6	69.2	43.8	48.3	61.1	53.2	60.5	60.0	56.2	59.3	64.7	46.2	61.3	52.0
5-9	54.4	77.1	59.2	51.1	42.8	44.7	49.5	51.5	40.3	50.6	47.2	48.8	48.1	59.0	53.7
10-17	31.2	44.1	41.4	45.6	38.1	39.5	38.7	41.8	37.5	45.0	49.0	42.7	43.1	46.0	40.4
18-29	21.6	26.3	23.9	18.5	15.6	15.3	14.1	14.4	14.8	14.0	14.0	12.1	11.9	11.1	10.6
30-39	14.9	19.5	16.9	13.8	11.9	11.8	11.6	10.9	11.3	10.4	10.0	9.6	8.6	8.6	8.2
40-49	9.5	13.1	12.3	9.7	8.6	8.4	8.2	7.9	8.0	7.8	7.6	7.0	6.7	6.6	6.4
50-59	3.5	5.5	6.8	6.0	5.9	6.0	6.0	5.8	6.0	5.8	5.8	5.5	5.1	4.9	4.7
60-64	0.5	1.7	2.7	3.2	3.6	3.8	3.8	4.0	4.1	4.3	4.2	4.2	4.2	4.0	3.8
65-69	0.2	0.5	1.2	1.5	2.2	2.2	2.5	2.7	2.8	3.1	3.2	3.0	3.0	3.0	3.0
70-74	0.1	0.1	0.3	0.5	0.8	0.9	1.0	1.1	1.2	1.4	1.5	1.5	1.5	1.6	1.7
75-79	.	.	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5
80-84	.	0.1	.	.	0.1	.	.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
85+	26.6	18.4	18.7	8.5	2.6	1.3	.	1.9	4.3	1.7	2.7	0.6	0.5	.	0.3
0-17	35.0	50.8	45.9	46.1	39.4	42.5	42.2	44.9	39.8	46.6	49.6	45.2	43.4	48.2	41.0
18-44	16.1	20.3	17.9	13.9	11.7	11.5	11.2	10.8	11.0	10.5	10.1	9.4	8.7	8.6	8.1
45-64	3.7	5.4	6.2	5.7	5.7	5.8	5.7	5.6	5.8	5.6	5.6	5.3	5.0	4.8	4.7
65-74	0.2	0.3	0.8	1.0	1.5	1.5	1.8	1.9	2.0	2.3	2.4	2.3	2.3	2.3	2.4
75+	26.6	18.4	18.7	8.5	2.6	1.3	.	1.9	4.3	1.7	2.7	0.6	0.5	.	0.3
Male	8.5	10.0	8.5	6.6	5.6	5.5	5.4	5.3	5.3	5.3	5.3	4.9	4.6	4.5	4.3
Female	6.3	6.9	6.1	4.6	4.3	4.3	4.3	4.2	4.2	4.2	4.1	3.8	3.7	3.7	3.5
White	8.6	10.1	9.1	7.1	6.4	6.2	6.2	5.9	5.9	5.7	5.6	5.1	4.8	4.6	4.3
Black/Af Am	4.8	5.4	4.2	3.5	3.0	3.1	3.1	3.1	3.1	3.2	3.2	3.0	2.9	2.9	2.9
Native American	6.0	8.3	5.4	4.1	3.6	3.6	3.2	3.3	3.7	3.4	4.5	4.2	4.2	4.8	4.1
Asian	8.0	7.3	9.4	2.3	2.1	1.8	1.2	2.9	6.9	7.1	6.2	3.8	3.7	3.5	3.8
†Hispanic	11.1	14.3	10.3	6.0	4.8	4.7	4.7	4.5	4.6	4.5	4.4	4.1	4.0	3.8	3.4
†Non-Hispanic	7.4	8.3	7.2	5.6	5.0	5.0	4.9	4.8	4.9	4.8	4.8	4.5	4.2	4.2	4.0
Diabetes	9.3	9.0	6.2	4.3	3.4	3.4	3.4	3.2	3.3	3.2	3.1	3.0	2.8	2.7	2.6
Hypertension	5.2	5.1	4.1	3.3	3.0	3.1	3.0	2.8	3.0	3.1	3.1	3.0	2.9	2.8	2.7
Glomerulonephritis	11.4	12.7	11.7	10.0	9.5	9.3	9.5	9.4	9.7	9.4	9.7	8.8	8.5	8.3	8.6
Other cause	6.3	8.2	9.2	8.2	7.9	7.9	7.6	7.9	7.7	7.8	7.6	7.0	6.6	6.6	6.1
All	7.5	8.5	7.4	5.7	5.0	4.9	4.9	4.8	4.8	4.8	4.8	4.4	4.2	4.1	3.9

Table E.9 (continued)

Renal transplant rates, by donor type

by age, gender, race, ethnicity, & primary diagnosis, per 100 dialysis patient years; unadjusted

DECEASED DONORS	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<1	46.6	34.8	12.2	10.0	9.0	10.1	7.3	12.5	10.6	12.7	19.9	20.6	15.0	21.0	10.2
1-4	21.3	40.9	38.3	17.6	17.4	17.3	23.6	24.2	21.4	24.9	36.8	34.9	23.4	31.8	34.1
5-9	29.2	38.3	33.0	21.0	18.3	18.8	21.1	24.0	20.0	26.2	28.8	29.0	31.2	35.5	31.5
10-17	18.2	24.9	23.3	22.2	17.9	16.8	16.8	20.4	20.3	25.4	33.4	28.2	28.0	29.3	26.1
18-29	12.9	16.3	16.2	11.4	7.9	7.0	6.7	6.2	6.4	6.4	6.5	5.6	5.7	5.0	4.9
30-39	10.2	13.0	12.9	9.7	7.2	7.0	6.8	6.2	6.6	6.2	5.9	6.0	5.3	5.2	4.9
40-49	7.2	9.2	10.3	7.2	5.4	5.1	5.0	4.8	4.9	4.8	4.8	4.5	4.3	4.1	4.0
50-59	2.9	3.8	5.9	4.6	3.9	3.9	3.8	3.6	3.8	3.7	3.9	3.7	3.4	3.2	3.1
60-64	0.4	1.2	2.5	2.5	2.5	2.4	2.6	2.7	2.7	2.9	2.9	2.9	3.0	2.8	2.6
65-69	0.2	0.3	1.1	1.2	1.6	1.5	1.6	1.8	1.9	2.2	2.3	2.2	2.2	2.1	2.1
70-74	0.1	0.1	0.3	0.4	0.6	0.6	0.7	0.8	0.8	1.1	1.1	1.1	1.1	1.1	1.2
75-79	.	.	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4
80-84	.	.	.	.	.	.	.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
85+	13.3	7.4	7.5	.	.	1.3	.	1.0	1.7	0.8	0.7	0.6	.	.	.
0-17	20.1	28.4	25.4	20.8	17.3	16.7	17.3	20.7	19.6	24.5	32.0	28.2	27.0	29.6	25.5
18-44	10.6	13.4	13.3	9.5	6.8	6.4	6.3	5.8	6.0	5.9	5.7	5.6	5.2	4.8	4.7
45-64	2.9	3.7	5.4	4.4	3.7	3.7	3.7	3.6	3.7	3.6	3.8	3.6	3.4	3.2	3.1
65-74	0.2	0.2	0.7	0.8	1.1	1.1	1.2	1.3	1.4	1.6	1.7	1.7	1.7	1.7	1.7
75+	13.3	7.4	7.5	.	.	1.3	.	1.0	1.7	0.8	0.7	0.6	.	.	.
Male	5.9	6.7	6.7	4.8	3.5	3.3	3.3	3.2	3.2	3.3	3.4	3.3	3.0	2.8	2.7
Female	4.1	4.4	4.7	3.2	2.6	2.5	2.5	2.4	2.5	2.6	2.6	2.5	2.4	2.3	2.3
White	5.7	6.4	6.9	4.9	3.7	3.5	3.4	3.2	3.2	3.3	3.3	3.1	2.9	2.7	2.5
Black/Af Am	3.7	4.1	3.7	2.8	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.3	2.3
Native American	3.9	4.1	3.9	2.6	2.5	1.9	2.1	2.1	2.6	2.5	2.9	2.6	2.7	3.0	2.8
Asian	6.4	5.3	5.9	0.9	0.6	0.8	0.6	1.4	3.3	3.6	4.2	3.1	2.8	2.6	2.6
†Hispanic	5.8	7.9	7.8	4.0	2.8	2.8	2.9	2.7	2.8	2.9	2.9	2.8	2.7	2.4	2.2
†Non-Hispanic	5.1	5.5	5.6	4.0	3.1	3.0	2.9	2.8	2.9	3.0	3.1	2.9	2.8	2.6	2.6
Diabetes	6.4	5.9	4.8	3.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.0	1.9
Hypertension	3.8	3.6	3.6	2.5	2.0	2.1	2.0	1.9	2.0	2.1	2.3	2.2	2.1	2.0	1.9
Glomerulonephritis	7.4	8.2	8.7	6.6	5.6	5.1	5.3	5.1	5.5	5.4	5.7	5.2	5.0	4.8	5.0
Other cause	4.4	5.4	7.0	5.4	4.4	4.1	4.0	4.1	4.1	4.2	4.4	4.1	3.9	3.7	3.5
All	5.1	5.6	5.7	4.0	3.1	3.0	2.9	2.8	2.9	3.0	3.0	2.9	2.7	2.6	2.5

Table E.9 (continued)

Renal transplant rates, by donor type

by age, gender, race, ethnicity, primary diagnosis, & donor relation, per 100 dialysis patient years; unadjusted

ALL LIVING DONORS	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<1	26.6	18.1	20.0	31.0	26.1	37.5	42.7	35.0	31.9	32.0	30.3	21.9	18.9	15.4	13.3
1-4	15.2	23.2	29.9	26.1	29.3	43.7	29.5	36.3	37.9	30.6	22.5	29.8	22.8	29.5	17.9
5-9	19.0	33.8	24.6	29.1	24.1	25.5	28.1	27.2	20.0	24.5	18.3	19.8	16.9	23.5	21.8
10-17	9.4	17.1	17.6	22.5	19.7	21.8	21.4	21.2	17.0	19.4	15.1	14.4	15.1	16.4	14.0
18-29	6.7	9.2	7.4	6.8	7.5	8.1	7.2	8.2	8.3	7.5	7.4	6.5	6.1	6.1	5.7
30-39	3.6	5.9	3.8	4.0	4.6	4.7	4.7	4.7	4.7	4.2	4.1	3.6	3.3	3.5	3.3
40-49	1.8	3.6	1.8	2.3	3.2	3.2	3.2	3.1	3.0	2.9	2.8	2.5	2.4	2.5	2.3
50-59	0.4	1.6	0.9	1.3	2.0	2.1	2.1	2.2	2.2	2.1	1.9	1.8	1.6	1.7	1.5
60-64	.	0.5	0.2	0.6	1.1	1.4	1.3	1.3	1.4	1.3	1.3	1.2	1.2	1.1	1.2
65-69	.	0.1	0.1	0.3	0.6	0.7	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.9
70-74	.	.	.	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5
75-79	.	.	.	.	.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
80-84	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
85+	.	11.1	7.5	8.5	2.6	.	.	1.0	2.6	0.8	2.0	.	0.5	.	0.3
0-17	11.1	19.8	19.8	24.5	21.6	25.1	24.4	24.0	19.9	21.8	17.2	17.0	16.4	18.4	15.2
18-44	4.3	6.3	4.3	4.2	4.8	5.0	4.8	5.0	4.9	4.5	4.3	3.8	3.5	3.7	3.4
45-64	0.5	1.5	0.7	1.3	2.0	2.1	2.0	2.0	2.1	2.0	1.9	1.7	1.6	1.6	1.6
65-74	.	0.1	0.1	0.2	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.7
75+	.	11.1	7.5	8.5	2.6	.	.	1.0	2.6	0.8	2.0	.	0.5	.	0.3
Male	2.0	3.0	1.7	1.7	2.0	2.1	2.1	2.1	2.1	2.0	1.9	1.7	1.6	1.6	1.5
Female	1.6	2.2	1.4	1.4	1.7	1.8	1.7	1.7	1.7	1.6	1.4	1.3	1.3	1.3	1.2
White	2.3	3.4	2.2	2.2	2.7	2.7	2.7	2.7	2.6	2.5	2.3	2.0	1.9	1.9	1.8
Black/Af Am	0.7	1.1	0.5	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.6	0.6	0.6
Native American	1.8	4.2	1.5	1.5	1.0	1.7	1.1	1.2	1.1	1.0	1.6	1.6	1.4	1.8	1.3
Asian	1.3	1.7	3.1	1.1	1.5	1.0	0.6	1.5	3.6	3.5	2.0	0.7	0.9	0.9	1.2
†Hispanic	4.0	5.8	2.4	1.9	1.9	1.8	1.8	1.8	1.7	1.6	1.5	1.3	1.2	1.4	1.2
†Non-Hispanic	1.8	2.5	1.5	1.6	1.9	2.0	1.9	1.9	1.9	1.8	1.7	1.6	1.5	1.5	1.4
Diabetes	2.4	2.9	1.3	0.9	1.0	1.1	1.1	1.0	1.0	1.0	0.9	0.8	0.7	0.8	0.7
Hypertension	1.0	1.4	0.5	0.7	0.9	0.9	1.0	0.9	1.0	0.9	0.9	0.8	0.8	0.8	0.8
Glomerulonephritis	3.0	4.1	2.8	3.2	3.9	4.1	4.1	4.3	4.2	4.0	3.9	3.6	3.4	3.5	3.6
Other cause	1.5	2.6	2.1	2.7	3.5	3.7	3.5	3.8	3.6	3.5	3.2	2.9	2.7	2.8	2.6
Related donor	.	.	1.3	1.3	1.2	1.3	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.7	0.6
Unrelated donor	.	.	0.1	0.3	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8
All	1.8	2.6	1.5	1.6	1.9	2.0	1.9	1.9	1.9	1.8	1.7	1.5	1.4	1.5	1.4

Table F.2

One-year graft survival probabilities: all deceased donor transplants

by age, gender, race, ethnicity, primary diagnosis, & transplant number

UNADJUSTED	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<1	*	77.3	*	*	*	*	*	*	*	*	*	*	63.6	*	88.9	90.5	75.0	87.0
1-4	*	50.0	60.5	79.2	81.1	78.1	95.8	84.4	79.2	95.8	76.7	92.9	96.8	90.5	93.9	90.0	95.2	92.1
5-9	71.9	75.0	63.9	87.7	85.5	93.6	89.2	79.0	91.1	96.4	91.0	89.7	89.3	94.6	92.6	89.3	92.9	91.8
10-14	69.4	79.8	73.8	83.8	91.8	91.3	91.1	90.7	94.4	87.6	92.9	91.5	93.7	86.8	93.2	95.5	94.2	98.1
15-19	79.0	70.5	78.3	82.4	85.4	90.1	81.4	87.2	87.4	90.8	90.9	90.4	92.7	92.6	90.8	94.3	90.9	94.0
20-29	68.5	75.9	80.7	87.9	87.7	90.2	90.9	89.7	89.6	90.2	89.8	90.4	93.0	91.7	93.0	90.4	92.1	93.9
30-39	65.1	76.2	80.5	87.5	89.0	89.9	90.8	89.1	90.9	91.1	90.3	89.7	90.7	91.8	92.6	93.0	93.6	92.4
40-49	61.8	73.7	79.0	85.7	87.5	89.1	90.7	90.4	89.2	90.5	90.1	91.5	91.8	90.9	91.6	92.8	93.3	92.8
50-59	60.8	68.7	79.3	85.3	86.1	86.8	87.2	86.7	86.5	88.4	88.4	88.9	88.7	89.7	89.8	91.3	90.1	91.9
60-64	57.7	69.5	78.8	83.2	84.9	87.0	84.2	84.0	83.7	85.8	86.9	84.9	87.5	89.3	88.7	88.1	90.1	89.2
65-69	72.7	66.7	76.0	79.8	81.8	82.2	84.0	83.3	82.6	83.0	85.1	86.9	84.7	83.4	88.6	87.8	90.2	87.4
70-74	*	*	75.0	80.6	83.7	80.0	78.5	80.8	83.5	80.6	81.7	84.0	85.8	85.3	83.2	87.1	87.6	89.5
75-79	.	.	.	*	*	*	*	*	*	*	*	93.3	94.1	73.3	85.2	71.0	83.3	76.5
80-84	.	*	*	*	*	.	*	*	*	*	*	.	*	.	*	*	*	*
85+	*	*	.	.	.	.	.	*	.	.	.	.	.	.	*	*	.	.
Male	65.2	74.0	79.0	85.2	86.6	88.8	88.2	87.9	87.7	88.6	88.2	88.5	89.2	89.3	89.7	90.6	91.0	91.0
Female	66.2	73.1	79.4	86.4	87.3	87.3	89.0	87.5	87.8	89.1	89.4	89.8	90.1	90.0	91.0	91.3	91.6	91.8
White	67.6	74.5	79.6	85.4	87.5	88.6	88.9	88.6	88.8	89.5	89.5	90.1	89.8	89.8	90.6	91.6	91.7	91.6
Black/Af Am	58.7	70.4	77.1	85.4	85.3	86.2	86.7	85.2	84.7	86.9	86.5	86.4	88.1	88.2	88.6	88.9	89.6	90.6
Other race	61.5	78.2	82.7	89.6	87.7	93.2	92.4	89.6	90.3	90.1	89.8	90.4	93.0	92.1	92.9	92.9	93.6	92.1
†Hispanic	.	.	.	.	89.0	90.3	91.6	89.6	89.9	91.6	91.9	91.4	91.6	91.0	91.4	92.7	92.9	92.6
†Non-Hispanic	.	.	.	.	86.7	88.0	88.2	87.5	87.4	88.4	88.2	88.7	89.3	89.3	90.0	90.6	90.9	91.1
Diabetes	62.1	76.0	78.3	86.6	87.5	87.7	88.4	88.1	87.4	89.3	88.0	88.5	88.3	88.6	88.5	90.1	89.6	89.6
Hypertension	64.8	71.6	79.2	85.8	87.3	86.1	87.9	86.9	84.9	87.1	87.3	87.8	89.7	89.0	90.7	90.8	91.9	91.0
Glomerulonephritis	69.3	75.8	80.0	85.7	86.9	89.7	89.2	87.9	89.3	89.9	89.8	89.7	90.0	90.3	91.1	91.6	93.1	92.2
Other cause	64.3	71.5	79.1	84.3	86.1	88.8	88.5	87.8	88.6	88.5	89.4	89.9	90.6	90.4	91.0	91.3	91.2	92.9
First transplant	66.5	75.7	79.9	86.3	87.2	88.5	88.9	88.1	88.1	89.3	88.8	89.5	90.1	89.7	90.4	91.0	91.5	91.3
Subsequent transplants	57.8	63.5	74.6	81.2	84.7	86.2	86.2	85.1	85.0	85.4	87.9	85.5	86.1	88.3	89.3	89.6	88.9	91.4
All	65.5	73.7	79.2	85.6	86.9	88.2	88.6	87.8	87.7	88.8	88.7	89.0	89.6	89.5	90.2	90.9	91.2	91.4

ADJUSTED																		
0-19	72.9	71.3	72.9	83.3	86.2	89.5	86.9	86.7	88.7	90.7	90.3	90.6	91.7	90.3	91.2	92.8	91.3	93.6
20-44	64.2	75.4	79.6	87.2	88.4	89.8	91.2	89.6	90.3	90.9	90.8	90.8	91.7	92.1	92.6	92.7	93.4	93.2
45-64	56.0	69.3	78.8	84.9	86.1	87.6	87.3	87.2	86.7	88.6	88.4	88.7	89.3	89.8	90.1	91.0	90.9	91.6
65-74	74.4	61.2	74.1	79.8	82.0	81.5	82.7	82.9	83.1	82.6	84.2	86.3	85.7	84.7	87.1	87.8	89.4	88.4
75+	.	*	*	65.8	75.6	75.3	74.6	72.7	76.2	75.6	78.7	83.5	80.5	77.5	81.5	83.6	86.9	85.3
Male	58.1	70.0	76.4	83.9	85.5	88.0	87.5	87.2	87.2	88.3	88.0	88.5	89.2	89.4	90.0	90.9	91.3	91.5
Female	59.8	69.1	76.5	85.1	86.3	86.2	88.2	86.6	87.1	88.6	89.0	89.5	89.8	89.8	90.8	91.2	91.6	91.8
White	60.2	70.0	76.8	84.1	86.4	87.6	88.2	87.8	88.3	89.1	89.3	90.1	89.8	90.0	90.8	91.9	92.0	92.0
Black/Af Am	55.5	68.5	75.8	84.7	84.6	85.6	86.2	84.8	84.2	86.6	86.2	86.2	88.0	88.1	88.6	88.8	89.6	90.7
Other race	52.0	72.7	79.0	87.7	86.1	92.2	91.3	88.8	89.4	89.3	89.0	89.9	92.5	91.8	92.5	92.5	93.4	92.0
Diabetes	52.7	70.1	73.9	84.6	85.8	86.3	87.3	87.1	86.6	88.8	87.5	88.4	88.3	88.7	88.8	90.5	90.0	90.2
Hypertension	64.8	72.0	79.8	86.4	87.9	87.0	88.8	87.8	86.1	88.3	88.5	89.0	90.7	90.2	91.7	91.8	92.9	92.1
Glomerulonephritis	65.2	73.0	77.9	84.6	85.8	88.8	88.3	87.1	88.6	89.4	89.4	89.4	89.6	90.1	91.0	91.5	93.1	92.3
Other cause	59.3	68.2	76.4	82.7	84.6	87.6	87.5	86.6	87.8	87.5	88.7	89.3	89.9	89.8	90.5	90.8	90.7	92.6
First transplant	59.5	71.6	77.3	85.2	86.3	87.7	88.3	87.5	87.8	89.0	88.7	89.5	90.1	89.9	90.6	91.3	91.8	91.8
Subsequent transplants	52.5	59.3	71.0	78.5	82.5	84.2	84.3	83.2	83.0	83.7	86.5	84.0	84.5	87.2	88.2	88.7	87.9	90.7
All	58.6	69.7	76.4	84.3	85.8	87.3	87.7	86.9	87.1	88.4	88.4	88.9	89.4	89.6	90.3	91.0	91.4	91.6

Table F.6

Ten-year graft survival probabilities: all deceased donor transplants

by age, gender, race, ethnicity, primary diagnosis, & transplant number

UNADJUSTED	1980	1985	1990	1995	1996	1997	1998	1999	2000
<1	*	54.6	*	*	*	*	*	*	*
1-4	*	17.7	51.2	62.5	54.1	56.3	75.0	62.5	54.2
5-9	34.4	32.4	34.7	49.1	49.3	59.7	61.5	57.9	55.6
10-14	26.4	28.4	32.0	44.4	39.8	40.8	43.6	46.6	54.4
15-19	39.1	24.6	33.3	33.5	36.0	35.9	35.4	37.6	36.7
20-29	33.4	33.8	39.2	42.0	42.8	45.2	45.5	47.1	46.1
30-39	25.3	31.0	39.1	47.3	48.8	48.6	52.3	50.8	52.7
40-49	20.2	26.2	37.2	45.6	45.8	48.0	49.3	50.7	51.0
50-59	18.2	18.9	33.9	40.2	38.2	40.8	42.3	43.0	42.0
60-64	11.5	15.9	30.0	28.9	34.1	33.2	32.4	35.9	34.5
65-69	9.1	7.7	19.6	27.3	28.3	21.9	30.1	25.0	26.8
70-74	*	*	21.9	15.1	21.1	16.1	20.5	23.8	22.1
75-79	.	.	.	*	*	*	*	*	*
80-84	.	*	*	*	*	.	*	*	*
85+	*	*	.	.	.	.	.	*	.
Male	24.9	26.8	35.4	41.0	41.2	42.4	44.1	43.6	43.3
Female	27.2	28.9	37.3	42.8	43.2	43.7	45.3	46.5	46.0
White	29.4	31.1	39.2	44.3	45.0	46.4	47.9	47.8	47.7
Black/Af Am	12.4	14.5	24.6	32.2	32.2	31.8	33.8	34.2	33.6
Other race	25.6	42.2	45.7	55.0	51.7	53.2	53.3	55.6	56.2
†Hispanic	.	.	.	.	49.5	48.2	50.5	48.1	48.5
†Non-Hispanic	.	.	.	.	41.3	42.3	43.8	44.3	43.8
Diabetes	20.7	22.8	30.1	38.3	36.0	36.5	39.5	39.4	39.2
Hypertension	19.3	18.2	31.5	34.3	35.1	36.8	36.3	36.9	35.7
Glomerulonephritis	31.0	33.4	38.2	44.4	46.0	45.4	47.6	48.1	47.8
Other cause	25.3	29.6	41.6	47.8	49.5	51.7	52.8	52.5	52.7
First transplant	27.0	29.7	36.6	42.6	42.8	43.4	45.0	45.2	45.0
Subsequent transplants	15.1	16.9	33.5	35.5	36.8	39.7	41.5	42.0	40.2
All	25.7	27.5	36.2	41.7	42.0	42.9	44.6	44.8	44.4

ADJUSTED									
0-19	31.2	26.4	34.0	40.3	40.2	42.6	45.5	44.3	44.4
20-44	25.3	30.5	37.9	46.4	47.3	47.7	50.1	50.2	51.1
45-64	15.4	19.3	33.4	39.4	39.1	41.9	42.5	43.6	43.1
65-74	7.1	5.7	18.1	24.0	25.7	20.3	27.8	24.8	25.3
75+	.	*	*	0.0	26.6	8.1	17.0	22.1	21.7
Male	18.3	21.5	31.5	38.3	38.5	40.2	42.2	41.7	41.9
Female	19.9	23.5	32.0	39.6	40.5	40.8	42.5	43.8	44.1
White	21.4	25.0	34.6	41.3	42.3	43.8	45.9	45.7	46.4
Black/Af Am	10.3	12.8	22.9	30.8	30.8	30.8	32.8	33.2	32.5
Other race	17.5	32.2	38.7	49.8	48.2	48.9	48.9	53.7	53.8
Diabetes	12.7	15.7	23.8	33.3	31.6	32.7	36.1	36.3	37.0
Hypertension	19.9	18.8	32.9	36.2	37.5	39.6	39.6	39.7	39.2
Glomerulonephritis	25.6	28.7	34.5	41.5	43.3	42.6	44.8	45.8	45.9
Other cause	20.6	25.2	37.2	44.5	46.2	48.2	49.8	49.4	50.3
First transplant	19.9	23.9	32.3	40.2	40.6	41.4	43.3	43.4	44.0
Subsequent transplants	11.8	13.9	28.6	30.5	32.1	35.2	37.1	37.9	35.7
All	18.8	22.2	31.7	38.8	39.3	40.4	42.3	42.5	42.7

Table F.8

One-year graft survival probabilities: all living donor transplants

by age, gender, race/ethnicity, primary diagnosis, & transplant number

UNADJUSTED	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<1	*	*	86.7	89.7	88.0	100.0	97.0	97.1	87.0	92.1	97.5	86.7	93.6	89.2	97.0	96.2	84.2	100.0
1-4	*	85.7	70.0	97.1	85.4	90.7	90.6	95.9	92.9	98.3	91.5	96.4	94.6	98.0	100.0	97.6	97.9	98.1
5-9	91.7	82.4	84.8	88.9	90.1	98.3	97.1	94.3	98.3	93.4	97.5	96.2	98.5	95.3	93.6	96.2	97.6	95.3
10-14	91.5	82.4	78.8	91.4	95.8	92.3	96.9	93.0	93.0	94.8	98.5	97.1	93.1	94.3	95.7	94.3	98.8	95.7
15-19	87.9	91.2	83.4	91.8	94.0	92.3	92.1	96.2	93.8	94.6	95.6	95.8	94.3	92.0	97.9	96.2	96.4	98.3
20-29	88.8	89.7	93.3	92.8	94.9	95.3	93.4	93.9	93.4	94.7	95.8	95.3	96.0	95.5	95.7	96.2	95.8	96.5
30-39	90.1	88.4	90.2	94.1	93.5	95.3	95.1	94.6	95.7	95.1	95.4	95.1	94.0	95.1	96.0	96.8	97.4	96.7
40-49	81.5	91.4	89.4	93.1	94.8	93.3	95.7	94.3	93.9	94.4	94.7	95.5	96.3	95.6	96.1	96.6	97.4	96.9
50-59	78.6	91.6	87.4	89.3	92.4	92.7	94.3	93.6	93.4	93.6	94.0	95.9	95.5	94.7	95.9	96.6	96.2	96.5
60-64	.	94.9	89.7	87.7	92.9	91.2	92.8	93.4	94.8	92.5	94.3	94.6	93.5	95.9	96.7	95.4	95.3	96.0
65-69	*	91.7	86.4	82.7	88.2	92.1	93.1	93.7	92.8	91.8	93.3	93.7	95.4	95.0	95.0	95.6	94.8	93.5
70-74	.	*	*	88.5	92.0	93.9	78.3	91.4	88.4	92.6	92.6	91.3	89.8	92.3	94.5	96.7	91.9	96.1
75-79	.	.	.	.	.	.	.	*	*	*	*	*	*	*	*	*	*	100.0
80-84	*	.	*	.	.	.	.	.	.	.	.	*	.	*	*	*	.	*
85+	.	*	.	.	.	.	.	.	.	.	.	.	*	.	.	.	.	.
Male	86.6	89.9	89.2	91.7	94.6	94.5	94.8	94.9	94.2	94.4	94.9	95.5	95.8	95.3	96.1	96.7	96.5	96.6
Female	88.6	89.1	88.9	92.2	92.2	92.9	93.8	93.1	93.6	93.7	94.6	94.9	94.0	94.6	95.7	95.8	95.8	96.1
White	87.9	90.3	88.9	92.0	94.0	93.8	94.5	94.3	94.3	94.3	94.9	95.3	95.1	94.9	96.1	96.4	96.4	96.3
Black/Af Am	83.5	85.7	88.4	91.0	91.0	92.9	93.1	92.3	92.0	92.6	93.4	94.7	93.7	94.1	94.6	95.6	95.2	95.7
Other race	85.0	87.1	94.4	94.6	96.0	96.2	95.8	97.1	93.5	95.3	96.3	95.9	97.3	97.8	96.7	97.2	96.5	97.6
†Hispanic	.	.	.	.	94.5	95.8	94.6	94.7	94.4	95.1	96.0	96.1	96.0	95.2	96.9	97.0	97.4	96.2
†Non-Hispanic	.	.	.	.	93.4	93.5	94.3	94.1	93.9	94.0	94.6	95.1	95.0	95.0	95.8	96.3	96.1	96.4
Diabetes	85.1	84.7	87.4	91.6	93.0	92.3	93.6	93.9	93.6	93.5	93.5	94.6	94.4	93.7	96.1	96.3	95.0	95.4
Hypertension	88.2	92.8	88.9	91.2	94.8	94.7	94.0	92.1	92.9	93.8	95.0	95.4	94.6	95.3	96.1	96.3	96.3	96.1
Glomerulonephritis	89.6	90.9	90.5	91.9	93.8	94.0	94.9	94.3	93.8	94.4	95.6	95.2	95.8	95.2	95.9	96.4	96.5	96.8
Other cause	86.2	90.1	88.8	92.5	93.2	94.2	94.6	94.8	94.7	94.4	94.9	95.5	95.2	95.5	95.8	96.4	96.7	96.8
First transplant	87.1	89.9	89.5	91.9	93.6	94.0	94.5	94.3	94.2	94.3	95.0	95.3	95.3	95.3	96.2	96.7	96.3	96.6
Subsequent transplants	92.0	85.6	82.6	92.5	93.0	92.0	92.8	91.8	91.3	92.1	93.0	94.7	93.4	92.5	93.9	93.6	95.7	94.8
All	87.4	89.6	89.1	92.0	93.6	93.8	94.4	94.1	93.9	94.1	94.8	95.2	95.1	95.0	96.0	96.4	96.2	96.4

ADJUSTED																		
0-19	86.9	84.4	79.1	90.1	91.3	92.3	93.6	94.1	92.6	93.4	95.6	94.9	93.4	92.0	96.3	94.8	95.7	96.5
20-44	87.5	89.8	91.5	93.4	94.4	94.9	94.7	94.3	94.3	94.8	95.2	95.5	95.1	95.3	96.1	96.3	96.6	96.6
45-64	79.2	91.3	87.9	91.0	93.7	92.7	94.8	94.0	94.2	93.9	94.7	95.5	95.6	95.4	96.0	96.6	96.5	96.5
65-74	*	93.1	86.8	85.5	89.0	92.3	90.3	93.3	91.7	92.8	93.8	93.5	94.5	94.7	95.3	96.0	94.5	94.7
75+	*	*	*	*	*	*	*	*	83.2	84.1	88.3	87.7	89.1	86.9	94.1	98.4	90.8	96.1
Male	83.6	88.8	87.7	91.1	94.2	94.0	94.5	94.6	94.0	94.3	94.9	95.5	95.9	95.4	96.2	96.8	96.6	96.7
Female	86.9	88.4	88.2	92.0	92.0	92.7	93.6	92.9	93.4	93.7	94.6	94.8	93.9	94.5	95.6	95.7	95.7	95.9
White	85.2	89.1	87.5	91.3	93.5	93.3	94.1	93.9	94.1	94.1	94.9	95.2	95.2	94.9	96.2	96.5	96.5	96.4
Black/Af Am	82.7	86.0	88.7	91.2	91.1	93.1	93.3	92.4	92.2	92.8	93.6	94.9	93.8	94.3	94.7	95.7	95.3	95.8
Other race	79.8	84.8	93.6	94.0	95.7	96.1	95.5	96.8	92.8	95.4	96.3	95.6	97.1	97.5	96.4	97.0	96.2	97.4
Diabetes	81.7	82.2	85.0	91.0	92.6	92.0	93.3	93.8	93.6	93.6	93.6	94.7	94.6	94.0	96.3	96.5	95.3	95.7
Hypertension	87.3	92.9	88.6	91.5	95.0	94.9	94.3	92.5	93.3	94.1	95.4	95.7	95.1	95.7	96.4	96.6	96.6	96.5
Glomerulonephritis	88.4	90.2	89.6	91.5	93.4	93.6	94.5	93.9	93.5	94.1	95.4	95.1	95.6	95.1	95.7	96.3	96.4	96.6
Other cause	84.6	89.3	87.7	91.9	92.8	93.8	94.2	94.5	94.3	94.1	94.7	95.4	95.0	95.2	95.6	96.2	96.6	96.6
First transplant	84.7	89.1	88.4	91.5	93.4	93.7	94.3	94.2	94.1	94.3	95.0	95.3	95.3	95.4	96.3	96.7	96.3	96.6
Subsequent transplants	90.4	84.0	81.1	91.7	92.1	91.1	91.9	90.7	90.4	91.3	92.3	94.2	92.7	91.7	93.3	92.9	95.4	94.3
All	84.9	88.6	87.8	91.5	93.3	93.4	94.1	93.9	93.8	94.0	94.8	95.2	95.1	95.0	96.0	96.3	96.2	96.4

Table F.12

Ten-year graft survival probabilities: all living donor transplants

by age, gender, race/ethnicity, primary diagnosis, & transplant number

UNADJUSTED	1980	1985	1990	1995	1996	1997	1998	1999	2000
<1	*	*	73.3	69.0	76.0	78.6	81.8	74.3	73.9
1-4	*	71.4	46.7	60.0	68.8	79.6	75.0	85.7	85.7
5-9	45.8	51.0	57.6	63.0	63.4	63.3	73.5	71.4	66.7
10-14	38.3	37.7	53.8	47.4	50.9	54.8	62.5	60.5	53.9
15-19	45.5	39.5	36.9	53.6	56.0	51.4	44.1	51.0	46.9
20-29	60.3	55.8	59.3	56.3	59.0	62.0	56.5	57.8	60.9
30-39	58.8	52.4	61.2	62.5	61.5	65.3	65.4	69.4	66.7
40-49	45.2	55.4	57.6	58.0	60.4	59.0	64.5	63.3	63.4
50-59	33.3	50.4	42.5	48.4	52.7	54.0	56.5	61.2	58.1
60-64	.	64.4	28.2	37.0	45.6	43.4	47.8	45.7	51.3
65-69	*	33.3	50.0	27.2	40.2	43.0	32.4	32.9	41.7
70-74	.	*	*	38.5	24.0	18.2	37.0	37.9	30.1
75-79	.	.	.	.	.	.	.	*	*
70-74	*	.	*	.	.	.	.	.	.
75-79	.	*	.	.	.	.	.	.	.
80-84	.	.	.	.	.	.	.	.	.
85+	51.9	51.2	55.8	56.6	58.6	59.2	59.6	60.6	60.7
Female	54.6	54.3	54.0	53.2	55.7	56.9	58.5	60.5	58.1
White	53.6	54.3	56.6	56.5	59.7	60.7	61.0	62.2	60.7
Black/Af Am	46.2	38.7	38.8	46.0	44.7	43.5	46.1	47.2	49.2
Other race	60.0	60.0	64.4	63.0	63.1	62.9	67.0	76.7	69.6
†Hispanic	.	.	.	.	62.1	65.5	64.0	64.2	67.0
†Non-Hispanic	.	.	.	.	56.7	57.2	58.4	60.1	58.5
Diabetes	46.7	39.7	46.6	45.6	47.2	44.1	48.5	48.4	46.6
Hypertension	54.0	48.5	48.7	48.6	48.8	51.5	53.5	52.6	57.7
Glomerulonephritis	54.2	56.0	57.8	56.8	59.9	63.3	61.5	62.4	60.4
Other cause	53.5	58.2	59.5	61.8	64.9	64.2	65.8	68.9	67.4
First transplant	52.5	52.1	55.7	55.5	58.2	58.6	59.9	61.3	60.3
Subsequent transplants	60.0	54.9	46.4	51.2	48.2	54.5	51.5	53.1	51.9
All	53.0	52.4	55.0	55.1	57.4	58.2	59.1	60.6	59.6

ADJUSTED									
0-19	37.2	39.4	42.7	50.2	53.2	53.9	54.3	55.7	50.9
20-44	56.3	55.5	61.0	60.3	60.6	62.6	62.1	64.3	64.0
45-64	36.4	52.8	43.9	51.9	57.1	55.4	59.7	60.3	59.8
65-74	*	39.3	48.2	32.1	39.6	38.2	35.8	38.4	41.1
75+	*	*	*	*	*	*	*	*	27.8
Male	44.5	48.3	51.6	54.1	57.0	57.0	58.0	59.4	60.0
Female	48.9	51.6	50.9	52.3	54.4	55.4	57.2	59.3	57.0
White	46.1	50.4	52.4	53.8	57.3	57.9	58.9	60.3	59.5
Black/Af Am	43.0	39.5	39.2	46.3	45.1	44.6	47.1	48.0	50.3
Other race	49.8	56.5	60.5	60.1	62.6	63.0	66.8	74.9	67.2
Diabetes	38.0	33.8	39.6	42.5	45.3	42.3	47.2	48.1	46.8
Hypertension	51.0	49.7	46.9	49.9	50.0	52.5	54.8	54.6	59.5
Glomerulonephritis	49.2	52.5	53.5	54.1	57.3	60.5	58.6	59.5	58.0
Other cause	49.4	55.7	56.4	59.8	63.1	62.3	64.0	67.4	66.0
First transplant	46.1	49.4	52.0	53.9	57.2	57.0	58.7	60.4	59.8
Subsequent transplants	52.8	50.5	42.6	47.6	43.3	50.2	47.1	48.7	48.4
All	46.2	49.4	51.1	53.2	55.8	56.2	57.5	59.2	58.6

Table G.1

Total admission rates: ESRD patients

per 1,000 patient years, period prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	2,273	2,044	2,559	2,349	2,263	2,291	2,216	2,179	2,209	2,446	2,079	2,208	2,773	2,554	2,428	2,285	2,470	2,633
5-9	1,592	1,792	1,561	1,747	1,861	1,784	1,903	1,538	2,242	1,617	1,798	1,624	1,752	1,957	1,941	1,775	1,803	1,584
10-14	1,590	1,703	1,745	1,439	1,366	1,672	1,404	1,402	1,501	1,638	1,682	1,495	1,716	1,726	1,611	1,437	1,719	1,488
15-19	1,595	1,619	1,657	1,571	1,386	1,538	1,608	1,644	1,724	1,739	1,715	1,683	1,650	1,846	1,738	1,788	1,854	1,857
20-29	1,676	1,618	1,631	1,590	1,555	1,550	1,603	1,576	1,609	1,658	1,685	1,745	1,757	1,756	1,833	1,944	1,936	1,990
30-39	1,703	1,736	1,730	1,717	1,676	1,678	1,722	1,704	1,734	1,778	1,751	1,811	1,811	1,766	1,738	1,747	1,774	1,747
40-49	1,632	1,631	1,669	1,668	1,635	1,626	1,687	1,713	1,785	1,801	1,802	1,880	1,868	1,829	1,774	1,761	1,739	1,717
50-59	1,733	1,782	1,750	1,762	1,749	1,726	1,778	1,768	1,806	1,823	1,822	1,835	1,829	1,783	1,760	1,755	1,745	1,734
60-64	1,766	1,816	1,838	1,856	1,811	1,838	1,875	1,847	1,890	1,936	1,890	1,939	1,908	1,852	1,812	1,803	1,773	1,754
65-69	1,913	1,949	1,942	1,958	1,931	1,962	1,995	1,957	1,995	2,017	2,002	1,992	2,005	1,924	1,864	1,888	1,810	1,831
70-74	1,907	1,960	1,983	2,017	2,002	1,995	2,058	2,023	2,052	2,035	2,045	2,030	2,035	1,963	1,942	1,956	1,869	1,904
75-79	1,969	2,008	2,045	2,065	2,009	2,019	2,052	2,050	2,085	2,107	2,043	2,095	2,105	2,016	1,976	2,022	1,907	1,907
80-84	2,037	2,108	2,084	2,114	2,105	2,066	2,139	2,078	2,134	2,108	2,068	2,087	2,141	2,050	2,012	2,051	1,936	1,915
85+	2,061	2,121	2,105	2,159	2,179	2,131	2,210	2,147	2,200	2,164	2,191	2,172	2,178	2,126	2,076	2,088	1,969	1,971
Male	1,680	1,713	1,700	1,709	1,683	1,691	1,736	1,714	1,759	1,774	1,776	1,811	1,813	1,747	1,714	1,727	1,683	1,679
Female	1,927	1,965	1,996	2,010	1,982	1,983	2,044	2,037	2,085	2,109	2,079	2,099	2,105	2,058	2,020	2,031	1,978	1,976
White	1,817	1,840	1,863	1,867	1,839	1,854	1,896	1,880	1,918	1,934	1,919	1,933	1,937	1,870	1,836	1,858	1,804	1,817
Black/Af Am	1,800	1,857	1,841	1,869	1,839	1,824	1,894	1,879	1,944	1,963	1,956	2,008	2,011	1,968	1,931	1,928	1,885	1,858
Native American	1,796	1,913	1,994	1,911	1,888	1,912	1,987	1,958	1,928	1,970	1,955	1,988	1,904	1,819	1,737	1,713	1,767	1,718
Asian	1,256	1,259	1,253	1,275	1,316	1,349	1,403	1,394	1,380	1,419	1,389	1,393	1,415	1,373	1,350	1,365	1,322	1,336
†Hispanic						1,802	1,843	1,799	1,864	1,890	1,888	1,874	1,862	1,791	1,759	1,766	1,741	1,736
†Non-Hispanic						1,831	1,886	1,874	1,917	1,934	1,919	1,953	1,958	1,902	1,866	1,878	1,826	1,823
Diabetes	2,206	2,232	2,209	2,230	2,177	2,179	2,232	2,204	2,231	2,225	2,204	2,217	2,208	2,135	2,075	2,082	2,036	2,044
Hypertension	1,750	1,789	1,778	1,774	1,745	1,733	1,790	1,766	1,821	1,844	1,831	1,860	1,858	1,805	1,779	1,783	1,718	1,708
Glomerulonephritis	1,475	1,480	1,525	1,485	1,468	1,461	1,469	1,474	1,503	1,525	1,525	1,548	1,554	1,514	1,476	1,503	1,472	1,449
Other cause	1,558	1,590	1,606	1,631	1,604	1,614	1,670	1,647	1,703	1,735	1,707	1,752	1,768	1,711	1,707	1,719	1,669	1,653
All	1,797	1,833	1,841	1,852	1,824	1,828	1,882	1,865	1,911	1,928	1,915	1,943	1,946	1,887	1,852	1,863	1,814	1,810

ADJUSTED																		
0-19	1,886	1,875	1,756	1,839	1,619	1,757	1,837	1,778	1,566	1,333	1,362	1,301	1,372	2,036	2,146	2,378	1,703	1,512
20-44	1,871	1,873	1,886	1,874	1,822	1,816	1,880	1,860	1,919	1,964	1,954	2,017	2,015	1,952	1,912	1,940	1,950	1,934
45-64	1,759	1,783	1,769	1,771	1,740	1,731	1,775	1,774	1,811	1,830	1,817	1,852	1,835	1,793	1,766	1,758	1,740	1,730
65-74	1,902	1,941	1,935	1,957	1,931	1,938	1,979	1,937	1,969	1,974	1,976	1,963	1,971	1,898	1,860	1,879	1,799	1,823
75+	2,038	2,089	2,091	2,118	2,084	2,064	2,117	2,093	2,130	2,126	2,085	2,120	2,144	2,069	2,022	2,056	1,947	1,929
Male	1,767	1,799	1,767	1,779	1,746	1,744	1,786	1,758	1,795	1,801	1,798	1,830	1,830	1,762	1,727	1,740	1,693	1,688
Female	1,976	2,003	2,022	2,031	1,995	1,986	2,038	2,028	2,070	2,092	2,061	2,081	2,083	2,037	2,001	2,014	1,962	1,960
White	1,900	1,911	1,914	1,910	1,873	1,876	1,908	1,887	1,916	1,926	1,908	1,920	1,918	1,852	1,818	1,840	1,791	1,805
Black/Af Am	1,858	1,919	1,896	1,930	1,893	1,872	1,943	1,927	1,983	1,999	1,990	2,043	2,048	2,002	1,963	1,965	1,915	1,886
Native American	1,743	1,825	1,936	1,880	1,882	1,947	1,982	1,905	1,901	1,924	1,866	1,899	1,839	1,762	1,687	1,686	1,755	1,706
Asian	1,404	1,384	1,364	1,392	1,427	1,436	1,476	1,460	1,425	1,455	1,420	1,420	1,439	1,386	1,364	1,372	1,320	1,331
†Hispanic						1,832	1,864	1,798	1,859	1,886	1,873	1,856	1,843	1,772	1,746	1,750	1,719	1,716
†Non-Hispanic						1,860	1,910	1,895	1,934	1,946	1,928	1,961	1,964	1,908	1,871	1,884	1,833	1,829
Diabetes	2,209	2,239	2,205	2,233	2,179	2,181	2,237	2,208	2,236	2,233	2,218	2,239	2,236	2,174	2,119	2,137	2,081	2,085
Hypertension	1,735	1,762	1,759	1,747	1,725	1,712	1,760	1,741	1,787	1,808	1,794	1,828	1,821	1,768	1,741	1,751	1,697	1,692
Glomerulonephritis	1,565	1,564	1,615	1,576	1,567	1,556	1,561	1,569	1,598	1,609	1,611	1,625	1,639	1,597	1,555	1,580	1,544	1,518
Other cause	1,582	1,626	1,627	1,671	1,646	1,646	1,706	1,678	1,728	1,764	1,745	1,796	1,809	1,747	1,744	1,757	1,695	1,678
All	1,862	1,891	1,883	1,894	1,860	1,856	1,902	1,881	1,922	1,935	1,918	1,945	1,946	1,887	1,851	1,864	1,815	1,811

Table G.2

Total admission rates: dialysis patients

per 1,000 patient years, period prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	2,754	2,535	3,278	2,639	2,503	2,472	2,362	2,041	2,149	2,631	2,345	2,839	3,304	2,872	2,828	3,121	2,661	2,908
5-9	2,036	2,423	2,047	2,149	2,394	2,118	2,499	2,007	3,181	1,720	2,012	2,169	2,437	2,914	2,444	1,927	1,851	1,753
10-14	1,905	2,052	2,163	1,622	1,505	1,884	1,640	1,603	1,645	1,804	1,767	1,522	1,621	1,701	1,731	1,538	1,858	1,675
15-19	1,687	1,744	1,733	1,705	1,490	1,608	1,554	1,710	1,794	1,949	1,737	1,757	1,797	2,005	1,972	2,004	1,988	2,006
20-29	1,800	1,700	1,694	1,684	1,636	1,601	1,657	1,615	1,673	1,735	1,789	1,857	1,862	1,878	1,983	2,106	2,097	2,136
30-39	1,806	1,807	1,825	1,811	1,784	1,773	1,812	1,790	1,825	1,864	1,858	1,899	1,897	1,867	1,835	1,844	1,868	1,835
40-49	1,687	1,684	1,744	1,746	1,698	1,690	1,757	1,783	1,853	1,872	1,894	1,972	1,967	1,925	1,864	1,842	1,812	1,796
50-59	1,781	1,838	1,800	1,823	1,804	1,784	1,840	1,829	1,863	1,878	1,890	1,900	1,895	1,845	1,823	1,820	1,805	1,792
60-64	1,800	1,853	1,876	1,893	1,849	1,882	1,919	1,885	1,939	1,991	1,940	1,996	1,965	1,906	1,867	1,856	1,825	1,806
65-69	1,930	1,967	1,960	1,981	1,953	1,987	2,025	1,988	2,025	2,048	2,043	2,032	2,045	1,969	1,918	1,942	1,861	1,884
70-74	1,914	1,966	1,991	2,028	2,012	2,005	2,070	2,033	2,066	2,051	2,065	2,054	2,060	1,991	1,975	1,996	1,902	1,942
75-79	1,969	2,011	2,047	2,069	2,010	2,020	2,054	2,053	2,087	2,110	2,049	2,105	2,114	2,026	1,989	2,039	1,924	1,926
80-84	2,036	2,108	2,085	2,114	2,105	2,067	2,140	2,079	2,135	2,108	2,071	2,088	2,142	2,052	2,016	2,054	1,941	1,919
85+	2,061	2,121	2,106	2,159	2,180	2,132	2,210	2,147	2,199	2,165	2,192	2,172	2,178	2,126	2,075	2,089	1,970	1,971
Male	1,725	1,757	1,746	1,766	1,735	1,741	1,785	1,759	1,803	1,820	1,829	1,865	1,867	1,801	1,772	1,784	1,734	1,731
Female	1,981	2,018	2,052	2,066	2,038	2,036	2,099	2,091	2,141	2,162	2,141	2,158	2,164	2,116	2,078	2,091	2,029	2,028
White	1,899	1,921	1,947	1,958	1,926	1,939	1,976	1,955	1,992	2,007	2,001	2,011	2,018	1,944	1,915	1,939	1,873	1,888
Black/Af Am	1,807	1,863	1,853	1,885	1,851	1,837	1,913	1,898	1,964	1,984	1,981	2,035	2,038	1,998	1,960	1,960	1,914	1,888
Native American	1,819	1,921	2,026	1,953	1,934	1,952	2,010	1,983	1,958	2,009	1,990	2,012	1,914	1,842	1,768	1,735	1,785	1,754
Asian	1,302	1,294	1,304	1,340	1,364	1,390	1,449	1,445	1,425	1,464	1,435	1,428	1,456	1,426	1,403	1,401	1,364	1,385
†Hispanic						1,851	1,902	1,848	1,919	1,952	1,961	1,935	1,919	1,843	1,815	1,815	1,786	1,784
†Non-Hispanic						1,886	1,939	1,926	1,968	1,984	1,976	2,010	2,016	1,960	1,926	1,940	1,880	1,878
Diabetes	2,235	2,261	2,245	2,270	2,216	2,215	2,269	2,237	2,264	2,255	2,240	2,251	2,242	2,169	2,110	2,118	2,068	2,078
Hypertension	1,773	1,815	1,810	1,811	1,773	1,761	1,819	1,795	1,849	1,870	1,866	1,893	1,894	1,844	1,819	1,824	1,755	1,745
Glomerulonephritis	1,553	1,529	1,585	1,551	1,534	1,520	1,530	1,532	1,560	1,587	1,596	1,614	1,635	1,582	1,553	1,582	1,547	1,519
Other cause	1,621	1,669	1,676	1,711	1,682	1,686	1,738	1,715	1,777	1,816	1,796	1,846	1,858	1,798	1,798	1,814	1,746	1,735
All	1,849	1,883	1,894	1,912	1,881	1,882	1,936	1,917	1,963	1,980	1,974	2,001	2,004	1,945	1,911	1,923	1,867	1,865

ADJUSTED																		
0-19	2,175	2,209	1,955	2,021	1,745	2,056	2,035	1,996	1,757	1,348	1,309	1,306	1,403	2,214	2,496	2,536	1,730	1,560
20-44	1,986	1,967	2,005	2,002	1,942	1,923	1,985	1,960	2,027	2,064	2,078	2,139	2,131	2,066	2,019	2,043	2,044	2,026
45-64	1,793	1,822	1,815	1,821	1,785	1,781	1,827	1,822	1,859	1,881	1,879	1,910	1,899	1,852	1,825	1,818	1,795	1,785
65-74	1,910	1,948	1,943	1,969	1,942	1,950	1,994	1,953	1,985	1,994	2,002	1,989	1,999	1,930	1,900	1,923	1,840	1,867
75+	2,037	2,090	2,092	2,119	2,083	2,063	2,118	2,094	2,130	2,126	2,086	2,122	2,147	2,072	2,026	2,062	1,954	1,937
Male	1,789	1,820	1,793	1,814	1,776	1,775	1,818	1,787	1,825	1,834	1,838	1,871	1,872	1,804	1,771	1,785	1,734	1,731
Female	2,010	2,038	2,063	2,070	2,032	2,022	2,076	2,066	2,112	2,133	2,112	2,128	2,133	2,086	2,051	2,067	2,009	2,007
White	1,951	1,962	1,973	1,973	1,932	1,935	1,965	1,940	1,972	1,982	1,977	1,986	1,987	1,917	1,886	1,910	1,853	1,867
Black/Af Am	1,862	1,920	1,901	1,936	1,898	1,876	1,953	1,938	1,995	2,012	2,007	2,063	2,067	2,025	1,985	1,990	1,938	1,912
Native American	1,742	1,826	1,960	1,911	1,911	1,969	1,979	1,909	1,919	1,964	1,902	1,919	1,849	1,786	1,725	1,706	1,777	1,750
Asian	1,408	1,386	1,378	1,414	1,425	1,435	1,480	1,467	1,427	1,459	1,425	1,416	1,438	1,397	1,379	1,376	1,336	1,357
†Hispanic						1,849	1,886	1,813	1,883	1,915	1,914	1,890	1,873	1,801	1,780	1,783	1,749	1,751
†Non-Hispanic						1,898	1,949	1,934	1,974	1,987	1,977	2,011	2,015	1,960	1,924	1,938	1,882	1,879
Diabetes	2,249	2,276	2,252	2,284	2,226	2,229	2,287	2,254	2,280	2,272	2,264	2,286	2,280	2,221	2,168	2,180	2,121	2,124
Hypertension	1,754	1,783	1,787	1,778	1,748	1,738	1,783	1,767	1,814	1,833	1,831	1,861	1,859	1,809	1,782	1,793	1,735	1,730
Glomerulonephritis	1,604	1,579	1,643	1,608	1,598	1,588	1,595	1,602	1,629	1,650	1,662	1,671	1,699	1,643	1,613	1,643	1,606	1,580
Other cause	1,612	1,668	1,665	1,713	1,691	1,687	1,748	1,720	1,777	1,819	1,809	1,862	1,873	1,814	1,815	1,831	1,759	1,747
All	1,889	1,918	1,916	1,931	1,893	1,889	1,936	1,915	1,957	1,971	1,963	1,988	1,991	1,932	1,898	1,912	1,858	1,856

Table G.5

Total admission rates: transplant patients

per 1,000 patient years, period prevalent patients, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	1,139	1,113	1,378	1,363	1,498	1,614	1,406	1,757	1,742	1,804	1,336	1,186	1,715	1,559	1,349	1,321	1,562	1,821
5-9	828	1,005	892	1,010	949	1,182	1,296	1,075	1,084	1,283	1,192	1,055	964	1,202	1,060	1,232	1,261	1,110
10-14	979	835	873	808	887	1,009	774	901	1,054	1,041	1,034	1,032	1,177	1,369	1,121	937	1,061	865
15-19	886	829	1,064	982	963	968	1,096	1,235	1,195	1,009	1,165	1,165	1,041	1,232	1,085	1,171	1,266	1,356
20-29	851	853	888	811	817	891	879	902	872	920	879	897	936	853	869	924	887	841
30-39	890	971	877	920	870	866	913	910	902	976	894	922	957	880	813	837	821	822
40-49	869	905	822	829	846	842	830	821	898	901	835	850	828	789	768	757	763	716
50-59	896	848	898	857	888	821	826	838	890	895	840	851	849	810	813	791	765	754
60-64	850	880	839	865	950	886	897	983	909	905	971	923	902	866	794	857	799	818
65-69	851	937	989	924	859	904	987	909	1,000	990	928	955	992	893	835	824	828	782
70-74	974	992	995	858	1,018	912	972	954	1,005	952	1,016	999	957	982	924	835	831	815
75-79	1,018	854	936	788	1,032	1,200	1,324	976	1,306	1,163	1,036	964	1,010	892	895	806	820	800
80-84	*	*	*	*	*	*	917	1,297	1,104	2,109	597	960	1,021	1,247	954	1,021	780	858
85+	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	767	1,199	1,120
Male	846	856	832	817	818	808	819	835	861	867	839	840	825	780	751	758	745	734
Female	930	973	957	948	967	959	978	971	1,012	1,038	970	989	1,023	990	948	939	924	894
White	838	866	845	833	830	829	852	866	895	909	869	872	870	843	801	788	777	787
Black/Af Am	1,069	1,081	1,048	1,048	1,073	1,027	1,008	1,009	1,040	1,068	1,010	1,027	1,051	968	942	956	941	878
Native American	1,058	1,072	1,112	934	939	1,030	1,039	1,062	1,116	925	937	1,136	1,104	1,091	944	948	1,002	756
Asian	578	535	479	406	569	558	615	539	602	593	547	556	567	545	570	654	579	495
†Hispanic						882	823	871	893	899	846	873	873	857	786	802	785	803
†Non-Hispanic						867	892	894	927	943	900	906	911	866	836	834	819	795
Diabetes	1,311	1,377	1,283	1,282	1,249	1,212	1,230	1,229	1,254	1,258	1,208	1,194	1,209	1,149	1,055	1,059	1,040	1,019
Hypertension	873	844	792	766	863	829	807	797	843	911	839	828	788	743	760	756	711	722
Glomerulonephritis	684	726	721	693	691	677	678	720	758	752	743	756	717	710	669	707	684	647
Other cause	734	711	737	722	718	758	807	794	809	806	739	779	835	786	779	745	759	738
All	880	903	882	869	878	869	884	891	923	937	893	901	906	865	829	829	814	796

ADJUSTED																		
0-19	953	824	1,217	1,050	1,123	913	1,170	736	806	644	906	885	1,060	1,131	704	2,042	1,516	2,001
20-44	1,058	1,076	1,009	1,016	1,020	1,002	1,028	1,018	1,019	1,107	1,000	1,010	1,044	990	941	972	964	940
45-64	1,009	1,018	953	943	971	928	922	936	980	970	936	945	927	876	861	857	827	811
65+	1,002	1,055	1,139	1,020	1,008	994	1,108	1,020	1,117	1,103	1,062	1,027	1,061	986	927	878	865	833
Male	1,018	1,042	1,007	963	966	947	947	941	991	985	957	957	937	875	829	824	808	782
Female	1,025	1,052	1,074	1,007	1,017	991	1,084	1,022	1,095	1,105	1,038	1,019	1,077	1,020	991	956	941	918
White	976	993	955	902	901	895	932	921	981	975	931	930	939	901	862	828	810	832
Black/Af Am	1,047	1,128	1,199	1,145	1,123	1,073	1,164	1,100	1,154	1,179	1,128	1,089	1,131	1,016	980	970	952	873
Other race	1,007	832	787	630	783	886	914	777	893	777	729	780	775	799	752	762	741	623
†Hispanic						961	878	872	957	918	890	953	970	962	888	847	848	833
†Non-Hispanic						933	995	966	1,026	1,027	979	960	975	920	887	868	850	832
Diabetes	1,319	1,326	1,277	1,244	1,179	1,136	1,225	1,221	1,281	1,256	1,217	1,193	1,235	1,171	1,082	1,086	1,078	1,060
Hypertension	877	899	899	808	930	899	894	813	887	936	885	857	839	788	809	783	729	731
Glomerulonephritis	771	831	854	827	823	773	823	813	887	812	844	860	794	770	745	749	691	654
Other cause	754	795	855	814	756	830	909	823	856	875	763	833	903	791	740	717	753	696
All	1,020	1,043	1,035	976	982	961	1,010	975	1,037	1,037	990	979	997	937	900	880	865	841

Table H.1

Total patient deaths: ESRD patients

period prevalent patients, by age, gender, race, ethnicity, primary diagnosis, & patient vintage

	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	*	23	57	36	36	49	37	31	36	40	38	36	38	41	64
5-9	15	15	28	16	12	20	*	21	13	*	12	*	13	15	14
10-14	28	23	33	26	17	17	27	32	24	29	20	19	*	19	23
15-19	47	47	69	61	53	55	53	77	58	72	63	41	49	37	58
20-29	345	411	563	592	534	583	610	577	578	594	592	563	569	582	554
30-39	791	1,212	1,864	2,334	2,191	2,250	2,233	2,168	2,107	2,054	2,007	2,059	1,925	1,905	1,833
40-49	1,125	1,718	2,859	4,530	5,485	5,822	5,964	5,981	6,028	6,097	5,965	5,834	5,556	5,680	5,336
50-59	2,180	3,456	4,710	7,155	10,341	11,129	11,580	12,178	12,515	12,800	13,568	13,354	13,454	13,482	13,320
60-64	1,470	2,818	4,061	5,655	7,408	7,773	7,867	8,580	8,791	8,785	9,109	9,233	9,593	10,178	10,672
65-69	1,730	3,212	5,398	7,755	9,630	10,000	10,004	10,376	10,505	10,599	10,654	10,847	11,181	11,553	11,761
70-74	1,331	3,038	5,191	8,897	11,589	11,889	12,241	12,133	12,252	12,240	12,099	12,022	12,202	12,396	12,540
75-79	885	2,231	4,416	7,556	11,705	12,288	12,525	12,944	12,991	13,132	13,213	12,914	12,926	12,691	12,616
80-84	383	1,133	2,524	5,047	8,418	9,188	9,852	10,285	10,803	11,284	11,530	11,641	11,487	11,497	11,712
85+	138	452	1,162	2,626	5,419	5,934	6,645	7,205	7,506	8,237	8,829	9,286	9,655	10,055	10,498
0-19	100	108	187	139	118	141	127	161	131	150	133	106	109	112	159
20-44	1,601	2,351	3,734	4,949	4,987	5,111	5,216	5,091	4,996	4,958	4,861	4,799	4,615	4,633	4,297
45-64	4,310	7,264	10,323	15,317	20,972	22,446	23,038	24,393	25,023	25,372	26,380	26,244	26,482	27,194	27,418
65-74	3,061	6,250	10,589	16,652	21,219	21,889	22,245	22,509	22,757	22,839	22,753	22,869	23,383	23,949	24,301
75+	1,406	3,816	8,102	15,229	25,542	27,410	29,022	30,434	31,300	32,653	33,572	33,841	34,068	34,243	34,826
Male	5,947	10,976	17,680	27,357	37,997	40,375	41,879	43,918	45,182	46,456	47,576	48,083	48,879	50,210	50,780
Female	4,531	8,813	15,255	24,924	34,840	36,621	37,769	38,665	39,025	39,514	40,121	39,776	39,778	39,921	40,219
Unk.	.	.	.	*	*	*	.	*	.	*	*	.	.	.	*
White	7,555	14,107	22,875	35,228	48,404	51,066	53,048	54,760	55,631	57,005	58,635	58,908	59,592	60,714	61,693
Black/Af Am	2,654	5,188	9,114	15,067	20,668	22,028	22,491	23,513	24,113	24,360	24,595	24,460	24,547	24,808	24,704
N Am	30	157	364	561	903	872	936	964	945	974	955	954	1,054	1,073	1,008
Asian	14	186	491	1,180	1,916	2,125	2,239	2,416	2,521	2,684	2,770	2,953	2,904	3,094	3,198
Other/unk.	225	151	91	250	947	906	934	935	997	949	744	584	560	442	398
†Hispanic					7,200	7,819	8,211	8,785	9,068	9,401	9,611	9,585	9,966	10,401	10,582
†Non-Hisp.					65,638	69,178	71,437	73,803	75,139	76,571	78,088	78,274	78,691	79,730	80,419
Diabetes	1,239	5,064	10,858	20,495	32,362	34,796	35,871	37,347	38,177	39,004	40,063	39,915	40,339	41,064	41,764
Hypertension	1,209	4,824	9,924	16,111	20,438	21,452	22,284	23,132	23,769	24,327	24,741	24,893	25,250	25,506	25,876
Glomerulonephritis	983	2,404	4,128	5,361	6,318	6,366	6,480	6,559	6,327	6,347	6,185	6,071	5,751	5,924	5,710
Cystic kidney	264	624	900	1,167	1,323	1,457	1,423	1,418	1,427	1,444	1,466	1,498	1,397	1,523	1,542
Oth. urologic	150	595	994	1,264	2,053	2,134	2,238	2,291	2,379	2,268	1,864	1,767	1,569	1,538	1,456
Other cause	784	1,925	3,161	5,061	6,724	7,099	7,605	7,927	8,068	8,322	9,113	9,562	10,014	10,273	10,491
Unk. cause	981	1,481	1,711	2,008	2,745	2,949	3,015	3,130	3,268	3,384	3,385	3,392	3,448	3,428	3,154
Missing	4,868	2,872	1,259	819	875	744	732	784	792	876	882	761	889	875	1,008
<2 years	6,538	10,860	18,070	26,055	35,626	37,226	38,007	38,864	38,875	39,347	39,799	39,423	39,182	38,796	38,404
2-<5 years	3,228	5,624	8,811	15,907	20,841	22,181	23,198	23,965	24,574	24,825	25,183	24,830	25,190	25,619	26,062
5+ years	712	3,305	6,054	10,324	16,371	17,590	18,443	19,759	20,758	21,800	22,717	23,606	24,285	25,716	26,535
All	10,478	19,789	32,935	52,286	72,838	76,997	79,648	82,588	84,207	85,972	87,699	87,859	88,657	90,131	91,001
All with unknowns dropped	9,287	18,168	31,144	50,039	69,174	73,169	75,732	78,557	79,975	81,681	83,591	83,906	84,669	86,277	87,460

Table H.2

Annual mortality rates: ESRD patients

per 1,000 patient years at risk, period prevalent patients, by age, gender, race, ethnicity, primary diagnosis, & patient vintage

UNADJUSTED	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	116.7	67.8	69.3	54.8	64.7	77.1	61.4	56.6	51.1	43.8	41.6	45.5	47.1	41.3	59.6
5-9	60.5	33.5	15.6	17.8	13.3	17.0	7.6	18.6	13.5	8.2	8.1	6.0	9.0	15.1	13.7
10-14	40.2	34.1	13.2	13.9	7.0	6.8	14.4	17.1	11.2	15.7	10.4	10.2	4.3	8.6	10.8
15-19	27.8	24.3	16.4	23.0	17.1	17.9	16.1	21.6	16.3	17.0	16.7	11.2	12.5	8.5	14.2
20-29	47.9	39.7	39.8	36.6	30.5	34.2	35.5	34.1	33.0	32.9	32.8	31.0	30.5	30.1	28.5
30-39	78.9	68.0	65.9	61.6	52.6	54.5	52.5	49.9	48.0	47.0	46.1	46.2	42.5	41.8	39.8
40-49	112.2	97.5	92.1	88.8	79.7	82.2	81.1	79.0	76.7	75.6	72.9	68.8	64.3	64.0	59.3
50-59	153.1	162.0	147.3	138.2	128.1	128.2	124.8	123.2	119.1	114.1	113.9	107.6	103.1	100.6	94.7
60-64	228.1	228.2	209.7	196.7	184.2	181.9	173.6	178.4	171.1	160.5	157.6	147.7	142.0	137.3	135.0
65-69	290.3	287.7	276.4	249.7	238.4	235.3	226.8	222.3	215.7	208.7	198.1	189.7	182.2	177.9	171.6
70-74	314.9	346.8	329.8	312.4	302.1	294.3	290.9	282.5	273.2	268.6	254.5	241.7	234.5	229.1	218.9
75-79	427.3	411.5	400.7	370.1	368.7	367.2	358.6	349.9	346.1	337.1	329.8	315.3	303.9	289.4	277.3
80-84	498.3	496.8	451.8	453.2	446.2	450.9	439.7	429.5	417.0	419.3	409.2	398.1	381.5	367.1	360.6
85+	613.0	599.6	565.5	539.9	573.9	559.5	564.8	547.5	530.6	533.6	520.4	516.6	494.2	476.3	467.2
Male	161.4	172.2	171.3	169.8	168.1	169.4	166.9	167.0	164.0	161.2	157.8	152.3	147.4	145.5	140.8
Female	159.0	170.5	175.9	182.2	186.8	188.0	185.8	182.8	177.4	173.6	169.9	162.5	156.3	151.4	147.0
White	164.0	179.6	182.2	186.3	188.7	189.1	187.7	185.5	180.4	177.9	175.1	168.9	163.6	160.6	157.2
Black/Af Am	152.2	156.2	159.9	161.5	159.3	163.6	159.4	160.0	158.1	153.9	149.4	142.7	136.9	133.1	127.4
Other race	150.0	141.6	134.6	132.3	149.4	143.2	140.8	138.1	133.1	128.3	122.2	116.3	111.6	108.8	100.9
†Hispanic					148.8	149.7	146.7	145.1	139.8	136.3	130.4	121.6	117.6	116.4	110.7
†Non-Hisp.					180.3	181.8	179.6	178.4	174.7	171.6	168.5	162.8	157.2	153.8	149.6
Diabetes	256.9	265.8	244.7	233.8	232.6	234.1	227.5	225.2	219.3	213.8	209.1	198.9	192.2	187.6	182.1
Hypertension	135.6	189.1	203.6	204.6	200.3	201.3	200.1	197.6	194.8	192.8	189.5	182.2	176.1	169.8	165.2
Glomerulonephritis	75.7	91.2	100.5	95.0	89.0	87.5	86.2	85.2	79.9	78.6	75.1	72.4	67.2	68.0	64.5
Other cause	188.7	169.1	142.4	134.9	134.8	135.2	134.6	133.8	130.3	126.3	123.1	120.3	115.8	113.5	108.3
<2 years	194.2	222.6	224.1	217.3	224.7	227.0	224.3	224.4	218.3	215.0	210.8	202.8	196.0	190.1	183.1
2-<5 years	140.3	153.6	165.4	186.6	184.0	185.9	186.2	183.6	181.5	178.7	176.5	168.8	163.6	161.1	158.2
5+ years	77.7	105.9	107.2	110.1	115.7	116.9	114.5	114.9	113.6	112.1	109.9	107.5	104.5	104.7	102.2
All	160.4	171.4	173.4	175.5	176.6	177.8	175.4	174.1	170.0	166.7	163.1	156.8	151.3	148.1	143.5

ADJUSTED															
0-19	50.8	50.8	36.3	35.2	30.2	30.5	29.3	33.5	30.3	30.1	27.0	23.8	22.0	20.3	25.9
20-44	91.2	82.2	75.9	71.0	64.4	64.6	65.1	64.0	62.0	60.7	59.3	57.3	54.7	53.5	50.7
45-64	170.0	183.9	162.6	144.0	131.2	131.1	127.3	126.3	122.8	119.2	116.4	111.0	106.6	103.9	100.0
65-74	274.0	312.6	289.9	264.6	254.0	250.4	243.7	238.0	230.5	224.6	214.7	203.3	194.7	190.2	183.7
75+	386.0	429.7	410.5	393.4	398.0	398.1	389.4	382.4	375.4	370.9	363.7	352.3	340.1	331.5	320.2
Male	220.8	236.7	215.9	194.5	182.0	180.9	176.1	173.9	170.0	166.7	162.4	155.8	150.1	147.0	141.9
Female	200.3	217.9	200.3	190.4	184.6	184.2	180.4	177.1	171.4	167.0	162.8	156.0	150.0	145.3	140.3
White	227.7	250.9	225.2	206.2	191.5	189.3	184.4	180.7	175.0	170.9	166.8	160.3	154.8	151.4	147.1
Black/Af Am	180.7	190.3	187.8	179.4	174.7	177.6	173.8	173.3	170.8	168.0	163.0	155.2	148.5	144.1	137.4
Other race	192.7	209.7	173.6	144.5	154.1	149.9	144.1	140.3	135.9	132.0	126.3	120.2	114.9	111.6	105.3
Diabetes	274.1	291.9	258.8	235.4	223.9	222.2	214.8	210.7	204.2	199.4	194.2	185.6	178.3	173.7	168.2
Hypertension	160.9	193.3	188.3	180.3	170.5	170.1	167.5	165.1	161.5	159.1	156.0	150.1	145.6	142.1	137.6
Glomerulonephritis	139.8	152.7	153.6	137.8	128.5	127.7	125.0	122.9	117.9	115.0	110.5	105.7	99.9	98.8	95.4
Other cause	199.6	210.4	187.6	172.5	167.3	167.7	165.5	164.6	161.7	158.1	152.2	146.1	140.4	136.7	129.8
<2 years	256.3	256.6	228.3	202.7	193.0	192.9	188.9	187.3	182.4	179.2	175.1	168.5	162.7	158.4	152.0
2-<5 years	214.4	219.9	205.9	200.7	184.3	182.6	179.0	175.2	170.4	165.9	162.0	154.7	148.8	145.3	141.3
5+ years	143.8	194.5	182.7	168.8	166.5	165.8	160.5	157.0	152.4	148.7	143.7	137.6	131.9	128.6	124.2
All	211.1	228.1	208.7	192.4	183.0	182.3	178.0	175.2	170.4	166.7	162.4	155.8	150.0	146.2	141.1

Table H.3

Total patient deaths: dialysis patients

period prevalent patients, by age, gender, race, ethnicity, primary diagnosis, & patient vintage

	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	*	*	18	20	26	29	21	20	20	18	17	21	21	22	35
5-9	*	*	*	*	*	14	*	14	*	*	*	*	*	*	*
10-14	*	*	13	14	*	*	16	24	19	18	*	15	*	*	*
15-19	22	37	25	39	29	34	31	44	36	30	43	27	27	20	31
20-29	228	279	393	435	422	459	470	479	474	468	454	443	460	459	434
30-39	522	878	1,358	1,817	1,732	1,776	1,774	1,721	1,667	1,624	1,650	1,667	1,563	1,536	1,503
40-49	823	1,310	2,111	3,476	4,338	4,629	4,762	4,808	4,863	4,912	4,833	4,705	4,465	4,526	4,287
50-59	1,656	2,814	3,757	5,800	8,324	9,036	9,464	9,875	10,220	10,270	10,910	10,817	10,853	10,901	10,765
60-64	1,178	2,401	3,372	4,682	6,093	6,350	6,483	7,055	7,234	7,185	7,446	7,536	7,816	8,233	8,587
65-69	1,364	2,684	4,576	6,485	8,002	8,321	8,341	8,573	8,643	8,685	8,751	8,852	9,118	9,302	9,462
70-74	1,026	2,523	4,323	7,508	9,686	9,892	10,193	10,140	10,192	10,174	9,935	9,779	9,981	10,088	10,078
75-79	681	1,857	3,673	6,219	9,752	10,180	10,418	10,733	10,804	10,892	10,923	10,690	10,642	10,348	10,245
80-84	277	904	2,022	4,199	6,726	7,469	8,086	8,517	8,920	9,290	9,504	9,596	9,492	9,474	9,649
85+	83	323	908	2,079	4,329	4,686	5,193	5,604	5,873	6,513	6,989	7,469	7,750	8,119	8,553
0-19	42	66	63	79	68	83	71	102	84	72	78	69	63	60	85
20-44	1,099	1,697	2,701	3,810	3,932	4,018	4,171	4,061	4,004	3,937	3,916	3,847	3,719	3,703	3,453
45-64	3,308	5,985	8,290	12,400	16,977	18,232	18,782	19,877	20,454	20,522	21,377	21,321	21,438	21,952	22,123
65-74	2,390	5,207	8,899	13,993	17,688	18,213	18,534	18,713	18,835	18,859	18,686	18,631	19,099	19,390	19,540
75+	1,041	3,084	6,603	12,497	20,807	22,335	23,697	24,854	25,597	26,695	27,416	27,755	27,884	27,941	28,447
Male	4,323	8,710	13,926	21,971	30,578	32,410	33,785	35,449	36,454	37,262	38,205	38,616	39,237	40,170	40,515
Female	3,557	7,329	12,630	20,808	28,894	30,471	31,470	32,158	32,520	32,823	33,268	33,007	32,966	32,876	33,133
White	5,604	11,197	17,996	28,076	38,337	40,399	42,229	43,471	44,119	45,063	46,313	46,561	47,078	47,644	48,465
Black/Af Am	2,084	4,439	7,765	13,077	17,929	19,170	19,506	20,430	21,070	21,114	21,314	21,252	21,286	21,461	21,330
N Am	23	134	322	478	784	760	837	833	817	847	829	830	890	915	836
Asian	*	158	420	1,012	1,655	1,815	1,925	2,101	2,174	2,280	2,352	2,468	2,472	2,638	2,711
Other/unk.	161	111	53	136	767	737	758	772	794	781	665	512	477	388	306
†Hispanic	.	.	.	.	6,014	6,631	7,055	7,527	7,771	8,043	8,146	8,179	8,453	8,888	8,988
†Non-Hisp.	.	.	.	.	53,458	56,250	58,200	60,080	61,203	62,042	63,327	63,444	63,750	64,158	64,660
Diabetes	1,069	4,274	9,205	17,435	27,572	29,664	30,727	32,003	32,718	33,424	34,183	34,159	34,616	35,210	35,713
Hypertension	1,038	4,038	8,114	13,614	17,010	17,820	18,533	19,245	19,898	20,322	20,737	20,720	20,976	21,087	21,489
Glomerulonephritis	831	1,981	3,302	4,324	5,013	5,039	5,179	5,211	5,030	4,967	4,829	4,730	4,435	4,490	4,320
Cystic kidney	226	522	722	911	962	1,075	1,042	1,043	1,030	1,016	1,038	1,032	971	1,012	1,036
Oth. urologic	115	491	823	978	1,594	1,681	1,756	1,802	1,861	1,812	1,545	1,428	1,250	1,194	1,136
Other cause	696	1,547	2,483	3,859	5,097	5,284	5,652	5,786	5,825	5,874	6,407	6,773	7,113	7,186	7,197
Unk. cause	825	1,224	1,345	1,535	2,113	2,250	2,312	2,408	2,456	2,517	2,549	2,607	2,630	2,627	2,407
Missing	3,080	1,962	562	123	111	68	54	109	156	153	185	174	212	240	350
<2 years	4,987	9,430	15,516	23,013	31,127	32,517	33,197	34,055	33,943	34,183	34,563	34,320	34,029	33,439	33,129
2-<5 years	2,421	4,192	6,746	12,676	17,040	18,232	19,263	19,931	20,513	20,768	21,248	20,964	21,267	21,861	22,099
5+ years	472	2,417	4,294	7,090	11,305	12,132	12,795	13,621	14,518	15,134	15,662	16,339	16,907	17,746	18,420
All	7,880	16,039	26,556	42,779	59,472	62,881	65,255	67,607	68,974	70,085	71,473	71,623	72,203	73,046	73,648
All with unknowns dropped	6,907	14,714	25,164	41,115	56,616	59,915	62,212	64,457	65,748	66,822	68,279	68,526	69,109	70,046	70,945

Table H.4

Annual mortality rates: dialysis patients

per 1,000 patient years at risk, period prevalent patients, by age, gender, race, ethnicity, primary diagnosis, & patient vintage

UNADJUSTED	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	111.6	85.0	125.2	99.1	141.2	151.5	112.9	113.4	93.7	83.7	80.4	94.7	91.5	79.8	100.2
5-9	73.5	68.6	40.6	44.8	34.8	61.0	9.2	59.8	58.8	28.7	43.0	32.0	38.4	53.3	67.3
10-14	40.7	46.8	42.7	34.2	17.1	17.4	34.2	51.3	34.2	36.6	25.8	40.6	18.7	23.6	25.7
15-19	36.3	45.1	26.0	42.1	35.8	40.1	33.0	44.6	36.7	27.4	42.0	27.0	29.0	18.2	29.3
20-29	66.5	62.6	70.2	64.0	51.6	55.8	58.7	60.0	56.8	56.5	54.3	51.7	50.8	49.4	47.2
30-39	94.5	99.1	110.5	104.9	89.2	90.8	88.6	83.9	80.0	77.8	77.0	76.2	70.2	67.6	63.6
40-49	120.4	121.5	130.2	130.7	120.0	124.0	123.5	122.5	119.7	118.4	113.7	107.2	99.5	97.7	90.4
50-59	160.3	178.6	180.2	176.0	168.7	170.6	168.5	166.9	164.0	156.6	157.4	149.3	143.0	140.2	131.7
60-64	230.3	235.8	232.6	224.5	219.7	217.9	211.4	218.8	212.3	201.3	199.9	189.3	183.8	178.1	175.2
65-69	291.9	291.0	287.7	269.1	266.7	266.3	259.0	256.4	250.5	244.8	236.3	228.9	222.4	218.6	211.4
70-74	315.5	348.4	334.0	322.2	319.4	313.4	312.7	306.2	300.4	298.3	285.4	271.7	268.8	263.3	253.2
75-79	427.9	412.3	403.1	372.9	376.1	375.5	368.1	359.6	358.6	351.8	346.4	333.7	324.9	310.7	300.8
80-84	498.3	496.9	452.6	454.5	448.5	454.3	443.7	433.8	421.5	424.8	415.2	405.0	388.9	375.8	370.2
85+	613.4	599.5	566.1	540.4	575.1	560.7	566.4	549.6	532.2	535.6	523.2	518.9	497.9	480.8	471.6
Male	184.2	217.4	231.4	227.9	226.6	228.0	225.7	226.4	223.3	219.4	215.5	208.2	202.0	198.6	191.2
Female	179.4	203.8	222.6	231.0	239.2	241.6	240.3	237.0	231.7	228.1	224.0	214.7	206.8	199.7	194.0
White	192.1	233.8	260.1	268.0	274.4	274.7	274.7	272.2	266.1	262.4	258.5	248.4	240.7	234.3	228.2
Black/Af Am	160.5	171.6	179.3	181.4	180.9	186.4	182.0	183.4	182.5	178.3	173.7	166.9	160.2	156.0	149.2
Other race	170.3	178.7	180.0	169.1	189.1	181.0	178.3	175.5	169.5	165.5	160.7	155.9	152.7	151.7	141.1
†Hispanic					185.5	186.5	185.0	184.3	178.0	173.8	165.8	155.7	150.4	149.0	141.5
†Non-Hisp.					239.4	241.8	240.0	239.0	235.4	232.0	228.9	221.3	214.3	208.8	202.6
Diabetes	286.1	309.2	293.9	274.6	271.2	272.4	265.4	262.8	256.0	250.6	244.9	233.3	225.6	219.8	212.5
Hypertension	147.5	211.5	233.1	234.8	233.6	234.9	233.9	232.1	229.7	227.3	224.9	217.0	210.1	202.7	197.3
Glomerulonephritis	91.9	124.1	152.2	148.4	142.0	140.8	142.6	142.1	136.3	133.8	129.5	126.5	117.4	118.4	112.6
Other cause	210.5	211.7	204.1	206.5	215.0	217.2	219.1	219.1	216.7	211.3	206.7	200.5	194.5	189.3	180.3
<2 years	209.5	244.3	244.8	232.5	239.0	241.2	238.3	238.4	231.8	228.1	224.5	216.0	208.4	201.9	193.6
2-<5 years	162.2	200.8	231.7	249.3	236.1	236.9	236.2	232.3	228.6	224.3	220.5	209.6	203.2	198.6	193.3
5+ years	103.5	146.1	175.9	193.4	211.9	214.9	213.9	214.1	215.2	212.3	207.4	203.5	197.4	194.6	189.6
All	182.0	211.0	227.1	229.4	232.6	234.4	232.5	231.3	227.2	223.4	219.4	211.1	204.2	199.1	192.5

ADJUSTED															
0-19	66.2	78.1	61.1	63.8	61.1	65.3	57.7	67.0	61.8	55.9	55.1	51.8	49.1	43.0	51.2
20-44	112.4	112.7	118.9	113.9	104.2	103.2	104.5	103.0	100.0	97.6	94.1	89.6	84.6	81.6	75.9
45-64	183.1	203.0	198.7	185.3	176.7	177.3	174.7	174.1	171.0	165.9	162.7	155.5	149.2	145.1	138.8
65-74	288.4	324.0	309.2	292.6	292.8	291.3	287.4	283.5	277.8	273.1	263.8	251.1	243.0	237.7	230.7
75+	404.6	444.3	433.0	418.7	431.2	432.7	426.1	418.7	412.9	408.7	401.9	390.5	378.3	368.6	357.5
Male	234.8	256.0	249.0	229.5	219.9	219.2	215.4	213.4	209.9	205.8	200.9	192.8	186.2	182.3	175.6
Female	213.1	232.6	224.0	220.0	218.6	219.0	216.9	214.0	208.6	203.4	198.9	190.7	183.7	177.2	170.7
White	243.8	273.5	263.1	249.4	239.4	237.7	234.6	231.2	225.8	220.8	215.8	207.2	200.1	195.1	188.8
Black/Af Am	191.2	199.4	203.1	196.4	191.6	195.3	191.9	191.7	189.6	186.4	180.8	172.5	165.1	159.9	152.2
Other race	202.3	223.4	195.0	165.4	179.5	174.9	168.1	163.8	158.7	154.1	148.2	141.1	136.7	133.6	126.1
Diabetes	296.0	319.6	300.4	278.1	268.4	266.6	259.4	254.4	247.1	240.6	234.3	223.2	214.0	207.4	200.0
Hypertension	170.6	206.4	211.1	207.7	200.1	200.0	197.8	196.3	193.0	190.1	186.5	179.3	174.3	169.9	164.2
Glomerulonephritis	147.0	163.7	175.4	164.1	158.2	158.8	158.5	158.0	154.3	151.0	146.6	141.9	135.2	133.6	129.2
Other cause	212.6	225.3	215.6	208.4	212.2	214.4	214.7	214.7	213.3	210.0	204.3	196.5	190.1	185.4	176.5
<2 years	259.9	264.8	238.7	212.9	204.9	204.9	201.7	200.5	195.9	192.1	188.0	180.9	174.6	169.5	162.2
2-<5 years	224.3	242.3	243.0	236.8	215.9	213.8	210.4	206.3	201.0	195.6	191.2	182.2	175.5	170.8	165.3
5+ years	175.5	221.1	231.2	230.6	241.8	243.3	240.5	237.6	234.3	229.9	223.8	215.2	207.5	202.2	195.7
All	224.5	245.4	237.7	225.0	219.1	219.0	215.9	213.4	209.0	204.6	199.8	191.7	184.8	179.8	173.2

Table H.10

Annual mortality rates: transplant patients

per 1,000 patient years at risk, period prevalent patients, by age, gender, race, ethnicity, primary diagnosis, & patient vintage

UNADJUSTED	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	124.2	48.3	22.2	10.0	4.3	16.5	23.0	15.1	15.6	10.9	10.7	7.0	10.0	3.6	10.4
5-9	48.5	13.2	6.4	8.6	7.1	3.0	7.1	7.0	1.3	2.6	.	.	2.5	7.3	3.5
10-14	39.7	26.0	.	5.8	3.9	3.0	6.9	4.4	2.9	8.1	5.7	1.4	.	4.2	6.8
15-19	17.2	8.7	9.6	11.5	6.7	6.9	7.2	9.4	5.9	11.8	4.6	3.7	5.0	4.3	7.6
20-29	15.4	16.1	11.9	8.1	7.0	9.8	9.5	5.6	7.1	7.4	9.5	8.2	7.3	7.6	6.3
30-39	39.8	27.4	20.9	16.5	14.1	16.2	14.1	13.3	12.7	12.8	10.6	11.2	9.5	9.8	9.2
40-49	73.6	40.3	36.9	31.0	24.7	25.9	24.6	21.7	20.2	19.8	19.6	17.9	17.3	18.0	15.7
50-59	66.2	71.1	54.1	45.7	42.4	40.3	36.9	37.8	33.5	35.0	34.1	31.5	30.0	28.4	26.9
60-64	131.2	90.4	69.4	70.7	62.3	62.7	55.1	59.0	55.6	51.3	48.7	45.3	43.0	42.7	43.4
65-69	60.2	99.6	100.6	90.3	83.3	77.4	74.4	73.1	75.2	72.7	64.2	61.6	58.4	59.2	58.4
70-74	112.4	71.0	107.5	111.7	108.5	107.3	101.3	101.0	87.9	87.1	85.5	89.8	74.7	81.4	80.1
75-79	.	.	88.3	156.5	137.3	139.9	128.9	151.0	130.0	116.4	121.4	115.2	109.3	113.2	102.9
80-84	.	403.1	98.5	136.0	201.0	153.9	144.1	150.3	163.5	169.7	172.7	168.4	172.2	158.8	159.3
85+	.	602.7	297.4	.	190.9	216.3	199.2	110.9	240.3	237.5	139.2	237.3	164.8	136.3	175.0
Male	48.6	37.5	37.9	36.9	35.9	37.6	35.5	35.9	35.0	36.1	35.1	34.5	32.9	34.1	34.3
Female	33.8	31.1	27.0	29.3	32.5	32.5	31.4	32.5	30.2	30.2	30.3	29.6	29.2	30.4	29.3
White	38.2	33.8	32.1	33.0	34.2	35.4	33.2	34.3	33.0	33.9	33.4	33.4	32.0	34.0	33.5
Black/Af Am	61.4	42.9	43.6	39.6	38.9	39.5	39.4	38.8	35.8	36.3	35.6	32.2	32.5	32.0	32.3
Other race	66.0	27.3	22.9	27.0	24.8	25.6	25.5	23.4	25.4	23.9	23.4	23.6	22.6	20.9	21.5
†Hispanic					28.0	28.4	24.5	23.5	23.9	25.5	27.9	24.0	24.8	24.6	24.3
†Non-Hisp.					35.2	36.4	35.0	35.8	34.2	34.8	33.9	33.7	32.3	33.8	33.6
Diabetes	77.2	62.6	52.8	54.8	55.5	57.7	54.4	55.5	56.2	53.2	55.2	51.8	50.1	50.9	51.8
Hypertension	33.1	32.9	38.2	38.2	39.0	40.7	41.3	38.6	35.5	39.7	37.1	37.1	36.8	36.4	35.3
Glomerulonephritis	21.9	21.6	23.7	23.8	25.6	25.9	23.2	24.1	21.8	23.9	23.1	22.5	22.0	23.7	22.7
Other cause	53.9	37.9	31.1	28.4	26.5	27.1	26.1	27.4	25.9	26.1	24.7	25.5	23.6	25.4	25.1
<2 years	59.3	37.2	25.7	20.4	15.5	19.1	19.3	17.9	16.9	21.2	15.1	15.1	15.7	14.7	16.3
2-<5 years	44.8	35.7	31.4	26.4	24.5	25.0	24.3	23.0	22.8	22.1	20.8	21.9	18.6	19.4	22.0
5+ years	14.0	33.3	37.0	39.6	40.4	41.1	38.7	40.0	37.8	38.3	38.3	37.0	36.0	37.4	36.0
All	42.6	35.0	33.6	33.8	34.5	35.6	33.9	34.5	33.0	33.7	33.1	32.5	31.4	32.6	32.3

ADJUSTED														
0-19	30.9	21.7	16.6	11.7	10.2	12.0	12.7	10.3	13.3	9.1	6.6	5.5	6.3	9.4
20-44	35.4	27.7	19.4	15.5	16.4	15.7	14.9	13.6	13.5	12.4	11.9	10.9	10.8	10.4
45-64	66.9	54.9	46.2	36.7	36.9	34.5	33.8	30.9	31.1	28.8	26.6	24.9	24.6	24.3
65-74	87.4	89.0	90.4	77.8	77.1	73.2	71.8	67.5	67.3	61.1	57.9	52.9	53.1	52.5
75+	147.8	76.0	130.5	112.5	116.6	111.4	115.8	112.8	106.5	101.7	96.1	91.8	91.5	89.8
Male	81.9	64.3	68.3	52.2	53.5	50.7	50.1	47.1	47.6	43.6	41.0	37.1	36.2	36.5
Female	66.2	49.4	48.3	45.1	45.7	43.5	44.2	41.5	40.2	37.7	35.1	33.7	34.1	32.9
White	79.4	57.8	58.2	48.8	49.8	46.8	47.5	44.8	45.0	42.0	39.5	36.7	36.9	36.3
Black/Af Am	72.1	58.5	62.1	51.3	52.6	50.8	49.5	45.6	44.0	40.5	37.1	34.6	33.7	33.3
Other race	44.0	50.7	48.0	36.8	35.8	32.9	31.5	31.8	31.8	30.5	29.1	28.6	27.8	27.7
Diabetes	86.4	69.5	78.8	67.8	69.1	64.7	64.9	62.2	59.3	56.0	50.9	47.0	46.1	46.0
Hypertension	60.7	52.3	50.5	41.1	42.2	41.3	40.5	36.8	38.7	35.7	34.7	32.5	32.3	31.2
Glomerulonephritis	74.2	49.2	41.5	35.5	35.6	33.0	33.0	29.4	30.6	28.3	26.8	25.4	25.9	26.1
Other cause	85.3	55.8	49.4	37.8	37.6	35.3	35.7	34.4	34.4	30.8	29.1	27.4	28.4	27.7
<2 years	79.3	50.9	47.1	33.3	35.9	35.7	35.9	33.3	35.5	30.5	27.6	25.9	25.4	25.9
2-<5 years	74.3	55.2	52.4	45.0	44.6	41.9	41.0	39.1	36.7	34.7	33.6	30.1	29.7	30.1
5+ years	69.3	68.2	82.4	77.2	77.0	71.0	72.1	68.2	65.5	64.2	60.4	57.1	57.1	54.1
All	74.8	57.6	58.7	48.9	49.8	47.3	47.3	44.5	44.0	40.8	38.2	35.6	35.3	34.8

Table I.2

One-year survival probabilities: incident ESRD patients

censored at loss to follow-up or recovery of function, from day 1 to one year, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
0-4	91.5	91.1	77.4	87.6	89.3	87.6	87.4	84.2	83.8	87.9	90.9	89.8	88.2	89.7	83.3	91.1	91.6	86.0
5-9	93.5	94.1	91.2	95.9	93.7	96.1	100.0	96.0	96.0	97.3	94.9	97.2	97.2	98.6	96.0	96.0	94.3	95.0
10-14	96.6	98.1	89.3	97.4	97.4	97.5	98.1	98.0	97.4	97.7	97.6	98.4	98.1	97.8	98.2	99.3	98.9	98.6
15-19	96.7	97.2	92.4	97.6	96.7	98.5	96.4	97.3	97.9	97.0	97.6	96.7	96.7	96.3	97.4	97.6	97.7	96.9
20-29	92.9	93.1	92.9	91.7	94.0	94.1	95.3	95.2	93.4	94.7	93.7	93.7	93.7	93.5	94.0	94.3	94.7	94.7
30-39	89.6	90.3	89.8	88.5	89.3	90.6	90.7	90.6	90.6	91.0	91.2	91.2	91.7	91.8	92.7	92.8	92.2	93.1
40-49	89.1	89.0	89.0	88.4	88.6	89.3	88.5	88.7	89.1	88.7	88.2	88.3	88.5	88.6	89.4	89.7	90.0	90.4
50-59	84.7	82.9	84.4	85.1	84.4	85.4	84.7	84.4	84.6	84.4	84.8	84.1	85.0	84.6	85.3	85.6	86.0	86.3
60-64	78.4	76.4	77.7	78.8	79.6	79.8	78.3	79.4	79.0	79.7	79.4	79.9	80.4	80.8	81.2	81.5	82.4	82.3
65-69	70.4	69.3	73.6	74.8	74.7	73.8	74.3	74.1	74.0	74.6	74.5	74.9	74.7	75.5	76.7	76.4	76.8	78.1
70-74	65.6	65.0	68.3	69.5	68.9	68.3	68.9	68.2	68.6	68.3	68.2	68.5	69.2	69.6	70.8	70.9	71.2	72.6
75-79	58.8	62.5	63.5	62.9	62.9	62.1	62.1	62.1	62.6	62.8	63.0	62.6	63.1	63.9	63.8	65.1	66.4	66.4
80-84	53.3	56.2	57.3	57.9	57.3	56.7	55.3	55.7	55.2	55.4	56.5	57.0	57.3	57.2	57.4	58.0	60.0	61.0
85+	51.5	45.9	50.2	50.7	47.6	46.7	47.0	46.2	47.4	47.1	47.8	46.2	47.6	48.7	48.3	50.6	51.9	51.9
Male	80.7	77.9	77.6	77.2	76.9	76.5	76.1	75.9	76.0	75.8	75.7	75.6	75.9	76.3	76.9	77.2	77.7	78.3
Female	80.9	78.2	78.1	77.4	76.7	75.9	75.4	75.0	74.6	74.7	74.5	74.5	75.2	75.2	75.9	76.5	77.4	77.9
White	79.1	75.6	75.1	74.6	73.8	73.1	72.9	72.7	72.7	72.4	72.2	72.3	72.8	73.2	73.8	74.0	74.7	75.1
Black/Af Am	85.2	83.1	83.0	81.9	82.1	82.0	81.0	80.5	79.9	80.2	80.0	79.5	80.1	80.2	81.1	81.6	82.3	82.8
Other race	80.6	84.1	86.3	82.6	81.1	81.7	81.0	80.5	82.1	82.7	82.8	83.0	83.0	83.5	84.3	85.1	85.2	87.7
†Hispanic					82.3	81.2	81.2	81.1	81.5	81.6	81.2	81.5	82.4	82.3	83.6	83.8	84.3	85.0
†Non-Hispanic					76.0	75.6	75.1	74.7	74.4	74.4	74.3	74.1	74.5	74.8	75.4	75.8	76.5	76.9
Diabetes	78.5	75.4	77.5	77.9	77.4	76.9	76.2	76.2	76.2	76.4	76.4	76.7	77.3	77.3	78.3	78.5	79.3	80.3
Hypertension	83.8	76.8	75.2	75.5	74.7	73.4	73.3	72.7	72.9	72.5	72.9	72.7	73.1	73.6	73.9	74.8	75.6	75.5
Glomerulonephritis	91.6	87.8	85.7	86.5	86.5	86.4	86.0	85.6	86.7	86.2	86.6	86.6	87.3	87.8	88.2	89.2	89.8	90.1
Other cause	77.2	75.9	77.1	73.1	72.4	72.7	72.6	72.2	71.3	71.4	70.0	69.7	70.1	70.9	71.7	72.1	72.2	72.9
All	80.8	78.0	77.9	77.3	76.8	76.2	75.8	75.4	75.3	75.3	75.1	75.1	75.6	75.8	76.5	76.9	77.6	78.1

ADJUSTED																		
0-19	93.1	93.4	83.3	93.2	92.4	93.9	93.3	92.7	92.4	93.0	93.9	93.7	92.8	93.3	92.4	94.5	94.4	91.5
20-44	88.9	89.9	89.7	88.6	89.6	90.5	90.5	90.4	90.3	90.6	90.5	90.5	90.9	91.1	91.7	92.2	92.1	92.6
45-64	81.5	80.7	82.8	83.9	84.0	84.7	83.8	84.0	84.1	84.1	84.1	83.9	84.4	84.4	85.1	85.3	85.8	86.0
65-74	67.8	66.8	71.2	72.4	72.1	71.3	71.9	71.5	71.7	71.9	71.7	72.1	72.5	73.1	74.3	74.2	74.7	75.9
75+	58.3	59.4	60.3	59.9	59.2	58.5	58.0	57.9	58.2	58.2	58.6	58.2	58.8	59.2	59.3	60.2	61.6	61.9
Male	71.9	71.1	73.3	74.2	74.5	74.8	74.6	74.7	75.1	75.0	75.2	75.0	75.4	75.9	76.5	76.8	77.3	77.8
Female	72.6	72.9	75.4	76.1	75.7	75.5	75.2	74.9	74.9	75.2	75.1	75.1	75.7	75.8	76.4	76.9	77.7	78.2
White	69.2	69.2	72.2	73.7	73.5	73.5	73.5	73.6	73.9	73.9	73.9	74.0	74.6	74.8	75.3	75.6	76.3	76.4
Black/Af Am	79.6	77.4	78.3	77.8	78.3	78.6	77.7	77.1	76.7	77.2	77.0	76.5	77.0	77.2	78.2	78.8	79.6	80.3
Other race	70.2	77.5	82.5	80.3	79.3	80.1	79.2	79.2	80.6	81.2	81.6	81.8	81.7	82.5	83.2	83.9	84.2	86.8
Diabetes	69.9	68.9	73.7	75.5	75.4	75.5	74.9	75.1	75.3	75.8	75.8	76.1	76.7	76.7	77.6	77.9	78.6	79.5
Hypertension	79.1	75.7	76.2	77.2	76.9	76.3	76.3	75.9	76.3	76.0	76.6	76.2	76.6	77.0	77.2	77.6	78.5	78.2
Glomerulonephritis	83.1	81.0	79.4	81.3	81.8	81.9	81.3	81.3	82.3	81.3	82.2	81.9	82.5	83.1	83.7	84.8	85.5	86.0
Other cause	71.1	70.7	72.2	68.8	68.4	69.5	69.4	69.2	68.4	68.8	67.5	67.2	67.6	68.5	69.3	69.8	70.0	70.8
All	72.2	71.9	74.3	75.1	75.1	75.1	74.9	74.8	75.0	75.1	75.1	75.1	75.6	75.8	76.4	76.8	77.5	78.0

Table I.6

Ten-year survival probabilities: incident ESRD patients

censored at loss to follow-up or recovery of function, from day 1 to ten years, by age, gender, race, ethnicity, & primary diagnosis

UNADJUSTED	1980	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
0-4	74.6	74.4	72.1	72.1	64.9	72.1	62.4	68.6	72.9	72.3	73.7	75.0	74.7	74.6	74.3	72.8	68.7
5-9	79.8	82.7	86.3	83.3	89.0	81.9	80.8	88.4	90.4	78.5	87.8	84.6	80.9	91.4	91.3	92.6	85.2
10-14	79.6	81.3	85.3	91.4	81.7	80.1	75.4	84.5	82.1	83.8	81.1	86.6	87.8	83.2	86.1	85.9	87.6
15-19	79.8	76.5	79.7	78.7	79.8	82.2	78.2	79.1	80.7	78.9	81.6	80.6	77.4	79.9	77.1	77.6	80.1
20-29	65.5	64.3	65.6	64.5	66.6	64.1	64.9	63.9	65.1	67.7	67.2	65.4	68.1	69.2	69.8	71.3	68.2
30-39	48.6	47.1	48.5	46.7	49.0	49.3	49.6	48.4	49.2	49.3	48.9	51.0	50.7	52.5	53.3	53.5	55.0
40-49	34.4	35.3	36.4	35.6	35.7	34.1	35.6	34.4	36.5	36.3	36.2	37.0	36.7	37.3	38.3	39.0	40.2
50-59	17.1	17.7	18.4	19.3	18.0	17.9	17.8	19.1	19.0	19.1	20.1	20.7	20.7	21.8	23.0	23.5	24.3
60-64	8.7	8.7	8.5	8.3	9.0	8.1	8.2	8.7	9.3	9.6	10.0	10.2	11.0	11.4	11.7	12.4	13.4
65-69	4.1	5.5	4.7	4.3	4.5	4.4	4.9	4.3	4.2	5.2	4.7	5.2	5.4	5.4	6.3	6.4	7.4
70-74	3.0	2.9	2.4	2.7	2.3	2.1	2.5	1.9	2.3	2.4	2.3	2.5	2.5	2.6	2.8	3.6	3.9
75-79	1.6	1.2	1.5	1.4	1.6	0.9	0.8	1.1	1.0	1.2	0.9	1.2	1.1	1.2	1.3	1.5	1.6
80-84	1.4	0.8	0.5	0.7	0.3	0.5	0.3	0.5	0.5	0.5	0.4	0.7	0.4	0.4	0.5	0.7	0.6
85+	1.1	0.0	0.0	0.0	0.2	0.4	0.1	0.2	0.4	0.2	0.2	0.2	0.5	0.1	0.2	0.3	0.2
Male	25.1	22.0	22.6	21.7	21.2	20.4	20.8	19.5	19.8	20.1	19.3	20.2	19.5	18.9	19.4	19.4	19.7
Female	25.5	21.3	20.3	19.4	19.9	18.1	17.4	17.1	17.1	16.8	16.7	16.7	16.2	16.1	16.3	16.6	17.0
White	25.6	21.4	21.2	20.3	19.4	18.1	18.2	17.2	17.2	17.2	16.5	17.0	16.3	15.8	16.3	16.3	16.3
Black/Af Am	24.3	21.4	21.3	20.5	21.9	21.0	20.2	19.8	20.5	20.2	20.3	20.8	20.7	20.4	20.3	20.9	21.6
Other race	26.8	30.4	32.1	29.3	31.0	28.8	29.4	28.0	26.2	26.7	25.1	22.6	21.7	22.4	23.6	23.8	25.6
†Hispanic													21.5	22.3	23.0	23.3	24.2
†Non-Hispanic													17.5	17.0	17.3	17.4	17.5
Diabetes	14.8	12.2	12.4	11.8	11.5	11.1	10.4	10.3	10.6	10.7	10.9	10.7	10.6	10.4	10.8	11.4	11.8
Hypertension	26.2	16.6	16.7	14.8	16.3	14.9	15.2	14.5	15.1	14.6	14.5	15.8	15.2	14.8	14.9	15.1	15.7
Glomerulonephritis	48.6	38.8	39.2	38.3	39.1	37.8	38.2	36.2	38.7	39.0	37.7	39.8	38.9	39.7	40.4	40.7	41.8
Other cause	21.0	26.1	26.4	27.3	26.4	26.8	28.1	28.3	27.4	28.3	27.7	26.6	26.4	26.4	27.3	27.0	27.3
All	25.3	21.7	21.6	20.6	20.6	19.4	19.2	18.4	18.6	18.6	18.1	18.5	18.0	17.6	17.9	18.1	18.4

ADJUSTED																	
0-19	69.4	67.6	71.7	72.2	69.9	71.4	65.7	70.3	72.6	69.9	72.8	73.4	71.1	73.3	72.6	72.6	72.5
20-44	45.4	46.3	47.4	46.0	47.5	47.7	48.1	47.0	48.1	48.6	48.8	49.2	49.2	50.7	50.8	51.5	52.2
45-64	13.2	14.9	15.9	16.2	16.3	16.2	16.3	17.3	18.3	18.7	19.6	20.4	21.0	21.8	22.9	23.7	24.8
65-74	3.4	4.2	3.5	3.5	3.4	3.3	3.7	3.2	3.4	3.9	3.7	4.1	4.2	4.3	4.9	5.4	6.2
75+	1.7	1.0	1.1	1.1	1.1	0.8	0.6	0.9	0.8	0.9	0.7	1.0	0.9	0.9	0.9	1.1	1.2
Male	13.0	13.7	14.2	13.9	13.8	14.1	14.6	14.4	14.9	15.5	15.4	16.1	16.3	16.5	17.2	17.9	18.4
Female	14.1	14.6	14.4	14.4	14.8	14.2	14.1	14.4	14.8	15.0	15.3	15.6	15.6	16.0	16.6	17.0	18.0
White	12.9	13.6	13.8	13.9	13.7	13.8	14.1	14.1	14.7	15.3	15.3	15.9	16.0	16.3	17.1	17.6	18.1
Black/Af Am	14.1	13.6	13.7	13.4	14.1	13.7	13.6	13.8	14.1	14.2	14.6	15.0	15.2	15.6	15.8	16.4	17.4
Other race	12.8	18.2	19.1	17.1	19.5	18.6	19.9	19.5	19.3	19.5	19.0	19.2	19.2	20.1	21.3	22.2	23.7
Diabetes	8.6	8.9	9.0	9.0	8.9	8.9	8.9	9.0	9.5	10.0	10.3	10.5	10.8	10.9	11.6	12.3	12.9
Hypertension	18.3	15.9	16.1	15.5	16.2	15.9	16.3	16.0	16.5	16.7	16.8	17.7	17.5	17.9	18.3	18.8	19.8
Glomerulonephritis	23.6	22.2	22.9	22.3	23.1	22.9	22.8	22.8	24.5	24.5	24.4	25.9	25.9	26.7	27.6	28.6	29.3
Other cause	14.2	17.7	18.0	18.6	18.2	18.6	19.3	19.8	19.2	20.1	19.7	19.7	19.9	20.5	21.2	21.1	21.9
All	13.5	14.1	14.3	14.2	14.3	14.2	14.4	14.4	14.9	15.3	15.3	15.9	16.0	16.3	16.9	17.5	18.2

Table J.1

Certified dialysis & transplant facilities: by Medicare certification

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Certified units										
Facilities	2,148	2,292	2,456	2,624	2,876	3,083	3,344	3,576	3,833	4,013
Dialysis patients	141,942	156,834	170,958	186,316	199,711	213,731	229,834	245,365	259,159	273,009
Transplanted patients	9,997	10,090	10,903	11,295	11,885	12,179	12,367	13,316	13,479	14,300
Veterans Administration										
Facilities	12	12	13	13	12	12	11	11	10	10
Dialysis patients	546	520	521	506	451	372	356	345	334	324
Transplanted patients	14	11	*	*	.	.	.	.	.	.
Total facilities	2,160	2,304	2,469	2,637	2,888	3,095	3,355	3,587	3,843	4,023
Total dialysis patients	142,488	157,354	171,479	186,822	200,162	214,103	230,190	245,710	259,493	273,333
Patients transplanted	10,011	10,101	10,910	11,296	11,885	12,179	12,367	13,316	13,479	14,300
Total transplants	10,026	10,115	10,934	11,312	11,902	12,198	12,427	13,272	13,483	14,311
Living donor	2,382	2,536	2,828	3,000	3,416	3,703	3,915	4,520	4,644	5,427
Deceased donor	7,644	7,579	8,106	8,312	8,486	8,495	8,512	8,752	8,839	8,884

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Certified units										
Facilities	4,175	4,379	4,530	4,673	4,870	4,997	5,170	5,430	5,689	5,798
Dialysis patients	285,645	296,322	307,909	318,170	330,132	342,752	355,443	368,639	384,176	399,200
Transplanted patients	14,608	15,055	15,661	16,488	17,146	17,712	17,254	16,961	17,209	17,447
Veterans Administration										
Facilities	10	54	61	59	71	70	70	71	71	71
Dialysis patients	337	2,030	2,186	2,234	2,658	2,551	2,652	2,696	2,841	2,854
Transplanted patients	.	22	51	41	114	106	100	93	123	97
Total facilities	4,185	4,433	4,591	4,732	4,941	5,067	5,240	5,501	5,760	5,869
Total dialysis patients	285,982	298,352	310,095	320,404	332,790	345,303	358,095	371,335	387,017	402,054
Patients transplanted	14,608	15,077	15,712	16,529	17,260	17,818	17,354	17,054	17,332	17,544
Total transplants	14,628	15,106	15,738	16,568	17,295	17,870	17,380	17,098	17,370	17,584
Living donor	5,804	5,893	6,244	6,506	6,480	6,361	5,987	5,858	6,250	6,182
Deceased donor	8,824	9,213	9,494	10,062	10,815	11,509	11,393	11,240	11,120	11,402

Table K.1

Total Medicare costs ($) of reported ESRD per calendar year

all ESRD patients with at least one Medicare claim, by age, gender, race, ethnicity, & primary diagnosis

	1995	2000	2005	2006	2007	2008	2009	2010
0-4	10,805,739	7,632,816	16,495,763	16,694,119	15,824,545	22,153,251	21,315,533	24,245,826
5-9	9,305,565	9,504,316	11,496,457	13,890,301	15,808,563	16,031,286	16,732,720	16,737,800
10-14	19,655,317	16,547,299	28,544,985	32,174,382	30,438,583	29,479,239	34,663,266	31,028,773
15-19	47,201,197	47,010,035	64,454,258	78,246,924	72,748,179	82,156,432	85,775,917	87,798,879
20-29	335,165,312	354,530,875	450,634,026	521,591,520	538,564,416	588,480,987	643,607,427	663,748,401
30-39	811,466,548	894,552,760	1,216,029,842	1,371,197,210	1,412,881,604	1,519,980,677	1,657,665,897	1,675,605,513
40-49	1,174,568,603	1,593,204,201	2,438,049,784	2,724,116,312	2,827,985,097	3,070,910,106	3,358,094,583	3,475,272,147
50-59	1,464,047,150	2,176,692,196	3,731,469,214	4,268,443,016	4,523,783,833	5,062,475,896	5,511,664,666	5,821,011,264
60-64	923,764,913	1,270,017,477	2,127,631,280	2,351,091,509	2,511,214,707	2,860,268,033	3,172,091,761	3,452,216,359
65-69	1,320,547,838	1,666,983,528	2,643,863,336	2,852,290,192	2,970,493,456	3,332,110,305	3,564,433,426	3,840,151,829
70-74	1,253,478,877	1,701,069,174	2,481,452,420	2,624,676,116	2,744,266,077	3,019,741,111	3,203,161,629	3,442,227,006
75-79	877,933,813	1,421,478,206	2,194,087,651	2,314,782,771	2,350,146,981	2,555,264,064	2,629,669,068	2,779,399,038
80-84	414,525,795	670,681,729	1,273,208,403	1,358,362,893	1,410,992,191	1,568,411,013	1,629,942,654	1,726,753,464
85+	188,881,893	381,151,509	774,258,088	869,909,304	949,225,946	1,100,320,925	1,201,991,348	1,325,049,583
Unknown	591,046	590,980	95,023	1,113,366	363,665	320,131	1,258,889	777,080
0-19	86,967,818	80,694,466	120,991,463	141,005,726	134,819,870	149,820,208	158,487,436	159,811,278
20-44	1,694,102,366	1,957,337,209	2,724,071,320	3,074,258,045	3,164,579,146	3,430,400,322	3,731,654,442	3,789,729,262
45-64	3,014,910,159	4,331,660,299	7,239,742,826	8,162,181,522	8,649,850,511	9,671,715,376	10,611,469,892	11,298,124,423
65-74	2,574,026,715	3,368,052,703	5,125,315,756	5,476,966,308	5,714,759,532	6,351,851,416	6,767,595,055	7,282,378,835
75+	1,481,341,501	2,473,311,445	4,241,554,141	4,543,054,968	4,710,365,118	5,223,996,003	5,461,603,070	5,831,202,085
Unknown	591,046	590,980	95,023	1,113,366	363,665	320,131	1,258,889	777,080
Male	4,452,111,081	6,226,954,627	10,273,887,844	11,314,370,578	11,877,974,054	13,248,438,143	14,328,348,855	15,208,876,637
Female	4,399,718,001	5,984,692,475	9,177,796,260	10,084,201,248	10,496,759,419	11,579,663,321	12,403,608,373	13,152,923,745
Unknown	110,522 .		86,426	8,109	4,368	1,992	111,556	222,581
White	5,234,442,158	6,950,537,953	11,081,467,227	12,116,502,801	12,690,371,421	14,117,318,972	15,162,436,807	16,077,751,536
Black/Af Am	3,268,920,857	4,631,507,371	7,294,970,122	8,094,873,975	8,445,964,610	9,329,562,489	10,051,424,944	10,656,624,604
Native American	112,710,001	171,143,756	261,320,535	281,217,465	294,148,557	324,886,544	360,144,790	389,699,188
Asian	218,829,198	366,038,222	631,591,939	734,304,263	790,891,380	913,717,083	1,021,405,801	1,116,379,000
Other/unknown	17,037,389	92,419,800	182,420,706	171,681,431	153,361,874	142,618,369	136,656,441	121,568,635
†Hispanic		1,404,567,481	2,533,707,797	2,858,124,791	3,055,922,869	3,467,526,188	3,830,386,998	3,997,055,352
†Non-Hispanic		10,072,117,454	16,599,446,765	18,240,936,291	19,040,953,636	21,049,625,210	22,583,114,712	23,996,201,327
Unknown		734,962,167	318,615,968	299,518,853	277,861,336	310,952,057	318,567,074	368,766,284
Diabetes	3,343,236,042	5,232,240,474	8,843,362,330	9,758,370,636	10,226,063,330	11,356,112,899	12,253,337,516	13,076,031,005
Hypertension	2,623,489,256	3,318,718,493	5,216,311,292	5,674,885,626	5,938,245,226	6,575,004,310	7,054,843,261	7,521,548,700
Glomerulonephritis	1,265,544,015	1,520,975,532	2,066,403,383	2,245,964,079	2,278,725,600	2,457,770,547	2,621,982,852	2,658,413,246
Other cause	1,323,082,824	1,732,248,588	2,652,627,511	2,961,057,844	3,130,974,874	3,531,813,905	3,836,899,527	4,073,619,984
Unknown	296,587,467	407,464,015	673,066,013	758,301,751	800,728,811	907,401,795	965,005,627	1,032,410,028
All	8,851,939,603	12,211,647,102	19,451,770,530	21,398,579,935	22,374,737,841	24,828,103,456	26,732,068,784	28,362,022,963

Table K.6

Per person per year costs ($): dialysis patients, with unknowns dropped (model 1)

period prevalent patients, as-treated model, primary payor only, by age, gender, race, ethnicity, & primary diagnosis

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	61,058	54,756	55,287	59,243	65,670	78,695	89,556	82,008	82,795	126,285	102,470	103,544
5-9	39,303	49,112	50,155	47,542	48,585	52,365	56,957	78,655	76,150	80,214	78,745	76,561
10-14	43,933	40,604	42,918	45,347	48,962	48,309	55,424	66,924	68,442	68,641	81,539	76,529
15-19	42,102	43,765	46,523	50,254	49,214	50,198	57,195	62,996	61,268	71,425	73,936	77,001
20-29	41,297	44,458	46,493	48,743	51,035	53,790	56,089	63,484	66,344	71,559	76,305	77,820
30-39	44,163	48,025	50,675	52,703	54,092	56,484	59,824	66,662	68,798	73,349	78,595	78,375
40-49	44,647	49,788	52,743	55,482	57,341	60,728	63,375	69,136	70,978	76,051	80,697	81,058
50-59	46,843	52,870	56,116	58,518	60,483	63,648	65,821	70,967	72,552	78,015	82,650	83,421
60-64	48,735	54,724	58,588	61,732	63,509	67,077	68,861	72,888	74,569	79,617	83,891	84,972
65-69	53,222	58,582	61,859	65,239	67,707	70,723	72,992	76,525	78,080	84,589	88,048	89,724
70-74	53,966	60,099	63,571	65,897	68,130	71,026	73,923	77,536	80,148	86,773	90,592	93,172
75-79	54,658	59,976	63,597	66,295	68,261	71,760	74,400	78,155	79,630	86,559	90,332	91,972
80-84	55,179	59,610	63,551	66,231	68,354	70,668	74,487	77,983	80,229	87,017	90,681	91,966
85+	55,736	60,136	63,402	65,598	69,241	70,332	74,455	77,716	79,632	86,077	89,977	91,346
0-19	44,039	44,329	46,735	49,615	50,393	52,330	59,379	66,699	65,711	76,699	78,912	80,159
20-44	43,784	47,660	50,442	52,894	54,508	57,287	60,558	67,331	69,280	74,141	79,038	79,195
45-64	46,949	52,926	56,235	58,882	60,827	64,180	66,207	71,069	72,815	78,106	82,651	83,499
65-74	53,585	59,348	62,724	65,568	67,917	70,872	73,447	77,014	79,074	85,630	89,254	91,341
75+	54,950	59,888	63,553	66,166	68,447	71,154	74,439	78,015	79,832	86,616	90,375	91,832
Male	47,416	52,947	56,116	58,830	61,000	63,975	66,994	71,211	72,915	78,507	82,708	83,658
Female	51,867	57,638	61,298	64,077	66,103	69,213	71,465	76,345	78,337	84,557	88,683	90,184
White	50,220	55,729	59,023	61,622	63,948	66,618	69,412	73,539	75,353	81,415	85,514	86,785
Black/Af Am	49,233	54,971	58,718	61,598	63,680	67,296	69,898	75,078	76,867	82,638	86,836	87,912
Native American	45,500	49,796	52,077	56,112	56,521	59,066	59,614	62,711	64,410	68,082	73,105	75,011
Asian	43,237	50,809	52,689	55,702	55,995	58,348	60,389	64,814	66,720	72,211	76,419	77,950
Other/unknown	56,369	57,537	59,053	60,314	59,578	62,945	65,584	68,638	72,747	76,643	83,144	81,109
†Hispanic	.	54,227	57,233	60,450	62,387	65,048	67,473	72,393	74,773	80,702	84,923	84,266
†Non-Hispanic	.	55,185	58,773	61,478	63,599	66,693	69,378	73,825	75,534	81,335	85,445	86,927
Diabetes	55,239	60,391	64,110	66,556	68,461	72,097	74,922	79,609	81,279	87,609	92,005	93,643
Hypertension	48,163	52,940	56,238	58,937	61,045	63,502	65,925	70,141	71,955	77,501	81,088	82,186
Glomerulonephritis	43,188	47,176	49,629	52,255	53,968	56,270	58,149	62,542	64,075	68,765	72,896	72,838
Other cause	46,573	53,253	56,431	59,360	61,936	64,270	66,921	71,171	73,325	78,835	83,439	84,140
Unknown cause	48,028	52,789	54,896	58,321	59,519	63,670	66,806	71,193	73,071	79,680	82,713	83,426
All	49,583	55,189	58,581	61,306	63,398	66,420	69,067	73,580	75,399	81,260	85,419	86,608

Table K.7

Per person per year costs ($): hemodialysis patients, with unknowns dropped (model 1)

period prevalent patients, as-treated model, primary payor only, by age, gender, race, ethnicity, & primary diagnosis

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	82,293	87,752	96,260	80,083	65,607	89,134	131,536	106,722	105,377	192,680	119,646	119,327
5-9	48,044	50,196	61,090	59,505	64,605	66,255	70,184	99,420	76,642	104,662	96,042	90,444
10-14	46,099	45,015	51,456	54,285	55,223	51,660	58,729	67,251	76,123	75,031	88,409	82,819
15-19	44,816	45,757	48,908	52,890	51,681	53,691	59,698	66,199	64,676	73,532	77,569	79,543
20-29	42,469	45,658	48,140	50,465	52,832	55,751	57,780	65,168	68,057	73,168	77,877	79,435
30-39	45,660	49,142	52,137	54,282	55,792	58,292	61,479	68,439	70,596	75,020	80,477	79,933
40-49	45,784	50,831	53,873	56,516	58,541	62,188	64,967	70,605	72,389	77,418	82,002	82,396
50-59	47,675	53,569	56,947	59,410	61,521	64,742	66,959	72,081	73,703	79,140	83,821	84,463
60-64	49,536	55,165	59,203	62,417	64,392	68,108	69,802	73,903	75,627	80,651	84,757	85,993
65-69	53,810	59,095	62,160	65,768	68,340	71,443	73,758	77,199	78,831	85,388	88,820	90,561
70-74	54,490	60,250	63,760	66,314	68,584	71,726	74,520	78,148	80,788	87,431	91,216	93,803
75-79	54,860	59,781	63,406	66,281	68,313	71,966	74,611	78,498	79,914	86,808	90,554	92,578
80-84	55,197	59,225	63,131	65,819	67,928	70,371	74,202	77,731	80,001	86,943	90,580	91,998
85+	55,433	59,430	62,714	64,794	68,402	69,632	73,882	77,268	79,038	85,586	89,396	90,870
0-19	47,054	46,904	51,141	54,283	53,238	54,826	61,881	69,044	68,228	80,183	82,166	82,352
20-44	45,124	48,818	51,828	54,389	56,129	59,072	62,277	69,003	70,957	75,702	80,695	80,729
45-64	47,858	53,622	57,094	59,747	61,852	65,326	67,377	72,237	73,991	79,260	83,754	84,584
65-74	54,146	59,681	62,973	66,042	68,462	71,583	74,131	77,659	79,775	86,364	89,958	92,087
75+	55,038	59,558	63,213	65,897	68,199	71,032	74,343	78,007	79,771	86,601	90,312	91,999
Male	48,172	53,384	56,595	59,370	61,673	64,726	67,714	71,954	73,550	79,168	83,386	84,353
Female	53,015	58,449	62,202	65,080	67,151	70,455	72,709	77,500	79,660	85,872	89,901	91,480
White	51,491	56,456	59,810	62,497	64,958	67,696	70,492	74,554	76,433	82,552	86,593	87,929
Black/Af Am	49,807	55,388	59,182	62,114	64,253	68,060	70,597	75,770	77,532	83,276	87,446	88,539
Native American	45,843	50,284	52,608	56,834	56,983	59,724	60,153	63,204	64,809	68,210	73,286	74,957
Asian	44,488	51,885	53,783	56,867	57,212	59,691	61,964	66,345	68,007	73,362	77,746	79,517
Other/unknown	57,782	58,747	60,594	61,745	60,642	64,131	66,902	69,949	74,082	77,903	84,272	81,527
†Hispanic	.	55,180	58,129	61,414	63,439	66,085	68,622	73,409	75,782	81,757	85,825	85,058
†Non-Hispanic	.	55,734	59,392	62,187	64,407	67,665	70,308	74,736	76,461	82,276	86,365	87,922
Diabetes	55,933	60,717	64,471	66,992	69,025	72,724	75,540	80,174	81,879	88,155	92,555	94,157
Hypertension	48,811	53,312	56,609	59,457	61,579	64,235	66,651	70,884	72,712	78,269	81,785	83,033
Glomerulonephritis	44,718	48,381	50,950	53,697	55,433	58,035	59,872	64,070	65,804	70,569	74,635	74,479
Other cause	47,648	54,053	57,475	60,411	63,138	65,608	68,190	72,408	74,466	80,042	84,606	85,385
Unknown cause	49,142	53,341	55,365	58,744	60,331	64,111	67,280	72,036	73,690	80,304	83,255	84,070
All	50,534	55,796	59,253	62,056	64,237	67,391	70,020	74,503	76,336	82,205	86,329	87,561

Table K.8

Per person per year costs ($): CAPD/CCPD patients, with unknowns dropped (model 1)

period prevalent patients, as-treated model, primary payor only, by age, gender, race, ethnicity, & primary diagnosis

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	53,296	41,091	46,412	53,158	65,506	70,517	80,002	75,194	75,386	101,546	95,997	96,542
5-9	37,186	47,077	41,863	40,376	39,934	45,282	50,035	65,164	76,457	62,731	70,124	68,971
10-14	41,386	34,418	32,873	36,318	42,852	44,904	52,574	66,122	60,568	63,216	75,245	68,083
15-19	37,344	38,301	40,476	42,502	42,102	39,427	48,466	52,671	51,584	64,396	64,082	68,923
20-29	37,486	38,114	38,459	39,754	41,268	43,409	46,014	52,972	55,335	61,415	65,628	66,893
30-39	38,538	41,204	41,430	42,513	42,528	43,484	47,271	53,426	55,173	59,561	62,778	65,036
40-49	39,751	41,747	43,357	45,830	46,067	46,842	47,338	54,362	55,604	61,355	65,821	66,115
50-59	42,087	45,262	46,442	48,099	47,999	50,067	50,981	56,065	56,898	61,839	64,986	67,528
60-64	42,651	47,619	48,552	49,579	49,031	50,657	52,349	55,142	56,160	61,444	67,308	66,128
65-69	45,513	47,352	51,359	51,910	52,649	53,643	54,158	58,813	58,371	63,536	65,438	67,369
70-74	44,280	49,634	50,811	49,259	51,602	51,051	54,299	57,556	58,549	63,320	66,551	68,903
75-79	43,172	49,095	50,968	50,592	50,222	52,181	54,670	56,511	58,171	64,037	67,058	64,046
80-84	44,268	45,172	47,997	50,891	52,223	52,359	56,095	58,635	59,744	62,751	63,693	65,167
85+	42,166	47,237	45,281	46,561	51,367	48,331	51,860	55,291	55,662	56,207	62,298	64,205
0-19	40,597	38,764	39,518	42,060	45,989	46,992	55,071	62,242	61,627	70,812	74,281	75,726
20-44	38,687	40,367	41,448	42,735	42,960	44,619	47,282	54,377	55,725	61,036	64,377	65,960
45-64	41,661	45,213	46,164	48,019	48,031	49,441	50,353	55,046	56,232	61,375	65,785	66,768
65-74	44,952	48,420	51,104	50,681	52,161	52,410	54,224	58,225	58,452	63,438	65,940	68,038
75+	43,400	47,864	49,580	50,289	50,931	51,787	54,743	57,010	58,364	62,511	65,337	64,425
Male	40,837	43,732	45,270	46,721	47,082	48,701	51,160	55,382	57,446	61,901	64,997	66,149
Female	42,749	45,853	47,243	48,142	49,001	49,681	51,143	56,675	56,482	62,260	66,365	67,398
White	41,771	44,658	46,184	47,312	47,755	49,463	51,371	56,145	56,501	61,196	64,761	66,092
Black/Af Am	42,508	45,757	47,436	48,850	49,846	50,017	52,687	57,719	59,547	65,338	69,359	70,010
Native American	42,651	42,215	45,103	45,400	48,248	48,058	49,552	53,039	55,650	61,921	67,177	71,758
Asian	34,874	41,387	41,404	41,953	41,772	41,987	42,056	46,723	50,691	57,343	58,430	57,785
Other/unknown	39,377	44,681	40,850	44,421	44,678	43,952	43,157	52,290	54,108	57,486	63,182	67,446
†Hispanic	.	41,521	43,839	45,446	45,590	48,471	47,790	53,693	55,241	60,896	65,909	67,230
†Non-Hispanic	.	44,847	46,571	47,681	48,393	49,344	51,667	56,399	57,230	62,227	65,635	66,677
Diabetes	48,236	51,666	53,327	54,394	54,358	56,820	58,496	63,840	64,487	71,077	74,458	77,404
Hypertension	40,164	42,595	44,598	44,749	45,938	46,114	48,408	52,496	53,457	58,416	61,900	61,550
Glomerulonephritis	36,295	38,739	39,874	41,246	42,789	42,879	44,958	50,264	49,770	54,224	58,479	59,411
Other cause	39,495	42,577	43,557	45,454	45,865	46,964	48,904	53,841	55,837	60,063	63,321	63,480
Unknown cause	38,817	41,128	41,284	43,789	41,717	44,078	46,424	49,575	54,588	56,298	61,648	61,401
All	41,761	44,789	46,248	47,420	48,027	49,181	51,152	56,007	56,978	62,076	65,657	66,751

Table K.9

Per person per year costs ($): transplant patients, with unknowns dropped (model 1)

period prevalent patients, as-treated model, primary payor only, by age, gender, race, ethnicity, & primary diagnosis

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
0-4	23,595	26,815	29,695	33,139	31,520	36,335	26,832	49,522	37,780	53,800	52,298	62,162
5-9	16,319	13,540	16,547	16,710	14,449	19,119	16,024	33,188	20,088	44,911	24,345	50,377
10-14	15,495	12,933	16,294	17,153	13,212	26,716	14,279	37,501	21,473	38,031	33,525	46,585
15-19	18,984	16,094	16,236	20,233	16,704	26,376	19,527	35,735	23,249	36,960	27,857	45,236
20-29	18,467	17,085	18,090	20,247	17,233	22,893	19,207	31,301	20,633	31,405	24,787	35,010
30-39	17,894	17,150	17,227	19,945	16,413	22,581	18,693	27,646	20,246	28,783	23,774	32,612
40-49	18,126	17,314	18,901	20,145	16,580	22,607	19,188	27,614	20,264	28,664	23,827	31,366
50-59	19,841	19,407	20,571	21,484	17,753	23,510	20,388	27,506	21,620	29,949	24,236	32,810
60-64	19,531	20,426	20,526	21,814	18,895	24,210	21,416	28,088	24,247	29,684	25,641	32,802
65-69	19,644	21,175	20,328	24,309	19,838	26,310	22,427	28,247	24,597	30,737	27,091	32,767
70-74	18,685	21,752	19,490	23,463	19,114	25,178	23,671	27,496	24,485	30,657	26,761	33,950
75-79	17,362	18,546	17,890	25,712	20,720	26,046	25,644	26,442	25,036	30,011	26,736	31,783
80-84	18,333	18,671	18,268	19,044	13,091	23,577	20,455	25,135	20,599	32,630	25,989	32,766
85+	10,425	17,349	12,371	17,780	7,826	32,165	18,129	27,677	16,028	29,753	21,709	30,219
0-19	18,027	15,381	17,342	19,715	16,134	26,372	17,870	37,270	23,470	40,054	31,118	48,121
20-44	18,023	16,989	17,915	20,047	16,554	22,478	18,806	28,207	20,317	29,153	24,172	32,428
45-64	19,331	19,231	20,048	21,223	17,738	23,560	20,408	27,728	21,879	29,635	24,354	32,572
65-74	19,379	21,370	20,084	24,009	19,602	25,887	22,862	27,960	24,556	30,706	26,966	33,241
75+	17,400	18,537	17,824	24,494	19,518	25,790	24,705	26,239	24,107	30,495	26,488	31,920
Male	18,519	18,200	18,580	20,825	17,239	23,580	20,098	27,699	21,773	29,443	24,794	32,104
Female	18,921	19,026	19,715	21,931	17,815	24,042	20,301	28,571	22,101	30,805	25,307	34,131
White	17,702	17,323	17,935	19,970	16,359	22,522	18,846	26,286	20,634	28,389	23,562	31,261
Black/Af Am	22,892	23,109	23,299	26,198	21,548	28,116	25,075	33,935	26,821	35,371	30,007	38,571
Native American	18,217	18,300	19,371	19,882	19,065	23,730	19,805	28,514	21,137	31,070	25,822	33,246
Asian	14,782	15,352	16,466	18,386	14,962	20,359	17,805	25,007	17,747	27,293	21,465	29,198
Other/unknown	15,729	26,003	18,568	18,810	14,117	46,998	15,460	37,750	34,697	30,263	34,972	32,664
†Hispanic	.	18,652	19,895	21,108	18,148	23,807	20,273	29,688	21,695	31,467	25,089	33,801
†Non-Hispanic	.	19,367	20,071	22,102	18,201	24,252	20,990	28,301	22,652	30,099	25,421	33,021
Diabetes	25,500	25,093	25,873	28,951	22,940	31,348	27,024	35,665	29,445	37,993	32,643	41,527
Hypertension	19,461	18,877	19,414	22,216	18,028	24,165	21,495	27,903	22,692	30,203	25,351	32,831
Glomerulonephritis	15,488	15,332	16,014	17,200	14,701	19,582	16,376	23,468	17,781	24,614	20,301	26,978
Other cause	15,950	15,595	15,840	17,618	14,936	20,356	16,875	25,071	18,717	26,910	21,873	29,822
Unknown cause	13,987	15,467	15,594	17,171	14,997	19,241	16,498	24,352	16,039	25,293	21,067	27,582
All	18,679	18,533	19,031	21,274	17,470	23,767	20,180	28,051	21,906	29,988	25,002	32,914

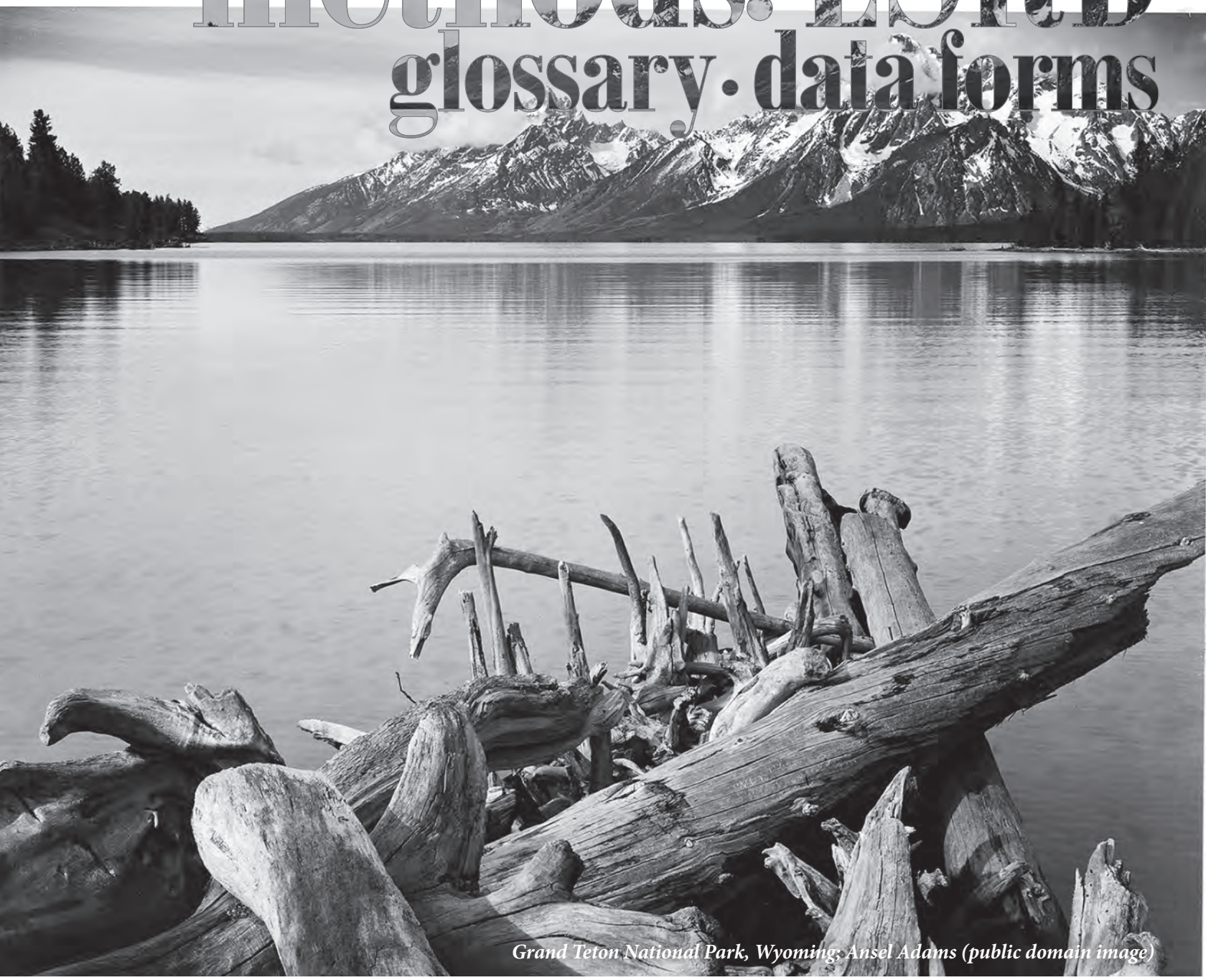
Table K.b

Medicare payments ($) per person per year: 2010, by claim type & modality (model 1)

period prevalent patients, as-treated model; Medicare primary payor only

	All ESRD	All dialysis	Hemodialysis	CAPD/CCPD	Other dialysis	Transplant
Patient years at risk	357,347	280,375	260,412	18,745	1,218	76,971
Total Medicare	75,043	86,608	87,561	66,751	188,471	32,914
Total inpatient	26,696	29,804	29,766	24,935	112,986	15,371
Medical DRG	13,571	15,538	15,556	12,027	65,589	6,405
Surgical DRG	10,778	12,520	12,469	11,410	40,474	4,430
Other DRG	125	137	140	76	356	83
Rehabilitation	780	899	891	813	3,858	349
Transplant DRG	705	0	0	0	0	3,273
Non-transplant pass-throughs	698	711	709	609	2,710	650
Transplant pass-throughs	39	0	0	0	0	181
Total outpatient	24,664	30,591	31,031	24,912	23,858	3,077
Outpatient hemodialysis	12,978	16,505	17,691	708	6,235	128
Outpatient peritoneal dialysis	999	1,269	77	17,463	6,869	17
Outpatient other dialysis	15	19	20	4	73	1
Outpatient ESA	4,623	5,858	6,023	3,683	3,991	125
Outpatient vitamin D hormones	923	1,174	1,262	25	163	7
Outpatient iron	632	802	847	184	644	11
Outpatient other injectables	222	210	215	128	342	265
Radiology	346	376	380	314	414	239
Pharmacy	114	134	135	105	322	45
Ambulance	68	80	81	46	243	25
Laboratory/pathology	445	331	331	324	598	859
Outpatient other	3,299	3,833	3,970	1,929	3,962	1,354
Skilled nursing facility	2,706	3,262	3,370	980	15,267	680
Home health agency	1,682	1,949	2,006	1,106	2,756	709
Hospice	252	304	308	145	1,885	63
Total physician/supplier	14,570	15,878	16,241	9,933	29,743	9,806
Transplant surgery	75	6	5	8	37	326
Inpatient surgery	470	506	503	472	1,596	342
Outpatient surgery	827	902	929	553	654	553
~E&M nephrology inpatient	468	521	521	402	2,276	274
~E&M nephrology outpatient	71	23	22	33	64	248
~E&M non-nephrology inpatient	1,755	2,037	2,053	1,349	9,391	728
~E&M non-nephrology outpatient	788	826	833	714	1,057	651
Dialysis capitation	1,822	2,316	2,348	1,930	1,433	24
Inpatient dialysis	211	265	259	284	1,142	16
Home dialysis	22	28	9	265	367	3
Vascular access	1,238	1,563	1,661	203	1,564	53
Peritoneal access	8	9	5	61	112	4
Physician/supplier ESA	28	11	9	30	61	94
Physician/supplier iron	1	1	0	5	4	4
Immunosuppressive drugs	876	17	16	11	213	4,008
Durable medical equipment	291	334	343	203	468	133
Physician/supplier radiology	414	448	453	365	793	287
Physician/supplier lab/pathology	1,263	1,459	1,460	1,403	2,182	547
Physician/supplier ambulance	2,483	3,110	3,295	451	4,493	198
Other physician/supplier	1,456	1,495	1,515	1,190	1,836	1,312
Part D	4,473	4,821	4,840	4,741	1,977	3,208

methods: ESRD
glossary · data forms



Grand Teton National Park, Wyoming; Ansel Adams (public domain image)

Because you have seen something doesn't mean you can explain it. Differing interpretations will always abound, even when good minds come to bear. The kernel of indisputable information is a dot in space; interpretations grow out of the desire to make this point a line, to give it direction. The directions in which it can be sent, the uses to which it can be put by a culturally, professionally, and geographically diverse society are almost without limit. The possibilities make good scientists chary.

BARRY LOPEZ, *Arctic Dreams*

In this appendix we present details on the USRDS database, its standardized working datasets and specialized code definitions, and our common data processing practices. We also describe the statistical methods used in this ADR. The researcher's guide to the USRDS database, available online, provides additional information about the database and standard analysis files.

data sources

The USRDS maintains a stand-alone database with data on diagnoses and demographic characteristics of ESRD patients, along with biochemical data, dialysis claims, and information on treatment and payor histories, hospitalization events, deaths, physician/supplier services, and providers.

REMIS/REBUS/PMMIS DATABASE

The major source of ESRD patient information for the USRDS is the Renal Beneficiary and Utilization System (REBUS) of the Centers for Medicare and Medicaid Services (CMS, formerly HCFA), adopted in 1995 as the On-Line Transaction Processing system from the previous Program Management and Medical Information System (PMMIS) database. The REBUS/PMMIS database contains demographic, diagnosis, and treatment history information for all Medicare beneficiaries with ESRD. The database has also been expanded to include non-Medicare patients, as discussed later in this appendix. Having advanced its database technology, CMS migrated the REBUS database into an Oracle relational database in the fall of 2003, including all patients who were alive and had ESRD as of January 1, 1995, or who were incident after this date. This database is known as the Renal Management Information System (REMIS).

CMS updates the REMIS/REBUS/PMMIS database on a regular basis, using the Medicare Enrollment Database (EDB), Medicare inpatient and outpatient claims, the Organ Procurement and Transplantation Network (OPTN) transplant database, ESRD Medical Evidence

forms (2728) provided by the ESRD networks, and ESRD Death Notification forms (2746) obtained from renal providers, as well as the Standard Information Management System (SIMS) database of the ESRD networks. CMS has also established data integrity rules to ensure accurate identification of patients in the SIMS and CMS databases. Each ESRD patient is now identified with a unique patient identification number common to both databases, ensuring that data on all patients are consistently managed over time.

CMS MEDICARE ENROLLMENT DATABASE (EDB)

The Medicare Enrollment Database is the designated repository of all Medicare beneficiary enrollment and entitlement data, and provides current and historical information on residence, Medicare as secondary payor (MSP) and employer group health plan (EGHP) status, and Health Insurance Claim/Beneficiary Identification Code (HIC/BIC) cross-referencing.

ESRD MEDICAL EVIDENCE FORM (CMS 2728)

The ESRD Medical Evidence (ME) form is used to register patients at the onset of ESRD, and must be submitted by dialysis or transplant providers within 45 days of initiation. The form establishes Medicare eligibility for individuals previously not Medicare beneficiaries, reclassifies previously eligible beneficiaries as ESRD patients, and provides demographic and diagnostic information on all new patients. The CMS, USRDS, and renal research communities rely on the form to ascertain patient demographics, primary diagnosis, comorbidities, and biochemical test results at the time of ESRD initiation. Before 1995, units were required to file the ME form only for Medicare-eligible patients. Since the 1995 revision, however, providers are required to complete the form for all new ESRD patients.

The third major revision of the ME form, in May, 2005, remedied several shortcomings of the 1995 form and its earlier version. Key additions target pre-ESRD care and vascular access use, and additional new fields collect information on glycosylated hemoglobin and lipid testing, on the frequency of hemodialysis sessions, and on whether patients are informed of transplant options.

This form is the only source of information about the cause of a patient's ESRD. Because the list of diseases has been revised, the USRDS stores the codes from each version so that detail is not lost through conversion of one set of codes to the other.

ESRD DEATH NOTIFICATION FORM (CMS 2746)

The ESRD Death Notification form is used to report the death of ESRD patients. According to CMS policy, this form must be submitted by dialysis or transplant providers within 30 days of a patient's death, and provides the date and causes of death (primary and secondary), reasons for discontinuation of renal replacement therapy, if applicable, and evidence of hospice care prior to death. It is the primary source of death information for CMS and the USRDS, identifying more than 99 percent of deaths. The USRDS also utilizes the Social Security Administration's (SSA) Death Master File as a supplemental data source for ascertaining death in a small group of lost-to-follow-up ESRD patients; this file, however, identifies only all-cause deaths.

OPTN TRANSPLANT DATABASE

In the early 1980s CMS began collecting data on all Medicare kidney transplants. In 1988, the United Network of Organ Sharing (now OPTN) was created to provide a national system for allocating donor organs. OPTN also began collecting data on all transplants. These two efforts were consolidated in 1994, and OPTN became the single source of data on transplant donors and recipients.

The CMS and OPTN transplant data files overlap for 1988–1993, and some patients with ME forms indicating transplant as the initial modality are not included in either file. To resolve conflicts among the three sources, the USRDS adopts the following procedure:

- OPTN transplants are accepted into the database.
- CMS transplants before 1988 are accepted.
- CMS transplants from 1988 to 1993 are accepted if there is no OPTN transplant record for that patient within 30 days of the CMS transplant.
- Transplants indicated on ME forms are accepted if there is no previously accepted record of a transplant for that patient within 30 days of the date listed on the ME form.

CMS STANDARD ANALYTICAL FILES (SAFS)

These files contain billing data from final action claims, submitted by Medicare beneficiaries with ESRD, in which all adjustments are resolved. For inpatient/outpatient institutional claims we use the following data: inpatient, 100 percent SAF; outpatient, 100 percent SAF; home health agency (HHA), 100 percent SAF; hospice, 100 percent SAF; and skilled nursing facility (SNF), 100 percent SAF. For physician/supplier claims, we use: physician/supplier, 100 percent SAF; and durable medical equipment (DME), 100 percent SAF.

CMS SAFS are updated each quarter through June of the next year, when the annual files are finalized. Datasets for the current year are created six months into the year and updated quarterly until finalized at 18 months, after which they are not updated to include late arriving claims. Annual files are thus approximately 98 percent complete. The USRDS 2012 ADR includes all claims up to December 31, 2010. Patient-specific demographic and diagnosis information, however, includes data as recent as October, 2011.

Inpatient transplant and outpatient dialysis claims records are used to identify new ESRD patients for whom no ME form has been filed. These patients, primarily non-Medicare patients, or beneficiaries who develop ESRD while on Medicare because of age or disability, will eventually be entered into the REMIS/REBUS/PMMIS — and hence the USRDS — database through the claims records. For patients without ME forms these claims are the only reliable information from which to determine first ESRD service dates. These paid claims records are, however, only a supplement to, rather than a replacement of, other sources of data on incidence and prevalence.

The problem of timely identification has lessened with the revision of the ME form in April 1995, and the amended ESRD entitlement policy that now requires the form to be submitted for all ESRD patients regardless of insurance and eligibility status.

CMS 5 PERCENT STANDARD ANALYTICAL FILES (SAFS)

These files contain billing data from final action claims submitted by Medicare beneficiaries, in which all adjustments have been resolved. The claims data are selected randomly from general Medicare claims (final action claims) using five combinations of the last two digits of the CMS Health Insurance Claims (HIC) number: 05, 20, 45, 70, and 95. Since the same two-digit numbers are used each year, one should expect to see the same beneficiaries in these annual datasets. These claims are categorized into the inpatient (IP), outpatient (OP), home health agency (HHA), hospice (HS), skilled nursing facility (SNF), physician/supplier (PB), and durable medical equipment (DME) SAFS.

The files are updated each quarter through June of the next year, when annual files are finalized. Datasets for the current

year are created six months into the year and updated quarterly until finalized at 18 months, after which they are not updated to include late arriving claims. Annual files are thus approximately 98 percent complete. The USRDS 2012 ADR includes all claims up to December 31, 2010.

STANDARD INFORMATION MANAGEMENT SYSTEM (SIMS) DATABASE (ESRD NETWORKS)

The USRDS continues to collaborate with CMS and the ESRD networks to address data tracking issues relating to non-Medicare ESRD patients. Past ADRs have documented the lack of consistent Medicare claims data among these patients. Working solely with data from the ME form, the USRDS could establish the first ESRD service date, but could not generate a more detailed treatment history. With the integration of the SIMS event data into the USRDS database, however, we can now address issues in the non-Medicare ESRD population such as the large and growing number of lost-to-follow-up patients, and look as well at patients for whom there previously were no data on initial modality or death. This data integration is detailed in the section on data management and preparation.

CMS DIALYSIS FACILITY COMPARE DATA

The USRDS uses the CMS Dialysis Facility Compare data to define chain and ownership information for each renal facility. Prior to the 2003 ADR, similar data were extracted from the Independent Renal Facility Cost Report (CMS 265-94).

ESRD CLINICAL PERFORMANCE MEASURES PROJECT

CMS developed its ESRD Clinical Performance Measures Project (CPM, formerly the ESRD Core Indicators Project) to collect information on the quality of care provided to dialysis patients. The data originate from data collection forms completed by staff at primary care facilities, and focus on dialysis adequacy measures, anemia management, and vascular access. Additional clinical parameters such as albumin are available as well. These data have been collected annually since 1994, using a random sample of adult (age 18 and older) patients alive and on dialysis at the end of each calendar year; on average, roughly 8,500 adult in-center hemodialysis patients and 1,500 peritoneal dialysis patients are surveyed each year. Data collection for all hemodialysis patients age 12–17 was begun in 2000. Collection was then expanded in 2002 to all in-center hemodialysis patients younger than 18, and in 2005 to all peritoneal dialysis patients of this age. The USRDS Coordinating Center, in collaboration with CMS, is now making these ESRD CPM data available to the general research community.

In anticipation of the national release of the CROWNWEB system and its supporting performance measures reports, CMS concluded its CPM project in 2009, making 2008 its final survey year. CMS is currently working with ESRD communities to develop new CPM measures on the CROWNWEB system.

MEDICARE CURRENT BENEFICIARY SURVEY (MCBS)

The Medicare Current Beneficiary Survey is a longitudinal survey of a nationally representative sample of aged, disabled, and institutionalized Medicare beneficiaries. The MCBS contains information on the health status, health care use and expenditures, drug prescriptions, health insurance coverage, and socioeconomic and demographic characteristics of the entire spectrum of Medicare beneficiaries. Data are made available by CMS in two datasets: Access to Care (1992–2009), and Cost and Use (1992–2008), with the 2009 and 2008 files, respectively, the latest updates for the 2012 ADR.

In the fall of 1991, the MCBS began to be conducted three times per calendar year (winter, summer, and fall), and in 1994 a sample rotation scheme was introduced. Survey participants are kept in the sample for four years, with approximately one-third rolling off, and with new participants added each fall to keep the overall sample size at approximately 12,000 each calendar year.

CMS PRESCRIPTION DRUG EVENT (PDE) FILE

In December 2003, Congress passed the Medicare Prescription Drug, Improvement, and Modernization Act (MMA), amending the Social Security Act by adding Part D under Title XVIII. With this new Part D coverage, health plans must submit a summary record called the prescription drug event (PDE) record to CMS whenever a Medicare beneficiary fills a prescription. The PDE record contains 37 data elements; the USRDS receives PDE records with 30 data elements and excluding a few non-critical fields. Each drug is identified by a National Drug Index (NDC) code; the record also contains prescription dosing information, drug costs above and below the out-of-pocket threshold, other true out-of-pocket (TROOP) amounts, plan paid amounts, and low-income cost-sharing subsidy amounts.

Due to delays in the availability of the data, only the 2006 and 2007 PDE files were available for the 2010 ADR; 2008 PDE data were included in the 2011 ADR. Starting with the 2012 ADR, however, PDE data are in-sync with ESRD claims, so 2009 and 2010 PDE data are both included in this ADR.

THOMSON REUTERS MARKETSCAN DATA

The Thomson Reuters MarketScan Commercial Claims and Encounters Database includes specific health services records for employees and their dependents in a selection of large employers, health plans, and government and public organizations. The database includes nine files: Annual Enrollment Summary Table, Enrollment Detail Table, Inpatient Admissions Table, Inpatient Services Table, Outpatient Services Table, Outpatient Pharmaceutical Claims Table, Facility (Inpatient and Outpatient) Header Table, Aggregated Populations Table, and the Red Book (prescription drug information by National Drug Code). The strength of this database lies in the quality of its cost information, where claims data include actual paid dollars and net payments by the insurer.

The MarketScan database links billing and encounter data to detailed patient demographic and enrollment information across sites and types of providers, and over time from 1999 to 201, and includes commercial health data from approximately 100 payors. About 80 percent of those covered are self-insured. Each year the database contains health data for about 10.5 million people. For details about the MarketScan data, please visit www.usrds.org.

INGENIX I3 DATA

The Ingenix i3 database is a commercial and non-capitated health plan database covering employees from multiple employers within a single insurer. In addition to the usual service encounter and drug data, similar to that of the MarketScan database, this database also includes laboratory data, allowing for comparisons between claims-based and lab-based definitions of diseases. In order to protect the discount structure of its business, the billing data of this single insurer discloses only charged dollars without actual paid amounts or the portion paid by the insurer.

The Ingenix i3 database links billing and encounter data to detailed demographic and enrollment information of individual employees from 2000 to 2010, and contains health data

for approximately 14 million people annually. For details about what is contained in the Ingenix i3 data, please visit our website at www.usrds.org.

NATIONAL HEALTH & NUTRITION EXAMINATION SURVEY (NHANES)

NHANES is a series of health examination surveys conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). Begun in 1960, NHANES is designed to monitor the health and nutritional status of the non-institutionalized civilian population in the United States. NHANES III was conducted in two phases between 1988 and 1994. In 1999, NHANES became a continuous annual survey to allow annual estimates, with release of public-use data files every two years. Both NHANES III and NHANES 1999–2010 were nationally representative cross-sectional surveys and used a complex, stratified, multistage probability cluster sampling design that included selection of primary sampling units (counties), household segments within the counties, and sample persons from selected households. Survey participants were interviewed in their homes and/or received standardized medical examinations in mobile examination centers. Both surveys over-sampled African Americans, Mexican Americans, and individuals age 60 or older to improve the estimates for these subgroups.

ANNUAL FACILITY SURVEY (AFS)

Independent ESRD patient counts are available not only from the CMS ESRD database, but also from CMS's Annual Facility Survey (CMS 2744), which all Medicare-certified dialysis units must complete at the end of each year. The AFS reports counts of patients being treated at the end of the year, new ESRD patients starting treatment during the year, and patients dying during the year. Both Medicare and non-Medicare end-of-year patients are counted. While AFS files do not carry patient-specific demographic and diagnosis data, they provide independent patient counts used to complement the CMS patient-specific records. Starting with the 2005 AFS, CMS stopped posting data from these surveys on the web. And beginning with the 2007 ADR, the USRDS has extracted the relevant facility survey data directly from the SIMS database.

CDC SURVEILLANCE

The CDC used its National Surveillance of Dialysis-Associated Diseases to collect data from U.S. dialysis facilities on patient and staff counts, membrane types, reuse practices, water treatment, therapy, vascular access use, antibiotic use, hepatitis vaccination and conversion rates, and the incidence of HIV, AIDS, and tuberculosis. No data are patient-specific. The CDC did not conduct a survey in 1998, and terminated this program after 2002.

UNITED STATES CENSUS

In rate calculations throughout this year's ADR we use data from the 2000 and 2010 U.S. Census, and also incorporate CDC population estimates by race. Our methods are described on later in this appendix.

data management & preparation

Our main computer system is based on a VMS cluster running Alpha EV6 processors. We currently maintain three nodes in the cluster: three 4-CPU (i.e. Alpha EV6 processor) servers, each with 16-GB RAM memory. Through the HP Advanced Server System, we map VMS directories to network shares accessible to Windows clients as mapped network drives. The Alpha EV6s are connected to 50 terabytes of RAID-5 (Redundant Array of Independent Disks, level 5) disk farms, which are managed by three interconnecting high-speed disk controllers via Fibre Channel. All data in disk farms are independently accessible through Alpha server nodes.

We use SAS database management system and development tools as our core database technology platform; this differs from the Oracle RDBMS system used by the previous contractor only in physical data allocation and management. All information in the earlier system was integrated into the new database, and its continuity and completeness are maintained.

DATA LOADING AND CLEANING

The USRDS receives data files in IBM 3490 and 3490e cartridges/CD-ROMs with EBCDIC, ASCII, or SAS formats. Due to increased awareness of and concerns over data security and patient privacy protection, in 2008 CMS began delivering most of the USRDS requested data via a dedicated and secured T1 line connection. CMS has also instituted data encryption procedures on all out-bound data regardless of file format and transportation medium. Once loaded and decrypted, files are converted into SAS datasets for processing, and a series of data verification steps is completed to ensure data quality and integrity before updating the USRDS database.

DATABASE UPDATES

For this ADR, patient demographic and diagnosis data are updated through October, 2011, and Medicare inpatient/outpatient and physician/supplier claims through December 31, 201.

ESRD PATIENT DETERMINATION

A person is identified as having ESRD when a physician certifies the disease on the CMS ME form, or when there is other evidence of chronic dialysis or a kidney transplant. Patients with acute kidney failure who are on dialysis for days or weeks, but who then recover kidney function, are excluded from the database if their ME forms have not been submitted. Patients who die soon after kidney failure without receiving dialysis are sometimes missed.

The ESRD First Service Date (FSD) is the single most important data element in the USRDS database, and each patient must, at a minimum, have a valid FSD. This date is used to determine the incident year of each new patient and the first year in which the patient is counted as prevalent. The date 90 days after the FSD is used as the starting point for most survival analyses.

The FSD is derived by taking the earliest of the date of the start of dialysis for chronic kidney failure, as reported on the ME form; the date of a kidney transplant, as reported on a CMS or OPTN transplant form, an ME form, or a hospital inpatient claim; or the date of the first Medicare dialysis claim. Most FSDs are obtained from the ME form. In the absence of this form, the date of the first Medicare dialysis claim or transplant usually supplies the FSD. In the few cases in which the date of the earliest dialysis claim precedes the first dialysis date reported on the ME form, the earliest claim date is used as the FSD. However, starting with the 2007 ADR, a patient entering into the ESRD program after December 31, 1994, has his or her FSD defined solely by the regular dialysis start date or the preemptive transplant date, whichever is earliest, on the ME form. This new method of determining the FSD aligns more closely to the methods used by CMS. After careful monitoring and repeated comparative analyses of the traditional USRDS method to the new ME method, the USRDS began applying the ME method to incident patients entering into the ESRD program on or after January 1, 1995.

MEDICARE AND NON-MEDICARE ('ZZ') PATIENTS

Beneficiaries are enrolled in Medicare based on criteria defined in Title XVIII of the Social Security Act of 1965, and in subsequent amendments to the act. A person in one of these four categories is eligible to apply for Medicare: age 65 and over, disabled, ESRD program, and Railroad Retirement Board (RRB).

Most ESRD patients are eligible to apply for Medicare as their primary insurance payor. Some, however, are not immediately eligible for Medicare coverage because of their employment status and insurance benefits. These patients are usually covered by employer group health plans (EGHPS), and must wait 30–33 months before becoming eligible to have Medicare as their primary payor. Some of these patients, particularly new patients since 1995, have FSDs established by ME forms, but have no dialysis claims or hospitalization events in the CMS claims database. In the REBUS/PMMIS database all non-Medicare ESRD patients are assigned a code of 'ZZ' in the two-character Beneficiary Identification Code field. CMS does not generally include these patients in the datasets released to researchers.

The USRDS recognizes that 'ZZ' patients are true ESRD patients, and should be included in patient counts for incidence, prevalence, and modality. Calculations of standardized mortality ratios, standardized hospitalization ratios, and standardized transplantation ratios, however, should not include these patients because of the small number of claims available in the first 30–33 months after their first ESRD service. Furthermore, it may not be possible to link 'ZZ' patients to their ESRD Death Notification forms or the OPTN transplant data, or to determine comorbidity or inpatient/outpatient and physician/supplier services. Because such data are limited, event rates that include these patients must be assessed with caution.

We continue to include 'ZZ' patients in the mortality rate calculations of the ADR. The USRDS, in working with CMS, has been able to resolve most of the 'ZZ' patients since the release of the ESRD Patient Database, REMIS, in the fall of 2003. According to our most recent assessment — performed during production of the 2007 ADR — we have determined that at least 99 percent of 'ZZ' patients have been resolved due to significant advancements in the REMIS/REBUS database system.

DEATH DATE DETERMINATION

After the ESRD First Service Date, the date of death is the most critical piece of information in the ESRD database. Death dates are obtained from several sources, including the CMS Medicare Enrollment Database, CMS forms 2746 (ESRD Death Notification form) and 2728 (ESRD Medical Evidence form), the OPTN transplant follow-up form, the ESRD Network SIMS database, and the Social Security Death Master File. Because multiple sources report death information for the same patient, one patient may have several reported dates. The USRDS therefore uses an algorithm to determine the date of death. EDB information is given first priority, and, in the absence of an EDB death date, other sources are evaluated in the following order: form 2746, form 2728, SIMS data, the transplant follow-up form, and, if no other death date is available, the Death Master file.

LOST-TO-FOLLOW-UP METHODOLOGY

The USRDS uses all available data to create a treatment history for each patient in the database, including all modality events, their duration, and the renal providers involved in each patient's care.

Gaps frequently exist in the billing data upon which modality periods are based. The USRDS assumes that a modality continues until death or the next modality-determining event. A patient with a functioning transplant is assumed to maintain it unless a transplant failure or death notification is encountered in the data. In the absence of a death notification, dialysis claims, or other confirmation of a continuing modality, a dialysis modality, in contrast, is assumed to continue for only 365 days from the date of the last claim. After this period the patient is declared lost-to-follow-up until the occurrence of a dialysis claim or transplant event.

Because Medicare may be the secondary payor for up to the first 30–33 months of ESRD, delaying the submission of Medicare dialysis claims, lost-to-follow-up categorization cannot begin until the end of the third year after the start of ESRD service. This "first three-year rule" is particularly important for non-Medicare patients, who may be followed for up to three years with limited event or mortality data. These patients would contribute dialysis or transplant days to the denominator of rate calculations, but only questionable event data to the numerator. In comparison to the two-year rule used in the 2001 ADR, this three-year rule significantly reduces the number of lost-to-follow-up patients in the prevalent population.

A number of events can result in a lack of dialysis data and eventual reclassification of a patient as lost-to-follow-up:

- The patient may have recovered renal function (RRF) and no longer have ESRD. For a valid patient classification, this event must occur within 180 days of the FSD, and the RRF period must persist for at least 90 days.
- The patient may have left the country.
- The patient may receive dialysis covered by a payor other than Medicare, or have received a transplant not paid for by Medicare or reported to OPTN.
- The patient may be enrolled in a Medicare HMO, so that Medicare dialysis claims are not generated even though the patient is eligible for Medicare coverage.
- The patient's death may not have been reported to the Social Security Administration or to CMS.

INTEGRATION OF THE USRDS, SIMS, AND REMIS DATABASES

We have worked to reconcile ESRD patients in the SIMS, REMIS, and USRDS databases. We have analyzed each database for duplicate records, consolidated these records, and integrated the databases. Data were then re-analyzed for duplicates, which were themselves consolidated. This consolidation of patients is an ongoing collaborative effort between the ESRD Networks, CMS, and the USRDS.

Treatment histories compiled by the USRDS rely on Medicare dialysis billing records, which contain no information on dialysis therapy or modality changes in non-Medicare patients. Beginning with the 2003 ADR, we incorporate treatment-specific information from the ESRD Networks' SIMS event database to improve the tracking of these patients in the USRDS database, and of patients who are considered lost-to-follow-up. Efforts to integrate the USRDS, SIMS, and REMIS databases continue to pay dividends in reducing the number of lost-to-follow-up patients.

We continue to take a conservative approach to incorporating SIMS Event History data into the USRDS treatment history; as we learn more about the data, we may expand this approach. We currently make the following updates on an annual basis:

- The USRDS database is updated with mortality data from the SIMS event database.
- The database is updated for each incident patient whose initial modality is listed as "unknown dialysis," and for whom the SIMS database lists a known dialytic modality within 90 days of the established first ESRD service date.

» Data on non-Medicare "lost-to-follow-up" patients are substituted with available SIMS treatment information.

Since 2007 we have included the RRF event in the modality sequence, reducing lost-to-follow-up episodes for prevalent patients. This event is now established in our database only if it occurs within the first 180 days of the FSD and lasts for at least 90 days, a definition more conservative than that in the SIMS event database.

60-DAY STABLE MODALITY RULE: TREATMENT HISTORY

This rule requires that a modality continue for at least 60 days before it is considered a primary or switched modality. It is used to construct a patient's modality sequence, or treatment history, so that incident and prevalent patients are known to have stable and established modalities. Starting with the 2003 ADR, all descriptive data in the incident, prevalent, and modality sections are based on incident and prevalent cohorts produced from the modality sequence without using this rule. In analyses of patient outcomes such as hospitalization and mortality, in contrast, this rule is applied.

90-DAY RULE: OUTCOMES ANALYSES

This rule defines each patient's start date, for data analyses, as day 91 of ESRD. Allowing outcomes to be compared among all ESRD patients at a stable and logical point in time, it is used primarily to calculate survival rates and compare outcomes by modality at several points in time. Use of the rule overcomes the difficulties of examining data from the first three months of ESRD service (an unstable time for new patients as renal providers try to determine the best treatment modality), and from in-center hemodialysis patients younger than 65 and not disabled, who cannot bill Medicare for their dialysis treatments and hospitalizations until 90 days after the first ESRD service date. Patients on peritoneal dialysis or home dialysis, or with transplant as the first modality, can bill immediately.

SERUM ALBUMIN DATA

The ME form reports albumin level along with the test's lower limit, which indicates the testing method: bromcresol purple or bromcresol green, with lower limits of 3.2 and 3.5 g/dl, respectively.

In producing the 2004 ADR we found that, in 1995–2003, almost 50 percent of forms contained lower limit values equal to "zero," while another 25 percent reported values other than the expected 3.2 and 3.5 g/dl. Only 25 percent (n=173,000) of incident patients had legitimate lower limit values. Further analyses, however, showed that these patients are a representative cohort sample, with similar demographic distributions by age, gender, race, and cause of ESRD to those of the overall ESRD population. For all figures in the 2005 and later ADRs which present serum albumin data from the ME form, we therefore include only those incident patients with both an albumin lower limit of 3.2 or 3.5 g/dl and an albumin value.

database definitions

MODALITI ES

The USRDS and the CMS ESRD group have worked extensively on methods of categorizing patients by ESRD modality. While the ME form is the primary source of data on modality at ESRD initiation, the modality it indicates may be temporary, as patients often change to a new one in the first 90 days, and it can be difficult to track modality during this time. Patients age 65 and older have Medicare claims in the first 90 days; these claims contain revenue codes designating modality. Patients younger than 65 and in employer group health plans (EGHPS) or Medicare risk programs, however, have no such claims. Modality may thus not be determined until Medicare becomes the primary payor at day 91 or, for EGHP patients, at 30–33 months after the first ESRD service date. These limitations influence our ability to determine a patient's modality at any one point in time.

Of particular concern are patients categorized as having an unstable modality (i.e., on a modality for fewer than 60 consecutive days) in the first 90 days, and who are thus not recognized as being hemodialysis or peritoneal dialysis patients. Because these patients tend to have higher death and hospitalization rates, interpretations of modality-specific outcome data including them should be viewed with caution. These patients are included in the "all ESRD" category, which provides a more complete view of mortality and hospitalization with the least biasing of the data.

As mentioned earlier, a new modality/event — recovered renal function — was introduced in the 2007 ADR. This event can be established only if it occurs within first 180 days of the FSD and if the RRF period persists for at least 90 days. The RRF event is similar to the lost-to-follow-up event in that patients with an RRF event will not be included in the prevalent populations for outcomes analyses. However, as with lost-to-follow-up events, we keep them in the modality sequence so that subsequent renal failure episodes can be tracked closely and in a timely manner.

Individual analyses categorize modalities in different ways; these are defined in the methods sections for each chapter.

PAYORS

Information on payors is obtained from the CMS Medicare Enrollment Database. We also examine Medicare outpatient claims to identify patients for whom the EDB does not indicate Medicare as primary payor (MPP), but who have at least three consecutive months of dialysis treatment covered by Medicare; these patients are also designated as having MPP coverage. From these two data sources we construct a payor sequence file to provide payor history, and, starting with the 2003 ADR, we use this file to identify Medicare eligibility status and other payors.

The construction of this file is similar to that of the treatment history file. Payor status is maintained for each ESRD patient from the first ESRD service date until death or the end of the study period. Payor data are used to categorize a patient as MPP, MSP with EGHP, MSP non-EGHP, Medicare Advantage (Medicare + Choice), Medicaid, or a combination of payors. With this approach, the USRDS is now able to apply payor status information in all outcome analyses using the "as-treated" model (see the discussion of Chapter Eleven).

PRIMARY CAUSE OF RENAL FAILURE

Information on the primary cause of renal failure is obtained directly from the ME form. For the ADR we use eight categories, with ICD-9-CM codes as follows:

- diabetes: 250.00 and 250.01
- hypertension: 403.9, 440.1, and 593.81
- glomerulonephritis: 580.0, 580.4, 582.0, 582.1, 582.9, 583.1, 583.2, 583.4, and 583.81
- cystic kidney: 753.13, 753.14, and 753.16
- other urologic: 223.0, 223.9, 590.0, 592.0, 592.9, and 599.6
- other cause: all other ICD-9-CM codes covered in the list of primary causes on the ME form, with the exception of 799.9
- unknown cause: 799.9 and ICD-9-CM codes not covered in the list of primary causes on the ME form
- missing cause: no ICD-9-CM code listed

RACE AND ETHNICITY

Data on patient race and ethnicity are obtained from the ME form, the CMS Medicare Enrollment Database, and the REMIS/REBUS identification file. Because they are addressed in separate questions on the ME form, racial and ethnic categories can overlap.

Patient ethnicity became a required field on the 1995 revised ME form; because data for 1995 are incomplete, information on Hispanic patients is presented starting in 1996. The non-Hispanic category includes all non-Hispanics and patients with unknown ethnicity.

Because of the small number of ESRD patients of some races, as well as the construction of the U.S. census data, we concentrate on white, African American, Native American (including Alaskan Native), and Asian (including Pacific Islander) populations. Data on patients of other races will be presented as their numbers increase.

EGHP COHORT

As mentioned, EGHP data in this year's ADR are derived from the MarketScan and Ingenix I3 databases. To examine the demographic segment not represented by Medicare, we use enrollment information to construct yearly cohorts of enrollees younger than 65. To ensure that we select enrollees with the potential to generate claims evidence appropriate to the analytical demands, rules for inclusion also include 12 months of continuous coverage in a commercial fee-for-service plan, and, for medication analyses, continuous prescription drug coverage. Comorbidities are identified using claims. Patients with at least one inpatient claim or at least two outpatient claims during the period of interest and with a diagnosis code of a particular comorbidity are identified as having that comorbidity.

ESRD COHORT IN THE EGHP POPULATION

As the MarketScan and I3 databases provide no identifiable data elements, we cannot link them directly to the USRDS ESRD registry. To identify ESRD patients we thus use a process similar to that of the registry. Transplant patients are identified by evidence of a transplant procedure or adverse graft event, and chronic dialysis patients by evidence of continuous history of dialysis therapy, with at least three consecutive months of dialysis service and with service claims in at least 70 percent of treatment months. Treatment months are defined from the first dialysis claim to the earliest of kidney transplant, death, or end of enrollment. Both inpatient and outpatient claims are evaluated for evidence of dialysis service history.

The first ESRD service date is set to the earliest of the first dialysis service date or the transplant date. If neither is available, the start of enrollment is used. Incidence is defined by a first ESRD service date at least 60 days after the start of enrollment.

précis

For Figure p.1 we identify chronic kidney disease (CKD), congestive heart failure (CHF), and diabetes in patients from the 5 percent Medicare sample, using methods described for Chapter Eleven; these methods are also used to determine diabetic status and CHF in the ESRD population. Costs for the "cost year" are determined for the entire calendar year for patients who have fee-for-service coverage and Medicare as primary payor. Because this analysis combines the ESRD cohort with the 5 percent Medicare sample, ESRD patients in the 5 percent sample are excluded.

Methods for the portion of Table p.a that addresses Medicare spending are addressed in the discussion of Chapter Eleven.

Total transplant counts shown in Table p.a include all transplants performed in 2010, as reported by the OPTN. Transplants of unknown donor type are excluded from by-donor counts. New wait list counts include all patients added to the list for a kidney-alone or kidney-pancreas transplant in 2010; patients added at multiple centers are counted once. The total N on the wait list includes all patients listed for a kidney-alone or kidney-pancreas transplant as of December 31, 2010, regardless of when they first listed. If patients are added to the list in early 2010 and removed from the list before the end of the year, it is possible for a group to have more new patients than existing patients. Median time on the list is shown for patients on the list on December 31, 2010.

Data for Table p.2 are from the CMS Annual Facility Survey.

healthy people 2020

Objective CKD-3 Data for this objective include all patients in the 5 percent Medicare sample who are age 65 and older and who have hospitalized acute kidney injury (AKI) events in the given year (1992–2010). Hospitalized AKI is defined by ICD-9-CM diagnosis code 584 in inpatient claims, and renal evaluation is identified by having a microalbumin test. Patients are followed from the discharge date to the earliest date of death, ESRD, end of Medicare coverage, or six months after the discharge date. CPT codes for urinary microalbumin measurement are identified from HEDIS 2008 specifications (HEDIS 2008, an NCQA program, is used to monitor the performance of managed health care plans), and include 82042, 82043, 82044, and 84156.

Objective D-12 The cohort includes general Medicare patients diagnosed with diabetes in each year, continuously enrolled in Medicare Parts A and B during the whole year, and age 65 or older at the beginning of the year. CPT codes for urinary microalbumin measurement are those used in Objective CKD-3, above. Testing is tracked during each year. Methods of defining diabetes are described in the appendix of the CKD volume.

Objective CKD-4.1 The cohort here is similar to that used for Objective D-12, but includes all CKD patients. Testing is tracked during each year. Patients are excluded if they are enrolled in a managed care program (HMO), acquire Medicare as secondary payor, are diagnosed with ESRD during the year, have a missing date of birth, or do not live in the 50 states, the District of Columbia, Puerto Rico, or the Territories. Racial and ethnic categories are mutually exclusive. Methods of defining CKD are described in the appendix of the CKD volume. Serum creatinine is identified through CPT codes 80047–80050, 80053–80054, 80069, and 82565, while lipid testing is identified through CPT codes 80061, 82465, 82470, 83695, 83705, 83715–83721, 84478, 83700, 83701, and 83704. CPT codes for urinary microalbumin measurement are the same as those used for Objective CKD-3, above.

Objective CKD-4.2 Methods and codes used to determine rates of glycosylated hemoglobin (A1c) testing and eye examinations are taken from HEDIS 2008 specifications. CPT codes 83036 and 83037 are used to identify A1c testing. Codes used to identify diabetic eye examinations are as follows: CPT codes, 92002, 92004, 92012, 92014, 92018, 92019, 92225, 92226, 92230, 92235, 92240, 92250, 92260, 67101, 67105, 67107, 67108, 67110, 67112, 67141, 67145, 67208, 67210, 67218, 67227, 67228, 67028, 67030, 67031, 67036, 67038, 67039, 67041, 67042, 67043, 67113, 67121, 67221, 67228, S0625, S0620, S0621, and S3000; ICD-9-CM procedure codes, 14.1–14.5, 14.9, 95.02, 95.03, 95.04, 95.11, 95.12, and 95.16; and ICD-9-CM diagnosis code V72.0. The cohort is similar to that used for Objective CKD-4.1, but includes all diabetic CKD patients. Methods of defining diabetes are described in the appendix of the CKD volume.

Objective CKD-5 The cohort includes general Medicare patients diagnosed with both diabetes and chronic kidney disease in each

year, continuously enrolled in the Medicare inpatient/outpatient and physician/supplier program during the entire year, and age 65 or older at the beginning of the year. Additionally, for 2006, patients are enrolled in Medicare Part D for at least six months; in 2007–2010, patients are enrolled in Medicare Part D during the entire year. Use of angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) is defined by at least one prescription fill from either drug class during the year.

Objective CKD-8 Incident rates are calculated using the methods described for Chapter One. Overall rates are adjusted by age, gender, and race; rates by age are adjusted for gender and race; rates by gender are adjusted for age and race; and rates by race and ethnicity are adjusted by age and gender.

Objective CKD-9.1 Rates of kidney failure due to diabetes are also calculated using the methods described for Chapter One, and adjustments are the same as those described for Objective CKD-8, above.

Objective CKD-9.2 This table uses data from the National Health Interview Survey (NHIS); all ages are included. Three-year data are used to estimate the prevalence of diabetes in the middle year, and the size of the population with diabetes is based on U.S census data. The incident rate per million of ESRD caused by diabetes is calculated as the number of incident ESRD patients with a primary diagnosis of diabetes divided by the size of the population with diabetes in that group.

Objectives CKD-10 & CKD-11.3 These tables use data from the newest version of the ME form. The cohorts include incident hemodialysis patients, with CKD-11.3 limited to those age 18 and older at initiation and with a known vascular access at that time. CKD-10 includes only patients for whom it is known whether they saw a nephrologist prior to initiation.

Objectives CKD-11.1 & CKD-11.2 use data from the CMS ESRD Clinical Performance Measures (CPM) project. Included patients are those whose date of dialysis initiation, according to the CPM data, occurs in the same year as the data collection, and access type represents the access used during the last quarter of the year, according to the CPM data.

Objective CKD-12 The cohort here includes patients younger than 70 in 1991–2009. Percentages are calculated as the number of patients placed on the deceased donor organ wait list or receiving a deceased donor transplant within one year of initiation, divided by the number of patients without a living donor available (i.e., patients receiving a living donor transplant are excluded), and are estimated using the Kaplan-Meier method.

Objective CKD-13.1 Data include patients from 1991–2007 who are younger than 70 at ESRD certification. Patients are followed for three years, from ESRD certification until the first of death, transplant, or censoring at three years post-transplant. Percentages are calculated using the Kaplan-Meier methodology.

Objective CKD-13.2 The cohort includes patients from 1992–2010 who are younger than 70 at the initiation of ESRD. Pre-emptive transplants are those in which ESRD initiation date is the date of transplant. Percentages are calculated in the usual way: 100*(N/D), where N = the number of preemptive transplants in the year and D=the number of ESRD patients in the year.

Objectives CKD-14.1 & CKD-14.3 Cohorts for these tables include period prevalent dialysis patients in each calendar year, 2000–2010, whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment during the year (incident patients). We exclude patients with unknown age, gender, or race, and those with an age calculated to be less than zero, as well as patients who are not residents of the 50 states, the District of Columbia, Puerto Rico, or the Territories. Age is calculated on January 1, and race is defined from the ME form. Cardiovascular mortality is defined using codes from past and current Death Notification forms: 01, 02, 03, 04, 1, 2, 3, 4, 23, 25, 26, 27, 28, 29, 30, 31, 32, 36, and 37. Patients are followed from January 1 (for point prevalent dialysis patients) or day 91 of ESRD (for incident dialysis patients) until death, transplant, or December 31 of the year. Rates are estimated as the number of patients who die from any cause (Objective 14.1) and who die from cardiovascular disease (Objective 14.3) in each year, per 1,000 patient years at risk.

Objective CKD-14.2 Cohorts here include incident dialysis patients in each calendar year, 2000–2010. In addition to applying the same exclusion criteria described for Objectives 14.1 and 14.3, we further exclude patients with recovered kidney function. Age is calculated on the first ESRD service date. Patients are followed from the first service date until death, transplant, or 90 days after ESRD. Rates are estimated as the number of patients who die from any cause per 1,000 patient years at risk.

Objectives CKD-14.4–5 Patient cohorts here include period prevalent transplant patients, 2000–2010, whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment (incident patients). Exclusion criteria are the same as those described for Objectives 14.1 and 14.3. Patients are followed from January 1 (for point prevalent dialysis patients) or day 91 of ESRD (for incident dialysis patients) until death or December 31 of the year. Rates are estimated as the number of patients who die from any cause (Objective 14.4) and who die from cardiovascular disease (Objective 14.5) in each year, per 1,000 patient years at risk.

incidence, prevalence, patient characteristics, & modalities

chapter one

INCIDENCE & PREVALENCE

Here and throughout the ADR, the USRDS generally reports point prevalence — the type of prevalence used throughout most of the book — as of December 31, while period prevalence is reported for a calendar year. Annual period prevalent data thus consist both of patients who have the disease at the end of the year and those who have the disease during the year and die before the year's end. Because the USRDS treats successful transplantation as a therapy rather than as a "recovery" from ESRD, patients with a functioning transplant are counted as prevalent patients.

Because data are available only for patients whose ESRD therapy is reported to CMS, patients who die of ESRD before receiving treatment or whose therapy is not reported to CMS are not included in the database. We therefore qualify the terms incidence and prevalence as incidence and prevalence of reported ESRD. Some ESRD registries use the term "acceptance into ESRD therapy." We believe, however, that "incidence of reported ESRD therapy" is more precise, because "acceptance" implies that remaining patients are rejected, when they may simply not be identified as ESRD cases or may not be reported to CMS. Beginning with the 1992 ADR, lost-to-follow-up patients are not included in the point prevalent counts; they are, however, reported in Table B.1 of the Reference Tables.

Rate adjustments in this chapter are as follows: overall rates (including those in the maps) are adjusted for age, gender, and race; rates by age are adjusted for gender and race; rates by race or ethnicity are adjusted for age and gender; and rates by primary diagnosis

are adjusted for age, gender, and race. Census data rate calculations are now based on intercensal estimates; for details, see the section on census populations later in this appendix.

PATIENT CARE AND LABORATORY VALUES

Table 1.f and Figures 1.17 & 1.19 include 2010 incident hemodialysis patients with Medical Evidence forms. Access type is identified from the ME form, and data exclude patients with unknown access type.

Figure 1.18 includes incident hemodialysis patients during July–December, 2010. Vascular access data based on the Medical Evidence form include only those patients with a valid ME form at initiation. For the other measures, eligible patients are those with at least one outpatient dialysis claim within 14 days after each time point (day 1 or day 90) and (when applicable) age 65 or older at initiation. For these measures, vascular access is determined from the first outpatient dialysis claim after each time point, using the HCPCS modifier codes: V5, catheter; V6, arteriovenous graft; V7, arteriovenous fistula.

Data for Figures 1.20– 21 and Table 1.g are also obtained from the ME form.

REFERENCE SECTION A

The Reference Tables present parallel sets of counts and rates for incidence (Section A) and December 31 point prevalence (Section B). Section B also presents annual period prevalent counts and counts of lost-to-follow-up patients. Because the U.S. population figures (shown in Reference Section M) used in the ADR include only residents of the 50 states and the District of Columbia, tables also focus on patients from these areas. Exceptions are Tables A.1, A.6, A.8, and A.10, all of which present data specific to patients in Puerto Rico and the Territories, or include these patients in the patient population. Age is computed as of the beginning of ESRD therapy.

Rates in Table A.9 are calculated using the model-based method (described in the Statistical Methods section later in this appendix), and adjusted for age, race, and gender, with the 2005 national population as reference.

REFERENCE SECTION B

With the exception of Tables B.1, B.6, B.8, and B.10, these tables focus on patients in the 50 states and the District of Columbia. Age is calculated as of December 31. Table B.9 is constructed similarly to Table A.9.

REFERENCE SECTION C

Data used in these tables are obtained from the ME form.

TREATMENT MODALITIES

Modality figures and the associated reference tables describe the treatment modalities of all known ESRD patients, both Medicare and non-Medicare, who are not classified as lost-to-follow-up or having recovered renal function (RRF). The RRF event, introduced in the 2007 ADR, is defined as an event that occurs within the first 180 days of ESRD initiation and lasts for at least 90 days. By definition, patients classified as having RRF post-initiation are included in the incident counts. Unless noted otherwise, incident and point prevalent cohorts without the 60-day stable modality rule are used in the analyses. Treatment modalities are defined as follows:

- center hemodialysis: hemodialysis treatment received at a dialysis center
- center self-hemodialysis: hemodialysis administered by the patient at a dialysis center; a category usually combined with center hemodialysis
- home hemodialysis: hemodialysis administered by the patient at home; cannot always be reliably identified in the database
- CAPD: continuous ambulatory peritoneal dialysis; usually combined with CCPD
- CCPD: continuous cycling peritoneal dialysis; usually combined with CAPD
- peritoneal dialysis: analyses typically consist of CAPD and CCPD only, unless stated otherwise
- other peritoneal dialysis: primarily intermittent peritoneal dialysis (IPD), a small category except among very young children; usually combined with unknown dialysis and uncertain dialysis to form an other/unknown dialysis category
- uncertain dialysis: a period in which the dialysis type is unknown or multiple modalities occur but none last 60 days; usually combined with other peritoneal dialysis and unknown dialysis to form an other/unknown dialysis category
- unknown dialysis: a period in which the dialysis modality is not known (e.g. when dialysis sessions are performed in a hospital); usually combined with other peritoneal dialysis (IPD) and uncertain dialysis to form an other/unknown dialysis category
- renal transplantation: a functioning graft from either a living donor (a blood relative or other living person) or a deceased donor
- death: a category not appearing in the year-end modality tables, which report only living patients, but used as an outcome (e.g. in tables showing living patients followed for a period of time for their modality treatment history)

In Tables 1.d–e, rates by age are adjusted for gender and race, rates by gender are adjusted for age and race, rates by race and ethnicity are adjusted for age and gender, and rates by primary diagnosis are adjusted for age, gender, and race.

REFERENCE SECTION D

Reference Section D is divided into four parts. The first, Tables D.1–11 and D.15–16, provides counts and percentages — by demographics, geographic location, and treatment modality — of incident and prevalent patients alive at the end of each year. Age is computed as of the start of ESRD for incident patients, and as of December 31 for point prevalent patients.

Table D.12 shows modality at day 90 and at two years after first service for all incident Medicare patients beginning renal replacement therapy from 2006 to 2008. The 90-day rule is used to exclude patients who die during the first 90 days of ESRD, and age is computed as of the first ESRD service date.

The third section, Tables D.13–14, presents counts of prevalent patients alive at the end of each year, by ESRD exposure time and modality. Table D.13 shows counts by the number of years of ESRD, while Table D.14 presents counts by the number of years on the end-of-year treatment modality. For the duration of ESRD exposure, zero should be read as less than one year, one as at least one full year but less than two, and so on.

The fourth section, Tables D.17–24, presents counts of incident and prevalent patients alive at the end of selected years (i.e. 2002,

2006, 2010), by demographic characteristics, payor category, and treatment modality. Again, age is computed as of the start of ESRD for incident patients, and as of December 31 for point prevalent patients. The definitions of payor categories can be found in the section on database definitions at the beginning of this appendix.

clinical indicators & preventive health

chapter two

In Figure 2.1, the URR for prevalent hemodialysis patients in 2010 is obtained from the G-modifier attached to CPT code 90999, with a revenue code of 821 or 825. Each measurement is categorized into one of five ranges, and the median URR is calculated; for patients whose median lies between two ranges, we assign a weight of 0.5 to each. For the Kt/V measurement, 2008 ESRD CPM data are used to calculate a mean Kt/V value for each patient from the 1–3 values present for each, and the percent of patients with a mean Kt/V over a certain threshold is determined. Information on new hemodialysis patients with an AV fistula as the first access is determined from the ME form. Data for diabetic care are from obtained from Figures 2.8, 2.9, and 2.11, while data for influenza, vaccinations are from Table 2.a.

ANEMIA TREATMENT

Figure 2.2 presents the monthly distribution of patients by mean hemoglobin group, with each month containing all patients with at least one valid EPO claim during the month. The hemoglobin is calculated as the reported hematocrit value divided by three. Figure 2.3 shows the mean hemoglobin, by month, for prevalent dialysis patients with EPO claims, along with the monthly EPO dose per week for patients with 20 or fewer administrations per month. A patient's time at risk includes only those days in which he or she is not in an inpatient hospital setting.

Figures 2.4–7 include data from all incident dialysis patients with an EPO claim in the first 30 days of ESRD therapy and with at least one EPO claim during each of the following six months. EPO claims with a dose per administration of less than 500 units or more than 80,000 units are omitted, as are those with an average dose per day (calculated as the total EPO units on the claim divided by the number of days spanned by the claim) of less than 100 units or greater than 10,000 units. For 2010, patients are incident prior to June 1, to allow them to have six months of EPO and/or iron claims after their incident date. For graphs by starting hemoglobin, patients are included only if they have a hematocrit listed on the ME form, and their starting hemoglobin is determined from this value. In Figure 2.4, a mean hemoglobin is calculated for each patient from claims during the month, and the average of these values is then calculated for each month. For Figure 2.5, the mean EPO dose per week is adjusted by only including days during a month in which a patient is not in an inpatient hospital setting, so that the mean EPO dose represents outpatient dosing only.

PREVENTIVE CARE

Figures 2.8–11 present data on diabetic preventive care. ESRD patients without Medicare inpatient/outpatient and physician/supplier coverage during the entire study period are omitted, as are general Medicare patients enrolled in an HMO or diagnosed with ESRD during the study period. Also omitted are those who do not reside in the 50 states, the District of Columbia, Puerto Rico, or the Territories; who have a missing date of birth; who do not survive the entire reporting period; who have ESRD for fewer than 90 days prior to the start of the reporting interval; or who are lost to follow-up during the study period.

Age is generally calculated at the end of the study period. Methods and codes used to determine rates of glycosylated hemoglobin (A1c) testing and eye examinations are taken from HEDIS 2008 specifications. CPT codes 83036 and 83037 are used to identify diabetic glycosylated hemoglobin testing (A1c; claims made within 30 days of the last claim for each patient are excluded, and at least two A1c claims must be counted). Codes used to identify diabetic eye examinations are as follows: CPT codes, 92002, 92004, 92012, 92014, 92018, 92019, 92225, 92226, 92230, 92235, 92240, 92250, 92260, 67101, 67105, 67107, 67108, 67110, 67112, 67141, 67145, 67208, 67210, 67218, 67227, 67228, 67028, 67030, 67031, 67036, 67038, 67039, 67041, 67042, 67043, 67113, 67121, 67221, 67228, S0625, S0620, S0621, and S3000; ICD-9-CM procedure codes, 14.1–14.5, 14.9, 95.02, 95.03, 95.04, 95.11, 95.12, and 95.16; and ICD-9-CM diagnosis code V72.0. Lipid testing is identified through CPT codes 80061, 82465, 82470, 83695, 83705, 83715–83721, 84478, 83700, 83701, and 83704. Patients are defined as having diabetes either through medical claims (one inpatient/outpatient, two physician/supplier, two outpatient, or one physician/supplier and one outpatient), or through a listing of diabetes on the ME form as the primary cause of ESRD or as a comorbid condition. ICD-9-CM diagnosis codes used to define diabetes are 250, 357.2, 362.0x, and 366.41. Comprehensive diabetic care includes at least four A1c tests, at least two lipids tests, and at least one eye exam. A1c and lipid tests are at least 30 days apart.

The ESRD population includes patients initiating therapy at least 90 days prior to January 1 of the first year of each study period and with diabetes in the first year. Testing is tracked in the second year of each study period, and tests are at least 30 days apart.

Table 2.a shows rates of influenza, pneumococcal pneumonia, and hepatitis B vaccinations for prevalent ESRD patients by modality, age, race/ethnicity, and time period. The cohort for influenza vaccinations includes all ESRD patients initiating therapy at least 90 days prior to September 1 of each year and alive on December 31. For pneumococcal pneumonia vaccinations, the cohort includes all ESRD patients initiating therapy at least 90 days before January 1 of the graphed time period and alive on December 31. And the cohort for hepatitis B vaccinations includes patients initiating therapy at least 90 days before January 1 of each year and alive on December 31. Patients without Medicare inpatient/outpatient and physician/supplier coverage during the study period are omitted, as are those who do not reside in the 50 states, the District of Columbia, Puerto Rico, or the Territories; who have a missing date of birth; who have ESRD for fewer than 90 days prior to the start of the study period; or who are lost-to-follow-up during the study period. Influenza vaccinations are tracked between September 1 and December 31 of each year, pneumococcal pneumonia vaccinations are tracked during the time periods reported, while hepatitis B vaccinations are tracked in each year. All ages are calculated at the end of the graphed time period. Influenza vaccinations are identified by CPT codes 90724, 90657, 90658, 90659, and 90660, and HCPCS code G0008; pneumococcal vaccinations through CPT codes 90670, 90669 and 90732, and HCPCS codes J6065, S0195, and G0009; and hepatitis B vaccinations through CPT codes 90636, 90740, 90743–90748, 90731, 90723, and G0010. Hepatitis B vaccinations are at least 30 days apart.

VASCULAR ACCESS

Data for Figures 2.12–14 are obtained from the ME form. Tables 2.b–c include prevalent hemodialysis patients who are in both the USRDS and ESRD CPM databases, and whose day 91 begins prior to October 1 of the prevalent year. Access represents the current access

being used, according to the CPM data, and claims are searched during the following calendar year for events and complications. Additionally, Table 2.c includes incident peritoneal dialysis patients from the USRDS database. For Table 2.c, complication rates are calculated as the number of events (from Medicare claims) divided by the time at risk, which is censored at death, change in modality, change in payment status, or the placement of a different type of access. Vascular access codes are listed in Table a.a.

hospitalization

chapter three

Methods used to examine hospitalization in prevalent patients generally echo those used for the tables in Reference Section G (described below). Inclusion and exclusion criteria are generally the same, as are the methods for counting hospital admissions and days, and defining the follow-up time at risk. One difference is the exclusion in Section G of patients of races that are unknown or other than white, African American, Native American, or Asian; these patients are included in the Chapter Three figures. Included patients have Medicare as primary payor, with Parts A and B coverage at the start of follow-up, and without HMO coverage. Rates include total admissions or hospital days during the time at risk divided by patient years at risk. The period at risk begins at the latest of January 1 or day 91 of ESRD, and censoring occurs at death, end of Medicare Parts A and B coverage, or December 31, in addition to other censoring criteria which vary by modality as described below. Since a currently hospitalized patient is not at risk for admission, hospital days are subtracted from the time at risk for hospital admissions. Additionally, rehospitalization rates include the percentage of live hospital discharges that are followed by a subsequent hospital admission within 30 days.

Hospitalization data exclude inpatient stays for the purpose of rehabilitation therapy. Inpatient rehabilitation claims are identified by provider numbers; numbers for inpatient rehabilitation facilities include values 3025–3099 in the third through sixth positions or "R" or "T" in the third position.

Inpatient institutional claims are used for the analyses, and methods for cleaning claims follow those described for Section G. Adjusted rates are calculated using the model-based adjustment method on the observed category-specific rates. Predicted rates are calculated with a Poisson model, and adjusted rates are then computed with the direct adjustment method and a reference cohort. This method is described further in the discussion of Section G, and in the statistical methods section later in this appendix.

Methods in Figures 3.1–2 follow those for Reference Section G. Figure 3.1 shows the percent change in admission rates since 1993 for period prevalent ESRD patients. Included patients have Medicare as primary payor and are residents of the 50 states, the District of Columbia, Puerto Rico, and the Territories. Patients with AIDS as a primary or secondary cause of death are excluded, as are patients with missing age or gender information. Rates are adjusted for age, gender, race, and primary diagnosis using the model-based adjustment method. The reference cohort includes period prevalent ESRD patients, 2005. New dialysis access codes for peritoneal dialysis patients appeared in late 1998; dialysis access values are therefore shown for peritoneal dialysis patients as change since 1999 rather than 1993. For peritoneal dialysis patients, dialysis access hospitalizations are those defined as "pure" inpatient vascular/dialysis access events, as described for Tables G.11–15. For hemodialysis patients, vascular access hospitalizations include "pure" inpatient vascular access events, and vascular access for hemodialysis patients excludes codes specific to peritoneal dialysis catheters (996.56, 996.68, and V56.2). Principal ICD-9-CM diagnosis codes are used to identify cardiovascular and infectious admissions. The cardiovascular category consists of codes 276.6, 394–398.99, 401–405, 410–420, 421.9, 422.90, 422.99, 423–438, and 440–459, while infection is indicated by codes 001–139, 254.1, 320–326, 331.81, 372–372.39, 373.0–373.2, 382–382.4, 383.0, 386.33, 386.35, 388.60, 390–393, 421–421.1, 422.0, 422.91–422.93, 460–466, 472–474.0, 475–476.1, 478.21–478.24, 478.29, 480–490, 491.1, 494, 510–511, 513.0, 518.6, 519.01, 522.5, 522.7, 527.3, 528.3, 540–542, 566–567.9, 569.5, 572–572.1, 573.1–573.3, 575–575.12, 590–590.9, 595–595.4, 597–597.89, 598, 599.0, 601–601.9, 604–604.9, 607.1, 607.2, 608.0, 608.4, 611.0, 614–616.1, 616.3–616.4, 616.8, 670, 680–686.9, 706.0, 711–711.9, 730–730.3, 730.8–730.9, 790.7–790.8, 996.60–996.69, 997.62, 998.5, and 999.3.

Figure 3.2 presents adjusted rates of total hospital admissions and days per patient year. Prevalent ESRD patients are included, and rates are adjusted for age, gender, race, and primary diagnosis, with the 2005 ESRD cohort used as the reference.

Figure 3.3 shows adjusted admission rates for principal diagnoses among prevalent ESRD patients. Again, rates are adjusted for age, gender, race, and primary diagnosis, with ESRD patients in 2005 used as the reference cohort. Principal ICD-9-CM codes for cardiovascular and infectious hospitalizations are listed in the discussion of Figure 3.1, while other infectious groups are as follows: vascular access infection (hemodialysis patients only), 996.62 and 999.31; peritoneal dialysis catheter infection (peritoneal dialysis patients only), 996.68; peritonitis (peritoneal dialysis patients only), 567; and bacteremia/sepsis, 038.0-038.9 and 790.7.

Table 3.a presents unadjusted and adjusted admission rates among adult (age 20 and older) period prevalent hemodialysis patients. Principal ICD-9-CM diagnosis codes are used to identify cause-specific admissions: codes for cardiovascular and infectious admissions are listed in the discussion of Figure 3.1, while codes for vascular access infection are the same as those for Figure 3.3. Rates are adjusted for age, gender, race, and primary ESRD diagnosis; values presented by one factor are adjusted for the other three. For adjusted rates, hemodialysis patients in 2005 are used as the reference cohort. Values by age, gender, race, and primary diagnosis are shown for 2009–2010 prevalent hemodialysis patients.

Figures 3.4–10 show rates of rehospitalization and/or death among prevalent hemodialysis patients of all ages (age 66 and older in 3.10), 30 days after hospital discharge. Live hospital discharges from January 1 to December 1 of the year are identified as index hospitalizations; the latter date provides a 30-day period following the latest discharge to evaluate rehospitalization. The units of analyses include hospital discharges rather than patients. Hospitalization data exclude rehabilitation claims and transfers. Discharges with a same-day admission to long-term care or a critical access hospital are excluded. For hemodialysis patients in Figures 3.4–9, discharges are excluded with a transplant, loss to follow-up, or end of payor status before day 30 after discharge. For ESRD patients in Figure 3.10, the same exclusions apply except for the transplant exclusion; instead, discharges from transplant patients are excluded if they occur after two years and 11 months following the most recent transplant to ensure that complete claims are available during the 30-day post-discharge period.

Figures 3.4–6 and 3.8–9 indicate the percentage of discharges with readmission and/or death within 30 days after discharge. The groups indicate status at day 30 after discharge from the index hospitalization, and do not consider events after day 30. Figures 3.4–5 include all-cause index hospitalizations, while in 3.6 categories of

cause-specific admissions are based on principal ICD-9-CM diagnosis codes of the index hospitalization. Codes for cardiovascular and infectious hospitalizations are listed in the discussion of Figure 3.1; vascular access infection codes are 996.62 and 999.31. Figures 3.8-9 include codes for discharges from cardiovascular hospitalizations listed for Figure 3.1, and Figure 3.9 includes the following subgroups based on ICD-9-CM principal diagnosis codes: AMI, 410.X0 and 410.X1; CHF, 398.91, 402.X1, 404.x1, 404.x3, 425, and 428; stroke, 430-434; and dysrhythmia, 426–427.

Figure 3.7 indicates the percentage of hospital discharges followed by a 30-day rehospitalization by cause-specific groups for both the index hospitalization and the rehospitalization. Categories of cause-specific rehospitalization also include non-vascular access infections, defined by infection codes excluding 996.62 and 999.31, and other, defined by codes other than cardiovascular and infectious.

Figure 3.10 shows overall percentages of discharges with 30-day rehospitalization and/or death in the general Medicare, CKD, and ESRD populations. Data include point prevalent Medicare patients on December 31, 2009, who are age 66 and older. For the general Medicare patients with and without CKD, during 2009 CKD is defined, and patients remain without ESRD, with continuous enrollment in Medicare Parts A and B, and without HMO coverage. Live hospital discharges from January 1 to December 1, 2010 are included.

Figures 3.11–13 and Table 3.b show adjusted annualized all-cause admission rates on different days of the dialysis week. The analyses include point prevalent Medicare hemodialysis patients on January 1, 2010, who are alive on January 31. Included patients have Medicare Parts A and B coverage, are U.S. residents, and are age 20 years and older. Patients remain uncensored on January 31, 2010, and the hemodialysis schedule is defined from January 18 to 31, 2010. Patients with hemodialysis sessions three times weekly are included (Monday/Wednesday/Friday and Tuesday/Thursday/Saturday); those who received hemodialysis on a day other than the scheduled or with a missed scheduled day during this two-week period are excluded. Patients with a bridge hospitalization spanning the entire follow-up period are also excluded. Follow-up begins on February 1, 2010, and continues until censoring at the earliest of death, end of Medicare payor status, loss to follow-up, modality change to peritoneal dialysis or transplant, recovery of renal function, a gap in the scheduled hemodialysis sessions that was not during an inpatient stay, a hemodialysis session on an unscheduled day, or December 31, 2010. The model-based adjustment method is used, with the Poisson model and direct adjustment. Rates for all patients and groups by ESRD duration are adjusted for age, gender, race, Hispanic ethnicity, and primary diagnosis; rates by age, gender, and primary diagnosis are adjusted for the other four factors; and rates by race and ethnicity are adjusted for age, gender, and primary diagnosis.

In Figures 3.11–13, HD_1, HD_2, and HD_3 refer to the days with dialysis sessions: Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday. The days after dialysis are defined as HD_1+1, HD_2+1, and HD_3+1: Tuesday, Thursday, and Saturday, or Wednesday, Friday, and Sunday. The second day without dialysis after HD_3 is HD_3+2: Sunday or Monday, respectively. In Table 3.b, the day after the long interdialytic interval refers to Monday for patients with a Monday/Wednesday/Friday schedule, and to Tuesday for patients with a Tuesday/Thursday/Saturday schedule. The days after the short interdialytic interval are Wednesday and Friday for patients with a Monday/Wednesday/Friday schedule, and Thursday and Saturday for patients with a Tuesday/Thursday/Saturday schedule. Days without dialysis are Tuesday, Thursday, Saturday, and Sunday for patients with a Monday/Wednesday/Friday schedule, and Monday, Wednesday, Friday, and Sunday for patients with a Tuesday/Thursday/Saturday schedule.

REFERENCE SECTION G

Hospitalization reference tables present adjusted total admission and hospital day rates, by year, 1993–2010. They begin in 1993 because Medicare inpatient claims are available beginning in 1991, and the model-based adjustment method uses data from the current and previous two years to obtain the predicted rates. (This method is further discussed later in this section and in the statistical methods section at the end of this appendix.)

Because hospitalization data for non-Medicare patients may be incomplete, analyses in this section include only patients with Medicare as their primary payor. Hospitalization data are obtained from institutional inpatient claims. As in Chapter Six, hospitalization data in Reference Section G also now exclude inpatient stays for the purpose of rehabilitation therapy.

Tables G.1–15 include dialysis and transplant patients on their modality for at least 60 days, reaching day 91 of ESRD by the end of the year, and residing in the 50 states, the District of Columbia, Puerto Rico, and the Territories. Excluded are patients with AIDS as a primary or secondary cause of death; patients with missing values for age, gender, or race; and patients of races that are unknown or other than white, African American, Native American, or Asian. Age is determined on January 1 of each year. Patients are also classified according to their primary cause of ESRD, in which the "other" category includes patients with missing data or causes other than diabetes, hypertension, or glomerulonephritis.

Patients are classified by modality at the beginning of the year:

- all dialysis: patients on hemodialysis, CAPD/CCPD, or dialysis of an unknown type, as well as those on more than one modality in the past 60 days
- hemodialysis: patients on hemodialysis for at least 60 days as of the start of the period at risk
- CAPD/CCPD: patients on CAPD/CCPD for at least 60 days as of the start of the period at risk
- transplant: patients with a functioning transplant, and who received the transplant less than three years prior to the start of the period at risk
- all-ESRD: all patients

To limit the contribution of patient years at risk from patients who do not have Medicare coverage but do have Medicare as a secondary payor or HMO coverage, and who therefore have incomplete hospitalization data, cohorts include only patients with Medicare Parts A and B coverage at the start of follow-up. The follow-up period is censored when a patient's payor status changes to no longer having Medicare Parts A and B coverage or Medicare as a primary payor.

For patients in the all-dialysis, hemodialysis, and peritoneal dialysis categories, the period at risk for all hospitalization analyses is from January 1 or day 91 of ESRD until the earliest of death, three days prior to transplant, end of Medicare Parts A and B coverage, or December 31. Modality change is considered a censoring event only in the case of a change from dialysis to transplant. For dialysis patients in the all-ESRD category, in contrast, the analysis period is censored only at death, end of Medicare Parts A and B coverage, or December 31 of the year; a modality change is not used as a censoring event. For transplant patients in the all-ESRD and transplant categories, the period is censored at the earliest of death, three years

after the transplant date, end of Medicare Parts A and B coverage, or December 31 of the year. The censoring of transplant patients at three years following the transplant is necessary because Medicare eligibility may be lost and hospitalization data may be incomplete for these patients.

Time at risk is calculated differently for hospital days and total admissions. Since a hospitalized patient remains at risk for additional hospital days, rates for hospital days include hospital days in the time at risk. Since a currently hospitalized patient is not, however, at risk for new admissions, hospital days for each year are subtracted from the time at risk for total admissions. In the case of a hospitalization in which admission occurs the same day as discharge, zero days are subtracted from the time at risk for total admissions. When bridge hospitalizations span the start of the analysis period, only the days within the period are subtracted from the time at risk for total admissions.

All admissions and hospital days during the analysis period are included, respectively, in the total admissions and hospital days for each year. An admission for a hospitalization that occurs before and spans the start of the analysis period is excluded from the total admissions for that period, and only the hospitalization days within the period are counted in the total days for hospital day rates. The minimum length of stay is one day, and hospitalizations with an admission and discharge on the same day, as well as those with a discharge the day after admission, are both counted as one day.

As in previous ADRs, all overlapping and only certain adjacent hospitalizations are combined, due to the fact that many adjacent claims may actually be legitimate separate hospitalizations. Specifically, hospitalizations with an admission on the same day or the day after a previous discharge are combined only when there is a discharge transfer code or indication of an interim claim. In the case of two hospitalizations combined into one, the principal diagnosis and procedure codes are retained from the first of the two hospitalizations, with the combined hospitalization extending from the first admission date to the last discharge date.

The methodology for computing adjusted total admission and hospital day rates uses the model-based adjustment method (discussed in the section on statistical methods). Predicted rates for each subgroup combination of age, gender, race, primary diagnosis, and year are obtained using a model with the Poisson assumption. For prevalent patient cohorts, this model uses data from the current and previous two years, with respective weights of 1, ¼, and ⅛. Adjusted rates are then calculated using the direct adjustment method, with all 2005 ESRD patients as the reference cohort.

Tables G.11–15 show inpatient utilization in period prevalent ESRD patients. Methods — including modality definitions, inclusion criteria, data cleaning, follow-up time definitions, and rate calculations — generally follow those described for the total admission rates in Tables G.1–5, but some differences do exist. While patients of races other than white, African American, Native American, or Asian are excluded from G.1–5, they are included in G.11–15, except where rates are given by race. Rates are unadjusted and reflect total admissions per 100 patient years for 2002–2004, 2005–2007, and 2008–2010 (pooled) prevalent patients. While the rates for all causes are computed similarly to the unadjusted rates in G.1–5, the other nine cause-specific categories only include admissions for specific diseases. Vascular access and peritoneal dialysis access hospitalizations are those classified as "pure" inpatient vascular/dialysis access events. Such access events are defined as admissions with a specified ICD-9-CM principal diagnosis code, or an ICD-9-CM principal procedure code in conjunction with a certain DRG code. Codes are listed in Table a.b. If an admission does not qualify as vascular/dialysis access, it is classified by the principal diagnosis code into one of eight other mutually exclusive groups. Categories and ICD-9-CM

a CPT codes for vascular access & peritoneal dialysis access services

Complication 34101*, 35190*, 35321*, 35458*, 35460*, 35475*, 35476*, 35484*, 35875*, 35876*, 35900*, 35903*, 35910*, 36005*, 36145, 36534*, 36535*, 36550*, 36575*, 36580*, 36581*, 36584*, 36589*,36593, 36596*, 36597*, 36815, 36831, 36832, 36833, 36834*, 36838, 36860, 36861, 36870, 37190*, 37201*, 37205*, 37206*, 37207*, 37208*, 37607, 49422, 75790, 75820*, 75860*, 75896*, 75960*, 75962*, 75978*, 75998*, 76937*, 77001, 00532*, 01784*, 01844*, 90939, 90940, G0159, G0392, G0393, and M0900

Hemodialysis catheter placement 36011*, 36488*, 36489*, 36490*, 36491*, 36533*, 36555*, 36556*, 36557*, 36558*, 36565*, and 36800

Peritoneal dialysis catheter placement 49419, 49420, and 49421

Synthetic graft placement 36830

Fistula placement 36818, 36819, 36820, 36821, and 36825

Other placement 36810, 36835

*Requires accompanying renal diagnosis code for inclusion.

This list is comprehensive and includes codes that are now obsolete, but that were in use at some point during the study period.

b DRG & ICD-9-CM codes for vascular access & peritoneal dialysis access services

DRG codes[a]: prior to October 1, 2007

112 Percutaneous cardiovascular procedure 120 Other circulatory system OR procedure 315 Other kidney and urinary tract OR procedure 442 Other OR procedure for injuries with complication 443 Other OR procedure for injuries without complication 478 Other vascular procedure with complication 479 Other vascular procedure without complication

DRG codes[a]: after September 30, 2007

252 Other vascular procedures with Major complicating conditions (MCC) 264 Other circulatory system O.R. procedures 673 Other kidney & urinary tract procedures with MCC 674 Other kidney & urinary tract procedures with CC 675 Other kidney & urinary tract procedures without CC/MCC 907 Other O.R. procedures for injuries with MCC 908 Other O.R. procedures for injuries with CC 909 Other O.R. procedures for injuries without CC/Medicare

ICD-9-CM procedure codes[a]

38.95 Venous catheterization for renal dialysis 39.27 Arteriovenostomy for renal dialysis 39.42 Revision of arteriovenous shunt for renal dialysis 39.43 Removal of arteriovenous shunt for renal dialysis 39.93 Placement of vessel-to-vessel cannula 39.94 Replacement of vessel-to-vessel cannula 86.07 Placement of totally implantable vascular access device

ICD-9-CM diagnosis codes[b]

996.1 Mechanical complication of vascular device, implant, graft 996.56 Mechanical complication due to peritoneal dialysis catheter 996.62 Infectious complication of vascular device, implant, graft 996.68 Infectious complication due to peritoneal dialysis catheter 996.73 Other complication due to renal dialysis device, implant, graft V56.1 Fitting and adjustment of extracorporeal dialysis catheter V56.2 Fitting and adjustment of peritoneal dialysis catheter

a DRG and procedure codes are used in conjunction to define inpatient pure vascular access events (both must be present).

b The presence of any of these diagnosis codes as the "Principal Diagnosis Code" is sufficient to define an inpatient pure vascular access or peritoneal dialysis access event.

codes are as follows: circulatory diseases, 390–459; digestive diseases, 520–579; genitourinary diseases, 580–629; endocrine and metabolic diseases, 240–279; respiratory diseases, 460–519; infectious diseases, 001–139; and cancer, 140–172, 174–208, 230–231, and 233–234. Hospitalizations that do not fall under any of these categories are counted under all others.

Supplementary tables providing additional rates and counts are available on our website and CD-ROM. Tables G.1.1–5.1 present adjusted rates similar to those shown in G.1–5, but include more patient subgroups. Additional tables (G.1.2–5.2) display the counts of the total admissions, patient years at risk, and total patients that are used to calculate the total admission rates. Standard errors of the rates in Tables G.1–10 and G.1.1–5.1 are also available.

cardiovascular disease

chapter four

Data for Figure 4.1 are obtained from Reference Table H.12.

Figures 4.2–6 present rates of sudden cardiac death (SCD) in prevalent dialysis patients. Figure 4.2 shows the trends in SCD rates in prevalent dialysis patients from 1991 to 2010. The cohorts include period prevalent dialysis patients in each calendar year from 1991 to 2010 whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment during the year (incident patients) and have Medicare Parts A and B coverage at the beginning of the year or on day 91 of ESRD of the year. We exclude patients with unknown age or gender, and those with an age calculated to be less than twenty. Patients are followed from January 1 (for point prevalent patients) or day 91 of ESRD (for incident patients) until death, transplant, loss to follow-up, change of Medicare Parts A and B coverage, recovery of kidney function, or December 31 of the year. Rates are unadjusted, and are estimated as the number of SCD patients in each year per 1,000 patient years at risk.

Figures 4.3–6 describe rates of SCD by age, modality, race, and primary diagnosis of ESRD in 2000, 2005, and 2010. In Figure 4.4, comparing SCD rates between hemodialysis and peritoneal dialysis, follow-up time is also censored at modality change.

Two methods are used to identify SCD. The "simple method" identifies SCD based on the primary or secondary cause of death listed on the ESRD Death Notification Form (Form CMS-2746), and consists of all deaths due to "cardiac arrhythmia" or "cardiac arrest, cause unknown." The "complex method" includes three components: place of death and cause of death reported on Form 2746, and diagnosis codes on Medicare claims. For deaths occurring in the hospital setting, an inpatient Medicare claim for ventricular fibrillation or cardiac arrest (ICD-9-CM diagnosis codes 427.4 or 427.5) and a primary cause of death due to cardiac disease (death codes 23 and 25-32 on form 2746) are required to classify a SCD. In the absence of claims evidence, SCD can be defined only if the primary cause of death is listed as "cardiac arrhythmia" or "cardiac arrest, cause unknown." For deaths occurring in the outpatient setting, an outpatient Medicare claim for ventricular fibrillation or cardiac arrest and a primary cause of death due to cardiac disease or "unknown" on form 2746 are required to classify a SCD. In the absence of claims evidence, SCD is defined only if the primary cause of death is cardiac disease.

Deaths excluded from consideration are those due to hyperkalemia, septicemia, and malignant disease, and those occurring in the setting of dialysis withdrawal or hospice care. Three sources are used to identify death occurring in the setting of dialysis withdrawal based on Form 2728: 1) primary or secondary cause of death is listed as "withdrawal from dialysis/uremia;" 2) reason for discontinuation of renal replacement therapy prior to death is listed as "following HD and/or PD access failure" or "following chronic failure to thrive;" and 3) discontinuation of renal replacement therapy was after patient/family request to stop dialysis. Death in the setting of hospice care is defined if the answer to the question "Was patient receiving Hospice care prior to death?" on form 2746 is "Yes" or there is a hospice claim with date of death within the claim period. Both methods are used in Figure 4.2, and the "complex method" is used in Figures 4.3–6.

Figures 4.7–12 report rates of SCD in incident dialysis patients, using the "simple method" described above. Figure 4.7 shows trends in SCD rates in incident dialysis patients, 2005–2009, at different intervals following the initiation of ESRD treatment: 0–90, 91–180, 181–270, and 271–360 days. The cohorts include incident dialysis patients with their first ESRD service date in each calendar year, without application of the 60-day stable modality rule. We exclude patients with unknown age or gender, and those with an age calculated to be less than twenty. Patients are followed from ESRD service date until death, transplant, loss to follow-up, recovery of kidney function, or one year later. Interval rates are estimated using the Kaplan-Meier method, and are presented as the number of SCD patients per 1,000 patient years at risk. Figure 4.8 presents the cumulative probability of death for all-cause of death and for SCD, cardiovascular death, and non-cardiovascular death using the Kaplan-Meier method for 2009 incident dialysis patients. Cardiovascular death is defined if the primary cause of death is listed as any cardiac death (death codes 23 and 25-32) or stroke (death codes 36 and 37) on Form 2746. Figures 4.9–12 display the cumulative probability of SCD in 2009 incident dialysis patients by age, race, primary diagnosis of ESRD, and modality in 2009 incident dialysis patients, respectively. In Figure 4.12, follow-up time is additionally censored at modality change.

Figures 4.13–17 illustrate defibrillator use and survival in dialysis and renal transplant patients. Two types of defibrillators are examined: 1) implantable cardioverter defibrillator (ICD) or cardiac resynchronization therapy with defibrillator (CRT-D); and 2) wearable cardioverter defibrillator (WCD). ICD/CRT-D is identified from an inpatient or outpatient facility claim with ICD-9-CM procedure codes 37.94 (ICD) or 00.51 (CRT-D). WCD is identified from an outpatient facility claim or physician/supplier claim with HCPCS codes 93292 or 93745.

Figure 4.13 describes the cumulative number and percentage of dialysis patients receiving an ICD/CRT-D in 1991–2010. The study cohort includes point prevalent dialysis patients on January 1, 1991, whose first ESRD service date is at least 90 days prior to this date, and incident dialysis patients in 1991–2010 who reach day 91 of ESRD in 1991–2010 and have Medicare Parts A and B coverage. Patients are followed from January 1, 1991 (for point prevalent patients) or day 91 of ESRD (for incident patients) until receipt of ICD/CRT-D, death, transplant, loss to follow-up, change of Medicare as primary payor status, recovery of kidney function, or December 31, 2010. The cumulative number of patients receiving ICD/CRT-D from 1991 up to a given year is identified during the period from 1991 to the year of interest. The cumulative percentage of patients receiving ICD/CRT-D from 1991 up to a given year is calculated by the cumulative number of patients divided by the total number of patients in the study cohort.

Figure 4.14 shows the percentage of ESRD patients receiving ICDs/CRT-Ds in each year from 1991 to 2010. Annual study cohorts include period prevalent Medicare hemodialysis, peritoneal dialysis,

and transplant patients. Patients are followed from either January 1 (for point prevalent patients) or ESRD day 91 (for incident patients) until the earliest of receiving ICD/CRT-D, death, modality change, transplant, loss to follow-up, recovery of kidney function, end of Medicare as primary payor status, or December 31 of the year.

Figure 4.15 describes the cumulative number and percentage of dialysis patients using a WCD in 2005–2010, using the same method described for Figure 4.13.

In Figure 4.16 we show all-cause survival after ICD/CRT-D implantation, by indication (primary or secondary prevention), in hemodialysis, peritoneal dialysis, and transplant patients age 20 or older who received their first ICD or CRT-D between 1999 and 2010 and had Medicare as their primary payor. Secondary prevention is indicated by ICD-9-CM diagnosis codes 427.1 (paroxysmal ventricular tachycardia), 427.4 (ventricular fibrillation and flutter), or 427.5 (cardiac arrest) during the hospitalization for device implantation. The absence of such diagnoses indicates primary prevention. Patients are followed from the date of first device implantation to the earliest of death, modality change, three years after implantation, or June 30, 2011. All-cause survival is estimated using the Kaplan-Meier method.

Figure 4.17 presents all-cause survival following the use of a WCD, by indication (primary or secondary prevention), in dialysis patients age 20 or older who received their first WCD between 2005 and 2010 and had Medicare as their primary payor. Indication of device use is defined using the same diagnosis described above for Figure 4.16, reported on the same claim for WCD. Patients are followed from the date of first WCD use to the earliest of death, modality change, two years after implantation, or June 30, 2011.

Table 4.a describes rates of cardiovascular events and procedures in ESRD patients by modality. The cohorts include point prevalent hemodialysis, peritoneal dialysis, and transplant patients on January 1 of each calendar year from 1996 to 2010, whose first ESRD service date is at least 90 days prior to the beginning of the year, and who have Medicare Parts A and B coverage at the beginning of the year. We exclude patients with unknown age or gender, and those with an age calculated to be less than twenty. Patients having the disease or procedure of interest before January 1 of the year are not excluded. Follow-up begins on January 1 of each year and ends at the earliest of death, modality change, transplant, lost-to-follow-up, change of Medicare Parts A and B coverage, recovery of kidney function, or December 31 of the year. Rates are unadjusted, and are estimated as the number of patients who have a cardiovascular event or receive a procedure in each year per 1,000 patient years at risk.

Cardiovascular events of AMI and CVA/TIA are identified from both Medicare claims data and the cause of death listed on form 2746, while events of CHF, PAD, and revascularization procedures (CABG and PCI) are identified from Medicare claims data only. Based on Form 2746, an AMI event is defined if AMI is the primary cause of death (death code 23) or the secondary causes of death with cardiac death as the primary cause of death; a CVA/TIA event is defined if CVA/TIA is listed as either primary cause of death or secondary cause of death (death codes 36-37). Based on Medicare claims, the event dates of AMI, CHF, CVA/TIA, and PAD are defined as the date of the first appearance of a qualifying ICD-9-CM diagnosis code in one or more Part A inpatient claims only (for AMI), or in one or more Part A inpatient, skilled nursing facility, or home health agency claims or two or more Part A outpatient and/or Part B physician/supplier claims (for CHF, CVA/TIA, and PAD). CABG surgery is identified through ICD-9-CM procedure code in Part A inpatient claims, and PCI is identified through ICD-9-CM procedure code in Part A inpatient and outpatient claims as well as CPT codes in Part A outpatient claims and Part B claims. PAD is also identified through ICD-9-CM procedure codes and CPT codes for amputation, using the same methods as described for PCI. Codes used to define these events include the following:

- AMI: 410, 410.X0, and 410.X1 (ICD-9-CM diagnosis codes)
- CHF: 398.91, 425, 428, 402.X1, 404.X1, and 404.X3 (ICD-9-CM diagnosis codes)
- CVA/TIA: 430–437 (ICD-9-CM diagnosis codes)
- PAD: 440–444, 447, and 557 (ICD-9-CM diagnosis codes); 84.0, 84.1, 84.91, 39.25, 39.26, and 39.29 (ICD-9-CM procedure codes); 24900, 24920, 25900, 25905, 25920, 25927, 27295, 27590, 27591, 27592, 27598, 27880, 27881, 27882, 27888, 27889, 28800, 28805, 34900, 35131, 35132, 35141, 35142, 35151, 35152, 34051, 34151, 34201, 34203, 34800–34834, 35081–35103, 35331, 35341, 35351, 35355, 35361, 35363, 35371, 35372, 35381, 35450, 35452, 35454, 35456, 35459, 35470, 35471, 35472, 35473, 35474, 35480, 35481, 35482, 35483, 35485, 35490, 35491, 35492, 35493, 35495, 35521, 35531, 35533, 35541, 35546, 35548, 35549, 35551, 35556, 35558, 35563, 35565, 35566, 35571, 35583, 35585, 35587, 35621, 35623, 35646, 35647, 35651, 35654, 35656, 35661, 35663, 35665, 35666, and 35671 (CPT codes)
- CABG: 36.1X (ICD-9-CM procedure code)
- PCI: 00.66, 36.01, 36.02, 36.05, 36.06, and 36.07 (ICD-9-CM procedure code); 92980–92982, 92984, 92995–92996, G0290, and G0291 (CPT codes).

Figure 4.18 presents rates by modality of fatal and non-fatal AMI in point prevalent ESRD patients on January 1 of 2000, 2005, and 2010. Cohort construction and rate estimation are the same as those described for Table 4.a. Fatal AMI is defined using the following algorithm: for a patient dying without an inpatient claim for AMI, fatal AMI is defined if AMI is listed as primary cause of death on Form 2746 or if it is listed as the secondary cause with cardiac death as the primary. For patients admitted to hospital for AMI and dying on the day of admission or the following day, fatal AMI is defined regardless of discharge status recorded on the inpatient claim or cause of death listed on the form 2746; for those admitted for AMI and dying two days later, fatal AMI is defined if hospital discharge status is death and AMI is listed as primary cause of death on form 2746 or listed as secondary cause with cardiac death as the primary cause.

Figure 4.19 illustrates the cumulative probability of death following an AMI in prevalent dialysis patients. The study cohorts include period prevalent dialysis patients in 1993, 1998, 2003, and 2008 whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment during the year (incident patients) and who are hospitalized for a first AMI in the prevalent year with Medicare as primary payor. We exclude patients with unknown age or gender, and those with an age calculated to be less than twenty on January 1 of the year (point prevalent patients) or on day 91 of ESRD (incident patients). Patients with a history of AMI are not excluded. Follow-up time begins on the data of hospital admission for AMI and ends at the earliest of death, transplant, kidney function recovery, loss to follow-up, or two years after AMI admission. The Kaplan-Meier method is used to estimate survival probabilities after AMI, and the cumulative probabilities of death are obtained by subtracting the survival probabilities from one.

Table 4.b and Figures 4.20–27 describe cardiovascular disease diagnostic testing in dialysis patients and pre-renal transplant

patients. Diagnostic testing includes resting echocardiogram, coronary angiography, non-invasive coronary angiography, or any stress test including stress echocardiograms, stress nuclear imaging, stress test, and stress electrocardiograms (ECGs). Patients receiving these tests are identified through ICD-9-CM procedure codes in Part A inpatient, outpatient, or skilled nursing facility claims and by CPT codes in Part A outpatient claims or Part B physician/supplier claims. Codes used to define these tests are as follows:

- resting echocardiogram: 93303, 93304, 93306–93308, 93312-93318, 93320, 93321, and 93325 (CPT codes)
- coronary angiography and/or catheterization: 37.22–37.23 and 88.53–88.57 (ICD-9-CM procedure codes); 93508, 93510, 93511, 93524, 93526, 93527, 93529, 93531–93533, 93539, 93540, 93543, 93545, and 93555 (CPT codes)
- non-invasive coronary angiography: 75571–75574 (CPT codes; available in 2010)
- stress test: 89.41–89.44 (ICD-9-CM procedure codes)
- stress echocardiograms: 93350 (CPT code)
- stress nuclear imaging: 78459–78461, 78464, 78465, 78469, 78472, 78473, 78478, 78480, 78481, 78483, 78491, and 78492 (CPT codes)
- stress ECGs: 93015–93018 (CPT codes)

The study cohort for Table 4.b and Figures 4.20–23 includes incident dialysis patients who reach day 91 of ESRD in 2010 and have Medicare Parts A and B coverage. We exclude patients with unknown age or gender, and those with an age calculated to be less than zero on the first ESRD service date. Patients are followed from the first ESRD service date until the earliest of death, modality change, transplant, loss to follow-up, recovery of kidney function, change of Medicare Parts A and B enrollment status, one year after first ESRD service date, or December 31, 2010. Diagnostic testing is identified during the entire follow-up period for patients age d ≥65 years on first ESRD service date, but from day 91 of ESRD to the end of follow-up for patients age <65 years because of incomplete Medicare claims during the first 90 days of ESRD for these younger patients. Table 4.b presents the percentage of patients receiving their first echocardiograms during the first 90 days of ESRD (for patients age ≥65 years) and from day 91 of ESRD to one year after ESRD, respectively. Figures 4.20–23 show the cumulative percentage of patients receiving a diagnostic test, and uses the Kaplan-Meier method.

Figures 4.24–27 illustrate the use of a diagnostic testing in prevalent dialysis patients and pre-renal transplant patients. The study cohorts of dialysis patients include point prevalent dialysis patients on January 1 of 2000, 2005, and 2010 who have Medicare Parts A and B coverage on January 1 of the year and whose first ESRD service date is at least 90 days prior to the beginning of the year. We exclude patients with unknown age or gender, and those with an age calculated to be less than zero. Follow-up begins on January 1 of each year and ends at the earliest of diagnostic testing of interest, death, transplant, loss to follow-up, change of Medicare Parts A and B coverage, recovery of kidney function, three years, or December 31, 2010. The study cohorts of pre-renal transplant patients consist of Medicare enrollees who are wait-listed for the first time for a kidney or kidney-pancreas in 2000, 2005, and 2010, and who are continuously enrolled in Medicare Parts A and B for at least one year before their first wait-list date. We exclude patients with a kidney transplant prior to their first wait-list date and those meeting the same exclusion criteria as described for dialysis cohorts. Follow-up begins one year before the first wait-list date and ends at the earliest of diagnostic testing of interest, wait-list stop date, first renal transplant date, death, change of Medicare both Parts A and B coverage, three years after first wait-list date, or December 31, 2010. The Kaplan-Meier method is used to estimate the cumulative percent of a diagnostic testing during the follow-up period.

Table 4.c describes pharmacological interventions for cardiovascular disease in ESRD patients. For each year (2007 and 2010), the cohort includes prevalent hemodialysis, peritoneal dialysis, and kidney transplant patients on January 1, with date of ESRD onset at least 90 days before January 1 and with Medicare as primary payer, followed until the earliest of death, change in renal replacement modality (i.e., change in dialytic modality, receipt of kidney transplant, or failure of kidney transplant), cessation of Medicare coverage (with either Part A or B), or December 31. First cardiovascular disease events in the follow-up interval are identified with the claims-based method, as described in Table 4.a. For CHF, events rae identified by ICD-9-CM codes 398.91, 402.x1, 404.x1, 404.x3, 425.x, and 428.x. For AMI, events are identified by codes 410, 410.x0, and 410.x1 on inpatient claims. For CVA/TIA, events are identified by codes 430–437. And for all other diagnoses and procedures, events are identified with codes used in Table 4.a. The index date of each event is defined as the admission or service date of the first claim in the follow-up interval with a qualifying diagnosis code. Baseline cardiovascular disease is ascertained from claims during the one year preceding the index date; algorithms and codes are the same as those used in Table 4.a.

Because Table 4.c and Figures 4.28–30 describe pharmacological interventions, only a subset of cardiovascular disease events is retained for analysis. Specifically, each patient is required to be discharged within two weeks of the index date of the event (if the patient is hospitalized on the index date), to not be hospitalized at one month after the index date, and to carry continuous Medicare Part D coverage during the interval from one month before to one month after the index date. This set of requirements establishes prescription drug coverage during an interval of time around the index date of the event, and admits sufficient cumulative time outside the hospital for the patient to fill a prescription at an outpatient pharmacy. Use of a medication is defined by at least one prescription fill between one month before and one month after the index date. Drugs are identified from National Drug Codes linked to Generic Product Identifiers, using the Medi-Span Master Drug Data Base.

In Table 4.c, all cardiovascular disease events that satisfy inclusion criteria regarding Medicare Part D coverage and hospitalization are retained for analysis, regardless of baseline cardiovascular disease status. For 2007, events with an index date between January 1 and December 31 are analyzed, whereas for 2010, events with an index date between January 1 and November 30 are analyzed (as Part D data after December 31, 2010, were unavailable). Patients with no cardiac event include those whose entire follow-up interval is marked by no cardiovascular disease events. In Figures 4.28–30, only the subset of cardiovascular disease events not accompanied by baseline disease is retained for analysis. In analyses of death risk in Figures 4.29–30, patients were followed from one month after the index date to the earliest of earliest of death, cessation of Medicare coverage (with either Part A or B), or December 31, 2010. In analyses of cardiovascular hospitalization risk in Figures 4.29–30, patients are followed from one month after the index date to the earliest of inpatient admission for cardiovascular disease, death, cessation of Medicare coverage, or December 31, 2010. Admission for cardiovascular disease is defined by the principal diagnosis codes listed in Chapter Three. In analyses of cardiovascular hospitalization risk,

death is treated as a competing risk, such that hospitalization risk is properly deemed to be zero following death.

mortality

chapter five

Unless otherwise specified, patient cohorts for mortality figures include both Medicare and non–Medicare patients living in the 50 states, the District of Columbia, Puerto Rico, and the Territories.

Figure 5.1 shows trends in mortality rates, by modality, for incident ESRD patients, 1980–2009. The population groups include all ESRD, hemodialysis, CAPD/CCPD, and first transplant (known deceased and living donors only). In defining the population for all ESRD, hemodialysis, and CAPD/CCPD, the 90-day rule is applied and patients are followed from day 91 after the onset of ESRD until January 31, 2010. Hemodialysis and CAPD/CCPD patients are censored at transplant and loss to follow-up; the ESRD and first transplant populations are censored at loss to follow-up only. Adjusted first-, second-, third-, fourth-, and fifth-year mortality rates for each incident cohort are computed from the Cox model using the model-based adjustment method, described later in this appendix. Mortality rates for all patients are adjusted for age, gender, race, and primary diagnosis, and the reference population consists of 2005 incident ESRD patients.

Figure 5.2 shows all-cause mortality, by age, for 2010 prevalent ESRD, dialysis, transplant, and general Medicare patients, calculated using generalized mixed models, and adjusted for gender and race. Medicare patients from 2010 are used as the reference cohort.

Figure 5.3 displays adjusted all-cause and cause-specific mortality for incident hemodialysis patients. Patients with unknown age, gender, or primary diagnosis are excluded, as are those with a listed age greater than 110. Patients are followed from the first service date up to one year, and censored at loss to follow-up, transplant, or recovery of kidney function. Overall rates are adjusted for age, gender, race, Hispanic ethnicity, and primary diagnosis, and adjusted rates can be compared across years and causes of mortality. The reference population consists of 2005 incident hemodialysis patients.

Figure 5.4 illustrates trends in mortality rates, by patient vintage, for period prevalent dialysis patients alive on renal replacement therapy on January 1, with a first service date at least 90 days prior to the beginning of the year, and reaching day 91 of ESRD treatment during the year. Patients with unknown age or gender, or of a race other than white, African American, Native American, or Asian, are excluded. Patients are followed from January 1 until death, transplantation, or the end of the year, and all-cause rates are adjusted for age, gender, race, and primary diagnosis using generalized mixed models. The reference population consists of 2005 prevalent dialysis patients, and adjusted mortalities are comparable across vintages.

Table 5.a presents five-year survival by modality, with modality defined on the first ESRD service date. Transplant is defined as the first transplant in the incident year. Patients with unknown age, gender, or primary diagnosis, and those with a listed age greater than 110, are excluded. All patients are followed from day 1 until death, transplantation, loss to follow-up, recovery of function, or the end of 2010, while transplant patients are followed from the first transplant date until death or the end of 2010. All probabilities are adjusted for age, gender, Hispanic ethnicity,and race; overall probabilities are also adjusted for primary diagnosis. The reference population consists of 2005 incident ESRD patients, and adjusted probabilities are comparable across modalities.

Table 5.b presents unadjusted and adjusted all-cause mortality in ESRD, dialysis, transplant, and general Medicare patients with cancer, diabetes, CHF, CVA/TIA, and AMI. All cohorts are defined on January 1, and include patients age 65 and older. Follow-up for ESRD patents is from January 1 to December 31 of each year, and for transplant patients is censored at transplant patients. For general Medicare patients, follow-up is from January 1 to December 31 of each year, censored at ESRD and at the end of Medicare entitlement. Adjusted mortality is adjusted for age, gender, race, and comorbidities defined in the previous year. ESRD patients in 2005 are used as the reference cohort.

Figures 5.5–6 present adjusted all-cause mortality in the ESRD, dialysis, transplant, and general Medicare populations in 2010. The cohorts and adjustment method are same as those used in Table 5.b; 2010 ESRD patients are used as the reference cohort.

Figures 5.7–9 and Table 5.c show adjusted annualized mortality rates on different days of the dialysis week among prevalent Medicare hemodialysis patients. Methods generally follow those used for hospital admission rates in Figures 3.11–13 and Table 3.b. One difference in methods is that patients with a bridge hospitalization spanning the entire follow-up period are excluded from the admission rates but included for mortality. Censoring criteria are the same except that rates are censored at death only for admissions. All analyses require Medicare as a primary payor and censor at payor change date, since complete claims are needed to define the hemodialysis schedule and to censor at a change or gap in this schedule. Another difference is that the time at risk for mortality includes inpatient days, while the time at risk for admission does not include days in the hospital, since patients are at risk for death but not admission during a hospital stay. For mortality rates, it is assumed that the same hemodialysis schedule is maintained during inpatient stays when hemodialysis claims are unavailable.

REFERENCE SECTION H

Cohorts for tables in Section H include both Medicare and non–Medicare patients living in the 50 states, the District of Columbia, Puerto Rico, and the Territories.

Cohorts in Tables H.1–12 include both incident and prevalent patients. Incident cohorts are limited to patients who reach day 91 of ESRD treatment during the year, while prevalent cohorts include patients alive on renal replacement therapy on January 1 and whose first service date is at least 90 days prior to the beginning of the year. Because calculations include only one year of follow-up, a prevalent patient surviving to the end of the year contributes one year at risk, while a prevalent patient dying during the year contributes less than one year. Since the calculation for incident patients begins on day 91 of ESRD, most patients contribute less than one year at risk; a full year is contributed only if day 91 of ESRD is January 1 and the patient survives to the end of the year. Patients considered lost-to-follow-up at the beginning of the year are excluded. The period at risk is not censored at the start of a lost-to-follow-up period, however; if a patient enters the lost-to-follow-up category during a calendar year, he or she remains in the death rate computation until the end of that year. Patient cohort populations often overlap. Patients with a functioning transplant on the start date, for example, are included in the all-ESRD and functioning transplant categories, while patients on dialysis are defined as both all-ESRD and all-dialysis. A patient in the all-dialysis category may also be reported in one of two subgroups — hemodialysis or CAPD/CCPD — if he or she has been on that modality for at least the previous 60 days. Dialysis patients not on hemodialysis or CAPD/CCPD, or on that modality for fewer than 60 days, are included only in the all-ESRD and all-dialysis categories.

Tables H.1, H.2, and H.2.1 present mortality data for all ESRD patients. Total deaths are presented in Table H.1. Overall unadjusted and adjusted annual mortality rates by age, gender, race/ethnicity, primary diagnosis, and vintage are presented in Table H.2. The unadjusted mortality rates are calculated by dividing total patient deaths in a category — male, for example — by total follow-up time in the same category. For the adjusted rates, generalized mixed models are used to calculate the smoothed rates; these methods are described in the statistical methods section later in this appendix. After obtaining smoothed rates from the generalized mixed models, direct adjustment methods are used. Overall mortality rates are adjusted for age, gender, race, primary diagnosis, and vintage, while rates for each individual category are adjusted for the remaining four. The reference population includes 2005 prevalent ESRD patients. Table H.2.1 presents unadjusted mortality rates by patient age, gender, race, and primary diagnosis for 2010 prevalent ESRD patients; rates are smoothed using a generalized mixed model.

The same methods are used for Tables H.3, H.4, and H.4.1 (dialysis); H.5 (dialysis patients, never on transplant waitlist); H.6 (dialysis patients on transplant waitlist); H.7 (dialysis patients, returned to dialysis from transplant); H.8 and H.8.1 (hemodialysis); H.9 and H.9.1 (CAPD/CCPD); and H.10 and H.10.1 (transplant).

REFERENCE SECTION I

These tables, which include only incident cohorts, present patient counts and survival probabilities. All causes of death are included, as are all non-Medicare patients and patients living in the 50 states, the District of Columbia, Puerto Rico, and the Territories. Patients with unknown gender or age, or whose listed age is greater than 110, are excluded.

Patient selection criteria are the same for both unadjusted and adjusted survival probabilities. All new ESRD patients with a first ESRD service date between January 1, 1980, and December 31, 2007, are included in the analysis. These patients are followed until December 31, 2010, with a maximum follow-up time of 24 years and a minimum of one year. New to this year's ADR, cohorts for all ESRD, dialysis, hemodialysis, and peritoneal dialysis patients are followed from day 1. For all ESRD patients, follow-up is censored at loss to follow-up, recovery of function, or December 31, 2010. For dialysis patients, both hemodialysis and peritoneal dialysis, follow-up is censored at loss to follow-up, recovery of function, transplant, or December 31, 2010.

Unadjusted patient survival probabilities are estimated using the Kaplan-Meier method, while the Cox model and the model-based adjustment method are used for adjusted probabilities.

To limit imprecision due to small cell sizes, adjusted probabilities use aggregate categories for age, gender, race, and primary diagnosis. For each cohort, a probability presented for one variable is adjusted for the remaining three. Overall probabilities for all patients are adjusted for each of the four variables. The reference population consists of 2005 incident ESRD patients.

prescription drug coverage in ESRD patients

chapter six

In figures and tables regarding enrollment and utilization of Medicare Part D, we analyze cohorts of Medicare enrollees in 2006–2010 based on the 100 percent end-stage renal disease (ESRD) population receiving hemodialysis, receiving peritoneal dialysis, or with a functioning kidney transplant, along with cohorts of Medicare enrollees in 2006–2010 based on the 5 percent sample (general Medicare enrollees) and with non-dialysis-dependent chronic kidney disease (CKD). For general Medicare enrollees or enrollees with non-dialysis-dependent CKD, we require continuous enrollment in Medicare Parts A and B during the previous calendar year; no participation in Medicare Advantage during the previous year; and Medicare enrollment in January of the index year. CKD is identified from diagnosis codes on claims during the previous calendar year. For hemodialysis, peritoneal dialysis, and kidney transplant cohorts, we identify point prevalent and incident cohorts. Point prevalent cohorts include all patients alive and enrolled in Medicare on January 1 of the index year, with ESRD onset at least 90 days earlier; treatment modality is identified on January 1. Incident cohorts include all patients alive and enrolled in Medicare exactly 90 days after ESRD onset, with this date between January 1 and December 31 of the index year; modality is identified on this date.

In Figures 6.2–4, type of prescription drug coverage is defined sequentially. That is, we first classify patients as "Part D with LIS" if there exists at least one calendar month in 2008 with Part D enrollment and receipt of the low-income subsidy (LIS). In patients without one such month, we classify remaining patients as "Part D without LIS" if there exists at least one calendar month with Part D enrollment. In patients without one such month, we classify remaining patients as "retiree drug subsidy" if there exists at least one calendar month with employer receipt of the subsidy. In patients without one such month, we classify remaining patients as "other creditable coverage" if there exists at least one calendar month with enrollment in military, government employee, or employer group health plans. And we classify all remaining patients as "no known coverage."

For Figure 6.5 and Table 6.a we classify Part D enrollees as LIS recipients if there exists at least one calendar month in 2008 with receipt of the LIS. In Table 6.c, the proportion enrolled in Part D is the sum of those enrolled in Part D with the LIS and without the LIS.

In Figures 6.6–8, we consider only those Part D enrollees who are not LIS recipients during any calendar month of the index year. In all figures, patients enrolled in Medicare Advantage Part D (MA-PD) plans are excluded.

In Figures 6.15–17 and Tables 6.d–e, we consider only those Part D enrollees who are not LIS recipients during any calendar month of 2010. In all figures, patients enrolled in employer group waiver plans or national Programs of All-inclusive Care for the Elderly (PACE) are excluded, as these types of plans do not report data concerning coverage phase progression of enrollees. In Figure 6.16, follow-up begins on January 1, 2010, and in Figure 6.17, follow-up begins on the date of entry into the coverage gap. In Table 6.d, diagnoses of hypertension, cardiovascular disease, diabetes, and cancer are ascertained from the Medical Evidence form alone. For Table 6.e, a fill is simply defined as a transaction billed to Part D.

Part D costs for ESRD patients are based on the 100 percent ESRD population, using the period prevalent, as-treated model (Model 1) described for Chapter Eleven. Some figures also compare the general Medicare population (all Part D enrollees) based on the 5 percent Medicare sample, as well as point prevalent CKD patients from the 5 percent sample. The CKD population includes only persons who survive all of year one, are continuously enrolled in Medicare inpatient/outpatient and physician/supplier coverage for this period, are not enrolled in a Medicare Advantage Part D (MA-PD) plan, and have a qualifying CKD diagnosis (but do not have ESRD) during the prevalent year. Costs are then aggregated for the subsequent year. Costs are presented as the total Part D net payment, estimated as the Medicare covered amount plus the low income subsidy amount (LIS) in Figures 6.9–12.

Figure 6.9 compares total Part D expenditures for general Medicare, CKD, and ESRD populations in 2007–2010. Figures 6.10–11 present PPPY net payment and out-of-pocket expenditures for general Medicare, CKD, and ESRD Medicare populations. In Figure 6.12 we show PPPY Part D net payments by race and LIS status for dialysis patients in calendar year 2010, while Figures 6.13 (total net payment) and 6.14 (PPPY) show total expenditures for Part B prescription drugs (injectable drugs and immunosuppressive agents) compared to Part D net payments in the ESRD population.

Tables 6.f (dialysis) and 6.g (transplant) present data on the top 15 Part D drugs (generic name) by frequency (measured as total prescribed days supply) and cost for ESRD patients. Figures 6.18 and 6.20 show the top 15 prescribed Part D drug classes (based on Medi-Span's generic product identifier therapeutic classification system) by frequency for dialysis and transplant patients, respectively, while Figures 6.19 and 6.21 show these drug classes by net payments.

transplantation

chapter seven

Figure 7.1 presents an overview of the transplant population. The first panel juxtaposes the growing rate of ESRD with the falling rate of transplantation in patients age 20 and older at transplant, 1988–2010. Most adult-only figures are limited to patients age 18 and older, but this figure is limited to age 20 and older because census population data are provided in five-year increments. The second panel summarizes the wait list, showing, by prior transplant status, the number of patients age 20 and older on the OPTN kidney or kidney-pancreas wait list on December 31 of the year, and the median wait time for a deceased-donor kidney. Patients with overlapping listings at more than one center are counted once. Median wait time is plotted only when the Kaplan-Meier median is observed, and is thus missing for patients listed more recently. The third panel presents transplant counts for patients 20 and older, by donor type, obtained through a combination of OPTN and CMS data. The fourth panel shows functioning transplant counts for patients 20 and older, by donor type.

WAIT LIST AND DONATION

Figure 7.2 shows the percentage of patients wait-listed or a receiving a deceased donor kidney transplant within one year of ESRD initiation, stratified by age, while Figures 7.3–4 illustrate the number and distribution of adult (age 18 and older) patients on the OPTN kidney or kidney-pancreas wait list on December 31 of the year. Because patients may list at multiple transplant centers, Figure 7.3 shows, by status (active/inactive), the number of unique patients and the proportion of patients listed at multiple centers. Figure 7.4 reports, by blood type, proportions of adult patients who receive a deceased donor transplant, receive a living donor transplant, or die within three years of listing. Because these outcomes are subject to competing risks, we use cumulative incidence estimates.

In Figure 7.5 we illustrate three-year outcomes for adult patients first listed in 2007. Outcomes are classified into five groups: 1) received a deceased donor transplant, 2) received a living donor transplant, 3) died awaiting a transplant, 4) removed from the list prior to transplantation, or 5) still waiting. Calculated PRA was used where available.

Figure 7.6 shows median wait times, by state, for adults receiving a deceased donor kidney during 2010. Wait time is calculated as the transplant date minus the date the patient is added to the kidney or kidney-pancreas wait list, not necessarily the date he or she is first listed at the center where the transplant is performed.

Figure 7.7 presents adjusted one-year mortality, by state of residence, for January 1, 2010 point prevalent wait-list patients. A Poisson regression is used to estimate rates, adjusting for age, gender, white/non-white race, willingness to accept an ECD donor, and time on the list prior to 2010. Patients are followed for up to one year.

Figure 7.8 shows the likelihood of adult patients dying while awaiting transplant in the first through fifth year after listing, looking at those first listed in 1991–2009. The likelihood of dying is estimated from Cox proportional hazard models, adjusted for listing year, age, gender, race, primary diagnosis, and PRA level at listing; the 2005 period prevalent cohort is used as reference. Patients are censored at removal from the list and end of follow-up. CPRA is used in place of PRA when available.

In Figure 7.9 we present the three-year cumulative incidence of transfusion among wait-listed patients by PRA level at listing. The cohort is limited to wait-list patients with primary Medicare coverage, and transfusion data are obtained from Medicare claims. Incidence is estimated using Kaplan-Meier methods, with censoring at transplant, death, removal from the waiting list, or loss of Medicare coverage.

Figure 7.10 shows rates of organ donation per million population by age, gender, and race. A deceased donor is counted once, regardless of how many organs are transplanted. Figure 7.11 presents unadjusted donation rates per 1,000 deaths, by state. Population and death count estimates for the year from July 1, 2009 to July 1, 2010 are obtained from the US Census Bureau.

TRANSPLANT AND OUTCOMES

Figures 7.12 and 7.14 illustrate the number of deceased and living donor transplants for both kidney and kidney-pancreas recipients, while Figures 7.13 and 7.15 present transplant rates by age, gender, race, and primary diagnosis; rates by one factor are adjusted for the remaining three. For example, rates by age are adjusted for gender, race, and primary diagnosis. Figure 7.16 shows adjusted transplant rates (per 100 dialysis patient years) by state of patient residence and donor type in 2010. Rates are adjusted for age, gender, race, and primary diagnosis.

Figures 7.17–18 present one-, five-, and ten-year graft and patient outcomes for adult recipients of kidneys from deceased and living donors. Data are reported as unadjusted probabilities of each outcome, computed using Kaplan-Meier competing risk methods. All-cause graft failure includes re-transplant, return to dialysis, and death with function.

Figure 7.19 presents the one-year cumulative incidence of acute rejections in adult, first-time, kidney-alone transplant patients discharged from the transplant hospitalization with a functioning graft. A patient is assumed to have acute rejection if OPTN data collection forms note 1) acute rejection episodes, 2) that medications were given for acute rejection, or that 3) acute rejection was the primary or secondary cause of graft failure. Biopsy-proven status was available starting in 1991 on the OPTN Transplant Recipient Registration, which identifies early rejection; it was not, however, added to the Transplant Recipient Follow-up form until April, 2003, so incidence of biopsy-proven rejection is available for 2004 and later. Rejections that are a primary or contributing cause of graft failure are assumed to be biopsy-proven, while rejections identified by treatment status are not. Cumulative incidence is estimated using Kaplan-Meier methods, censored at death or graft failure.

Figure 7.20 reports the percentage of patients with evidence of delayed graft function (defined by a need for dialysis in the first

week after transplantation), by donor type and ECD and DCD status, as reported to the OPTN.

Figure 7.21 presents first-year and second-year post-transplant hospital admission rates for adult Medicare patients receiving their first kidney-alone transplant in 2008. Data are collected from Medicare claims occurring within two years of discharge from the transplant hospitalization, and exclude the hospitalization itself. Admission rates are censored at graft failure, loss of Medicare coverage, or December 31, 2010. Statistical methods for computing admission rates are similar to those described for Reference Section G, but cohorts are constructed differently. Instead of computing rates in point prevalent patients within a given year, we define the cohort based on the transplant year, and examine hospital claims up to a year post-transplant for first-year data and two years post-transplant for second-year data. Figure 7.22 illustrates the primary cause of hospitalization for cardiovascular problems and infection in the first and second years post-transplant in Medicare patients with a first kidney-alone transplant in 2006–2008.

Figure 7.23 presents data on the three-year cumulative incidence of post-transplant lymphoproliferative disorder (PTLD). The population includes first-time, kidney-only transplant recipients, 2003–2007. PTLD is identified from the OPTN Post-Transplant Malignancy form and the Transplant Recipient Follow-Up form.

Figure 7.24 illustrates the three-year cumulative incidence of new onset diabetes following transplant, looking at Medicare patients transplanted during 2003–2007. To identify de novo post-transplant diabetes, the cohort is limited to patients with six months of Medicare primary payor coverage prior to transplantation; patients with claims for diabetes during this period are omitted. Cumulative incidence in the three years following the transplant is estimated using a Cox proportional hazards model, adjusting for recipient age, gender, race, cause of ESRD, donor type, hepatitis status, duration of dialysis, donor factors, HLA mismatch, and initial immunosuppression.. Events are censored at graft failure, death, or loss of Medicare coverage.

In Figure 7.25 we show the rate of return to dialysis or retransplant, the rate of death with a functioning graft, and the rate of all-cause graft failure, which includes failure due to death. Rates are limited to adult patients, and estimated from a Poisson regression, adjusting for age, gender, and race.

Figure 7.26 displays causes of death for adult patients transplanted in 2006–2010 who subsequently die with a functioning graft. Causes of death are ascertained from OPTN transplant follow-up data, or, if unknown, from the ESRD Death Notification form.

FOLLOW-UP CARE

Figure 7.27 presents data on immunosuppressive medications used in adult recipients at the time of transplantation, as reported to the OPTN. All such medications are indicated on the form as maintenance immunosuppression. Mycophenolate data include mycophenolate mofetil and mycophonelate sodium, while MTOR inhibitors include sirolimus and everoliumus. Data on MTOR inhibitors and steroids are also shown at one year post-transplant.

Figure 7.28 displays the percentage of patients with Medicare claims for influenza vaccinations, lipid testing, and CBC panels. The cohort is limited to adult patients with Medicare coverage, transplanted in 1991–2010, and discharged alive with graft function. To avoid counting inpatient procedures done as part of the transplant hospitalization, claims are searched from one day after the discharge date to one year post-transplant. Percentages are estimated using Kaplan-Meier methods, with censoring at graft failure, death, or loss of Medicare coverage. HCPCS codes for testing are as follows: influenza vaccination, 90724, 90657, 90658, 90659, 90660, and G0008; lipid panel, 80061, 82465, 83715, 83716, 83717, 83718, 83719, 83720, 83721, and 84478; and CBC panel, 85025, 85027, 80050, and 80055.

Figures 7.29–30 illustrate the sources of prescription drug coverage among transplant patients. Sources are defined sequentially. We first classify patients as "Part D with LIS" if there exists at least one calendar month in the given year with Part D enrollment and receipt of low-income subsidy (LIS). In patients without one such month, we classify remaining patients as "Part D without LIS" if there exists at least one calendar month with Part D enrollment. In patients without one such month, we classify remaining patients as "retiree drug subsidy" if there exists at least one calendar month with employer receipt of the subsidy. In patients without one such month, we classify remaining patients as "other creditable coverage" if there exists at least one calendar month with enrollment in military, government employee, or employer group health plans. And we classify all remaining patients as "no known coverage." Figure 7.31 shows the proportion of transplant recipients enrolled in the Medicare Part D program, among new transplants and live transplants. "Live recipients" are those alive with graft function in the given year, regardless of when the transplant occurred.

Figure 7.32 displays total expenditures for Part B prescription drugs (injectable drugs and immunosuppressive agents) compared to Part D net payments in the Medicare-covered transplant population.

Figures 7.33–35 address medication use in the first six months post-transplant. The cohort for these figures includes adult patients receiving a first-time, kidney-only transplant between January 1, 2008, and June 30, 2010, who remain alive with graft function and who have Medicare Part D coverage during the six months following transplant. Medication use is defined by at least one prescription fill during this six-month period. In Figure 7.34, with data on lipid-lowering agents, "other" agents include cholesterol absorption inhibitors, niacin, and omega-3 fatty acids . For Figure 7.35, which shows medications for diabetes control, diabetic status is based on primary diagnosis (as recorded on the Medical Evidence form).

Figures 7.a–b show the top 15 Part D medications used by transplant recipients enrolled in Medicare Part D. We provide the generic names, and show the top ten medications by frequency (measured as total prescribed days supply) and cost for transplant patients in the first, second, and third years following transplant.

REFERENCE SECTION E

Tables E.1–5 present data on the kidney transplant wait list. Wait list data prior to 1988 are not shown; the OPTN wait list began in earnest in 1987. All wait list data are limited to ESRD certified patients. Table E.1 presents counts of patients newly added to the wait list for a kidney or kidney-pancreas transplant on December 31 of the given year. Patients listed at multiple transplant centers are counted only once. Table E.2 presents wait times, defined as the median time in days from first listing to transplant among patients listed for a kidney-alone transplant, and estimated with the Kaplan-Meier method. Patients listed at multiple centers are counted from the time of the first listing. Table E.3 presents counts of patients on the wait list at any center on December 31 of the given year, regardless of when the first listing occurred. Table E.4 includes point prevalent dialysis patients on December 31 of the given year. And Table E.5 presents the percentage of patients wait-listed or receiving a transplant within one year of ESRD initiation; patients receiving a transplant from a living donor are excluded from the measure in the first half

of the table and included in the second half. Percentages are calculated using the Kaplan-Meier methodology.

Transplant counts are presented in Tables E.6–8. All known transplant events are included unless specified in the footnote, and all counts include non-Medicare patients. Table E.8 illustrates the distribution of transplanted patients by donor type and PRA level, determined from the OPTN Recipient Histocompatibility form, and shows as well a cross-tabulation of recipients and donors in terms of CMV antibody status, hepatitis C antibody status, and Epstein-Barr antibody status at the time of transplantation. A recipient/donor is considered positive for any of these antibodies if any applicable OPTN data source indicates positive. "Unknown" status is applied when no applicable data fields indicate "positive" or "negative." Cold ischemia time (in hours) is reported for deceased donor transplants only, and is taken from the OPTN Transplant Recipient Registration form.

Transplant rates per 100 dialysis patient years are shown in Table E.9. All hemodialysis patients, peritoneal dialysis (CAPD/CCPD) patients, and patients on an unknown form of dialysis are included, as are all non-Medicare patients. A patient's dialysis days are counted from the beginning of the specified year, or day one of ESRD dialysis therapy if treatment begins mid-year, until the first of transplant, death, or the end of the year. Patients lost to follow-up in a given year are not censored at the lost-to-follow-up date, but are followed until the end of the calendar year. Dialysis time for patients returning from transplant is counted. Transplant rates are calculated as the number of transplant events divided by the total number of dialysis patient years for each year.

REFERENCE SECTION F

This section presents probabilities of graft survival and graft failure necessitating dialysis or retransplantation, by donor type, age, gender, race, ethnicity, primary diagnosis, and transplant number. Data are presented for outcomes at 90 days, one year, two years, three years, five years, and ten years post-transplant. In ADRs prior to 2010, "graft failure necessitating dialysis or retransplantation" was referred to as "death-censored graft failure." Due to confusion regarding terminology, we renamed this outcome in the 2010 ADR. This section now seeks to address two major issues: the probability of graft survival at various times post-transplant, and the probability that a patient will return to dialysis or require retransplantation at various times post-transplant. Patients are followed from the transplant date to graft failure, death, or the end of the follow-up period (December 31, 2010). In the analysis of graft survival, death is considered a graft failure. In the analysis of graft failure necessitating dialysis or retransplantation, patients are followed until graft failure (excluding death), and patient follow-up is censored at death. To produce a standard patient cohort, patients with unknown age or gender are omitted. Unknown age is defined as a missing age at transplant, or an age calculated to be less than zero or greater than or equal to 100. Patients are also excluded if their first ESRD service date is prior to 1977.

Unadjusted survival probabilities are estimated using the Kaplan-Meier methodology, while the Cox proportional hazards model is used for adjusted probabilities. Probabilities are adjusted for age, gender, race, primary diagnosis, and first versus- subsequent transplant, and standardized to 2005 patient characteristics.

pediatric ESRD

chapter eight

Information on pediatric patients is a subset of ESRD patient data used throughout the ADR; methods used for most figures are therefore the same as those described in the related chapter discussions.

PREVENTIVE CARE

Figures 8.7–9 show rates of preventive healthcare in pediatric ESRD patients by modality and race. Methods and codes used to determine vaccination rates are similar to those described for Chapter Two. In addition, CPT code 90732 and HCPCS code G0009 are used to identify pneumovax vaccination, while CPT codes 90669 and 90670, and HCPCS code S0195 are used to identify prevnar vaccination. All patients are age 0–19 at the beginning of each study period; reside in the 50 states, the District of Columbia, Puerto Rico, or the Territories; and have Medicare inpatient/outpatient and physician/supplier coverage for the entire period.

For influenza vaccinations, the cohort includes patients starting ESRD therapy at least 90 days prior to September 1 and alive on December 31 of each year; rates are calculated for patients vaccinated in the last four months of each year. For pneumococcal pneumonia vaccinations, the cohort includes prevalent patients initiating therapy at least 90 days prior to January 1 of the first year of each two-year period and alive on December 31 of the second year; rates are calculated for patients receiving one vaccination in each period. Years 2007–2010 are grouped in Figures 8.7, and 2007–2008 and 2009–2010 are grouped in Figures 8.8 and 8.9.

HOSPITALIZATION

Figures 8.1–5 and 8.10–12 show rehospitalization and admission rates among pediatric ESRD patients. Patients have Medicare as their primary payor and are residents of the 50 states, the District of Columbia, Puerto Rico, and the Territories. Patients with AIDS as a primary or secondary cause of death, and those with missing age or gender information, are excluded.

Figure 8.1 shows adjusted 30-day rehospitalization rates in period prevalent ESRD patients age 0–19. Rates include the percentages of live hospital discharges from January 1 to December 1 of each year that were followed by a rehospitalization within 30 days. Rates are adjusted for gender, race, and primary diagnosis using the direct adjustment method. The reference group consists of all included discharges in 2005.

Figures 8.2–5 include period prevalent ESRD patients age 0–19 during pooled years 2007–2010; rates are unadjusted. Age is determined on January 1 of each year. Cohorts and admission rate calculations follow those described for Reference Section G. Principal ICD-9-CM codes for infection are listed in the discussion of Figure 3.1. Those for infection due to internal device include 996.62, 996.68, and 999.31; bacteremia/septicemia include 038.0–038.9 and 790.7; and respiratory infection (including pneumonia) codes are 460–466, 472–474.0x, 475–476.1, 478.21–478.24, 480–486, 487.0, 487.1–487.8, 488–490, 491.1, 494, 510–511, 513.0, 518.6, and 519.01.

Figure 8.6 identifies period prevalent pediatric dialysis (hemodialysis and peritoneal dialysis) patients in 2009 with an infection in 2009 who have evidence of IV or oral antibiotics during the first three months after the infection claim. Patients are limited to those who remain alive, on the same modality, and have Part D coverage for 90 days after the infection claim.

Figures 8.10–12 present adjusted admission rates in the first year among incident ESRD patients age 0–19 in 2000–2009. Since in-center hemodialysis patients who are younger than 65 and not disabled cannot bill for hospitalizations until 90 days after ESRD initiation, the 90-day rule is applied. Patients are required to survive the first 90 days after initiation, and are followed for admissions for up to one year after day 90. Data cleaning, and counting of admissions and time at risk for admissions, generally follow methods described for Reference Section G. Censoring occurs at

death, loss to follow-up, end of payor status, December 31, 2010, or one year. Censoring also occurs three days prior to transplant for dialysis patients, and three years after the transplant date for transplant patients. Rates are adjusted for gender, race, and primary diagnosis. Adjusted rates are calculated with a model-based adjustment method and an interval Poisson model. The reference cohort includes incident ESRD patients age 0–19 in 2004–2005. Principal ICD-9-CM diagnosis codes used for cardiovascular and infectious hospitalizations are listed in the discussion of Figure 3.1.

MORTALITY AND SURVIVAL

Figure 8.13–15 present adjusted all-cause and cause-specific mortality in the first months of ESRD, by age and modality, for 2000–2004 and 2005-2009 incident patients younger than 20. Dialysis patients are followed from the day of ESRD onset until December 31, 2010, and censored at loss to follow-up, transplantation, or recovered function. Transplant patients who receive a first transplant in a calendar year are followed from the transplant date to December 31, 2010. Rates are adjusted for gender, race, Hispanic ethnicity, and primary diagnosis. Incident ESRD patients younger than 20, 2004–2005, are used as the reference cohort.

Figure 8.16 presents five-year survival for 2001–2005 incident ESRD patients age 0–19. Dialysis patients are followed from the day of ESRD onset until December 31, 2010, and censored at loss to follow-up, transplantation, or recovered function. Transplant patients who receive a first transplant in a calendar year are followed from the transplant date to December 31, 2010. Probabilities by age are adjusted for gender, race, Hispanic ethnicity, and primary diagnosis; probabilities by modality are adjusted for age, gender, race, Hispanic ethnicity, and primary diagnosis. The reference population consists of 2004–2005 incident pediatric ESRD patients.

PEDIATRIC ESRD IN THE U.S. & CANADA

Figures 8.17–27 present data on pediatric patients in the United States and Canada, using data — new to the USRDS ADR — from the Canadian Organ Replacement Register (CORR).

CORR is a national database managed by Canadian Institute for Health Information (CIHI). CORR's mandate is to record and analyze the level of activity and outcomes of vital organ transplantation and renal dialysis activities. This national register provides statistics that track long-term trends for organ transplantation, organ donation, waiting list statistics and dialysis activity. In doing so, the register makes comparative data available that can enhance treatment, patient care, and research.

CORR collects data from hospital dialysis programs, regional transplant programs, organ procurement organizations, and independent health facilities that offer kidney dialysis services. The data is collected and reported on a calendar-year basis (January 1 to December 31), as is the practice in other international registries reporting on end-stage organ failure, and allowing the program to report international comparisons.

Patients are tracked from their first treatment for end-stage organ failure (dialysis or transplantation) to death, unless they become lost to follow-up. Only treatments provided in Canada are included in the reports. For the purposes of recording continuity of care, however, CORR does capture data about patients transferred outside of Canada when those facilities report the transfers.

Incident and prevalent rates for both U.S. and Canadian patients are unadjusted.

Figure 8.27 shows unadjusted first transplant rates per million population. First transplants among patients age 0–19 are included, while retransplants are excluded. U.S. population estimates are obtained from the National Center for Health Statistics (http://www.cdc.gov/nchs/nvss/bridged_race.htm).

MEDICATION USE

Figure 8.28 and Tables 8.b–e include period prevalent ESRD patients in 2009 and 2010. The study cohort of pediatric (age younger than 20) dialysis patients includes prevalent hemodialysis and peritoneal dialysis patients on January 1, 2009, with date of ESRD onset greater than 90 days before January 1 and with Medicare Parts A, B, and D coverage; and incident hemodialysis and peritoneal dialysis patients (who survive the first 90 days of dialysis) in 2009 and 2010. Patients are followed from the later of January 1, 2009, or 90 days after the date of ESRD onset to the earliest of change in dialytic modality, kidney transplant, death, or December 31, 2010. Continuous coverage with Medicare Parts A, B, and D is required during the follow-up interval. The study cohort of pediatric transplant patients includes prevalent kidney transplant patients on January 1, 2009, with date of ESRD onset greater than 90 days before January 1 and with Medicare Parts A, B, and D coverage; and new kidney transplant recipients in 2009 and 2010. Patients are followed from the later of January 1, 2009, or date of new kidney transplant until the earliest of graft failure, death, or December 31, 2010. Continuous coverage with Medicare Parts A, B, and D is required during the follow-up interval.

Figure 8.28 describes the percentages of patients treated with injectable and oral medications during the follow-up interval. Epoetin alfa, darbepoetin, intravenous (IV) iron, and IV vitamin D analog use are ascertained from Part B claims for dialysis, whereas oral vitamin D, phosphate binder, and somatropin use are identified from Part D claims. Oral drugs are identified from National Drug Codes linked with Generic Product Identifiers, using the Medi-Span Drug Data Base. Use is defined by at least one injection or prescription during the follow-up interval. In Table 8.b, methods are identical. Calcium channel blockers include only dihydropyridine agents, alpha agonists include clonidine, guanfacine, and methyldopa, and vasoldilators include hydralazine and minoxidil. Table 8.c describes mean administered doses of injectable medications in pediatric dialysis patients. Doses are calculated from the quotient of the sum of all administered doses in the study cohort and the sum of all follow-up time spanned by claims for such doses. Tables 8.d–e describe the top 25 drugs used in pediatric ESRD patients, by total days supply and percentage.

special studies

chapter nine

COMPREHENSIVE DIALYSIS STUDY

The Comprehensive Dialysis Study (CDS), a joint effort of the Nutrition Special Study Center and the Rehabilitation/Quality of Life Special Studies Center of the USRDS, enrolled incident dialysis patients between September 1, 2005 and June 1, 2007 from a stratified random sample of dialysis facilities throughout the United States. All participants were asked to respond to a patient questionnaire focusing on physical activity and quality of life by telephone, and patients initiating dialysis in a prespecified subset of facilities were also asked to respond to a brief food frequency questionnaire and to provide baseline and quarterly serum samples.

Physical activity was measured using the Human Activity Profile (HAP), a 94-item questionnaire that asks individuals to report whether they are "still doing," have "stopped doing," or "never did" 94 activities ranked according to estimated energy expenditure, and ranging from getting in and out of chairs or bed without assistance

to running or jogging three miles in 30 minutes or less. Two scores are generated from the HAP, a Maximum Activity Score (MAS) and an Adjusted Activity Score (AAS). The MAS is the highest oxygen-demanding activity that the respondent still performs, and is indicative of the respondent's current maximum activity level. The AAS is calculated by subtracting from the MAS the total number of activities that are less demanding than the MAS but that the respondent is no longer doing, and is reflective of an individual's usual daily activity level.

HAP results for ambulatory men and women are shown in Figure 9.9. The boxes represent the 25th to 75th percentiles, with the center line indicating the 50th percentile. Lines above and below extend to the 99th and 1st percentile, respectively. Within each age group, control data are represented on the left and CDS participants' data are plotted on the right.

For Figure 9.10, a frailty phenotype was constructed using data on physical activity level, self-reported physical functioning, and exhaustion, similar to previous questionnaire-based definitions. One point was given for self-reported physical activity (from the HAP) in the lowest quintile of the general population based on age, one point for a Physical Function score on the SF-12 of <75, and one point for responding "a little of the time" or "none of the time" when asked how much of the time during the past four weeks they thought they had a lot of energy. Patients with two or more points were considered frail.

The Patient Questionnaire included questions about symptoms of insomnia, restless legs syndrome (RLS) and depression. To assess insomnia, participants were asked whether they had trouble falling asleep, waking up during the night, or waking up too early and not being able to fall asleep again. Participants were asked to indicate the frequency with which these symptoms occurred as "all or most of the time," "some of the time," "a little of the time," or "none of the time." These data are shown in Figures 9.11–15.

Restless legs syndrome (RLS) is addressed in Figure 9.13. Questions about RLS were based on the clinical criteria established by the RLS diagnosis and epidemiology workshop at the National Institutes of Health. Patients reported whether they had an urge to move their limbs accompanied by "creepy or crawly" sensations, whether the sensations were relieved by movement, and whether they were worse in the evening or at night. In Figures 9.14–15, a score of three or greater on the two-item Patient Health Questionnaire-2, which asks about feelings of depression and anhedonia over a two-week period, was considered to indicate symptoms of depression.

Participants in the nutrition substudy of the CDS provided information about usual dietary intake using the Block 2000 Brief Food Frequency Questionnaire, and also provided serum samples at baseline. Albumin, prealbumin, and C-reactive protein were measured, and these data were presented in the 2009 USRDS Annual Data Report. More recently, 25-hydroxyvitamin D (25-OH vitamin D) levels were measured on the baseline serum samples among 192 participants whose serum samples were drawn within 120 days of the Patient Questionnaire. Related data are presented in Figures 9.16–17.

EARLY AWARENESS OF TREATMENT OPTIONS

Descriptive statistics were used to summarize the association of patients' early awareness of peritoneal dialysis (PD) with PD initiation, and the association of patients' early awareness of kidney transplantation with transplant outcomes. In the Kaplan-Meier plot describing the association of predialysis kidney transplantation discussion with waiting list placement, the analysis start date was defined as date of first regular dialysis (between June 1, 2005 and June 1, 2007), and the study end date was September 30, 2009. Patients were censored at death and the end of follow-up, and patients who were not wait listed and received living donor transplants were censored at the date of transplant. Patients preemptively wait listed (before the initiation of dialysis) were assigned a value of 0 time to wait listing. Predictors of waiting list placement were also investigated in a proportional hazards model (more accurately, discrete logistic model to accommodate ties) that included patient sociodemographic and clinical characteristics and dialysis treatment modality. The interaction between race (black/African American, white) and early discussion of kidney transplantation as a treatment option was investigated and included in this model.

providers

chapter ten

Throughout the atlas and in Reference Section J, we define a chain-affiliated unit as one of a group of 20 or more freestanding dialysis units owned or operated by a corporation at the end of a year. The category of small dialysis organization (SDO) includes all organizations meeting our definition of a chain but having 20 or more and fewer than 200 units. In previous years, chain affiliation was determined from the "Provider Name" field of the CMS Annual Facility Survey and the "Chain Organization Name" field of the CMS Independent Renal Facility Cost Report. Currently, however, it is determined solely from the "Chain Name" field of the CMS patient-accessible, web-based Dialysis Facility Compare database (DFC).

Data are obtained from the Facility Survey (1988–2010), the Cost Report (Form 265-94, 1994–2000), the DFC database (2001 to the present), and the CDC National Surveillance of Dialysis-Associated Diseases in the United States (1988–2002, excluding 1998, when the CDC did not conduct a survey). The CDC discontinued the National Surveillance of Dialysis-Associated Diseases after 2002. In 2010, there were 5,869 facilities in the Facility Survey.

A facility's hospital-based or freestanding status is determined from the third and fourth digits of the provider number assigned to each unit by CMS. For years prior to 2002, we determine profit status through the ownership type field on the CMS survey. In the 2002 CMS survey the profit status variable was dropped, so for that and subsequent years we use the profit status field of the DFC database. There are, however, a small number of facilities in the CMS survey that are not in the DFC database; these facilities have an unknown profit status, and are omitted from any figure showing profit status.

For provider-specific analyses, unless otherwise noted, the dialysis provider for individual patients is assigned as follows: for prevalent studies, the patient is assigned to the facility providing dialysis services at the prevalent date, as determined from the treatment history. For incident analyses, the patient is assigned to the facility providing dialysis services at the incident date, as determined from the treatment history. In either case, if provider data are unavailable from the patient's treatment history, the patient is assigned to "unknown provider" or excluded, depending on the analysis.

Figure 10.1 shows the distribution of units and patients for large dialysis organizations (LDOs) and SDOs from the 2010 Facility Survey. Figure 10.2 presents the number of dialysis facilities and patients by renal network for 2005 and 2010, while Figure 10.3 compares chain affiliations for 2010.

Figures 10.4–6 employ the same cohort as Figure 2.8, here for 2009–2010 and limited to dialysis patients.

For Table 10.a and Figures 10.7–14, facilities are defined as opting into the new dialysis bundle if 25 percent or less of their 2011 EPO

line item claims had a payment greater than 0. Non-bundle facilities are those in which 75 percent or more of their EPO line item claims had a payment greater than 0; facilities with 25–75 percent of EPO line item claims having a payment great than 0 are not classified.

Figure 10.a shows the distribution of facilities opting into the new dialysis bundle. Only facilities that classified as bundle or non-bundle providers are included.

Figures 10.7–9 summarize weekly dose for ESA, IV iron, and IV vitamin D in the last two quarters of 2010 and the first two quarters of 2011 for point prevalent dialysis patients with a first service date 90 days prior to January 1 of the given year. Only facilities defined as opting into the new dialysis bundle are included.

Figure 10.10 summarizes the total monthly dose of anemia treatment therapeutics (EPO, IV iron, and IV vitamin D), hemoglobin levels, and transfusions in period prevalent dialysis patients pre- (September 2010) and post- (September 2011) dialysis bundle. Patients need to have a dialysis claim within the month to be included in the denominator for the percentage of patients with at least one transfusion and for the percentage of patients with and EPO claim. Transfusion dates are defined based on the from date of the claim.

Figures 10.11–13 show the percentage of patients with hemoglobin levels <10, 10–12, and > 12 g/dl in the last two quarters of 2010 and the first two quarters of 2011 in point prevalent dialysis patients with a first service date 90 days prior to January 1 of the given year for facilities defined as opting into the new dialysis bundle. Figure 10.14 shows the percent of patients with a transfusion in the same cohort, but also requires patients to have at least one dialysis claim within the quarter. Transfusion dates are defined based on the from date of the claim.

Figures 10.15–22 compare mortality and hospitalization among dialysis provider types, chains, and regions, using standardized mortality ratios (SMRs) and standardized hospitalization ratios (SHRs). Both are estimated by the traditional SMR calculation method. A patient's dialysis provider is defined on January 1, 2010. Patients are followed from January 1, 2010, to the first of death, transplant, or December 31, 2010. Patients dying of AIDS are excluded; those dying of drug overdose (street drugs) or of an accident not related to treatment are censored at the date of death. SMR calculations include all January 1, 2010, point prevalent hemodialysis patients, while SHR calculations include only hemodialysis patients with Medicare as primary payor, and use the number of hospital admissions as the endpoint. Both SMRs and SHRs are adjusted for age, gender, race, primary diagnosis, and vintage, with 2010 national point prevalent hemodialysis patients as the reference cohort for the SMR calculations, and Medicare patients used for the SHR data.

costs of ESRD

chapter eleven

The majority of economic analyses in this ADR use the as-treated model, described later in this section.

PAYOR SEQUENCE

The payor sequence is similar in concept to the USRDS treatment history. Payor status is tracked for each ESRD patient from the first ESRD service date until death or the end of the study period. Data from the Medicare Enrollment Database, as well as dialysis claims information, are used to categorize payor status as Medicare primary payor (MPP), Medicare secondary payor (MSP), Medicare Advantage (HMO), or non-Medicare. The claims database contains data only for MPP and MSP patients, so economic analyses are restricted to these categories. In addition, since it is impossible to determine the complete cost of care for ESRD patients with MSP coverage, most analyses exclude patients during the periods when they have this coverage.

CHAPTER ELEVEN

Table p.a in the Précis summarizes data on the costs of ESRD treatment. Total 2010 Medicare spending is calculated from the claims data, and includes all paid claims for ESRD patients in the USRDS database. Cost aggregation for each patient begins at the first ESRD service date. Total 2010 Medicare spending is inflated by 2 percent to account for incomplete claims, and organ acquisition costs are estimated with the same methods used in the 1999 ADR (pages 149–150). HMO costs are estimated using the total HMO months for 2010 (obtained from the CMS managed care organization file) in conjunction with the 2010 AAPCC rate.

Non-Medicare EGHP spending is estimated by separately computing the per year at-risk costs for EGHP and non-EGHP patients, then multiplying the difference by the EGHP years at risk for 2010. Patient obligations are estimated as the difference between Medicare allowable and net payment amounts. Non-Medicare patient spending is estimated as the number of patient months at risk for non-Medicare patients (determined from the USRDS payor sequence) multiplied by the AAPCC rate.

Changes in Medicare spending from 2009 to 2010 are obtained from Table K.2, without the 2 percent adjustment for late claims. Calculations of per person per year (PPPY) at-risk costs are based on patients for whom Medicare is the primary payor during the study period (Table K.e), again using non-inflated results. The range for inflation-adjusted costs is calculated using the overall Consumer Price Index (1.5 percent) and Medical Consumer Price Index (3.4 percent).

Figures 11.12–18 describe PPPY costs for items billed in the outpatient SAFs, particularly injectable drugs, for period prevalent dialysis patients with Medicare as primary payor.

Figures 11.19–25 present PPPY costs for the services described in Figures 11.12–18, by modality and race. Modalities are determined using Model 1 (as-treated actuarial model) methodology, as described below. Data are also presented for a subset of hemodialysis patients who are matched to peritoneal dialysis patients, using a propensity score technique. In the cohort of dialysis patients, we first estimate the propensity for peritoneal dialysis prescription by fitting a logistic model of dialytic modality, with age, race (white, black, other), gender, primary cause of ESRD (diabetes, hypertension, glomerulonephritis, cystic kidney disease, other known, unknown), cumulative ESRD duration, and seven diagnosed comorbid conditions (cardiovascular disease, hypertension, diabetes, COPD or tobacco use, cancer, alcohol or drug dependence, and in need of assistance) as predictors. Age and ESRD duration are parameterized with quadratic polynomials. The propensity for peritoneal dialysis prescription is defined as the estimated probability of peritoneal dialysis as dialytic modality. We then assemble a matched cohort by matching to each peritoneal dialysis patient with propensity p a hemodialysis patient with propensity q, such that |p – q| is minimized, and we use a greedy matching algorithm.

Figures 11.26–29 and Tables 11.a–b present cost data for the Medicare Part D prescription drug benefit. Costs are estimated net pay, calculated as the sum of the plan payment amount and the low income subsidy (LIS); they do not include out-of-pocket expenditures. Figures 11.26–28 and Table 11.a include all Part D claims for ESRD patients, starting on January 1, 2010 (or the first ESRD service date if after this date), regardless of payor status; total Medicare costs for

Part D (estimated from the 5 percent Medicare sample) are included for comparison. Figure 11.29 includes 2010 period prevalent ESRD patients enrolled in Part D for all of 2010. LIS status is determined from the Part D enrollment file. Per person per year (PPPY) costs are estimated net pay as well as true out-of-pocket costs, presented separately for dialysis and transplant patients. General Medicare costs are included for comparison. Table 11.a includes Part A and B costs, divided into drug and non-drug costs, as well as Part D drug costs for 2010 dialysis patients. Part A and B drug costs are limited to drugs included in the new composite rate, implemented in 2011; Part D drugs are divided into branded and generic categories. Table 11.b examines the costs for Part B drugs for dialysis patients compared to dialysis-related drugs paid for in the Part D benefit.

C Medicare categories of payment & basis for categorizing claim

- **Total** Sum of all payments
- **Total inpatient** Sum of all payments originating from the inpatient SAF, including pass-throughs
  - **Medical DRG** Inpatient SAF, DRG
  - **Surgical DRG** Inpatient SAF, DRG
  - **Transplant DRG** Inpatient SAF, DRG 302 & 512
  - **Other DRG** Inpatient SAF, DRG not included in the above categories
  - **Non-transplant pass-throughs** Inpatient SAF, DRG not 302 or 512, calculated from per diem and covered days
  - **Transplant pass-throughs** Inpatient SAF, DRG 302, calculated from per diem and covered days
- **Total outpatient** Sum of all payments originating from the Outpatient SAF
  - **Outpatient hemodialysis** Outpatient SAF, hemodialysis revenue codes
  - **Outpatient peritoneal dialysis** Outpatient SAF, peritoneal dialysis revenue codes
  - **Outpatient other dialysis** Outpatient SAF, dialysis revenue codes other than HD or PD
  - **Outpatient ESA** Outpatient SAF, revenue codes and/or HCPCS code
  - **Outpatient vitamin D hormones** Outpatient SAF, revenue and HCPCS codes
  - **Outpatient iron** Outpatient SAF, revenue and HCPCS codes
  - **Outpatient other injectables** Outpatient SAF, revenue and HCPCS codes
  - **Radiology** Outpatient SAF, revenue and/or CPT codes
  - **Pharmacy** Outpatient SAF, revenue codes
  - **Ambulance** Outpatient SAF, revenue codes
  - **Laboratory/pathology** Outpatient SAF, revenue and/or CPT codes
  - **Outpatient other** Outpatient SAF, does not qualify for any other cost category
- **Skilled nursing facility** Skilled nursing facility SAF
- **Home health agency** Home health SAF
- **Hospice** Hospice SAF
- **Total physician/supplier** Sum of physician/supplier payments
  - **Transplant surgery** Physician/supplier SAF, CPT codes
  - **Inpatient surgery** Physician/supplier SAF, CPT, and place of service codes
  - **Outpatient surgery** Physician/supplier SAF, CPT and place of service codes
  - **E&M nephrologist inpatient** Physician/supplier SAF, CPT, place of service and specialty codes
  - **E&M nephrologist outpatient** Physician/supplier SAF, CPT, place of service and specialty codes
  - **E&M non-nephrologist inpatient** Physician/supplier SAF, CPT, place of service and specialty codes
  - **E&M non-nephrologist outpatient** Physician/supplier SAF, CPT, place of service and specialty codes
  - **Dialysis capitation** Physician/supplier SAF, CPT and/or type of service codes
  - **Inpatient dialysis** Physician/supplier SAF, CPT codes
  - **Home dialysis** Physician/supplier SAF, HCPCS and place of service codes
  - **Vascular access** Physician/supplier SAF, CPT codes
  - **Peritoneal access** Physician/supplier SAF, CPT codes
  - **Physician/supplier ESA** Physician/supplier SAF, HCPCS codes
  - **Physician/supplier iron** Physician/supplier SAF, HCPCS codes
  - **Immunosuppressive drugs** Physician/supplier SAF, HCPCS codes
  - **Durable medical equipment** Physician/supplier SAF, HCPCS codes
  - **Physician/supplier radiology** Physician/supplier SAF, CPT and specialty codes
  - **Physician/supplier lab/pathology** Physician/supplier SAF, CPT codes
  - **Physician/supplier ambulance** Physician/supplier SAF, HCPCS and place of service codes
  - **Other physician/supplier** Physician/supplier SAF, does not qualify for any other category

E&M: Evaluation and management

REFERENCE SECTION K: MEDICARE CLAIMS DATA

Cost information in this section is derived from Medicare inpatient/outpatient, physician/supplier and Part D claims data in the CMS SAFs, which are created annually six months after the end of each calendar year. The data for 2006–2010 are comprised of approximately 48 million institutional claims for hospital inpatient and outpatient facilities, outpatient dialysis facilities, skilled nursing facilities, hospice facilities, and home health agencies, as well as over 409 million line items from physician/supplier claims. Claims data are obtained for all patient identification numbers in the USRDS database, and the Renal Management Information System (REMIS) is used to gather all CMS ID numbers under which patients may have claims. The claims data are then merged with patient demographic data and modality information in the USRDS database.

The economic analyses for this section focus on two amounts found in the claims data: the claim payment amount, which is the amount of the payment made from the Medicare trust fund for the services covered by the claim record; and the pass-through per diem amount, which applies to inpatient claims and reimburses the provider for capital-related costs, direct medical education costs, and kidney acquisition costs.

PAYMENT CATEGORIES

Medicare payments are broken into several categories, shown in Table C. Estimates of costs from the Outpatient SAF are derived for the individual services provided. Since actual payment amounts are provided only for the entire claim, cost estimates for dialysis, EPO, iron, and so forth are calculated from the claim-level "Total Charge," the payment amount, and the revenue line-level "Total Charge," as follows: payment (line) = [total charge (line) / total charge (claim)] * payment (claim). In August, 2000 CMS added to the Outpatient SAF a field containing line item payment amounts. According to CMS documentation, the total of these payments may not equal the total paid amount for the claim. In such cases, each line item cost is discounted by the ratio of the sum of line item payment amounts to the total paid amount for the claim. Since complete data on line item payments are available starting with the 2001 Outpatient SAF, the estimates for outpatient payment categories are taken directly from the claims data for calendar years 2001–2010, with adjustments as noted.

MODEL 1: AS-TREATED ACTUARIAL MODEL

In an as-treated model patients are first classified by their modality at entry into the analysis, and retain that classification until a modality change. When a change is encountered in the data, the beginning modality is censored at the change date plus 60 days, and a new observation with the new modality is created. The first 60 days after a change are attributed to the previous modality to account for any carryover effects. If the change is from dialysis to transplant, however, the modality is censored, and the transplant

modality begins on the date of the transplant hospital admission. In the case of changes involving only a change from one type of dialysis to another, the new modality must last at least 60 days in order to be counted. Aggregation of Medicare payments is done on an as-treated basis, attributing all payments to the patient's modality at the time of the claim.

In Section K of the Reference Tables we classify patients into four as-treated modality categories: hemodialysis, CAPD/CCPD, other dialysis, and transplant. The "other dialysis" category includes cases in which the dialysis modality is unknown or is not hemodialysis or CAPD/CCPD, while the transplant category includes patients who have a functioning graft at the start of the period or who receive a transplant during the period. Some tables also include categories for all dialysis (hemodialysis, CAPD/CCPD, and other dialysis) and all ESRD (all-dialysis and transplant).

The study spans the 20 years from January 1, 1991, to December 31, 2010, and ESRD patients prevalent on January 1, 1991, or incident at any time during the period are potentially eligible for inclusion. The initial study start date for a given patient is defined as the latest of January 1, 1991, the first ESRD service date in the USRDS database for that patient, or the earliest Medicare eligibility date from the payor sequence. Because it is impossible to characterize the total cost of their care, patients for whom Medicare is the secondary payor at any time during the study period are classified as MSP for the duration of the MSP status in the payor sequence. If the payor status changes to Medicare as primary payor, a new sequence begins at the change date. Patients who are non-Medicare or enrolled in a Medicare Advantage program are excluded until their payor status changes to Medicare (either as primary or secondary payor). Patients classified as MSP are included in Tables K.1–4, and are excluded for the rest of the tables in Section K.

For each modality period, Medicare payments are aggregated from the modality start date until the earliest of death, transplant, modality change, loss to follow-up, or December 31, 2009. Patients incurring no inpatient/outpatient or physician/supplier Medicare costs for the entire period are excluded, and Medicare payment amounts are linearly prorated for claims that span the start or end date of a modality period or of the study itself.

To express costs as dollars per year at risk, total costs during the follow-up period are divided by the length of the period. Costs per patient year at risk are calculated by patient category, and stratified by age, gender, race, modality, and diabetic status. Diabetic status is based on the primary diagnosis, as recorded on the Medical Evidence form. A patient with a non-diabetic cause of renal failure may have diabetes, but the disease is not judged to be the cause of ESRD. Patient age is recalculated for each calendar year , and patients with a missing date of birth are excluded from the analysis.

MODEL 2: CATEGORICAL CALENDAR YEAR MODEL

This model, described in the HCFA (now CMS) research report on ESRD (1993–1995), is used for Figure 11.8, as well as Reference Tables K.10–13. With this method, patients are classified into four mutually exclusive treatment groups:

- dialysis: ESRD patients who are on dialysis for the entire calendar year, or for that part of the year in which they are alive, ESRD, and Medicare entitled.
- transplant: ESRD patients receiving a kidney transplant during the calendar year.
- functioning graft: ESRD patients with a functioning graft for the entire calendar year, or for that part of the year in which they are alive, ESRD, and Medicare entitled.
- graft failure: ESRD patients who have had a transplant, but return to dialysis due to loss of graft function during the calendar year; patients with a graft failure and a transplant in the same calendar year are classified in the transplant category.

EGHP PATIENTS

Figure 11.8 includes data for EGHP patients. Patients in the MarketScan database who are identified as having ESRD, are younger than 65, and do not have evidence of Medicare payments (either as primary or secondary payor) are included in these analyses. Medicare payments are identified in the MarkestScan database, and patients are excluded on the basis of these payments in order to obtain a more accurate estimate of ESRD costs in the private sector. The payment amounts presented are the net payments and do not include deductibles and copayments.

international comparisons

chapter twelve

The international data for this Annual Data Report have been collected from the following sources, using the data collection form at the end of this section:

- Marinovich S, Lavorato C, Celia E, Bisigniano L, Soratti M, Hansen Krogh D, Fernandez V, Tagliafichi V, Rosa Diez G, Fayad A, Lopez A. Registro Argentino de Diálisis Crónica 2009–2010.
- Sociedad Argentina de Nefrología (SAN) and Instituto Nacional Central Unico Coordinador de Ablación e Implante (INCUCAI). Buenos Aires, Argentina, 2011.
- the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA)
- the Austria OEDTR
- the Bangladesh Renal Registry
- the French-Speaking Belgium ESRD Registry, Bruxelles
- Nederlandstalige Belgische Vereniging voor Nefrologie (NBVN)
- Clinical Center University of Sarajevo, Bosnia, and Herzegovina
- Sociedade Brasileira de Nefrologia and Associacao Brasileira de Transplante de Orgaos
- the Canadian Organ Replacement Register (CORR)
- the Chilean Renal Registry
- the Asociacion Colombiana de Nefrología
- the Croatian Society of Nephrology, Dialysis, and Transplantation
- the Czech Dialysis Registry
- the Danish Society of Nephrology
- the ERA-EDTA Registry
- the Finnish Registry for Kidney Diseases
- the French Renal Epidemiology and Information Network (REIN) Registry
- the Hellenic Renal Registry, Greece
- the Hong Kong Renal Registry
- the Landspitali University Hospital, Iceland
- the Israeli Renal Registry
- the Jalisco State Dialysis and Transplant Registry, Mexico
- the Japanese Society of Dialysis Therapy
- the Korean Society of Nephrology ESRD registry
- the National Renal Registry, Malaysia
- Instituto Mexicano De Trasplantes, Cuernavaca Morelos, Mexicothe
- Netherlands Dialysis Registry

- the Norwegian National Hospital
- the Romanian Renal Registry
- the Society of Dialysis, Russia
- the Scottish Renal Registry
- Singapore Renal Registry, National Disease Registries Office
- the Registro Español de Enfermos Renales and Organización Nacional de Trasplantes, Spain
- the Swedish Renal Registry
- the Taiwan Society of Nephrology
- the Thailand Renal Replacement Therapy Registry and the Nephrology Society of Thailand
- the Turkish Society of Nephrology
- the UK Renal Registry
- the Uruguayan Dialysis Registry and Uruguayan Registry of Renal Transplantation
- the U.S. Census Bureau International Database

Thank you to all who provided data for this year's ADR. We are especially grateful to staff at the ERA-EDTA Registry for their help in coordinating much of the European data presented in this chapter. Data for some countries do not represent 100 percent of the ESRD population; interpretation of changes in incident and prevalent rates must therefore be performed with caution. Notations are made in the captions for countries reporting prevalent data only for dialysis patients. Data from Belgium and from England, Wales, and Northern Ireland do not include patients younger than 20 and 18, respectively. To contribute data from your country's registry, please send the completed International Data Collection Form to usrds@usrds.org.

vascular access

L tables

Tables L.1–3 include period prevalent hemodialysis patients, 1999–2010, with Medicare as primary payor. Placements are identified from Medicare claims, and rates represent the total number of events divided by the time at risk. Follow-up time is censored at death, change in modality, change in payor status, or the end of the prevalent year. Tables L.4–6 include January 1, 2010 point prevalent hemodialysis patients. Vintage represents the amount of time between the first service date and January 1, 2010.

Tables L.7–14 include point prevalent hemodialysis patients with Medicare as primary payor who are also in the ESRD CPM report for the corresponding year. Current access is determined from the CPM data as the access used at the time of the most recent data collection, i.e., during October–December of the year prior to the prevalent year. Complications and intervention events are obtained from claims during the time at risk in the prevalent year, which is censored at death, change in modality, change in payor status, or a claim for the placement of a different hemodialysis vascular access. Patients with a placement claim after the CPM data collection but prior to the start of the prevalent year are excluded.

Tables L.14–15 include point prevalent peritoneal dialysis patients with Medicare as primary payor. Complications and intervention events are obtained from claims during the time at risk in the prevalent year, which is censored at death, change in modality, change in payor status, or a claim for hemodialysis vascular access placement.

census populations

The 2000 U.S. Census, available in 2002, introduced a new race category with additional groupings. Estimates for 1990–1999 were back-calculated based on the actual 2000 census. Later data, however, include racial groups that do not coincide with those in the ESRD data. For rate calculations throughout the ADR we thus use the CDC's Bridged Race Intercensal Estimates Dataset, which estimates white, African American, Native American, and Asian populations. The data and methods for these estimates are available at http://tinyurl.com/28kpp9j. For state and network rates, we use Vintage 2010 Bridged-Race Postcensal Population Estimates. Both intercensal and postcensal estimates data sets are available at http://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm.

statistical methods

METHODS FOR CALCULATING RATES

The calculation of observed rates is straightforward, with some rates based on counts and others on follow-up time. The ESRD incident rate in 2009, for example, is the observed incident count divided by the 2009 population size and, if the unit is per million population, multiplied by one million; the 2009 death rate for prevalent ESRD patients is the number of deaths in 2009 divided by the total follow-up time (patient years) in 2009 of the 2009 prevalent patients, and, if the unit is per thousand patient years, multiplied by one thousand. Standard errors of estimated rates are based on the assumption of the data; the observed count has a Poisson or binomial distribution. The count-based rate describes the proportion of having "event" and the time-based rate tells how often the "event" happens when the "event" rate is invariant over time.

model-based rates

Some patient groups may be very small, and their observed rates therefore unstable. If follow-up time is considered, the hazard of an event may change over time. A model-based method can improve the stability of these estimates and incorporate changes of hazard over time. In this ADR, for example, we have used the generalized linear mixed Poisson model to estimate prevalent patient mortality rates for Reference Section H.

measurement unit for rates

Both raw and model-based rates are calculated per unit of population (such as per 1,000 patients) or per unit of follow-up time (such as per 1,000 patient years). Calculating rates per unit of follow-up time can account for varying lengths of follow-up among patients. Patient years are calculated as the total number of years, or fractions of a year, of follow-up time for a group of patients.

Take, for example, a calculation of 2010 first hospitalization rates for two groups of patients, all receiving dialysis therapy on January 1, 2010. Group A consists of three patients: Patient 1 had a first hospitalization on March 31, 2010; Patient 2 was hospitalized on June 30, 2010; and Patient 3 was on dialysis through December 31, 2010, with no hospitalizations. Group B also has three patients: Patient 4 was first hospitalized on December 31, 2010; Patient 5 was hospitalized on September 30, 2010; and Patient 6 was on hemodialysis the entire year, with no hospitalizations through December 31, 2010.

Patients 1 to 6 contribute 0.25, 0.5, 1.0, 1.0, 0.75, and 1.0 patient years at risk, respectively. The first hospitalization rate per thousand patients is 667 for both groups in 2009. But the first hospitalization rate per thousand patient years at risk is 1,143 for Group A and 727 for Group B (calculated as [2 total events / 1.75 total patient years at risk] x 1,000 for Group A and [2 total events / 2.75 patient years at risk] x 1,000 for Group B). The resulting rate is lower for Group B because of the longer total follow-up time.

Rates per unit of population may be influenced by the proportion of patients who are followed for only a fraction of a year. The event rate per unit of population is likely to be lower, for example, in a group of patients followed for only one month until censoring than in a group whose patients are each followed for up to a full year. Rates per unit of follow-up time at risk, in contrast, count only the actual time that a patient is at risk for the event.

METHODS FOR ADJUSTING RATES

Because each cohort contains a different patient mix, unadjusted event rates may not be comparable across cohorts. Adjusted analyses make results comparable by reporting rates that would have arisen had each cohort contained patients with the same distribution of confounders — such as age, gender, race, and primary diagnosis — as the reference population.

direct adjustment

There are several rate adjustment methods, but only the direct method allows rates to be compared (Pickle LW, White AA). Here the adjusted rate is derived by applying the observed category-specific rates to a single standard population, i.e. the rate is a weighted average of the observed category-specific rates, using as weights the proportion of each category in the reference population. Categories are defined by the adjusting variables. For example, if a rate is adjusted for race and gender and there are three race groups (white, African American, and other) and two gender groups, there are six categories: white males, white females, African American males, African American females, males of other races, and females of other races.

Suppose we try to compare state-level incident rates in 2009 after removing the difference caused by race. To do this, we need to calculate the adjusted incident rate, adjusted for race, for each state. Because racial distributions in each state are quite different, we use as reference the national population — here, the population at the end of 2009 — with five race groups (white, African American, Native American, Asian/Pacific Islander, and other).

Assuming the incident rate of state A in 2009 is 173 per million population, and the race-specific rates and national populations are as shown in the following table, the adjusted incident rate of state A with the national population as reference is (153 x 75.1%) + (250 x 12.3%) + (303 x 0.9%) + (174 x 3.6%) + (220 x 8%) = 158.73 per million population. This means that if state A had the same racial distribution as the entire country, its incident rate would be 158.73 instead of 173. If state B had an adjusted incident rate of 205, we could say that state B had a higher incident rate than state A if they both had the same racial distribution as the whole country.

	Incident rate of State A	National population (%)
White	153	75.1
African American	250	12.3
Native American	303	0.9
Asian/Pacific Islander	174	3.6
Other	220	8.0

This method is used to produce some adjusted incident and prevalent rates in Chapters Two and Three and in Reference Sections A and B, as well as in the model-based adjustment method.

model-based adjustment

Under some circumstances there are disadvantages to the direct adjustment method. Suppose we are calculating mortality rates for a set of groups, and adjusting for potential confounding variables. If one category in a group has only a few patients or deaths, its estimated mortality rate will be unstable, likely making the adjusted rate unstable as well. In addition, if one includes category no patients, the method is not valid for calculating an adjusted mortality rate for the group. An attractive alternative is a model-based approach, in which we find a good model to calculate category-specific estimated rates for each group and then calculate direct adjusted rates using these estimates with a given reference population. This method can also be extended to adjustments with continuous adjusting variables (Liu et al., 2006). There is, unfortunately, no straightforward way here to calculate standard errors of the adjusted rates for some models; the bootstrap approach works well, but is time consuming.

In this ADR we use model-based adjustments to calculate adjusted mortality rates; adjusted survival probabilities based on the Cox regression model; adjusted hospitalization rates and state-level adjusted incident and prevalent rates using the Poisson model; adjusted HSA-level incident and prevalent rates based on the Bayesian spatial hierarchical model, and some other rates, described in the text on the individual figures.

SURVIVAL PROBABILITIES & MORTALITY RATES

unadjusted survival probabilities

In this ADR, unadjusted survival probabilities are calculated using the Kaplan-Meier method, and corresponding standard errors are calculated with Greenwood's formula (Kalbfleisch JD, Prentice RL). Survival probabilities in Reference Section I are expressed as percentages from 0 to 100. The mortality/event rate in the period of (0,t) is calculated by –ln(Survivor at time t). This event rate will be the same as that estimated by event time divided by follow-up time after adjustment of the unit if the event rate is a constant over time.

survival probability with competing risks

When competing risks exist, the estimate of the cumulative incidence function of a specific cause may be biased if the other competing risks are ignored. If we have K competing risks, the cumulative incidence function of cause k, $k=1, 2, \ldots, K$, at time t, $I_k(t)$, is defined as the probability of failing from cause k before time t (including time t), $Prob(T \le t, D=k)$. Then

$$I_k(t) = \int_0^t \lambda_k(s) S(s) ds$$

where $\lambda_k(s)$ is the hazard of event from cause k at time s and $S(s)$ is the survival probability at time s. If we have failing time $t_1, t_2, \ldots, t_m$, the cumulative incidence function of cause k at time t is estimated by

$$\widehat{I_k}(t) = \sum_{j:t_j \le t} \widehat{\lambda_k}(t_j) \hat{S}(t_{j-1})$$

where $\widehat{\lambda_k}(t_j)=d_{kj}/n_j$, $\hat{S}(t_{j-1})$ is the Kaplan-Meier estimate of survival at time t_{j-1}, d_{kj} is the number of patients failing from cause k at time t_j, and n_j is the number of patients at risk at prior time t_j (Putter et al.).

adjusted survival probabilities

Adjusted survival probabilities are reported in Reference Sections F and I, with age, gender, race, and primary diagnosis used as adjusting risk factors. The model-based adjustment method is used, with survival probabilities predicted from the Cox regression model (Kalbfleisch JD, Prentice RL). This process yields estimates of probabilities that would have arisen in each year if the patients had had

the same attributes as the reference population. Since the probabilities in each table are adjusted to the same reference set of patient attributes, any remaining differences among cohorts and years are due to factors other than age, gender, race, and primary diagnosis. The adjusted mortality rates for incident cohorts in Reference Section H are calculated using similar methods.

GENERALIZED LINEAR MODELS

generalized linear mixed model for mortality rates

We use the generalized linear mixed model with log link and Poisson distribution to calculate mortality and first transplant rates for prevalent patients. While rates are reported for a year, data from the previous two years with different weights are also used to improve the stability of the estimates. The generalized linear mixed model is used as well for SMR calculations, described later in this section.

The generalized linear mixed model, which considers both fixed and random effects, is implemented using the SAS macro GLIMMIX. Rates for the intersections of age, gender, race, and diagnosis are estimated using the log linear equation Log (rate) = (fixed effects) + (random effect). Fixed effects include year, age, gender, race, and primary diagnosis, and all two-way interactions among age, gender, race, and primary diagnosis. Assumed to be independently and identically distributed with a normal distribution, the random effect is the four-way interaction of age, gender, race, and primary diagnosis. Age is used as a categorical variable in main effect and four-way interactions, and as a continuous variable in two-way interactions.

For tables with mortality rates for both intersecting and marginal groups we have used a single model to calculate all rates in each table. The marginal rates are simply the weighted averages of the estimated, cross-classified rates, with cell-specific patient years as weights. For this approach the use of a single model means that GLIMMIX cannot give the standard errors for some of these estimated rates; the bootstrap method is therefore used instead.

The adjusted mortality rates for prevalent cohorts in Section H are calculated using the direct adjustment method based on the category-specific mortality rates from the generalized linear mixed models.

generalized linear model for hospitalization rates

In this ADR, hospitalization reference tables present rates of total admissions and hospital days. We use a generalized linear model with log link and Poisson distribution; the model includes age, gender, race, primary diagnosis, and their two-way interactions.

To stabilize the estimates, three years of data are used with different weights. Year is also included in the model as a covariate. The adjusted hospitalization rates are calculated using the direct adjustment method based on the category-specific admission rate from the generalized linear models.

STANDARDIZED MORTALITY RATIOS

The standardized mortality ratio (SMR) compares the mortality of a group of patients relative to a specific norm, or reference, after adjusting for some important risk factors. For example, the state-level SMR is used to compare mortality in prevalent dialysis patients — after adjusting for age, gender, race, primary diagnosis, and ESRD vintage — in each state using the national dialysis population in the corresponding year as the reference. An SMR of 1.05 for a state indicates that patients in this state have a risk of death approximately five percent higher than that of patients in the reference population of all U.S. dialysis patients.

traditional method of SMR calculation

The traditional approach used to calculate unit-specific SMRs is straightforward: produce unit-specific expected death counts and compute the "observed/expected" ratio. There are two methods of producing unit-specific expected death counts. In the indirect method, the expected death count is the weighted sum of category-specific death rates in the reference population, and the weights are the category-specific total follow-up times in the units. In the model-based method, a statistical model is employed to estimate the category-specific death rate for the reference population, and the indirect method is then used to produce the expected death count for each unit based on the estimates of category-specific death rates of the reference population from the model.

EXPECTED REMAINING LIFETIMES

The expected remaining lifetime for a patient group is the average of the remaining life expectancies for the patients in that group. Some patients will live longer than, and some will live less than, the average. Although the average cannot be known until all patients in the cohort have died, the expected remaining lifetime can be projected by assuming that patients in the cohort will die at the same rates as those observed among groups of recently prevalent ESRD patients.

For a subgroup of ESRD patients of a particular age, the expected remaining lifetime is calculated using a survival function, estimated for the group. Let S(A) denote the survival function of patients at time A. Among patients alive at age A, the probability of surviving X more years is S(X|A) = S(A+X)/S(A). For a given starting age A, the expected remaining lifetime is then equal to the area under the curve of S(X|A) plotted versus X. Because few patients live beyond 100, this area is truncated at the upper age limit A + X = 100.

HALF-LIVES (MEDIAN TIME)

conditional half-life

The conditional half-life is conditional on having survived a given period of length T_0 without the event, the point at which 50 percent of patients who survived the given period remain alive. In other words, it is the median remaining lifetime conditional on surviving a given period T_0.

The conditional half-life is estimated using the Kaplan-Meier method if the median survival time falls in the duration of follow-up. Otherwise, the conditional half-life is estimated as the following:

- Estimate the survival probabilities S(T0) and S(T1) using the Kaplan-Meier method from the data available, where T0<T1 and T1 is within the follow-up
- $\mu = \dfrac{T_1 - T_0}{(\ln[S(T_0)] - \ln[S(T_1)])}$
- the estimate of the conditional half-life = $\mu \cdot \ln(2)$

This method can be used only when the hazard is a constant after T0 and T1 is chosen to be big enough to obtain a stable estimate of ln(S(T0))-ln(S(T1)).

MAPPING METHODS

Mapping is an important tool for assessing environmental determinants and illustrating spatial patterns and temporal trends. Geographic resolution is enhanced by mapping at the level of small regions, but this can increase data instability. The use of smoothing methods, however, can help stabilize data and show geographic patterns while still maintaining geographic resolution.

Much of disease mapping within the ADR is by Health Service Area (HSA), an approach we continue to adopt from the Atlas of

United States Mortality (Centers for Disease Control and Prevention). Remaining maps are by state or census division. Each HSA is a group of counties described by the CDC authors as "an area that is relatively self-contained with respect to hospital care." The methods described here have been used for all HSA-level maps in the ADR. Because the distribution of age, gender, and race in a population can affect incident and prevalent ESRD rates, we have included maps in which data are adjusted for these variables as well as smoothed. Maps by state and census division are not smoothed.

In many figures, data ranges have been standardized to invite comparisons across years, modalities, or patient characteristics. In remaining maps, HSAs are divided into quintiles.

Throughout the ADR, data in maps and graphs are unadjusted unless otherwise noted. HSA-level information is mapped according to the patient's residence (with the exception of some maps of organ donation rates in Chapter Seven). Because of area size and limitations in the mapping software, data for Puerto Rico and the U.S. Territories are not included in the maps.

methods for smoothing and adjusting map data

To smooth map data we use a Bayesian spatial hierarchical model (Waller et al.). This method is a statistical approach that uses the log linear model (Poisson regression model) to fit the incident counts of the regions. The region effects, as random effects, follow the Conditional Autoregressive (CAR) Normal distribution, and the precision of the effects has a Gamma distribution. The model smooths the incident counts by borrowing information for each HSA from its neighbors through the relationship defined by CAR; neighbors, in our definition, are HSAs sharing a boundary. Smoothed incident rates are obtained by dividing the predicted counts by the corresponding population sizes. For adjusted maps, an almost non-informative prior is assigned to fixed effects of age, gender, and race with the Bayesian model. Adjusted incident rates are calculated using the model-based adjustment method based on the predicted values from the Bayesian spatial hierarchical model, with the national population as reference.

This model is also used to smooth prevalent rates and calculate some percentages. To smooth maps of mean hemoglobin, eGFRs, and creatinine levels, the model is extended to assume that the means have a normal distribution.

special studies & data collection forms

The USRDS website includes complete copies of the CMS Medical Evidence (2728) and Death Notification forms (2746); the OPTN Transplant Candidate Registration form, Kidney Transplant Recipient Registration form and Kidney Transplant Recipient Follow-up form; and forms used for data collection in USRDS Special Studies.

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Products and services provided by the usrds to support the work of the renal community are detailed in table b.a. The entire adr is available at www.usrds.org, with powerpoint slides of all figures and excel files of the data behind the graphs; included as well are pdf files of the researcher's guide. The site's render system allows users to create customized data tables and regional maps. Data on website use are presented in figure b.1.

data requests

Making information on ESRD available to the renal community is a primary objective of the USRDS, and we are committed to the timely fulfillment of data requests. In many cases requests can be answered through data published in the ADR or elsewhere. Requests for data not available in material published by the USRDS, but that require two hours or less of staff time, are fulfilled by the Coordinating Center without charge, usually within one week. More complex requests — requiring more than two hours of staff time — as well as requests for Standard Analysis Files and custom files, must be accompanied by a written proposal (see details below), and will be completed only upon written approval by the NIDDK Project Officer.

research files

The Coordinating Center maintains a set of Standard Analysis Files (SAFS) to meet diverse research needs and provide easy access to data used in the ADR. The SAFS were introduced in 1994, as the NIDDK began awarding new grants focusing on research using the USRDS data. The result has been an annual increase in the number of files provided by the USRDS.

Prior to 1994, all researcher files were created for specific projects. Since the introduction of the SAFS, however, custom files are generally limited to cases in which a researcher provides a patient finder file to be matched with the USRDS database. For more information on merged data requests, please contact the Coordinating Center at usrds@usrds.org.

The Core SAF set contains basic patient data, and is needed to use any of the other SAFS. Included are each patient's demographic information, payor and treatment history, limited transplant data, provider data, and data from many of the USRDS Special Studies. Approximately half of the researchers using the USRDS SAFS need only this data set. The Transplant data set contains detailed transplant and transplant follow-up data collected by CMS and UNOS. Data on hospital inpatient stays are found on the Hospital data set. All Medicare billing data are available by individual year (see Table b.c).

standard analysis files

SAF use is governed by the USRDS policy on data release for investigator-initiated research, found later in these appendices. Research proposals must be approved by a USRDS Project Officer, and researchers must sign the USRDS "Agreement for Release of Data," on the same page. File prices are listed in Table b.c.

Most SAFS provide patient-specific data. All patient identifiers are removed or encrypted, but data confidentiality remains a serious concern. The USRDS "Agreement for Release of Data" describes restrictions on SAF use and disposition. SAFS include an encrypted ID number to allow patient data from multiple SAFS to be merged.

CORE DATASET

The Core Standard Analysis Files contain the most frequently used data and are needed for use of the Transplant and Hospital datasets, or any data based on Medicare claims. Included files are as follows (also listed in Table b.b).

Patient Contains one record per patient in the USRDS database, and gives basic demographic and ESRD-related data.

Residence A longitudinal record, to ZIP code, of residence.

Payor History Contains a new record for each patient at each change in insurance payor.

Treatment History/Modality Sequence Contains a new record for each patient at each change in modality or dialysis provider.

Medical Evidence Contains full data from the 1995 and 2005 versions of the CMS Medical Evidence form. In April 1995 a new version of the form went into use, with data on comorbidity, employment status, lab values at initiation, and Hispanic ethnicity.

Transplant Contains basic data for all transplants (reported by CMS and UNOS), including the date of graft failure (detailed transplant data are contained on a separate transplant data set).

Transplant Wait List Beginning with 2001 data (used in the 2002 ADR), this file has been updated to include basic patient demographic data and, from UNOS, all unique wait-list periods for each dialysis patient.

Facility Conducted annually, the CMS End-Stage Renal Disease Facility Survey is the source of data for the Facility SAF. Geographic variables that could identify facilities are deleted. The survey period is January 1 through December 31.

Facility Cost Reports CMS hospital and independent facility cost reports for 1989–1995 and 1989–1993, respectively, are available as SAFs. All geographic variables are deleted to ensure confidentiality. The files may be linked to the Facility SAF using the USRDS provider ID, though analyses at less than a regional or network level are not possible. Because these files are rarely used, additional data will be added only if there is sufficient demand.

Dialyzers The Case Mix Severity, Case Mix Adequacy, and DMMS Special Studies collected information on patient dialyzers. SAFs for these studies describe the dialyzer through a code, which must be matched to information in the Dialyzer file to find the manufacturer and model along with characteristics such as membrane type and clearance. We believe that these data, from published sources available at the time of the study, accurately represent the dialyzer characteristics, but they should be used with caution.

DATA FROM SPECIAL STUDIES

Topics for USRDS Special Studies are approved by the NIDDK, with recommendations from CMS, the Scientific Advisory Committee, the ESRD networks, and the Renal Community Council. Design and sampling plans are developed, samples are selected, and data collection forms and instructions are drafted, tested, and finalized. The main studies to date are summarized below, and are detailed in the Researcher's Guide.

Dialysis Morbidity & Mortality Study (DMMS) The DMMS was a USRDS Special Study in which data on demographics, comorbidity, laboratory values, treatment, socioeconomic factors, and insurance were collected, using dialysis records, for a random sample of U.S. patients. Waves 1, 3, and 4 are historical prospective studies on a total of 16,812 participants in which data were collected for patients on in-center hemodialysis on December 31, 1993. Data were abstracted from medical records, and patients were followed to the earliest of data abstraction, death, transplant, change in modality, or transfer to another facility. Wave 2 is a prospective study of incident hemodialysis and peritoneal dialysis patients for 1996 and early 1997 and included 4,024 participants. Case Mix Adequacy Study of Dialysis: The objectives of this USRDS Special Study were to establish the relationship between the dose of delivered dialysis therapy and mortality, determine the strength of this relationship when data are adjusted for comorbidity, assess how this relationship changes with dialysis dose, assess how this relationship is affected by dialyzer reuse, and examine the impact of different dialysis membranes on patient morbidity and mortality.

The study consisted of two groups: an incident sample of ESRD patients who began hemodialysis in 1990, and a prevalent sample of hemodialysis patients whose ESRD began prior to 1990. A total of 7,096 patients from 523 dialysis units were included, with approximately 3,300 patients having both the pre- and post-BUN values needed to calculate delivered dialysis dose. Ninety-four percent of these cases were matched to the USRDS database. The ESRD networks collected these data in conjunction with their Medical Case Review data abstraction.

Case Mix Severity Study For this USRDS Special Study, data were collected on 5,255 patients incident in 1986–87 at 328 dialysis units nationwide. Objectives were to estimate the correlation of comorbidity and other factors existing at the onset of ESRD to mortality and hospitalization rates, while adjusting for age, gender, race, and primary diagnosis; evaluate possible associations of these factors with reported causes of death; assess the distribution of comorbidity and other factors among patients on different modalities; and compare relative mortality rates by treatment modality, adjusting for comorbid conditions and other factors.

Pediatric Growth & Development The objectives of the USRDS Pediatric Growth and Development Study were to establish a baseline for assessing the relation of patient growth and sexual maturation to modality, and establish a prototype for the ongoing collection of pediatric data. All patients prevalent in 1990 and born after December 31, 1970, were included in the study, a total of 3,067 patients at 548 units.

CAPD & Peritonitis Study The USRDS CAPD and Peritonitis Study examined the relation of peritonitis episodes in CAPD patients to connection device technology and other factors. The study population included all patients newly starting CAPD in the first six months of 1989, a maximum of 14 patients per dialysis unit. All units providing CAPD training participated in the study. The sample contains data on 3,385 patients from 706 units.

TRANSPLANT DATASET

Due to changes in data collection sources over the years, data related to transplants are now presented in eight separate SAFs. The first two are included on the Core SAF, and the remaining six are included inthe Transplant data set.

TX includes minimum details on all transplants from all sources

- TXWAIT contains one record for each patient in the USRDS database per wait list event
- TXHCFA includes transplant information collected by CMS's PMMIS system prior to 1994
- TXUNOS includes transplant information collected since 1987 by UNOS, currently the main source of transplant data for the USRDS
- TXIRUNOS includes information on immunosuppressive drugs collected by UNOS at the time of transplantation events
- TXFUHCFA includes transplant follow-up reports collected by CMS prior to 1994; reports are completed at discharge, six months, each year post-transplant, and at graft failure
- TXFUUNOS includes transplant follow-up reports collected by UNOS since 1988
- TXIFUNOS includes information on immunosuppressive drugs, collected by UNOS at follow-up visits

Tables in Reference Sections E and F are produced primarily from the CMS and UNOS transplant files.

In July of 1994, CMS and the Health Resources Services Administration (HRSA) consolidated transplant data into a single collection by UNOS under its HRSA contract. Expanded transplant data are shared among HRSA, CMS, and the NIH, and are thus available to the USRDS. This has resulted in the addition of data on a substantial number of non-Medicare transplant patients, including children.

CMS and UNOS transplant files overlap for 1988–1993, and some Medical Evidence (ME) forms and institutional claims records indicate transplants not included in either file. To resolve conflicts among the sources and create the transplant SAF, all UNOS transplants are first accepted into the file, with all pre-1988 CMS transplants accepted next. CMS transplants from 1988–1993 are then accepted if there is no transplant in the file for that patient within 30 days of the CMS transplant (it is common for dates between sources to differ by one day). Finally, transplants indicated on the ME form

a USRDS products & services

Reports & guides

Annual Data Reports Available from the National Kidney and Urologic Disease Information Clearinghouse, 3 Information Way, Bethesda, MD 20892-3560; 301.654.4415, nkudic@info.niddk.nih.gov. ADR material is also published in the American Journal of Kidney Diseases.

Annual Data Report CD Contains the text and graphics of the ADR, data tables, PowerPoint slides, and the Researcher's Guide.

Researcher's Guide to the USRDS database

Provides a detailed description of the USRDS database and of the USRDS Standard Analysis Files; the basic reference for researchers who use USRDS data files.

www.usrds.org

Contains PDF files of the chapters, reference tables, and the Researcher's Guide; PowerPoint slides of atlas figures and USRDS conference presentations; Excel files of the data tables; notices regarding current news and analyses; links to related Internet sites; and email addresses for contacting the USRDS.

RenDER

The USRDS Renal Data Extraction and Referencing (RenDER) System is a querying application that allows users to create data tables and interactive maps . It can be accessed at www.usrds.org/odr/xrender_home.asp following a short registration; a tutorial is also available on this site to help new users.

Requests for data

Data requests: two-hour Questions and data requests that are not answered directly by the ADR can be addressed to the Coordinating Center; those that require less than two hours of staff time to fulfill will be processed without charge.

Data requests: more than two hours Questions and data requests that require over two hours of staff time must be submitted in writing and approved by the NIDDK Project Officer. Fulfillment of these requests is subject to staff availability, and costs are assessed on a case-by-case basis.

Standard Analysis Files SAFs provide patient-specific data from the USRDS to support ESRD research. A standard price list has been established for the files (Table b.c), and users must sign a Data Release Agreement with the NIDDK.

Merged data files Merged files can be created by the Coordinating Center for approved research projects. An hourly rate of $119.57 will be assessed for time spent on the request, and users must sign a data release agreement with the NIDDK. Contact the USRDS Coordinating Cener for more information.

Publications & presentations

Most USRDS research studies result in published papers or presentations at national meetings. Figures from abstracts and presentations can be found on the website, while published abstracts and papers can be found in the relevant journals.

Contact information

Data requests & publication orders USRDS Coordinating Center
914 South 8th Street, Suite S-206
Minneapolis, MN 55404
612.347.7776 or 1.888.99USRDS
Fax 612.347.5878
usrds@usrds.org

Data file contacts Shu-Cheng Chen, MS; schen@usrds.org
Beth Forrest, BBA; bforrest@usrds.org

b Contents of the USRDS Core Standard Analysis CD-ROM

File name unit of observation & uses. This two-CD set is needed in order to use any of the other Standard Analysis Files.

Patient one record for each ESRD patient. Incidence, prevalence, patient survival. Most other files will need to be linked to this file using the encrypted patient ID.

Residence for each patient, one record for each period in a different residence. Regional analyses.

Treatment History one record for each period a patient is on one modality. Modality distribution and treatment patterns.

Payor History one record for each period a patient is covered by one payor; each patient can have many records. The impact of insurance payors on clinical outcomes.

Medical Evidence one record for each 2728 form filed (1995 version). ESRD first service date, initial treatment modality, comorbid conditions, patient status at start of ESRD.

Transplant one record for each transplant event; patients can have multiple events. Transplant and transplant outcome analyses.

Transplant Wait List one or more records for each patient ever on list. Comparison of transplanted patients to dialysis patients who are transplant candidates. Patient selection to wait list.

Dialysis Morbidity and Mortality (DMMS; Special Study) Wave 1: 5,670 patients; Wave 2: 4,024 patients; Wave 3–4: 11,142 patients. Comorbid conditions, adequacy of dialysis, dialysis prescription and other treatment parameters, laboratory test values, nutrition, vascular access.

Case Mix Adequacy (Special Study) 7,096 patients. Comorbid conditions, adequacy of dialysis, dialysis prescription and other treatment parameters, laboratory values.

Case Mix Severity (Special Study) 5,255 patients. Comorbid conditions, adequacy of dialysis, dialysis prescription and other treatment parameters, laboratory values.

Pediatric Growth and Development (Special Study) 3,067 patients. Growth, development, and other issues relating to pediatric ESRD patients.

CAPD Peritonitis (Special Study) 3,385 patients. CAPD and peritonitis.

Facility one record for each year facility has operated. Merge with the treatment history, transplant, or annual summary SAFs for analyses involving provider characteristics by encrypted ID.

Facility Cost Reports one record per facility per year (1989–1995). Costs and staffing of dialysis facilities.

Dialyzers information on dialyzer characteristics; to be matched to patient dialyzer information in other files on CD. Relation of dialyzer characteristics to patient outcomes.

CLMCODES one record for each diagnosis, procedure, or HCPCS code appearing in claims files. Frequency of occurrence of each code. A starting point for analyses that will use diagnosis and procedure codes.

Formats.SC2 all USRDS-defined SAS formats used by SAFs. Format library used to format values of categorical variables.

are accepted if no transplant is listed for the patient within 30 days of the Medical Evidence transplant date.

HOSPITAL DATASET

Hospitalization inpatient data are a subset of the data in the Institutional Claims file. No payment or cost variables are included on this data set, which is for researchers who need data on hospital inpatient stays and on diagnoses and procedures for those stays, but who do not need payment data.

COMPREHENSIVE DIALYSIS STUDY

This data set contains information from the Comprehensive Dialysis Study (CDS), a USRDS special data collection study to assess rehabilitation/quality of life and nutrition issues in incident dialysis patients. The study was conducted between 2005 and 2008. All 1,677 participants answered questions on physical activity level, health-related quality of life, and work/disability status during the first six months of after the initiation of ESRD therapy. In a subset of 400 participants, dietary intake and nutritional status were also assessed.

DIALYSIS MORBIDITY & MORTALITY CLAIMS

This data set contains Medicare claims for participants in the Dialysis Morbidity and Mortality Studies. Data are followed to the currently reported claims year.

CASE MIX ADEQUACY CLAIMS

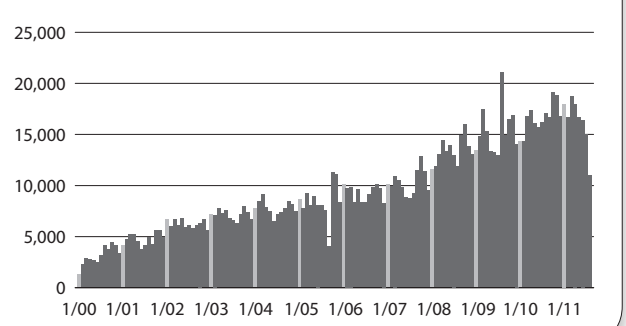
This data set contains Medicare claims for particiants in the Case Mix Adequacy Special Study. Medicare payment data for these patients are followed to the currently reported claims year.

MEDICARE PAYMENT DATA

Medicare payment data on institutional claims are available for pre-1989 through 2007, while data on physician/supplier claims are available for 1991–2007. The 2008 claims will be available, along with other updated USRDS SAFs, by the end of 2010.

Institutional claims consist of all inpatient/outpatient claims (inpatient, outpatient, skilled nursing facility, home health agency, and hospice), including outpatient dialysis claims. Physician/supplier claims account for 80 percent of claims but only 20 percent of dollars. The structure and content of the two types of claims differ, as do the files derived from them. Institutional claims are provided in two types of files: the Institutional Claims file, indicating claim type, dollar amounts, DRG code, type of dialysis involved (if any), and dates of service; and the Institutional Claims Detail file, containing details such as diagnosis and procedure codes. Many analyses require only the Institutional Claims files. Physician/supplier claims are contained in one type of file with one record for each claim line-item. The file includes dollar amounts, dates of service, diagnosis and procedure codes, and type and place of service.

1 **USRDS website visits**



CLINICAL PERFORMANCE MEASURES SURVEY

The Clinical Performance Measures (CPM) data is a CMS project developed to collect information on the quality of care provided to the dialysis population. The data originates from yearly surveys of approximately 10,000 dialysis patients completed by the primary care facilities, and was formerly known as the ESRD Core Indicators Project. This project results in a rich source of detailed information, useful in analyses of healthcare delivery in a sample of the dialysis population.

To further expand the value and use of the CPM data, we have linked patient data from the USRDS SAFs, enabling complete claims extraction from the SAFs for all identified patients. The resulting claims history has been combined with the CPM data to form a complete mini-set of the USRDS data products with supporting files. This enables researchers to add patient-level laboratory and dialysis prescription detail to a broad range of healthcare service event data over many years.

The USRDS Coordinating Center has made the CPM data available as SAFs. The dataset contains CPM data collected in surveys from 1994–2008. A listing of available files and the corresponding costs can be found in Table b.e, or you may contact the USRDS Coordinating Center for further information. For a detailed explanation of why there are no 2009 CPM form data available, please view the CPM 2010 Researcher's Guide on the USRDS website.

CKD 5 PERCENT GENERAL MEDICARE PAYMENT DATA

The CKD cohort datasets are built from the 5 percent general Medicare Claims SAFs, and contain a patient master file, a payor sequence file, and a set of comorbidity files. We no longer produce datasets for diabetes and CHF based on the 5 percent Medicare claims.

Separately, a 5 percent general Medicare Hospital SAF (inpatient, outpatient, skilled nursing facility, home health, hospice, Part B, and durable medical equipment) for the CKD cohort is also available for 1992–2008; 2009 claims will be available by the end of 2011. Data are derived from the IP claims SAF files. No payment or cost variables are included, so these data are for researchers who need data on hospital inpatient stays and on diagnoses and procedures for those stays, but do not need payment data.

PRE-ESRD MEDICARE CLAIMS

The pre-ESRD claims (also known as the back-casted claims) are a collection of Medicare institutional and physician/supplier billing records incurred prior to the onset of ESRD. Included in these claims are any and all claims available from Medicare for incident patients during their incident year and the two prior calendar years.

The USRDS has made the pre-ESRD data available as SAFs. This dataset includes Medicare claims of ESRD patients from incident years 1995–2008 with 2009 data available by the end of 2010. The structure of the claims file is identical to the ESRD claims files and organized by calendar year. In addition, a pre-ESRD payor sequence is provided so researchers can determine Medicare enrollment for the periods prior to first ESRD service date. A listing of available files and the corresponding costs can be found in Table b.e.

PART D DATA

Section 101 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 amended Title XVIII of the Social

c Prices for the USRDS Standard Analysis Files

Standard Analysis Files

Core dataset	$1,275	Needed in order to use the other files.
Transplant dataset	$500	Detailed transplant data from CMS and UNOS.
Hospital dataset	$500	Derived from the institutional claims; contains diagnosis and surgical procedure codes for each stay but does not include the cost data from the institutional claims records.
CDS survey dataset	$750	Survey information and laboratory values from the Comprehensive Dialysis Survey
DMMS claims	$500	Contains all of the Institutional and Physician/Supplier claims data for the patients in the USRDS Dialysis Morbidity and Mortality (DMMS) Special Study. Survey data are included in the Core dataset.
Case Mix Adequacy claims	$125	Contains all institutional and physician/supplier claims data for patients in the USRDS Case Mix Adequacy Special Study. Survey data are included in the Core dataset.

Pre-ESRD claims available for 1993 to 2010; price ranges from $200 to $800 per year and claim type. Prices subject to change.

ESRD Medicare payment data

	Institutional	Physician/ supplier	Part D
pre-1989	$250		
1989	$250		
1990	$250		
1991	$375	$500	
1992	$375	$500	
1993	$375	$500	
1994	$375	$625	
1995	$500	$625	
1996	$500	$750	
1997	$500	$875	
1998	$500	$875	
1999	$500	$875	
2000	$750	$875	
2001	$875	$875	
2002	$875	$1,000	
2003	$1,000	$1,125	
2004	$1,125	$1,125	
2005	$1,250	$1,250	
2006	$1,250	$1,250	$750
2007	$1,750	$1,375	$1,000
2008	$1,875	$1,500	$1,000
2009	$2,000	$1,625	$1,250
2010	$2,000	$1,750	$1,250

d Prices for the CKD 5 percent Medicare Sample Standard Analysis Files

Patient cohort finder $750 / Hospital file $250

	Institutional	Physician/ supplier		Institutional	Physician/ supplier	Part D
1992	$375	$375	2002	$500	$500	
1993	$375	$375	2003	$500	$500	
1994	$375	$375	2004	$500	$500	
1995	$375	$375	2005	$625	$625	
1996	$375	$500	2006	$750	$625	$350
1997	$375	$500	2007	$875	$625	$500
1998	$375	$500	2008	$1,000	$750	$500
1999	$500	$500	2009	$1,125	$875	$750
2000	$500	$500	2010	$1,125	$875	$750
2001	$500	$500				

e Prices for the ESRD CPM/USRDS files

ESRD CPM Survey data
Includes 1994–2008 hemodialysis survey years and 1995–2008 peritoneal dialysis survey years $1,250

ESRD CPM/SAF linked files

Core files	$500
Hospital	$200
Transplant	$200

ESRD CPM Medicare participant institutional & physician/supplier claims
are available for the years pre-1989 through 2010; $100–300 per year

f Outline for research proposals using USRDS data

A data request applies only to the project stated in the proposal; a new proposal must be submitted for each additional use of the data

I Research topic title and submission date.

II Background information.

III Study design: objectives, hypothesis(es), analytical methods.

IV Data being requested: 1) List of Standard Analysis Files needed (if multiple years, please specify), or data fields needed in custom data file. 2) Description of data security: responsible party, computer access, etc. 3) Time frame for the project. 4) Statement that data will be returned to the USRDS or destroyed at the end of the project.

V To address patient privacy issues, to be consistent with HIPAA policies, and to insure that researchers are adhering to local privacy standards as well as to USRDS and CMS privacy policies, the USRDS now requires IRB approval for all research proposals. IRB approval is not required from those requesting aggregate data.

VI Outline of estimated costs of requested data; source of funding.

VII Agreement for Release of Data, signed by all researchers.

VIII For Principal Investigator and co-authors, **required**:
Name
Affiliation
Business address
Business phone & fax
Email address

Submit to
Paul Eggers, PhD
NIDDK
6707 Democracy Blvd, Room 615
Bethesda, MD 20892-5458
Phone 301.594.8305
Fax 301.480.3510
eggersp@extra.niddk.nih.gov

Security Act by establishing the Voluntary Prescription Drug Benefit Program (Part D). Effective January 1, 2006, Part D is an optional prescription drug benefit for individuals who are entitled to Medicare benefits under Part A or enrolled in Medicare benefits under Part B. The data from the first few months of 2006, when the benefit was very new, may be incomplete, and should be interpreted with caution.

The Part D data is obtained from CMS annually, with finder files provided by the USRDS. The Part D data are divided into two separate files: an annual enrollment file containing monthly indicators of enrollment in Part D, and a prescription drug event file (PDE) containing details of prescriptions filled by Part D beneficiaries.

Since the Part D benefit is voluntary, not all Medicare beneficiaries are enrolled. The annual enrollment file contains 12 monthly indicators that detail whether the beneficiary is enrolled in Part D, and if so, the type of plan. There are also monthly indicators for dual eligibility (Medicare and Medicaid), the retiree drug Subsidy, and the low income subsidy (LIS).

LINKAGES TO THE USRDS DATABASE

The USRDS does provide the service of linking population cohorts to the USRDS dataset to determine ESRD status and outcomes for epidemiological research. Please contact the USRDS Coordinating Center for more information on the application process and the costs for this service.

FILE MEDIA & FORMATS

SAFs are provided on DVDs as SAS files, and can be used by SAS on any 486 or Pentium PC with a DVD reader. The SAS format is widely used, easily transported, and largely self-documenting. SAS is a commercially available data management and statistical analysis software system that runs on most computers, and is almost universally available on university computer systems. The SAFs take full advantage of the program's ability to incorporate detailed documentation into the file. Researchers needing another format or medium must arrange for the conversion.

COSTS

File prices cover file reproduction, documentation, administrative costs, and costs of technical support. Prices are subject to change.

DOCUMENTATION

The Researcher's guide to the USRDS database provides most of the SAF documentation. It includes a codebook of variables, copies of data collection forms used by CMS, UNOS, and the USRDS Special Studies, and a chapter on using the SAFs in SAS. The guide may be downloaded from the USRDS website, and a copy on CD-ROM will be sent to researchers with the purchase of the SAFs.

data use acknowledgement

Publications using USRDS data should include an acknowledgment and this notice: The data reported here have been supplied by the United States Renal Data System (USRDS). The interpretation and reporting of these data are the responsibility of the author(s) and in no way should be seen as an official policy or interpretation of the U.S. government.

data release policy

Since the SAFs and custom data files contain confidential, patient-specific data, their release requires the approval process described here. Investigators may contact the USRDS Project Officer (PO) at the NIDDK to discuss requests before preparing a proposal. To request and use USRDS data files, investigators must provide the PO with a detailed description of the proposed investigation (see Table b.d). The summary must include goals, background data, an in-depth description of study design and methodology, and resources available for completing the project, and may be the description from a grant proposal or other application. The project must comply with the Privacy Act of 1974, and the summary should provide enough information to enable assessment of compliance. Guidelines for Privacy Act adherence are found in the "Agreement for Release of Data," later in the appendices. With your completed research proposal, please include a signed agreement for release of information from each investigator and analyst who will use the data files.

Investigators must also indicate needed USRDS SAFs by name. If these files cannot meet requirements of the proposed research, investigators must specify precisely which data elements are needed, and budget for a substantially higher cost.

The investigator and the Coordinating Center (CC) will resolve any technical questions. The investigator will arrange payment with the CC, and payment must be received before the files will be released. Checks must be made payable to the Minneapolis Medical Research Foundation.

The NIH will review the project for technical merit and for conformity with the Privacy Act. The PO will notify the investigator(s) in writing of the outcome, and if the project is not approved will discuss reasons for the decision. The PO will send a copy of the approval letters to the CC. When payment for the files has been received by the CC, the CC will prepare the files and documentation and send them to the investigator.

Any reports or articles resulting from use of USRDS data must be submitted to the PO prior to submission for publication to assure adherence to the Privacy Act. The PO must respond within 30 days. If a report or article is determined not to adhere to the Act, it shall not be published until compliance is achieved. Assessment of compliance will not depend on the opinions and conclusions expressed by the investigators, nor will the PO's approval indicate government endorsement of the investigator's opinions and conclusions.

All publications using released data must contain the standard acknowledgement and disclaimer presented above. Investigators are requested to send copies of all final publications resulting from this research to both the PO and the CC.

caveats

This policy establishes conditions and procedures for the release of data from the USRDS, and is intended to ensure that data are made available to investigators in the pursuit of legitimate biomedical, cost-effectiveness, or other economic research.

The USRDS will not release data that identify individual patients, providers, or facilities. Since it might be possible, however, to infer identity from SAF data, these data are considered confidential. The USRDS "Agreement for Release of Data" contains a number of general and specific restrictions on the use of USRDS data, and investigators are expected to abide by these restrictions. If individually identifiable data are needed, the request should be submitted directly to CMS. Use of these data to identify and/or contact patients, facilities, or providers is prohibited by USRDS policy and by the Privacy Act of 1974.

The USRDS CC will provide data in on CD or DVD. Analytical services other than review of the proposal and preparation of the data file will not be provided under the USRDS contract, though CC personnel may participate in analyses funded by other sources.

Acute kidney injury (AKI) Also known as acute kidney failure or acute renal failure is a sudden decline in renal function triggered by a number of acute occurrences such as shock, trauma, drug toxicity, or kidney stones.

Acute myocardial infarction (AMI) An event causing injury to the heart muscle.

Adult polycystic kidney disease An inherited disease in which the kidneys contain multiple cysts.

Albumin/creatinine ratio (ACR) A screening test used to assess chronic conditions such as diabetes and hypertension that can put patients at risk for chronic kidney failure.

Anemia A condition marked by a reduced number of red cells in the bloodstream.

Angiography A radiographic procedure where a radio-opaque contrast material is injected into a blood vessel for the purpose of identifying its anatomy.

Angioplasty A procedure in which a balloon catheter is inserted into a blocked or narrowed vessel in order to reopen the vessel and allow normal blood flow.

Angiotensin converting enzyme (ACE) inhibitor An antihypertensive agent that inhibits the production of angiotensin II. Can delay progression to diabetes or kidney disease.

Angiotensin II receptor blocker (ARB) an antihypertensive agent that inhibits the actions of angiotensin II, a substance which causes narrowing of blood vessels.

Arteriovenous fistula A type of vascular access used in hemodialysis patients, and created by the anastomosis of the radial artery and the cephalic vein.

Arteriovenous graft A type of vascular access used in hemodialysis patients and created via a connection between an artery and vein using either a native vessel (saphenous vein) or a synthetic material such as Teflon.

Atherosclerotic heart disease (ASHD) A disease of the arteries of the heart, characterized by a thickening and/or loss of elasticity of the arterial walls.

Beta blockers Antihypertensive medications that block production of norepinephrine, slowing the heart rate and preventing the constriction of blood vessels.

Blood urea nitrogen (BUN) A by-product of the breakdown of amino acids and endogenous and ingested protein.

Body mass index (BMI) A measure of height to weight ratio: weight (kg)/height (m^2).

C-reactive protein A protein produced by the liver in response to infection or injury; high levels are associated with an increased risk of heart disease and stroke.

Calcium channel blockers Antihypertensive agents that work by blocking the access of calcium to muscle cells in artery walls.

Cardiac arrest A complete cessation of cardiac activity.

Cardiac resynchronization therapy defibrillator (CRT-D) A device designed to arrest the fibrillation of (heart muscle) by applying electric shock across the chest, thus depolarizing the heart cells and allowing normal rhythm to return.

Cardiomyopathy A general diagnostic term indicating a primary non-inflammatory disease of the heart muscle.

Catastrophic coverage The interval following the coverage gap.

Catheter A vascular access used in hemodialysis patients, commonly implanted into the jugular or subclavian vein.

Centers for Disease Control & Prevention (CDC) The lead federal agency for protecting the health and safety of people at home and abroad; develops and applies programs designed to improve the health of the people of the United States.

Centers for Medicare and Medicaid Services (CMS) Formerly the Health Care Financing Administration (HCFA). Federal agency that administers the Medicare, Medicaid, and State Childrens' Health insurance programs.

Cerebrovascular accident (CVA) A general descriptor that encompasses such problems as stroke and cerebral hemorrhage.

Cerebrovascular disease A disease that causes narrowing or occlusion of the arteries supplying blood to the brain.

Chain provider A single business entity that at years end owns or operates 20 or more freestanding dialysis units. This definition applies to all chain affiliation references in the USRDS Annual Data Reports. An alternative definition from the Centers for Medicare and Medicaid Services can be found under "definitions" in the Health Care Provider/Supplier Application Form, CMS 855.

Chronic kidney disease (CKD) A condition in which there is a progressive loss of kidney function which over time may lead to end-stage renal disease.

Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) A method used to estimate glomerular filtration rate using a single serum creatinine. Yields a lower CKD prevalence than the Modification of Diet in Renal Disease (MDRD) Study equation.

Chronic obstructive pulmonary disease (COPD) A progressive disease characterized by coughing, wheezing, or difficulty in breathing.

Clinical Performance Measures (CPM) Project Formerly the Core Indicator Project. A project in which CMS and the ESRD networks cooperatively maintain a clinical database of key elements related to the quality of dialysis care. These elements are used as indicators in quality improvement initiatives.

Common Working File (CWF) System The Medicare inpatient/outpatient and physician/supplier benefit coordination and claims validation system. Under the CWF, CMS maintains both institutional and physician supplier claims-level data. CWF claims records are the data source for most claims and utilization files used by the USRDS.

Comprehensive Dialysis Study (CDS) A special data collection study that focuses on physical activity level, health-related quality of life, and work/disability status reported by patients who have recently started maintenance dialysis.

Congestive heart failure (CHF) A condition caused by ineffective pumping of the heart and subsequent fluid accumulation in the lungs.

Continuous ambulatory peritoneal dialysis (CAPD) A type of dialysis in which dialysate is continuously present in the abdominal cavity. Fluid is exchanged using gravity to fill and empty the cavity 4–5 -times a day.

Continuous cycler-assisted peritoneal dialysis (CCPD) A type of dialysis in which the abdominal cavity is filled and emptied of dialysate using an automated cycler machine.

Coverage gap The interval following the initial coverage period, but preceding catastrophic coverage.

Creatinine A waste product of protein metabolism found in the urine; often used to evaluate kidney function. Abnormally high creatinine levels indicate kidney failure or renal insufficiency.

Creatinine clearance Used as an indicator to predict the onset of uremia, which develops when creatinine clearance falls below 10 ml/minute/1.73 m^2.

Creditable coverage Prescription drug coverage that is actuarially equivalent to the standard Part D benefit, as defined annually by CMS. Beneficiaries with creditable coverage may forgo participation in Medicare Part D without having to pay increased monthly premiums upon future enrollment. Examples of creditable coverage include the Federal Employee Health Benefits Program, TRICARE, VA Health Care Benefits, State Pharmacy Assistance Programs (SPAPs), and private insurance that is eligible for the retiree drug subsidy. Private insurance for the working aged may or may not be creditable.

Cystatin-C equation A method which uses the laboratory marker cystatin-C for estimating glomerular filtration rate (GFR).

Darbepoetin alfa (DPO) One of a class of medications called erythropoietic proteins. Used to treat anemia in patient with serious kidney disease.

Death Notification Form (CMS-2746) A form submitted following the death of an ESRD patient, and containing basic patient demographic information in addition to information on the primary cause of death.

Diabetes mellitus, insulin-dependent A condition in which insulin is necessary to regulate abnormally high levels of glucose (sugar) in the blood.

Diagnosis Related Groups (DRGs) Used by Medicare to determine payment for inpatient hospital stays; based on diagnosis, age, gender, and complications.

Employer group health plan (EGHP) A health plan of or contributed to by an employer, providing medical care directly or through other methods such as insurance or reimbursement to current or former employees, or to these employees and their families.

End-stage renal disease (ESRD) A condition in which a person's kidney function is inadequate to support life.

Erythropoiesis stimulating agent (ESA) Used to increase the production of red blood cells; includes erythropoietin (EPO) and darbepoetin alfa (DPO).

Erythropoietin (EPO) A hormone secreted chiefly by the adult kidney; acts on bone marrow to stimulate red cell production. Also produced in a formulated version to treat anemia.

ESRD Facility Survey Data for this survey are collected annually by CMS from all facilities certified to provide Medicare-covered renal dialysis and transplantation. The survey uses CMS form 2744, and encompasses the full calendar year. Geographic data are included to the level of facility ZIP code. Each record contains facility information and data on the number of patients served, dialysis treatments provided, and kidney transplants performed. The data include services to both Medicare and non-Medicare patients.

ESRD networks Regional organizations, established by law in 1978, contracted by CMS to perform quality oversight activities to assure the appropriateness of services and protection for dialysis patients.

Expanded criteria donors (ECDs) Older kidney donors or donors whose health issues in the past would have prevented their acceptance into the donor program.

Fills per person Each prescription drug purchase constitutes a fill. Fills per person are calculated from the quotient of cumulative fills in a population and the number of people in that population.

Glomerular filtration rate (eGFR) Estimated rate in ml/min/1.73 m^2 of the volume of plasma filtered by the kidney. Rates of filtration are based on an individual's age, gender, and height, and on levels of serum creatinine, blood urea nitrogen, and serum albumin. GFR is traditionally considered the best overall index to determine renal function.

Glycosylated hemoglobin (HbA1c) test Used to help determine how well a patient's diabetes is being controlled, this test measures the level of glucose-bound hemoglobin in the bloodstream.

Health Maintenance Organization (HMO) A competitive medical plan, such as Medicare+Choice, that has contracts with CMS on a prospective capitation payment basis for providing healthcare to Medicare beneficiaries.

Health Service Area (HSA) A group of counties described by the authors of the CDC Atlas of United States Mortality as "an area that is relatively self-contained with respect to hospital care."

Healthy People 2010 A national agenda for health promotion and disease prevention, with objectives and goals aimed at improving the health of the American people (www.health.gov/healthypeople).

Hemodialysis The process of removing toxins from the blood by diffusion through a semi-permeable membrane.

Hemoglobin Oxygen-carrying protein in the erythrocyte (red blood cell).

Hepatitis An inflammation of the liver that may be caused by a viral infection, poisons, or the use of alcohol or other drugs. Forms include Hepatitis A, usually transmitted by contaminated food or water; Hepatitis B, more serious than Hepatitis A and transmitted through blood and body fluids; Hepatitis C, also transmitted through blood and body fluids; and Hepatitis D, which causes symptoms only when an individual is already infected with the Hepatitis B virus.

Hospital-based facility A dialysis unit attached to or located in a hospital and licensed to provide outpatient dialysis services directly to ESRD patients.

Implantable cardioverter defibrillator (ICD) An implantable device designed to arrest the fibrillation of (heart muscle) by applying electric shock thus depolarizing the heart cells and allowing normal rhythm to return.

Incident ESRD patient A patient starting renal replacement therapy for ESRD during a calendar year. Excludes patients with acute renal failure, those with chronic renal failure who die before starting ESRD treatment, and those whose treatments are not reported to CMS.

Incident population The people in a population who are newly diagnosed with a disease in a given time period, typically a year.

Independent unit A unit licensed to provide outpatient and home maintenance dialysis, and not affiliated with a chain.

Initial coverage period The interval following the deductible phase, but preceding the coverage gap.

Ischemic heart disease (ISHD) A disease of the heart evidenced by a lowered oxygen supply to the heart tissue, caused by occlusion or narrowing of the arteries supplying the heart muscle.

Kidney Disease Outcomes Quality Initiative (KDOQI) Established in 1995 by the National Kidney Foundation to improve patient outcomes and survival by providing recommendations for optimal clinical practices in the areas of dialysis adequacy, vascular access, and anemia.

Kt/V An indicator of the dialysis dose per treatment, calculated by multiplying the urea clearance (K) by the treatment duration (t) and dividing by the urea distribution (V). The urea distribution volume is approximately equal to the volume of total body water.

Low income subsidy (LIS) For Medicare beneficiaries with limited income and/or assets, the costs of participation in Medicare Part D may be reduced by the LIS. Beneficiaries who are dually eligible for Medicare and Medicaid are automatically granted the LIS, while beneficiaries who are not dually eligible may apply for it. While the LIS may take eight different levels, with monthly premiums and copayments either eliminated or reduced, all dually eligible beneficiaries pay no monthly premiums.

Medical Evidence form (CMS-2728) A form which provides source data about ESRD patients, including information on demographics, primary cause of renal disease, comorbidity, biochemical data, dialysis treatment, transplant, dialysis training, employment status, initial insurance coverage, and first ESRD service date.

Medicare Advantage Part D plans (MA-PDs) Medicare Part D plans that are offered only to participants in Medicare Part C.

Medicare as Secondary Payor (MSP) patient A Medicare beneficiary with a health insurer other than Medicare (e.g. an Employer Group Health Plan) that has primary responsibility for payment of the beneficiary's medical bills.

Medicare Current Beneficiary Survey (MCBS) An ongoing national survey of aged, disabled, and institutionalized Medicare beneficiaries. Sponsored by the Centers for Medicare and Medicaid Services, and used to study the health status, health care use and expenditures, health insurance coverage, and socioeconomic and demographic characteristics of Medicare beneficiaries.

Microalbuminuria A condition in which small amounts of albumin are present in the urine; indicates early kidney damage.

Modality A method of treatment. Treatment for end-stage renal disease (ESRD) is comprised of three modalities: hemodialysis, peritoneal dialysis, and transplantation.

Modification of Diet in Renal Disease (MDRD) Study equation A method used to estimate glomerular filtration (GFR) using a single serum creatinine.

National Health and Nutrition Examination Survey (NHANES) A survey conducted by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention; uses home interviews and health tests to collect information on health and diet in the United States.

National Institutes of Health (NIH) The federal focal point for medical research in the U.S. and one of eight health agencies of the Public Health Services, which are part of the Department of Health and Human Services.

Organ Procurement and Transplantation Network (OPTN) The unified transplant network established by the United States Congress under the National Organ Transplant Act (NOTA) of 1984. A private, non-profit organization administered by the United Network for Organ Sharing, under contract with the Health Resources and Services Administration of the U.S. Department of Health and Human Services.

Part D Medicare coverage A U.S. government program which subsidizes the costs of medications for Medicare beneficiaries.

Percutaneous coronary intervention (PCI) A therapeutic procedure to treat the stenotic (narrowed) coronary arteries of the heart found in coronary heart disease. Commonly known as coronary angioplasty or simply angioplasty.

Period prevalent patient A patient receiving treatment for ESRD at some point during a period of time, usually six months or a year. Patients may die during the period or be point prevalent at the end of the period. Period prevalence is a useful measure for cost analysis, since it indicates total disease burden over the course of a year.

Peripheral vascular disease (PVD) A progressive disease that causes narrowing or occlusion of the arteries supplying the extremities of the body.

Peritoneal dialysis Dialysis in which fluid (dialysate) is introduced into the abdominal cavity and uremic toxins are removed across the peritoneum.

Point prevalent patient A patient reported as receiving treatment for ESRD on a particular day of the calendar year (e.g. December 31).

Program Medical Management and Information System for ESRD, and Renal Beneficiary and Utilization System (PMMIS/REBUS) The major source of data for the USRDS. This CMS file incorporates data from the Medical Evidence form (CMS 2728), the Death Notification form (CMS 2746), the Medicare Enrollment Database, CMS paid claims records, and the UNOS transplant database.

Prevalent ESRD patient A patient on renal replacement therapy or with a functioning kidney transplant (regardless of the transplant date). This definition excludes patients with acute renal failure, those with chronic renal failure who die before receiving treatment for ESRD, and those whose ESRD treatments are not reported to CMS.

Prevalent population The people in a population who have a disease at a given point in time (point prevalence) or during a given time period (period prevalence).

Proteinuria The existence of protein in the urine; indicative of kidney damage.

Recombinant human growth hormone (rhGH) Also called somatropin; a substance identical in its amino acid sequence to human growth hormone, and used to treat growth hormone deficiency.

REMIS CMS's Renal Management Information System (REMIS), which has replaced the Renal Beneficiary and Utilization System (REBUS). Includes an operational interface to the SIMS Central Repository.

Renin Inhibitors A class of drugs used to lower blood pressure by blocking the renin-angiotensin system which regulates blood volume and systemic vascular resistance.

Retiree drug subsidy (RDS) A program designed to encourage employers to continue to provide prescription drug coverage to retirees eligible for Medicare Part D. Under the program, employers received a tax-free rebate equal to 28 percent of covered prescription drug costs incurred by its retirees. The program is relatively simple to administer, but may ultimately be more costly than providing employees a type of Part D plan known as an "employer group waiver plan." Following passage of the Patient Protection and Affordable Care Act, the tax-free status of the subsidy is due to expire on December 31, 2012.

SIMS CMS's Standard Information Management System (SIMS), which became operational at the beginning of 2000. Supports CMS reporting requirements and the business processes of the ESRD networks; provides communication and data exchange links for the networks, CMS, and other parts of the renal community; supplies standard core data functionality for previous network data systems; and provides improved electronic communication capabilities, data standardization, and information management tools.

Standard Analysis Files (SAFs) CMS files containing final action Medicare inpatient/outpatient claims data: Inpatient, Outpatient, Home Health Agency, Hospice, Skilled Nursing Facility, Clinical Laboratory, Durable Medical Equipment, and 5 percent Sample Beneficiary.

Standardized hospitalization ratio (SHR) Used to compare hospitalization rates for a selected group of patients by computing the ratio of the group's observed hospitalization rate to the expected hospitalization rate for the national ESRD population.

Standardized mortality ratio (SMR) Used to compare dialysis patient mortality rates from year to year. Mortality rates for a subgroup of patients are compared to a set of reference rates, with adjustments for age, gender, race, primary diagnosis, and ESRD vintage.

Standardized transplantation ratio (STR) Used to compare transplant rates for a subgroup of patients to national transplant rates.

Statins Medications that lower cholesterol through action on an enzyme in the liver.

Total days supply Each prescription drug is disbursed with sufficient quantity to administer for a set number of days, so long as instructions are followed (i.e., so long as adherence is perfect). The total days supplied is equal to the cumulative number of days supplied through all fills of a particular medication in a population.

Transient ischemic attacks (TIA) A temporary loss of neurological function caused by a brief period of inadequate blood supply in a portion of the brain supplied by the carotid or vertebral basilar arteries.

United Network for Organ Sharing (UNOS) A private, non-profit organization that maintains the organ transplant list for the nation and coordinates the matching and distribution of organs to patients awaiting transplant.

Urea reduction ratio (URR) A means of measuring dialysis dose by calculating the change in BUN over the course of a dialysis treatment. URR = (pre-dialysis – post-dialysis BUN) / pre-dialysis BUN * 100.

Vintage Time in years that a patient has had ESRD.

Wait list A list of patients awaiting an organ transplant; maintained by the United Network for Organ Sharing (UNOS).

Some of these definitions are obtained from the Mondofacto Medical Dictionary, found at www.mondofacto.com/dictionary.

abbreviations

A1c	glycosylated hemoglobin
AAPCC	average annual per capita cost
ACEI	angiotensin converting enzyme inhibitor
ACR	albumin/creatinine ratio
AKI	acute kidney injury
AKI-D	acute kidney injury with dialysis
AMI	acute myocardial infarction
ARB	angiotensin receptor blocker
ASHD	atherosclerotic heart disease
AV	arteriovenous
BMI	body mass index
BRFSS	Behavioral Risk Factor Surveillance System
BUN	blood urea nitrogen
CAPD	continuous ambulatory peritoneal dialysis
CCPD	continuous cycler peritoneal dialysis
CCR	creatinine clearance rate
CDC	Centers for Disease Control and Prevention
CDS	Comprehensive Dialysis Study
CHF	congestive heart failure
CK	cystic kidney disease
CKD	chronic kidney disease
CKD-EPI	Chronic Kidney Disease Epidemiology Collaboration
CMS	Centers for Medicare & Medicaid Services
COPD	chronic obstructive pulmonary disease
CPM	Clinical Performance Measures Project
CVA/TIA	cerebrovascular accident/transient ischemic attack
CPT	Current Procedure and Terminology
CRT-D	cardiac resynchronization therapy defibrillator
CVD	cerebrovascular disease
DCD	donation after cardiac death
DGF	delayed graft function
DM	diabetes, diabetic
DPO	darbepoetin alfa
DRG	diagnosis related group
ECD	expanded criteria donor
EGHP	employer group health plan
EPO	erythropoietin
ESA	erythropoiesis stimulating agent
ESRD	end-stage renal disease
eGFR	estimated glomerular filtration rate
GN	glomerulonephritis
HCPCS	healthcare common procedure coding system
HD	hemodialysis
HEDIS	Health Plan Employer Data Information Set
HMO	health maintenance organization
HSA	Health Service Area
HTN	hypertension
ICD	implantable cardioverter defibrillator
ICD-9-CM	International Classification of Diseases, 9th revision, Clinical Modification
IPD	intermittent peritoneal dialysis
ISHD	ischemic heart disease
KDOQI	Kidney Disease Outcomes Quality Initiative
LIS	low income subsidy
MCBS	Medicare Current Beneficiary Survey
MDRD	Modification of Diet in Renal Disease
ME	Medical Evidence form (2728)
MI	myocardial infarction
MPP	Medicare as primary payor
MSP	Medicare as secondary payor
NDC	National Drug Code
NDM	non-diabetic
NHANES	National Health and Nutrition Examination Survey
NKF	National Kidney Foundation
OPTN	Organ Procurement and Transplantation Network
PACE	programs of all-inclusive care for the elderly
PCI	percutaneous coronary intervention
PD	peritoneal dialysis
PPPM	per person per month
PPPY	per person per year
PAD	peripheral arterial disease
PVD	peripheral vascular disease
RDS	retiree drug subsidy
SCD	standard criteria donor
SHR	standardized hospitalization ratio
SMR	standardized mortality ratio
STR	standardized transplantation ratio
Tx	transplant
UNOS	United Network for Organ Sharing
WHO	World Health Organization

United States Renal Data System (USRDS)
Agreement for Release of Data

Project title _____

In this agreement, "Requestor Organization" means _____

A. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), through the United States Renal Data System (USRDS) Coordinating Center (CC), will provide the Requestor with CDs, DVDs, or other media type containing the data extracted from the USRDS research database(the "Data"), which constitutes a Limited Data Set within the meaning of the HIPAA privacy regulations.

B. The sole purpose of providing the Data is the conduct of legitimate and approved biomedical, cost-effectiveness, and/or other economic research by the Requestor.

C. The Requestor shall not use the Data to identify individuals on the file.

D. The Requestor shall not combine or link the Data provided with any other collection or source of information that may contain information specific to individuals on the file, except where written authorization has been obtained through the approval process.

E. The Requestor shall not use the Data for purposes that are not related to biomedical research, cost-effectiveness, economic and/or other epidemiological research. Purposes for which the Data may not be used include, but are not limited to,
   - the identification and targeting of under- or over-served health service markets primarily for commercial benefit
   - the obtaining of information about providers or facilities for commercial benefit
   - insurance purposes such as redlining areas deemed to offer bad health insurance risks
   - adverse selection (e.g., identifying patients with high risk diagnoses)

   Any use of the Data for research not in the original proposal must be approved by the USRDS Project Officer (PO).

F. The Requestor shall not publish or otherwise disclose the Data in the file to any person or organization unless the Data have been aggregated (that is, combined into groupings of Data such that the Data are no longer specific to any individuals within each grouping), and no cells (aggregates of Data) contain information on fewer than ten individuals or fewer than five providers or facilities. The Requestor shall not publish or otherwise disclose Data that identify individual providers or facilities, or from which such identities could be inferred. However, the Requestor may release Data to a contractor for purposes of data processing or storage if (1) the Requestor specified in the research plan submitted to the USRDS Project Officer that Data would be released to the particular contractor, or the Requestor has obtained written authorization from the PO to release the Data to such contractor, and (2) the contractor has signed a data release agreement with the PO.

G. A copy of any aggregation of Data intended for publication shall be submitted to the PO for review for compliance with the confidentiality provisions of this agreement prior to submission for publication and, if not approved, shall not be published until compliance is achieved. The PO must respond within 30 days.

H. Appropriate administrative, technical, procedural, and physical safeguards shall be established by the Requestor to protect the confidentiality of the data and to prevent unauthorized access to it. The safeguards shall provide a level of security outlined in OMB Circular No. A-130, Appendix III — Security of Federal Automated Information System, which sets forth guidelines for security plans for automated information systems in Federal agencies.

I. No copies or derivatives shall be made of the data in this file except as necessary for the purpose authorized in this agreement. The Requestor shall keep an accurate written account of all such copies and derivative files, which will be furnished upon request to the PO. The USRDS data files covered in this data use agreement may be retained by the Requestor until the date specified by the PO in the approval letter, at which time Requestor may request renewal of this data use agreement to extend the retention period to comply with legal or institutional recordkeeping requirements or to maintain the integrity of the research or research publications. If at any time during the data retention period the DUA between USRDS and CMS is canceled, the Requestor will be contacted to destroy the files in their possession. At the completion of the activities in the research plan, the file(s) and any derivative files and copies shall be destroyed. At that time the Requestor will inform the USRDS and the PO in writing that the files have been destroyed.

J. For the purpose of inspecting security procedures and arrangements, authorized representatives of the NIDDK and/or of CMS will, upon request, be granted access to premises where the Data are kept.

K. The following USRDS data file(s) is/are covered under this Agreement.

Name of Data file(s) requested (eg Core, Institutional claims, etc)	Year(s) if applicable

REQUESTOR SIGNATURE: _____

_____
Authorized signatory (name, title & date)

_____
Requestor address

_____
Requestor telephone number

READ AND ACKNOWLEDGED:

_____	_____
Investigator/Analyst signature	Print Investigator/Analyst name & date
_____	_____
Investigator/Analyst signature	Print Investigator/Analyst name & date
_____	_____
Investigator/Analyst signature	Print Investigator/Analyst name & date

USRDS Project Officer - Lawrence Y. C. Agodoa, MD, NIDDK, NIH or Paul W. Eggers, PhD, NIDDK, NIH

_____
USRDS Project Officer signature & date

June 2012

United States Renal Data System (USRDS)
Merged Dataset Agreement for Release of Data

Project title _____

In this agreement, "Requestor Organization" means _____

A. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), through the United States Renal Data System (USRDS) Coordinating Center (CC), will provide the Requestor CDs, DVDs or other media type containing data extracted from the USRDS research database. Prior to receiving USRDS data, the Requestor will provide USRDS with a list of personally identifiable information (PII) so USRDS can report which of the Requestor's subjects are in the USRDS end-stage renal disease (ESRD) data.

B. The sole purpose of providing the Data is the conduct of legitimate and approved biomedical, cost-effectiveness, and/or other economic research by the Requestor.

C. USRDS shall not use or disclose the Requestor's data for any purpose other than to create the data extracted from the USRDS database. In the event that the Requestor's data is used or disclosed for any purpose other than that covered by this agreement, USRDS will notify the Requestor immediately and agree to work with Requestor to address the use or disclosure. The USRDS will destroy the Requestor's data set one year after the linkage is complete unless otherwise specified by the Requestor in the research proposal.

D. The Requestor shall not combine or link the data provided with any other collection or source of information that may contain information specific to individuals on the file, except where a waiver of authorization has been approved by the Requestor's IRB/Privacy Board.

E. The Requestor shall not use the Data for purposes that are not related to biomedical research, cost-effectiveness, economic and/or other epidemiological research. Purposes for which the Data may not be used include, but are not limited to,
   - the identification and targeting of under- or over-served health service markets primarily for commercial benefit
   - the obtaining of information about providers or facilities for commercial benefit
   - insurance purposes such as redlining areas deemed to offer bad health insurance risks
   - adverse selection (e.g., identifying patients with high risk diagnoses)

   Any use of the Data for research not in the original proposal must be approved by the USRDS Project Officer (PO).

F. The Requestor shall not publish or otherwise disclose the data in the file to any person or organization unless the data have been aggregated (that is, combined into groupings of data such that the data are no longer specific to any individuals within each grouping), and no cells (aggregates of data) contain information on fewer than ten individuals or fewer than five providers or facilities. The Requestor shall not publish or otherwise disclose data that identify individual providers or facilities, or from which such identities could be inferred. However, the Requestor may release data to a contractor for purposes of data processing or storage if (1) the Requestor specified in the research plan submitted to the USRDS Project Officer that data would be released to the particular contractor, or the Requestor has obtained written authorization from the PO to release the data to such contractor, and (2) the contractor has signed a data release agreement with the PO.

G. A copy of any aggregation of data intended for publication shall be submitted to the PO for review for compliance with the confidentiality provisions of this agreement prior to submission for publication and, if not approved, shall not be published until compliance is achieved. The PO must respond within 30 days.

H. Appropriate administrative, technical, procedural, and physical safeguards shall be established by the Requestor to protect the confidentiality of the data and to prevent unauthorized access to it. The safeguards shall provide a level of security outlined in OMB Circular No. A-130, Appendix III — Security of Federal Automated Information System, which sets forth guidelines for security plans for automated information systems in Federal agencies.

I. No copies or derivatives shall be made of the data in this file except as necessary for the purpose authorized in this agreement. The Requestor shall keep an accurate written account of all such copies and derivative files, which will be furnished upon request to the PO. The USRDS data files covered in this data use agreement may be retained by the Requestor until the date specified by the PO in the approval letter, at which time Requestor may request renewal of this data use agreement to extend the retention period to comply with legal or institutional recordkeeping requirements or to maintain the integrity of the research or research publications. If at any time during the data retention period the DUA between USRDS and CMS is canceled, the Requestor will be contacted to destroy the files in their possession. At the completion of the activities in the research plan, the file(s) and any derivative files and copies shall be destroyed. At that time the Requestor will inform the USRDS and the PO in writing that the files have been destroyed.

J. For the purpose of inspecting security procedures and arrangements, authorized representatives of the NIDDK and/or of CMS will, upon request, be granted access to premises where the Data are kept.

K. The following USRDS data file(s) is/are covered under this Agreement.

Name of Data file(s) requested (eg Core, Institutional claims, etc)	Year(s) if applicable

REQUESTOR SIGNATURE: _____

_____
Authorized signatory (name, title & date)

_____
Requestor address

_____
Requestor telephone number

READ AND ACKNOWLEDGED:

_____	_____
Requestor/investigator signature	Print name & date
_____	_____
Requestor/investigator signature	Print name & date
_____	_____
Requestor/investigator signature	Print name & date

USRDS Project Officer - Lawrence Y. C. Agodoa, MD, NIDDK, NIH or Paul W. Eggers, PhD, NIDDK, NIH

_____
USRDS Project Officer signature & date

June 2012

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR MEDICARE & MEDICAID SERVICES

Form Approved
OMB No. 0938-0046

END STAGE RENAL DISEASE MEDICAL EVIDENCE REPORT MEDICARE ENTITLEMENT AND/OR PATIENT REGISTRATION

A. COMPLETE FOR ALL ESRD PATIENTS

Check one: ☐ Initial ☐ Re-entitlement ☐ Supplemental

1. Name *(Last, First, Middle Initial)*

2. Medicare Claim Number

3. Social Security Number

4. Date of Birth ____/____/____ MM DD YYYY

5. Patient Mailing Address *(Include City, State and Zip)*

6. Phone Number ( )

7. Sex ☐ Male ☐ Female

8. Ethnicity ☐ Not Hispanic or Latino ☐ Hispanic or Latino (Complete Item 9)

9. Country/Area of Origin or Ancestry

10. Race *(Check all that apply)*
☐ White ☐ Asian
☐ Black or African American ☐ Native Hawaiian or Other Pacific Islander*
☐ American Indian/Alaska Native
Print Name of Enrolled/Principal Tribe _____ *complete Item 9

11. Is patient applying for ESRD Medicare coverage?
☐ Yes ☐ No

12. Current Medical Coverage *(Check all that apply)*
☐ Medicaid ☐ Medicare ☐ Employer Group Health Insurance
☐ DVA ☐ Medicare Advantage ☐ Other ☐ None

13. Height
INCHES _____ OR
CENTIMETERS _____

14. Dry Weight
POUNDS _____ OR
KILOGRAMS _____

15. Primary Cause of Renal Failure *(Use code from back of form)*

16. Employment Status *(6 mos prior and current status)*

Prior	Current	
☐	☐	Unemployed
☐	☐	Employed Full Time
☐	☐	Employed Part Time
☐	☐	Homemaker
☐	☐	Retired due to Age/Preference
☐	☐	Retired (Disability)
☐	☐	Medical Leave of Absence
☐	☐	Student

17. Co-Morbid Conditions *(Check all that apply currently and/or during last 10 years)* *See instructions

a. ☐ Congestive heart failure
b. ☐ Atherosclerotic heart disease ASHD
c. ☐ Other cardiac disease
d. ☐ Cerebrovascular disease, CVA, TIA*
e. ☐ Peripheral vascular disease*
f. ☐ History of hypertension
g. ☐ Amputation
h. Diabetes, currently on insulin
i. ☐ Diabetes, on oral medications
j. ☐ Diabetes, without medications
k. ☐ Diabetic retinopathy
l. ☐ Chronic obstructive pulmonary disease
m. ☐ Tobacco use (current smoker)
n. ☐ Malignant neoplasm, Cancer
o. ☐ Toxic nephropathy
p. ☐ Alcohol dependence
q. ☐ Drug dependence*
r. ☐ Inability to ambulate
s. ☐ Inability to transfer
t. ☐ Needs assistance with daily activities
u. ☐ Institutionalized
☐ 1. Assisted Living
☐ 2. Nursing Home
☐ 3. Other Institution
v. ☐ Non-renal congenital abnormality
w. ☐ None

18. Prior to ESRD therapy:

a. Did patient receive exogenous erythropoetin or equivalent?	☐ Yes	☐ No	☐ Unknown	If Yes, answer:	☐ 6-12 months	☐ >12 months
b. Was patient under care of a nephrologist?	☐ Yes	☐ No	☐ Unknown	If Yes, answer:	☐ 6-12 months	☐ >12 months
c. Was patient under care of kidney dietitian?	☐ Yes	☐ No	☐ Unknown	If Yes, answer:	☐ 6-12 months	☐ >12 months
d. What access was used on first outpatient dialysis:	☐ AVF	☐ Graft	☐ Catheter	☐ Other		
If not AVF, then: Is maturing AVF present?	☐ Yes	☐ No				
Is maturing graft present?	☐ Yes	☐ No				

19. Laboratory Values Within **45** Days Prior to the Most Recent ESRD Episode. (Lipid Profile within 1 Year of Most Recent ESRD Episode).

LABORATORY TEST	VALUE	DATE	LABORATORY TEST	VALUE	DATE
a.1. Serum Albumin (g/dl)	___ . ___		d. HbA1c	___ ___ . ___ %	
a.2. Serum Albumin Lower Limit	___ . ___		e. Lipid Profile TC	___ ___ ___	
a.3. Lab Method Used (BCG or BCP)			LDL	___ ___ ___	
b. Serum Creatinine (mg/dl)	___ ___ . ___		HDL	___ ___	
c. Hemoglobin (g/dl)	___ ___ . ___		TG	___ ___ ___ ___	

B. COMPLETE FOR ALL ESRD PATIENTS IN DIALYSIS TREATMENT

20. Name of Dialysis Facility

21. Medicare Provider Number *(for item 20)*

22. Primary Dialysis Setting
☐ Home ☐ Dialysis Facility/Center ☐ SNF/Long Term Care Facility

23. Primary Type of Dialysis
☐ Hemodialysis (Sessions per week____/hours per session____)
☐ CAPD ☐ CCPD ☐ Other

24. Date Regular Chronic Dialysis Began ____/____/____ MM DD YYYY

25. Date Patient Started Chronic Dialysis at Current Facility ____/____/____ MM DD YYYY

26. Has patient been informed of kidney transplant options?
☐ Yes ☐ No

27. If patient NOT informed of transplant options, please check all that apply:
☐ Medically unfit ☐ Patient declines information
☐ Unsuitable due to age ☐ Patient has not been assessed
☐ Psychologically unfit ☐ Other

C. COMPLETE FOR ALL KIDNEY TRANSPLANT PATIENTS

28. Date of Transplant	29. Name of Transplant Hospital	30. Medicare Provider Number for Item 29
____/____/____ MM DD YYYY		

Date patient was admitted as an inpatient to a hospital in preparation for, or anticipation of, a kidney transplant prior to the date of actual transplantation.

31. Enter Date	32. Name of Preparation Hospital	33. Medicare Provider number for Item 32
____/____/____ MM DD YYYY		

34. Current Status of Transplant *(if functioning, skip items 36 and 37)*	35. Type of Donor:
☐ Functioning ☐ Non-Functioning	☐ Deceased ☐ Living Related ☐ Living Unrelated
36. If Non-Functioning, Date of Return to Regular Dialysis ____/____/____ MM DD YYYY	37. Current Dialysis Treatment Site ☐ Home ☐ Dialysis Facility/Center ☐ SNF/Long Term Care Facility

D. COMPLETE FOR ALL ESRD SELF-DIALYSIS TRAINING PATIENTS (MEDICARE APPLICANTS ONLY)

38. Name of Training Provider	39. Medicare Provider Number of Training Provider (for Item 38)
40. Date Training Began ____/____/____ MM DD YYYY	41. Type of Training ☐ Hemodialysis a. ☐ Home b. ☐ In Center ☐ CAPD ☐ CCPD ☐ Other
42. This Patient is Expected to Complete *(or has completed)* Training and will Self-dialyze on a Regular Basis. ☐ Yes ☐ No	43. Date When Patient Completed, or is Expected to Complete, Training ____/____/____ MM DD YYYY

I certify that the above self-dialysis training information is correct and is based on consideration of all pertinent medical, psychological, and sociological factors as reflected in records kept by this training facility.

44. Printed Name and Signature of Physician personally familiar with the patient's training	45. UPIN of Physician in Item 44
a.) Printed Name b.) Signature c.) Date ____/____/____ MM DD YYYY	

E. PHYSICIAN IDENTIFICATION

46. Attending Physician *(Print)*	47. Physician's Phone No. ( )	48. UPIN of Physician in Item 46

PHYSICIAN ATTESTATION

I certify, under penalty of perjury, that the information on this form is correct to the best of my knowledge and belief. Based on diagnostic tests and laboratory findings, I further certify that this patient has reached the stage of renal impairment that appears irreversible and permanent and requires a regular course of dialysis or kidney transplant to maintain life. I understand that this information is intended for use in establishing the patient's entitlement to Medicare benefits and that any falsification, misrepresentation, or concealment of essential information may subject me to fine, imprisonment, civil penalty, or other civil sanctions under applicable Federal laws.

49. Attending Physician's Signature of Attestation *(Same as Item 46)*	50. Date ____/____/____ MM DD YYYY
51. Physician Recertification Signature	52. Date ____/____/____ MM DD YYYY

53. Remarks

F. OBTAIN SIGNATURE FROM PATIENT

I hereby authorize any physician, hospital, agency, or other organization to disclose any medical records or other information about my medical condition to the Department of Health and Human Services for purposes of reviewing my application for Medicare entitlement under the Social Security Act and/or for scientific research.

54. Signature of Patient *(Signature by mark must be witnessed.)*	55. Date ____/____/____ MM DD YYYY

G. PRIVACY STATEMENT

The collection of this information is authorized by Section 226A of the Social Security Act. The information provided will be used to determine if an individual is entitled to Medicare under the End Stage Renal Disease provisions of the law. The information will be maintained in system No. 09-70-0520, "End Stage Renal Disease Program Management and Medical Information System (ESRD PMMIS)", published in the Federal Register, Vol. 67, No. 116, June 17, 2002, pages 41244-41250 or as updated and republished. Collection of your Social Security number is authorized by Executive Order 9397. Furnishing the information on this form is voluntary, but failure to do so may result in denial of Medicare benefits. Information from the ESRD PMMIS may be given to a congressional office in response to an inquiry from the congressional office made at the request of the individual; an individual or organization for research, demonstration, evaluation, or epidemiologic project related to the prevention of disease or disability, or the restoration or maintenance of health. Additional disclosures may be found in the *Federal Register* notice cited above. You should be aware that P.L.100-503, the Computer Matching and Privacy Protection Act of 1988, permits the government to verify information by way of computer matches.

LIST OF PRIMARY CAUSES OF END STAGE RENAL DISEASE

Item 15. Primary Cause of Renal Failure should be completed by the attending physician from the list below. Enter the ICD-9-CM code to indicate the primary cause of end stage renal disease. If there are several probable causes of renal failure, choose one as primary. **Code effective as of September 2003**.

DIABETES

25040	Diabetes with renal manifestations Type 2
25041	Diabetes with renal manifestations Type 1

GLOMERULONEPHRITIS

5829	Glomerulonephritis (GN) (histologically not examined)
5821	Focal glomerulosclerosis, focal sclerosing GN
5831	Membranous nephropathy
58321	Membranoproliferative GN type 1, diffuse MPGN
58322	Dense deposit disease, MPGN type 2
58381	IgA nephropathy, Berger's disease (proven by immunofluorescence)
58382	IgM nephropathy (proven by immunofluorescence)
5834	With lesion of rapidly progressive GN
5800	Post infectious GN, SBE
5820	Other proliferative GN

SECONDARY GN/VASCULITIS

7100	Lupus erythematosus, (SLE nephritis)
2870	Henoch-Schonlein syndrome
7101	Scleroderma
28311	Hemolytic uremic syndrome
4460	Polyarteritis
4464	Wegener's granulomatosis
58392	Nephropathy due to heroin abuse and related drugs
44620	Other Vasculitis and its derivatives
44621	Goodpasture's syndrome
58391	Secondary GN, other

INTERSTITIAL NEPHRITIS/PYELONEPHRITIS

9659	Analgesic abuse
5830	Radiation nephritis
9849	Lead nephropathy
5909	Nephropathy caused by other agents
27410	Gouty nephropathy
5920	Nephrolithiasis
5996	Acquired obstructive uropathy
5900	Chronic pyelonephritis, reflux nephropathy
58389	Chronic interstitial nephritis
58089	Acute interstitial nephritis
5929	Urolithiasis
27549	Other disorders of calcium metabolism

HYPERTENSION/LARGE VESSEL DISEASE

40391	Unspecified with renal failure
4401	Renal artery stenosis
59381	Renal artery occlusion
59383	Cholesterol emboli, renal emboli

CYSTIC/HEREDITARY/CONGENITAL DISEASES

75313	Polycystic kidneys, adult type (dominant)
75314	Polycystic, infantile (recessive)
75316	Medullary cystic disease, including nephronophthisis
7595	Tuberous sclerosis
7598	Hereditary nephritis, Alport's syndrome
2700	Cystinosis
2718	Primary oxalosis
2727	Fabry's disease
7533	Congenital nephrotic syndrome
5839	Drash syndrome, mesangial sclerosis
75321	Congenital obstruction of ureterpelvic junction
75322	Congenital obstruction of uretrovesical junction
75329	Other Congenital obstructive uropathy
7530	Renal hypoplasia, dysplasia, oligonephronia
75671	Prune belly syndrome
75989	Other (congenital malformation syndromes)

NEOPLASMS/TUMORS

1890	Renal tumor (malignant)
1899	Urinary tract tumor (malignant)
2230	Renal tumor (benign)
2239	Urinary tract tumor (benign)
23951	Renal tumor (unspecified)
23952	Urinary tract tumor (unspecified)
20280	Lymphoma of kidneys
20300	Multiple myeloma
20308	Other immuno proliferative neoplasms (including light chain nephropathy)
2773	Amyloidosis
99680	Complications of transplanted organ unspecified
99681	Complications of transplanted kidney
99682	Complications of transplanted liver
99683	Complications of transplanted heart
99684	Complications of transplanted lung
99685	Complications of transplanted bone marrow
99686	Complications of transplanted pancreas
99687	Complications of transplanted intestine
99689	Complications of other specified transplanted organ

MISCELLANEOUS CONDITIONS

28260	Sickle cell disease/anemia
28269	Sickle cell trait and other sickle cell (HbS/Hb other)
64620	Post partum renal failure
042	AIDS nephropathy
8660	Traumatic or surgical loss of kidney(s)
5724	Hepatorenal syndrome
5836	Tubular necrosis (no recovery)
59389	Other renal disorders
7999	Etiology uncertain

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR MEDICARE & MEDICAID SERVICES

Form Approved
OMB No. 0938-0448

ESRD DEATH NOTIFICATION

END STAGE RENAL DISEASE MEDICAL INFORMATION SYSTEM

1. Patient's Last Name	First	MI	2. Medicare Claim Number

3. Patient's Sex	4. Date of Birth	5. Social Security Number
a. ☐ Male b. ☐ Female	__ __ / __ __ / __ __ __ __ (Month / Day / Year)	

6. Patient's State of Residence	7. Place of Death	8. Date of Death
	a. ☐ Hospital c. ☐ Home e. ☐ Other b. ☐ Dialysis Unit d. ☐ Nursing Home	__ __ / __ __ / __ __ __ __ (Month / Day / Year)

9. Modality at Time of Death

a. ☐ Incenter Hemodialysis b. ☐ Home Hemodialysis c. ☐ CAPD d. ☐ CCPD e. ☐ Transplant f. ☐ Other

10. Provider Name and Address (Street)	11. Provider Number

Provider Address (City/State)

12. Causes of Death (enter codes from list on back of form)

a. Primary Cause __ __ __

b. Were there secondary causes?

☐ No

☐ Yes, specify: __ __ __ __ __ __ __ __ __ __ __ __

C. If cause is other (98) please specify:_____

13. Renal replacement therapy discontinued prior to death: ☐ Yes ☐ No

If yes, check one of the following:

a. ☐ Following HD and/or PD access failure
b. ☐ Following transplant failure
c. ☐ Following chronic failure to thrive
d. ☐ Following acute medical complication
e. ☐ Other
f. Date of last dialysis treatment __ __ / __ __ / __ __ __ __ (Month / Day / Year)

14. Was discontinuation of renal replacement therapy after patient/family request to stop dialysis?

☐ Yes ☐ No

☐ Unknown ☐ Not Applicable

15. If deceased ever received a transplant:

a. Date of most recent transplant __ __ / __ __ / __ __ __ __ (Month / Day / Year) ☐ Unknown

b. Type of transplant received
☐ Living Related ☐ Living Unrelated ☐ Deceased ☐ Unknown

c. Was graft functioning (patient not on dialysis) at time of death?
☐ Yes ☐ No ☐ Unknown

d. Did transplant patient resume chronic maintenance dialysis prior to death?
☐ Yes ☐ No ☐ Unknown

16. Was patient receiving Hospice care prior to death?

☐ Yes ☐ No

☐ Unknown

17. Name of Physician (Please print complete name)	18. Signature of Person Completing This Form	Date

This report is required by law (42, U.S.C. 426; 20 CFR 405, Section 2133). Individually identifiable patient information will not be disclosed except as provided for in the Privacy Act of 1974 (5 U.S.C. 5520; 45 CFR Part 5a).

ESRD DEATH NOTIFICATION FORM
LIST OF CAUSES

CARDIAC
- 23 Myocardial infarction, acute
- 25 Pericarditis, incl. Cardiac tamponade
- 26 Atherosclerotic heart disease
- 27 Cardiomyopathy
- 28 Cardiac arrhythmia
- 29 Cardiac arrest, cause unknown
- 30 Valvular heart disease
- 31 Pulmonary edema due to exogenous fluid
- 32 Congestive Heart Failure

VASCULAR
- 35 Pulmonary embolus
- 36 Cerebrovascular accident including intracranial hemorrhage
- 37 Ischemic brain damage/Anoxic encephalopathy
- 38 Hemorrhage from transplant site
- 39 Hemorrhage from vascular access
- 40 Hemorrhage from dialysis circuit
- 41 Hemorrhage from ruptured vascular aneurysm
- 42 Hemorrhage from surgery (not 38, 39, or 41)
- 43 Other hemorrhage (not 38-42, 72)
- 44 Mesenteric infarction/ischemic bowel

INFECTION
- 33 Septicemia due to internal vascular access
- 34 Septicemia due to vascular access catheter
- 45 Peritoneal access infectious complication, bacterial
- 46 Peritoneal access infectious complication, fungal
- 47 Peritonitis (complication of peritoneal dialysis)
- 48 Central nervous system infection (brain abscess, meningitis, encephalitis, etc.)
- 51 Septicemia due to peripheral vascular disease, gangrene
- 52 Septicemia, other
- 61 Cardiac infection (endocarditis)
- 62 Pulmonary infection (pneumonia, influenza)
- 63 Abdominal infection (peritonitis (not comp of PD), perforated bowel, diverticular disease, gallbladder)
- 70 Genito-urinary infection (urinary tract infection, pyelonephritis, renal abscess)

LIVER DISEASE
- 64 Hepatitis B
- 71 Hepatitis C
- 65 Other viral hepatitis
- 66 Liver-drug toxicity
- 67 Cirrhosis
- 68 Polycystic liver disease
- 69 Liver failure, cause unknown or other

GASTRO-INTESTINAL
- 72 Gastro-intestinal hemorrhage
- 73 Pancreatitis
- 75 Perforation of peptic ulcer
- 76 Perforation of bowel (not 75)

METABOLIC
- 24 Hyperkalemia
- 77 Hypokalemia
- 78 Hypernatremia
- 79 Hyponatremia
- 100 Hypoglycemia
- 101 Hyperglycemia
- 102 Diabetic coma
- 95 Acidosis

ENDOCRINE
- 96 Adrenal insufficiency
- 97 Hypothyroidism
- 103 Hyperthyroidism

OTHER
- 80 Bone marrow depression
- 81 Cachexia/failure to thrive
- 82 Malignant disease, patient ever on Immunosuppressive therapy
- 83 Malignant disease (not 82)
- 84 Dementia, incl. dialysis dementia, Alzheimer's
- 85 Seizures
- 87 Chronic obstructive lung disease (COPD)
- 88 Complications of surgery
- 89 Air embolism
- 104 Withdrawal from dialysis/uremia
- 90 Accident related to treatment
- 91 Accident unrelated to treatment
- 92 Suicide
- 93 Drug overdose (street drugs)
- 94 Drug overdose (not 92 or 93)
- 98 Other cause of death
- 99 Unknown

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR MEDICARE & MEDICAID SERVICES

Form Approved
OMB No. 0938-0447

END STAGE RENAL DISEASE MEDICAL INFORMATION SYSTEM
ESRD FACILITY SURVEY (DIALYSIS UNITS ONLY)

FOR THE PERIOD

Facility Physical Address _____
(If different than mailing address) *Suite/Room* *Street* *City* *State/Zip Code*

Number of Dialysis Stations: _____ **Facility Telephone: (** **)** _____

Facility Ownership Type: ☐ **Profit** ☐ **Non-Profit**

Facility Local/National Affiliation/Chain Information _____
(i.e. Gambro, etc.)

Types of dialysis services offered:
☐ Incenter Hemodialysis ☐ Peritoneal Dialysis ☐ Home Hemodialysis Training

Does your facility offer a dialysis shift that starts at 5:00 p.m. or later?
☐ Yes ☐ No

DIALYSIS PATIENTS AND TREATMENTS

DIALYSIS PATIENTS

Patients Receiving Care Beginning of Survey Period		
Incenter	Home	Total Fields 01 thru 02
01	02	03

Additions During Survey Period				
	Started for first time ever	Restarted	Transferred from other dialysis unit	Returned after transplantation
Incenter				
Home				
	04A 04B	05A 05B	06A 06B	07A 07B

Losses During Survey Period					
Deaths	Recovered kidney function	Received transplant	Transferred to other dialysis unit	Discontinued dialysis	Other (LTFU)
08A 08B	09A 09B	10A 10B	11A 11B	12A 12B	13A 13B

Patients Receiving Care at End of Survey Period												
Incenter Dialysis		Self-Dialysis Training				Total Incenter Dialysis	Home Dialysis				Total Home Dialysis	Total Patients
Hemo-Dialysis	Other	Hemo-Dialysis	CAPD	CCPD	Other	Fields 14 thru 19	Hemo-Dialysis	CAPD	CCPD	Other	Fields 21 thru 24	Fields 20 and 25
14	15	16	17	18	19	20	21	22	23	24	25	26

Patient Eligibility Status End of Survey Period		
Currently enrolled in Medicare	Medicare application pending	Non-Medicare
27	28	29

Hemodialysis Patients Dialyzing More Than 4 Times Per Week		
Setting	Day	Nocturnal
Incenter		
Home		
	30A 30B	31A 31B

Vocational Rehabilitation			
Patients aged 18 through 54	Patients receiving services from Voc Rehab	Patients Employed full-time or part-time	Patients attending school full-time or part-time
32	33	34	35

TREATMENT AND STAFFING

Incenter Dialysis Treatments (Include Training Treatments)	
Hemodialysis	Other
36	37

Staffing				
	Number of Staff		Number of Open Pos.	
Position	Full Time	Part Time	Full Time	Part Time
a. RNs				
b. LPN/LVNs				
c. PCTs				
d. APNs				
e. Dietitians				
f. Social Workers				
	38	39	40	41

COMPLETED BY (Name)	DATE	TITLE	TELEPHONE NO.

REMARKS REGARDING INFORMATION PROVIDED ON THIS SURVEY SHOULD BE ENTERED ON THE LAST PAGE OF THE SURVEY

This report is required by law (42 USC 426; 42 CFR 405.2133). Individually identifiable patient information will not be disclosed except as provided for in the Privacy Act of 1974 (5 USC 5520; 45 CFR, Part 5a).

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR MEDICARE & MEDICAID SERVICES

Form Approved
OMB No. 0938-0447

END STAGE RENAL DISEASE MEDICAL INFORMATION SYSTEM
ESRD FACILITY SURVEY (TRANSPLANT CENTERS ONLY)

FOR THE PERIOD

KIDNEY TRANSPLANTS PERFORMED

PATIENTS TRANSPLANTED AND DONOR TYPE

TO BE COMPLETED BY KIDNEY TRANSPLANT CENTERS ONLY

Patients who received transplant at this facility	Eligibility Status of Patients Transplanted at this Facility During the Survey Period			
	Currently enrolled in Medicare	Medicare applica-tion pending	Non-Medicare	
			U.S. Res.	Other
42	43	44	45	46

Transplant Procedures Performed at This Facility			
Living Related Donor	Living Unrelated Donor	Deceased Donor	Total Fields 47 thru 49
47	48	49	50

Patients Awaiting Transplant	
Dialysis	Nondialysis
51	52

REMARKS/COMMENTS

COMPLETED BY (Name)	DATE	TITLE	TELEPHONE NO.

This report is required by law (42 USC 426; 42 CFR 405.2133). Individually identifiable patient information will not be disclosed except as provided for in the Privacy Act of 1974 (5 USC 5520; 45 CFR, Part 5a).

1 Grand Canyon National Park, Arizona; Ron Thomas
2 Snake River, Grand Teton National Park, Wyoming; Ansel Adams (public domain)
3 Bryce Canyon National Park, Utah; Luca Galuzzi
4 Glacier Bay National Park, Alaska; Randy Roach
5 Arches National Park, Utah; Cedric Gouyvenoux

6 Misty Fjords National Monument, Alaska; zarxox
7 Glacier National Park, Montana; Ken Thomas
8 Glacier National Park, Montana; Acroterion
9 Appalachian Mountains; Ken Canning
10 Antelope Canyon, Lake Powell Navajo Tribal Park, Arizona; Moondigger

11 Mount McKinley, Denali National Park, Alaska; BillC
12 Grand Teton National Park, Wyoming; Ansel Adams (public domain)
13 Zion National Park, Utah; Tobias Alt
14 Denali National Park, Alaska; dubhe
15 Grand Prismatic Spring, Yellowstone National Park, Wyoming; David Monniaux

16 Split Rock State Park, Minnesota; Alexander King
17 Arches National Park, Utah; Sanjay Acharya
18 Crater Lake National Park, Oregon; Markgorzynski
19 Mesa Verde National Park, Colorado; Tobi87
20 Redwood National Park, California; HadelProductions

21 Arches National Park, Utah; Kennethhung
22 Mount Rainier National Park, Washington; Stan Shebs
23 Mount McKinley, Denali National Park, Alaska; Sbork
24 Monument Valley, Navaho Tribal Park, Utah; Christian Mehlführer
25 Grand Canyon National Park, Arizona; Nick Schlax
26 Bryce Canyon National Park, Utah; Moondigger
27 Havasu Falls, Grand Canyon National Park, Arizona; phototropic
28 Acadia National Park, Maine; Pakko
29 North Cascades National Park, Washington; Walter Siegmund
30 Mount McKinley, Denali National Park, Alaska; Nic McPhee

This year's ADR is framed by a theme of preservation and conservation, using images from one of the most important preservation initiatives in the United States: the national parks. These parks, visited by millions of people each year, serve as spiritual places in which people may consider how precious life is and the challenges faced in maintaining it. We hope the emotional connections created through images of these breathtaking landscapes help give readers a broader perspective on kidney disease.

colophon