

chapter **THREE**

patient characteristics

When we try to pick out anything by itself we find that it is bound fast by a thousand invisible cords that cannot be broken, to everything in the universe.

John Muir, journal, July 1969

USING DATA FROM THE MEDICAL EVIDENCE (ME) FORM, THE USRDS TRACKS PATIENT DATA AT THE START OF ESRD TREATMENT, ASSESSING CHANGING DEMOGRAPHIC CHARACTERISTICS AND ACCESS TO CARE. A REVISED FORM WAS INTRODUCED IN 2005, WITH NEW INFORMATION

on vascular access use at the first outpatient dialysis treatment as well as on care received prior to ESRD from nephrologists and nutritional counselors.

We have previously reported on the high use of catheters at the first outpatient hemodi-

alysis treatment, and on concerns related to the association between a lack of pre-ESRD nephrologist referral and higher mortality in the first year of treatment. On the next page we illustrate the marked differences between the access used at the first outpatient dialysis treatment and time under pre-ESRD nephrologist care. Among patients who have seen a nephrologist for more than a year, fewer than half use a catheter; these patients also have the greatest likelihood at initiation of having an arteriovenous fistula or a maturing internal access.

These findings demonstrate that a planned transition to ESRD can be achieved through active coordination of care. Evidence provided elsewhere in this ADR on the risks associated with catheters makes a compelling case for use of the Chronic Kidney Disease Education benefit for Medicare beneficiaries. Nephrologists understand the consequences of late referral and catheter use; this may not, however, be the case for primary care providers. Late and inadequate preparation for ESRD may contribute to the causal pathway for early morbidity and mortality of CKD patients who advance to ESRD.

Also in this chapter, we show that the level of anemia correction after dialysis initiation has slowed, with the rise in hemoglobin levels now similar to that seen in 2005 — a notable change. There has also been a shift in the pre-ESRD use of erythropoiesis stimulating agents (ESAs), with a continued decline since 2004. This appears to have led to more patients starting dialysis with a hemoglobin below that recommended by clinical practice guidelines and FDA targets; one in two new patients now begins dialysis with a hemoglobin of less than 10 g/dl. Providers and patients are now in a challenging position. For more than 20 years, transfusion avoidance — to reduce iron overload and the sensitization of potential transplant candidates — has been a mainstay of anemia treatment. And because hemoglobin levels greater than 12 g/dl have been associated with adverse risks of cardiovascular and cerebrovascular events, guidelines and payment policies have also been directed at minimizing these risks. These efforts, however, may have unintended consequences among late-



stage CKD patients nearing ESRD therapy, with a lack of anemia treatment increasing the potential for transfusions and for complications such as fluid overload, congestive heart failure, and, rarely, hyperkalemia. The risks associated with both high and low hemoglobin levels require careful consideration, with more research needed to understand the potential hazards of anemia treatment during the transition from CKD to ESRD.

Criteria for starting dialysis therapy have evolved over time, with primary indications being uremia symptoms such as nausea, vomiting, weight loss, pruritus, myoclonic jerks, acidosis, hyperkalemia, and mental confusion. These criteria became more dependent on serum creatinine and estimated glomerular filtration rate (eGFR) when creatinine and BUN measures were added to the ME form in 1995. At that time, criteria for initiating dialysis included an eGFR of 15 ml/min/1.73 m² for patients with a primary diagnosis of diabetes, and an eGFR of 10 for other patients (translating to serum creatinine levels of 6 and 8 mg/dl, respectively).

Use of the MDRD equation to estimate GFR in ESRD patients has not been validated, since a large fraction of creatinine excretion may be non-renal, falsely elevating the estimates. This year we use both the MDRD equation and the new CKD-EPI equation to estimate GFR, and show that the latter results in both a lower eGFR and the elimination of major differences by age.

Regardless of the formula used, however, it is clear that over the past 15 years there has been a steady rise in eGFR at the initiation of therapy. Some have questioned whether many of these patients should have been

placed on dialysis or, alternatively, if the influx of patients with higher eGFRs may represent sicker individuals who in the past would not have survived to ESRD. Striking is the fact that the increased eGFRs occur across all age, gender, and racial groups, suggesting that this is not simply an issue for an older and sicker population.

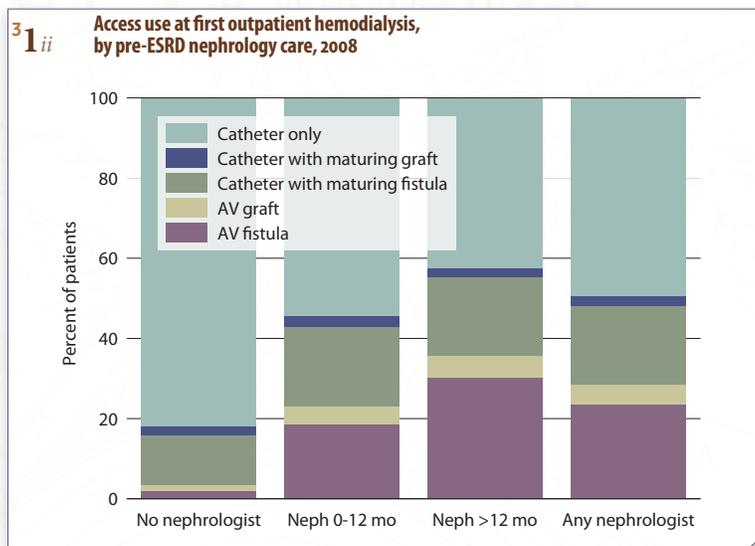
We conclude with further laboratory data from the ME form (showing, for example, that approximately 80 percent of patients with diabetes have a glycosylated hemoglobin level below 8 percent at initiation), and with new information on patients informed of their transplant options as they begin dialysis therapy. Compared to those not receiving this information, informed patients are twice as likely to be placed on the transplant wait list.

✦ **FIGURE 3.1;** see page 472 for analytical methods. *Incident hemodialysis patients, 2008.*

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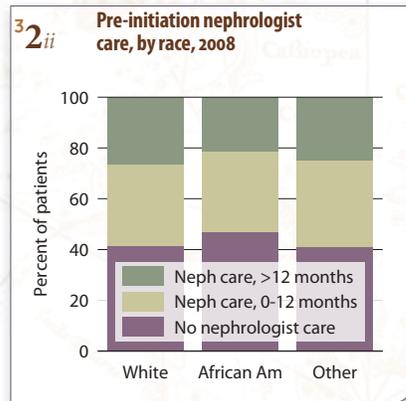
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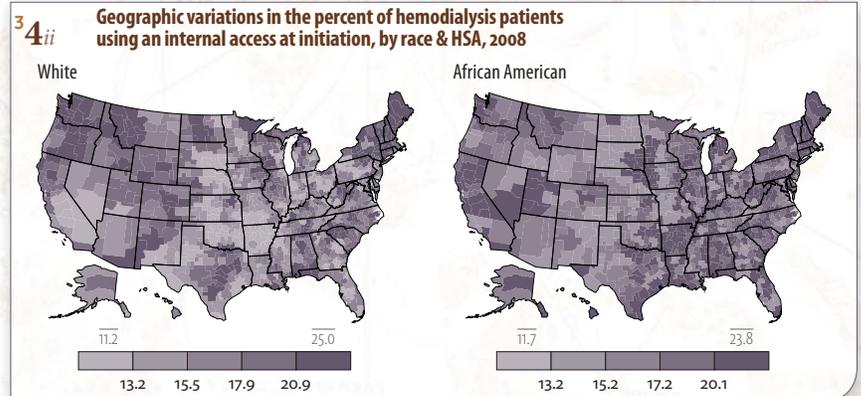
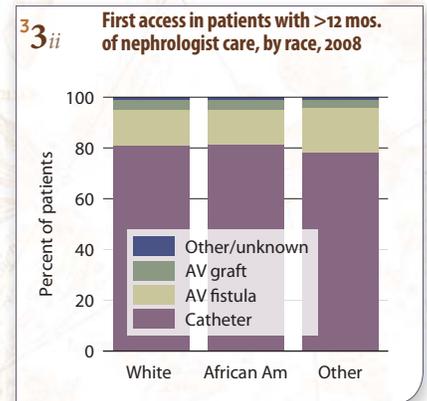
Among patients beginning ESRD therapy in 2008, 43.7 percent had not seen a nephrologist prior to initiation. Of those with no pre-nephrologist care, 89.0 percent initiated with a catheter and only 2.6 percent had a fistula; 12.3 percent had a maturing internal access. Patients with more than one year of pre-ESRD nephrologist care, in contrast, were far more likely to initiate with a fistula, at 25 percent. † **TABLE 3.A**; see page 472 for analytical methods. *Incident ESRD patients, 2008.*

3 a ii Pre-ESRD nephrologist care (column percent), 2008			
	None	0–12 mo.	>12 mo.
All	43.7	31.8	24.5
Mean age	61.6	62.7	63.2
Female	43.2	43.9	43.8
Race			
White	62.7	65.8	69.9
African American	30.8	28.0	24.2
Native American	1.1	1.2	1.2
Asian	4.4	5.0	4.5
Hispanic	16.2	13.5	10.3
Access at initiation			
Catheter	89.0	69.1	55.0
Fistula	2.6	15.9	25.0
Graft	1.3	3.9	4.5
Maturing fistula	10.4	17.5	16.6
Maturing graft	1.9	2.5	2.2
ESA use	2.5	39.2	50.4
Dietary care	0.2	15.4	18.3
eGFR (ml/min/1.73 m ²)			
<5	10.0	5.8	5.3
5–<10	37.3	38.3	40.2
10–<15	28.3	35.2	35.4
≥15	18.7	18.6	16.9
DM (comorbidity)	48.6	56.1	53.5
Primary diagnosis			
Diabetes	39.0	49.0	46.4
Hypertension	29.4	27.5	25.7
Glomerulonephritis	5.0	6.7	9.5
Cystic kidney	1.0	2.5	4.7

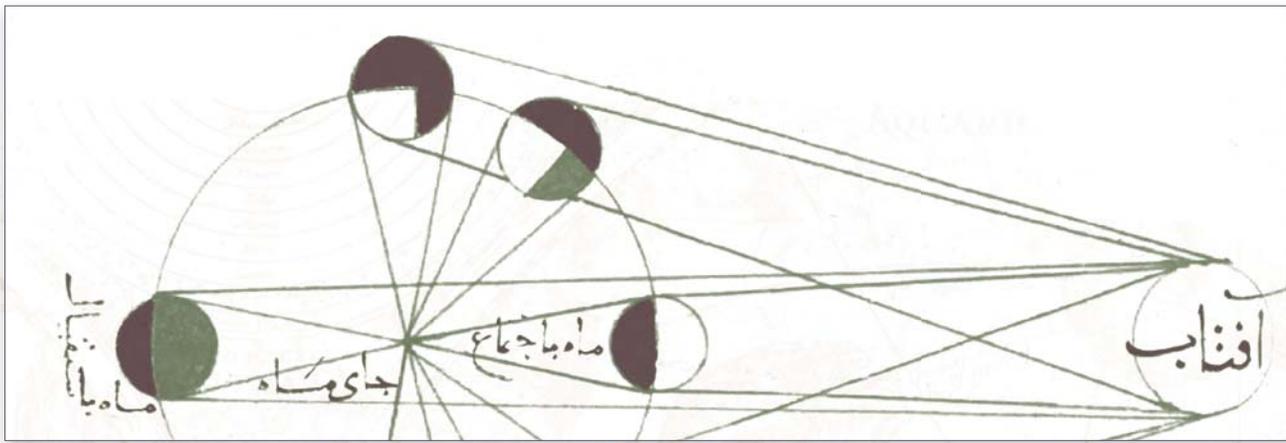
Forty-seven percent of African American patients receive no nephrologist care before beginning ESRD therapy, compared to 41.4 percent of white patients. Twenty-six percent of whites, in contrast, receive more than 12 months of nephrologist care prior to ESRD, compared to 21.2 percent of African Americans. † **FIGURE 3.2**; see page 472 for analytical methods. *Incident ESRD patients, 2008.*



Among patients who receive more than 12 months of nephrologist care prior to ESRD, the percentage beginning therapy with an arteriovenous (AV) fistula is 26.4 for African Americans, 30.3 for whites, and 33.0 among patients of other races. Use of grafts is greatest among African Americans, at 7.4 percent compared to 4.0–4.6 percent for whites and patients of other races. † **FIGURE 3.3**; see page 472 for analytical methods. *Incident hemodialysis patients, 2008.*

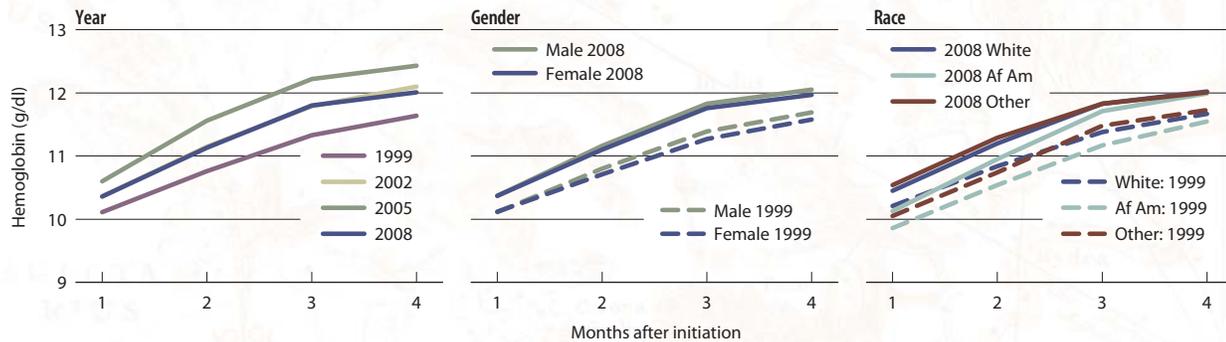


In 2008, the percentage of hemodialysis patients starting ESRD with either an arteriovenous (AV) fistula or AV graft varied considerably across the country among both whites and African Americans. In the lower quintile, an average of 11.2 and 11.7 percent, respectively, initiated treatment with an internal access. Means in the upper quintile were 25.0 and 23.8 percent. By location, the highest percentage of whites with an internal access occurred in areas of the Pacific Northwest and in parts of Arizona, New Mexico, Texas, and upper New England. Among African Americans, patients who resided in portions of California, Nevada, Utah, and scattered areas ranging from the Gulf Coast through the Mid-Atlantic states and into parts of New England were the most likely to begin therapy with an internal access. † **FIGURE 3.4**; see page 472 for analytical methods. *Incident hemodialysis patients, 2008.*

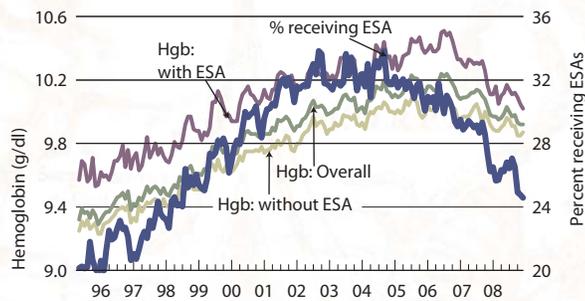


ANEMIA & TREATMENT

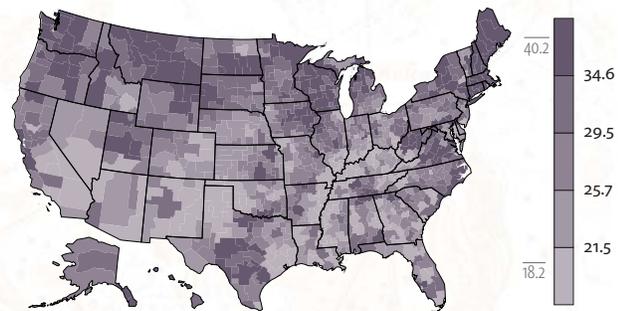
3.5ii Hemoglobin after initiation, by year, gender, & race



3.6ii Mean hemoglobin at initiation, by pre-ESRD ESA treatment



3.7ii Geographic variations in the percentage of patients receiving ESAs at initiation, by HSA, 2007–2008



Hemoglobin levels after initiation rise in the first three months of dialysis, then level off as patients reach the KDOQI target of 11–12 g/dl. In 2008, for example, incident dialysis patients initiated with an average hemoglobin of 10.4 g/dl; by month four average levels reached 12.0.

In 2008, month one hemoglobin levels were the same in males and females, at 10.4 g/dl, and reached 12.1 and 12.0, respectively, at month four. Levels were also similar across races through the first four months of dialysis, starting at 10.1–10.5 g/dl in month one, and reaching, for all races, 12.0 in month four.

In the incident ESRD population, the mean hemoglobin at initiation has continued to fall from its peak in 2006, reaching

9.92 g/dl overall, 10.02 for patients receiving pre-ESRD treatment with an erythropoiesis stimulating agent (ESA), and 9.87 for patients without ESA treatment. The percentage of patients receiving pre-ESRD ESAs fell to 24.6 percent at the end of 2008.

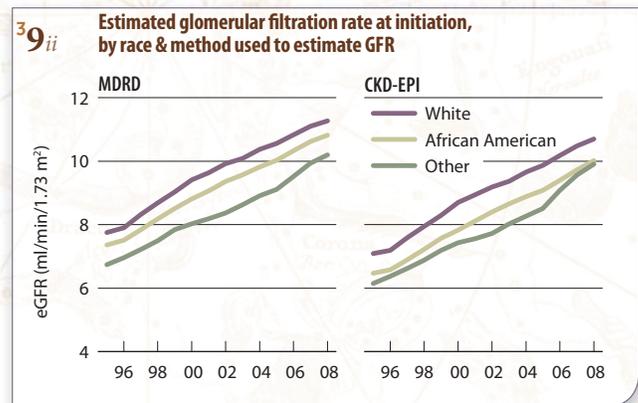
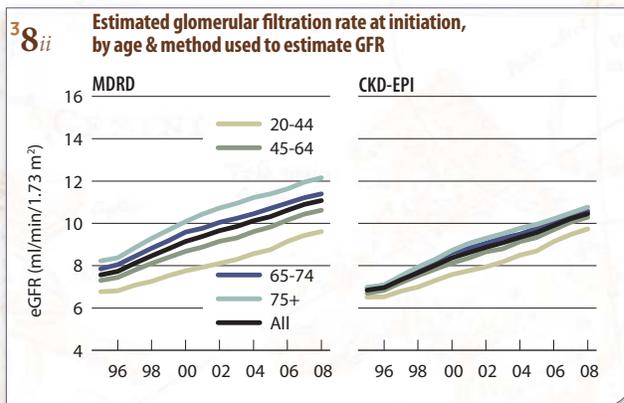
The percentage of patients receiving ESAs prior to initiation is highest for those residing in the northern tier of states, portions of New England and Texas, and throughout the Mid-Atlantic states, averaging 40.2 percent in the upper quintile.

✦ **FIGURES 3.5–7;** see page 472 for analytical methods. *Incident dialysis patients (3.5); incident ESRD patients (3.6–7).*

Among new ESRD patients, initial hemoglobin levels vary little by race, with a range of just 9.7–10.1 g/dl. Creatinine values, in contrast, range from 5.8 mg/dl among whites to 7.3 among African Americans, while cholesterol levels range from 152 mg/dl to 165 in the same two populations. By primary diagnosis, initial eGFR is lowest, and cholesterol and triglycerides are highest, among patients with glomerulonephritis. † **TABLE 3.B**; see page 472 for analytical methods. *Incident ESRD patients, 2008.*
 *A1c data include only patients with diabetes as their primary diagnosis or as a comorbidity.

3bii Mean laboratory values at initiation, by age, gender, race, ethnicity, & primary diagnosis, 2008

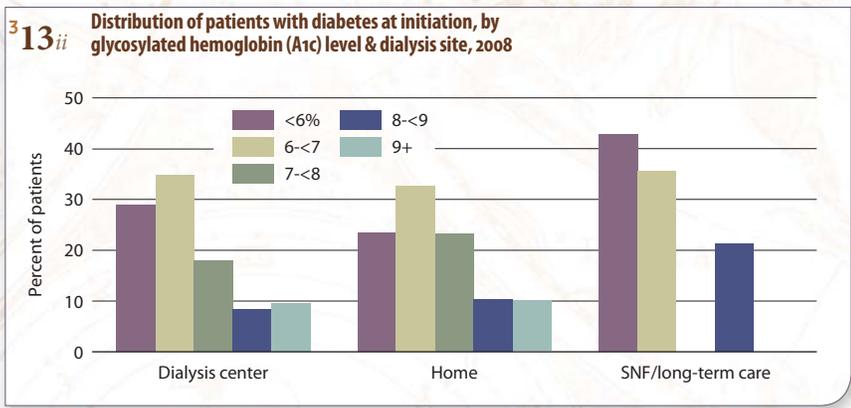
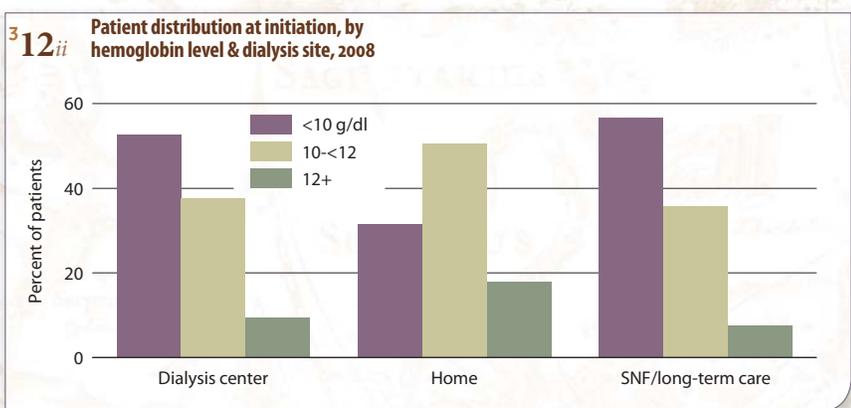
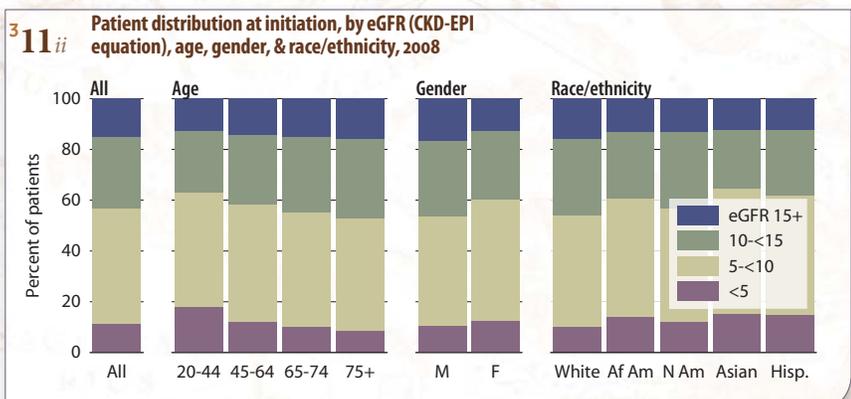
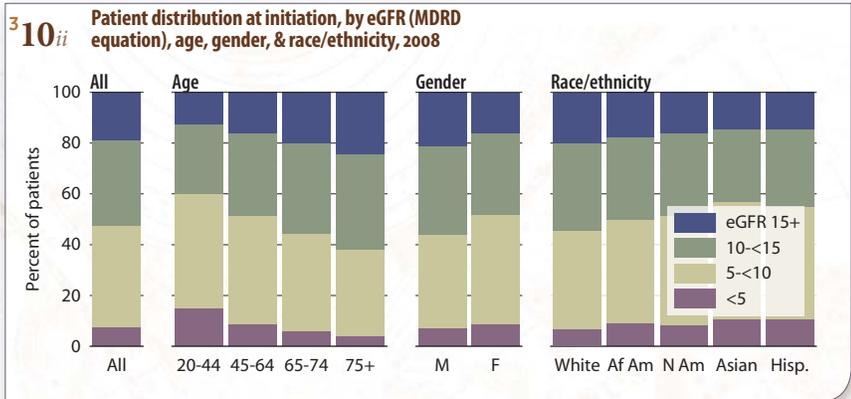
	eGFR (ml/min/1.73 m ²)	Creatinine (mg/dl)	Hemoglobin (g/dl)	Cholesterol (mg/dl)	Triglycerides (mg/dl)	A1c* (%)
20-44	9.6	8.3	9.7	174.2	172.6	7.4
45-64	10.6	6.7	9.9	162.3	165.7	7.3
65-74	11.4	5.8	10.0	149.0	150.0	7.2
75+	12.2	5.2	10.1	141.9	132.8	6.8
Male	11.5	6.8	10.0	148.6	152.0	7.1
Female	10.6	5.7	9.9	166.8	160.8	7.2
White	11.3	5.8	10.1	152.0	161.7	7.1
African American	10.8	7.3	9.7	164.9	139.8	7.4
Native American	10.6	6.2	9.9	152.8	158.8	7.5
Asian	10.1	6.6	10.0	162.6	163.6	6.9
Hispanic	10.3	6.7	9.9	159.4	164.8	7.2
Diabetes	11.6	5.8	9.9	155.4	156.6	7.5
Hypertension	10.9	6.5	10.0	152.6	143.9	6.6
Glomerulonephritis	9.7	7.6	10.1	175.8	176.1	6.5
Cystic kidney	9.9	6.7	10.6	159.3	159.8	6.3
All	11.1	6.3	10.0	156.3	155.7	7.2



The Modification of Diet in Renal Disease (MDRD) equation has routinely been used to estimate glomerular filtration rates (eGFRs). The National Institute of Diabetes and Kidney Diseases (NIDDK) recently funded efforts to develop a new estimating formula, resulting in the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation.

Across age groups it appears that MDRD GFR estimates are higher in most instances — 5.9 percent overall — and show more disparity between age groups when compared to esti-

mates using the CKD-EPI equation. Regardless of the method of calculation, patients age 20–44 have the lowest eGFRs at initiation, at 9.6–9.7 ml/min/1.73 m², while eGFR generally increases with age in patients 45 and older. Comparisons by race show that MDRD eGFRs for whites, African Americans, and other races are slightly higher than those calculated using CKD-EPI, at 11.3, 10.8, and 10.2 ml/min/1.73 m² versus 10.7, 10.0, and 9.9, respectively. † **FIGURES 3.8–9**; see page 472 for analytical methods. *Incident ESRD patients, 2008.*



Compared to estimates using the CKD-EPI equation, and across most age, race, and ethnicity categories, the MDRD equation shows fewer patients having an estimated glomerular filtration rate (eGFR) less than 10 ml/min/1.73 m² at initiation, and more with an eGFR of 10 or higher. The percentage of new patients with an eGFR equal to or exceeding 15 ml/min/1.73 m², for example, is 18.9 with the MDRD equation, compared to 14.9 with the CKD-EPI equation. And nearly one in five patients age 75 and older has an eGFR above 15 when the MDRD equation is used, compared to 16 percent using CKD-EPI. + FIGURES 3.10-11; see page 472 for analytical methods. Incident ESRD patients, 2008.

Patients initiating therapy at dialysis centers or long-term care facilities are the most likely to begin treatment with less than optimal hemoglobin levels. In 2008, 53-57 percent of these patients had a hemoglobin of less than 10 g/dl; only 8-10 percent began therapy with a hemoglobin of 12 or above. Sixty-nine percent of home dialysis patients, in contrast, started with a hemoglobin of 10 g/dl or higher. + FIGURE 3.12; see page 472 for analytical methods. Incident dialysis patients, 2008.

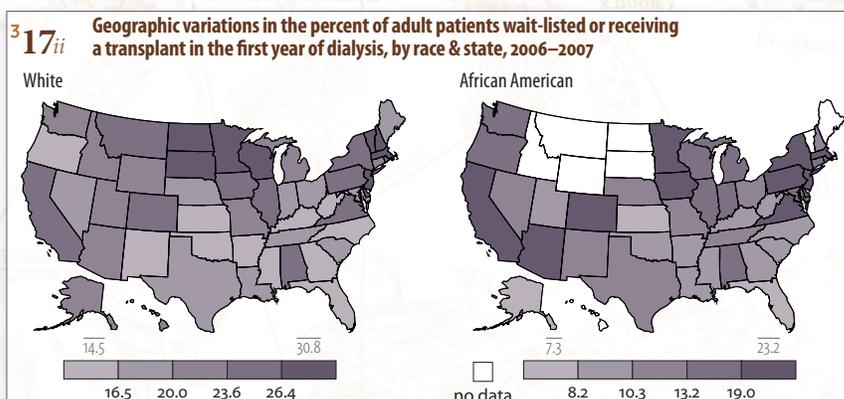
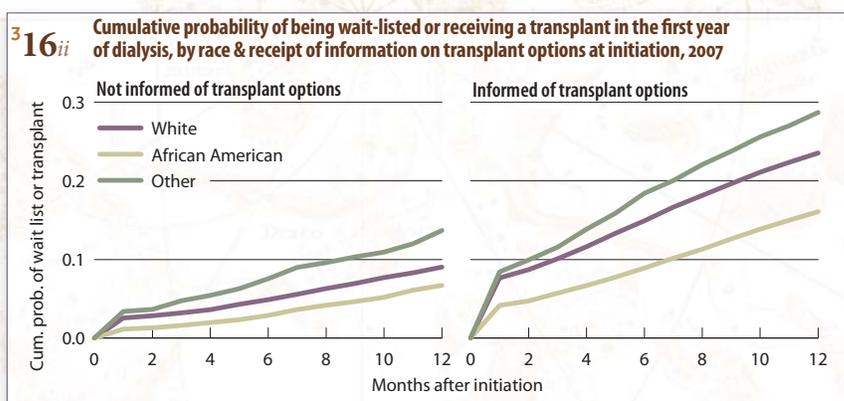
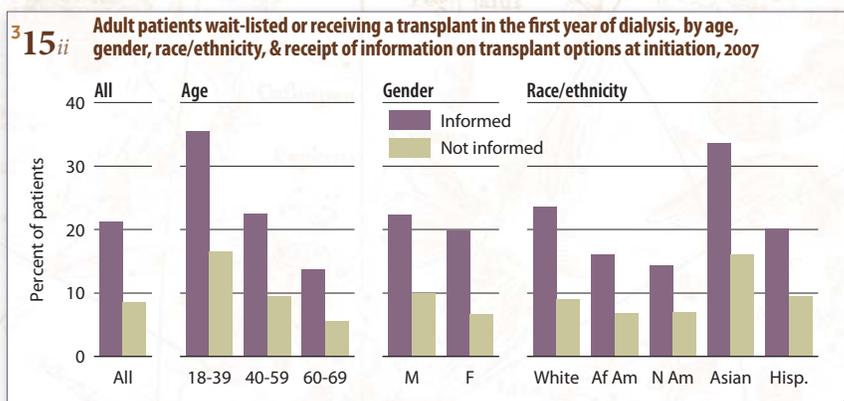
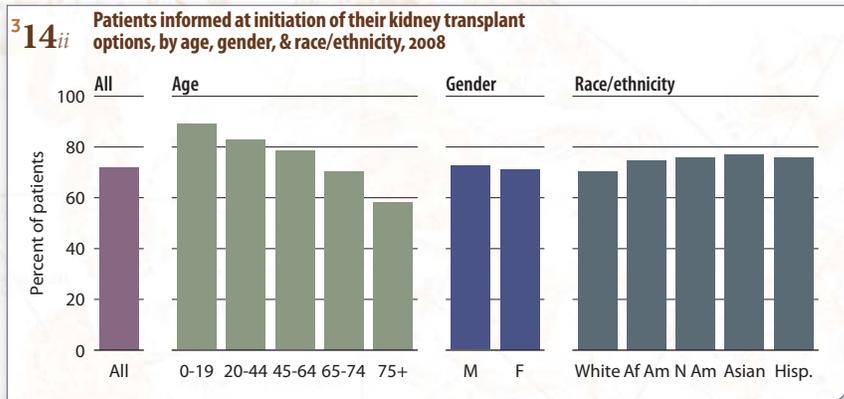
Glycosylated hemoglobin (A1c) levels above 7 percent indicate poorly controlled diabetes. Among 2008 incident dialysis patients with diabetes and receiving care at a dialysis center, 36 percent initiated with an A1c of 7 percent or above; among patients receiving their dialysis at home, this number rose to nearly 44 percent. + FIGURE 3.13; see page 472 for analytical methods. Incident dialysis patients with diabetes, 2008.

In 2008, 72 percent of new ESRD patients were informed of their kidney transplant options. The likelihood of receiving this information at the start of ESRD therapy falls steadily by age (from 89 percent of pediatric patients to 58 percent of those age 75 and older), differs little by gender, and, by race/ethnicity, ranges from 71 percent among whites to 77 percent among Asians. **FIGURE 3.14**; see page 472 for analytical methods. *Incident ESRD patients, 2008.*

Of adult patients informed of their transplant options at the start of ESRD therapy, 21.3 percent are wait-listed or receive a transplant in the first year of dialysis, compared to just 8.5 percent of those receiving no such information. Across patient groups, those informed of their transplant options at initiation are 2.1–3.0 times more likely to be wait-listed or transplanted in the first year. **FIGURE 3.15**; see page 472 for analytical methods. *Incident ESRD patients age 18–69, 2007.*

The probability of a patient appearing on the kidney transplant wait list or receiving a transplant in the first year of dialysis is considerably higher in those informed of their transplant options prior to initiation, reaching 0.16, 0.24, and 0.29 at month 12 for African Americans, whites, and patients of other races, respectively, compared to 0.07, 0.09, and 0.14 among those receiving no information on transplant options. **FIGURE 3.16**; see page 472 for analytical methods. *Incident ESRD patients age 18–69, 2007.*

In 2006–2007, the highest percentages of whites wait-listed or receiving a kidney transplant in the first year of dialysis therapy were reported in the Upper Midwest and parts of New England; for African Americans, the highest percentages were reported in Minnesota, Iowa, Massachusetts, New York, Delaware, Virginia, Colorado, Arizona, and California. **FIGURE 3.17**; see page 472 for analytical methods. *Incident ESRD patients age 18–69, 2006–2007; state is state of patient's primary residence.*

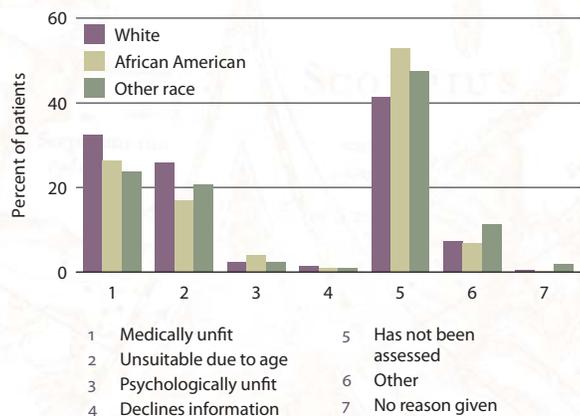


3 Cii Adult patients wait-listed or transplanted in the first year of dialysis, by receipt of information on transplant options at initiation, 2007

	Informed (N)	% on wait list or tx	Not informed (N)	% on wait list/tx
18-39	7,065	35.5	1,408	16.6
40-59	25,921	22.4	6,968	9.4
60-69	18,323	13.7	6,774	5.6
Male	29,336	22.3	8,522	9.9
Female	21,974	19.8	6,628	6.7
White	30,202	23.6	9,237	9.1
African American	17,974	16.1	5,144	6.7
Native American	733	14.3	181	6.9
Asian	2,308	33.6	571	16.0
Diabetes	25,060	16.8	7,361	7.2
Hypertension	11,809	18.0	3,330	7.7
Glomerulonephritis	4,384	41.7	846	18.6
Cystic kidney/hereditary dis.	1,581	55.4	195	37.0
No nephrology care	15,930	13.2	5,900	6.2
Nephrology care 0-12 mos	17,810	23.5	4,401	10.6
Nephrology care >12 mos	12,114	31.5	2,476	11.5
Catheter	29,794	16.0	10,701	6.4
Catheter/maturing fistula	8,119	20.7	2,076	8.0
AV fistula	6,979	31.0	1,333	12.2
AV graft	1,668	19.6	420	6.4
All	51,310	21.3	15,150	8.5

This table provides additional detail on patients wait-listed or transplanted in the first year of dialysis, by whether or not they are informed of their transplant options at initiation. One-third of Asian patients who receive this information, for example, are listed or transplanted in the first year, compared to just 16 percent of those not informed. Among female patients, the percentage listed or transplanted is three times greater for those who are informed, at 19.8 compared to 6.7. † **TABLE 3.C**; see page 472 for analytical methods. Incident ESRD patients, age 18-69, 2007.

3 18ii Reasons for not being informed at ESRD initiation of kidney transplant options, by race, 2008



Of new patients in 2008 who were not informed of their transplant options at initiation, 41.3 and 52.9 percent of whites and African Americans, respectively, were not assessed for transplantation. Nearly one-third of whites were determined to be medically unfit, compared to 26.4 and 23.8 percent of African Americans and patients of other races. And nearly 26 percent of white patients not informed of their transplant options at the start of therapy were classified as unsuitable due to age, compared to 17 percent of African Americans. † **FIGURE 3.18**; see page 472 for analytical methods. Incident ESRD patients, 2008.

Forty-seven percent of African American patients receive no nephrologist care before beginning ESRD therapy, compared to 41.4 percent of white patients. **FIGURE 3.2**

Of new patients in 2008 with no pre-ESRD nephrologist care, 89.0 percent initiated with a catheter, and only 2.6 percent with a fistula. **TABLE 3.A**

In the incident ESRD population, the mean hemoglobin at initiation has continued to fall from its peak in 2006, reaching 9.92 g/dl overall, 10.02 for patients receiving pre-ESRD treatment with an erythropoiesis stimulating agent, and 9.87 for patients without ESA treatment. **FIGURE 3.6**

Creatinine values at initiation range from 5.8 mg/dl among whites to 7.3 among African Americans, while cholesterol levels range from 152 mg/dl to 164.9 in the same two populations. **TABLE 3.B**

Across age groups, MDRD GFR estimates tend to be higher — 5.9 percent overall — and show more disparity between age groups when compared to estimates using the CKD-EPI equation. **FIGURES 3.8–9**

In 2008, 72 percent of new patients were informed of their kidney transplant options. **FIGURE 3.14**

Of adult patients informed of their transplant options at the start of ESRD therapy, 21.3 percent are wait-listed or receive a transplant in the first year of dialysis, compared to just 8.5 percent of those receiving no such information. **FIGURE 3.15**