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Glacier Bay National Park, Alaska

IDENTIFICATION & CARE OF PATIENTS WITH CKD

2012
USRDS
Annual
DATA
REPORT

volume
1
CKD

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Sit and be still
until in the time
of no rain you hear
beneath the dry wind's
commotion in the trees
the sound of flowing
water among the rocks,
a stream unheard before,
and you are where
breathing is prayer.

WENDELL BERRY,
"Sabbaths 2001"

The identification of CKD is a significant challenge, as most datasets lack the biochemical data that provide the greatest precision in identifying the disease. And while random samples such as the NHANES dataset contain biochemical information, as shown in Chapter One, they rarely include event rates or economic data, making it difficult to evaluate access to care for this high-risk population, or to examine adverse events in patients with CKD, diabetes, and cardiovascular disease.

The USRDS uses several datasets to assess the recognized CKD population based on reported diagnosis codes, including the general Medicare 5 percent sample, with an average of 1.2 million individuals each year, and several employer group health plan (EGHP) populations which together total 25 million enrollees. The Thomson Reuters MarketScan dataset (20 million enrolled lives) contains data from 40 Fortune 100 companies, 80 percent of which are self-insured, and has information on claims for services but no laboratory data. We also employ data from United Health Group's Ingenix i3 LabRx dataset, with information on 5.6 million lives per year from employers that are 20 percent self-insured. This dataset contains provider charges but no paid claims; it does, however, contain biochemical data provided by contract laboratories in the United Healthcare system on approximately 20 percent of the covered lives. Other ordered labs can be tracked, but results are not available.

The mean age of the period prevalent Medicare population age 65 and older is 75.3 overall, and 77.9 for those with CKD — a contrast to the EGHP population, at 44.3 and 52.5, respectively, for MarketScan patients, and 42.9 and 51.5 for those in the Ingenix i3 dataset. As expected, disease prevalence is lower for the younger EGHP patients. Interesting, however, is the similar disease burden in the MarketScan and Ingenix i3 populations, which, though associated with two very different sets of employers with different health plan payment systems, have similar degrees of diabetes, hypertension, congestive heart failure, and cancer. The 5–6 times greater burden of cancer among CKD patients in these younger populations has received little attention.

New stage-specific ICD-9-CM codes (585.x) were introduced in the fall of 2005, providing an opportunity to track populations with reported diagnosis codes over time. CKD is also defined through codes for diabetes (250.4x) and hypertension (403.9x), and through codes specific to kidney disease, such as glomerular disease (583.x). Definition of the total recognized CKD population must therefore take into consideration a variety of codes beyond the 585.x series.

The recognized prevalent CKD population has been growing rapidly since 2003, a year after the new CKD stage classification system was published. Stage-specific codes are now being used more frequently, and use of the 585.9 code — for unknown/unspecified stage — has been falling. CKD of Stages 3 and 4 continues to increase, particularly among black/African American patients. This growth represent greater recognition of the disease, as the true burden shown in the NHANES estimates has changed only slightly, and levels identified using claims data are far higher than those using only the combined 585 codes.

The testing of patients at high risk for kidney disease has long been a focus of the USRDS, and has been added as well to the Healthy People 2020 goals developed by the Department of Health and Human Services (see the HP2020 chapter in Volume Two). But while testing for urine albumin has been recommended by the American Diabetes Association for some time, there has been slow progress in its use. In 2010, for example, just one in three patients with diabetes alone, and one in 20 patients with hypertension alone, received a urine albumin test; for patients

with both diabetes and hypertension, the rate was still less than 40 percent. Serum creatinine testing, in contrast, was used in 77–93 percent of patients. Serum creatinine tests, however, are frequently part of a panel of tests, so their use may not represent an active assessment of kidney function. Because urine albumin testing must be ordered separately, it may represent a true intent to assess kidney disease. Recent papers addressing the risk stratification of kidney disease use both the urine albumin/creatinine ratio and the estimated glomerular filtration rate, emphasizing that both tests are needed to fully assess kidney disease and its associated risks of death and progression to ESRD (Lancet 2010).

Data on physician care show that patients are far more likely to visit a primary care physician or cardiologist than a nephrologist after a CKD diagnosis. This may relate to concerns of primary care physicians that they will lose contact with patients as specialists assume aspects of care; it may also be difficult for patients to navigate what is for them a new dimension of care. Consultations within the hospital setting may present fewer barriers, an idea which should receive future assessment. Regardless of the possible reasons, nephrologists are seen by only one-third of patients with recognized CKD, a number similar within the Medicare system and the EGHPs. Among those with more advanced CKD (Stage 3 or higher), in contrast, 60 percent visit a nephrologist. It will be important to assess any differences in treatment among the referred and non-referred populations, and ways in which these differences might affect adverse outcomes.
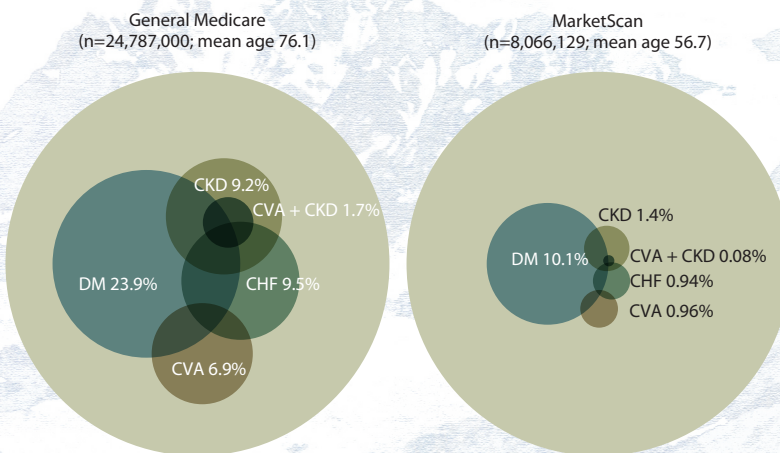
Among both Medicare Part D enrollees and their younger MarketScan counterparts, approximately 60 percent of those with CKD and diagnosed diabetes receive an ACEI/ARB/renin inhibitor. Beta blocker use reaches 71–77 percent for patients with congestive heart failure and 59–73 percent in those with hypertension; the very high rates of cardiovascular events and of sudden death among CKD patients may provide a background for studies assessing the value of beta blockers across the board in the CKD population. Dihydropyridine calcium channel blockers are far more widely used to treat hypertension and cardiovascular disease in the MarketScan population than in Medicare Part D enrollees, and potassium-sparing diuretics or combination products are rarely used in CKD patients. Thiazide and loop diuretics, in contrast, receive much wider use in both populations.

Given the progressive clinical problems with fluid overload and hypertension in patients with Stage 4–5 CKD, it is puzzling to note in these patients the reduced use of ACEI/ARBs, drugs well known to help heart failure. Unfortunately, concerns about lower eGFRs and possible hyperkalemia have led physicians to reduce the use of these medications. More research is needed into the causes of lowered utilization of ACEIs/ARBs to determine the risks and benefits with advancing CKD.

The identification and care of CKD patients is very complex. Disparities do exist and should be addressed, as these patients have very high event rates and high rates of progression to ESRD, making them a costly and multifaceted population. **» Figure 2.1;** see page 141 for analytical methods. *Point prevalent general (fee-for-service) Medicare patients age 65 & older; point prevalent MarketScan patients age 50–64. Diabetes, CKD, CHF, & CVA determined from claims.*

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Distribution of point prevalent general Medicare (age 65 & older) & MarketScan (age 50–64) patients with coded diabetes, CKD, CHF, & CVA, 2010

General Medicare
(n=24,787,000; mean age 76.1)

CKD 9.2%
CVA + CKD 1.7%
DM 23.9%
CHF 9.5%
CVA 6.9%

MarketScan
(n=8,066,129; mean age 56.7)

CKD 1.4%
DM 10.1%
CVA + CKD 0.08%
CHF 0.94%
CVA 0.96%

This table presents descriptive data on patients in the three datasets used throughout Volume One of the ADR: the 1.2 million Medicare patients age 65 and older in the 5 percent sample, the 20.2 million patients age 20–64 in the MarketScan database, and the 5.6 million, also age 20–64, in the Ingenix i3 database. Information on race and ethnicity is not available in the MarketScan and Ingenix i3 data.
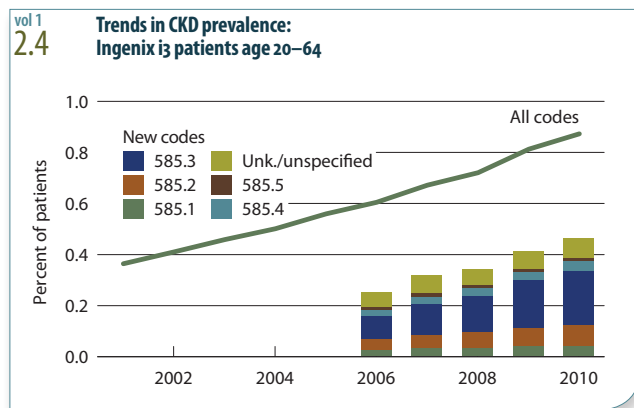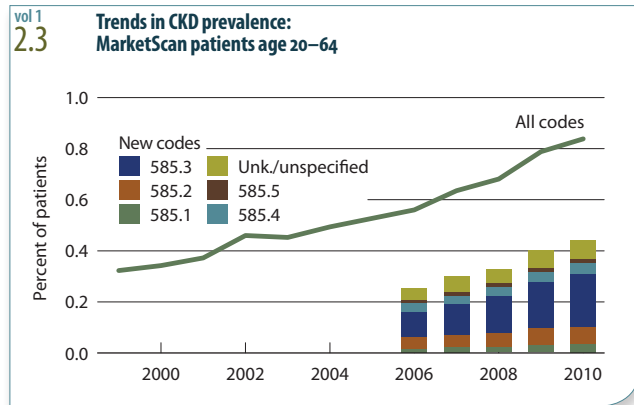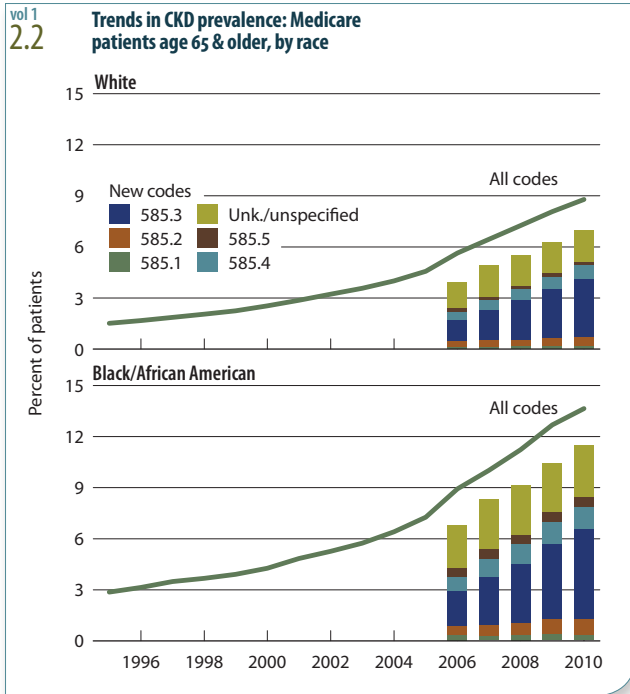
Data on comorbidity in part reflect the older age of the Medicare population. Ninety-two percent of Medicare CKD patients, for example, have hypertension, compared to 61.4 and 66.9 percent, respectively, of those in the MarketScan and Ingenix i3 databases. Thirty-two percent of Medicare CKD patients have congestive heart failure, compared to 8.6 and 7.4 percent in the MarketScan and Ingenix i3 populations. And the rate of cancer in Medicare CKD patients is 17.9 percent, compared to 13.7 and 12.4 percent, respectively, in MarketScan and Ingenix i3 patients. **» Table 2.a;** see page 141 for analytical methods. *Period prevalent patients 2010, without ESRD, age 65 & older (Medicare) & 20–64 (MarketScan & Ingenix i3).*

vol 1 2.a Descriptive parameters of CKD datasets, by age, gender, race/ethnicity, & coded comorbidity, 2010

| | Medicare 65+ | | | | MarketScan (20–64) | | | | Ingenix i 3 (20–64) | | | |
| | All (mean age: 75.3) | | CKD (77.9) | | All (44.3) | | CKD (52.5) | | All (42.9) | | CKD (51.5) | |
	N	%	N	%	N	%	N	%	N	%	N	%
All	1,223,405	100.0	112,308	100.0	20,181,077	100.0	169,255	100.0	5,589,835	100.0	5,589,835	100.0
20-44					9,546,513	47.3	34,308	20.3	2,937,557	52.6	11,346	23.3
45-54					5,577,626	27.6	44,321	26.2	1,499,581	26.8	13,855	28.4
55-64					5,056,938	25.1	90,626	53.5	1,152,697	20.6	23,599	48.4
65-74	639,089	52.2	41,394	36.9								
75-84	414,580	33.9	46,272	41.2								
85+	169,736	13.9	24,642	21.9								
Male	515,109	42.1	52,716	46.9	9,606,282	47.6	90,216	53.3	2,711,710	48.5	26,424	54.1
Female	708,296	57.9	59,592	53.1	10,574,795	52.4	79,039	46.7	2,877,890	51.5	22,375	45.9
White	1,064,229	87.0	93,536	83.3								
Black/African American	92,315	7.5	12,605	11.2								
Other	17,718	1.4	1,380	1.2								
Hispanic	21,091	1.7	2,132	1.9								
Diabetes	291,751	23.8	53,441	47.6	1,171,149	5.8	63,817	37.7	304,598	5.4	17,931	36.7
Hypertension	742,753	60.7	103,523	92.2	2,630,713	13.0	103,859	61.4	772,345	13.8	32,636	66.9
CHF	116,019	9.5	35,697	31.8	102,952	0.5	14,560	8.6	26,191	0.5	3,613	7.4
Cancer	127,182	10.4	20,110	17.9	395,735	2.0	23,172	13.7	102,772	1.8	6,031	12.4

The prevalence of recognized CKD in the Medicare population increased by more than three-fold between 2000 and 2010, from 2.7 to 9.2 percent, and rose with age. Net increases in CKD prevalence are evident in the smaller EGHP populations as well — from 0.3 to 0.8 percent in the MarketScan population, and, in the Ingenix i3 population, from 0.4 percent in 2001 to 0.9 percent in 2010. **» Table 2.b;** see page 141 for analytical methods. *Prevalent patients surviving cohort year without ESRD, age 65 & older (Medicare) & 20–64 (MarketScan & Ingenix i3).*

vol 1 2.b Prevalence (%) of recognized CKD, by dataset & age

	Medicare	MarketScan	Ingenix i3
2000	2.7	0.3	
2001	3.0	0.4	0.4
2002	3.4	0.5	0.4
2003	3.8	0.5	0.5
2004	4.2	0.5	0.5
2005	4.8	0.5	0.6
2006	5.9	0.6	0.6
2007	6.7	0.6	0.7
2008	7.6	0.7	0.7
2009	8.5	0.8	0.8
2010	9.2	0.8	0.9
2010			
20-44		0.4	0.4
45-54		0.8	0.9
55-64		1.8	2.0
65-74	6.5		
75-74	11.2		
85+	14.5		

IDENTIFICATION & CARE OF PATIENTS WITH CHRONIC KIDNEY DISEASE
prevalence of recognized CKD

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**Trends in CKD prevalence:
MarketScan patients age 20–64**

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**Trends in CKD prevalence: Medicare
patients age 65 & older, by race**

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**Trends in CKD prevalence:
Ingenix i3 patients age 20–64**

ICD-9-CM codes

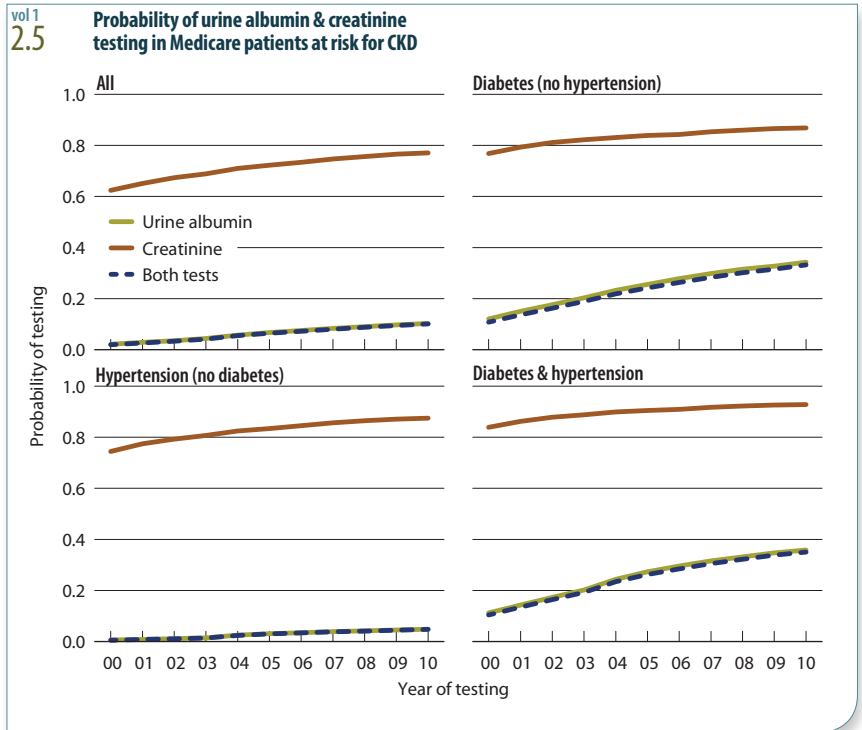|	
585.1	Chronic kidney disease, Stage 1
585.2	Chronic kidney disease, Stage 2 (mild)
585.3	Chronic kidney disease, Stage 3 (moderate)
585.4	Chronic kidney disease, Stage 4 (severe)
585.5	Chronic kidney disease, Stage 5 (excludes 585.6: Stage 5, requiring chronic dialysis.*)

Chronic kidney disease, unknown/unspecified

In usrds analyses, patients with icd-9-cm code 585.6 & with no esrd 2728 form or other indication of esrd are considered to have code 585.5; see Appendix A for details.

ckd stage estimates are from a single measurement. For clinical case definition, abnormalities should be present ≥ 3 months.

Among Medicare patients, claims data identify 13.7 percent of blacks/African Americans, and 8.8 percent of whites, as having prevalent ckd in 2010, compared to 11.5 and 7.0 percent identified using only the combined 585 codes. The difference is even more pronounced in the eghp population, with claims data identifying prevalent ckd rates nearly twice as high as those found using solely the stage-specific codes.

The most commonly reported stage-specific code in the prevalent ckd population is 585.3 (Stage 3), at 3.4 and 5.2 percent for white and black/African American Medicare patients, respectively, and 0.21 and 0.22 percent among MarketScan and Ingenix i3 patients. **» Figures 2.2–4;** see page 141 for analytical methods. *Prevalent patients surviving cohort year, without esrd, age 65 & older (Medicare) & 20–64 (MarketScan & Ingenix i3).*

All

Diabetes (no hypertension)

- Urine albumin
- Creatinine
- Both tests

Hypertension (no diabetes)

Diabetes & hypertension

Probability of testing

Year of testing

It is important that individuals at risk for CKD be screened periodically for kidney disease. Urine albumin and creatinine tests are valuable laboratory markers used to detect early signs of kidney damage. In 2010, the probability of creatinine testing in Medicare patients at risk for CKD was 0.77; the probability of receiving a urine albumin test (which must be ordered separately), in contrast, was 0.10.

In patients with either diabetes or hypertension alone, the probablility of creatinine testing in 2010 was 0.87; the probability of urine albumin testing in those with diabetes alone was 0.34, compared to 0.05 in patients with hypertension alone.

Having both diabetes and hypertension greatly increases the odds of developing CKD. The probability of creatinine testing in patients with both conditions was 0.93 in 2010, while the probability of a urine albumin test was 0.36; the probability of receiving both tests was 0.35. Because urine albumin testing must be ordered separately, it may represent a true intent to assess kidney disease. **» Figure 2.5;** see page 141 for analytical methods. *Medicare patients from the 5 percent sample, age 20 & older, with Parts A & B coverage in the prior year; patients diagnosed with CKD or ESRD during prior year are excluded. Tests tracked during each year.*

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Probability of laboratory testing in patients at risk for CKD, by demographic characteristics, 2010

	Urine albumin Unadjusted	Adjusted	Creatinine Unadjusted	Adjusted	Both tests Unadjusted	Adjusted
All						
20-44	0.06	0.06	0.59	0.61	0.05	0.05
45-54	0.09	0.09	0.69	0.70	0.09	0.09
55-64	0.12	0.12	0.72	0.73	0.12	0.12
64-74	0.12	0.12	0.76	0.76	0.12	0.12
75-84	0.11	0.11	0.82	0.82	0.10	0.10
85+	0.06	0.06	0.82	0.82	0.06	0.06
Male	0.11	0.11	0.72	0.73	0.10	0.10
Female	0.10	0.10	0.81	0.81	0.10	0.10
White	0.10	0.10	0.78	0.78	0.10	0.10
Black/Af. American	0.13	0.14	0.73	0.75	0.13	0.13
Other	0.13	0.13	0.71	0.71	0.13	0.13
Hispanic	0.15	0.16	0.71	0.72	0.14	0.15
Diabetes						
20-44	0.35	0.35	0.87	0.88	0.34	0.34
45-54	0.35	0.36	0.88	0.89	0.34	0.35
55-64	0.37	0.37	0.89	0.89	0.35	0.36
64-74	0.40	0.41	0.92	0.92	0.40	0.40
75-84	0.34	0.34	0.93	0.93	0.33	0.33
85+	0.22	0.22	0.93	0.92	0.21	0.21
Male	0.36	0.36	0.90	0.90	0.35	0.34
Female	0.35	0.36	0.93	0.93	0.34	0.35
White	0.36	0.36	0.92	0.92	0.35	0.35
Black/Af. American	0.34	0.33	0.90	0.90	0.33	0.32
Other	0.37	0.36	0.87	0.87	0.36	0.35
Hispanic	0.38	0.39	0.90	0.90	0.37	0.37
Hypertension						
20-44	0.14	0.15	0.83	0.84	0.14	0.15
45-54	0.16	0.16	0.85	0.86	0.16	0.16
55-64	0.19	0.19	0.86	0.87	0.19	0.19
64-74	0.17	0.17	0.89	0.89	0.17	0.17
75-84	0.13	0.14	0.91	0.91	0.13	0.13
85+	0.07	0.08	0.90	0.90	0.07	0.08
Male	0.16	0.15	0.87	0.88	0.15	0.15
Female	0.14	0.14	0.90	0.90	0.13	0.14
White	0.14	0.14	0.90	0.90	0.13	0.14
Black/Af. American	0.18	0.17	0.87	0.88	0.18	0.17
Other	0.18	0.18	0.85	0.85	0.18	0.18
Hispanic	0.22	0.22	0.88	0.88	0.21	0.21
Cardiovascular disease						
20-44	0.10	0.10	0.83	0.83	0.10	0.10
45-54	0.14	0.14	0.86	0.86	0.13	0.13
55-64	0.17	0.17	0.87	0.87	0.17	0.16
64-74	0.16	0.16	0.88	0.89	0.15	0.15
75-84	0.12	0.12	0.90	0.90	0.12	0.12
85+	0.06	0.07	0.89	0.89	0.06	0.06
Male	0.13	0.13	0.87	0.87	0.13	0.13
Female	0.12	0.12	0.90	0.91	0.11	0.12
White	0.12	0.12	0.89	0.89	0.12	0.12
Black/Af. American	0.16	0.15	0.88	0.88	0.16	0.15
Other	0.17	0.16	0.86	0.86	0.16	0.16
Hispanic	0.19	0.20	0.90	0.90	0.19	0.19

Across all age, gender, and racial/ethnic categories, the adjusted probability of receiving a creatinine test is considerably higher — 5 to 13 times — than the probability of receiving a urine albumin test.

By disease category, the large disparity in the type of test performed is less evident in patients with diabetes, where differences favor creatinine testing over urine albumin testing by a margin of approximately three to one. In patients with hypertension or cardiovascular disease, the probability of creatinine testing is generally 6–7 times greater than that of urine albumin testing. » Table 2.c; see page 141 for analytical methods. *Medicare patients from the 5 percent sample, age 20 & older, with Parts A & B coverage in 2010; patients diagnosed with CKD or ESRD during 2010 are excluded.*
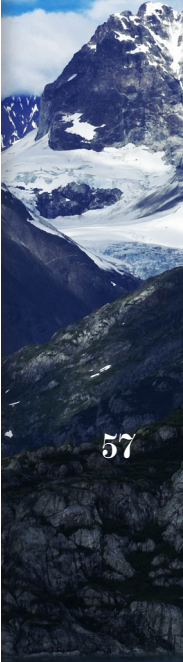
In the NHANES population, 14 percent of participants have CKD. The likelihood of CKD increases with age, is highest in those age 80 and older, and is recognized in women more often than in men, at 15.8 and 12.1 percent, respectively. By race, 14.3 percent of whites and 16 percent of blacks/African Americans in the NHANES population have CKD. Fifty-one percent of participants age 80 and older have CKD of Stage 3 or higher.

Among Medicare patients age 65 and older, a CKD diagnosis code is more likely in older patients, men, and blacks/African Americans, and in patients with cardiovascular disease, at 23.1 percent compared to 10.3 and 15.8 percent in patients with diabetes or hypertension.

In the MarketScan population age 55–59 and 60–64, the odds of a CKD diagnosis code are 18 and 42 percent higher compared to patients age 50–64, are lower in women compared to men, and are three times higher in patients with diabetes, hypertension, or cardiovascular disease than in patients without these conditions. **» Tables 2.d–f;** see page 141 for analytical methods. *Medicare patients age 65 & older & MarketScan patients age 50–64, alive & eligible for all of 2010. CKD claims as well as other diseases identified in 2010. NHANES 2005–2010 participants, age 20 & older; eGFR estimated by CKD-EPI equation.*

vol 1 2.d — Percent of patients with CKD, by demographic characteristics, comorbidity, & dataset, 2010

	NHANES Any CKD	Medicare (65+) DM (no HTN)	HTN (no DM)	CVD	MarketScan (50–64) DM (no HTN)	HTN (no DM)	CVD
All	14.0	10.3	15.8	23.1	6.1	5.4	10.0
20-49	6.5						
50-54	8.4				5.1	4.4	7.9
55-59	13.3				5.8	5.1	9.7
60-64	17.2				7.1	6.4	11.5
65-74	29.1	8.5	11.3	19.4			
75-79	49.5	11.1	16.1	23.3			
80+	65.5	14.1	21.5	26.8			
Male	12.1	11.5	18.3	24.4	6.6	6.1	10.6
Female	15.8	9.1	14.3	22.0	5.5	4.7	9.3
White	14.3	10.3	15.6	22.3			
Black/Af Am	16.0	11.2	19.6	32.3			
Other	11.9	10.2	14.3	24.9			

vol 1 2.e — Percent of patients with a CKD diagnosis code of 585.3 or higher, by demographic characteristics, comorbidity, & dataset, 2010
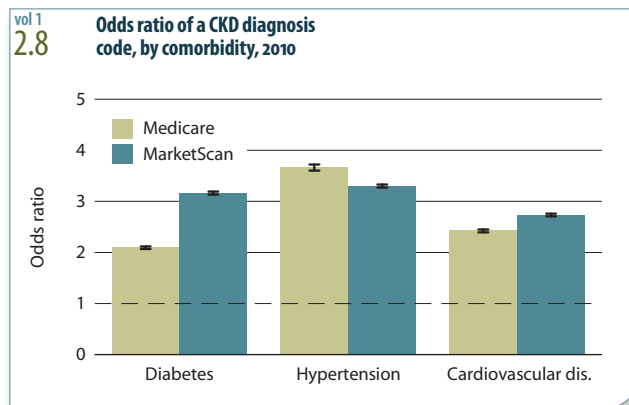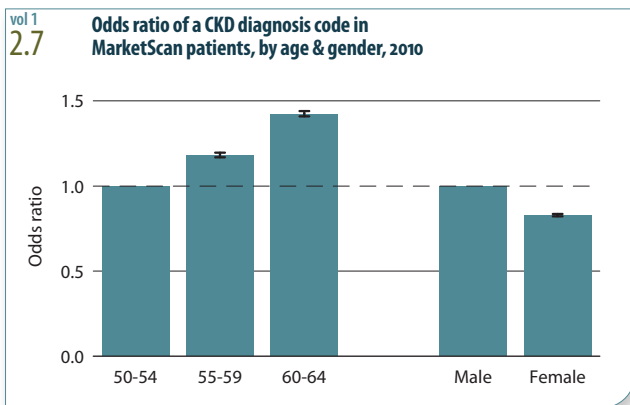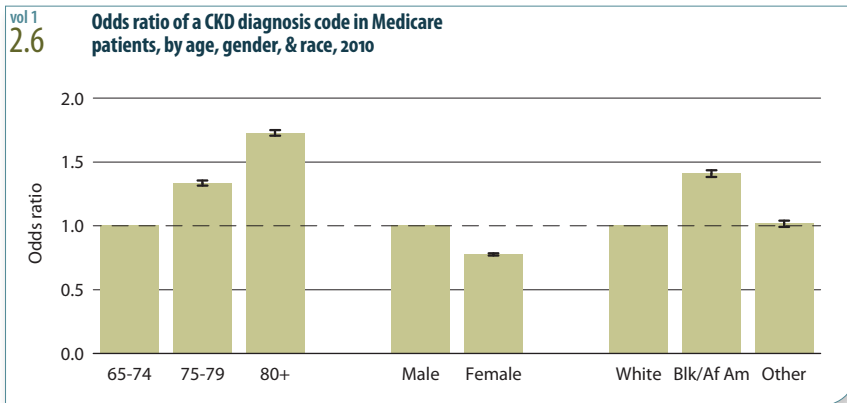
|	NHANES eGFR <60	Medicare (65+) DM (no HTN)	HTN (no DM)	CVD	MarketScan (50–64) DM (no HTN)	HTN (no DM)	CVD
All	6.7	2.8	6.2	9.3	1.5	1.6	3.3
20-49	0.5						
50-54	2.5				0.9	1.2	2.2
55-59	5.3				1.3	1.5	3.0
60-64	8.5				2.1	2.1	4.0
65-74	18.7	2.2	4.1	7.5			
75-79	35.9	3.2	6.5	9.7			
80+	51.3	3.9	8.7	10.8			
Male	5.6	3.2	7.2	10.0	1.7	1.8	3.5
Female	7.7	2.4	5.6	8.7	1.3	1.4	3.0
White	7.9	2.8	6.1	8.9			
Black/Af Am	6.2	3.1	8.2	13.9			
Other	2.6	3.0	5.4	10.0			

vol 1 2.f — Adjusted odds ratio of a CKD diagnosis code, by demographic characteristics, comorbidity, & dataset, 2010

	Medicare (65+) Odds ratio	p-value	MarketScan (50-64) Odds ratio	p-value
50-54			ref	
55-59			1.18	< .0001
60-64			1.42	< .0001
64-74	reference		-	
75-84	1.44	< .0001	-	
85+	1.90	< .0001	-	
Male	reference		ref	
Female	0.78	< .0001	0.83	< .0001
White	reference		-	
Black/Af Am	1.41	< .0001	-	
Other	1.02	0.1813	-	
Diabetes	2.09	< .0001	3.16	< .0001
Hypertension	3.66	< .0001	3.30	< .0001
Cardiovascular disease	2.43	< .0001	2.74	< .0001

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vol 1 2.6 Odds ratio of a CKD diagnosis code in Medicare patients, by age, gender, & race, 2010

vol 1 2.7 Odds ratio of a CKD diagnosis code in MarketScan patients, by age & gender, 2010

vol 1 2.8 Odds ratio of a CKD diagnosis code, by comorbidity, 2010

The odds of a CKD diagnosis code in Medicare patients age 65 and older, and in MarketScan patients age 50–64, are higher in older patients and males compared to their respective reference populations; for Medicare patients, the odds are greater for blacks/African Americans than for whites. And in both Medicare and MarketScan populations, patients with diabetes, hypertension, or cardiovascular disease are 2–3 times more likely to have a CKD diagnosis code compared to patients without these diseases. **» Figures 2.6–8;** see page 141 for analytical methods. *Medicare patients age 65 & older & MarketScan patients age 50–64, alive & eligible for all of 2010. CKD claims as well as other diseases identified in 2010.*
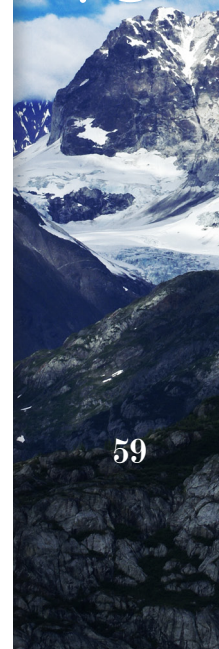
In the year after being diagnosed with CKD, the cumulative probability of seeing a primary care physician is much higher than the probability of seeing a cardiologist or nephrologist, at 0.79 in the MarketScan population, and 0.93 in patients with Medicare coverage. And in both populations, the cumulative probability of a cardiology visit is much higher than that of a nephrologist visit, at 0.64 versus 0.31, respectively, in Medicare patients and 0.37 versus 0.27 in the MarketScan population. » **Figure 2.9;** see page 141 for analytical methods. *Patients alive & eligible all of 2009. CKD diagnosis represents date of first CKD claim during 2009; physician claims searched during the 12 months following that date.*

vol 1 2.9 Cumulative probability of a physician visit at month 12 after CKD diagnosis, by dataset & physician specialty, 2010

The type of physician seen by month 12 following a CKD diagnosis changes dramatically with the severity of CKD. In Medicare patients with any CKD, for example, the probability of seeing a nephrologist is 0.24–0.35 across demographic groups; in those with a diagnosis code of 585.3 or higher, the probability is 0.44–0.62. In the MarketScan CKD population, the probability of seeing a nephrologist is 0.27 overall, increasing to 0.56 in patients with a diagnosis code of 585.3 or higher. » **Tables 2.g–h;** see page 141 for analytical methods. *Patients alive & eligible all of 2009. CKD diagnosis represents date of first CKD claim during 2009; physician claims searched during the 12 months following that date.*
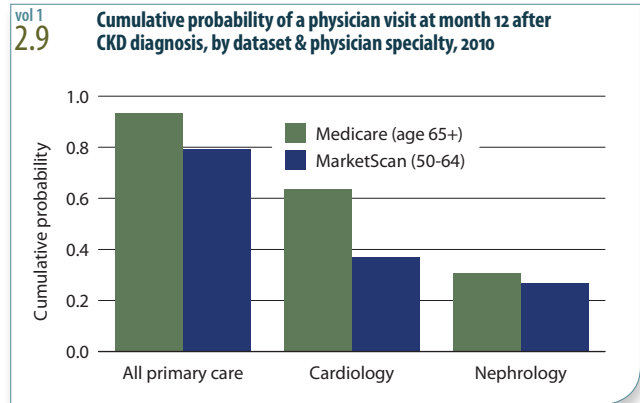
vol 1 2.g Cumulative probability of a physician visit at month 12 after CKD diagnosis in 2009, by demographic characteristics, physician specialty, & dataset, 2010

	Medicare (65+)			MarketScan (50–64)		
	Primary care	Cardiologist	Nephrologist	Primary care	Cardiologist	Nephrologist
50-54				0.74	0.31	0.23
55-59				0.77	0.35	0.26
60-64				0.79	0.40	0.28
65-74	0.91	0.60	0.33			
75-84	0.93	0.66	0.31			
85+	0.93	0.66	0.24			
Male	0.93	0.61	0.29	0.76	0.38	0.26
Female	0.92	0.67	0.31	0.78	0.35	0.26
White	0.93	0.65	0.29			
Black/Af Am	0.91	0.61	0.35			
Other	0.90	0.59	0.31			
All	0.93	0.64	0.31	0.79	0.37	0.27

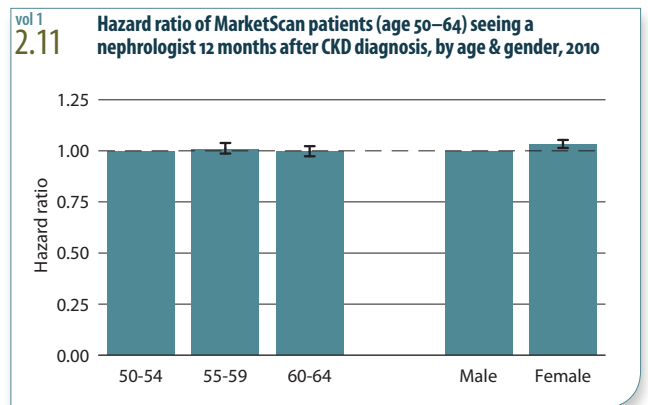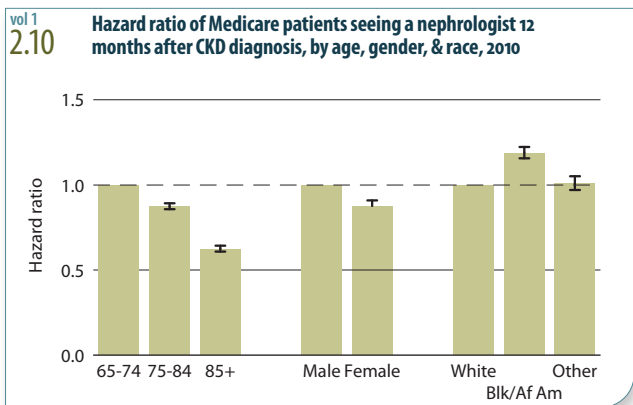**vol 1 2.h Cumulative probability of a physician visit at month 12 after a CKD diagnosis code of 585.3 or higher in 2009, by demographic characteristics, physician specialty, & dataset, 2010**

	Medicare (65+)			MarketScan (50–64)		
	Primary care	Cardiologist	Nephrologist	Primary care	Cardiologist	Nephrologist
50-54				0.75	0.37	0.53
55-59				0.78	0.39	0.52
60-64				0.80	0.43	0.52
65-74	0.92	0.61	0.62			
75-84	0.93	0.67	0.57			
85+	0.93	0.66	0.44			
Male	0.93	0.61	0.54	0.77	0.42	0.52
Female	0.92	0.69	0.59	0.79	0.38	0.52
White	0.93	0.65	0.56			
Black/Af Am	0.92	0.61	0.61			
Other	0.90	0.60	0.55			
All	0.93	0.65	0.60	0.79	0.41	0.56

ICD-9-CM codes

585.1 Chronic kidney disease, Stage 1

585.2 Chronic kidney disease, Stage 2 (mild)

585.3 Chronic kidney disease, Stage 3 (moderate)

585.4 Chronic kidney disease, Stage 4 (severe)

585.5 Chronic kidney disease, Stage 5 (excludes 585.6: Stage 5, requiring chronic dialysis.*)

Chronic kidney disease, unknown/unspecified

In USRDS analyses, patients with ICD-9-CM code 585.6 & with no ESRD 2728 form or other indication of ESRD are considered to have code 585.5; see Appendix A for details.

CKD stage estimates are from a single measurement. For clinical case definition, abnormalities should be present ≥ 3 months.

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IDENTIFICATION & CARE OF PATIENTS WITH CHRONIC KIDNEY DISEASE

probability & odds of seeing a physician after CKD diagnosis

Hazard ratio of seeing a nephrologist 12 months after CKD diagnosis, by demographics, comorbidity, CKD stage, & dataset, 2010

	Medicare (65+)		MarketScan (50-64)	
	Hazard ratio	p-value	Hazard ratio	p-value
50-54			reference	
55-59			1.01	0.3538
60-64			1.00	0.9000
65-74	reference		-	
75-84	0.88	< .0001	-	
85+	0.63	< .0001	-	
Male	reference		reference	
Female	0.88	< .0001	1.03	0.0004
White	reference		-	
Black/Af Am	1.19	< .0001	-	
Other	1.01	0.63	-	
Diabetes	1.23	< .0001	1.16	< .0001
Hypertension	2.13	< .0001	1.41	< .0001
Cardiovascular disease	1.16	< .0001	1.14	< .0001
Stgs 3–5 vs Stg 1–2 or unk	3.41	< .0001	3.75	< .0001

Among Medicare patients age 65 and older, blacks/African Americans are 19 percent more likely than their white counterparts to have seen a nephrologist 12 months after CKD diagnosis, and men are more likely to see a nephrologist after diagnosis than women. For CKD patients with diabetes or cardiovascular disease, the likelihood of seeing a nephrologist is 23 and 16 percent higher, respectively, than in CKD patients without these conditions. Among patients with a CKD diagnosis code of Stage 3 or higher, the likelihood of seeing a nephrologist is more than three times that found in patients with CKD of an unknown stage or CKD of Stages 1–2. **» Table 2.i;** see page 141 for analytical methods. *Patients alive & eligible all of 2009. CKD diagnosis represents date of first CKD claim during 2009; physician claims searched during the 12 months following that date.*

Hazard ratio of Medicare patients seeing a nephrologist 12 months after CKD diagnosis, by age, gender, & race, 2010

Hazard ratio of MarketScan patients (age 50–64) seeing a nephrologist 12 months after CKD diagnosis, by age & gender, 2010

Factors associated with a higher likelihood of seeing a nephrologist 12 months after a CKD diagnosis include black/African American race (Medicare population), diabetes, hypertension, cardiovascular disease, and a CKD diagnosis code of 585.3 or higher. **» Figures 2.10–12;** see page 141 for analytical methods. *Patients alive & eligible all of 2009. CKD diagnosis represents date of first CKD claim during 2009; physician claims searched during the 12 months following that date.*

Hazard ratio of patients seeing a nephrologist 12 months after CKD diagnosis, by comorbidity, CKD stage, & dataset, 2010
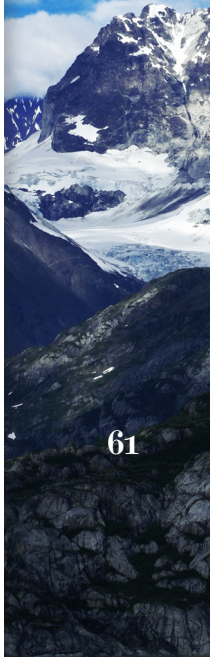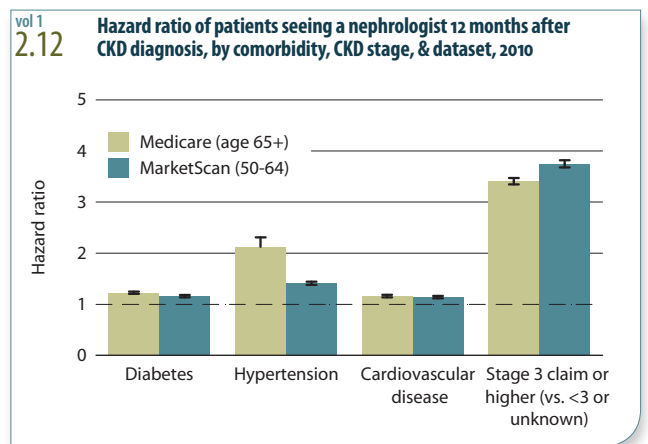
These figures compare medication use in identified older CKD patients enrolled in Part D to that of younger, commercially-insured CKD patients in the MarketScan database. Among Part D patients with a diagnosis of diabetes or hypertension, 59 and 54 percent use a renin-angiotensin system agent, compared to 61 and 54 percent in the MarketScan population.

Beta blocker use in Part D patients with CHF or hypertension is 71 and 59 percent, compared to 77 and 73 percent for MarketScan patients. Use of this medication class tends to be more common in Part D patients with later-stage CKD, and in MarketScan patients in the earlier stages of CKD.

In patients with hypertension or cardiovascular disease, use of a dihydropyridine calcium channel blocker is higher in the Marketscan population, and more common in those with later-stage CKD.

Potassium-sparing diuretics or combination diuretic products are rarely used in CKD patients. Thiazide and loop diuretics, in contrast, receive much wider use, with 30 and 31 percent, respectively, of Medicare and Marketscan patients receiving a thiazide diuretic, and 44 and 21 percent a loop diuretic. Across all stages of CKD, loop diuretic use is more common in Medicare patients. » **Figures 2.13–16;** see page 141 for analytical methods. *Point prevalent Medicare CKD patients age 65 & older, & MarketScan CKD patients age 50–64.*
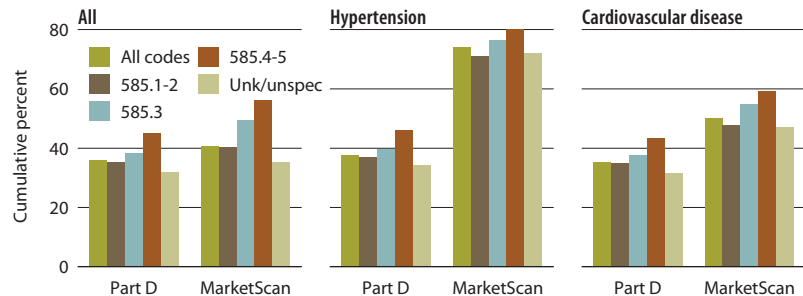
ICD-9-CM codes

585.1   Chronic kidney disease, Stage 1

585.2   Chronic kidney disease, Stage 2 (mild)

585.3   Chronic kidney disease, Stage 3 (moderate)

585.4   Chronic kidney disease, Stage 4 (severe)

585.5   Chronic kidney disease, Stage 5 (excludes 585.6: Stage 5, requiring chronic dialysis.*)

Chronic kidney disease, unknown/unspecified

*In USRDS analyses, patients with ICD-9-CM code 585.6 & with no ESRD 2728 form or other indication of ESRD are considered to have code 585.5; see Appendix A for details.

CKD stage estimates are from a single measurement. For clinical case definition, abnormalities should be present ≥ 3 months.

vol 1 2.13 Medicare Part D & MarketScan CKD patients with at least one claim for an ACEI/ARB/renin inhibitor in the 12 months following the disease defining entry period, by CKD diagnosis code, 2010
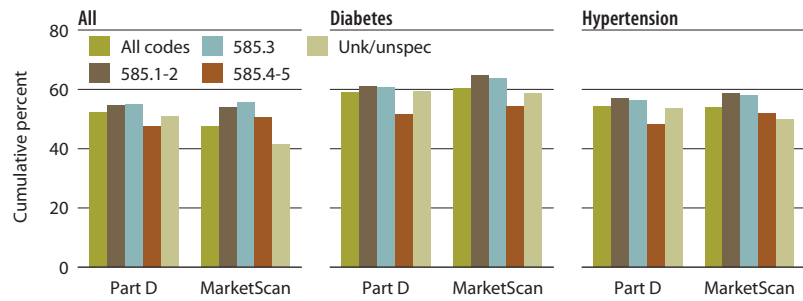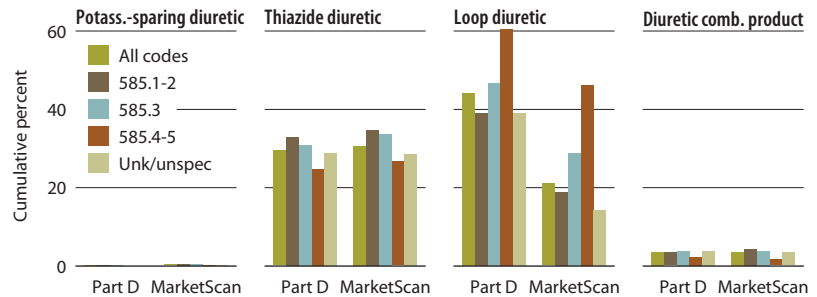

vol 1 2.14 Medicare Part D & MarketScan CKD patients with at least one claim for a beta blocker in the 12 months following the disease defining entry period, by CKD diagnosis code, 2010
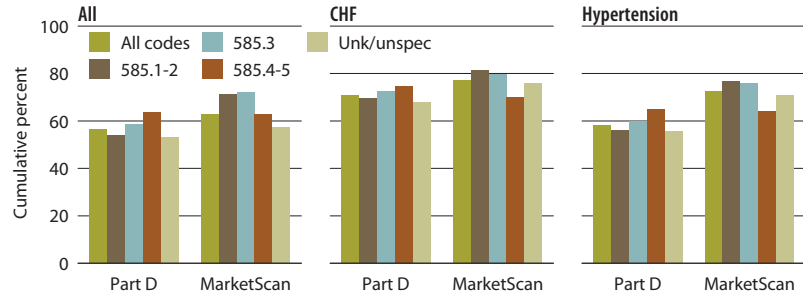
vol 1 2.15 Medicare Part D & MarketScan CKD patients with at least one claim for a DHP calcium channel blocker in the 12 months following the disease-defining entry period, by CKD diagnosis code, 2010

vol 1 2.16 CKD patients with at least one claim for a diuretic in the 12 months following the disease-defining entry period, by dataset & CKD diagnosis code, 2010
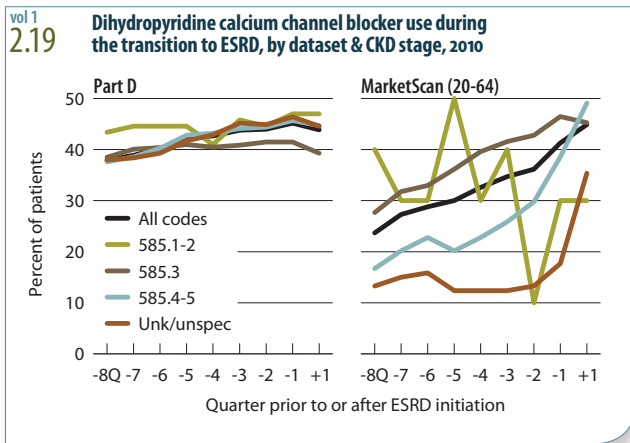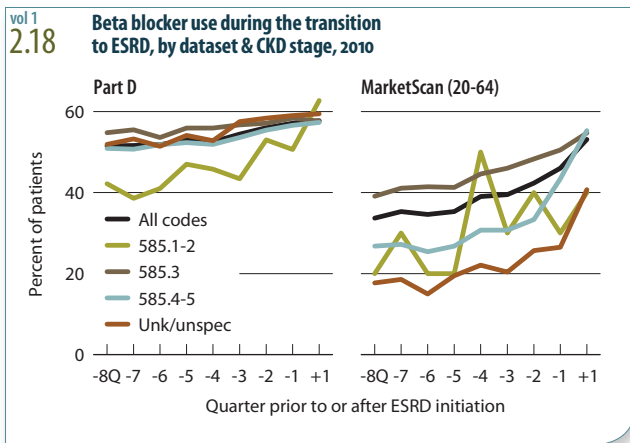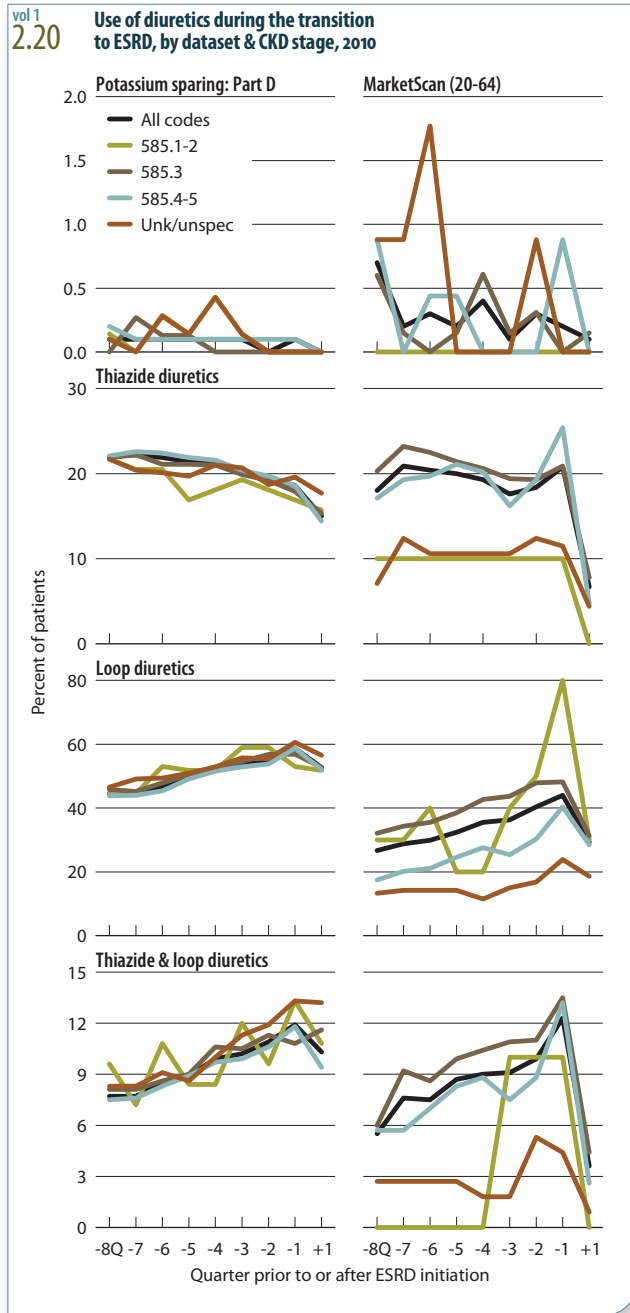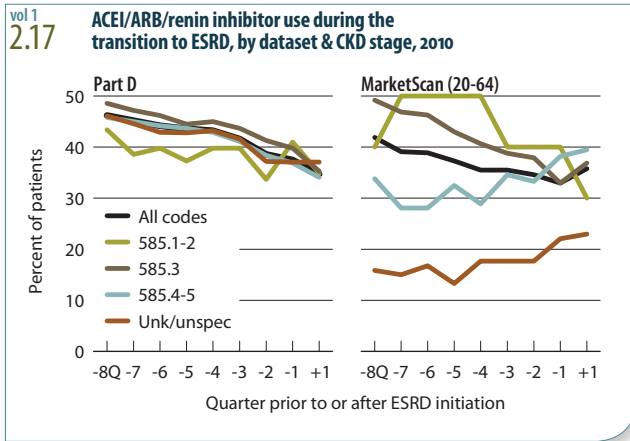
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2.17 vol 1 — ACEI/ARB/renin inhibitor use during the transition to ESRD, by dataset & CKD stage, 2010

Part D | MarketScan (20-64)

Legend: All codes · 585.1-2 · 585.3 · 585.4-5 · Unk/unspec

Percent of patients / Quarter prior to or after ESRD initiation

2.18 vol 1 — Beta blocker use during the transition to ESRD, by dataset & CKD stage, 2010

Part D | MarketScan (20-64)

Legend: All codes · 585.1-2 · 585.3 · 585.4-5 · Unk/unspec

Percent of patients / Quarter prior to or after ESRD initiation

2.19 vol 1 — Dihydropyridine calcium channel blocker use during the transition to ESRD, by dataset & CKD stage, 2010

Part D | MarketScan (20-64)

Legend: All codes · 585.1-2 · 585.3 · 585.4-5 · Unk/unspec

Percent of patients / Quarter prior to or after ESRD initiation

2.20 vol 1 — Use of diuretics during the transition to ESRD, by dataset & CKD stage, 2010

Potassium sparing: Part D | MarketScan (20-64)

Legend: All codes · 585.1-2 · 585.3 · 585.4-5 · Unk/unspec

Thiazide diuretics

Loop diuretics

Thiazide & loop diuretics

Percent of patients / Quarter prior to or after ESRD initiation

These figures illustrate patterns of medication use during the transition to ESRD. Among Medicare patients with recognized CKD, ACEI/ARB/renin inhibitor use falls from 38–46 percent at eight quarters before ESRD diagnosis to 35 percent in the quarter following; use of beta blockers, in contrast, increases from 52 to 58 percent. The pattern of use of dihydropyridine calcium channel blockers is similar to that of beta blockers, although overall use is lower. **» Figures 2.17–20;** see page 141 for analytical methods. *Point prevalent Medicare CKD patients age 67 & older, & MarketScan CKD patients age 20–64.*

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PREVALENCE OF RECOGNIZED CKD
patients with coded diabetes, CKD, CHF, & CVA, 2010 (Figure 2.1)

Medicare (age 65+)	» CKD · 9.2%	» diabetes · 23.9%	» CHF · 9.5%	» CVA · 6.9%	» CVA + CKD · 1.7%
MarketScan (age 50–64)	· 1.4%	· 10.1%	· 0.94%	· 0.97%	· 0.1%

LABORATORY TESTING IN PATIENTS AT RISK FOR CKD
probability of urine albumin & creatinine testing in Medicare patients age 65 & older at risk for CKD, 2010 (Figure 2.5)

overall	» urine albumin · 0.10	» creatinine · 0.77	» both · 0.10
diabetes, no hypertension	· 0.34	· 0.87	· 0.33
hypertension, no diabetes	· 0.05	· 0.87	· 0.05
diabetes & hypertension	· 0.36	· 0.93	· 0.35

PROBABILITY & ODDS OF A CKD DIAGNOSIS CODE
adjusted odds ratio of a CKD diagnosis code, 2010 (Table 2.f)

Medicare (age 65+) » white · reference » blacks/African American · 1.41
  » diabetes · 2.09 » hypertension · 3.66 » CVD · 2.43
MarketScan (age 50–64) » diabetes · 3.16 » hypertension · 3.30 » cardiovascular disease · 2.74

PROBABILITY & ODDS OF SEEING A PHYSICIAN AFTER CKD DIAGNOSIS
cumulative probability of a physician visit at month 12 following a CKD diagnosis, 2009 (Figure 2.9)

Medicare (age 65+)	» all primary care · 0.93	» cardiologist · 0.64	» nephrologist · 0.31
MarketScan (age 50–54)	· 0.79	· 0.37	· 0.27

PRESCRIPTION DRUG THERAPY
CKD patients with at least one claim for an ACEI/ARB/renin inhibitor, 2010 (Figure 2.13)

Medicare Part D (age 65+)	» all · 52%	» with diabetes · 59%	» with hypertension · 54%
Marketscan (age 50–64)	· 48%	· 61%	· 54%

CKD patients with at least one claim for a beta blocker, 2010 (Figure 2.14)

Medicare Part D (age 65+)	» all · 57%	» with CHF · 71%	» with hypertension · 59%
Marketscan (age 50–64)	· 63%		· 73%

CKD patients with at least one claim for a DHP calcium channel blocker, 2010 (Figure 2.15)

Medicare Part D (age 65+)	» all · 36%	» with hypertension · 38%	» with CVD · 35%
Marketscan (age 50–64)	· 41%	· 74%	· 50%

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