2 Identification and care of patients with chronic kidney disease

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 29 million enrollees. The Truven Health MarketScan (THMS) dataset (23 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 Clinformatics DataMart (CDM) dataset, with information on 5.7 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 30 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 78.0 for those with CKD — in contrast to the EGHP population, at 52.6 and 51.7, respectively, for patients in the THMS and CDM datasets with recognized CKD. As expected, disease prevalence is lower for the younger EGHP patients. Interesting, however, is the similar disease burden in the two EGHP 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. In both the Medicare and EGHP populations, for example, patients with recognized CKD have a high burden of hypertension, at 92 percent among Medicare patients, and 62 and 67 percent among THMS and CDM patients. Diabetes is also highly prevalent in the recognized CKD populations, at 48, 38, and 37 percent. These realities illustrate the importance of screening and detection programs to target those with diabetes and hypertension, populations in need of testing for evidence of kidney disease.

Also of note is the burden of cancer in younger CKD patients. While just 1.8–2.0 percent of the total THMS and CDM populations have cancer, the rates rise to 12.4–13.8 percent among those with CKD. This far greater burden of cancer among younger CKD patients has received little attention.

New stage-specific ICD-9-CM codes (585.x) were introduced in 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. Analyses which include these codes show evidence of a growing recognition of CKD. The continued under-reporting of CKD through diagnosis codes, however, becomes clear when comparing rates obtained

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from the codes to those from the NHANES cohort, in which CKD is identified through biochemical data.
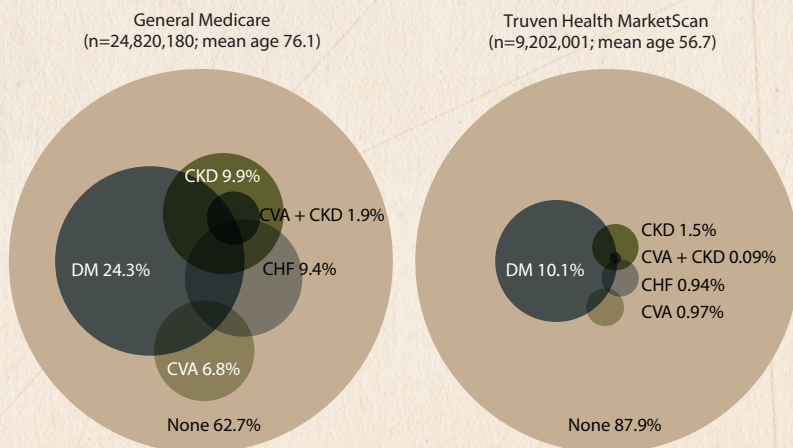
Assessing the care of patients at high risk for kidney disease has long been a focus of the USRDS, and is now part of the Healthy People 2020 goals developed by the Department of Health and Human Services (see the HP2020 chapter in Volume Two). But while testing for urine albumin has been recommended by the American Diabetes Association for some time, there has been slow progress in its use. In 2011, for example, just two in five 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. The serum creatinine test, however, is frequently part of a panel of tests, so its 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, Kidney International 2013).

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 how primary care physicians decide to refer patients to specialists; it may also be a result of the difficulties patients encounter in navigating 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 less than 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, 45–60 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.

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 multi-faceted population. Based on the NHANES data reported in Chapter One, there have been marked improvements during the past decade in blood pressure control, lipid control, and glycemic control in the overall population. Among those with CKD, however, treatment and control is lagging. This may reflect inadequate recognition of the prognostic implications of CKD, with its reduced EGFR levels and evidence of elevated levels of urinary albumin/creatinine ratios. Continued tracking of care will be needed to determine areas to target and ways in which improved care over time may impact rates of incident ESRD, which, as noted in Chapter One of Volume Two, are beginning to decline. ◆ **Figure 2.1;** *Point prevalent general (fee-for-service) Medicare patients age 65 & older; point prevalent Truven Health MarketScan patients age 50–64. Diabetes, CKD, CHF, & CVA determined from claims.*

vol 1 2.1 **Distribution of point prevalent general Medicare (age 65 & older) & Truven Health MarketScan (age 50–64) patients with coded diabetes, CKD, CHF, & CVA, 2011**

General Medicare
(n=24,820,180; mean age 76.1)

Truven Health MarketScan
(n=9,202,001; mean age 56.7)

CKD 9.9%
CVA + CKD 1.9%
DM 24.3%
CHF 9.4%
CVA 6.8%
None 62.7%

CKD 1.5%
CVA + CKD 0.09%
DM 10.1%
CHF 0.94%
CVA 0.97%
None 87.9%

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 23.4 million patients younger than 65 in the Truven Health MarketScan (THMS) database, and the 5.7 million, also younger than 65, in the Clinformatics DataMart (CDM) database. Information on race and ethnicity is not available in the latter two datasets.

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 62 and 68 percent, respectively, of those in the THMS and CDM databases. Thirty-one percent of Medicare CKD patients have congestive heart failure, compared to 8.7 and 7.1 percent in the THMS and CDM populations. And the rate of cancer in Medicare CKD patients is 17.9 percent, compared to 13.8 and 12.4 percent, respectively, in in the other populations. ✦ Table 2.a; see page 141 for analytical methods. *Period prevalent patients, 2011, without ESRD, age 65 & older (Medicare) & 20–64 (Truven Health MarketScan & Clinformatics DataMart).*

vol 1 2.a	Descriptive parameters of CKD datasets, by age, gender, race, & coded comorbidity, 2011										
	Medicare (age 65+)				Truven Health MarketScan (20–64)				Clinformatics DataMart (20–64)		
	All (mean age: 75.3)		CKD (78.0)		All (43.9)		CKD (52.6)		All (42.7)		CKD (51.7)	
	N	%	N	%	N	%	N	%	N	%	N	%
All	1,223,801	100.0	121,735	100.0	23,394,147	100.0	201,759	100.0	5,738,797	100	51,051	100.0
20-44					11,287,981	48.3	40,076	19.9	3,033,891	52.9	11,429	22.4
45-54					6,233,525	26.7	52,032	25.8	1,504,460	26.2	14,308	28.0
55-64					5,872,641	25.1	109,651	54.4	1,200,446	20.9	25,314	49.6
65-74	642,366	52.5	44,448	36.5								
75-84	409,885	33.5	49,822	40.9								
85+	171,550	14.0	27,465	22.6								
Male	517,577	42.3	57,221	47.0	11,203,666	47.9	108,317	53.7	2,801,905	48.83	27,753	54.4
Female	706,224	57.7	64,514	53.0	12,190,481	52.1	93,442	46.3	2,936,617	51.2	23,298	45.6
White	1,061,880	86.8	101,266	83.2								
Black/African American	92,937	7.6	13,619	11.2								
Native American	4,786	0.4	525	0.4								
Asian	22,286	1.8	2,322	1.9								
Other	39,411	3.2	3,841	3.2								
Unknown	2,501	0.2	162	0.1								
Diabetes	297,138	24.3	58,772	48.3	1,349,607	5.8	76,129	37.7	311,974	5.4	18,840	36.9
Hypertension	747,985	61.1	112,516	92.4	3,039,813	13.0	124,665	61.8	773,559	13.5	34,068	66.7
CHF	114,635	9.4	37,985	31.2	118,132	0.5	17,448	8.7	26,063	0.5	3,621	7.1
Cancer	128,449	10.5	21,728	17.9	461,697	2.0	27,814	13.8	105,264	1.8	6,342	12.4

The prevalence of recognized CKD in the Medicare population was 3.7 times greater in 2011 than in 2000, at 10.0 percent. By age, prevalence in this population ranges from 6.9 percent among those age 65–74 to 16 percent in those age 85 and older.

Net increases in CKD prevalence are evident in the smaller EGHP populations as well — from 0.3 to 0.9 percent in the Truven Health MarketScan population, and, in the Clinformatics DataMart population, from 0.3 percent in 2001 to 0.9 percent in 2011. ✦ Table 2.b; see page 141 for analytical methods. *Prevalent patients surviving cohort year without ESRD, age 65 & older (Medicare) & age 20–64 (Truven Health MarketScan & Clinformatics DataMart).*

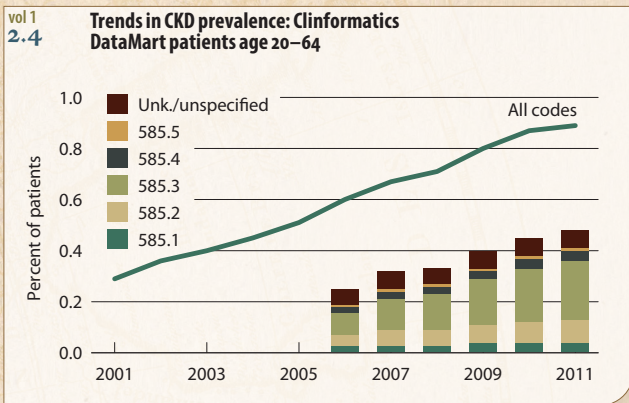| vol 1 2.b	Prevalence (%) of recognized CKD, by dataset & age		
	Medicare	Truven Health MS	Clinformatics DataMart
2000	2.7	0.3	
2001	3.1	0.4	0.3
2002	3.4	0.5	0.4
2003	3.8	0.5	0.4
2004	4.2	0.5	0.5
2005	4.8	0.5	0.5
2006	5.9	0.6	0.6
2007	6.8	0.6	0.7
2008	7.6	0.7	0.7
2009	8.5	0.8	0.8
2010	9.2	0.8	0.9
2011	10.0	0.9	0.9
2011			
20-44		0.4	0.4
45-54		0.8	1.0
55-64		1.9	2.1
65-74	6.9		
75-74	12.2		
85+	16.0		

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.*)

CKD unspecified identified by multiple codes including 585.9, 250.4x, 403.9x, & others.

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

White

Unk./unspecified
585.5
585.4
585.3
585.2
585.1

All codes

Black/African American

All codes

Native American

All codes

Asian

All codes

Percent of patients

95   97   99   01   03   05   07   09   11

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Trends in CKD prevalence: Truven Health MarketScan patients age 20–64

Unk./unspecified
585.5
585.4
585.3
585.2
585.1

All codes

Percent of patients

1999   2001   2003   2005   2007   2009   2011

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Trends in CKD prevalence: Clinformatics DataMart patients age 20–64

Unk./unspecified
585.5
585.4
585.3
585.2
585.1

All codes

Percent of patients

2001   2003   2005   2007   2009   2011

Among Medicare patients, claims data continue to identify more prevalent CKD than found using only the combined 585 codes. In 2011, for example, 14.7 percent of black/African American patients in the Medicare database, and 11 percent of Native American patients, were identified as having prevalent CKD, compared to 12.6 and 9.2 percent found using the 585 codes alone. The difference is even more pronounced among those with private insurance, 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 6.1 percent for black/African American Medicare patients, 4.0–4.3 percent for Medicare patients of other races, and 0.22 and 0.23 percent among Truven Health MarketScan and Clinformatics DataMart patients, respectively. **✦ Figures 2.2–4;** see page 141 for analytical methods. *Prevalent patients surviving cohort year, without ESRD, age 65 & older (Medicare) & 20–64 (Truven Health MarketScan & Clinformatics DataMart).*
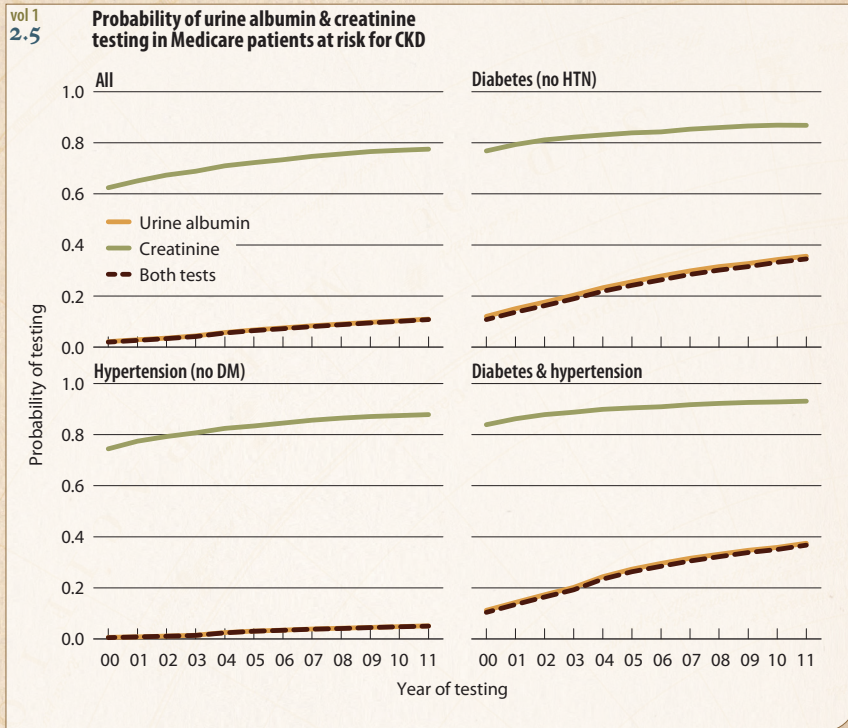
Probability of urine albumin & creatinine testing in Medicare patients at risk for CKD

Figure 2.5 — four panels labeled All; Diabetes (no HTN); Hypertension (no DM); Diabetes & hypertension. Legend: Urine albumin, Creatinine, Both tests. Y-axis: Probability of testing. X-axis: Year of testing (00–11).

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 2011, the probability of creatinine testing in Medicare patients at risk for CKD was 0.78; the probability of receiving a urine albumin test (which must be ordered separately), in contrast, was 0.11.

In patients with either diabetes or hypertension alone, the probablility of creatinine testing in 2011 was 0.87–0.88; the probability of urine albumin testing in those with diabetes alone was 0.36, 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 2011, while the probability of a urine albumin test was 0.37; the probability of receiving both tests was 0.37. Because urine albumin testing must be ordered separately, it may represent a true intent to assess kidney disease. ✦ **Figure 2.5;** 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, 2011

	Urine albumin		Creatinine		Both tests	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
All						
20-44	0.06	0.06	0.60	0.62	0.06	0.06
45-54	0.09	0.09	0.69	0.70	0.09	0.09
55-64	0.13	0.13	0.73	0.74	0.13	0.13
65-74	0.12	0.13	0.76	0.77	0.12	0.12
75-84	0.11	0.12	0.82	0.82	0.11	0.11
85+	0.06	0.07	0.83	0.82	0.06	0.07
Male	0.11	0.11	0.73	0.74	0.11	0.11
Female	0.11	0.11	0.81	0.81	0.11	0.11
White	0.10	0.10	0.78	0.78	0.10	0.10
Black/Af. American	0.14	0.14	0.74	0.75	0.14	0.14
Native American	0.09	0.09	0.57	0.58	0.09	0.08
Asian	0.16	0.16	0.76	0.75	0.16	0.16
Other	0.15	0.16	0.72	0.74	0.15	0.15
Diabetes						
20-44	0.06	0.06	0.60	0.62	0.06	0.06
45-54	0.09	0.09	0.69	0.70	0.09	0.09
55-64	0.13	0.13	0.73	0.74	0.13	0.13
65-74	0.12	0.13	0.76	0.77	0.12	0.12
75-84	0.11	0.12	0.82	0.82	0.11	0.11
85+	0.06	0.07	0.83	0.82	0.06	0.07
Male	0.11	0.11	0.73	0.74	0.11	0.11
Female	0.11	0.11	0.81	0.81	0.11	0.11
White	0.10	0.10	0.78	0.78	0.10	0.10
Black/Af. American	0.14	0.14	0.74	0.75	0.14	0.14
Native American	0.09	0.09	0.57	0.58	0.09	0.08
Asian	0.16	0.16	0.76	0.75	0.16	0.16
Other	0.15	0.16	0.72	0.74	0.15	0.15
Hypertension						
20-44	0.15	0.15	0.83	0.84	0.15	0.15
45-54	0.17	0.17	0.85	0.86	0.17	0.17
55-64	0.20	0.20	0.87	0.88	0.20	0.20
65-74	0.18	0.18	0.89	0.90	0.18	0.18
75-84	0.15	0.15	0.91	0.91	0.14	0.14
85+	0.08	0.08	0.90	0.90	0.08	0.08
Male	0.17	0.16	0.88	0.88	0.16	0.16
Female	0.14	0.15	0.91	0.91	0.14	0.15
White	0.15	0.15	0.90	0.15	0.14	0.14
Black/Af. American	0.19	0.18	0.88	0.18	0.19	0.18
Native American	0.12	0.11	0.66	0.11	0.12	0.11
Asian	0.21	0.21	0.88	0.21	0.21	0.21
Other	0.23	0.22	0.89	0.22	0.22	0.22
Cardiovascular disease						
20-44	0.10	0.10	0.82	0.83	0.10	0.10
45-54	0.14	0.14	0.86	0.86	0.14	0.14
55-64	0.18	0.17	0.87	0.87	0.17	0.17
65-74	0.16	0.16	0.89	0.89	0.16	0.16
75-84	0.13	0.13	0.90	0.91	0.13	0.13
85+	0.07	0.07	0.89	0.89	0.07	0.07
Male	0.14	0.14	0.87	0.88	0.14	0.14
Female	0.12	0.13	0.91	0.91	0.12	0.12
White	0.13	0.13	0.89	0.89	0.12	0.12
Black/Af. American	0.17	0.16	0.89	0.89	0.17	0.16
Native American	0.12	0.11	0.74	0.73	0.12	0.11
Asian	0.19	0.19	0.89	0.89	0.19	0.19
Other	0.20	0.20	0.90	0.90	0.20	0.19

Across all age, gender, and racial/ethnic categories, the adjusted probability of receiving a creatinine test is considerably higher — 5 to 12 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 5–6 times greater than that of urine albumin testing. **✦ Table 2.c;** see page 142 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; category "Other" includes Hispanics.*

In the NHANES 2005–2010 population, 14 percent of participants have CKD. The likelihood of CKD in this population increases with age, is highest in those age 80 and older, and is higher in women 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 is 3.7 times more likely in patients with hypertension than in those without.

In the Truven Health MarketScan population age 55–59 and 60–64, the odds of a CKD diagnosis code are 18 and 43 percent higher compared to patients age 50–54, are lower in women compared to men, and are 2.7–3.3 times higher in patients with diabetes, hypertension, or cardiovascular disease than in patients without these conditions. ♦ **Tables 2.d–f;** see page 142 for analytical methods. *Medicare patients age 65 & older & Truven Health MarketScan patients age 50–64, alive & eligible for all of 2011. CKD claims as well as other diseases identified in 2011. 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, 2011

	NHANES Any CKD	Medicare (65+) DM (no HTN)	HTN (no DM)	CVD	Truven Health MarketScan (50–64) DM (no HTN)	HTN (no DM)	CVD
All	14.0	10.8	16.8	24.5	6.2	5.6	10.4
20-49	6.5						
50-54	8.4				5.1	4.5	8.1
55-59	13.3				5.9	5.3	9.8
60-64	17.2				7.1	6.6	12.0
65-74	29.1	8.8	11.8	20.3			
75-79	49.5	11.3	17.0	24.6			
80+	65.5	15.2	22.9	28.7			
Male	12.1	11.8	19.2	25.7	6.7	6.3	11.0
Female	15.8	9.7	15.3	23.4	5.6	4.8	9.5
White	14.3	10.8	16.6	23.6			
Black/Af Am	16.0	11.5	20.6	33.7			
Native American		9.2	15.4	26.1			
Asian		11.1	14.9	27.2			
Other/unk.	11.9	10.3	15.2	26.0			

vol 1 2.e Percent of patients with a CKD diagnosis code of 585.3 or higher, by demographic characteristics, comorbidity, & dataset, 2011
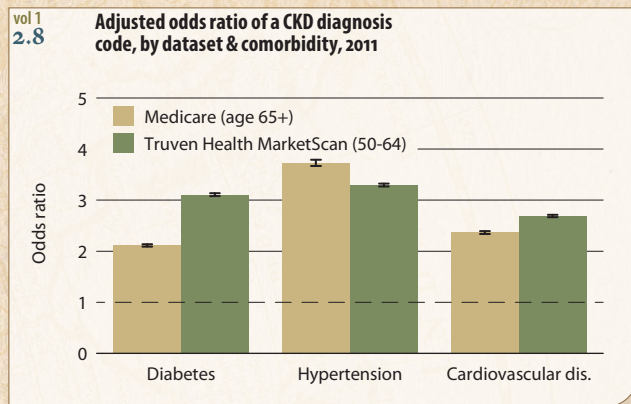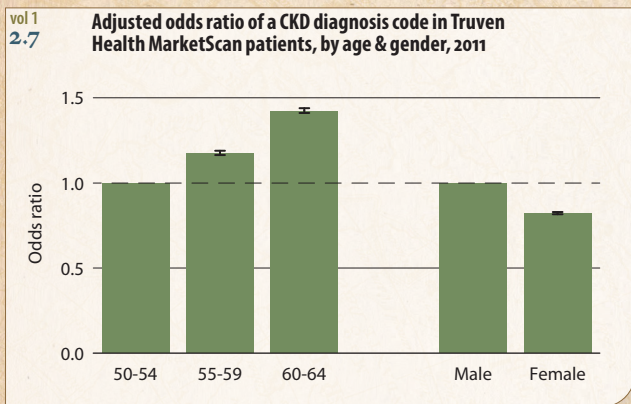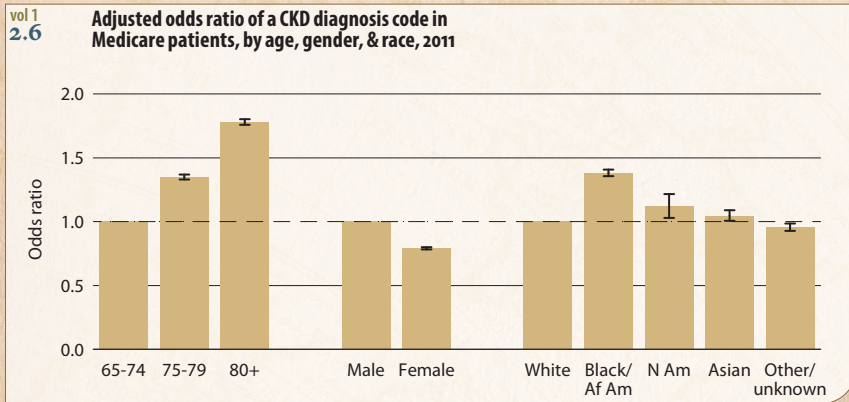
	NHANES eGFR <60	Medicare (65+) DM (no HTN)	HTN (no DM)	CVD	Truven Health MarketScan (50–64) DM (no HTN)	HTN (no DM)	CVD
All	6.7	3.5	7.1	10.7	1.5	1.7	3.4
20-49	0.5						
50-54	2.5				0.9	1.2	2.3
55-59	5.3				1.4	1.6	3.1
60-64	8.5				2.1	2.2	4.3
65-74	18.7	2.6	4.6	8.3			
75-79	35.9	3.7	7.3	11.0			
80+	51.3	5.4	10.1	12.8			
Male	5.6	3.8	8.2	11.4	1.6	1.9	3.6
Female	7.7	3.1	6.4	10.0	1.4	1.5	3.1
White	7.9	3.4	6.9	10.2			
Black/Af Am	6.2	4.2	9.1	15.6			
Native American		3.1	6.1	11.9			
Asian		3.7	6.2	12.6			
Other/unk.	2.6	3.7	6.2	11.1			

vol 1 2.f Adjusted odds ratio of a CKD diagnosis code, by demographic characteristics, comorbidity, & dataset, 2011

	Medicare (65+) Odds ratio	p-value	Truven Health MS (50-64) Odds ratio	p-value
50-54			ref	
55-59			1.18	<.0001
60-64			1.43	<.0001
64-74	ref			
75-84	1.35	<.0001		
85+	1.78	<.0001		
Male	ref		ref	
Female	0.79	<.0001	0.82	<.0001
White	ref			
Black/Af Am	1.38	<.0001		
Native American	1.12	0.0085		
Asian	1.05	0.0218		
Other/unknown	0.96	0.004		
Diabetes	2.11	<.0001	3.11	<.0001
HTN	3.73	<.0001	3.30	<.0001
CVD	2.37	<.0001	2.69	<.0001

vol 1 2.6 Adjusted odds ratio of a CKD diagnosis code in Medicare patients, by age, gender, & race, 2011

vol 1 2.7 Adjusted odds ratio of a CKD diagnosis code in Truven Health MarketScan patients, by age & gender, 2011

vol 1 2.8 Adjusted odds ratio of a CKD diagnosis code, by dataset & comorbidity, 2011

The odds of a CKD diagnosis code in Medicare patients age 65 and older, and in Truven Health 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 patients of other races. And in both Medicare and MarketScan populations, patients with diabetes, hypertension, or cardiovascular disease are two to nearly four times more likely to have a CKD diagnosis code compared to patients without these diseases.

❖ **Figures 2.6–8;** see page 142 for analytical methods. *Medicare patients age 65 & older & Truven Health MarketScan patients age 50–64, alive & eligible for all of 2011. CKD claims as well as other diseases identified in 2011.*

In the year after being diagnosed with CKD, the cumulative probability of a patient seeing a primary care physician is much higher than the probability of seeing a cardiologist or nephrologist, at 0.82 in the employed 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 nephrology visit, at 0.63 versus 0.31, respectively, in Medicare patients and 0.35 versus 0.27 in patients with private insurance. ✦ **Figure 2.9;** see page 142 for analytical methods. *Patients alive & eligible all of 2010. CKD diagnosis represents date of first CKD claim during 2010; physician claims searched during the 12 months following that date.*

vol 1 2.9 Cumulative probability of a physician visit by month 12 after CKD diagnosis in 2010, by dataset & physician specialty
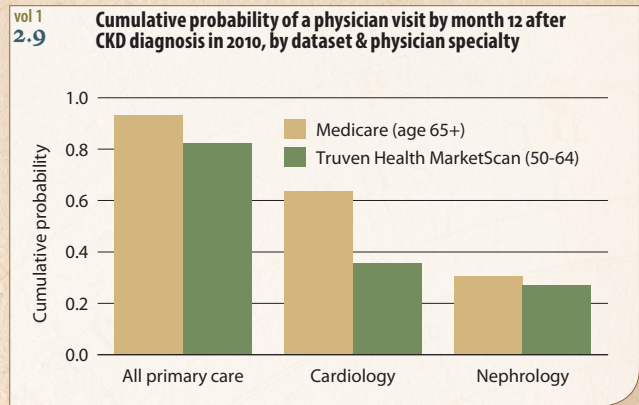
The type of physician seen after a CKD diagnosis changes with CKD severity. In Medicare CKD patients, the probability of seeing a nephrologist is 0.24–0.35 across demographic groups and 0.42–0.60 in those with a diagnosis code of 585.3 or higher. In employed CKD patients, the probability is 0.27 overall, 0.54 in patients with a code of 585.3 or higher. ✦ **Tables 2.g–h;** see page 142 for analytical methods. *Patients alive & eligible all of 2010. CKD diagnosis represents date of first CKD claim during 2010; physician claims searched during the following 12 months.*

vol 1 2.g Cumulative probability of a physician visit by month 12 after CKD diagnosis in 2010, by demographic characteristics, physician specialty, & dataset

	Medicare (65+)			Truven Health MarketScan (50–64)		
	Primary care	Cardiologist	Nephrologist	Primary care	Cardiologist	Nephrologist
50-54				0.78	0.31	0.25
55-59				0.80	0.36	0.27
60-64				0.82	0.40	0.29
65-74	0.91	0.60	0.33			
75-84	0.93	0.66	0.31			
85+	0.93	0.66	0.24			
Male	0.92	0.67	0.31	0.80	0.38	0.27
Female	0.93	0.61	0.29	0.82	0.35	0.28
White	0.92	0.64	0.29			
Black/Af Am	0.91	0.61	0.35			
Other	0.90	0.58	0.30			
All	0.93	0.63	0.31	0.82	0.35	0.27

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

	Medicare (65+)			Truven Health MarketScan (50–64)		
	Primary care	Cardiologist	Nephrologist	Primary care	Cardiologist	Nephrologist
50-54				0.79	0.37	0.57
55-59				0.81	0.40	0.56
60-64				0.83	0.43	0.55
65-74	0.91	0.61	0.60			
75-84	0.93	0.67	0.54			
85+	0.94	0.67	0.42			
Male	0.93	0.61	0.52	0.81	0.43	0.56
Female	0.92	0.69	0.56	0.83	0.38	0.56
White	0.93	0.65	0.53			
Black/Af Am	0.91	0.62	0.58			
Other	0.91	0.58	0.53			
All	0.93	0.64	0.57	0.85	0.45	0.54

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.*)

CKD unspecified identified by multiple codes including 585.9, 250.4x, 403.9x, & others.

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.
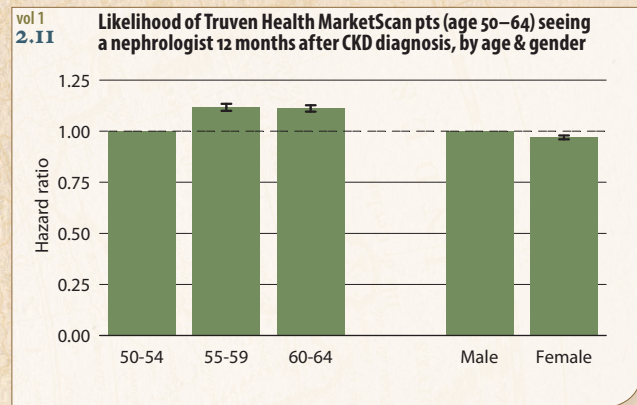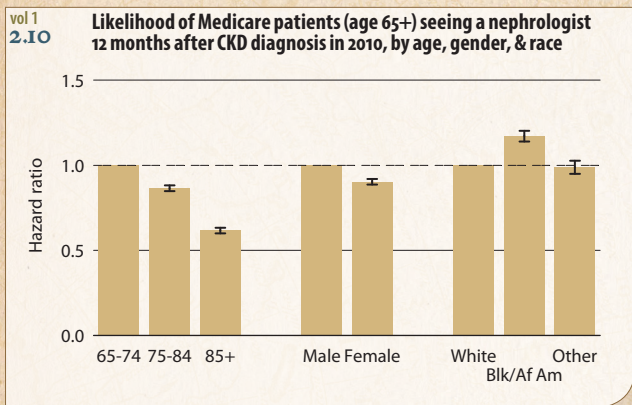
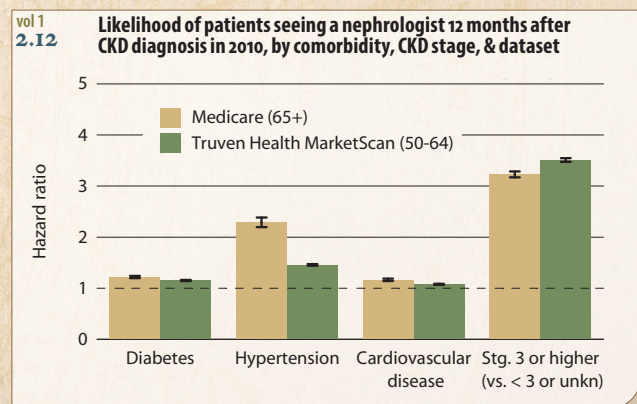| vol 1 2.1	Likelihood of seeing a nephrologist 12 months after CKD diagnosis in 2010, by demographics, comorbidity, CKD stage, & dataset			
	Medicare (65+)		**Truven Health MS (50–64)**	
	Hazard ratio	p-value	Hazard ratio	p-value
50-54			reference	
55-59			1.12	< .0001
60-64			1.11	< .0001
65-74	reference		-	
75-84	0.87	< .0001	-	
85+	0.62	< .0001	-	
Male	reference		reference	
Female	0.90	< .0001	0.97	< .0001
White	ref		-	
Black/Af Am	1.17	< .0001	-	
Other	0.99	0.53	-	
Diabetes	1.22	< .0001	1.15	< .0001
Hypertension	2.29	< .0001	1.46	< .0001
Cardiovascular disease	1.17	< .0001	1.08	< .0001
Stgs 3–5 vs Stg 1–2 or unknown	3.23	< .0001	3.51	< .0001

Among Medicare patients age 65 and older, blacks/African Americans are 17 percent more likely than their white counterparts to have seen a nephrologist during the 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 22 and 17 percent higher, respectively, than for CKD patients without these conditions. CKD patients with hypertension are more than two times more likely to see a nephrologist than those without the condition.

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 142 for analytical methods. *Patients alive & eligible all of 2010. CKD diagnosis represents date of first CKD claim during 2010; physician claims searched during the 12 months following that date.*

vol 1 2.10 · Likelihood of Medicare patients (age 65+) seeing a nephrologist 12 months after CKD diagnosis in 2010, by age, gender, & race

vol 1 2.11 · Likelihood of Truven Health MarketScan pts (age 50–64) seeing a nephrologist 12 months after CKD diagnosis, by age & gender

Factors associated with a higher likelihood of seeing a nephrologist in the 12 months after a CKD diagnosis include black/African American race (Medicare population), age of 55–64 (those with private insurance), and, in both populations, diabetes, hypertension, cardiovascular disease, or a CKD diagnosis code of 585.3 or higher. ✦ **Figures 2.10–12;** see page 142 for analytical methods. *Patients alive & eligible all of 2010. CKD diagnosis represents date of first CKD claim during 2010; physician claims searched during the 12 months following that date.*

vol 1 2.12 · Likelihood of patients seeing a nephrologist 12 months after CKD diagnosis in 2010, by comorbidity, CKD stage, & dataset

Medicare (65+)
Truven Health MarketScan (50-64)

prevalence of recognized ckd
PATIENTS WITH CODED DIABETES, CKD, CHF, & CVA, 2011 (FIGURE 2.1)

	CKD	diabetes	CHF	CVA	CVA + CKD
Medicare (age 65+)	9.9%	24.3%	9.4%	6.8%	1.9%
Truven Health MarketScan (age 50–64)	1.5%	10.1%	0.9%	1.0%	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, 2011 (FIGURE 2.5)

	urine albumin	creatinine	both
overall	0.11	0.78	0.11
diabetes, no hypertension	0.36	0.87	0.35
hypertension, no diabetes	0.05	0.88	0.05
diabetes & hypertension	0.37	0.93	0.37

odds of a ckd diagnosis code
ADJUSTED ODDS RATIO OF A CKD DIAGNOSIS CODE, 2011 (TABLE 2.F)

Medicare (age 65+) ✦ white: reference; black/African American: 1.38; Native American: 1.12; Asian: 1.05; diabetes: 2.11; hypertension: 3.73; CVD: 2.37

Truven Health MarketScan (age 50–64) ✦ diabetes: 3.11; hypertension: 3.30; cardiovascular disease: 2.69

probability of seeing a physician after ckd diagnosis
CUMULATIVE PROBABILITY OF A PHYSICIAN VISIT AT MONTH 12 FOLLOWING A CKD DIAGNOSIS, 2011 (FIGURE 2.9)

	all primary care	cardiologist	nephrologist
Medicare (age 65+)	0.93	0.63	0.31
Truven Health MarketScan (age 50–64)	0.82	0.35	0.27

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IDENTIFICATION & CARE OF PATIENTS WITH CKD
summary