
Chapter 6: Medicare Expenditures for Persons With CKD

- Medicare spending for patients with CKD aged 65 and older exceeded \$50 billion in 2013, representing 20% of all Medicare spending in this age group.
- Patients with one or more of the chronic conditions accounted for \$8 billion of the total \$9 billion in Medicare spending growth for patients aged 65 and older between 2010 and 2013.
- Over 70% of Medicare spending for CKD patients aged 65 and older was incurred by those who also had diabetes, congestive heart failure, or both.
- While spending per year at risk was 12.7% higher for Blacks than Whites in 2013, this represents a reduction from the 19.6% gap than occurred in 2010.
- Spending per year at risk was more than twice as high for patients with all three chronic conditions of CKD, diabetes, and congestive heart failure (\$38,230) than in patients with only CKD (\$15,614).

Introduction

Determining the economic impact of chronic kidney disease (CKD) on a health care system is challenging. The considerable under-recognition of CKD (as noted in Vol. 1, Chapters 1, 2, and 3) affects estimates of CKD-related expenditures in several ways:

- Biochemical measures of renal function support the most definitive criterion, but health plan datasets, including Medicare's, rarely contain this information on a reliable or large scale.
- Even medical record data with complete laboratory results would be subject to substantial under-identification because many persons with underlying CKD have not been tested.
- Identification of cases of CKD based on ICD-9-CM (International Classification of Diseases, 9th revision, Clinical Modification) diagnosis codes will also reduce estimated total CKD expenditures below their true level, as formal diagnoses are not commonly documented early in the disease process.

However, assuming that under-identification is most common in the earliest and least costly cases, resulting estimates of cost per patient year will be biased upwards. To the extent that under-identification is not constant over time, the interpretation of trend data is also confounded.

Conversely, efforts to increase CKD identification may inaccurately affect estimates of CKD-related health system costs. For example, even if the true total number of cases in the population is constant, greater identification over time will likely result in artificially high trends in total expenditures, as the number of identified cases grows. Greater identification will have the opposite effect on trends in per-patient-year expenditures, as the distribution of identified cases is likely to become less severe. In addition, it is not possible to accurately attribute health care expenditures solely to kidney disease; the costs of CKD are influenced by its interactive nature, and resulting associations with cardiovascular disease, diabetes mellitus (DM), stroke, and infectious complications.

In addition, the use of Medicare billing data to describe total Medicare expenditures is becoming increasingly problematic. Medicare pays for persons

in managed care plans (“Medicare Advantage”) on a monthly capitated basis so billing data are not available. In recent years, Medicare enrollment in managed care plans has accelerated, possibly due to enhanced part D coverage in these plans. As a result, the percent of Medicare beneficiaries enrolled in managed care increased from 13 percent in 2004 to 27 percent in 2012 (CMS, 2013). Thus, while this chapter covers the majority of Medicare beneficiaries with CKD, a significant percentage will be missing.

The methodology we employ to calculate costs related to CKD (excluding end-stage renal disease; ESRD), was first discussed in the 2011 USRDS Annual Data Report and continued in subsequent ADRs. This method utilizes ICD-9-CM diagnosis codes to create a point prevalent CKD cohort from patients classified as having CKD on January 1 of each given year. As described in the 2013 ADR, this cost-calculation method does not include “new” CKD patients, who in the 2009 and 2010 ADR accounted for a disproportionate percentage of overall costs, resulting from a possible association with high rates of acute kidney injury (AKI). How to best integrate the costs of AKI patients into CKD calculations is a continuing area for research due to the potential for transition from AKI to CKD.

In this chapter, costs are defined as Medicare expenditures rather than true economic costs, using claims from Medicare Parts A, B, and D as based on the 5 percent Medicare sample. Only persons aged 65 and over were included, and disabled persons with CKD were not examined in this chapter. Patients with recognized CKD, who represent 10% of the point prevalent aged Medicare population, accounted for 20% of total expenditures (see Table 6.1). We examined CKD costs in relation to patients’ CKD stage, age, sex, race, and concurrent disease, focusing on DM and congestive heart failure (CHF). Diabetes and CHF, in addition to CKD, represent the highest chronic disease population-level expenditures for Medicare, and thus were analyzed as coexisting diseases. CHF, for example, affects 9% of patients in the fee-for-service Medicare population, but accounts for 21% of expenditures. Thirty-five percent of overall expenditures were directed toward the 24% of patients with DM. Overall, people with diagnoses of DM, CKD, and/or CHF accounted for one-third of the Medicare population, and one-half of programmatic costs.

vol 1 Table 6.1 Point prevalent distribution of Medicare fee-for-service patients aged 65+, and total annual costs of Medicare Parts A, B, and D services, by DM, CHF, and/or CKD, 2013

	U.S. Medicare Population	Costs (millions, U.S. \$)	PPPY (U.S. \$)	Population (%)	Costs (%)
All	23,897,280	\$250,503	\$10,854	100.00	100.00
With CHF or CKD or DM	8,041,400	\$127,725	\$16,810	33.65	50.99
CKD only (- DM & CHF)	964,240	\$14,223	\$15,614	4.04	5.68
DM only (- CHF & CKD)	4,088,260	\$47,039	\$11,842	17.11	18.78
CHF only (- DM & CKD)	911,260	\$17,321	\$20,716	3.81	6.91
CKD and DM only (- CHF)	780,520	\$13,605	\$18,404	3.27	5.43
CKD and CHF only (- DM)	339,040	\$8,748	\$30,312	1.42	3.49
DM and CHF only (- CKD)	535,020	\$12,968	\$26,477	2.24	5.18
CKD and CHF and DM	423,060	\$13,822	\$38,230	1.77	5.52
No CKD or DM or CHF	15,855,880	\$122,778	\$7,931	66.35	49.01
All CKD (+/- DM & CHF)	2,506,860	\$50,398	\$21,909	10.49	20.12
All DM (+/- CKD & CHF)	5,826,860	\$87,433	\$15,718	24.38	34.90
All CHF (+/- DM & CKD)	2,208,380	\$52,858	\$26,750	9.24	21.10
CKD and DM (+/- CHF)	1,203,580	\$27,427	\$24,916	5.04	10.95
CKD and CHF (+/- DM)	762,100	\$22,570	\$34,715	3.19	9.01
DM and CHF (+/- CKD)	958,080	\$26,789	\$31,469	4.01	10.69

Data Source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; CHF, congestive heart failure; DM, diabetes mellitus; PPPY, per patient per year costs.

We next present data on overall Medicare costs and those related to CKD, with and without DM and CHF, allowing for comparison of trends. CKD with comorbidities contributes significant cost stress to the Medicare system, accounting for large proportions of Medicare spending on DM and CHF. CKD patients with DM accounted for 31.4% of Medicare spending on DM, while CKD with CHF accounted for greater than 42.7% of Medicare CHF spending.

We conclude by presenting costs for different Medicare populations, including CKD patients with concurrent DM and CHF, comparing 2010 and 2013 expenditures. Although costs in all categories have grown, the rate of growth differs across groups. These data will further illustrate the importance of prevention and management of comorbidities in CKD cost-reduction efforts.

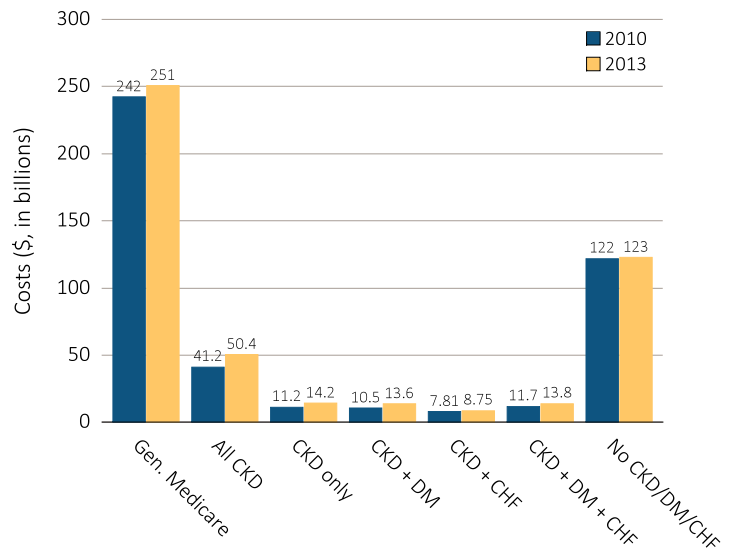
ANALYTICAL METHODS

See the CKD Analytical Methods chapter for an explanation of analytical methods used to generate the figures and tables in this chapter.

Costs of CKD by Stage and Patient Characteristics

Among the general Medicare population aged 65 and older, total costs for Parts A, B, and D rose 3.7% to \$251 billion between 2010 and 2013, while such costs rose 22.3% to \$50.4 billion among the CKD patients (Figure 6.1). Therefore, costs in the non-ESRD CKD population exceeded those in the ESRD population (\$30.9 billion, see Volume 2, Chapter 11, Costs of ESRD). Costs for these patients with CKD now represent 20.1% of all Medicare Parts A, B, and D spending. Although there was a universal rise in expenditure for all covered groups, certain patient populations with comorbid conditions in addition to CKD experienced higher rates of growth. Costs for patients without CKD, DM, or CHF increased by only 0.8%, while the costs for those with one or more of these three conditions increased by \$9 billion. This is equivalent to the \$9 billion increase in general Medicare spending on all elderly patients between 2010 and 2013.

vol 1 Figure 6.1 Overall Medicare Parts A, B, and D costs for fee-for-service patients aged 65 and older, by CKD, DM, CHF, and year, 2010 & 2013



Data source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; CHF, congestive heart failure, DM, diabetes mellitus.

Table 6.2 shows overall per person per year (PPPY) costs of Parts A, B, and D services for patients with CKD (but not ESRD) by stage of CKD (see Table A for definitions). In 2013, PPPY costs reached \$21,909 for Medicare CKD patients aged 65 and older, an 8.7% increase compared to 2012 (\$20,162) but a decrease since 2010 (\$22,440). The overall difference reflects both changes in average spending by stage (spending increased in all CKD stages from 2012), and the shift in the distribution of identified patient years towards the less severe and less costly stages. Costs for patients with Stages 4-5 CKD (\$27,405) were 38.0% greater than costs for patients with Stages 1-2 CKD (\$19,859). Costs for Black/African-American patients exceeded those for White patients by 12.7%, somewhat lower than the 19.6% gap observed in 2010.

vol 1 Table 6.2 Overall per person per year costs for Medicare Parts A, B, and D services for CKD patients, by CKD stage, age, sex, race, and year, 2010 & 2013

	2010					2013				
	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc
Patient years at risk	1,836,715	161,650	660,612	202,278	812,175	2,300,310	227,260	1,023,273	229,857	819,920
All patients	\$22,440	\$19,086	\$21,392	\$28,793	\$22,377	\$21,909	\$19,859	\$21,253	\$27,405	\$21,756
Age										
65-69	\$20,433	\$17,054	\$20,117	\$29,474	\$19,716	\$20,964	\$16,943	\$20,819	\$30,890	\$20,281
70-74	\$20,670	\$16,688	\$19,642	\$28,231	\$20,763	\$20,274	\$17,503	\$19,475	\$26,615	\$20,607
75-79	\$21,921	\$18,782	\$20,615	\$29,599	\$21,823	\$21,441	\$19,930	\$20,817	\$26,369	\$21,354
80-84	\$23,422	\$20,967	\$22,218	\$28,209	\$23,596	\$22,375	\$21,218	\$21,468	\$27,384	\$22,367
85+	\$24,714	\$22,255	\$23,798	\$28,732	\$24,623	\$23,737	\$23,650	\$23,076	\$27,165	\$23,409
Sex										
Male	\$21,841	\$18,540	\$21,078	\$28,438	\$21,586	\$21,545	\$19,753	\$21,223	\$26,807	\$21,063
Female	\$22,977	\$19,604	\$21,687	\$29,083	\$23,071	\$22,233	\$19,957	\$21,280	\$27,884	\$22,372
Race										
White	\$21,798	\$18,248	\$20,946	\$27,690	\$21,758	\$21,550	\$19,629	\$20,926	\$26,551	\$21,496
Black/African American	\$26,075	\$22,567	\$24,024	\$33,206	\$26,372	\$24,281	\$20,729	\$23,235	\$32,322	\$23,784
Other	\$25,054	\$22,153	\$23,325	\$33,833	\$24,720	\$22,694	\$20,901	\$22,487	\$27,658	\$22,100

Data source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; Unk/unspc, CKD stage unknown or unspecified.

Table A. ICD-9-CM codes for Chronic Kidney Disease (CKD) stages

ICD-9-CM code ^a	Stage
585.1	CKD, Stage 1
585.2	CKD, Stage 2 (mild)
585.3	CKD, Stage 3 (moderate)
585.4	CKD, Stage 4 (severe)
585.5	CKD, Stage 5 (excludes 585.6: Stage 5, requiring chronic dialysis ^b)
CKD stage-unspecified	For these analyses, identified by multiple codes including 585.9, 250.4x, 403.9x & others

^a For analyses in this chapter, CKD stage estimates require at least one occurrence of a stage-specific code, and the last available CKD stage in a given year is used.

^b In USRDS analyses, patients with ICD-9-CM code 585.6 & with no ESRD 2728 form or other indication of end-stage renal disease (ESRD) are considered to have code 585.5.

In Table 6.3, PPPY costs are shown for patients with both CKD and DM. Among 2013 Medicare patients with these two conditions, PPPY costs for Blacks were \$26,927—9.6% greater than the \$24,561 incurred by Whites.

Table 6.4 shows PPPY costs for patients with CKD and concurrent CHF. In 2013, PPPY costs for Black patients with both conditions reached \$38,433—12.9% higher than the \$34,036 PPPY cost for their White counterparts.

vol 1 Table 6.3 Per person per year costs for Parts A, B, and D services for Medicare CKD patients with DM, by CKD stage, age, sex, race, and year, 2010 & 2013

	2010					2013				
	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc
Patient years at risk	870,939	78,316	322,900	105,972	363,752	1,100,774	110,909	499,897	120,675	369,293
All patients	\$25,510	\$22,117	\$24,455	\$32,940	\$25,013	\$24,916	\$22,364	\$24,453	\$31,383	\$24,195
Age										
65-69	\$23,726	\$20,296	\$23,689	\$32,805	\$22,369	\$24,561	\$19,721	\$24,561	\$35,068	\$23,317
70-74	\$23,731	\$19,499	\$23,058	\$31,020	\$23,381	\$23,086	\$20,435	\$22,703	\$29,438	\$22,593
75-79	\$25,251	\$22,248	\$23,774	\$33,883	\$24,735	\$24,407	\$22,238	\$23,877	\$30,046	\$23,991
80-84	\$26,767	\$23,625	\$25,412	\$32,635	\$26,773	\$25,445	\$25,351	\$24,631	\$31,640	\$24,415
85+	\$28,441	\$27,272	\$27,127	\$34,251	\$27,763	\$27,446	\$25,803	\$27,016	\$31,741	\$26,787
Sex										
Male	\$24,252	\$21,432	\$23,568	\$31,835	\$23,411	\$23,991	\$21,786	\$23,870	\$30,042	\$23,036
Female	\$26,702	\$22,820	\$25,348	\$33,877	\$26,471	\$25,807	\$22,950	\$25,031	\$32,468	\$25,316
Race										
White	\$24,732	\$20,831	\$23,872	\$31,583	\$24,378	\$24,561	\$22,005	\$24,117	\$30,658	\$23,995
Black/African American	\$28,904	\$26,164	\$27,066	\$37,642	\$28,153	\$26,927	\$23,254	\$26,221	\$35,389	\$25,637
Other	\$27,767	\$25,507	\$26,488	\$36,765	\$26,553	\$25,089	\$23,869	\$25,051	\$30,165	\$23,873

Data source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; DM, diabetes mellitus; Unk/unspc, CKD stage unknown or unspecified.

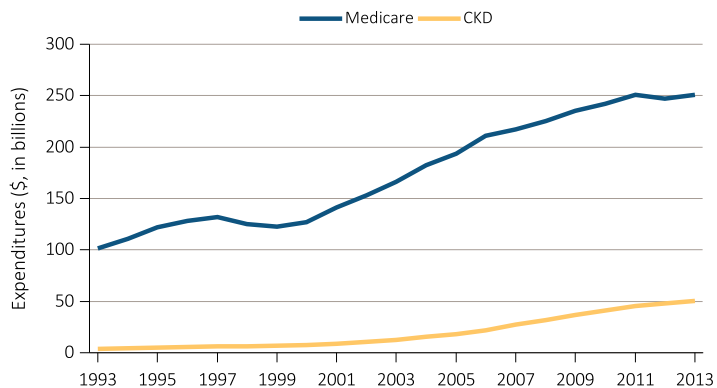
vol 1 Table 6.4 Per person per year costs for Parts A, B, and D services for Medicare CKD patients with CHF, by CKD stage, age, sex, race, and year, 2010 & 2013

	2010					2013				
	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc	Any CKD	Stages 1-2	Stage 3	Stages 4-5	Unk/Unspc
Patient years at risk	562,712	41,614	194,915	78,541	247,642	650,146	55,549	289,311	85,666	219,619
All patients	\$34,766	\$33,276	\$34,044	\$40,563	\$33,747	\$34,715	\$34,113	\$34,538	\$38,846	\$33,489
Age										
65-69	\$38,358	\$35,804	\$36,982	\$48,801	\$36,829	\$39,428	\$35,086	\$39,209	\$49,990	\$37,486
70-74	\$35,829	\$33,511	\$34,277	\$42,201	\$35,726	\$35,991	\$33,863	\$35,775	\$38,857	\$35,831
75-79	\$35,488	\$34,861	\$34,770	\$41,926	\$34,023	\$35,836	\$35,367	\$35,538	\$39,405	\$34,965
80-84	\$34,529	\$32,621	\$33,500	\$38,629	\$34,304	\$34,272	\$34,736	\$33,785	\$38,077	\$33,247
85+	\$32,757	\$31,195	\$32,686	\$37,841	\$31,510	\$32,144	\$32,517	\$32,234	\$35,904	\$30,458
Sex										
Male	\$33,906	\$33,686	\$33,122	\$39,935	\$32,686	\$33,603	\$33,431	\$34,001	\$38,291	\$31,364
Female	\$35,535	\$32,912	\$34,959	\$41,098	\$34,634	\$35,714	\$34,745	\$35,049	\$39,284	\$35,337
Race										
White	\$33,569	\$31,617	\$33,051	\$38,595	\$32,772	\$34,036	\$33,122	\$33,993	\$37,641	\$32,969
Black/African American	\$40,868	\$38,856	\$39,480	\$48,402	\$39,330	\$38,433	\$37,541	\$37,469	\$45,290	\$36,567
Other	\$40,817	\$40,894	\$39,173	\$48,838	\$38,873	\$37,206	\$40,194	\$36,955	\$39,873	\$35,497

Data source: Medicare 5 percent sample. Abbreviations: CHF, congestive heart failure; CKD, chronic kidney disease; Unk/unspc, CKD stage unknown or unspecified.

Over time, the costs for Medicare patients aged 65 and older with recognized CKD have accounted for an increasing share of Medicare expenditures, expanding from 4.2% in 1995, to 7.7% in 2003, and 20.1% in 2013. Much of this growth was due to the increased ascertainment of CKD as shown in Chapter 2 of this Volume, Identification and Care of Patients with CKD. Figure 6.2 compares total expenditures on Part A, B, and D services for the Medicare fee-for-service patients as a whole, with those with CKD.

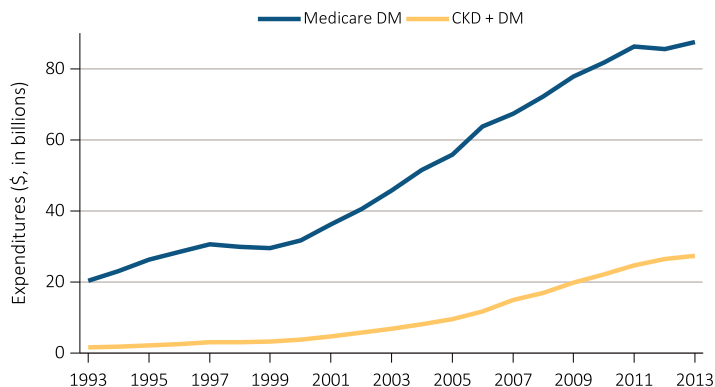
vol 1 Figure 6.2 Overall expenditures on Parts A, B, and D services for the Medicare population aged 65+ and for those with CKD, by year, 1993-2013



Data source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease.

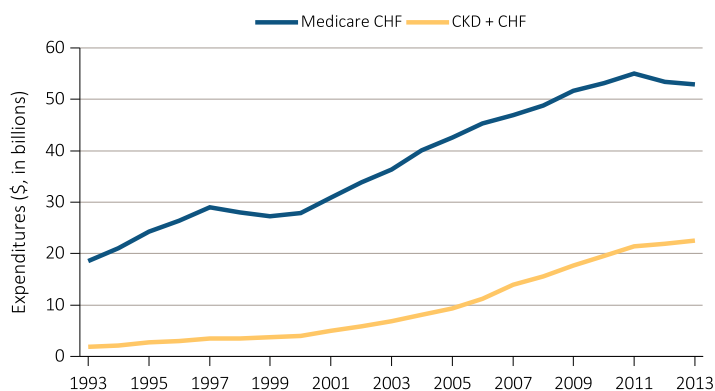
In Figures 6.3 and 6.4 we show total Part A, B, and D service expenditures for Medicare fee-for-service patients with DM and CHF, respectively. Spending for patients with comorbid DM and CKD, and CHF and CKD are also presented. Costs for patients with CKD and concurrent DM amounted to \$27.4 billion in 2013, or 31.4% of total Medicare spending on DM. Spending on CHF in the Medicare population was \$52.9 billion in 2013. Of this, \$22.6 billion (42.7%) was spent on the CKD patient population with CHF.

vol 1 Figure 6.3 Overall expenditures on Parts A, B, and D services for the Medicare DM population aged 65+ and for those with CKD and DM, by year, 1993-2013



Data Source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; DM, diabetes mellitus.

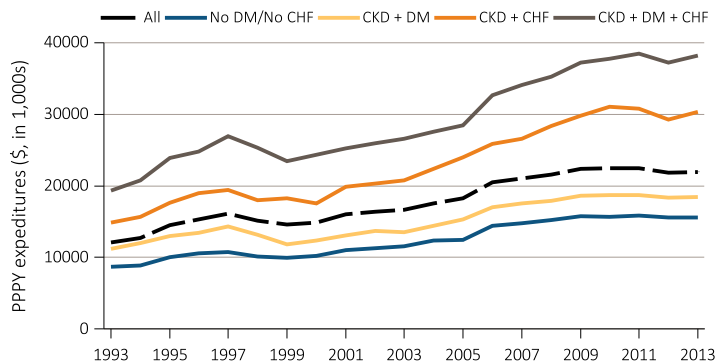
vol 1 Figure 6.4 Overall expenditures on Parts A, B, and D services for the Medicare CHF population aged 65+ and for those with CKD and CHF, by year, 1993-2013



Data Source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; CHF, congestive heart failure.

Figure 6.5 illustrates PPPY costs for Medicare CKD patients aged 65 and older by the presence of DM and CHF. In 2013, PPPY costs for CKD patients varied greatly by the presence of their comorbidities. CKD patients without DM and without CHF cost \$15,614 per person per year. Those with DM in addition to CKD averaged \$18,404 PPPY, and patients with CKD and CHF cost \$30,312, while expenditures for those with all three conditions reached \$38,230 PPPY.

vol 1 Figure 6.5 Per person per year expenditures on Parts A, B, and D services for the CKD Medicare population aged 65+, by DM, CHF, and year, 1993-2013



Data Source: Medicare 5 percent sample. Abbreviations: CKD, chronic kidney disease; CHF, congestive heart failure, DM, diabetes mellitus; PPPY, per person per year.

Cost growth per patient per year as shown in Figure 6.5 was considerably smaller in the 2009-2013 period than the growth in total costs for these comorbidity combinations shown in Figure 6.1. This indicates that the growth in overall costs was influenced more so by an increase in the number of patients with these conditions, than by growth in actual PPPY costs.

Conclusion

The analysis of cost data in the Medicare CKD population indicates avenues for potential cost savings, enduring racial cost disparities, and the effect of cost containment efforts in the CKD population. Potential cost savings could be achieved through the prevention of disease progression to later stages of CKD, and development of concurrent chronic conditions such as DM and CHF. Patients with CKD, DM, and CHF, alone or in combination, account for the vast majority of spending growth in the entire aged 65 or older Medicare population. In the Medicare CKD population, Black patients continue to exhibit higher costs in all disease categories as compared to Whites. However, the overall gap in spending between Black and White patients has declined in recent years. Despite accounting for an increasing share of Medicare spending, recent cost data shows that there have been decreases in the PPPY costs of CKD, especially for those in the later stages of the disease. Establishing the sources of this decline should be an important research priority. Growth in total CKD spending has been driven by growth in the number of identified cases, particularly in the earlier stages (CKD 1-3), that has more than offset the decline in spending per patient year.

References

Centers for Medicare and Medicaid Services (CMS). Medicare & Medicaid Statistical Supplement: 2013 Edition. Website. Retrieved October 8, 2015 from <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareMedicaidStatSupp/2013.html>.

Notes