Published in final edited form as:
Am J Kidney Dis. 2010 November ; 56(5): 928–936. doi:10.1053/j.ajkd.2010.08.006.

Using Race as a Case-Mix Adjustment Factor in a Renal Dialysis Payment System: Potentials and Pitfalls

Jesse L. Roach, M.D, **Marc N. Turenne, PhD**, **Richard A. Hirth, PhD**, **John RC Wheeler, PhD**, and **Kathryn S. Sleeman, MA**
University of Michigan, Kidney Epidemiology & Cost Center

Abstract

Background—Racial disparities in health care are widespread in the U.S. Identifying contributing factors may improve care for underserved minorities. Insofar as differential utilization of services, based on need or biologic effect, contributes to outcome disparities, prospective payment systems may require inclusion of race to minimize these adverse effects. This research determines if costs associated with ESRD care varied by race and if this variance affected payments to dialysis facilities.

Study Design—We compared the classification of race across Medicare databases and investigated the differences in cost of care for chronic dialysis patients by race. Setting and

Participants—Medicare ESRD database including 890,776 patient-years during 2004–2006.

Predictors—Patient race and ethnicity.

Outcomes—Costs associated with ESRD care and estimated payments to dialysis facilities under a prospective payment system.

Results—There were inconsistencies in race and ethnicity classification; however, there was significant agreement for classification of Black and non-Black race across the databases. In predictive models evaluating cost of outpatient dialysis care for Medicare patients, race is a significant predictor of cost, particularly for cost of separately billed injectable medications used in dialysis. Overall, Black patients had 9% higher costs than non-Black patients. In a model that did not adjust for race, other patient characteristics accounted for only 31% of this difference.

Limitations—Lack of information on biological causes of the link between race and cost.

Conclusions—There is a significant racial difference in the cost of providing dialysis care that is not accounted for by other factors that may be used to adjust payments. This difference has the potential to affect the delivery of care to certain populations. Of note, inclusion of race into a prospective payment system will require better understanding of biologic differences in bone and anemia outcomes as well as effects of inclusion on self-reported race.

Corresponding Author: Joseph M. Messana, M.D University of Michigan, Kidney Epidemiology & Cost Center 315 West Huron, Suite 240 Ann Arbor, MI 48103-4262 (734) 998-6611 (KECC) (734) 998-6620 (FAX) (734) 274-1611 (mobile) jmessana@umich.edu.

Note Added in Proof The Final Rule was published on July 26, 2010 without a race adjuster. Given the concerns brought up in this article, access to and quality of care should be closely monitored and changes to the system considered if warranted.

The health services research and clinical literatures have widely documented the existence of racial disparities in health care in the United States. This literature has been summarized in an Institute of Medicine Report[1]. In addition to disparities in care received, race has been shown in numerous cases to be related to health care outcomes across various disease and health disciplines[2, 3, 4]. There is also evidence that these outcomes are associated with higher health care costs[3, 5].

Black race is associated with a significant increased likelihood of developing ESRD. Although Black patients have lower mortality rates on dialysis than their non-Black counterparts[6], there is evidence that in some respects Black patients face a greater burden of disease. Black patients are more likely to be anemic than their non-Black counterparts, and their anemia is more often intractable. Blacks also have higher erythropoiesis-stimulating agent (ESA) use than other patients[7, 8]. Additionally, studies have identified racial differences in parathyroid hormone concentration and the biologic effect of this hormone on ESRD-related bone disease[9]. These relationships create the potential for race to affect the costs of dialysis.

In spite of documented relationships between race and health status and cost, payment systems that reimburse health providers do not typically adjust for race. This study will demonstrate the application of a racial adjustment to a new payment system under development for outpatient dialysis services. This analysis will include challenges in appropriately classifying patients and determining costs attributable to racial differences, as well as potential explanations for why cost differentials exist. These data can be used to inform a decision as to whether to include race in future payment models.

The issue of inclusion of race as a payment adjuster in the dialysis payment system has already sparked controversy in political and industry circles. In 2007, the Subcommittee on Health of the Committee on Ways and Means in the U.S. House of Representatives received testimony regarding the potential for an expanded ESRD prospective payment system to create racial disparities in ESRD anemia outcomes[10]. In the recently concluded public comment period, criticism of the exclusion of race in proposed payment rules issued in September 2009 by the Centers for Medicare and Medicaid Services (CMS) has come from both patient advocacy organizations and large dialysis providers[11, 12]

The current Medicare payment system for outpatient kidney dialysis facilities is a mixed payment system. It includes a bundled prospective payment, often referred to as the Composite Rate, for the dialysis treatment and specified, related services. Other services, including certain injectable medications (such as ESAs, Vitamin D analogs, and iron), laboratory tests not covered by the Composite Rate, and several miscellaneous supplies and services, are separately billed on a fee-for-service basis. Effective January 1, 2011, the Medicare Improvements for Patients and Providers Act of 2008 (MIPPA), Pub. L. 110–275,[13] requires that CMS implement a new payment system based on an expanded bundled of outpatient dialysis-related services. The new bundle is to include most or all of currently separately billed items in addition to services currently included in the Composite Rate.

MIPPA requires payment adjustments based on patient characteristics which affect cost of care. Appropriate adjustments help ensure access to care for individuals who are likely to face above average costs, and would provide more equitable payment to facilities caring for a disproportionate share of such patients. For example, payments for the more limited Composite Rate bundle of services are currently adjusted for patient age, body surface area, and low body-mass index. More recent research underlying a recent Report to Congress on the expanded bundle examined numerous other patient characteristics that may impact the cost of dialysis[14, 15]. Several characteristics were found to be associated with significantly

higher costs, and were included in the recently proposed case-mix adjusted payment model. These included but were not limited to HIV/AIDS, recent septicemia, recent gastrointestinal bleed, and previous diagnosis of a malignancy[16]. Race was not included as a case-mix adjuster. To the extent that costs differ by race in ways not captured by these other patient characteristics, the access to care or quality of care delivered to Black patients may be affected.

Methods

In order to evaluate a possible relationship between race and dialysis costs, we assessed the quality of the available data on race, the ability of race to predict costs, and the extent to which other case mix adjusters capture cost differences by race when race is not included in the payment model.

Since race and ethnicity are subjective, socially constructed characteristics, it was necessary to ensure there was a consistent way to classify patients. To evaluate consistency in reporting of race, we compared race categorization from two separate Medicare sources, the ESRD Medical Evidence Report (CMS Form 2728) and the Medicare enrollment database. The CMS Form 2728 race designation is based on provider reports and was used to specify four race categories (White, Black or African American, American Indian/Alaska Native, and Asian/Native Hawaiian or Other Pacific Islander [hereafter referred to as Asian/Pacific Islander]), and a separate designation for Hispanic ethnicity. The enrollment database race designation is derived from patient self-reports, sometimes modified by administrative rules. The enrollment database race categories are somewhat different, and Hispanic ethnicity is treated as a distinct racial category rather than a separate variable. We compared the two sources for consistency of patient classification.

Several analyses were then performed to evaluate the relationship between race and cost of dialysis and the implication of including race in a payment model. CMS data for the years 2004–2006 were used. Relationships between race and average Composite Rate cost per dialysis treatment, adjusted for regional wage differences, were estimated at a facility level using Medicare Independent Renal Dialysis Facility and Hospital Cost Reports with a sample of 11,814 facility years. Relationships between race and average separately billable Medicare Allowable Payments per treatment were estimated at the patient level using Medicare outpatient dialysis and carrier claims with a sample of 890,776 patient years. Payments were adjusted to reflect a single set of prices for the most frequently used ESRD drugs (used in quarter 1, 2008). Patient characteristics other than race were identified using CMS Form 2728 and Medicare claims.

Separate ordinary least squares regression models were estimated using the two sources of race data. Each model uses the natural log of measured costs per treatment as the dependent variable in order to account for the skewness of cost data. The reported effects are cost multipliers based on the regression coefficients associated with each characteristic. For example, a multiplier of 1.1 for a characteristic implies that costs are 10% higher if the characteristic is present than if it were absent. For each characteristic, cost multipliers from separate models for Composite Rate and separately billed services were used to calculate a combined cost multiplier. This combination was achieved by taking the weighted average of cost multipliers from the separate models, where weights reflect shares of total costs. These combined cost multipliers could be employed as the basis for payment multipliers in an expanded ESRD prospective payment system. In addition to the patient characteristics, all cost models controlled for several facility characteristics (freestanding/hospital based, size, ownership type, urban/rural, Composite rate exception, and urea reduction ratio) using data from Cost Reports, the Online Survey, Certification, and Reporting Database, the Standard

Information Management System, Medicare claims, and other information obtained from CMS. All analyses were performed using SAS 9.2.

We compared facility level payments resulting from inclusion and exclusion of a payment adjustment for race. To make this comparison we applied multipliers from payment models with and without race adjustment to forecast the impact of race adjustment on Medicare revenues at the facility level.

Results

A cross-tabulation of patient race and Hispanic ethnicity from the two data sources is presented in Table 1. Race categories specified on CMS Form 2728 are compared to race categories contained in the enrollment database. The agreement between the two sources ranged from 95.2% for Black race to 62.9% for Asian race. A difference in the Asian race definition and the inclusion of Hispanic as an enrollment database race category tended to reduce levels of agreement. For certain categories, however, there was substantial discordance between the two sources that does not reflect differences in definition. For example, 9.3% of Form 2728 Native American/Alaska Natives and 4.9% of Form 2728 Asian/Pacific Islanders were categorized as “White” in the enrollment database.

When patients were classified into two groups, Black and non-Black, there was relatively high agreement between Form 2728 and enrollment database (Table 2). Patients listed as Black on Form 2728 were listed as Black on the enrollment database 95.2% of the time, and patients listed as Black on the enrollment database were listed as Black on Form 2728 97.4% of the time. Facility level analysis also demonstrated high agreement (Table 3), with the median proportion of Black patients being 27.1% on Form 2728 and 26.7% in the enrollment database. The 25th to 75 percentiles were 6.6%–60.9% (Form 2728) vs. 6.7%–59.9% (enrollment database). Lastly, when facilities were divided into quartiles based on percentage of Black patients, the quartiles were very similar. Only 3.5% of facilities were placed in a different quartile based on the two data sources, and most of these are facilities near a boundary between quartiles. Given this high level of agreement, we used the Black vs. non-Black classification to evaluate costs.

The relationships between dialysis treatment-related costs and race are presented in Table 4. When controlling for age, sex, identified comorbidities, other patient characteristics, and facility characteristics, Blacks were shown to have approximately 9% higher costs than non-Blacks. The results were similar when using the enrollment database racial classification.

Table 5 shows payments by race category (based on Form 2728) using two different payment models, one employing the cost multipliers from Table 4 without race and ethnicity in the model, and one employing the cost multipliers from Table 4 with race in the model. When race is not included in the model, the average payment multiplier for Black patients is 1.028. In other words, using the model that does not explicitly account for race would result in a dialysis facility's getting paid 2.8% more for treating a typical Black patient, due to the higher prevalence among Black patients of several characteristics that predict cost. Inclusion of race in the payment model results in a much higher average payment multiplier of 1.090 for Black patients. The results presented in Table 5 demonstrate that less than one-third of the increased costs for Black patients are accounted for by other patient characteristics in the model.

The majority of the cost difference noted above was due to separately billed drugs. The multipliers for Black patients were 1.21 for separately billed services and 1.03 for Composite Rate services. Further breakdown of separately billed services shows that most of the estimated cost differential between Blacks and non-Blacks was due to ESA and Vitamin

D use. (Table 6) ESA use was 17% higher in Blacks. Vitamin D usage was 90% higher in Blacks.

Finally, we performed a facility level financial impact analysis. To do this, dialysis facilities were divided into quartiles based on percentage of Black patients. Average payments to facilities in each quartile were then estimated using models both with and without a race adjustment. Application of a Black race adjustment results in 2.4–2.6% lower payments (depending on which data source is used to classify race) for those facilities with the lowest percentage of Black patients (quartile 1, ≤6.7% Black patients; average 2.6% within this quartile). For those dialysis facilities with the highest percentage of Black patients (quartile 4, >59.9% Black patients; average 78.1%), the race adjustment increased the average payment by 2.7–2.9%.

Discussion

Our analysis demonstrates the difficulties of classifying dialysis patients by race, especially for certain minority groups. When comparing alternative data sources, we found inconsistencies in racial classifications that were independent of the treatment of Hispanic ethnicity and the specific race definitions used. However, when limiting the classification to Black and non-Black race groups, we found substantially better agreement between the two sources.

It is clear that there are significant cost differences by race in outpatient treatment of ESRD. Controlling for a large set of patient and facility characteristics, costs are 9% higher for Blacks than for non-Blacks. The implications of this cost difference depend on how it is reflected in a payment system. One approach is to reflect only cost differences due to other patient characteristics associated with Black race. Based on our analysis, such a payment system would reflect only about one-third of the 9% cost difference. The remaining difference would not be reimbursed in a system that does not explicitly include race. A second approach is to include an explicit adjustment for patient race.

From the dialysis facility perspective, the inclusion or exclusion of an explicit payment for race has implications for facility revenues. Facilities with the highest concentrations of Black patients would receive almost 3% higher payments in a race-specific payment system compared to one that does not pay based on race. Facilities with the lowest concentrations of Black patients would receive approximately 2.5% lower payments. Hence, a payment system that paid based on race would result in payments that differ between these two facility types by over 5%.

If the higher costs of treating Black patients are not reflected sufficiently in the payment system, facility revenues may be insufficient to cover facility costs. Some facilities, with very high percentages of Black patients, may be forced to alter their care processes substantially or even to close. Some facilities may try to attract patients from race categories with lower costs. These provider responses would likely result in reduced access to care by Black patients.

To anticipate provider response, it is important to examine the possible reasons for cost differences. Most of the cost difference that we found was for separately billable services, particularly for ESAs and Vitamin D. As discussed below, previous studies have identified racial differences in certain clinical characteristics that may help to explain greater use of these drugs in Black patients.

Several studies have examined racial differences in the prevalence of anemia and responsiveness to ESAs. A recent article by Kalantar-Zadeh looked for risk factors

associated with a lack of response to ESAs; black race was identified as a factor that has significant association with hyporesponsiveness[17]. Earlier studies have shown that Black race is associated with lower hemoglobin levels[7, 8]. The reasons for this difference are unclear. Beutler et al. demonstrated that among the general population, approximately one third of race related difference in hemoglobin could be attributed to the presence of alpha-thalessemia trait in Blacks[18]. There is speculation that poorer pre-ESRD anemia management[19] and higher catheter use among Black patients play a role, but there is a lack of evidence thus far to confirm this. In fact, Lacson showed higher EPO use among Black patients despite lower rates of catheter use and hospitalization[20].

Important questions remain unanswered in the debate over racial disparities in anemia and other ESRD treatments. Do variations in practice and outcome have the same clinical impact across racial categories? Regarding anemia, is the association between achieved hemoglobin and mortality similar across racial groups? How does race influence the association between ESA dose and mortality? A study of the non-ESRD population showed that the hemoglobin threshold at which mortality rose was a full gram lower for Black patients than for Whites or Hispanics[21]. However, a recent analysis of ESRD patients on dialysis suggested that identical hemoglobin targets may be appropriate for both Black and non-Black patients as mortality was similar between races for each level of achieved hemoglobin, except for higher mortality for Blacks with achieved hemoglobin of 10–11 gm/dl[22].

We also found that Vitamin D usage was significantly higher among Black patients. Other studies have shown higher intact parathyroid hormone (iPTH) levels in African American patients[9]. There is evidence that current iPTH goals may not be appropriate for Black patients as they may have lower levels of bone turnover for given levels of iPTH[23]. If this is the case, there needs to be further large scale study and guidelines that more accurately reflect racial differences in renal osteodystrophy.

Given these findings, there needs to be a more thorough evaluation of the pathology behind these racial differences so that treatment guidelines and decisions reflect clinical need. Evidence-based guidelines would likely improve outcomes more than any change in a reimbursement system.

Our analysis presents a mixed picture of the reliability of racial classification in payment systems. Classification of Black race seems highly reliable, based on the two data sources available. However, classification of non-Blacks into racial categories as general as Asian, White, and Native American is much less reliable. This more detailed classification is as yet insufficiently reliable to use in a payment system.

Moreover, explicit payment based on racial category may affect how race is reported by providers, patients, or both. A payment increase on the order of 9% is a strong incentive to alter racial designation. This fact argues further for taking care in the development of a data system to classify and record race to be used for payment purposes.

The decision to include or exclude race as an adjuster of payment for dialysis services, as well as for payment systems more generally, must reflect a consideration of both the difficulties of defining race and the differences in patient cost by race. Failure to account for cost differences not explained by other patient and facility characteristics can harm facility viability and patient access to care. However, application of a flawed racial classification system can result in confusion and abuse. Finally, the decision to use race-based case mix adjusters should also consider whether observed cost differences have a plausible biologic basis or if they simply reflect discretionary practice patterns. If it is likely that discretionary practices are important, it would generally be better to understand the sources of those

practices and work to ensure that they reflect high quality care for all patients before effectively validating them in a payment system.

Acknowledgments

Support: The research for this article was supported by the Centers for Medicare & Medicaid Services (CMS) under Contract Number 500-2006-00048C.

References

1. Nelson AR. Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. J Natl Med Assoc. August; 2002 94(8):666–668. [PubMed: 12152921]
2. Sims M, Sims TL, Bruce MA. Urban poverty and infant mortality rate disparities. J Natl Med Assoc. 2007; 99(4):349–56. [PubMed: 17444423]
3. Wong RJ. Marked Variations in Proximal Colon Cancer Survival by Race/Ethnicity Within the United States. J Clin Gastroenterol. 2009 doi: 10.1097/MCG.0b013e3181c64a7a.
4. Albain KS, Unger JM, Crowley JJ, Coltman CA Jr. Racial disparities in cancer survival among randomized clinical trials patients of the Southwest Oncology Group. J Natl Cancer Inst. 2009; 101(14):984–92. [PubMed: 19584328]
5. Cook BL, Manning WG. Measuring racial/ethnic disparities across the distribution of health care expenditures. Health Serv Res. Oct; 2009 44(5 Pt 1):1603–21. [PubMed: 19656228]
6. U.S. Renal Data System. USRDS 2009 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2009.
7. Madore F, Lowrie EG, Brugnara C, et al. Anemia in hemodialysis patients: variables affecting this outcome predictor. J Am Soc Nephrol. 1997; 8(12):1921–9. [PubMed: 9402095]
8. Petronis KR, Carroll CE, Held PS, Port FK. Effect of race on access to recombinant human erythropoietin in long-term hemodialysis patients. JAMA. 1994; 272(23):1818–9. [PubMed: 7990207]
9. Gupta A, Kallenbach LR, Zasuma G, Divine GW. Race is a major determinant of secondary hyperparathyroidism in uremic patients. J Am Soc Nephrol. 2000; 11(2):330–4. [PubMed: 10665940]
10. U.S. Congress. House of Representatives. Committee on Ways and Means, Subcommittee on Health. Hearing on ensuring kidney patients receive safe and appropriate anemia management care. 110th Cong., 1st sess.; June 26, 2007;
11. Burton, LaVarne A. Letter from the President and Chief Executive Officer of the American Kidney Fund to Charlene Frizzera. Acting Administrator of the Centers for Medicare and Medicaid Services; Baltimore, MD: Dec 14. 2009 Available at http://www.kidneyfund.org/advocacy/assets/pdf/akf_proposed_mippa_rule_co mment_letter.pdf
12. Thiry, Kent. Letter from the Chairman of Kidney Care Partners to Charlene Frizzera. Acting Administrator of the Centers for Medicare and Medicaid Services; Baltimore, MD: Nov Dec. 2009 Available at http://www.modernhealthcare.com/assets/pdf/CH679321214.PDF
13. Medicare Improvements for Patients and Providers Act of 2008. 2008. Pub L No 110–275, 122 Stat 2553
14. Leavitt, MO. Report to Congress: A Design for a Bundled End Stage Renal Disease Prospective Payment System. U.S. Department of Health and Human Services; Washington, D.C.: 2008. Available at: http://www.cms.hhs.gov/ESRDGeneralInformation/downloads/ESRDReportTo Congress.pdf.
15. Hirth, RA.; Wheeler, J.; Messana, J., et al. End Stage Renal Disease Payment System: Results of Research on Case-Mix Adjustment for an Expanded Bundle. University of Michigan; 2008. Available at http://www.sph.umich.edu/kecc/assets/documents/UMKECC_Expanded_ESRD_Bundle.pdf.

16. Federal Register. September 29; 2009 74(187):49922–50102. Medicare Programs; End-Stage Renal Disease Prospective Payment System; Town Hall Meeting on End-Stage Renal Disease Prospective Payment System; Proposed Rule and Notice.

17. Kalantar-Zadeh K, Lee GH, Miller JE, et al. Predictors of hyporesponsiveness to erythropoiesis-stimulating agents in hemodialysis patients. Am J Kidney Dis. 2009; 53(5):823–34. [PubMed: 19339087]

18. Beutler E, West C. Hematologic differences between African-Americans and whites: the roles of iron deficiency and alpha-thalassemia on hemoglobin levels and mean corpuscular volume. Blood. 2005; 106(2):740–5. [PubMed: 15790781]

19. Lea JP, Norris K, Agodoa L. The role of anemia management in improving outcomes for African-Americans with chronic kidney disease. Am J Nephrol. 2008; 28(5):732–43. [PubMed: 18434712]

20. Lacson E, Rogus J, Teng M, Lazarus JM, Hakim RM. The association of race with erythropoietin dose in patients on long-term hemodialysis. Am J Kidney Dis. 2008; 52(6):1104–14. [PubMed: 18824287]

21. Patel KV, Longo DL, Ershler WB, et al. Haemoglobin concentration and the risk of death in older adults: differences by race/ethnicity in the NHANES III follow-up. Br J Haematol. 2009; 145(4): 514–23. [PubMed: 19344387]

22. Servilla K, Singh AK, Hunt WC, et al. Anemia management and association of race with mortality and hospitalization in a large not-for-profit dialysis organization. Am J Kidney Dis. 2009; 54(3): 498–510. [PubMed: 19628315]

23. Moore C, Yee J, Malluche H, et al. Relationship between bone histology and markers of bone and mineral metabolism in African-American hemodialysis patients. Clin J Am Soc Nephrol. 2009; 4(9):1484–1493. [PubMed: 19713297]

Am J Kidney Dis. Author manuscript; available in PMC 2011 November 1.

Table 1

Comparison of race/ethnicity from CMS Form 2728 vs. EDB, 2004–06

Race from CMS Form 2728		Race from EDB							
		North American Native	Asian	Black	White	Hispanic	Other	Unknown	Total
American Indian / Alaska Native	No. patient-years	10,313	166	664	1,240	301	407	226	13,317
	% of row	77.4	1.3	5.0	9.3	2.3	3.1	1.7	
	% of column	84.9	0.7	0.2	0.3	0.7	2.1	1.1	
Asian / Pacific Islander	No. patient-years	116	19,565	601	1,521	477	8,118	730	31,128
	% of row	0.4	62.9	1.9	4.9	1.5	26.1	2.4	
	% of column	1.0	86.6	0.2	0.3	1.1	42.6	3.4	
Black	No. patient-years	225	212	308,278	4,199	1,306	1,977	7,712	323,909
	% of row	0.1	0.1	95.2	1.3	0.4	0.6	2.4	
	% of column	1.9	0.9	97.4	0.9	3.0	10.4	36.0	
White	No. patient-years	1,414	1,997	5,846	443,651	39,004	7,685	12,587	512,184
	% of row	0.3	0.4	1.1	86.6	7.6	1.5	2.5	
	% of column	11.6	8.8	1.9	97.5	88.5	40.3	58.8	
Other	No. patient-years	71	639	864	4,114	2,926	842	158	9,614
	% of row	0.7	6.7	9.0	42.8	30.4	8.8	1.6	
	% of column	0.6	2.8	0.3	0.9	6.6	4.4	0.7	
Unknown	No. patient-years	4	14	145	364	64	27	6	624
	% of row	0.6	2.2	23.2	58.3	10.3	4.3	1.0	
	% of column	0.0	0.1	0.1	0.1	0.2	0.1	0.0	
Total	No. patient-years	12,143	22,593	316,398	455,089	44,078	19,056	21,419	890,776

Abbreviation: CMS, Centers for Medicare & Medicaid Services; EDB, Medicare Enrollment Database

Table 2

Comparison of Black race from CMS Form 2728 vs. EDB, 2004–06

Race from CMS Form 2728		Race from EDB		
		Black	Non-Black	Total
Black	No. patient-years	308,278	15,631	323,909
	% of row	95.2%	4.8%	100.0%
	% of column	97.4%	2.7%	
Non-Black	No. patient-years	8,120	558,747	566,867
	% of row	1.4%	98.6%	100.0%
Total	% of column	2.6%	97.3%	
	No. patient-years	316,398	574,378	890,776
	% of row			
	% of column	100.0%	100.0%	

Abbreviation: CMS, Centers for Medicare & Medicaid Services; EDB, Medicare Enrollment Database

Table 3

Race distribution by facility, 2006

Data source	Facility percentiles for % Black						
	Minimum	5th	25th	Median	75th	95th	Maximum
CMS Form 2728	0.0%	0.0%	6.6%	27.1%	60.9%	91.1%	100.0%
EDB	0.0%	0.0%	6.7%	26.7%	59.9%	89.7%	100.0%

Note: n = 4,405.

Abbreviation: CMS, Centers for Medicare & Medicaid Services; EDB, Medicare Enrollment Database

Table 4

Effect of including Black race on the modeled case-mix adjustment for an expanded bundle of composite rate and separately billable services

Adjustments for dialysis patient characteristics	Modeled case-mix adjustment[1] for payment model		
	without race/ethnicity	with Black race from CMS Form 2728	with Black race from EDB
Age			
18–44	1.180	1.167	1.167
45–59	0.989	0.979	0.978
60–69	1.000	1.000	1.000
70–79	1.045	1.057	1.056
80+	1.063	1.082	1.082
Female	1.132	1.103	1.104
Race			
Black	--	1.091	1.089
Non-Black	--	1.000	1.000
Body surface area (per 0.1 m^2)	1.034	1.029	1.029
Underweight (BMI <18.5)	1.020	1.013	1.013
Duration of RRT <4 months	1.473	1.529	1.526
Alcohol/drug dependence[2]	1.150	1.125	1.126
Cardiac arrest[2]	1.032	1.035	1.035
Pericarditis[6]	1.195	1.196	1.195
HIV/AIDS[2]	1.316	1.240	1.241
Hepatitis B[3]	1.089	1.074	1.076
Specified infection[6]			
Septicemia	1.234	1.231	1.231
Bacterial pneumonia and other Pneumonias/opportunistic infections	1.307	1.337	1.335
GI tract bleeding[6]	1.316	1.306	1.307
Hereditary hemolytic or sickle cell anemias[3]	1.225	1.189	1.191
Cancer[4]	1.128	1.122	1.122
Myelodysplastic syndrome[3]	1.084	1.093	1.093
Monoclonal gammopathy[3]	1.021	1.017	1.017
Low volume facility adjustment[5]	1.202	1.212	1.212

For patients **ages ≥ 18 years. For each column, variable is** Multiplier_{EB}

CMS, Centers for Medicare & Medicaid Services; BMI, body mass index; EDB, enrollment database; GI, gastrointestinal; RRT, renal replacement therapy; HIV/AIDS, human immunodeficiency virus, acquired immune deficiency syndrome.

[1] The combined payment multipliers for patient characteristics were calculated as $PmtMult_{EB} = Weight_{CR} \times PmtMult_{CR} + Weight_{SB} \times PmtMult_{SB}$, where $PmtMult_{CR}$ is the estimated multiplier from a facility level model of composite rate costs and $PmtMult_{SB}$ is the estimated multiplier from a patient level model of separately billable Medicare Allowable Payments. Based on total estimated costs of $169.67 per session for composite rate services, $82.45 per session for separately billable services, and $252.12 per session for an expanded bundle ($169.67+ $82.45), the relative weights are $Weight_{CR}$=0.673 for composite rate services ($169.67/$252.12) and $Weight_{SB}$=0.327 for separately billable services ($82.45/$252.12).

[2] claims since 2000 or from CMS Form 2728

[3] claims since 2000

[4] claims since 2000; excludes non-melanoma skin cancer

[5] Facility size < 3,000 treatments during each year from 2004–06

[6] from same month to three months ago

Table 5

Average case mix multiplier for an expanded bundle, by patient race, 2004–06

		Inclusion of race in the payment model	
Race[1]	**Percent**	**No**	**Yes**
Non-Black	62.4%	1.000	1.000
Black	37.6%	1.028	1.090

n=8,827,854 Medicare patient facility months. For patients **ages > 18 years**

[1] Based on CMS Form 2728.

Table 6

Average separately billable Medicare Allowable Payments per session by Patient Race, 2004–06[^]

Separately billable service category	Black (n=323,909)	Non-Black** (n=566,867)	Total (n=890,776)
Epoetin alfa and darbepoetin alfa	$59.47	$50.67	$54.06
Iron	$6.85	$6.73	$6.78
Vitamin D	$15.54	$8.17	$11.01
Other injectable drugs	$1.28	$1.50	$1.41
Laboratory tests	$8.18	$8.09	$8.13
Other dialysis facility services	$1.11	$1.03	$1.06
Total	$92.42	$76.21	$82.45

Note: patient race Based on CMS Form 2728. The number of patient years is shown in parentheses

[^] weighted by Medicare hemodialysis-equivalent sessions

** Includes American Indian/Alaskan Native, Asian/Pacific Islander, white, other, and unknown race.