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Medicare Advantage Associated With More Racial Disparity Than Traditional Medicare For Hospital Readmissions

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ABSTRACT **We compared racial disparities in thirty-day readmissions between traditional Medicare and Medicare Advantage beneficiaries who underwent one of six major surgeries in New York State in 2013. We found that Medicare Advantage was associated with greater racial disparity, compared to traditional Medicare. After controlling for patient, hospital, and geographic characteristics in a propensity score based approach, we found that in traditional Medicare, black patients were 33 percent more likely than white patients to be readmitted, whereas in Medicare Advantage, black patients were 64 percent more likely than white patients to be readmitted. Our findings suggest that the risk-reduction strategies adopted by Medicare Advantage plans have not been successful in lowering the markedly higher rate of readmission among black patients, compared to white patients.**

Racial disparities in surgical outcomes, such as postoperative complications, mortality, and thirty-day rehospitalizations, have been well documented.[1–6] Excess readmissions within thirty days of surgical discharge reduce both patient quality of life and the efficiency of health care. Evidence suggests that thirty-day surgical readmission rates vary substantially across hospitals and geographic areas, and that such variations are largely attributable to patient factors such as sociodemographic characteristics, preexisting comorbidities, and postoperative complications.[3–5,7,8] A recent study by Ryan Merkow and colleagues further reveals that surgical complications that developed after discharge, in contrast to exacerbations of complications that developed during the initial hospital stay, are important predictors of thirty-day readmissions.[7] Two studies on traditional (or fee-for-service) Medicare beneficiaries who underwent common surgical procedures found that black race was independently associated with higher thirty-day readmission rates, even after important patient and hospital risk factors were controlled for.[3,4]

Reducing thirty-day surgical readmission rates has been a major component of national health care policies under the Hospital Readmissions Reduction Program of the Affordable Care Act (ACA). Although the program initially targeted readmissions of traditional Medicare beneficiaries with index hospitalizations for three medical conditions (acute myocardial infarction, congestive heart failure, and pneumonia), it was expanded in October 2014 to include total knee and hip arthroplasty, and it is expected to include more surgical procedures in the near future.[9] Recent estimates suggest that reduced all-cause thirty-day readmission rates among traditional Medicare beneficiaries were due to the Hospital Readmissions Reduction Program and other national efforts to improve the coordination of care.[9–11] Despite this positive trend nationally, it is unknown whether racial disparities in readmissions among traditional Medicare beneficiaries, including those undergoing major cardiac and noncardiac procedures, have also

improved, since previous disparity reports were largely derived from data for the pre-ACA period.

Although the majority of Medicare beneficiaries still receive their benefits through traditional Medicare, 31 percent of beneficiaries (sixteen million people) were enrolled in a private Medicare Advantage plan in 2015—an increase from 13 percent in 2005.[12] With approaches such as gatekeeper primary care physicians and targeted patient education, Medicare Advantage and Medicare managed care plans have strong financial incentives to reduce unnecessary hospital use, including preventable readmissions.[13–15] Nevertheless, the literature shows mixed results when comparing the thirty-day readmission rates of traditional Medicare and Medicare Advantage beneficiaries.[16] Moreover, it is unknown whether racial disparities in thirty-day readmissions also exist among Medicare Advantage beneficiaries.

We aimed to evaluate racial disparities in the risk of all-cause thirty-day readmissions among traditional Medicare and Medicare Advantage beneficiaries who underwent one of several inpatient surgical procedures. Using New York State hospital claims data, we further compared the magnitude of disparities between traditional Medicare and Medicare Advantage beneficiaries in an attempt to determine potential differential disparities by insurance type.

Study Data And Methods

STUDY SAMPLE We used the New York State Inpatient Database for 2013 to identify surgical patients admitted to a hospital in the state between January and November. We excluded admissions in December because readmission records for 2014 were not available from New York State when the study was conducted. Developed by the Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality, the State Inpatient Databases contain computerized discharge abstracts for all patients admitted to general acute care hospitals.[17] The standardized discharge information includes patient demographic characteristics; payer type; admission type (urgent, emergency, or elective); diagnoses and procedures recorded using the *International Classification of Diseases*, Ninth Revision, Clinical Modification (ICD-9-CM), codes; measures of twenty-nine comorbidities, using an algorithm developed and validated by the Agency for Healthcare Research and Quality;[18] discharge disposition; and an encrypted hospital identifier. The data also contain an encrypted patient identifier and a date indicator that can be used to identify patient readmissions to any New York State hospitals.[19]

We limited our study sample to Medicare fee-for-service or Medicare Advantage patients who were ages sixty-five and older and who received one of the following six major surgeries: isolated coronary artery bypass graft, pulmonary lobectomy, endovascular repair of abdominal aortic aneurysm, open repair of abdominal aortic aneurysm, colectomy, and hip replacement. To identify patients who had one of these procedures, we used the ICD-9-CM coding algorithm of Thomas Tsai and colleagues.[8] Previous studies have showed that patients undergoing these procedures are at high risk for readmission and that readmission rates vary substantially across patient groups and hospitals.[3–5,7,8] We further excluded patients who died in the hospital, were transferred to another hospital, were discharged with planned hospital readmission as coded in the data, or left the hospital against medical advice. Finally, given our focus on racial disparities, we limited the sample to non-Hispanic white and black patients.

VARIABLES The outcome was whether a patient had a readmission to an acute care hospital within thirty days of discharge from the initial hospitalization. The independent variables were two indicators, for race (black versus white) and insurance type (Medicare Advantage versus traditional Medicare) in 2013. Patient characteristics that were potentially associated with the risk for thirty-day readmission were selected a priori. These characteristics included age, sex, median household income at the ZIP code of patient residence (categorized as quartiles), area of patient residence (categorized as large metropolitan area, with at least a million residents; small metropolitan area, with half a million to a million residents; micropolitan area, with ten to fifty thousand residents; and rural area, with fewer than ten thousand residents), whether the admission was an urgent or an emergency admission (compared to an elective one), indicators for the six procedures included in this study, and indicator variables for the presence of twenty-nine comorbidities.

We obtained hospital characteristics from two types of hospital files for 2012 made available by the Centers for Medicare and Medicaid Services (CMS): Medicare impact files[20] and the archived Hospital Compare annual files.[21] Hospital characteristics were total number of beds; profit status (for-profit, nonprofit, or government owned); daily average occupancy; teaching hospital status; a case-mix index used by CMS for prospective payments; the disproportionate-share hospital patient percentage, which reflects the shares of uninsured and underinsured patients treated by a hospital; percentage of non-Hispanic white admissions; and location

of the hospital (New York City, another urban area, or a rural area). We further calculated a Herfindahl-Hirschman Index (based on hospital number of beds) for each county where a hospital was located, as a measure of competition for hospital care.

Previous studies have demonstrated that certain attributes of Medicare Advantage plans may play important roles in shifting beneficiaries' insurance choice.[15,22–24] For example, up to a certain limit (such as a total of fifteen plans), an increase in the number of plan options in a local market (the county) was associated with increased Medicare Advantage enrollment.[23] In contrast, increases in the premium or expected out-of-pocket spending and more restrictive provider networks (for example, a health maintenance organization [HMO] versus an open-network plan) all tended to predict a reduction in the market share of Medicare Advantage plans. More recent work has also shown that higher ratings of Medicare Advantage plans on the five-star system were associated with increased Medicare Advantage enrollment—although the associations were less evident among certain beneficiary groups, including black beneficiaries.[22] The five-star system is an overall measure of a plan's quality of and access to care, responsiveness, and beneficiary satisfaction (derived from multiple sources of information such as the Healthcare Effectiveness Data and Information Set[22]), with more stars indicating better overall performance.

Thus, to better account for beneficiaries' choice between traditional Medicare and Medicare Advantage, we obtained variables for key characteristics of Medicare Advantage plans from two sources of CMS data: the 2013 Medicare Advantage Part D contract and enrollment files[25] and the 2015 Medicare Advantage plan star ratings (which largely reflect plan performance in 2013).[26] These variables captured Medicare Advantage plans' availability, cost, network, and performance information, and we aggregated the data to the county level in analyses described below.

Specifically, county-level plan characteristics included the number of Medicare Advantage plans available in the county of patient residence, the number of Medicare HMO plans in the county, average premium amount for all Medicare Advantage plans in the county, the percentage of Medicare Advantage plans in the county with maximum enrollee out-of-pocket spending, the average maximum out-of-pocket spending, and average overall score on the five-star rating system for all Medicare Advantage plans.

ANALYSIS We performed bivariate analyses to compare racial differences in patient, hospital, and county characteristics for the traditional Medicare and Medicare Advantage groups separately. We also fitted a bivariate generalized estimating equation model to determine unadjusted racial disparities in the likelihood of thirty-day readmission and potential differential disparities by insurance type (that is, Medicare Advantage versus traditional Medicare).[27] This model assumed binomial distribution and a logit link function for the outcome; had race, insurance type, and their interactions as independent variables; and used an exchangeable correlation structure to account for the clustering of patient outcomes in hospitals.

Initiatives targeting disadvantaged groups could be developed to address persistent disparities.

In multivariable analyses, we used propensity score weighted regression to adjust for differences between traditional Medicare and Medicare Advantage beneficiaries.[28] To calculate the propensity score for enrolling in Medicare Advantage (versus traditional Medicare) for each patient, we fitted a logistic regression model of the probability of enrolling in Medicare Advantage as a function of patient and county-level Medicare Advantage plan characteristics that might affect beneficiaries' enrollment decisions.[22–24] In addition, the model included hospital characteristics since they might be correlated with local insurance market conditions, such as Medicare HMO penetration, and thus correlated with beneficiaries' insurance choice. In addition to all main effects, interactions between race and other key covariates were also included in the model.

We then fitted another logistic regression model in which the dependent variable was the likelihood of all-cause thirty-day readmissions, and the independent variables were race, Medicare Advantage enrollment, and their interaction. The model further adjusted for key patient and hospital covariates and used an inverse probability of treatment weighting approach to obtain weighted estimates of adjusted odds ratios. This approach used as a weight the inverse of the propensity of enrolling in Medicare Advantage (or traditional Medicare) for each

patient who was actually enrolled in Medicare Advantage (or traditional Medicare) in 2013, so that insurance enrollment status was independent of the distribution of other variables.[28,29] The model was fitted through the generalized estimating equation approach as described for our bivariate analyses.

LIMITATIONS This study had several limitations. First, it analyzed information on New York Medicare beneficiaries who underwent one of several surgical procedures. Thus, caution should be used in generalizing our results to other procedures or residents of other states.

Second, the inpatient data we used did not allow us to identify the specific Medicare Advantage plan (and its characteristics) in which each patient was enrolled. However, our multivariable analyses accounted for county-average plan characteristics that reflected market-level plan performance and generosity relevant to all beneficiaries, and that have previously been shown to affect the choice between traditional Medicare and Medicare Advantage.

Finally, although our propensity score models adjusted for Medicare plan selection and patient and hospital covariates, it is possible that the racial disparities we found were partially mediated by other key patient characteristics, such as variations in unmeasured socioeconomic status, health behaviors, or the availability of community-based support.

Study Results

The study population consisted of 13,703 traditional Medicare and 6,632 Medicare Advantage patients who underwent one of the six surgeries we analyzed in a New York hospital in 2013. In both insurance groups, the average age was about seventy-six years, and 55 percent of the patients were female (Exhibit 1). Compared to traditional Medicare patients, Medicare Advantage patients tended to have lower household incomes and were more likely to live in a large metropolitan area. Among traditional Medicare patients, blacks were more likely than whites to be in the lowest quartile of household income, to live in a large metropolitan area, and to be an emergency case at initial admission. Black patients also had higher rates of uncomplicated diabetes but lower rates of depression. Similar racial differences were found in the Medicare Advantage group. Online Appendix Exhibit A1 shows hospital- and county-level plan characteristics by insurance type and patient race.[30]

Overall thirty-day readmission rates were 13.2 percent among traditional Medicare patients and 13.1 percent among Medicare Advantage patients (Exhibit 2). Significant unadjusted racial disparities in readmission were found among both groups of patients. Meanwhile, enrollment in Medicare Advantage was associated with a higher unadjusted racial disparity, compared to traditional Medicare.

After adjusting for the propensity to enroll in Medicare Advantage and multiple covariates, we found that black race was significantly associated with an increased likelihood of thirty-day readmission among both traditional Medicare and Medicare Advantage patients (Exhibit 3). Furthermore, the adjusted racial disparity tended to be higher (without achieving significance) among Medicare Advantage than traditional Medicare patients. Exhibit 4 presents the predicted thirty-day readmission rates by insurance type and race obtained from our multivariable analysis, which confirms the results shown in Exhibit 3.

Finally, our sensitivity analyses confirmed that racial disparities may exist among patients undergoing each type of surgical procedure, and that racial disparities largely existed between black and white patients initially admitted to the same hospitals (for details, see the Appendix).[30] Further analyses did not find significant ethnic disparities (for details on these analyses, see Appendix Exhibit A7).[30]

Discussion

We analyzed claims for traditional Medicare and Medicare Advantage beneficiaries admitted to hospitals in New York State for selected surgical procedures and found that among both groups, black patients had higher risk for thirty-day readmission after discharge than white patients did. These racial disparities persisted after multivariable adjustment for the propensity of beneficiaries to enroll in each type of Medicare program and for other key beneficiary and hospital characteristics. In adjusted analyses, black race was associated with 33 percent and 64 percent increased likelihoods of thirty-day readmission among traditional Medicare and Medicare Advantage beneficiaries, respectively.

Our findings of racial disparities in thirty-day surgical readmissions among traditional Medicare beneficiaries were consistent with results of previous studies.[1–5] Multiple factors may underlie such disparities. For example, black patients may receive lower-quality surgical care in the hospital, compared to their white counterparts—a mechanism that is supported by results in our sensitivity analyses showing that disparities occurring within the same index hospitalization might play an important role (see the Appendix).[30] However, a recent study by Justin Dimick and colleagues reported that black patients were

EXHIBIT 1

Characteristics of New York State surgical patients in 2013, by insurance type and race

	Percent or mean					
	Traditional Medicare			Medicare Advantage		
	All (n = 13,703)	White (n = 12,962)	Black (n = 741)	All (n = 6,632)	White (n = 5,956)	Black (n = 676)
Age (years)	76.7	76.8	75.1	76.0	76.1	75.4
Female	55.4%	55.1%	60.1%	55.0%	54.1%	62.9%
MEDIAN HOUSEHOLD INCOME IN ZIP CODE OF RESIDENCE, BY QUARTILE						
1 (lowest)	13.4%	12.0%	39.6%	16.8%	13.6%	45.6%
2	23.6	23.8	19.8	28.9	30.0	19.6
3	25.6	25.6	25.8	33.7	34.7	24.8
4 (highest)	37.4	38.8	14.8	20.6	21.8	10.0
AREA OF RESIDENCE						
Large metropolitan	64.4%	62.9%	89.1%	70.8%	68.1%	94.8%
Small metropolitan	24.4	25.2	10.1	19.0	20.6	4.7
Micropolitan	7.7	8.1	0.7	7.3	8.1	0.4
Rural	3.5	3.8	0.1	2.9	3.2	0.0
ADMISSION TYPE						
Emergency	31.1%	30.5%	40.5%	29.0%	28.1%	37.0%
Urgent	6.2	6.3	4.5	6.1	6.2	5.3
Elective	62.7	63.1	55.0	65.0	65.8	57.7
PROCEDURE RECEIVED AT INITIAL ADMISSION						
Coronary artery bypass graft	13.2%	13.0%	15.8%	16.6%	16.8%	14.1%
Abdominal aortic aneurysm repair (open)	0.5	0.5	1.1	0.7	0.7	0.3
Abdominal aortic aneurysm repair (endovascular)	6.0	5.5	6.1	6.4	6.6	4.1
Colectomy	19.1	18.4	31.0	20.1	18.2	36.1
Pulmonary lobectomy	5.5	5.6	3.9	4.5	4.3	6.2
Hip replacement	55.7	56.4	42.7	51.9	53.3	39.2
SELECTED COMORBIDITY						
Chronic pulmonary disease	20.7%	20.6%	21.2%	21.4%	21.3%	21.5%
Depression	9.8	10.1	5.1	10.6	11.2	5.9
Uncomplicated diabetes	19.1	18.3	33.5	21.6	20.1	34.9
Hypothyroidism	15.9	16.3	9.0	16.2	17.0	8.9
Fluid and electrolyte disorders	23.1	22.9	26.2	23.4	22.9	27.5
Peripheral vascular disorders	9.2	9.1	10.3	10.7	10.5	12.6
Renal failure	10.7	10.2	18.8	12.4	11.8	17.8

SOURCE Authors' analysis of data from the New York State Inpatient Database. **NOTE** Percentages may not sum to 100 because of rounding.

EXHIBIT 2

Unadjusted 30-day readmission rates for New York State surgical patients in 2013, by insurance type and race

				Odds ratio (95% CI)	
	All	White	Black	Unadjusted racial disparity	Differential racial disparity (MA compared to TM)
Traditional Medicare (TM)	13.2%	11.2%	15.5%	1.45 (1.19, 1.78)***	1.31 (0.97, 1.77)*
Medicare Advantage (MA)	13.1%	9.8%	17.2%	1.91 (1.56, 2.33)****	—[a]

SOURCE Authors' analysis of data from the New York State Inpatient Database. **NOTES** Odds ratios indicate the relative likelihood that black surgical patients will experience thirty-day readmissions compared to white surgical patients. CI is confidence interval. [a]Not applicable. *p < 0.10 ***p < 0.01 ****p < 0.001

more likely than white patients to undergo surgical procedures in hospitals with low quality of care.[31] Several other studies examined the role of hospital performance more specifically in driving disparities in readmission rates and found that disparities occurring between hospitals with differential quality of care were also evident.[3,4]

It is also possible that black surgical patients tend to receive poorer transitional and ambulatory care after discharge. Previous studies suggest that compared to white patients, black patients may lack adequate access to ambulatory and rehabilitation services, have less appropriate social and community support, and have lower health literacy—all of which may lead to less optimal postdischarge care and increased risk for readmissions among black patients.[1,2,6,7]

The racial disparities in thirty-day readmissions among traditional Medicare beneficiaries in 2013 coincide with recent evidence that overall thirty-day readmission rates,[9,10] including for surgical populations, declined during the post-ACA period. A recent Department of Human and Health Services report shows that during 2012–13 the reduced readmission rate (which fell from 18.5 percent to 17.5 percent) translated into 150,000 fewer hospital readmissions among traditional Medicare beneficiaries.[10] Our findings of persistent racial disparities in surgical readmissions despite the national trend are troubling, and they may suggest that recent readmission reduction efforts were broadly targeted—incorporating few incentives for reducing disparities beyond overall reduced readmissions. Furthermore, concerns have been raised that the Hospital Readmissions Reduction Program and the value-based purchasing of health care currently being implemented in traditional Medicare might have the unintended effect of exacerbating disparities in quality and outcomes of care.[32,33] Our findings of racial disparities in surgical readmissions suggest that existing payment reforms could be revised to avoid potential unintended effects and that initiatives targeting disadvantaged groups could be developed to address persistent disparities.

Although Medicare Advantage plans use multiple approaches to reduce hospital use, comparisons of thirty-day readmission rates between traditional Medicare and Medicare Advantage beneficiaries tend to show mixed results,[16] varying over different conditions and samples. Our data on New York surgical patients found similar readmission rates between the two insurance groups overall, but lower rates for white Medicare Advantage patients and higher rates for black Medicare Advantage patients, compared to their respective counterparts in traditional Medicare—which resulted in increased racial disparity among Medicare Advantage patients.

A priori, it is not entirely clear whether black beneficiaries might fare worse or better relative to white beneficiaries in managed care plans

EXHIBIT 3

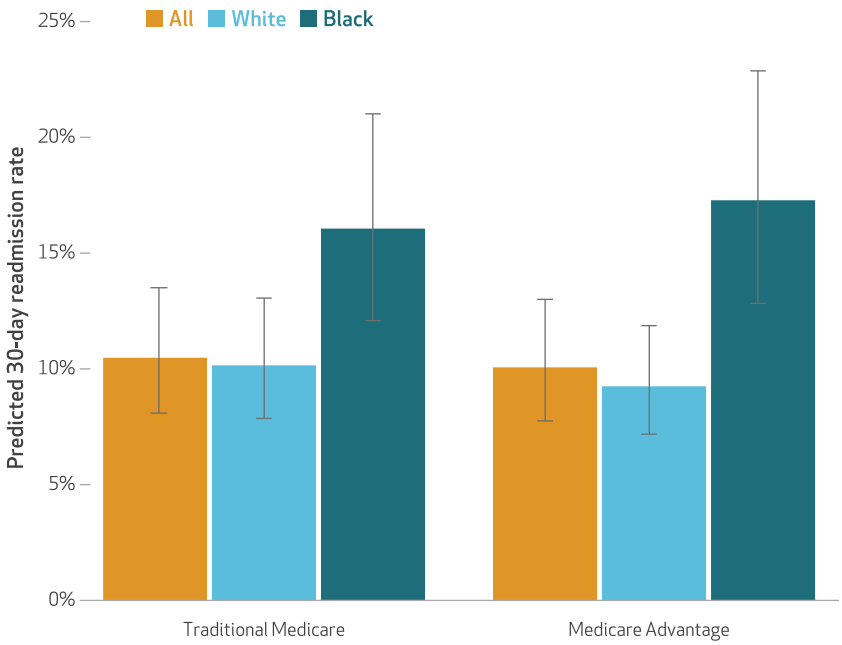
Adjusted racial disparities in risk for 30-day readmission for New York State surgical patients in 2013

	Odds ratio (95% CI)	
	Adjusted racial disparity	**Differential racial disparity (MA compared to TM)**
Traditional Medicare (TM)	1.33 (1.04, 1.70)**	1.23 (0.89, 1.70)
Medicare Advantage (MA)	1.64 (1.30, 2.05)****	—[a]

SOURCE Authors' analysis of data from the New York State Inpatient Database, linked to the Medicare impact files, the archived Hospital Compare annual files, Medicare Advantage contract and enrollment files, and the Medicare Advantage star ratings file. **NOTES** Our logistic regression model that used an inverse probability of treatment weighting approach adjusted for beneficiaries' propensity to enroll in a MA versus TM, based on beneficiaries' demographic, socioeconomic, geographic, and diagnostic characteristics and on hospital and county characteristics. Odds ratios indicate the relative likelihood that black surgical patients will experience thirty-day readmissions compared to white surgical patients. Appendix Exhibits A2–A4 present full results (see Note 31 in text). [a]Not applicable. **$p < 0.05$ ****$p < 0.001$

EXHIBIT 4

Predicted 30-day readmission rates for New York State surgical patients in 2013, by insurance type and race



SOURCE Authors' analysis of data from the New York State Inpatient Database, linked to the Medicare impact files, the archived Hospital Compare annual files, Medicare Advantage contract and enrollment files, and the Medicare Advantage star ratings file. **NOTES** The error bars show 95 percent confidence intervals. Our logistic regression model that used an inverse probability of treatment weighting approach adjusted for beneficiaries' propensity to enroll in a Medicare Advantage plan versus traditional Medicare, based on beneficiaries' demographic, socioeconomic, geographic, and diagnostic characteristics and on hospital and county characteristics.

than they do in the fee-for-service program. On the one hand, managed care limits beneficiaries' choice of providers with gatekeeping policies and restricted provider networks. The relative lack of choice in postdischarge ambulatory care, although it could not be directly tested in this study, might be particularly restricting for black Medicare Advantage beneficiaries who may have difficulties finding linguistically and culturally appropriate primary care providers. On the other hand, managed care provides targeted education to improve health behaviors, emphasizes more use of preventive care, and has devoted resources to the implementation of practice guidelines, all of which may be more relevant for black patients' postdischarge care and may help equalize the risk for postsurgical readmissions across racial groups.

Thus, our findings provide empirical evidence that these contrasting managed care mechanisms may collectively help reduce thirty-day readmissions for white Medicare Advantage patients but work in the opposite way for black Medicare Advantage patients relative to their traditional Medicare counterparts—which leads to increased racial disparity among Medicare Advantage patients. Future qualitative research is necessary to understand which specific managed care approaches may be effective in reducing thirty-day readmissions for white and black beneficiaries, and why existing Medicare Advantage plans do not seem to be successful in reducing racial disparity in thirty-day surgical readmissions.

Conclusion

We found important racial disparities in thirty-day readmission rates among both traditional Medicare and Medicare Advantage beneficiaries who underwent six selected inpatient surgeries. Enrollment in Medicare Advantage seemed to be associated with greater racial disparity than enrollment in traditional Medicare. Our findings suggest that the risk-reduction strategies adopted by Medicare Advantage plans have not succeeded in lowering the markedly higher rates of readmission for black patients compared to white patients. Further research is needed to understand whether newer health care delivery models, such as accountable care organizations, will help narrow the gap in readmission outcomes between black and white patients. ■

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