Racial and Ethnic Disparities in Meeting MTM Eligibility Criteria Based on Star Ratings Compared with the Medicare Modernization Act

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ABSTRACT

BACKGROUND: Previous research found racial and ethnic disparities in meeting medication therapy management (MTM) eligibility criteria implemented by the Centers for Medicare & Medicaid Services (CMS) in accordance with the Medicare Modernization Act (MMA).

OBJECTIVE: To examine whether alternative MTM eligibility criteria based on the CMS Part D star ratings quality evaluation system can reduce racial and ethnic disparities.

METHODS: This study analyzed the Beneficiary Summary File and claims files for Medicare beneficiaries linked to the Area Health Resource File. Three million Medicare beneficiaries with continuous Parts A, B, and D enrollment in 2012-2013 were included. Proposed star ratings criteria included 9 existing medication safety and adherence measures developed mostly by the Pharmacy Quality Alliance. Logistic regression and the Blinder-Oaxaca approach were used to test disparities in meeting MMA and star ratings eligibility criteria across racial and ethnic groups. Multinomial logistic regression was used to examine whether there was a disparity reduction by comparing individuals who were MTM-eligible under MMA but not under star ratings criteria and those who were MTM-eligible under star ratings criteria but not under the MMA. Concerning MMA-based MTM criteria, main and sensitivity analyses were performed to represent the entire range of the MMA eligibility thresholds reported by plans in 2009, 2013, and proposed by CMS in 2015. Regarding star ratings criteria, meeting any 1 of the 9 measures was examined as the main analysis, and various measure combinations were examined as the sensitivity analyses.

RESULTS: In the main analysis, adjusted odds ratios for non-Hispanic blacks (blacks) and Hispanics to non-Hispanic whites (whites) were 1.394 (95% CI=1.375-1.414) and 1.197 (95% CI=1.176-1.218), respectively, under star ratings. Blacks were 39.4% and Hispanics were 19.7% more likely to be MTM-eligible than whites. Blacks and Hispanics were less likely to be MTM-eligible than whites in some sensitivity analyses. Disparities were not completely explained by differences in patient characteristics based on the Blinder-Oaxaca approach. The multinomial logistic regression of each main analysis found significant adjusted relative risk ratios (RRR) between whites and blacks for 2009 (RRR=0.459, 95% CI=0.438-0.481); 2013 (RRR=0.449, 95% CI=0.434-0.465); and 2015 (RRR=0.436, 95% CI=0.425-0.446) and between whites and Hispanics for 2009 (RRR=0.559, 95% CI=0.528-0.593); 2013 (RRR=0.544, 95% CI=0.521-0.569); and 2015 (RRR=0.503, 95% CI=0.488-0.518). These findings indicate a significant reduction in racial and ethnic disparities when using star ratings eligibility criteria; for example, black-white disparities in the likelihood of meeting MTM eligibility criteria were reduced by 55.1% based on star ratings compared with MMA in 2013. Similar patterns were found in most sensitivity and disease-specific analyses.

CONCLUSIONS: This study found that minorities were more likely than whites to be MTM-eligible under the star ratings criteria. In addition, MTM eligibility criteria based on star ratings would reduce racial and ethnic disparities associated with MMA in the general Medicare population and those with specific chronic conditions.

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What is already known about this subject

- The Centers for Medicare and Medicaid Services (CMS) implemented medication therapy management (MTM) services as part of the Medicare Part D prescription drug benefit in 2006.
- The Medicare Modernization Act (MMA) established utilization-based criteria for MTM eligibility.
- Hispanic and non-Hispanic black (black) patients compared with non-Hispanic white (white) patients are less likely to be eligible for MTM services under the MMA-based thresholds, as set by CMS.

What this study adds

- Use of the CMS star ratings system as alternative MTM eligibility criteria significantly would reduce disparities in MTM eligibility between blacks and whites, as well as Hispanics and whites.
- In general, a significantly greater proportion of blacks and Hispanics, compared with whites, would be eligible for MTM under the star ratings criteria, a direct reversal of the findings under MMA-based MTM criteria.
- Star ratings measures demonstrate promise in diminishing disparities in MTM eligibility among Medicare beneficiaries.

Mandated by the Medicare Modernization Act (MMA), the Centers for Medicare and Medicaid Services (CMS) implemented medication therapy management (MTM) as part of the Medicare Part D prescription drug benefit in 2006. According to CMS, the goal of MTM is to optimize therapeutic outcomes and reduce adverse events “through improved medication use.”¹ MTM, which involves activities such as conducting a comprehensive medication review and developing a medication-related action plan, is beneficial for

patients with chronic disease states, particularly the elderly.²⁻¹¹ Such services have been found to improve patient outcomes and reduce health care utilization and costs.³⁻¹¹

Although CMS expected MTM to develop into a “cornerstone” of Part D benefits, the MMA established restrictive utilization-based criteria for eligibility, including meeting all 3 of the following: having multiple chronic conditions, taking multiple drugs covered by Part D, and incurring annual drug costs of \$4,000.¹²⁻¹⁴ Before 2010, the minimum MTM eligibility thresholds used by Part D plans were 2-5 chronic conditions and 2-23 Part D-covered drugs (this was changed to 2-15 in 2008).^{14,15} In an effort to boost MTM enrollment and reduce variability across Part D plans, CMS lowered the eligibility thresholds in 2010 to not more than 3 chronic conditions, 8 Part D-covered drugs, and annual drug costs of \$3,000.^{16,17}

Despite the changes made to MTM eligibility criteria in hopes of increasing accessibility, ongoing racial and ethnic disparities have been noted. Previous studies have demonstrated that Hispanic and non-Hispanic black (black) patients, compared with non-Hispanic white (white) patients are significantly less likely to be eligible for MTM under the 2010 criteria.¹⁸⁻²⁰ To address these disparities and continue efforts to bolster enrollment rate to its initial goal of 25%,¹² CMS proposed in 2015 to further lower MTM eligibility thresholds to 2 chronic conditions, 2 Part D-covered drugs, and \$620 in annual drug costs.¹² However, these proposed changes were not implemented partly because of stakeholder concerns regarding the effectiveness of such changes in improving MTM use.²¹ Moreover, an analysis conducted by Wang et al. (2016) found that the proposed 2015 changes would not have eliminated the problem of racial and ethnic disparities: Hispanic and black patients remained significantly less likely than white patients to meet MTM eligibility criteria.²² Therefore, to reduce or eliminate racial and ethnic disparities, an alternative set of MTM eligibility criteria is needed.

A possible alternative is the CMS star ratings system, which was designed to promote health care quality and improved performance of providers.²³ Part D plans and Medicare Advantage plans with prescription drug coverage (MAPDs) are assessed by CMS using star ratings on an annual basis.²³ Such ratings are available to Medicare beneficiaries as they select plans, and research has found that choice of plan is significantly associated with the ratings program.²⁴ Perhaps more significantly, star ratings affect bonus payments from CMS to MAPDs. In 2012, for example, these plans received \$3.1 billion in bonus payments based on star ratings.²⁵ CMS may also terminate plan contracts because of low performance on star ratings measures.²⁶ Because of their critical role in the operations of Part D plans, star ratings are already well integrated into the daily practice of these plans. Therefore, Part D plans could easily apply star ratings as MTM eligibility criteria, avoiding the more onerous burden of utilization-based criteria.

Star ratings include several medication safety and adherence measures developed by the Pharmacy Quality Alliance (PQA), including, for example, in 2013, use of high-risk medications in the elderly, appropriate treatment of hypertension in persons with diabetes, and proportion of days covered (PDC) for select drug classes.^{25,27,28} Previous studies have found minorities to be at least as likely as whites to receive high-risk medications (star ratings measure 1) and be nonadherent to medications (measure 3).^{29,30} Because star ratings measures concentrate on patient needs, and minorities typically have poorer health status than whites, the use of these criteria may reduce MTM disparities. However, a review of the literature did not produce any published studies examining use of star ratings criteria to determine Part D-related MTM eligibility and corresponding effects on racial and ethnic disparities. Therefore, the objective of this study was to examine whether alternative Medicare MTM eligibility criteria based on the CMS Part D star ratings quality evaluation system can reduce racial and ethnic disparities in meeting MMA-based MTM eligibility criteria.

Methods

Study Design, Population, and Data Sources

This retrospective study included 3 million Medicare beneficiaries who had continuous Medicare Parts A, B, and D enrollment in 2012-2013; were aged 65 years or older at any time of the enrollment; and were alive by the end of 2013. Patients were not enrolled in health maintenance organizations so that all claims were available. The study included 3 major racial and ethnic groups: whites, blacks, and Hispanics. Racial and ethnic disparities were examined by comparing whites to blacks and Hispanics, respectively.

This study used the Medicare Part D Event (PDE) database linked with various Medicare beneficiary and medical claims datasets, including comprehensive Parts A and B information. PDE data contained drug code, dispense date, strength, quantity, days supply, and prescription drug costs. The Medicare Master Beneficiary Summary File, including Base (A/B/D) and Cost & Use Segments, provided patient age, gender, state and county code, reason for entitlement code, enrollment period, and Medicare and Medicaid dual status code. Medical claims datasets with *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes and service dates were also used. Managed by the Health Resources and Service Administration, the Area Health Resource File (AHRF) was linked with the Medicare databases to provide characteristics of beneficiaries' residences at the county level.³¹⁻³³ This study was approved by the Institutional Review Board at the University of Tennessee Health Science Center.

Conceptual Framework

This study used Andersen's Behavioral Model for Health Services Utilization conceptual framework. Both individual and community (county)-level factors were used.^{34,35} Predisposing

factors included race, ethnicity, age, gender, and county-level information of percentage of nonwhite population, percentage of married-couple families, per capita income, percentage living in poverty, percentage of various educational achievements among 25 years or older, percentage eligible for Medicaid, percentage unemployed, and percentage without health insurance. Enabling factors included metropolitan statistical area (MSA), census regions, and whole/part of county as a health professional shortage area for primary care. Need factors included the Deyo-adapted Charlson Comorbidity Index and a risk adjustment summary score developed based on the Diagnostic Cost Group/Hierarchical Coexisting Condition model.³⁴⁻³⁶

MTM Eligibility Criteria

When determining MTM eligibility criteria under the MMA, thresholds used by health plans in 2009 and 2013 were applied because our previous analysis found that eligibility criteria for pre- and post-2010 might have different implications for racial and ethnic disparities.^{14,18-20} The proposed 2015 regulations were also studied.¹² The most recent years available for pre- and post-2010 periods at the time this study was conducted are 2009 and 2013.^{15,37}

Because Part D plans use a range of eligibility thresholds, it is reasonable to use minimum, median, mode, and maximum to examine thresholds. MTM eligibility thresholds used in 2009 had the following pattern: 2-15 Part D-covered drugs, 2-5 chronic conditions, and \$4,000 in annual drug costs.¹⁵ Because an individual must meet all 3 criteria to be eligible for MTM, 12 (4*3*1) different combinations of representative thresholds were examined (where 4, 3, and 1 are the number of unique representative thresholds for each eligibility criterion). The combination of mode values was studied as the main analysis: 8 covered medications, 3 chronic conditions, and \$4,000 in drug costs. The other 11 combinations were examined in sensitivity analyses.

MTM eligibility thresholds used in 2013 had the following pattern: 2-3 chronic conditions, 2-8 Part D drugs, and \$3,144 in annual drug costs.³⁷ There were 4 different combinations that represented the range of thresholds, and 8 medications, 3 chronic conditions, and \$3,144 in drug costs were analyzed in the main analysis. There was only 1 combination of 2015 eligibility criteria: 2 chronic conditions, 2 Part D drugs, and \$620 in annual drug costs.¹² The drug cost thresholds in 2009 and 2015 were adjusted for inflation based on the Consumer Price Index for prescription drugs for the study year.

Number of Part D drugs and drug costs were calculated based on the PDE database. Other Medicare claims were used to determine number of chronic conditions. A raw count of medical conditions was used based on a list of 25 chronic conditions devised to identify Medicare beneficiaries eligible for MTM.³⁸ The list included all chronic conditions targeted by MTM programs as required by CMS.^{16,37}

Star Ratings Eligibility Criteria

Star ratings eligibility criteria were based on existing medication safety and adherence measures related to the CMS star ratings system that were developed mostly by the PQA.^{27,28,39} Patients were considered MTM-eligible if they had any issues determined by 9 measures, defined as follows based on PQA technical specifications from 2013 and 2014 (the most recent at the time of this study^{25,27,28,39}):

1. High-risk medication use in the elderly: received ≥ 2 prescription fills for at least 1 high-risk medication.
2. Appropriate treatment of hypertension in persons with diabetes: received an angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker or direct renin inhibitor medication among patients dispensed a medication for diabetes and hypertension.
3. $\geq 80\%$ PDC for 3 drug classes, renin-angiotensin system antagonists, cholesterol medications, and oral diabetes medications, including biguanides, sulfonylureas, thiazolidinediones, and dipeptidyl peptidase (DPP)-IV inhibitors.
4. Drug-drug interactions: received a prescription for a target medication during the measurement period and was also dispensed a concurrent prescription for a precipitant medication.
5. Excessive doses of oral diabetes medications: dispensed a dose higher than the daily dose recommended by the U.S. Food and Drug Administration for biguanides, sulfonylureas, thiazolidinediones, and DPP-IV inhibitors.
6. $\geq 90\%$ PDC for HIV antiretroviral medications.
7. Chronic use of atypical antipsychotics by elderly beneficiaries in nursing homes.
8. $\geq 80\%$ PDC for beta blockers, calcium-channel blockers, and non-warfarin oral anticoagulants.
9. Antipsychotic use in persons with dementia: patients with dementia or who received medications treating dementia who also received ≥ 1 antipsychotic medication without evidence of a psychotic disorder or related condition.

According to the 2013 and 2014 star ratings used by CMS—the most current version at the time of this study—measures 1 through 3 above are core measures in the star ratings system.^{25,27,28} Measures 4 through 7 are “display measures” or measures reported to Part D plans in patient safety reports used to provide further evaluation of Part D plans. Measures 1 through 7 are applicable to all Part D plans, including MAPDs and stand-alone prescription drug plans. All measures except 7 were developed by PQA and applicable to the Medicare population; measure 7 was developed by CMS. Measures 8 and 9 are PQA measures but have not been included in the CMS evaluation report on Part D plans.^{25,27,28,39} These measures were examined individually and in the following combinations as alternative MTM eligibility criteria: (a) all core measures (1 to 3), (b) all display measures (4 to 7), (c) measures 1 to 7, (d) aforementioned combinations a, b, and c each merged with

measures 8 and 9, and (e) all PDC measures. In total, 1 main analysis (i.e., patient was MTM-eligible under any 1 of the individual measures) and 14 sensitivity measures according to different aforementioned combinations were conducted to devise comprehensive policy recommendations.

Statistical Analyses

Data analysis was conducted using SAS version 9.4 (SAS Institute, Cary, NC) and STATA version 13.1 (StataCorp, College Stations, TX). In descriptive analysis, a chi-square test was used to examine racial and ethnic disparities in meeting each set of criteria. A Mantel-Haenszel test was used to compare disparities associated with the 2 sets of criteria (star ratings vs. MMA).

For multivariate analysis, logistic regression was conducted to determine whether there were racial and ethnic disparities in MTM eligibility associated with star ratings criteria. All covariates in Andersen's model were included. Since the study included county-level measures from AHRF, a hierarchical model was used to account for clustering of the study population within a county. Racial and ethnic disparities in MTM eligibility associated with star ratings criteria, if identified, were decomposed using the Blinder-Oaxaca approach extended to binary dependent variables.^{40,41} Disparities were decomposed into the portion of disparities (a) explained by observed characteristics and (b) unexplained by observed characteristics. Racial and ethnic disparities were analyzed separately in order to accommodate the requirements for decomposition.

Multinomial logistic regression examined disparities in meeting the following 4 possible categories of MTM eligibility:

- Y = {
- 1 = Not meeting either star ratings criteria or the MTM eligibility criteria under the MMA.
 - 2 = Meeting only star ratings criteria but not the MTM eligibility criteria under the MMA.
 - 3 = Meeting only MTM eligibility criteria under the MMA but not the star ratings criteria.
 - 4 = Meeting both star ratings criteria and the MTM eligibility criteria under the MMA.

Category 2 was used as the reference group because the comparison between categories 2 and 3 allowed us to determine disparity implications of star ratings criteria relative to MTM eligibility criteria under the MMA. Multinomial logistic regression was used because there were more than 2 possible categories of outcomes. All outcome categories were analyzed in 1 regression model to gain maximum statistical power. All variables in Andersen's model were included as independent variables. A Brant test was used to test whether the parallel regression assumption for ordinal logistic regression was met. Because this assumption was violated, a multinomial logistic regression was used instead of ordinal logistic regression.

Disease-specific analyses were also conducted for each of the top 10 MTM-targeted chronic conditions.⁴² The statistical significance level was set a priori at 0.05.

Results

The study sample included 2,213,594 Medicare beneficiaries: 2,052,997 (92.7%) were white; 96,941 (4.4%) were black; and 63,656 (2.9%) were Hispanic. Differences between whites and minorities were significant for all characteristics ($P < 0.05$; Table 1). Minorities were more likely to belong to younger age groups than were whites and were more likely to have higher Charlson Comorbidity Index and risk adjustment summary scores. Counties where minorities versus whites lived had higher percentages of nonwhite population, people living in poverty, Medicaid-eligible individuals, unemployed, and no health insurance.

According to bivariate analyses of the main analysis, MTM-eligible proportions of blacks and Hispanics were lower than whites in the main analyses under the MMA. Specifically, these proportions were 10.0%, 17.4%, and 63.3% among whites; 9.8%, 16.7%, and 61.9% among blacks; and 8.8%, 15.3%, and 56.6% among Hispanics in 2009, 2013, and 2015, respectively. Differences between whites and blacks and between whites and Hispanics were significant for each year ($P < 0.05$). Most sensitivity analyses produced similar findings, except a few where there was no difference between blacks and whites (results not shown). The MTM-eligible proportions of blacks and Hispanics were higher than whites in the main analysis under star ratings. The proportions of eligible individuals were 42.9% among Whites, 55.0% among Blacks, and 48.8% among Hispanics. Differences between Whites and Blacks and between Whites and Hispanics were significant ($P < 0.05$). A few sensitivity analyses had different findings, with blacks and Hispanics having lower eligibility rates for some star ratings measures (results not shown). The racial and ethnic disparities in MTM eligibility under the 2 sets of eligibility criteria (MMA and star ratings) were significantly different, according to the Mantel-Haenszel test ($P < 0.05$).

Unadjusted and adjusted odds ratios (OR) of meeting star ratings eligibility criteria for blacks and Hispanics compared with whites were produced using logistic regression (Table 2). In the main analysis, adjusted ORs for blacks and Hispanics compared with whites were 1.394 (95% confidence interval [CI] = 1.375-1.414) and 1.197 (95% CI = 1.176-1.218), respectively. This suggests that the odds for blacks and Hispanics to meet star ratings eligibility thresholds were 39.4% and 19.7% higher than for whites, respectively. In sensitivity analyses, blacks and Hispanics were less likely to be eligible for MTM under the following star ratings criteria: (a) measures 4-7: all display measures (blacks: OR = 0.646, 95% CI = 0.611-0.683; Hispanics: OR = 0.672, 95% CI = 0.626-0.721); (b) measure 1: high-risk medication use in the elderly (blacks: OR = 0.719,

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TABLE 1 Sociodemographic and County-Level Characteristics Across Racial and Ethnic Groups Among the Study Population (N=2,213,594)

Variables	Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics	
	n	%	n	%	n	%
Mean age ± SD ^{a,b}	76.77 ± 7.28		75.87 ± 6.99		75.78 ± 6.72	
Gender ^{a,b}						
Male	809,198	39.4	35,397	36.5	27,554	43.3
Female	1,243,799	60.6	61,544	63.5	36,102	56.7
Mean percentage of nonwhite population ± SD ^{a,b}	22.1 ± 15.0		39.5 ± 16.7		30.7 ± 14.5	
Mean percentage of married-couple families ± SD ^{a,b}	77.8 ± 6.0		70.7 ± 7.0		75.8 ± 6.7	
Mean per capita income ± SD ^{a,b}	44,105.3 ± 12,125.4		43,780.8 ± 12,824.8		43,777.6 ± 15,380.6	
Mean percentage of people living in poverty ± SD ^{a,b}	15.3 ± 5.2		18.3 ± 6.2		17.5 ± 6.1	
Mean percentage of education level for persons aged 25+ years ± SD ^{a,b}						
< high school diploma	13.3 ± 5.3		15.5 ± 5.3		18.3 ± 8.0	
≥ high school diploma	86.8 ± 5.3		84.7 ± 5.3		81.9 ± 5.8	
4-year college degree	27.5 ± 10.6		28.4 ± 10.5		28.1 ± 10.3	
Mean percentage of Medicaid-eligible ± SD ^{a,b}	19.3 ± 7.6		22.8 ± 8.6		23.5 ± 9.8	
Mean percentage of unemployed ± SD ^{a,b}	7.4 ± 2.1		8.2 ± 1.9		8.5 ± 3.1	
Mean percentage without health insurance ± SD ^{a,b}	13.3 ± 4.1		15.0 ± 3.6		17.9 ± 6.0	
Metropolitan statistical area ^{a,b}	1,547,679	75.4	81,743	84.3	55,541	87.3
Region ^{a,b}						
Northeast	391,963	19.1	17,411	18.0	9,967	15.7
Midwest	560,034	27.3	17,146	18.0	7,198	11.3
South	768,105	37.4	56,780	58.6	20,445	32.1
West	330,867	16.1	4,749	4.9	21,043	33.1
Other	2,028	0.1	855	0.9	5,003	7.9
HPSA ^{a,b,c}	1,803,115	87.8	88,601	91.4	58,533	92.0
Mean Charlson comorbidity index ± SD ^{a,b}	1.80 ± 2.18		2.32 ± 2.48		1.95 ± 1.93	
Mean risk adjustment summary score ± SD ^{a,b}	0.80 ± 0.65		0.83 ± 0.70		0.76 ± 0.63	

^aP<0.05 for the difference between non-Hispanic whites and non-Hispanic blacks.

^bP<0.05 for the difference between non-Hispanic whites and Hispanics.

^cIndicates whether the whole county or part of the county was a HPSA for primary care.

HPSA = health professional shortage area; SD = standard deviation.

95% CI=0.703-0.734; Hispanics: OR=0.741, 95% CI=0.721-0.762); and (c) measure 4: drug-drug interactions (blacks: OR=0.742, 95% CI=0.696-0.791; Hispanics: OR=0.719, 95% CI=0.662-0.781). Blacks were also less likely than whites to be eligible under (a) measure 5: excessive doses of oral diabetes medications; (b) measure 7: use of atypical antipsychotics; and (c) measure 9: antipsychotic use in persons with dementia (Table 2).

Disparities were not completely explained by differences in patient characteristics in most analyses based on the Blinder-Oaxaca approach (Table 3). According to the main analysis, adjusting black endowment levels to the levels of whites would decrease the likelihood of MTM eligibility under star ratings measures by 3.7% (OR=0.963; 95% CI=0.961-0.964); a gap of 7.9% (OR=0.921; 95% CI=0.918-0.924) remains unexplained. Adjusting Hispanic endowment levels to the levels of whites would decrease the likelihood of MTM eligibility under star ratings measures by 1.4% (OR=0.986; 95% CI=0.985-0.988); a gap of 3.8% (OR=0.962; 95% CI=0.958-0.966) remains

unexplained (Table 3). There were a few exceptions where racial or ethnic disparities were completely explained by differences in patient characteristics in some sensitivity analyses (e.g., the comparison between whites and blacks regarding star ratings measure 2).

Multinomial logistic regression was used to examine whether there was a disparity reduction by comparing individuals who were eligible for MTM under the MMA but not under star ratings criteria and those who were eligible for MTM under star ratings criteria but not under the MMA. Significant reductions were found in all unadjusted and adjusted analyses (Table 4). The main analysis found significant adjusted relative risk ratios (RRR) between whites and blacks for 2009 (RRR=0.459, 95% CI=0.438-0.481); 2013 (RRR=0.449, 95% CI=0.434-0.465); and 2015 (RRR=0.436, 95% CI=0.425-0.446) and between whites and Hispanics for 2009 (RRR=0.559, 95% CI=0.528-0.593); 2013 (RRR=0.544, 95% CI=0.521-0.569); and 2015 (RRR=0.503, 95% CI=0.488-0.518). These ratios indicated that there was a significant reduction in racial and ethnic

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TABLE 2 Racial and Ethnic Disparities in Meeting Eligibility Criteria for MTM Services According to Star Ratings Eligibility Criteria Based on Logistic Regression

Comparison Groups	Unadjusted Model				Adjusted Model			
	Coef.	P Value	OR	95% CI	Coef.	P Value	OR	95% CI
Main analysis: star ratings measures 1-9								
Non-Hispanic blacks	0.486	<0.001	1.626	1.605-1.647	0.332	<0.001	1.394	1.375-1.414
Hispanics	0.240	<0.001	1.271	1.251-1.291	0.180	<0.001	1.197	1.176-1.218
Sensitivity analysis 1: star ratings measures 1-3								
Non-Hispanic blacks	0.472	<0.001	1.604	1.583-1.625	0.308	<0.001	1.360	1.341-1.380
Hispanics	0.290	<0.001	1.337	1.315-1.358	0.218	<0.001	1.243	1.221-1.265
Sensitivity analysis 2: star ratings measures 4-7								
Non-Hispanic blacks	-0.442	<0.001	0.643	0.609-0.678	-0.437	<0.001	0.646	0.611-0.683
Hispanics	-0.423	<0.001	0.655	0.613-0.699	-0.398	<0.001	0.672	0.626-0.721
Sensitivity analysis 3: star ratings measures 1-7								
Non-Hispanic blacks	0.451	<0.001	1.569	1.549-1.590	0.288	<0.001	1.334	1.316-1.353
Hispanics	0.268	<0.001	1.307	1.287-1.328	0.201	<0.001	1.223	1.202-1.245
Sensitivity analysis 4: star ratings measures 1,2,3,8,9								
Non-Hispanic blacks	0.503	<0.001	1.653	1.632-1.675	0.347	<0.001	1.415	1.396-1.436
Hispanics	0.257	<0.001	1.292	1.272-1.313	0.193	<0.001	1.213	1.192-1.234
Sensitivity analysis 5: star ratings measures 4-9								
Non-Hispanic blacks	0.470	<0.001	1.599	1.572-1.626	0.419	<0.001	1.520	1.493-1.548
Hispanics	0.194	<0.001	1.214	1.186-1.234	0.133	<0.001	1.142	1.113-1.172
Sensitivity analysis 6: star ratings measure 1								
Non-Hispanic blacks	-0.195	<0.001	0.823	0.806-0.840	-0.331	<0.001	0.719	0.703-0.734
Hispanics	-0.186	<0.001	0.831	0.810-0.852	-0.300	<0.001	0.741	0.721-0.762
Sensitivity analysis 7: star ratings measure 2								
Non-Hispanic blacks	0.011	0.478	1.011	0.980-1.044	0.026	0.128	1.027	0.992-1.062
Hispanics	0.282	<0.001	1.326	1.266-1.388	0.172	<0.001	1.188	1.130-1.248
Sensitivity analysis 8: star ratings measure 3								
Non-Hispanic blacks	0.642	<0.001	1.899	1.870-1.930	0.537	<0.001	1.710	1.682-1.739
Hispanics	0.551	<0.001	1.735	1.701-1.771	0.431	<0.001	1.539	1.506-1.573
Sensitivity analysis 9: star ratings measure 4								
Non-Hispanic blacks	-0.255	<0.001	0.775	0.729-1.824	-0.299	<0.001	0.742	0.696-0.791
Hispanics	-0.296	<0.001	0.744	0.689-0.803	-0.330	<0.001	0.719	0.662-0.781
Sensitivity analysis 10: star ratings measure 5								
Non-Hispanic blacks	-0.194	0.013	0.824	0.708-0.959	-0.240	<0.001	0.786	0.670-0.923
Hispanics	0.036	0.677	1.037	0.875-1.227	-0.050	0.593	0.952	0.793-1.142
Sensitivity analysis 11: star ratings measure 6								
Non-Hispanic blacks	0.369	0.101	1.446	0.930-2.248	0.372	0.163	1.450	0.860-2.446
Hispanics	0.344	0.343	1.411	0.692-2.877	0.530	0.168	1.698	0.799-3.608
Sensitivity analysis 12: star ratings measure 7								
Non-Hispanic blacks	-0.170	0.052	0.844	0.711-1.001	-0.235	0.010	0.790	0.662-0.943
Hispanics	0.117	0.285	1.125	0.907-1.395	0.033	0.774	1.033	0.827-1.292
Sensitivity analysis 13: star ratings measure 8								
Non-Hispanic blacks	0.541	<0.001	1.717	1.686-1.749	0.479	<0.001	1.614	1.583-1.646
Hispanics	0.397	<0.001	1.487	1.448-1.527	0.281	<0.001	1.324	1.286-1.363
Sensitivity analysis 14: star ratings measure 9								
Non-Hispanic blacks	-0.168	<0.001	0.845	0.786-0.909	-0.194	<0.001	0.824	0.763-0.888
Hispanics	0.011	0.807	1.011	0.928-1.100	-0.033	0.501	0.967	0.878-1.066

CI=confidence interval; Coef=coefficient; MTM=medication therapy management; OR=odds ratio.

disparities when using star ratings eligibility criteria compared with MMA criteria. Black-white disparities in likelihood of meeting MTM eligibility criteria were reduced by 54.1%, 55.1%, and 56.4%, respectively, when using star ratings

criteria compared with MMA criteria in 2009, 2013, and proposed 2015 criteria. Hispanic-white disparities in likelihood of meeting MTM eligibility criteria were reduced by 44.1%, 45.6%, and 49.7%, respectively, for the same criteria. Similar

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TABLE 3 Explained and Unexplained Factors in Racial and Ethnic Disparities in Meeting Eligibility Criteria for MTM Services According to the Star Rating Eligibility Criteria Based on Blinder-Oaxaca Approach

Comparison Groups	Non-Hispanic Blacks				Hispanics			
	Coef.	Exp(b)	P Value	95% CI	Coef.	Exp(b)	P Value	95% CI
Main analysis: star ratings measures 1-9								
Explained factors	-0.038	0.963	<0.001	0.961-0.964	-0.014	0.986	<0.001	0.985-0.988
Unexplained factors	-0.082	0.921	<0.001	0.918-0.924	-0.038	0.962	<0.001	0.958-0.966
Sensitivity analysis 1: star ratings measure 1-3								
Explained factors	-0.039	0.962	<0.001	0.961-0.963	-0.017	0.983	<0.001	0.982-0.984
Unexplained factors	-0.076	0.927	<0.001	0.924-0.930	-0.047	0.955	<0.001	0.951-0.958
Sensitivity analysis 2: star ratings measures 4-7								
Explained factors	0.001	1.001	0.01	1.001-1.002	0.003	1.003	<0.001	1.002-1.004
Unexplained factors	0.017	1.017	<0.001	1.015-1.019	0.016	1.016	<0.001	1.013-1.018
Sensitivity analysis 3: star ratings measure 1-7								
Explained factors	-0.038	0.962	<0.001	0.961-0.963	-0.016	0.984	<0.001	0.983-0.986
Unexplained factors	-0.071	0.931	<0.001	0.928-0.934	-0.043	0.958	<0.001	0.954-0.962
Sensitivity analysis 4: star ratings measures 1,2,3,8,9								
Explained factors	-0.038	0.962	<0.001	0.961-0.963	-0.015	0.985	<0.001	0.984-0.987
Unexplained factors	-0.086	0.917	<0.001	0.914-0.920	-0.042	0.959	<0.001	0.956-0.963
Sensitivity analysis 5: star ratings measures 4-9								
Explained factors	-0.008	0.992	<0.001	0.991-0.993	-0.008	0.992	<0.001	0.991-0.993
Unexplained factors	-0.076	0.926	<0.001	0.923-0.930	-0.020	0.980	<0.001	0.976-0.984
Sensitivity analysis 6: star ratings measure 1								
Explained factors	-0.014	0.986	<0.001	0.985-0.987	-0.016	0.989	<0.001	0.989-0.990
Unexplained factors	0.035	1.035	<0.001	1.033-1.037	0.032	1.032	<0.001	1.029-1.035
Sensitivity analysis 7: star ratings measure 2								
Explained factors	0.003	1.003	0.001	1.001-1.004	-0.012	0.988	<0.001	0.986-0.990
Unexplained factors	-0.004	0.996	0.072	0.992-1.003	-0.020	0.981	<0.001	0.975-0.986
Sensitivity analysis 8: star ratings measure 3								
Explained factors	-0.022	0.979	<0.001	0.977-0.980	-0.020	0.980	<0.001	0.979-0.982
Unexplained factors	-0.123	0.884	<0.001	0.881-0.888	-0.096	0.908	<0.001	0.904-0.913
Sensitivity analysis 9: star ratings measure 4								
Explained factors	-0.003	0.997	<0.001	0.997-0.998	0.0001	1.001	0.741	0.999-1.001
Unexplained factors	0.016	1.016	<0.001	1.013-1.019	0.016	1.016	<0.001	1.012-1.020
Sensitivity analysis 10: star ratings measure 5								
Explained factors	-0.005	0.999	0.015	0.998-0.999	-0.001	0.999	0.001	0.998-0.999
Unexplained factors	0.002	1.002	0.001	1.001-1.003	0.0004	1.0004	0.639	0.999-1.002
Sensitivity analysis 11: star ratings measure 6								
Explained factors	0.013	1.013	0.419	0.982-1.045	-0.002	0.998	0.885	0.975-1.022
Unexplained factors	-0.051	0.951	0.102	0.895-1.010	-0.040	0.961	0.353	0.884-1.045
Sensitivity analysis 12: star ratings measure 7								
Explained factors	-0.003	0.997	0.002	0.995-0.999	-0.003	0.997	<0.001	0.995-0.998
Unexplained factors	0.012	1.012	0.005	1.004-1.020	-0.002	0.998	0.773	0.985-1.011
Sensitivity analysis 13: star ratings measure 8								
Explained factors	-0.012	0.988	<0.001	0.987-0.989	-0.018	0.982	<0.001	0.981-0.984
Unexplained factors	-0.094	0.910	<0.001	0.906-0.914	-0.054	0.948	<0.001	0.942-0.953
Sensitivity analysis 14: star ratings measure 9								
Explained factors	-0.002	0.998	0.004	0.996-0.999	-0.001	0.999	0.325	0.996-1.001
Unexplained factors	0.020	1.020	<0.001	1.013-1.028	0.004	1.004	0.459	0.993-1.015

CI = confidence interval; Coef = coefficient; Exp(b) = odds ratio; MTM = medication therapy management.

patterns were found in most unadjusted and adjusted sensitivity analyses (results not shown). Likewise, disease-specific analyses produced similar findings (results not shown).

Discussion

Given the critical role played by MTM in improving the health outcomes of chronic disease patients, increased access to this

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TABLE 4 Reduction of Racial and Ethnic Disparities in Meeting Eligibility Criteria for MTM Services According to Star Ratings Eligibility Criteria Based on Multinomial Logistic Regression

Comparison Groups	Unadjusted Model		Adjusted Model	
	RRR	95% CI	RRR	95% CI
Star ratings (main) and MMA 2009 (main)				
Non-Hispanic blacks	0.502	0.480-0.525	0.459	0.438-0.481
Hispanics	0.562	0.532-0.594	0.559	0.528-0.593
Star ratings (main) and MMA 2013 (main)				
Non-Hispanic blacks	0.483	0.467-0.500	0.449	0.434-0.465
Hispanics	0.540	0.518-0.563	0.544	0.521-0.569
Star ratings (main) and MMA 2015 (main)				
Non-Hispanic blacks	0.471	0.461-0.482	0.436	0.425-0.446
Hispanics	0.501	0.487-0.516	0.503	0.488-0.518

CI=confidence interval; MMA=Medicare Modernization Act; MTM=medication therapy management; RRR=relative risk ratio.

service for Medicare beneficiaries under Part D has been a particular concern of CMS. However, previous studies have noted racial and ethnic disparities in MTM eligibility when applying utilization-based criteria established by CMS under the auspices of the MMA.^{14,18-20,22} Therefore, the purpose of the current study was to examine whether alternative Medicare Part D MTM eligibility criteria based on the CMS Part D star ratings system would reduce racial and ethnic disparities in meeting MMA-based MTM eligibility criteria. The findings indicate that, in general, minorities would be more likely to be eligible for MTM under the proposed star ratings measures compared with whites. However, disparities remain when examining select individual measures, which could not be explained by differences in other patient characteristics. These characteristics, based on Anderson's Behavioral Model for Health Services Utilization, may have suggested alternate sources of disparities other than race/ethnicity, which were not supported in the analysis. The study also found a significant reduction in racial and ethnic disparities when using star ratings criteria compared with MMA-based criteria for 2009, 2013, and 2015.

Historically, minorities tend to use fewer prescription medications and incur lower drug costs than whites.⁴³⁻⁴⁷ As a result, they are less likely to qualify for MTM services under the MMA's restrictive utilization-based criteria.^{13,43-47} Recognizing the disparity implications of the MMA-MTM eligibility criteria, CMS has made efforts to adjust eligibility thresholds to increase accessibility and reduce disparities (although the proposed changes in 2015 were not implemented).^{12,21} This study found that, despite changes made to the MMA-based MTM criteria, significantly greater proportions of whites than blacks or Hispanics would have been eligible using the 2009, 2013, and 2015 criteria. This is consistent with previous

studies conducted by Lu et al. (2017) and Wang et al.,^{20,22} which found that Hispanic and black patients, compared with white patients, are significantly less likely to be eligible for MTM under the post-2010 and proposed 2015 eligibility criteria.^{14,18-20,22}

Because of ongoing racial and ethnic disparities associated with MMA-based MTM eligibility criteria, alternative criteria should be evaluated to assist policymakers in improving access to MTM. Star ratings represent one possible replacement option. An advantage of the star ratings measures is that they are based on quality of treatment with a focus on medication safety and adherence, rather than use (e.g., number of Part D drugs used). Indeed, when star ratings criteria were applied in this study, significantly greater proportions of blacks and Hispanics would have qualified for MTM services compared with whites, raising concerns of reverse disparities. However, before applying such a label, the possible reason for this phenomenon should be considered. Minorities tend to experience a greater prevalence of several health risk factors (e.g., obesity), medication utilization issues, and chronic disease states compared with whites.⁴⁸⁻⁵⁴ Since the star ratings criteria examined in this study are largely based on medication utilization issues, including adherence, it is logical that populations who experience higher concentrations of such issues are more likely to be eligible for MTM.

Further, we should consider the definition of "disparities" in this context. According to *Healthy People 2020*, a disparity is "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group," among other factors.⁵⁵ Systemic, institutionalized obstacles to quality health care in the United States because of race/ethnicity and related factors (e.g., socioeconomic status) are well documented in black and Hispanic populations.⁵⁶ In contrast, as the majority population who has largely dominated development and implementation of U.S. health care policy, whites have not experienced the structural racism and barriers to quality health care faced by their minority counterparts. Therefore, although minorities would generally be more likely than whites to qualify for MTM eligibility under star ratings, this may not necessarily constitute a disparity.

In addition, while blacks and Hispanics were overall more likely than whites to be eligible for MTM under star ratings criteria, there were scenarios in which this was not the case, which suggests that star ratings criteria may not fully eliminate racial and ethnic disparities in MTM eligibility. For example, blacks and Hispanics were less likely to be eligible for MTM when applying the star ratings display measures 4 through 7. Eligibility was also affected by several individual measures, particularly among black patients. These differences could not

be explained completely by patient characteristics, suggesting that the implications of racial and ethnic disparities in MTM eligibility would vary depending on measures included in the star ratings. Caution should therefore be taken when applying star ratings as MTM eligibility criteria.

Despite the preceding concerns, this study did find that star ratings criteria successfully reduced disparities in meeting MMA-based MTM eligibility criteria. Specifically, star ratings criteria reduced black-white and Hispanic-white disparities by more than 54% and 44%, respectively, for each MMA criteria year (2009, 2013, and 2015) examined. Reductions in disparities were also noted when considering individual chronic disease states such as diabetes and hypertension. Thus, star ratings criteria have the potential to comprehensively increase MTM eligibility among black and Hispanic patients. Given the disproportionately high prevalence of many of these chronic disease states among minority populations, increased MTM access would likely be of great benefit to these patients, resulting in positive health outcomes.^{48,49}

As established by the MMA, MTM services under Part D were intended to decrease drug-related morbidity and mortality, as well as associated costs. Unfortunately, criteria provided in the MMA have made eligibility prohibitive for those who would likely benefit the most from such services. The findings of this study provide substantive evidence that forgoing utilization-based criteria in favor of those focused on quality measures (i.e., star ratings) may considerably improve MTM access for minority patients. Yet, expanded eligibility is only the first step. Efforts should be made to ensure that minority and non-minority patients take advantage of the MTM services offered through their Part D plans. Application of star ratings as eligibility criteria in combination with strategies to improve MTM participation may help CMS achieve its goals of making MTM a cornerstone of Part D and expanding MTM services to cover at least 55% of Part D beneficiaries.^{12,16}

Limitations

This study has limitations to consider. Since this was a retrospective analysis using administrative claims data, a causal relationship cannot be established between MTM eligibility criteria and racial/ethnic disparities. In addition, policy scenarios were analyzed rather than real-world policies for MTM enrollment. This was done because data on actual patient-level MTM enrollment is not currently available. However, study findings may assist policymakers in revising and/or developing policies that address potential racial and ethnic disparities in MTM eligibility under the MMA. Further, this study did not intend to link disparities in MTM eligibility with disparities in service quality or health outcomes, although we do suggest that future studies consider the possible ramifications of said disparities in these areas.

Conclusions

This study explored the effects of star ratings as alternate eligibility criteria in reducing racial and ethnic disparities in Medicare Part D MTM eligibility. This study found that minorities were more likely than whites to be eligible for MTM under the star ratings criteria. In addition, MTM eligibility criteria based on star ratings would reduce racial and ethnic disparities associated with the MMA in the general Medicare population and those with specific chronic conditions. Therefore, star ratings demonstrate considerable promise as a possible alternative to the MMA-based MTM eligibility criteria currently in use.

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