Racial and Ethnic Differences in Use of Mammography Between Medicare Advantage and Traditional Medicare

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Manuscript received May 29, 2013; revised September 3, 2013; accepted October 11, 2013.

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Background

Breast cancer is a leading cause of mortality for women in all racial/ethnic groups. We compared use of mammography by race/ethnicity in Medicare health maintenance organizations (HMOs), preferred provider organizations (PPOs), and traditional Medicare.

Methods

We matched 495,836 women in HMOs and 81,480 women in PPOs who were aged 65 to 69 years during 2009 to women enrolled in traditional Medicare by race/ethnicity, Medicaid eligibility status, and geographic area. We identified mammography use from the Healthcare Effectiveness Data and Information Set for Medicare HMOs and PPOs and from claims data for traditional Medicare with the same specifications. We then compared racial/ethnic differences in rates of mammography in HMOs and PPOs to matched populations in traditional Medicare and estimated differences with $z$ tests. All statistical tests were two-sided.

Results

Relative to matched white women, mammography rates were statistically significantly higher for black, Hispanic, and Asian/Pacific Islander women in HMOs (6.1, 5.4, and 0.9 percentage points, respectively; all $P \leq .003$) and statistically significantly lower for all three groups in traditional Medicare (3.3, 7.4, and 7.7 percentage points, respectively; all $P < .001$). Similar improvements in mammography rates also were observed in PPOs among all minority groups relative to traditional Medicare.

Conclusions

Higher rates of mammography in HMOs and PPOs were associated with a reversal of racial and ethnic differences observed in traditional Medicare. These differences may be related to lower patient cost-sharing and better systems to promote preventive services in managed care plans, as well as unmeasured characteristics or beliefs of minority women who enroll in these health plans relative to those in traditional Medicare.


Breast cancer is a leading cause of cancer mortality for women in the United States, ranking first for Hispanic women and second behind lung cancer for black, Asian/Pacific Islander, and white women (1). To facilitate the diagnosis of breast cancer at earlier stages and reduce mortality, mammography is recommended by national guidelines in the United States for women aged 50 through 74 years, based on evidence from randomized clinical trials (2,3).

At age 65 years, almost all US women become insured through the Medicare program, which began covering screening mammography biennially in 1991 and annually in 1998 (4). Since the Medicare Modernization Act in 2003, the proportion of Medicare beneficiaries enrolled in private health plans through the Medicare Advantage program has doubled from 13% in 2004 to 27% in 2012 (5), with the remainder enrolled in traditional fee-for-service Medicare. Among beneficiaries in Medicare Advantage in 2012, 65% were enrolled in health maintenance organizations (HMOs), and 28% were enrolled in preferred provider organizations (PPOs) (5). HMOs and PPOs receive capitated payments from Medicare and provide medical services through contracts with physicians and hospitals. Whereas HMOs have been widely available in Medicare since the mid-1990s, PPOs were rare before 2006 and have fewer restrictions on beneficiaries seeking care from physicians or hospitals outside PPO provider networks.

Relative to traditional Medicare, Medicare HMOs and PPOs had lower patient cost-sharing for preventive services before 2010 (6), and they may have more organized systems to promote appropriate preventive services. Medicare HMOs and PPOs are required by the Centers for Medicare and Medicaid Services (CMS) to publicly report their use of mammography each year for women aged 65 to 69 years, whereas such reporting is not required in traditional Medicare. Recently, we found that overall mammography rates were statistically significantly higher in Medicare HMOs than in traditional Medicare by 17.9% in 2003 and by 13.5% in 2009 (7).

Given their higher rates of mammography, Medicare HMOs may be more effective than traditional Medicare in eliminating racial and ethnic disparities in this service. Between 1997 and 2003, disparities in use of mammography between black and white women enrolled in Medicare HMOs narrowed, but rates for black
women remained statistically significantly lower (8). Comparable data were not available for Hispanic or Asian/Pacific Islander women because of incomplete identification of these groups in Medicare enrollment data (9,10). Similarly, little is known about racial and ethnic disparities in Medicare PPOs, which have largely developed since 2006.

Therefore, the objective of our study was to compare racial and ethnic differences in use of mammography in Medicare HMOs and PPOs relative to traditional Medicare. In addition to black and white women, we included Hispanic and Asian/Pacific Islander women using a new algorithm that identifies these latter two groups much more accurately (11).

**Methods**

**Study Cohort**

We studied care of Medicare beneficiaries in 2009, the most recent data available when our study was conducted. The study was approved by the CMS Privacy Board and by the Human Studies Committee of Harvard Medical School with a waiver of informed consent and in accord with an assurance filed with and approved by the US Department of Health and Human Services.

The Medicare Beneficiary Summary File from CMS provides data on beneficiaries' demographic characteristics (age, race/ethnicity, county, and state of residence), enrollment in HMOs or PPOs, dual eligibility for Medicaid, and vital status. Our study cohort included women in HMOs, PPOs, or traditional Medicare who were recorded as black, Hispanic, Asian/Pacific-Islander, or non-Hispanic white using a new race/ethnicity variable developed and validated by the Research Triangle Institute to identify Hispanic and Asian/Pacific Islander beneficiaries more accurately (11).

This new race/ethnicity variable uses algorithms based on lists of Hispanic and Asian/Pacific Islander surnames and given names from the US Census Bureau and on the CMS designation of Spanish as a beneficiary’s preferred language. The sensitivity of the prior Medicare race/ethnicity variable exceeded 93% for white and black beneficiaries but was substantially lower for Hispanic (30%–41%), Asian (56%–60%), and Pacific Islander (26%–39%) beneficiaries, and the prior Medicare variable disproportionately identified poorer and less healthy individuals in these latter three groups (10). Application of the new algorithm to Medicare enrollment data in 2003 increased the sensitivity for identifying Hispanic beneficiaries from 43% to 77% and for Asian/Pacific Islander beneficiaries from 54% to 79%, with essentially no change in specificity (>99%) for either group (11).

As described in previous research (7), we excluded partial-year enrollees and those in HMOs and PPOs with less than 500 enrollees.

**Outcome Variables**

As specified in the Healthcare Effectiveness Data and Information Set (HEDIS) developed by the National Committee for Quality Assurance, Medicare HMOs and PPOs submit individual-level data to CMS on use of mammography among women aged 65 to 69 years. This HEDIS measure for 2009 included screening and diagnostic mammograms identified from health plan records using Current Procedure Terminology codes (codes 77055–77057), Healthcare Common Procedure Coding System codes (codes G0202, G0204, and G0206), International Classification of Diseases, 9th Revision, Clinical Modification diagnosis codes (codes V76.11 and V76.12) and procedure codes (codes 87.36 and 87.37), and uniform billing revenue codes (codes 0401 and 0403). Using Medicare Part B, hospital outpatient, and Part A claims, we created comparable measures from the same codes for a 20% sample of traditional Medicare enrollees in 2009 (7,12).

**Statistical Analysis**

Racial and ethnic groups are distributed unevenly across US regions, as are Medicare HMOs and PPOs. Black, Hispanic, and Asian/Pacific Islander women are also more likely than white women to be eligible for Medicaid because of lower incomes, which may affect their use of mammography. To account for these geographic and socioeconomic differences by race/ethnicity, for women eligible for mammography in each minority group (black, Hispanic, Asian/Pacific Islander), we statistically reweighted white women in the same component of Medicare to match the distribution of the minority group cohort by age, eligibility for Medicaid, and county or state. To do so, we assigned women to cells defined by crossing these variables and weighted the white observations by the ratio of minority group to white observations in the cell. For the HMO cohort, all racial and ethnic groups were matched within county (>97%) or state (<3%). For the smaller PPO cohort, racial and ethnic groups were somewhat less likely be matched within county (>92%) and more likely to be matched within state (<8%). Among PPO enrollees, we excluded small proportions of black (0.2%) and Asian/Pacific Islander (0.6%) enrollees who could not be matched with white enrollees in the same county or state.

We calculated rates of mammography for each minority group relative to matched white women within HMOs and PPOs; corresponding differences were calculated within matched traditional Medicare cohorts that were matched separately to the HMO and PPO cohorts, respectively. For each racial/ethnic comparison, we compared the difference-in-differences in HMOs and PPOs to traditional Medicare. Analyses were conducted with SAS version 9.2 (SAS Institute, Cary, NC). Two-sided P values are reported from z tests using estimators for stratified sampling. Statistical significance was based on α less than or equal to 0.05.

**Results**

The characteristics of women eligible for mammography before matching are shown in Table 1. Women in HMOs tended to be slightly younger and more likely to reside in the Northeast or West than those in PPOs or traditional Medicare. The proportions of Hispanic and Asian/Pacific Islander women who were eligible for Medicaid were much lower in HMOs and PPOs than in traditional Medicare, whereas the proportions of beneficiaries eligible for Medicaid were more similar across all three components of Medicare among black women and among white women. After matching, minority and white women in HMOs, PPOs, and traditional Medicare had identical distributions of age, region, and Medicaid eligibility (data not shown).

Table 2 presents the unadjusted rates of mammography before matching by race/ethnicity among women in HMOs, PPOs, and traditional Medicare. For all racial and ethnic groups, mammography...
rates were highest in HMOs, intermediate in PPOs, and lowest in traditional Medicare.

Figure 1 depicts mammography rates by race/ethnicity in the matched cohorts for HMOs and traditional Medicare. Relative to matched white women in HMOs, mammography rates were statistically significantly higher for black, Hispanic, and Asian/Pacific Islander women in HMOs (6.1, 5.4, and 0.9 percentage points, respectively; all $P < .003$). In contrast, mammography rates in traditional Medicare were statistically significantly lower for all three groups relative to matched white women (3.3, 7.4, and 7.7 percentage points, respectively; all $P < .001$). Differences in these rates by race/ethnicity demonstrated substantially greater disparities in traditional Medicare than in HMOs for black, Hispanic, and Asian/Pacific Islander women relative to matched white women (9.4, 12.8, and 8.6 percentage points, respectively; all $P < .001$).

Rates of mammography are shown for women in PPOs and traditional Medicare in Figure 2. Relative to matched white women, rates were higher for black women in PPOs (3.8 percentage points; $P < .001$) but did not differ statistically significantly for those in traditional Medicare (0.1 percentage point; $P = .43$). Hispanic women had statistically significantly higher rates than white women in PPOs (5.6 percentage points; $P < .001$) and statistically significantly lower rates in traditional Medicare (3.9 percentage points; $P < .001$). Among Asian/Pacific Islander women, rates were lower than for white women in both PPOs (3.1 percentage points; $P = .01$) and traditional Medicare (8.6 percentage points; $P < .001$), but the disparity was narrowed in PPOs. The difference-in-differences of these rates by race/ethnicity were statistically significant for black, Hispanic and Asian/Pacific Islander women relative to matched white women (3.7, 9.5, and 5.5 percentage points, respectively; all $P < .003$).

Table 1. Characteristics of women aged 65 to 69 years in health maintenance organizations, preferred provider organizations, and traditional Medicare by race/ethnicity

<table>
<thead>
<tr>
<th>Medicare component</th>
<th>No.</th>
<th>Mean age, y</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
<th>Dual eligible for Medicaid, %</th>
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<tr>
<td>Health maintenance organization</td>
<td></td>
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<tr>
<td>Black</td>
<td>56,349</td>
<td>67.5</td>
<td>28.9</td>
<td>11.6</td>
<td>37.8</td>
<td>21.7</td>
<td>23.1</td>
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<td>Hispanic</td>
<td>56,305</td>
<td>67.6</td>
<td>16.1</td>
<td>1.8</td>
<td>31.9</td>
<td>49.9</td>
<td>26.7</td>
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<tr>
<td>Asian/Pacific Islander</td>
<td>19,414</td>
<td>67.5</td>
<td>20.2</td>
<td>3.9</td>
<td>9.4</td>
<td>66.6</td>
<td>17.0</td>
</tr>
<tr>
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<td></td>
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<tr>
<td>White</td>
<td>363,768</td>
<td>67.5</td>
<td>25.9</td>
<td>14.5</td>
<td>21.3</td>
<td>38.3</td>
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<td>Black</td>
<td>58,333</td>
<td>67.6</td>
<td>18.1</td>
<td>17.2</td>
<td>60.8</td>
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<td>67.7</td>
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<td>6.2</td>
<td>50.6</td>
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<td>67.7</td>
<td>13.6</td>
<td>10.1</td>
<td>16.0</td>
<td>60.3</td>
<td>9.6</td>
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<tr>
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<tr>
<td>White</td>
<td>70,707</td>
<td>67.5</td>
<td>30.3</td>
<td>19.2</td>
<td>24.0</td>
<td>26.6</td>
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<tr>
<td>Traditional Medicare</td>
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<tr>
<td>Black</td>
<td>40,946</td>
<td>67.6</td>
<td>13.8</td>
<td>19.4</td>
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<tr>
<td>Hispanic</td>
<td>24,832</td>
<td>67.7</td>
<td>15.7</td>
<td>8.6</td>
<td>38.8</td>
<td>36.9</td>
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<td>Asian/Pacific Islander</td>
<td>10,073</td>
<td>67.8</td>
<td>15.4</td>
<td>10.7</td>
<td>22.4</td>
<td>51.6</td>
<td>38.7</td>
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<tr>
<td>Islander</td>
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<tr>
<td>White</td>
<td>377,969</td>
<td>67.7</td>
<td>17.0</td>
<td>25.6</td>
<td>41.2</td>
<td>16.2</td>
<td>8.4</td>
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</table>

Table 2. Unadjusted rates of mammography by race/ethnicity among women aged 65 to 69 years in Medicare health maintenance organizations (HMOs), preferred provider organizations (PPOs), and traditional Medicare

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>HMO, %</th>
<th>PPO, %</th>
<th>Traditional Medicare, %</th>
</tr>
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<tbody>
<tr>
<td>Black</td>
<td>78.4</td>
<td>66.7</td>
<td>61.8</td>
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<tr>
<td>Hispanic</td>
<td>80.5</td>
<td>69.0</td>
<td>56.7</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>80.1</td>
<td>65.4</td>
<td>56.3</td>
</tr>
<tr>
<td>White</td>
<td>77.8</td>
<td>72.1</td>
<td>67.8</td>
</tr>
</tbody>
</table>

Discussion

In this national study, rates of mammography in 2009 were substantially higher in Medicare HMOs than in traditional Medicare and were associated with a reversal of statistically significant disparities in this procedure that were evident for black, Hispanic, and Asian/Pacific Islander women relative to white women in traditional Medicare. Similarly, rates of mammography were higher for all three minority groups in PPOs than in traditional Medicare, although the differences were less marked than in HMOs. These results suggest that minority women enrolled in Medicare HMOs and PPOs have better access to mammography than those in traditional Medicare.

Breast cancer mortality rates are substantially higher for black women than women in other racial and ethnic groups (1). Lower rates of mammography for black women are associated with more advanced stage at diagnosis (13,14)—an important contributor to worse survival. Lower rates of mammography were evident for black women relative to white women in Medicare HMOs as recently as 2003 (8). Our finding that mammography rates in 2009 were higher for black women than white women in HMOs represents a notable improvement, although this change could be due in part to geographic matching within counties rather than states. Our study also provides new data on mammography rates among...
Hispanic and Asian/Pacific Islander women in HMOs and for all women in Medicare PPOs.

At least three factors could explain the disproportionately higher rates of mammography for minority women vs white women in Medicare Advantage health plans relative to matched women in traditional Medicare. First, minority women enrolled in HMOs and PPOs may be more motivated to seek preventive services or they may differ in other unmeasured ways from their minority counterparts who remain in traditional Medicare. We are not aware of any evidence, however, that preferences for preventive services are disproportionately stronger among minority women than among white women who enroll in managed care plans relative to those in traditional Medicare.

Second, black and Hispanic women in traditional Medicare are much less likely than white women to have private supplemental insurance (15), and the absence of private supplemental insurance has been associated with substantially reduced use of mammography in traditional Medicare (16,17). Before 2010, patient cost-sharing for preventive services was generally lower in Medicare Advantage than traditional Medicare (6). Moreover, in Medicare HMOs that eliminated cost-sharing, use of mammography was substantially greater, particularly among women living in less

Figure 1. National rates of mammography among black, Hispanic, and Asian/Pacific Islander women aged 65 to 69 years in Medicare health maintenance organizations (HMOs) and in traditional Medicare during 2009, compared with matched white women in the same local areas. Two-sided P values are reported from z tests using estimators for stratified sampling.

Figure 2. National rates of mammography among black, Hispanic, and Asian/Pacific Islander women aged 65 to 69 years in Medicare preferred provider organizations (PPOs) and in traditional Medicare during 2009, compared with matched white women in the same local areas. Two-sided P values are reported from z tests using estimators for stratified sampling.
affluent or educated communities (18). With the elimination of cost-sharing for effective preventive services through the federal Affordable Care Act in 2010, minority women in traditional Medicare may experience similar gains in use of mammography. Nonetheless, cost-sharing for other services remains higher in traditional Medicare, which may reduce the use of preventive services.

Third, HMOs and PPOs may have better systems than traditional Medicare to promote use of mammography, which may disproportionately benefit minority women who would otherwise have lower rates. Recently initiated quality bonus payments and required public reporting of mammography rates give Medicare HMOs and PPOs strong incentives to promote screening. Consequently, these health plans may develop more effective outreach programs to both physicians and enrollees to encourage mammography when this service is due and ensure that enrollees have a regular source of primary care, which is associated with greater use of mammography (19,20). HMOs and PPOs may also reward providers for improving mammography rates through financial incentives or other contractual mechanisms that have not existed in traditional Medicare (21). The implementation in 2012 of the Medicare Shared Savings Program for Accountable Care Organizations extends these approaches to some beneficiaries enrolled in traditional Medicare by linking new financial incentives to quality performance measures, including rates of mammography (22). Understanding the impact of these changes on racial and ethnic disparities in the Medicare program will be an important challenge for policymakers, researchers, and health-care providers.

A potential limitation of our study is the accuracy of data on mammography from HEDIS reports by HMOs and PPOs and from claims data in traditional Medicare, which we could not directly compare. CMS audited the HEDIS mammography measure reported by Medicare HMOs in 1998 and found it to be highly accurate (23). Similarly, a California study reported that 94% of elderly women who had a mammogram were accurately identified by Medicare claims within a 2-year period (24). Another limitation is that the new measure of race/ethnicity does not identify Hispanic or Asian/Pacific Islander women whose surnames are not typical for their groups. These women are likely to be healthier and more affluent than others in their respective groups, as has been shown for those not identified by the standard Medicare race/ethnicity variable (10). Thus, their mammography rates may be higher than we ascertained in HMOs, PPOs, and traditional Medicare.

In conclusion, substantially higher rates of mammography in Medicare HMOs were associated with the reversal of disparities observed for black, Hispanic, and Asian/Pacific Islander women in traditional Medicare. In Medicare PPOs, such disparities were reversed for black and Hispanic women and narrowed for Asian/Pacific Islander women. These findings underscore the potential benefits of reduced cost-sharing and more organized systems of care in Medicare HMOs and PPOs to improve use of mammography for all women and to eliminate disparities by race and ethnicity.

References


**Funding**

This work was supported by the National Institute on Aging (grant No. P01 AG032952).

**Notes**

The study sponsor did not have any role in the design of the study, the collection, analysis, or interpretation of the data; the writing of the article, or the decision to submit the article for publication.

JZ Ayanian and BE Landon are consultants to RTI International on the development of statistical risk adjustment models for CMS to adjust payments to Medicare Advantage plans.

JP Newhouse is a director of and holds equity in Aetna, which sells Medicare Advantage plans; he is also a director of the National Committee for Quality Assurance, which owns and maintains HEDIS measures.

We are grateful to Lin Ding, PhD, and Jeffrey Souza, MS, for statistical programming and Debby Collins for assistance with preparing the manuscript. We also thank Nancy Keating, MD, MPH, and Thomas McGuire, PhD, for comments on an earlier version of this manuscript.

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