American Journal of
Preventive Medicine

RESEARCH ARTICLE

Breast, Cervical, and Colorectal Cancer Screening: Patterns Among Women With Medicaid and Commercial Insurance

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Introduction: Despite healthcare reforms mandating expanded insurance coverage and reduced out-of-pocket costs for preventive care, cancer screening rates remain relatively static. No study has measured cancer screening rates for multiple tests among non-Medicare patients.

Methods: This retrospective, population-based claims analysis, conducted in 2016−2017, of commercially insured and Medicaid-insured women aged 30−59 years enrolled in IBM MarketScan Commercial and Medicaid Databases (containing approximately 90 and 17 million enrollees, respectively) during 2010−2015 describes screening rates for breast, cervical, and colorectal cancer. Key outcomes were (1) proportion screened for breast, cervical, and colorectal cancer among the age-eligible population compared with accepted age-based recommendations and (2) proportion with longer-than-recommended intervals between tests.

Results: One half (54.7%) of commercially insured women aged 40−59 years (n=1,538,444) were screened three or more times during the 6-year study period for breast cancer; for Medicaid-insured women (n=78,897), the rates were lower (23.7%). One third (43.4%) of commercially insured and two thirds (68.9%) of Medicaid-insured women had a >2.5-year gap between mammograms. Among women aged 30−59 years, 59.3% of commercially insured women and 31.4% of Medicaid-insured women received two or more Pap tests. The proportion of patients with a >3.5-year gap between Pap tests was 33.9% (commercially insured) and 57.1% (Medicaid-insured). Among women aged 50−59 years, 63.3% of commercially insured women and 47.2% of Medicaid-insured women were screened at least one time for colorectal cancer. Almost all women aged 30−59 years (commercially insured, 99.1%; Medicaid-insured, 98.9%) had at least one healthcare encounter.

Conclusions: Breast and cervical cancer screenings remain underutilized among both commercially insured and Medicaid-insured populations, with lower rates among the Medicaid-insured population. However, almost all women had at least one healthcare encounter, suggesting opportunities for better coordinated care.

INTRODUCTION

The complex interactions that shape public health policy and payment systems commanded the attention of patients and practitioners in the passage of the Patient Protection and Affordable Care Act (ACA) in 2010.[1−3] The ACA placed renewed emphasis on preventive care services, including cancer

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0749-3797/$36.00
https://doi.org/10.1016/j.amepre.2019.04.010

screenings, by eliminating out-of-pocket costs for 45 U.S. Preventive Services Task Force–recommended services, thereby reducing economic barriers and, theoretically, reducing long-term costs associated with the treatment of disease.[3] Concurrent to these reforms, the Task Force convened an expert panel to review breast cancer screening guidelines.[4] In addition, various other organizations have also developed screening guidelines for women at average risk, with the intent of reducing mortality (Table 1).[4–10]

Expanded coverage and fewer out-of-pocket costs for preventive care services should have spurred gains in cancer screening rates. However, in 2009, the new mammography guidelines, which no longer recommended screening every 1–2 years for women aged 40–49 years, immediately created controversy,[11] and concerns emerged that ground would be lost in detecting breast cancer. In addition, cervical cancer screening guidelines[5] were changed in 2012 to reduce testing frequency, and new colorectal cancer screening guidelines[6] improved the range of options for patients. This confluence of public health guideline changes and significant health policy reform provides an important opportunity to reassess progress toward cancer screening targets.

Expanded access and improved affordability from ACA provisions are beginning to show some positive effects,[12,13] but cancer screening rates continue to make variable progress toward public health targets.[14,15] Several studies have attempted to describe the impact of reduced cost sharing[12,13] and guideline revisions on screening rates,[16–19] but none, to the authors' knowledge, have evaluated the usage of multiple screening tests in a large national claims-based design across Medicaid and commercially insured populations.

The objective of this analysis is to describe screening rates for breast, cervical, and colorectal cancer among commercially insured and Medicaid-insured (MI) U.S. women aged 30–59 years during the period 2010–2015. Specific study objectives were as follows:

1. describe claims-based adherence to recommended intervals for breast, cervical, and colorectal cancer screening during the 6-year study period among the organ-specific age-eligible population;
2. describe the frequency of intervals between screening; and
3. describe opportunities for improved coordination of care.

Claims-based screening rates were compared with national self-reported data.

Table 1. Screening Guidelines (Effective During Study Period) by Age

Screening type	Guideline
Mammography	
USPSTF	
40–49 years	Based on risk factors and provider consultation
50–74 years	Biennial
ACOG, ACR	
>40 years	Annual
ACS	
40–44 years	Annual (optional)
45–54 years	Annual
>55 years	Biennial/annual
Cervical	
USPSTF	
21–29 years	Every 3 years
30–65 years	Cytology only: every 3 years; Cytology + HPV: every 5 years
Colorectal	
USPSTF	
50–75 years	Fecal test: annual Sigmoidoscopy: every 5 years Colonoscopy: every 10 years
ACS	
>50 years	Sigmoidoscopy: every 5 years Colonoscopy: every 10 years Double-contrast barium enema: every 5 years Fecal occult blood test or fecal immunochemical test: annual Stool DNA test: uncertain

ACOG, American College of Obstetricians and Gynecologists; ACR, American College of Radiology; ACS, American Cancer Society; HPV, human papillomavirus; USPSTF, U.S. Preventive Services Task Force.

METHODS

Study Sample

Women aged 30–59 years as of January 1, 2010, with continuous enrollment in either a commercial or Medicaid insurance plan for the entire period from January 1, 2010 through December 31, 2015, were identified through the IBM MarketScan Commercial Claims and Encounters (Commercial) and Medicaid Multi-State (Medicaid) Databases. The Commercial Database contains the annual pooled healthcare experience of approximately 90 million individuals with employer-sponsored primary insurance throughout the U.S. The Medicaid Database contains the pooled healthcare experience of approximately 17 million Medicaid enrollees from 2010 to 2015 from multiple geographically dispersed states. Both databases include inpatient and outpatient service–related claims data as well as demographic information.

Measures

Screening mammography rates were computed as the proportion and interval between tests among women aged 40–59 years as of January 1, 2010, during the period from January 1, 2010 to

Table 2. Utilization of Screening Tests

Variable	Commercially insured	Medicaid insured
Breast cancer (women aged 40–59 years), *n*	1,538,444	78,897
Screening mammogram		
0	276,446 (18.0)	30,208 (38.3)
1	212,893 (13.8)	18,007 (22.8)
2	207,263 (13.5)	12,009 (15.2)
≥3	841,842 (54.7)	18,673 (23.7)
3	213,603 (13.9)	7,573 (9.6)
4	220,706 (14.3)	5,404 (6.8)
≥5	407,533 (26.5)	5,696 (7.2)
Any healthcare encounter	261,372 (94.5)	29,529 (97.8)
≥3	841,842 (54.7)	18,673 (23.7)
≥5	407,533 (26.5)	5,696 (7.2)
≥3 (among those aged 50–59 years)	459,044 (56.7)	9,905 (27.1)
Longest gap between mammograms, days, mean (SD)	1,051.2 (655.7)	1,451.2 (705.2)
Gap >1.5 years	1,104,017 (71.8)	67,945 (86.1)
Gap >2.5 years	667,524 (43.4)	54,324 (68.9)
Cervical cancer (women aged 30–59 years), n	2,042,752	127,076
Pap tests		
0	453,168 (22.2)	52,973 (41.7)
1	378,741 (18.5)	34,145 (26.9)
≥2	1,210,843 (59.3)	39,958 (31.4)
2	374,388 (18.3)	20,797 (16.4)
3	307,077 (15.0)	11,197 (8.8)
4	248,983 (12.2)	5,306 (4.2)
≥5	280,395 (13.7)	2,658 (2.1)
Any healthcare encounter	435,446 (96.1)	51,570 (97.4)
≥2	1,210,843 (59.2)	39,958 (31.4)
≥5	280,395 (13.7)	2,658 (2.1)
Longest gap between Pap tests, mean (SD)	1,136.3 (677.7)	1,467.7 (722.5)
Gap >3.5 years	691,647 (33.9)	72,570 (57.1)
Received HPV co-test[a]	922,134 (45.1)	32,911 (25.9)
Co-test % among women with ≥1 Pap	58.0	44.4
Received no HPV co-test	1,120,618 (54.9)	94,165 (74.1)
Gap >3.5 years	550,953 (49.2)	63,011 (66.9)
Any healthcare encounter	2,025,030 (99.1)	125,673 (98.9)
Colorectal cancer (women aged 50–59 years), *n*	809,521	36,587
Colorectal cancer screening	512,260 (63.3)	17,259 (47.2)
No screening mammogram, Pap, or colorectal screening	84,507 (10.4)	8,067 (22.0)

Note: All values represent *n* (%), unless otherwise specified.
[a]Co-testing: Pap and HPV test conducted on the same day.
HPV, human papilloma virus.

December 31, 2015 using Current Procedural Terminology (CPT) and Healthcare Common Procedural Coding System (HCPCS) codes (Appendix Table 1, available online). An upper age cut off of 59 years ensured that the cohort was aged <65 years for the entire 6-year study period. For guideline adherence, outcomes of interest were the proportion of women with (1) three or more screening mammograms (overall and by 10-year age strata), (2) a gap of >2.5 years between the screening tests, and (3) no mammograms, but any other type of healthcare visit. The proportion of women with three or more screening mammograms during 2010–2015 was compared with the number of women aged 40–64 years who reported having a mammogram within the last 2 years (National Health Interview Survey data [NHIS][20]).

Similarly, cervical cancer screening rates (proportion and interval between) were evaluated for women aged 30–59 years as of January 1, 2010 during the period 2010–2015 using CPT and HCPCS codes (Appendix Table 1, available online). Computed outcomes were the proportion of women with (1) at least two cytology tests (overall and by 10-year age strata), (2) a gap of >3.5 years between tests, (3) a co-test (human papilloma virus [HPV] and Pap test on the same day) at any cervical screening visit, and (4) no cytology tests, but any other type of healthcare

visit. The proportion of women with two or more cytology tests during 2010–2015 was compared with the number of women aged 18–64 years who reported having a Pap test within the last 2 years (NHIS data[20]).

The prevalence of colorectal screening, either a colonoscopy or fecal test, was evaluated for women aged 50–59 years as of January 1, 2010 during the period 2010–2015 using CPT and HCPCS codes (Appendix Table 1, available online). Patients were considered adequately screened if they had evidence of either a colonoscopy or two or more fecal tests. Rates of breast, cervical, and colorectal cancer screening were compared with public health targets.[21,22]

Finally, the proportion of women with none of the recommended tests was reported, as well as co-screening, defined as the proportion of women receiving a mammogram or cytology screening as the differentiating variable, who also had cervical cancer, mammography, or colorectal screening. Utilization of any other healthcare encounter was also described.

RESULTS

Cohorts of 2,042,752 and 127,076 women, from the Commercial and Medicaid databases, respectively, were aged 30–59 years as of January 1, 2010 and met the inclusion criteria. Among these women, the entire population (aged 30–59 years) was evaluated for cervical cancer screening rates; those aged 40–59 years were evaluated for breast cancer screening (commercially insured, 1,538,444; MI, 78,897), and those aged 50–59 years were evaluated for colorectal screening (commercially insured, 809,521; MI, 36,587).

The most common comorbid conditions among both commercially insured and MI women were hypertension (commercially insured, 21.3%; MI, 50.3%) and dyslipidemia (commercially insured, 16.4%; MI, 33.0%). Other than osteoarthritis, all the comorbid conditions were more than twice as common among MI women than commercially insured women, indicating a substantially higher comorbidity burden among MI women (Appendix Table 2, available online).

Among women aged 50–59 years, 56.7% of commercially insured and 27.1% of MI women had three or more mammograms during the 6-year study period, which is consistent with the recommendation of at least biennial screening (Table 2). Claims-based estimates for mammography screening among women aged 40–59 years were lower than self-reported data for both commercially insured and MI populations among women aged ≥40 years (commercially insured, 54.7% with three or more claims, 73.4% self-reported[20]; MI, 23.7% with three or more claims, 63.5% self-reported[20]). The screening rate increased modestly with age for both commercially insured and MI women (Figure 1a). Among commercially insured women, the screening rate was 52.5% for women aged 40–49 years and 56.7% for women aged 50–59 years. Among MI women, the screening rate was 20.7% for women aged 40–49 years and 27.1% for women aged 50–59 years. Among commercially insured women, 71.8% had a gap of >1.5 years between mammograms, whereas 43.4% had a gap >2.5

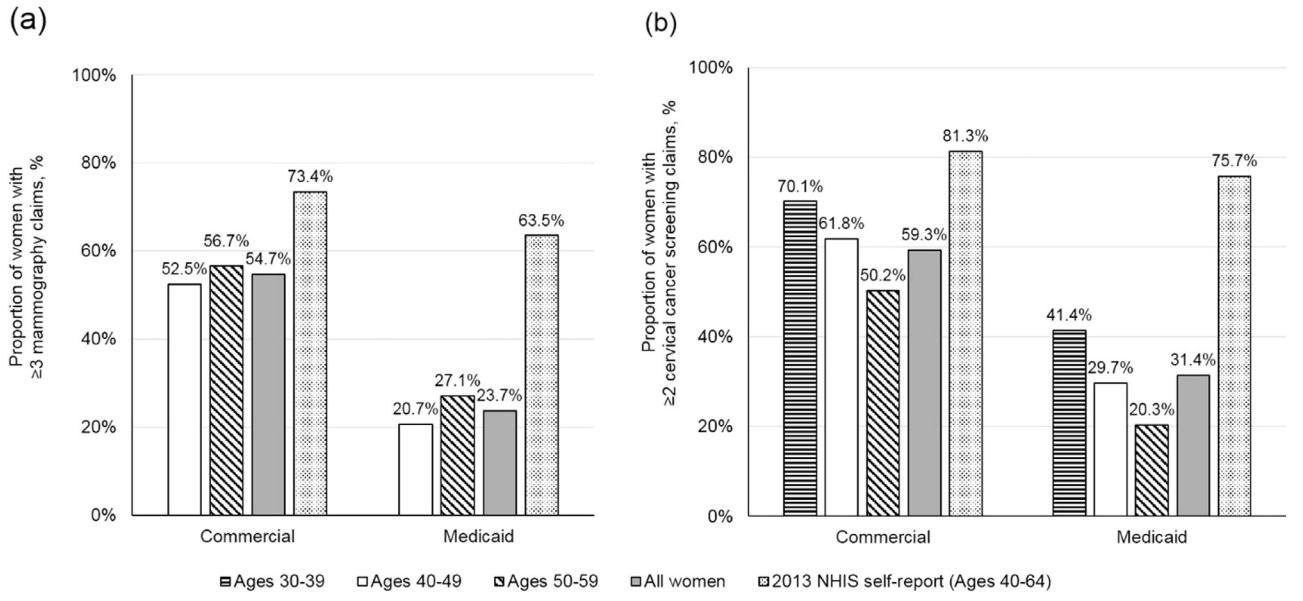

Figure 1. Cancer screening rates among commercial and Medicaid populations versus NHIS self-reported data. (a) Mammography. (b) Cervical cancer screening.
NHIS, National Health Interview Survey.

years; the proportions for MI women were 86.1% and 68.9%, respectively (Table 2). The utilization of screening mammography by insurance status presented striking disparities. Nearly one fifth of commercially insured women (18.1%) and slightly more than one third (38.3%) of MI women had no evidence of a screening mammogram, whereas more than a quarter (26.5%) of the commercially insured women were screened annually (had five or more mammograms) compared with only 7% of MI women (Table 2).

Among commercially insured women aged 30–59 years (n=2,042,752), 59.3% received two or more cervical cancer screening tests (cytology) during 2010–2015 (consistent with guideline recommendations of every 3 years); the rate was much lower (31.4%) among MI women (n=127,076) (Figure 1b). These figures are lower than self-reported rates for women aged ≥18 years (81.3% commercially insured, 75.7% MI[20]). The proportion of commercially insured women with a >3.5-year gap between tests was 33.9%; among the Medicaid population, this proportion was 57.1% (Table 2). Again, one in five (22.2%) commercially insured women and 41.7% of MI women had no evidence of a cytology test (Table 2). Among commercially insured women, 18.5% had one (MI, 26.9%), 18.3% had two (MI, 16.4%), and 40.9% (MI, 15.1%) had three or more tests. Annual screening (five or more Pap tests) was noted in 13.7% of commercially insured and 2.1% of MI women (Table 2).

Among those with at least one Pap test, 58.0% (922,134/1,589,584) of commercially insured and 44.4% (32,911/74,103) of MI women had a co-test (Pap + HPV test on the same day) (Table 2). Among women who did not receive a Pap + HPV co-test, the proportion of commercially insured women with a >3.5-year gap between Pap tests was 49.2%; among the MI population, this proportion was substantially higher at 66.9%.

The proportion of commercially insured and MI women aged 50–59 years who were screened for colorectal cancer was 63.3% and 47.2%, respectively (Table 2). Of the women who were screened for colorectal cancer, 57.4% of commercially insured and 41.5% of MI women were considered adequately screened.

Those screened with mammography were approximately twice as likely to have undergone other screening

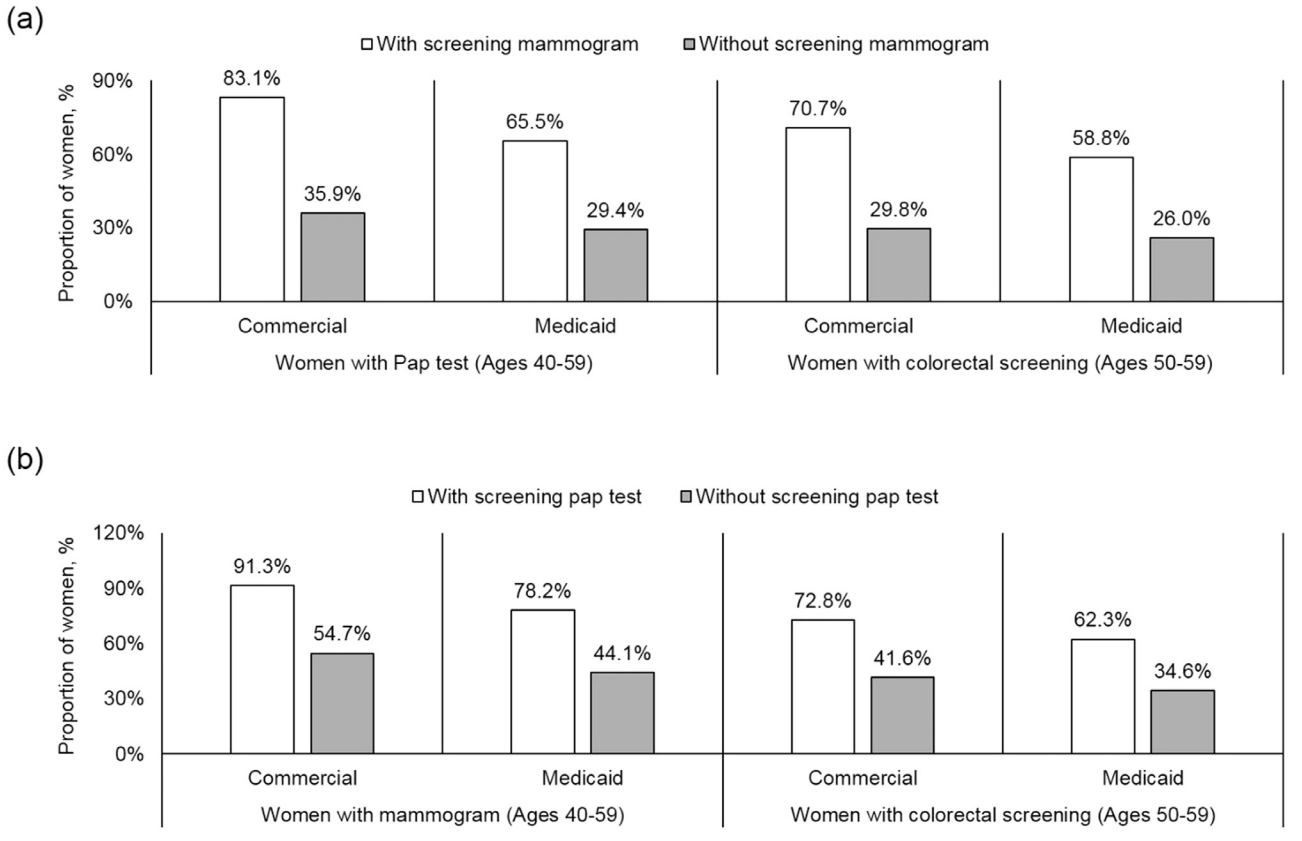

Figure 2. Co-testing during 2010–2015. (a) Cervical or colorectal screening rates, stratified by evidence of breast cancer screening. (b) Breast cancer or colorectal screening rates, stratified by evidence of cervical cancer screening.

tests (Figure 2a). Of those commercially insured women with one or more screening mammogram, about three fourths (70.7%) had a claim for colorectal screening; this was more than double the proportion of women screened for colorectal cancer among those with no screening mammography (29.8%). The same ratio was seen among MI women: Those with screening mammography were approximately twice as likely to have a colorectal screening test (58.8% vs 26.0% of those without cervical screening). When evidence of at least one Pap test was used as the differentiating variable, the same pattern was noted (Figure 2b). Among women aged 50–59 years for whom all three screening tests are recommended, 10.4% of commercially insured women and 22.0% of MI women had no screening tests at all during the entire study period (Table 2).

Among all women aged 30–59 years, 99.1% of commercially insured women and 98.9% of MI women had at least one healthcare encounter during the study period. Of the women who did not receive a Pap test, 96.1% of commercially insured and 97.4% of MI women had one or more healthcare encounter. Of women aged 40–59 years who were not screened with mammography, 94.5% of commercially insured and 97.8% of MI women had at least one healthcare encounter (Table 2).

DISCUSSION

Despite the removal of cost sharing and expanded access to insurance coverage, this large population-based claims analysis suggests that breast and cervical cancer screening rates remain lower than public health targets,[14,15,21] and that self-reported data[20] may overestimate actual screening patterns, particularly for breast and cervical cancer.

Among women aged 40–59 years for comparison with national survey data captured by self-report in 2013 (the middle of the study period),[20,22] the proportion with three or more mammography claims was much lower than self-reported data and screening targets (Figure 1a).[20] With respect to cervical cancer screening, the results of this study show proportions that are substantially lower than self-reported data.[20] Several guidelines recommend cervical screening intervals of up to 5 years for women who undergo co-testing. Therefore, the analysis may be insufficient to fully understand the rate of compliance with interval recommendations for those women who received a single co-test in the 6-year study period. When the analysis was restricted to women who did not receive a co-test, the gap between claims-based screening rates and self-reported data was even greater. In this subset, only 50.8% of commercially insured women and 33.1% of MI women did not have a screening gap >3.5 years.

When considering only those women classified as "adequately screened," claims-based screening rate estimates for colorectal screening are slightly lower for both commercially insured and MI women than current self-reported data.

Based on the 2015 NHIS results, which the results of this study suggest overestimate the true screening rates among insured women, screening rates remain approximately 10% lower than the *Healthy People 2020* target for each test based on self-reported data.[21] The gap is larger when compared with claims-based rates. The proportion of women achieving guideline-recommended screening was below target rates for all three cancer types.[21] Of particular concern are the one in ten commercially insured women and one in five MI women who were not screened at all for any of the three cancers examined during the study period. These low screening rates among insured women suggest that improving access and reducing out-of-pocket costs are only a part of the solution to increasing cancer screening. The controversy surrounding the revised mammography guidelines may play a role. Several studies pointed to modest declines in mammography screening among women in all age groups,[16,17] as well as increased anxiety and confusion following the 2009 U.S. Preventive Services Task Force guideline revisions.[18,19]

Suboptimal screening rates are particularly concerning given that disparities in both cancer risk and screening persist.[14,15,21] Disparities in screening vary by race/ethnicity and SES; rates among black and Hispanic patients remain lower than whites, and MI patients are screened less frequently than commercially insured patients.[6,9,10,14,15,23] The results of this study show that MI patients were consistently less likely to receive cancer screenings than commercially insured patients. In addition, commercially insured patients were approximately twice as likely to be meeting guideline recommendations for breast and cervical cancer screenings than MI patients, and MI patients were more than twice as likely as commercially insured patients to have received no breast, cervical, or colorectal cancer screenings at all. Predictors of mammography screening include higher education, breast cancer knowledge, presence of a regular provider, older age, and commercial insurance.[23–31] Further analysis should be done to determine the relative impact of these predictors on screening rates.

Chronic conditions such as depression, diabetes, dyslipidemia, and hypertension were common among women in this study. Women with multiple chronic conditions may be more likely to visit their physician and be encouraged to have a screening test.[24] Though

mobility and geographic access to health care are important considerations when evaluating barriers to care,[23–33] missed opportunities may persist. In this study, almost all women with no evidence of a screening mammogram or Pap test had a healthcare claim during the study period. This finding strongly suggests that although patients have some contact with the healthcare system, these interactions are not being effectively translated into opportunities to bring patients up to date on their preventive screenings. These encounters are a missed opportunity to close the gap in screening rates, especially among insured populations in which out-of-pocket costs have been eliminated for these preventive care services.

Efforts to encourage screening in both populations should also be mindful of persistent disparities in screening by race/ethnicity, regardless of insurance type. Systems to identify age-appropriate screening outreach among women should be provided throughout the delivery system, and intentional outreach must be employed to reach women who have little contact with a healthcare provider. Mobile mammography[32] and coordinated screening could be investigated as a means to improve preventive care adherence among those in traditionally underserved groups with insufficient guideline-related knowledge.[33] In this underserved group, case management, multifaceted interventions, and provider reminders were more effective than patient-oriented outreach.[33] In a recent claims-based study of colorectal cancer screening among commercially insured and MI beneficiaries, access to primary care was a strong predictor of screening, as was being female, having commercial insurance, and urban versus rural residence.[34] Another recent claims-based study of breast and cervical cancer screening, from the commercially insured population, found rural residence as an important predictor of screening status.[35] These findings suggest that despite addressing the economic disparities in access to care through expanded insurance coverage and the elimination of out-of-pocket costs for these preventive cancer screenings, a complex matrix of logistic and sociocultural barriers to care persist. Increasing contact with primary care remains the critical first step to improving coordination of care.

Limitations

As with any claims-based study, the sensitivity of claims data may impact findings. Claims data may underestimate screening rates among low-income MI women who may receive screening through free clinics or mobile screening programs.[32] By contrast, self-reported data are known to overestimate screening status.[36] A recent study evaluating medical chart, electronic health record, and claims data for the measurement of breast, cervical, and colorectal cancer screenings among Medicaid-enrolled patients found "substantial agreement (κ=0.67–0.80)."[37] Breast cancer screening was identified by screening mammography CPT codes; diagnostic mammograms were not captured. Colorectal screening is difficult to estimate with claims because of the variety of testing options and recommended intervals, including every 10 years for colonoscopy or annually for fecal occult blood testing. The definition of co-testing used in this study (Pap and HPV test on the same day) may underestimate co-testing rates, which may differ from laboratory reporting practices. Requiring continuous enrollment for 6 years may have reduced generalizability to women with less stable insurance coverage. Of women with any enrollment from 2010 to 2015, <13% of commercially insured and <11% of MI women were continuously enrolled for the entire study period. Screening rates in this subset are likely higher than those of women with less stable insurance. NHIS seeks to capture a nationally representative sample, which would include a number of groups not captured in the MarketScan populations, including Medicare recipients and those who are uninsured. Finally, neither did this study adjust for any covariates that could impact the likelihood of cancer screening nor did it identify predictors of different screening patterns. Future research should evaluate risk factors for different screening patterns that will account for patient, provider, and health plan characteristics.

CONCLUSIONS

This large, population-based claims analysis found that breast and cervical cancer screenings remain underutilized among both commercially insured and MI populations and are substantially lower than self-reported survey data as well as public health screening goals. Although difficult to measure, colorectal cancer screening rates appear to align well with self-reported data and have made significant improvements toward public health targets.

Despite landmark changes in access and affordability because of the ACA, important disparities in both proportions screened and frequency of screening persist. Though both populations had suboptimal screening rates, MI women were twice as likely as commercially insured women to lack screening altogether or have gaps in screening longer than the guideline-recommended intervals. However, most women in this study had at least one screening test, regardless of insurance type, and future research should explore this as an avenue to comprehensively improve screening rates. Among those with no evidence of cancer screening, most had at least one

provider visit during the study period, representing another missed screening opportunity and identified the potential for better coordinated care. Co-screening and intentional outreach may increase screening among those who do not routinely access health care.

ACKNOWLEDGMENTS

This study was sponsored by Hologic, Inc. The sponsor had no role in the study design; collection, analysis, and interpretation of data; writing the report; or the decision to submit the paper.

Author contributions are as follows: MB, JM: conceptualization, methodology, formal analysis, investigation, resources, data curation, writing (review and editing), supervision. SP, KT: conceptualization, methodology, investigation, writing (review and editing), supervision, funding acquisition. BLS, SDH: conceptualization, investigation, writing (review and editing). IW: methodology, formal analysis, resources, data curation, writing (original draft preparation), project administration.

MB, JM, and IW are employees of IBM Watson Health, which received a research contract to conduct this study, with and on behalf of Hologic, Inc. SP and KT are employees of Hologic, Inc. SDH served as unpaid consulting adviser to Hologic, Inc. and was formerly a Hologic, Inc. shareholder but divested all Hologic, Inc. stock before the conduct of this study. BLS was supported in part by funding from NIH (P20 GM103644, U54 CA163303). No other financial disclosures were reported by the authors of this paper.

SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2019.04.010.

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