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Changes in US Preventive Services Task Force recommendations: Effect on mammography screening in Olmsted County, MN 2004-2013

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Abstract

Objective—We assessed changes in adherence to screening mammography recommendations with the introduction of the new U.S. Preventive Services Task Force (USPSTF) recommendations in 2009.

Methods—Using the Rochester Epidemiology Project data linkage system, we examined mammography screening from 2004–2013 in 31,377 women 40 years of age and older residing in Olmsted County, MN before and after the 2009 change in recommendations. Chi-square was used to compare screening rates before and after changes in recommendations overall, by age group, and by baseline adherence.

Results—Among women 40 and older, declines in screening were observed: 69% of the population was adherent in 2004–2005, 61% in 2006–2009 and 53% in 2010–2013. Absolute decreases in screening were observed from pre- to post-change for those ages 40–49 (4%), 50–74 (9%), and those 75+ (19%, all $p < 0.0001$). Relative declines in screening rates were observed among women aged 70–74 who were non-adherent at baseline and among women who were adherent at baseline, overall, and in each age group (all $p < .001$).

Conclusions—Declines in screening, both absolute and relative, were most pronounced among women who were adherent at baseline. Research is needed to assess factors that influence screening in the context of evolving recommendations.

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Keywords

Mammography; U.S. Preventive Services Task Force; Screening; Adherence; Recommendations

Introduction

The United States Preventive Services Task Force (USPSTF) systematically reviews evidence to develop recommendations for clinical preventive services such as mammography screening. In 2002, the USPSTF recommended that women aged 40 and older have mammography screening every 1 to 2 years. In November of 2009, the USPSTF released a new set of recommendations endorsing biennial mammography screening for women starting at age 50 and continuing through age 74 and recommending against *routine* mammography screening for women aged 40–49 years (Mandelblatt et al., 2009; Nelson et al., 2009). In 2009, evidence was deemed insufficient to make recommendations for women aged 75 years or older. The revised recommendations led to wide-spread media attention, and controversy within patient, advocacy, and healthcare communities (Pace, He, & Keating, 2013; Squiers et al., 2011). Controversy spurred by the publication of the revised recommendations was captured in social media, newspapers, professional journals, and position statements published by other recommending bodies (Squiers, et al., 2011). Prior research has demonstrated that highly-visible controversy over health recommendations can create public confusion and may influence adherence to screening recommendations (Schwartz & Woloshin, 2002; Squiers, et al., 2011; Woloshin et al., 2000).

In the wake of continued controversy over the benefits and risks and mammography screening (Marmot et al., 2013; National Cancer Institute, 2012; Printz, 2014), it is essential to understand the impact of such controversy around changing recommendations on women's use of mammography screening.

Recently published analyses of data from two national surveys did not reveal significant shifts in mammography screening rates in response to the 2009 change in recommendations (Howard & Adams, 2012; Pace, et al., 2013). Both surveys rely on self-reported mammography screening, which generally overestimates screening (Caplan, Mandelson, & Anderson, 2003; McPhee et al., 2002; Rauscher, Johnson, Cho, & Walk, 2008). More importantly, however, self-report may be independently influenced by media attention and controversy, and therefore complicate tracking self-reported mammography trends over time. To address these limitations, we assessed longitudinal changes in mammography screening from 2004 to 2013 using comprehensive clinical record data for women living in a discrete geographic area. The primary aim of our study was to assess women's use of screening mammography by age group before and after introduction of the new screening recommendations in 2009.

Materials and Methods

Data

Data from the Rochester Epidemiology Project (REP) data linkage system were analyzed to examine mammography screening in women 40 years of age and older before and after the change to recommendations in 2009. The REP links data on medical care delivered to the population of Olmsted County, MN, and captures virtually the entire county population (St Sauver, Grossardt, Yawn, Melton, & Rocca, 2011).

The cohort we identified and followed over time was the 2005 REP population of women 40 years or older (n=31,377). Women under the age of 40 years and those with a prior breast cancer diagnosis were excluded. Women who had two or more mammograms before age 40 years were also excluded given their greater likelihood of having higher risk for breast cancer and therefore an alternative schedule for mammography. Computerized diagnostic indices were searched electronically to extract International Classification of Diseases, ninth revision (ICD-9) and Current Procedural Terminology (CPT) codes for screening mammography for this population between January 1, 2004 and December 31, 2013. Diagnostic mammography procedure codes were not included. The study was approved by the Institutional Review Boards at Mayo Clinic and Olmsted Medical Center.

This population is very stable, particularly those 40 years of age or older. Complete 10 year follow-up rates are close to 90% for women 40–44 years, and increase among older women (St Sauver, Grossardt, Leibson, et al., 2012). Population demographics are very similar to those of the 5-state region in the upper Midwest (St Sauver, Grossardt, Yawn, et al., 2012). The primary change in this population since 2000 has been an increase in the number of residents that are of a racial or ethnic minority (Rochester Epidemiology Project (REP), 2014). Finally, insurance coverage in this population is approximately 94%, very similar to coverage in both the 5-state region and the east coast (United States Census Bureau, 2014).

Adherence to USPSTF Mammography Screening Recommendations

At baseline, eligible women were defined as being adherent to USPSTF screening recommendations if they received at least one mammogram between 2004 and 2005. Women aged 40 to 74 years were categorized as adherent to recommendations if they received 2–4 mammograms in 2006–2009 (prior to recommendation changes), and, subsequently, 2–4 mammograms in 2010–2013 or a mammogram in 2009 and 2011 (after recommendation changes). To address the potential issue of re-screening, only 1 mammogram per year was counted. Women aged 75 years and older were not included in analyses stratified by baseline adherence since there are not specific recommendations for this age group.

We captured all mammograms that occurred in Olmsted County during our time frame of interest. We cannot exclude the possibility that some women may have received a screening mammography out of the county, and our data may therefore reflect an underestimate of the total number of mammograms received. However, Olmsted County is geographically isolated from other large medical care facilities (1.5 hour drive to the nearest large, metropolitan area), and the vast majority of the local population receives all of its health

care from the limited number of local health care providers that participate in the REP (Rocca, Yawn, St Sauver, Grossardt, & Melton, 2012).

Analysis

The screening rate from 2006–2009 and from 2010–2013 was calculated by dividing the number who were adherent by the corresponding age-specific population and were described overall and by age at baseline (2005) and by baseline adherence. Absolute change in screening rates from 2006–2009 to 2010–2013 were estimated and compared with McNemar Chi-square tests. Generalized estimating equation models with a Poisson distribution were used to estimate relative change in screening rates from 2006–2009 to 2010–2013. All analyses were performed using SAS version 9.2 (SAS Institute, Cary, North Carolina, USA).

Results

Table 1 summarizes the percentage of women ages 40 and older (n=31,377) adherent to mammography screening recommendations at baseline (2004–2005), before (2006–2009) and after (2010–2013) the 2009 change in USPSTF recommendations. Overall, 69% of the population was adherent at baseline, 61% before recommendation changes, and 53% after the changes. Adherence at baseline varied by age with the highest percentage of adherent women observed in the age group 50–74 and lowest among those ages 75 and older (Table 1). Declines in adherence were observed over time overall and within each age group (Table 1).

Table 2 summarizes the percent change in mammography screening adherence before and after recommendation changes by adherence at baseline. Absolute declines were observed among women who were non-adherent and adherent at baseline. In both adherent and non-adherent women, absolute declines in adherence increased with increasing age. The most dramatic absolute declines were observed among women who were adherent at baseline (9% overall), with declines of 6%, 8%, 10%, and 30% for women 40–49, 50–59, 60–69 and 70–74 years old at baseline. Among non-adherent women, the only significant relative decline observed was for women age 75 and older. Overall among women who were adherent at baseline, a significant 12% relative decline was observed over the time period before and after changes to recommendations ($p=0.002$). Significant relative declines among women who were adherent at baseline were observed in each of the age groups; relative change was similar across the different age groups with the exception of women aged 75 and older for whom the observed decline was most dramatic.

Discussion

The overall trend in adherence to mammography screening recommendations from baseline to prior to the change in USPSTF recommendations to after change in recommendations appears to be one of declining adherence in the overall population with greater declines observed after the change and among those aged 75 and older. However, when the data were stratified by baseline adherence, absolute declines in screening were most dramatic for women who were adherent at baseline. Overall, relative declines were observed only among

adherent women and among each of the age groups examined. Among non-adherent women, a relative decline was observed only among those aged 75 or older.

It is especially concerning that we observed a decline in screening among women 50 to 75 years of age, for whom mammography screening recommendations have not changed. Overall declines in screening in this population were not consistent with national trends based on self-reported and cross-sectional data which suggest that screening has remained fairly consistent (Howard & Adams, 2012; Pace, et al., 2013). However, national data have potential limitations, because they are self-reported, and may overestimate actual screening behaviors (Caplan, et al., 2003; McPhee, et al., 2002; Pace, et al., 2013). Our data are based on actual mammograms received by a defined population, and may better reflect use of screening services. The population of Olmsted County, MN is very similar to the population residing in the 5-state region of the Upper Midwest (St Sauver, et al., 2011). While populations in other areas with very different characteristics may have experienced different changes in mammography screening rates before and after the recommendation changes, overall the screening rates in our population at baseline are similar to reported national rates which have been relatively stable over the last decade (National Cancer Institute, 2012). Similar studies therefore need to be conducted in other populations to determine whether the changes observed in this area are widespread. Differences in changes in the rates of mammography screenings in other populations may offer useful insights into the reasons and mechanisms for such changes.

The relative declines in screening observed after the change in USPSTF recommendations among women who were adherent at baseline were similar across different age groups, with the exception of women aged 70–74, who showed greater declines. Relative decline in adherence of women aged 40–49, for whom screening was no longer recommended by the USPSTF, was similar to other age groups. Overall, screening rates among those aged 75 or older dropped considerably after the change in recommendations. Although not discernable from our data, prior research suggests that continued use of screening among women aged 40–49 group may be a result of conflicting recommendations across recommending bodies and/or continued referral to screening by primary care physicians (Corbelli et al., 2014).

Strengths of the study include our ability to describe mammography screening patterns for a defined population over time. All possible locations for mammograms in the county are included in the dataset. Additionally, the county is relatively geographically isolated from other major sources of medical care. As such, we expect that we capture the vast majority of mammograms received in this community. It is possible, however, that some women obtained mammograms outside of the community, and it is not possible for us to assess the degree of missing information. We do know, however, that 85–95% of women in this age group return to a health care provider that participates in the REP within 1 year of their initial visit, and approximately 95% return within 2 years (St Sauver, Grossardt, Yawn, et al., 2012).

If women who died or moved away were more or less likely to follow mammography recommendations than those who remained living in Olmsted County, our estimates may over or under-estimate the true rate of adherence in this community. Although complete

tracking of loss to follow up is not possible for the record linkage resource, we have 10-years of follow-up information for 90% of women in this age group (St Sauver, Grossardt, Leibson, et al., 2012). Therefore, error rates due to loss-to-follow-up should be limited. Another limitation of our study is the inability to assess the impact of economic, cultural, socio-behavioral, and system-level barriers on adherence to mammography screening recommendations. Key barriers to mammography screening identified in previous research, including lack of health insurance, lack of physician recommendation, and lack of a usual source of care (Finney Rutten, Nelson, & Meissner, 2004; Nash, Chan, Horowitz, & Vlahov, 2007), could not be examined in our data.

While characteristics of the Olmsted County population are similar to those of Minnesota and the Upper Midwest region of the United States (St Sauver, Grossardt, Leibson, et al., 2012), these data may not reflect screening behaviors in other populations with different characteristics. For this reason, similar studies are needed in other parts of the United States to determine if decreases in screening mammography are local or widespread.

National recommendations for cancer screening will be revised as scientific knowledge and screening technologies progress. A need exists to identify effective communication strategies to inform the public and advocacy communities of the reasons for changing recommendations and to support healthcare providers in their ability to convey recommendation changes to their patients. For example, evidence-based communication strategies for conveying the risks and benefits of mammography screening, such as the balance sheet proposed by the Euroscreen Working Group (EUROSCREEN Working Group, 2012; Giordano, Cogo, Patnick, & Paci, 2012) hold significant promise for supporting informed decision-making about screening. Relatedly, further research is needed to assess factors that influence patient and healthcare provider decisions about cancer screening in the context of evolving recommendations and resultant controversy.

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Highlights

- In a cohort of women residing in Olmsted County MN whose medical records were examined over time from 2004–2013:
 - Declines in mammography screening were observed among those ages 50–74.
 - Mammography screening declined after Preventive Services Task Force recommendation changes.
 - Declines in mammography screening were pronounced among those who were previously adherent.

Percentage of women 40 and older adherent to mammography screening guidelines at baseline, before (2006–2009) and after (2010–2013) changes to USPSTF guidelines by age group.

Table 1

	Baseline (1–2 mammogram in 2004–2005)		Prior to Change in Recommendation (2–4 mammograms in 2006–2009)		After Change in Recommendation (2–4 mammograms in 2010–2013)	
	N	%	N	%	N	%
Total Population Ages 40+	21,537	68.64%	19,227	61.28%	16,549	52.74%
Ages 40–49 N=10,976	7,092	64.61%	6,894	62.81%	6,518	59.38%
50–74 N=15,580	11,827	75.91%	10,864	69.73%	9,480	60.85%
75+ N=4,821	2,618	54.3%	1,469	30.47%	551	11.43%

Table 2

Percentage of women 40–74 adherent to mammography screening guidelines before (2006–2009) and after (2010–2013) changes to USPSTF guidelines by baseline adherence (2004–2005) and age group.

	Prior to Change in Recommendation (2–4 mammograms in 2006–2009)		After Change in Recommendation (2–4 mammograms in 2010–2013)		Absolute Change in Percent (CI)	Relative Change in Percent (CI)
	N	%	N	%		
Non-adherent at baseline (2004–2005) [†] (N = 7,637)	2,260	29.59%	2,217	29.03%	–0.56* (–0.58, –0.55)	–0.02 (–0.08, 0.04)
Ages 40–49 (N = 3,884)	1,322	34.04%	1,342	34.55%	0.51* (0.48, 0.55)	0.02 (–0.06, 0.09)
Ages 50–74 (N=3,753)	938	24.99%	875	23.31%	–1.68* (–1.71, 1.64)	–0.07 (–0.16, 0.02)
Ages 50–59 (N = 2,167)	604	27.87%	581	26.81%	–1.06* (–1.12, –1.00)	–0.04 (–0.15, 0.08)
60–69 (N = 1,163)	255	21.93%	262	22.53%	0.6* (0.50, 0.71)	0.03 (–0.15, 0.20)
70–74 (N = 423)	79	18.68%	32	7.57%	–11.11* (–11.40, –10.82)	–0.90* (–1.31, –0.49)
Adherent at baseline (2004–2005) [†] (N = 18,919)	15,498	81.92%	13,781	72.84%	–9.08* (–9.08, –9.07)	–0.12* (–0.14, –0.10)
Ages 40–49 (N=7,092)	5,572	78.57%	5,176	72.98%	–5.59* (–5.60, –5.56)	–0.08* (–0.11, –0.04)
Ages 50–74 (N=11,827)	9,926	83.93%	8,605	72.76%	–11.17* (–11.18, –11.16)	–0.14* (–0.17, –0.11)
Ages 50–59 (N = 6,286)	5,209	82.87%	4,732	75.28%	–7.59* (–7.61, –7.57)	–0.10* (–0.14, –0.06)
60–69 (N=4,076)	3,498	85.82%	3,087	75.74%	–10.08* (–10.11, –10.05)	–0.12* (–0.17, –0.08)
70–74 (N=1,465)	1,219	83.21%	786	53.65%	–29.56* (–29.66, –29.46)	–0.44* (–0.53, –0.35)

[†] Non-adherent at baseline = 0 mammograms in 2004–2005; Adherent baseline = 1 or more mammogram in 2004–2005

* p-value <0.001