JAMA Insights | CLINICAL UPDATE

Breast Cancer Screening in 2018
Time for Shared Decision Making

Nancy L. Keating, MD, MPH; Lydia E. Pace, MD, MPH

In the past 9 years, there has been a major shift in the recommendations for breast cancer screening. Recognizing additional evidence about the harms of mammography, in 2009, the United States Preventive Services Task Force (USPSTF) revised its previous recommendation of annual mammograms for all women beginning at age 40 years and instead recommended biennial mammograms for women aged 50 to 74 years. The USPSTF recommended against routine screening mammography for women aged 40 to 49 years, stating that the decision to start regular mammography before age 50 years should be an individual one that considers how each patient values specific benefits and harms. The USPSTF reiterated this recommendation in a 2016 update, and other organizations, notably the American Cancer Society in 2015, have joined the USPSTF in recommending less routine use of mammography and a more individualized approach to screening.

Supplemental content

Nevertheless, research has documented little change in US screening practices. Among primary care physicians surveyed in 2016, recommendations for screening were high across all patient age groups, with more than 80% of 871 surveyed physicians reporting they would recommend screening to women aged 40 to 44 years, for whom major guidelines recommend against routine screening.[1] Evidence from the National Health Interview Survey, which assessed patients' reports of their most recent mammogram in 2008, 2010, 2013, and 2015, shows minimal changes in rates of mammography screening over time.[2]

Recent articles[3,4] have highlighted some hypotheses about why mammography practices have not changed despite revisions to guidelines. Grady and Redberg[3] proposed that general enthusiasm for testing in the United States, generations of emphasis only on benefits of screening, concerns about litigation, and the US fee-for-service payment system are key factors. Kopans et al[4] suggested that physicians disagree with the guidelines and reject the idea that the harms of screening mammography for younger women outweigh the benefits. It is also likely that clinicians and patients overestimate the benefit of mammograms in preventing breast cancer deaths. However, the most important contributor to limited uptake of these guidelines may be the challenge clinicians have in truly engaging patients in shared decision making to individualize screening decisions.

Despite uncertainty about the extent to which evidence from randomized clinical trials conducted decades ago generalizes to current mammography practice, most experts agree that screening mammography lowers the risk of death from breast cancer. A meta-analysis of 8 randomized clinical trials involving more than 600 000 women suggested that mammography was associated with a 19% relative risk reduction in breast cancer mortality, a reduction that differs by age, ranging from an approximately 8% relative risk reduction for women aged 39 to 49 years to a 33% relative risk reduction for women aged 60 to 69 years.[5] In considering these estimates, it is important to remember that most women with breast cancer do not die of breast cancer. Moreover, a 19% relative reduction in breast cancer mortality means that 81% of the deaths that would occur without mammography would still occur even with regular screening. Nevertheless, as underscored in recent articles,[4] screening mammography for all women beginning at age 40 years is likely to maximize the number of lives saved.

Screening all women aged 40 years and older would make sense if the only goal of screening was to minimize the number of lives lost to breast cancer. However, decreasing the number of breast cancer deaths cannot be the only criterion for a successful screening program, particularly when the absolute number of deaths prevented is very small. The harms of mammography screening must also be considered. The high rates of false-positive results and unnecessary biopsies are well-documented, but overdiagnosis (the detection through screening of a cancer that would not have become clinically evident without screening) is the most important harm of mammography. Although there is uncertainty about the frequency of overdiagnosis, evidence from randomized clinical trials suggests that 19% of women diagnosed with breast cancer as a result of screening may be overdiagnosed.[6] It is not currently possible to identify which cancers are overdiagnosed, so all are treated, subjecting some women to the harms of treatment without any benefit. The **Table** summarizes the estimated absolute benefits and harms expected for screening 10 000 women with average risk annually over 10 years by age group. The likelihood that a woman with average risk will experience harm from mammography screening is consistently higher than the likelihood that she will benefit. However, different patients will value these benefits and harms differently.

The USPSTF and American Cancer Society guidelines recommend that physicians individualize decisions about breast cancer screening and engage patients in shared decision making. Ideally, physicians will obtain a thorough family history and use existing tools (eg, the National Cancer Institute's Breast Cancer Risk Tool or the Breast Cancer Surveillance Consortium's Breast Cancer Risk Calculator) to assess if a patient has a low or average risk of developing cancer in the next 5 years or an increased risk. Although such risk tools may not perfectly predict an individual's risk of breast cancer, they (in addition to comprehensive family histories) are currently the best tools available for identifying higher-risk patients who may have a greater benefit from screening mammography.

With this information, physicians and patients can discuss the benefits and harms of mammography screening. Patients should be reminded that the clear majority of women diagnosed with breast cancer do well, regardless of whether their cancer was diagnosed by mammography, and only a small proportion of cancers

Table. Estimates of Benefits and Harms of Mammograms for 10 000 Women Screened Yearly for 10 Years

	Estimated No. by Age, y[a]		
	40	50	60
Diagnosed with invasive breast cancer[b]	147	231	345
Breast cancer deaths[c]	32	62	88
Deaths averted because of mammogram[c]	3	10	43
≥1 False positive[d]	6130	6130	4970
≥1 Unnecessary biopsy[d]	700	940	980
Overdiagnosed[e]	28	44	66

[a] Estimates reflect best estimates. The true estimate likely falls within a large confidence interval around each number.

[b] See footnote b in eReferences in the Supplement for source of data.

[c] See footnote c in eReferences in the Supplement for sources of data.

[d] See footnote d in eReferences in the Supplement for sources of data.

[e] See footnote e in eReferences in the Supplement for source of data.

are likely to result in death. The benefit of screening is a small absolute decrease in the number of women likely to die of breast cancer (Table). The risks include a relatively high likelihood of false-positive results, unnecessary biopsies, and overdiagnosis. Physicians can then ask patients how they feel about additional testing and the possibility of overtreatment, as well as how they might feel about the unlikely possibility of being diagnosed with a potentially deadly cancer having not had regular mammography. Evidence suggests that patients can grasp these concepts, including breast cancer risk, and the uncertainties of the benefits and harms associated with screening.

Shared decision making can be time consuming for primary care physicians, who have numerous tasks to complete in limited time with patients. It also requires physicians to keep estimates of the benefits and harms of mammography readily available. These practical challenges may make it easier to simply order routine screening mammograms for women in their 40s, as many primary care physicians do.[1] Expanded use of decision tools, which could be used by patients at home or in office waiting rooms, could help to improve the quality of the information shared with patients and make shared decision making more efficient and feasible. Research demonstrates that such tools can increase knowledge and decrease decisional conflict and anxiety; in some cases, they also influence uptake of screening.[7] The Box in the Supplement includes some currently available tools that clinicians and patients may find helpful.

An additional barrier to shared decision making about breast cancer screening is the nature of available quality indicators. The rate of mammography screening among women aged 50 to 74 years is a widely used quality measure (eg, it has been part of the Health Employer Data and Information Set [HEDIS][8] plan since its inception; the population of interest has changed from ages 40-69 years to ages 50-74 years in 2014). However, given the modest benefits of mammography screening and real harms across all age groups, a more appropriate measure for accountability would be whether physicians assessed patients' risk of breast cancer and engaged patients in shared decisions about when and how often to undergo mammography screening.

Like many decisions in health care, the decision about when to start and how often to undergo breast cancer screening is complex and should differ based on a woman's risk for breast cancer and her values and preferences. It is no longer appropriate to apply a single recommendation across women of all ages and risk profiles, nor should clinicians make these decisions for patients. Tools to support shared decisions about breast cancer screening are increasingly available (Box in the Supplement), and investigators, clinicians, health care organizations, and insurers must now determine how to implement these discussions in practice. Hopefully, new and better screening tests in the future will provide more benefit for patients with fewer harms. Until then, efforts are needed to further develop tools to support clinicians and patients in risk stratification and shared decision making.

ARTICLE INFORMATION

Author Affiliations: Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts (Keating); Division of General Internal Medicine, Brigham and Women's Hospital, Boston, Massachusetts (Keating, Pace); Division of Women's Health, Brigham and Women's Hospital, Boston, Massachusetts (Pace).

Corresponding Author: Nancy L. Keating, MD, MPH, Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave, Boston, MA 02115 (keating@hcp.med.harvard.edu).

Conflict of Interest Disclosures: Both authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

REFERENCES

1. Radhakrishnan A, Nowak SA, Parker AM, Visvanathan K, Pollack CE. Physician breast cancer screening recommendations following guideline changes: results of a national survey. *JAMA Intern Med*. 2017;177(6):877-878.

2. Smith RA, Andrews KS, Brooks D, et al. Cancer screening in the United States, 2017: a review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin*. 2017;67(2):100-121.

3. Grady D, Redberg RF. Physician adherence to breast cancer screening recommendations. *JAMA Intern Med*. 2017;177(6):763-764.

4. Kopans DB, Baker JA, Zeynep Ozdemir B, Podrazik PM, Redberg RF, Grady D. False information about breast cancer screening—letters and reply. *JAMA Intern Med*. 2018;178(2):298-300.

5. Nelson HD, Fu R, Cantor A, Pappas M, Daeges M, Humphrey L. Effectiveness of breast cancer screening: systematic review and meta-analysis to update the 2009 US Preventive Services Task Force recommendation. *Ann Intern Med*. 2016;164(4):244-255.

6. Independent UK Panel on Breast Cancer Screening. The benefits and harms of breast cancer screening: an independent review. *Lancet*. 2012;380(9855):1778-1786.

7. Stacey D, Légaré F, Lewis K, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2017;4:CD001431.

8. National Committee for Quality Assurance. HEDIS 2014: Summary table of measures, product lines, and changes. http://www.ncqa.org/Portals/0/HEDISQM/HEDIS2014/List_of_HEDIS_2014_Measures.pdf. Accessed January 31, 2018.