EDITORIAL

Breast Cancer Screening
Toward Informed Decisions

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In today's fast-paced, media-saturated world, messages about mammography are ubiquitous. Breast cancer is sometimes characterized as an imminent threat to life and screening mammography as the way to overcome the resulting sense of vulnerability. Physicians recommend screening mammography, hoping that it will save lives; they also may be concerned about medical malpractice and poor quality performance ratings if they do not encourage screening. But patient fears and physician concerns are not conducive to truly informed shared decision making about a complex choice.

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In this issue of *JAMA*, Pace and Keating[1] present a thorough review of the benefits and risks of breast cancer screening with mammography. Based on the available evidence, the authors conclude that screening mammograms may reduce breast cancer mortality and that potential benefit should be underscored in discussions with women. However, the benefit of mammography is less than once hoped and the potential harms are greater than anticipated. Yet that nuanced balance is not easily communicated.

Mammography is now estimated to account for almost $8 billion in annual health care expenditures in the United States,[2,3] with active marketing by hospitals and facilities. The United States apparently is distinct in having so many groups actively encouraging annual screening starting at age 40 years. Most other countries recommend beginning screening later (eg, age 50) and at less frequent intervals (eg, every 2 to 3 years).[4]

Regular screening prevents death in a minority of women with breast cancer, and the effect size may be even smaller in the current era of effective adjuvant therapy.[5] Greater breast cancer awareness has also been associated with smaller average size of breast lesions diagnosed outside of mammography. Most women diagnosed with breast cancer do not die of the disease, even if their tumors are detected without mammography. However, many women diagnosed with late-stage disease who were not screened recently wrongly blame themselves, encouraging others not to make the same "mistake." Others attribute their survival to screening mammograms received, even when this is unlikely to be the case.

With the goal of improving access to preventive services and medical screening, the Affordable Care Act (ACA) offers free screening mammography to women. However, women often pay for the consequences of screening, even if the screening examination is free. Women bear not only financial charges but also important human costs. Screening mammography can trigger recalls for more testing, biopsies, mastectomies, radiation, systemic therapy, days off work, and debt related to health care costs. These byproducts of screening can lead to adverse financial consequences and personal harm.

One of the important adverse consequences of screening mammography is overdiagnosis—detection of non-life-threatening lesions, or tumors that would not shorten the woman's life. The problem is exacerbated by availability of ever more-sensitive screening tests that can detect lesions missed by mammograms. The emergence of increasingly sensitive screening tests is promoted by the assumption that discovering lesions early is always beneficial. Raising the thresholds for recall and biopsy after mammography, reducing the frequency of screening examinations, and focusing on frequent screenings for only high-risk populations may improve the benefit-harm ratio of screening mammography.[6,7]

Although the article by Pace and Keating[1] focuses on mammography, screening practices in US communities are already progressing beyond mammography, often using new technology. Society often is quick to adopt high-tech medical care. More than 70% of screening mammography examinations in the United States now use computer-aided detection, adding extra cost despite the conflicting data on whether this technology helps or harms women.[8,9] Some states now mandate that women be provided with information about their breast density and with recommendations to discuss other screening options with their physician.[10] Tomosynthesis 3-dimensional imaging, ultrasound, and magnetic resonance imaging are all increasingly used methods of breast cancer screening in the United States, despite lack of evidence that these imaging modalities benefit women at average risk.

Many guidelines now recommend that women discuss screening with their physicians or other health care professionals who provide their care. For many physicians, conveying nuance and uncertainty may be difficult, especially when patients accept or expect clear answers. Clinicians are more likely to discuss the benefits of screening than the harms and often do not elicit patient preferences. In one survey of 460 women, 96.3% reported discussing the benefits of breast cancer screening with their physicians or other practitioners, whereas only 19.5% recalled any discussion of adverse effects and fewer than half were asked about their screening preference.[11]

Although Pace and Keating[1] provide helpful discussion points for informed decision making about mammography, the discussions should begin with information about the wo-

man's realistic risk of a breast cancer diagnosis. However, the current ability to estimate individual risk is imprecise,[12,13] and communicating risk is challenging because women and their physicians have to overcome a heightened perception of breast cancer risk. For example, a survey of 123 radiologists whose clinical work included interpreting screening mammograms found that 96% overestimated a 41-year-old woman's risk of breast cancer.[12] Although it is true that women have a 1 in 8 chance of developing invasive breast cancer, this statistic may be misleading because it represents risk of a diagnosis, not death, and it represents lifetime risk, not risk over a short time interval (eg, 5 to 10 years). Many patients think about health care decisions in the context of avoiding death in the relatively near future.

In addition, numbers are interpreted differently depending on how they are presented. Telling a woman that 10 of 10 000 women in their 50s who are screened annually for a decade will avoid a breast cancer death because of mammography[1] is likely to have a different effect than describing outcomes for the other 9990 women not benefiting (eg, not avoiding a breast cancer death). After obtaining 100 000 mammography examinations over a decade in these 10 000 women, more than 6000 women will be called back for additional evaluation, even though they do not have breast cancer (ie, have a false-positive result).

People make decisions based on facts and also values and personal preferences. A shared decision-making discussion that only focuses on data is not complete. Physicians must find a way to discuss an individual patient's values and personal philosophies regarding health care in a neutral and nonjudgmental manner (eg, does the patient think that less is more, prefer to minimize his or her interactions with the medical care system, or want to do anything that might yield some benefit, even if it comes at a cost or with potential risks?).

Balanced messaging is essential to help each woman make her own individual decision regarding her participation in screening mammography. This decision should start with facts, and Pace and Keating[1] have provided an excellent summary of the risks and benefits. Health professionals should not shortchange the discussion of potential harms or impose personal opinions in the decision-making process. Messages based on fear or guilt may impede full understanding. Women considering screening mammography should receive all the information they need, and their preferences should be respected.

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REFERENCES

1. Pace L, Keating NL. A systematic assessment of benefits and risks to guide breast cancer screening decisions. *JAMA*. 2014. doi:10.1001/jama.2014.1398.

2. O'Donoghue C, Eklund M, Ozanne EM, Esserman LJ. Aggregate cost of mammography screening in the United States: comparison of current practice and advocated guidelines. *Ann Intern Med*. 2014;160(3):145-153.

3. Elmore JG, Gross CP. The cost of breast cancer screening in the United States: a picture is worth… a billion dollars? *Ann Intern Med*. 2014;160(3):203-204.

4. International Cancer Screening Network. Breast Cancer Screening Programs in 26 ICSN Countries, 2012: Organization, Policies, and Program Reach. National Cancer Institute Applied Research website. http://www.appliedresearch.cancer.gov/icsn/breast/screening.html. 2013. Accessed February 28, 2014.

5. Miller AB, Wall C, Baines CJ, Sun P, To T, Narod SA. Twenty five year follow-up for breast cancer incidence and mortality of the Canadian National Breast Screening Study: randomised screening trial. *BMJ*. 2014;348:g366.

6. Esserman LJ, Thompson IM Jr, Reid B. Overdiagnosis and overtreatment in cancer: an opportunity for improvement. *JAMA*. 2013;310(8):797-798.

7. Dunn BK, Srivastava S, Kramer BS. The word "cancer": how language can corrupt thought. *BMJ*. 2013;347(7):f5328.

8. Fenton JJ, Xing G, Elmore JG, et al. Short-term outcomes of screening mammography using computer-aided detection: a population-based study of medicare enrollees. *Ann Intern Med*. 2013;158(8):580-587.

9. Rao VM, Levin DC, Parker L, Cavanaugh B, Frangos AJ, Sunshine JH. How widely is computer-aided detection used in screening and diagnostic mammography? *J Am Coll Radiol*. 2010;7(10):802-805.

10. Lee CI, Forman HP. Radiology health services research: from imperative to legislative mandate. *AJR Am J Roentgenol*. 2011;196(5):1111-1114.

11. Hoffman RM, Lewis CL, Pignone MP, et al. Decision-making processes for breast, colorectal, and prostate cancer screening: the DECISIONS survey. *Med Decis Making*. 2010;30(5)(suppl):53S-64S.

12. Egger JR, Cutter GR, Carney PA, et al. Mammographers' perception of women's breast cancer risk. *Med Decis Making*. 2005;25(3):283-289.

13. Elmore JG, Fletcher SW. The risk of cancer risk prediction: "What is my risk of getting breast cancer?" *J Natl Cancer Inst*. 2006;98(23):1673-1675.