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CLINICAL GUIDELINE

Screening for Breast Cancer in Average-Risk Women: A Guidance Statement From the American College of Physicians

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Description: The purpose of this guidance statement is to provide advice to clinicians on breast cancer screening in average-risk women based on a review of existing guidelines and the evidence they include.

Methods: This guidance statement is derived from an appraisal of selected guidelines from around the world that address breast cancer screening, as well as their included evidence. All national guidelines published in English between 1 January 2013 and 15 November 2017 in the National Guideline Clearinghouse or Guidelines International Network library were included. In addition, the authors selected other guidelines commonly used in clinical practice. Web sites associated with all selected guidelines were checked for updates on 10 December 2018. The AGREE II (Appraisal of Guidelines for Research and Evaluation II) instrument was used to evaluate the quality of guidelines.

Target Audience and Patient Population: The target audience is all clinicians, and the target patient population is all asymptomatic women with average risk for breast cancer.

Guidance Statement 1: *In average-risk women aged 40 to 49 years, clinicians should discuss whether to screen for breast cancer with mammography before age 50 years. Discussion should include the potential benefits and harms and a woman's preferences. The potential harms outweigh the benefits in most women aged 40 to 49 years.*

Guidance Statement 2: *In average-risk women aged 50 to 74 years, clinicians should offer screening for breast cancer with biennial mammography.*

Guidance Statement 3: *In average-risk women aged 75 years or older or in women with a life expectancy of 10 years or less, clinicians should discontinue screening for breast cancer.*

Guidance Statement 4: *In average-risk women of all ages, clinicians should not use clinical breast examination to screen for breast cancer.*

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For author affiliations, see end of text.
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Breast cancer is the most common cancer type in women and the fourth leading cause of cancer death in the United States (1). The goal of screening is to reduce morbidity and mortality, both specific to breast cancer and overall, with acceptable tradeoffs (2, 3). The most commonly used screening test is mammography. Recommended strategies vary for breast cancer screening in average-risk women. Ages to start and discontinue mammography, screening intervals, the role of imaging methods other than mammography, and the role of clinical breast examination (CBE) have been points of disagreement among guideline developers.

Purpose and Target Population

The goal of this American College of Physicians (ACP) guidance statement is to critically review selected guidelines from around the world and their included evidence to assist clinicians in making decisions about breast cancer screening in asymptomatic women with average risk for breast cancer. Included screening methods are CBE and breast imaging (that is, mammography, ultrasonography, magnetic resonance imaging [MRI], and digital breast tomosynthesis [DBT]). This guidance statement does not address breast self-examination because no evaluated guideline recommends it for screening.

The target population for this guidance statement is women with average risk for breast cancer. The target audience is all clinicians.

Age is the single most important risk factor for breast cancer. Included guidelines generally define

See also:

Editorial comment 1

* This paper, authored by Amir Qaseem, MD, PhD, MHA; Jennifer S. Lin, MD, MCR; Reem A. Mustafa, MD, MPH, PhD; Carrie A. Horwitch, MD, MPH; and Timothy J. Wilt, MD, MPH, was developed for the Clinical Guidelines Committee of the American College of Physicians. Individuals who served on the Clinical Guidelines Committee from initiation of the project until its approval were Mary Ann Forciea, MD† (*Chair*); Nick Fitterman, MD†; Carrie A. Horwitch, MD, MPH†; Linda L. Humphrey, MD, MPH‡; Alfonso Iorio, MD, PhD†; Devan Kansagara, MD, MCR†; Jennifer S. Lin, MD, MCR†; Scott Manaker, MD, PhD§; Michael Maroto, JD, MBA†‖; Robert M. McLean, MD†; Reem A. Mustafa, MD, MPH, PhD†; Janice E. Tufte†‖; Sandeep Vijan, MD, MS†; and Timothy J. Wilt, MD, MPH†. Approved by the ACP Board of Regents on 21 July 2018.

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§ Recused from participation because of a conflict of interest.

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Table. Summary of Included Recommendations in Assessed Guidelines for Breast Cancer Screening of Average-Risk Women

Guideline, Year (Reference)	CBE	Age to Start Screening Mammography or Initiate Discussions About Screening	Age to Stop Screening Mammography	Screening Interval
ACOG, 2017 (8)	Recommend doing CBE	40 y (discuss; offer if chosen by SDM) 50 y (start screening if not previously started)	≥75 y	Annual or biennial
ACR, 2017 (9)	No recommendation	40 y (start screening)	None	Annual
ACS, 2015 (4)	Recommend against CBE	40–44 y (discuss; offer if chosen by SDM) 45 y (start screening)	Life expectancy <10 y	Annual for age 45–54 y Biennial for age ≥55 y
CTFPHC, 2018 (7)	Recommend against CBE	50 y (start screening)	No recommendation*	Every 2–3 y
NCCN, 2018 (10)	Recommend doing CBE	40 y (start screening)	None	Annual
USPSTF, 2016 (5)	No recommendation†	40–49 y (discuss; offer if chosen by SDM) 50 y (start screening)	75 y	Biennial
WHO, 2014 (6)	Recommend doing CBE (low-resource settings only)	50 y (start screening)	75 y	Biennial

ACOG = American College of Obstetricians and Gynecologists; ACR = American College of Radiology; ACS = American Cancer Society; CBE = clinical breast examination; CTFPHC = Canadian Task Force on Preventive Health Care; NCCN = National Comprehensive Cancer Network; SDM = shared decision making; USPSTF = U.S. Preventive Services Task Force; WHO = World Health Organization.
* The CTFPHC guideline addressed only women aged 40–74 y.
† The 2009 USPSTF guideline, which the authors did not formally assess for this paper, addressed and found insufficient evidence for CBE (11).

average-risk women as those who do not have a personal history of breast cancer or a previous diagnosis of a high-risk breast lesion, are not at high risk for breast cancer due to genetic mutations known to increase that risk (such as *BRCA1/2* gene mutation or another familial breast cancer syndrome), and were not exposed to radiation therapy to the chest in childhood (4, 5). However, definitions of average risk vary among guidelines. In addition, although risk factors (including early menarche, late menopausal onset, oral contraceptive or menopausal hormone therapy, increased breast density on mammography, and a family member with a history of postmenopausal breast cancer) may put a woman at greater risk for breast cancer than women without these factors, the evaluated guidelines generally include women with these factors under the umbrella of average risk. Therefore, our guidance statement applies to these women.

Guidelines vary somewhat in target populations and screening methods addressed (**Table** [4–11] and **Appendix**, available at Annals.org). Both the U.S. Preventive Services Task Force (USPSTF) and the World Health Organization (WHO) include women with dense breasts and those with a single family member with breast cancer in their guideline's target population (5, 6). The Canadian Task Force on Preventive Health Care (CTFPHC) guideline also includes women with dense breasts; however, it explicitly mentions that women with a first-degree relative with breast cancer are considered to be at increased risk and are thus excluded from the guideline (7).

METHODS

The ACP Clinical Guidelines Committee develops guidance statements on topics where several conflicting guidelines are available. Guidance statements rely on evidence presented or referenced in selected guidelines and accompanying evidence reports; they do not include de novo reviews or searches of the literature outside the body of evidence referenced by the guidelines. The goal of ACP guidance statements is to provide clinicians with a rigorous review of the available guidelines and their included evidence and to develop subsequent guidance based on an assessment of the benefits and harms reported by each guideline and its evidence. Unlike ACP guidelines, guidance statements are not derived from a systematic evidence review and hence do not use GRADE (Grading of Recommendations Assessment, Development and Evaluation) (12) to assess the quality of evidence or strength of recommendations.

Data Sources and Guideline Selection

We searched the National Guideline Clearinghouse and the Guidelines International Network library for breast cancer screening guidelines from national organizations that addressed breast imaging (that is, mammography, ultrasonography, MRI, or DBT) and CBE in women and were published in English between 1 January 2013 and 15 November 2017. We searched Web sites housing the selected guidelines for updates on 10 December 2018. We excluded guidelines that addressed specific populations (such as pregnant women and women at increased risk for breast cancer) or were more than 5 years old (thus considered inactive). We also excluded guidelines that directly endorsed another guideline, such as that of the American Academy of Family Physicians, which endorsed the USPSTF guideline. Our search yielded 3 guidelines, from the American College of Radiology (published in 2017; literature search end date, February 2016) (9), American Cancer Society (ACS) (published in 2015; literature search end date, March 2014) (4), and USPSTF (published in 2016; literature search end date, June 2015) (5). We also selected 3 guidelines not identified in either database but commonly used in clinical practice, from the National Comprehensive Cancer Network (NCCN) (published in 2018; literature search end date not reported) (10), WHO (published in 2014; literature search end date, December 2012) (6), and American College of Obstetricians and Gynecologists (published in 2017; literature search end date not applicable) (8). In addition, we selected the CTFPHC guideline, which

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ON MONDAY, APRIL 8, 2019

was updated after our initial search (published in 2018; literature search end date, January 2017) (7). The American College of Obstetricians and Gynecologists guideline was based on guidelines from the ACS, NCCN, and USPSTF and supporting evidence reviews.

Critical Appraisal

Five coauthors independently reviewed, assessed, and scored each guideline using the AGREE II (Appraisal of Guidelines for Research and Evaluation II) instrument (13, 14) (**Appendix Table 1**, available at Annals.org).

Clinician Peer Review

The guidance statement was peer-reviewed through *Annals of Internal Medicine* and by ACP Regents and Governors, who represent ACP members at the regional and international level.

Public Member Review

The development process for the guidance statement included participation by public members (2 of the Clinical Guidelines Committee and 7 of ACP's Public Panel) to share their perspectives, values, and preferences.

Critical Appraisal of Evaluated Guidelines

The major difference between high- and low-scoring guidelines (**Appendix Table 1**) was methodology. Guidelines from ACS (4), CTFPHC (7), USPSTF (5), and WHO (6) scored highest on the AGREE II instrument, whereas those from the American College of Obstetricians and Gynecologists (8), American College of Radiology (9), and NCCN (10) scored lowest. In addition to our review of each guideline, we examined the evidence supporting the 4 that scored highest (ACS, CTFPHC, USPSTF, and WHO). We also considered recommendations for adoption or adaptation from these 4 guidelines when developing our own guidance.

Several factors were important in considering guideline quality. The ACS, CTFPHC, USPSTF, and WHO guidelines best articulated benefits, harms, and strength of the evidence and how these link to recommendations. The lower-scoring guidelines often inadequately described how they considered these factors in developing the recommendations, or they relied on lower-quality evidence. The guidelines varied in the studies they reported, weighting of observational or modeling studies relative to randomized controlled trials (RCTs), and emphasis on relative versus absolute effects. The guidelines rarely addressed the small absolute effect on breast cancer mortality; the long lead time to any reduction in this mortality, especially in women with estimated life expectancy less than 15 to 20 years; and the low incidence of breast cancer for women younger than 60 years.

Mammography

Depending on the guideline, the recommended age to discuss initiating screening is 40 years (4, 5, 8) and the recommended age to start screening ranges from 40 (9, 10) to 45 (4) to 50 (5–8) years. Most guidelines agree to screen average-risk women with mammography between ages 50 and 74 years. However, WHO and CTFPHC recommend that screening in women aged 50 to 69 years should include shared decision making because screening is conditional on a woman's values and preferences. For women aged 70 to 75 years, WHO recommends screening only in the context of both rigorous research and shared decision making. Other areas of disagreement include screening in women aged 40 to 49 years, screening in women aged 75 years or older, and recommended screening intervals (**Table**). Intervals range from annual (particularly in women aged 40 to 49 years) to biennial or triennial. Guidelines from ACS, USPSTF, and WHO conclude that a close balance exists between screening benefits and harms for women in their 40s (for ACS, 40 to 44 years) and that decisions are influenced by patient preferences. The WHO guideline suggests population-based screening programs in women aged 40 to 49 years only in the context of rigorous research, monitoring, and evaluation and if shared decision-making strategies are implemented. The CTFPHC conditionally recommends against screening in women aged 40 to 49 years (without a first-degree family history of breast cancer); however, it states that some women in this age group may wish to be screened and that clinicians should engage in shared decision making with women who express interest (**Appendix**).

Appendix Table 2 summarizes the available data from the 4 guidelines with the highest AGREE II scores (ACS, CTFPHC, USPSTF, and WHO).

Benefits

All-Cause Mortality

Individual studies were not designed to assess all-cause mortality. Pooled results from meta-analyses of RCTs demonstrated that mammography was not associated with a reduction in all-cause mortality (**Appendix Table 2**) (6, 15, 16).

Breast Cancer–Associated Mortality and Advanced Breast Cancer

Reductions in breast cancer–associated mortality differed by age group and study type (**Appendix Table 2**). Guideline developers assessed the same set of screening trials but used different methods for calculating absolute mortality reductions according to age and thus arrived at different results. The evidence reviews all showed a statistically significant reduction in relative risk for breast cancer mortality for women aged 50 to 69 years (6, 15–17). Only ACS and WHO found statistically significant results for ages 39 to 49 years (6, 17). The CTFPHC considered a single reduction in relative risk across all age groups for women aged 40 to 74 years, and thus only absolute risk differences varied across age groups in its review (16). All 4 evidence reviews showed that women aged 39 to 49 years derived the lowest absolute benefit in terms of deaths prevented (6, 15–17) (**Appendix Table 2**).

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ON MONDAY, APRIL 8, 2019

Observational studies showed larger relative reductions in breast cancer mortality (15). Evidence from RCTs (fair quality) and observational studies (poor quality) did not show a reduction in the incidence of advanced disease with breast cancer screening in women aged 39 to 49 years (pooled results from 4 RCTs: relative risk, 0.98 [95% CI, 0.74 to 1.37]) (15).

Screening intervals varied in the trials from 12 to 33 months. Trials using annual screening had no clear differences in outcomes from those using longer intervals (15). Modeling studies designed to compare intervals of screening suggest slightly greater reductions in breast cancer mortality but larger increases in harms—including more false-positive results, benign biopsies, and overdiagnosed cases—with annual versus biennial mammography (5, 18).

Harms

Overdiagnosis and Overtreatment

The association between mammography screening and overdiagnosis has been demonstrated across many studies. However, estimates of the magnitude of overdiagnosis, defined as the detection of cancer through screening that would not otherwise have been diagnosed in a woman's lifetime, varied widely because of lack of a standardized definition and varying methods and metrics used to estimate overdiagnosis (6, 16, 17, 19). Estimates of overdiagnosis from RCTs of screening mammography were higher in women aged 40 to 49 years (range, 22.7% to 41%) than in those aged 50 to 59 years (range, 16% to 25%) (16, 17, 19). After 25 years of follow-up, the estimated overdiagnosis rate was 22% across age groups (19). Estimates from observational studies varied widely because of differences in the populations studied and in methods for estimating overdiagnosis; these estimates ranged from 0% to 54% (6, 17, 19). Modeling studies predict lower rates of overdiagnosis ranging from 2% to 12% over a lifetime horizon, although this number increases with inclusion of ductal carcinoma in situ and other in situ lesions (18).

Overtreatment is defined as treatment of cancer that would not have negatively affected a woman's health in her lifetime. Although reliable estimates of overtreatment are not available, nearly all women diagnosed with breast cancer (including those with ductal carcinoma in situ) receive early treatment with surgery, radiation, hormone therapy, or chemotherapy. Therefore, rates of overtreatment likely resemble estimated rates of overdiagnosis (5).

Other Potential Harms

Appendix Table 2 summarizes false-positive results reported in the evidence reviews. Overall, cumulative rates of receiving at least 1 false-positive result and having a biopsy after 10 years are higher for women of any age having annual versus biennial mammography (16, 17, 19). Pooled rates of receiving at least 1 false-positive result over 10 years of biennial screening ranged from 19.7% to 42% (6, 19). False-negative results are reported at a rate of 10 to 13 in 10 000 women (5).

Several studies have shown that harms from screening results requiring additional follow-up, including false-positive results, lead to the psychological problems of increased breast cancer–specific distress, anxiety, and worry, as well as reduced adherence to subsequent screening (19).

Screening is associated with additional treatments, some of which may not be necessary or effective. Women randomly assigned to screening were more likely to have surgical and radiation therapy; however, use of chemotherapy and hormonal therapy did not differ between groups (6, 16, 19). Treatment harms can be psychological, financial, physical (from surgery, adjunctive radiation, hormonal therapy, and chemotherapy), or related to productivity loss (5). Evidence on quality-adjusted life expectancy was of low quality because of overdiagnosis rates, available utility weights, and uncertainties in estimating life expectancy (19).

Lifetime radiation exposure increases with the number of mammographies, which depends on both the ages of screening initiation and discontinuation and the frequency of screening. Women are exposed to approximately 3.7 mGy per digital mammography (19). Modeling studies report that annual screening of women aged 40 to 74 years was associated with a lifetime attributable risk for radiation-induced breast cancer of 125 cases (95% CI, 88 to 178 cases) per 100 000 women (20). A modeling study predicted that the number of deaths due to such cancer over a lifetime per 100 000 women ranged from 2 with biennial screening in women aged 50 to 59 years to 11 with annual screening in women aged 40 to 59 years (19).

Pain associated with the screening procedure was commonly reported. Although few patients considered it a deterrent to future screening, failure to attend future screening due to concerns about pain ranged from 11% to 46% (19). None of the evidence reports or guidelines described direct harms of breast biopsies, which include biopsy site pain, bruising, and infection, as well as distress and anxiety.

CBE

Clinical breast examination is a full physical breast examination by a trained clinician; it takes on a average of 5 to 10 minutes per breast to do correctly (21, 22). Although CBE continues to be used as part of the examination of symptomatic women, data are sparse on screening asymptomatic women using CBE alone or combined with mammography. Guideline groups vary in their recommendations regarding use of CBE to screen for breast cancer. The ACS recommends against CBE in average-risk women of any age because of the lack of demonstrated benefit and the potential for false-positive results (4). The USPSTF previously stated that evidence was insufficient to assess the benefits and harms of CBE in addition to screening mammography; however, it did not update its 2009 CBE recommendation (5, 11). The CTFPHC provides a conditional recommendation against CBE, citing lack of evidence (7). The WHO suggests that CBE as a standalone screening

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ON MONDAY, APRIL 8, 2019

method could provide a low-cost option in low-resource settings with weak health systems; however, it acknowledges that more evidence is needed (6).

Benefits

No studies show direct clinical benefit of CBE alone or in addition to mammography (17). One RCT and 1 case–control study found no significant reduction in breast cancer mortality or "case fatality" in women having CBE alone or with annual mammography (17). The ACS found that CBE may detect 2% to 6% more cancer cases in addition to mammography (4). Whether increased detection by CBE is beneficial is unknown.

Harms

The biggest harm associated with CBE is false-positive results, and the related harms noted earlier likely also apply here. Rates of false-positive results from limited trials and observational studies were 2.2% to 5% for CBE alone and 3% to 8.7% for CBE combined with mammography, or 55 additional false-positive findings per extra breast cancer case detected with the addition of CBE (17).

Areas of Insufficient Evidence

Other Imaging Methods for First-Line Breast Cancer Screening

None of the guidelines recommend MRI or ultrasonography as the first-line screening method in asymptomatic, average-risk women. The CTFPHC provides a strong recommendation against use of these imaging types because it identified no evidence about their effect on breast cancer outcomes and because screening with these methods would require use of substantial and scarce health care resources without evidence of benefit. No studies have evaluated the effect of MRI, ultrasonography, or DBT on mortality, morbidity, or quality of life. Included studies evaluated diagnostic accuracy characteristics regarding cancer detection, false-positive results, recalls, and biopsy rates. Compared with conventional mammography, DBT seems to reduce recall rates and increase cancer detection (23). The effect of these more sensitive imaging methods on the spectrum of detected disease and associated screening benefits and harms, including overdiagnosis, is not known.

Alternative or Adjunctive Tests to Screening Mammography in Women Who Have Dense Breasts

Increased breast density seems to reduce sensitivity and specificity of mammography for detecting cancer. Women with increased breast density have higher risk for a false-positive result, an unnecessary breast biopsy, or a false-negative result than women with average breast density. Mammography screening RCTs included women with dense breasts but did not provide mortality data according to breast density. The USPSTF, WHO, and CTFPHC recommendations include women with dense breasts in their target population. Breast density classification is further complicated by inconsistency over time and between mammographers (5, 15). The absolute effect of breast density on breast cancer risk is at most small, although most guidelines note that women with dense breasts have higher risk than those without increased breast density (5).

Evidence is insufficient on benefits and harms of primary or adjunctive screening strategies in women who are found to have dense breasts on screening mammography. The USPSTF, WHO, and CTFPHC concluded that evidence is insufficient to assess the balance of benefits and harms of screening for breast cancer in women with dense breasts using other types of imaging (breast ultrasonography, MRI, or DBT) (5–7). In light of the lack of evidence and resource constraints, the CTFPHC recommends against use of these methods to screen for breast cancer in women who are not at increased risk (7). The ACS concluded that mammography alone may be less effective in women with dense breasts but presented no specific data on outcomes (4). The ACS guideline does not provide recommendations on first-line or adjunctive screening in such women.

ACP Guidance Statements

Guidance Statement 1: In average-risk women aged 40 to 49 years, clinicians should discuss whether to screen for breast cancer with mammography before age 50 years. Discussion should include the potential benefits and harms and a woman's preferences. The potential harms outweigh the benefits in most women aged 40 to 49 years.

ACP concludes that the potential harms of screening for breast cancer with mammography before age 50 years outweigh the benefits in most women. The absolute risk reduction in breast cancer mortality is lower in women aged 40 to 49 years than in older women. Overdiagnosis rates vary across age groups (**Appendix Table 2**) and are higher in women aged 39 to 49 years (6, 17, 19). Cumulative rates of receiving at least 1 false-positive result and having a biopsy after 10 years are higher for younger women, especially in those with heterogeneously or extremely dense breasts.

Women should be informed participants in personalized decisions about breast cancer screening. Those who do not have a clear preference for screening should not be screened. Initiating screening discussions at age 40 years is encouraged for several reasons: Public awareness about breast cancer screening is considerable, and most guidelines recommend at minimum informing women about the potential harms and benefits of screening. Physicians play a key role in helping women accurately sort through the clinical evidence about benefits and harms and in incorporating their personal preferences into individualized screening decisions. It is important for clinicians to convey to women in this age group who may want to be screened that evidence indicates at most small benefits with substantial harms. If a woman still requests screening after a careful discussion of benefits and harms, biennial frequency should be offered.

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ON MONDAY, APRIL 8, 2019

Figure. Summary of the American College of Physicians guidance statement on breast cancer screening in average-risk women.

Summary of the American College of Physicians Guidance Statement on Breast Cancer Screening in Average-Risk Women

Disease/Condition	Breast cancer
Target Audience	All clinicians
Target Patient Population	Asymptomatic women at average risk for breast cancer (including women with increased breast density on mammography)
Outcomes Evaluated	Breast cancer–associated mortality, all-cause mortality, advanced breast cancer, overdiagnosis, false-positive results, other harms
Benefits	Mammography: Reduced breast cancer mortality CBE: None identified
Harms	Mammography: Overdiagnosis and overtreatment, false-positive results, biopsies, pain, anxiety, distress, breast cancer–specific worry, radiation exposure, radiation-associated breast cancer and breast cancer death, lack of demonstrated reduction in all-cause mortality CBE: False-positive results, physician examination time
Guidance Statements	*Guidance Statement 1: In average-risk women aged 40 to 49 years, clinicians should discuss whether to screen for breast cancer with mammography before age 50 years. Discussion should include the potential benefits and harms and a woman's preferences. The potential harms outweigh the benefits in most women aged 40 to 49 years.* *Guidance Statement 2: In average-risk women aged 50 to 74 years, clinicians should offer screening for breast cancer with biennial mammography.* *Guidance Statement 3: In average-risk women aged 75 years or older or in women with a life expectancy of 10 years or less, clinicians should discontinue screening for breast cancer.* *Guidance Statement 4: In average-risk women of all ages, clinicians should not use clinical breast examination to screen for breast cancer.*
Talking Points With Patients	Breast cancer screening, like all tests and procedures, has both potential benefits and harms. It is important to consider the facts and your personal values and preferences when making a decision that is right for you. Below are frequently asked questions when the benefits and harms of screening are considered. *What is my risk for developing breast cancer?* Breast cancer risk increases with age. However, women aged 40–74 y are considered "average-risk" if they do not have a personal history of breast cancer or a previously diagnosed high-risk breast lesion, are not at high risk for breast cancer because of genetic mutations known to increase the risk for breast cancer mutation, and do not have a history of exposure to radiation therapy to the chest in childhood. Women with early menarche, late menopausal onset, oral contraceptive use, or menopausal hormone therapy are considered to be at average risk. The effect of breast density on breast cancer risk is unlikely to lead to more than a small absolute additional risk. *What are the benefits of screening, and do they vary by age?* The absolute reduction in breast cancer deaths due to mammography varies with age and is statistically significant only among women aged 50–69 y. For example, data from the USPSTF (5) showed: Ages 40–49 y: May be 3 fewer deaths per 10 000 women screened over 10 y Ages 50–59 y: 8 fewer breast cancer deaths per 10 000 women screened over 10 y Ages 60–69 y: 21 fewer breast cancer deaths per 10 000 women screened over 10 y Ages 70–74 y: May be 13 fewer deaths per 10 000 women screened over 10 y

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ON MONDAY, APRIL 8, 2019

Figure. Continued.

	What are the harms of screening? **About 20% of women diagnosed with breast cancer over a 10-y period will be overdiagnosed and likely overtreated, meaning that they would not be bothered by or die of breast cancer if not diagnosed or treated, would not receive benefit, and would only experience harm. Other harms include false-positive results (test shows abnormality even though the woman does not have breast cancer), as well as pain, worry, and distress from tests and procedures (including breast biopsies)—some for false-positive test results. Some women believe that the lack of demonstrated reduction in all-cause mortality due to screening is a harm.** ***When should I start screening?*** **Discuss benefits and harms of breast cancer screening beginning at age 40 y.** **The age to begin and stop screening is less clear. The best balance of benefits to harms for the large majority of women is to begin breast cancer screening at age 50 y and continue through age 74 y.** **Evidence from multiple large, long-term, randomized trials found no reduction in breast cancer mortality in women screened between the ages of 39 and 49 y. Evidence from modeling studies suggests that for every 1000 women screened with mammography starting at age 40 y (compared with no screening), 8 breast cancer deaths could be prevented. This is only 1 fewer breast cancer death per 1000 women screened than if screening had begun at age 50 y. Screening beginning at ages 39–49 y will result in almost twice the harms than screening beginning later; e.g., there will be 1529 false-positive results, 213 unnecessary biopsies, and 21 overdiagnosed cases of cancer. In comparison, screening 1000 women beginning at age 50 y (vs. not screening at all) will lead to 7 fewer breast cancer deaths and 953 false-positive results, 146 unnecessary biopsies, and 19 overdiagnosed cases of cancer.** ***If I receive screening, how frequently should I be screened?*** **Biennial mammography should be used for women who receive screening. There is little to no difference in breast cancer mortality for screening every year vs. screening every other year (biennial mammography).** **Annual mammography results in more harm than biennial mammography. Compared with women screened biennially, more women screened annually receive a recommendation for a biopsy after a false-positive result biennially (7.0% vs. 4.8%) and have surgery or radiation.** ***When should I stop screening?*** **Discontinue screening when it is unlikely that a woman would benefit or likely that harms outweigh the benefits from screening on the basis of advanced age, comorbid conditions that reduce life expectancy, or a patient's values of the balance of benefits and harms of continued screening. Because it takes a long time for any breast cancer mortality benefit from screening and treatment to occur (average time to prevent 1 breast cancer death per 1000 women screened is approximately 11 y), women aged 75 y or older—or of any age if they have serious health conditions—are unlikely to benefit yet still experience harms from screening and treatment. These women should not undergo and should discontinue screening.** ***Should I do a screening breast self-examination?*** **There is no benefit and there is potential harm, especially due to "false alarms" (false-positive findings).** **As with all health issues, we encourage you to be aware of your body and let your doctor know if you notice any changes, have any concerns, or have questions.**

CBE = clinical breast examination; USPSTF = U.S. Preventive Services Task Force.

Current guidelines are more aligned than past versions and have moved toward "less intensive" screening. For example, ACS recommends "offering" mammography as a "qualified recommendation" to women aged 40 through 44 years (4); the USPSTF notes that the net benefit is small in women aged 40 to 49 years and that decisions should be based on an individual woman's values and preferences (5). Guidelines from WHO emphasize screening implementation only in the context of shared decision making and rigorous research for most women regardless of age (6). The CTFPHC conditionally recommends against screening for women aged 40 to 49 years who are not at increased risk and encourages clinicians to focus shared decision-making discussions in this age group on women who express a preference for screening (7). The absolute risk reduction in breast cancer mortality from screening mammography increases with age and takes many years to accrue; the greatest absolute benefit is for women in their 60s. Likewise, all guidelines acknowledge that screening may result in clinically meaningful harms that occur early and may negatively affect a woman's current health status. Thus, they highlight the importance of incorporating individual patients' values and preferences based on the balance of benefits and harms of screening. However, the guidelines disagree

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ON MONDAY, APRIL 8, 2019

on the age at which to start and stop screening and the interval between screening tests. This disagreement primarily stems from how organizations weigh the tradeoffs between the magnitude and importance of reduction in breast cancer mortality and the potential harms from screening mammography (including false-positive results, overdiagnosis, and overtreatment), the reliance and emphasis on observational or modeling data, and the low certainty around the net benefit of screening. No organization specifically incorporates the lack of all-cause mortality benefit, and few assess cost or resource implications of screening. Harms are difficult to fully characterize because most studies, reviews, and guidelines do not assess harms as completely or rigorously as benefits, in part because some harms are more difficult to quantify, measure, and communicate (such as overdiagnosis, overtreatment, psychological harms, quality of life, opportunity costs, and financial costs) than benefits (such as breast cancer–specific mortality). Both CTFPHC and WHO discuss costs in their guideline, and WHO addresses the effect of population-based screening in resource-strained settings (6, 7).

Modeling studies can help illustrate the tradeoff between benefits and harms of screening mammography. Decision models used by the USPSTF show that for every 1000 women screened with mammography (vs. no screening), biennial screening starting at age 40 years will result in 8 fewer breast cancer deaths (but no difference in overall mortality) at the expense of 1529 false-positive results, 213 unnecessary biopsies, and 21 overdiagnosed cancer cases over these women's lifetime (18). In comparison, women starting at age 50 years will have 7 fewer breast cancer deaths at the expense of 953 false-positive results, 146 unnecessary biopsies, and 19 overdiagnosed cancer cases over their lifetime. In light of this tradeoff, uncertainties and assumptions in models, and the variability in how different organizations balance benefits and harms, it is important to engage in shared decision making to understand how an individual woman's risk for breast cancer, screening preferences, and values around benefits and harms affect her net benefit.

Guidance Statement 2: In average-risk women aged 50 to 74 years, clinicians should offer screening for breast cancer with biennial mammography.

Evidence from RCTs shows that screening reduced breast cancer mortality but not all-cause mortality in women aged 50 to 69 years (6, 15–17). Pooled results did not indicate a reduction in all-cause mortality, although individual studies were not designed to detect a difference. Evidence was mixed for breast cancer mortality reduction in women aged 70 to 74 years, although RCT data are limited in this age group. All guidelines agree on screening average-risk women starting at age 50 years and typically continuing through age 74 years. In well-resourced settings with relatively strong health systems, WHO recommends screening women aged 50 to 69 years in the context of shared decision making and screening women aged 70 to 75 years only in the context of shared decision making and rigorous research programs.

Most guidelines recommend biennial mammography as an acceptable or preferred option for women who receive screening (4, 5, 6, 8), and CTFPHC suggests screening every 2 to 3 years (7). No RCTs directly compared different screening intervals. Intervals varied, and outcomes did not differ clearly between trials using annual versus longer screening intervals. Observational studies assessing interval differences did not show a difference in breast cancer mortality between women (aged 50 years or older) who were screened annually versus biennially (15). Reasons for the general trend toward less frequent screening include concerns that more frequent screening will lead to an increase in harms, such as false-positive results, additional breast biopsies, overdiagnosis, overtreatment, and radiation exposure. In women aged 50 to 74 years receiving annual mammography, modeling studies suggested small reductions in breast cancer mortality (2 deaths per 1000 women) and life-years gained (23 life-years per 1000 women) compared with those receiving biennial mammography. However, they had much larger increases in overdiagnosis (6 cases per 1000 women), false-positive results (845 results per 1000 women), unnecessary breast biopsies (82 biopsies per 1000 women), and overtreatment (18).

Guidance Statement 3: In average-risk women aged 75 years or older or in women with a life expectancy of 10 years or less, clinicians should discontinue screening for breast cancer.

Discussions about when to stop screening in women who have received regular mammography screening are particularly important for older persons and for women with limited life expectancy due to comorbid conditions (for example, chronic obstructive pulmonary disease, heart failure, end-stage liver disease, end-stage renal failure, or dementia) (24, 25). The decision to stop screening should incorporate risk for cancer death, competing risk for other causes of death, the long time lag between mammography and reduction in breast cancer mortality, the tradeoffs between benefits and harms, and the individual patient's values and preferences (25). For example, it took an average of almost 11 years before 1 death from breast cancer was prevented for 1000 women screened (26). Although specific recommendations vary, most guidelines suggest discontinuing screening when, on the basis of advanced age or comorbid conditions, a woman is unlikely to have a life expectancy long enough to benefit from screening (4–9)—typically 10 years.

Although accurately calculating an individual's life expectancy is difficult, decisions informed in part by average life expectancy for a specific age may be helpful (25, 27). Among women aged 70 and 75 years with no comorbid conditions, life expectancy is 19 and 15 years, respectively (28). However, among 70- and 75-year-old women with serious comorbid conditions, average life expectancy is approximately 11 and 9 years, respectively (28).

Guidance Statement 4: In average-risk women of all ages, clinicians should not use clinical breast examination to screen for breast cancer.

EMBARGOED FOR RELEASE UNTIL 5:00 PM ET
ON MONDAY, APRIL 8, 2019

Evidence is lacking for a mortality benefit of CBE alone or in combination with mammography in asymptomatic women at average risk; CBE can also result in harms, including overdiagnosis and false-positive results leading to overtreatment. Clinical breast examination takes about 5 to 10 minutes to do—time that could be devoted to health care interventions of greater proven net benefit. As such, no guideline recommends screening with CBE if mammography is available.

The Figure summarizes the guidance, clinical considerations, and talking points for patients.

Appendix: Summary of Evaluated Guidelines to Inform the ACP Guidance Statement

American College of Obstetricians and Gynecologists Recommendations

Recommendations Based on Good and Consistent Scientific Evidence (Level A)

"Women at average risk of breast cancer should be offered screening mammography starting at age 40 years. Women at average risk of breast cancer should initiate screening mammography no earlier than age 40 years. If they have not initiated screening in their 40s, they should begin screening mammography by no later than age 50 years. The decision about the age to begin mammography screening should be made through a shared decision-making process. This discussion should include information about the potential benefits and harms.

"Women at average risk of breast cancer should have screening mammography every 1 or 2 years based on an informed, shared decision-making process that includes a discussion of the benefits and harms of annual and biennial screening and incorporates patient values and preferences. Biennial screening mammography, particularly after age 55 years, is a reasonable option to reduce the frequency of harms, as long as patient counseling includes a discussion that with decreased screening comes some reduction in benefits.

"Women at average risk of breast cancer should continue screening mammography until at least age 75 years" (8).

Recommendations Based on Limited or Inconsistent Scientific Evidence (Level B)

"Health care providers periodically should assess breast cancer risk by reviewing the patient's history.

"Women with a potentially increased risk of breast cancer based on initial history should have further risk assessment.

"Breast self-examination is not recommended in average-risk women because there is a risk of harm from false-positive test results and a lack of evidence of benefit" (8).

Recommendations Based Primarily on Consensus and Expert Opinion (Level C)

"Screening clinical breast examination may be offered to asymptomatic, average-risk women in the context of an informed, shared decision-making approach that recognizes the uncertainty of additional benefits and the possibility of adverse consequences of clinical breast examination beyond screening mammography. If performed for screening, intervals of every 1–3 years for women aged 25–39 years and annually for women aged 40 years and older are reasonable. The clinical breast examination continues to be a recommended part of evaluation of high-risk women and women with symptoms.

"Average-risk women should be counseled about breast self-awareness and encouraged to notify their health care provider if they experience a change. Breast self-awareness is defined as a woman's awareness of the normal appearance and feel of her breasts.

"Age alone should not be the basis to continue or discontinue screening. Beyond age 75 years, the decision to discontinue screening mammography should be based on a shared decision making process informed by the woman's health status and longevity" (8).

American College of Radiology Recommendations

"For average-risk women, annual screening mammography or DBT (with accompanying planar or synthesized [2-dimensional] images) is recommended beginning at age 40. For women with dense breasts, [ultrasonography] may also be considered, but the balance between increased cancer detection and the increased risk of a false-positive examination should be considered in the decision" (9).

ACS Recommendations

"The ACS recommends that women with an average risk of breast cancer should undergo regular screening mammography starting at age 45 years (strong recommendation). Women aged 45 to 54 years should be screened annually (qualified recommendation). Women 55 years and older should transition to biennial screening or have the opportunity to continue screening annually (qualified recommendation). Women should have the opportunity to begin annual screening between the ages of 40 and 44 years (qualified recommendation). Women should continue screening mammography as long as their overall health is good and they have a life expectancy of 10 years or longer (qualified recommendation). The ACS does not recommend clinical breast examination for breast cancer screening among average-risk women at any age (qualified recommendation)" (4).

CTFPHC Recommendations

Mammography

"Screening women aged 40 to 49 years: For women aged 40 to 49 years, we recommend not screening with mammography; the decision to undergo screening is conditional on the relative value a woman places on possible benefits and harms from screening *(conditional recommendation; low-certainty evidence).*

EMBARGOED FOR RELEASE UNTIL 5:00 PM ET
ON MONDAY, APRIL 8, 2019

Appendix Table 1. Scaled AGREE II Domain Scores for Each Guideline and Overall Assessment

Variable	ACOG	ACR	ACS	CTFPHC	NCCN	USPSTF	WHO
Scaled domain score, %*							
Scope and purpose	82	54	96	92	52	88	92
Stakeholder involvement	36	32	83	73	46	79	70
Rigor of development	33	17	73	81	20	88	83
Clarity of presentation	79	58	88	88	52	87	82
Applicability	19	4	28	70	12	39	68
Editorial independence	23	13	62	87	33	75	77
Overall guideline assessment							
Average overall quality rating (out of 7)†	3.6	2.4	6.0	6.0	2.6	6.0	5.5
Response (number of reviewers) to the question, "Would you recommend this guideline for use?"	No (3) Yes with modifications (2)‡	No (4) Yes with modifications (1)§	Yes (2) Yes with modifications (3)‖	Yes (4) Yes with modifications (1)¶	No (5)	Yes (3) Yes with modifications (2)**	Yes (3) Yes with modifications (2)††

ACOG = American College of Obstetricians and Gynecologists; ACR = American College of Radiology; ACS = American Cancer Society; AGREE II = Appraisal of Guidelines for Research and Evaluation II; CTFPHC = Canadian Task Force on Preventive Health Care; NCCN = National Comprehensive Cancer Network; USPSTF = U.S. Preventive Services Task Force; WHO = World Health Organization.
* The scaled domain score is calculated as follows: (obtained score − minimum possible score) ÷ (maximum possible score − minimum possible score).
† Final overall assessment questions on AGREE II.
‡ Reviewers suggested a need for more clarity about systematic review methods, a list of individuals involved in guideline development, and more clarity on how and where they are getting their data. This is a review of guidelines, not an original guideline.
§ Reviewers suggested a need for introductory paragraphs about methodology of literature review and explanations on guideline implementation.
‖ Reviewers suggested a need for more clarity around weighting of balance of benefits and harms, specifically around exact age to start and intervals of screening; needs clearer age group divisions and upper age limit; and needs to address limited life expectancy. Reviewers disagreed with recommended start age of 40 y when the benefits are at age 45 y.
¶ Reviewers disagreed with recommendation against screening women aged 40–49 y.
** Reviewers suggested a need for a section discussing the methods for developing the guideline (including decision models and voting procedures). Use the "clinical considerations" sections to target women in order to avoid unnecessary and/or harmful screening in older women, those with comorbidities, and those in whom the magnitude of benefit does not appear to outweigh harms, and inform them that it may reduce breast cancer mortality in a very few but will not increase length of life and has harms.
†† Reviewers had concerns about applicability for U.S. population, and screening women aged 40–49 y and ≥75 y should be addressed. Benefit is not clear for different resource settings.

"Screening women aged 50 to 69 years: For women aged 50 to 69 years, we recommend screening with mammography every 2 to 3 years; the decision to undergo screening is conditional on the relative value that a woman places on possible benefits and harms from screening *(conditional recommendation; very low-certainty evidence)*.

"Screening women aged 70 to 74 years: For women aged 70 to 74 years, we recommend screening with mammography every 2 to 3 years; the decision to undergo screening is conditional on the relative value that a woman places on possible benefits and harms from screening *(conditional recommendation; very low certainty evidence)*" (7).

Other Screening Methods

"We recommend not using magnetic resonance imaging, tomosynthesis or ultrasound to screen for breast cancer in women who are not at increased risk *(strong recommendation; no evidence)*.

"We recommend not performing clinical breast examinations to screen for breast cancer *(conditional recommendation; no evidence)*.

"We recommend not advising women to practise breast self-examination to screen for breast cancer *(conditional recommendation; low-certainty evidence)* " (7).

NCCN Recommendations

Average-Risk Women Aged 25 to 39 Years

"The NCCN panel recommends a clinical encounter, which includes ongoing breast cancer risk assessment, risk reduction counseling, as well as a CBE every 1 to 3 years and encouraging women to be aware of their breasts and promptly report any changes to their health care provider" (10).

Average-Risk Women Aged 40 Years or Older

"The NCCN panel recommends annual clinical encounter, which includes ongoing breast cancer risk assessment, risk reduction counseling, as well as a CBE, and encourages women to be aware of their breasts and promptly report any changes and annual screening mammography (category 1 recommendation) with the *consideration* of tomosynthesis. Women electing to undergo screening mammography should be counseled regarding its potential benefits, risks, and limitations" (10).

USPSTF Recommendations

"The USPSTF recommends biennial screening mammography for women aged 50 to 74 years. (B recommendation).

"The decision to start screening mammography in women prior to age 50 years should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin biennial screening between the ages of 40 and 49 years. (C recommendation)

"The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older. (I statement)

EMBARGOED FOR RELEASE UNTIL 5:00 PM ET
ON MONDAY, APRIL 8, 2019

Appendix Table 2. Summary of Evidence on Screening Mammography*

All-cause mortality

- Meta-analyses of RCTs from USPSTF (15)
  - No benefit overall (RR, 0.99 [95% CI, 0.97 to 1.002]) or in any age group
- Meta-analyses of RCTs from CTFPHC (16)
  - No benefit overall (RR, 0.99 [95% CI, 0.98 to 1.00]); 0.69 fewer deaths (95% CI, 0.00 to 1.38 fewer deaths) per 1000 women of all ages at moderate baseline risk
- Meta-analyses of RCTs from WHO (6)
  - Ages 39 to 49 y: RR, 0.97 (95% CI, 0.91 to 1.04); 484 fewer deaths (95% CI, 1615 fewer to 726 more deaths) per 1 million women
  - Ages 50 to 59 y: RR, 1.06 (95% CI, 0.96 to 1.18); 2204 more deaths (95% CI, 1408 fewer to 6201 more deaths) per 1 million women

Breast cancer mortality

- Meta-analyses of RCTs from USPSTF (15)
  - Ages 39 to 49 y: RR, 0.92 (95% CI, 0.75 to 1.02); 2.9 deaths prevented (95% CI, −0.6 to 8.9 deaths prevented) per 10 000 women screened over 10 y (not statistically significant)
  - Ages 50 to 59 y: RR, 0.86 (95% CI, 0.68 to 0.97); 7.7 deaths prevented (95% CI, 1.6 to 17.2 deaths prevented) per 10 000 women screened over 10 y (statistically significant)
  - Ages 60 to 69 y: RR, 0.67 (95% CI, 0.54 to 0.83); 21.3 deaths prevented (95% CI, 10.7 to 31.7 deaths prevented) per 10 000 women screened over 10 y (statistically significant)
  - Ages 70 to 74 y: RR, 0.80 (95% CI, 0.51 to 1.28); 12.5 deaths prevented (95% CI, −17.2 to 32.1 deaths prevented) per 10 000 women screened over 10 y (not statistically significant)
- Meta-analyses of RCTs from CTFPHC (16)
  - RR for all age groups calculated as 0.85 (CI, 0.78 to 0.93)
  - Absolute effects per age group
    - Ages 40 to 49 y: 0.58 fewer deaths (95% CI, 0.27 to 0.85 fewer deaths) per 1000 women who have been screened for a median of 7 y; NNS, 1724 (95% CI, 1176 to 3704)
    - Ages 50 to 69 y: 0.75 fewer deaths (95% CI, 0.35 to 1.10 fewer deaths) per 1000 women who have been screened for a median of 7 y; NNS, 1333 (95% CI, 909 to 2857)
    - Ages 60 to 69 y: 0.92 fewer deaths (95% CI, 0.43 to 1.35 fewer deaths) per 1000 women who have been screened for a median of 7 y; NNS, 1087 (95% CI, 741 to 2326)
    - Ages 70 to 74 y: 1.55 fewer deaths (95% CI, 0.72 to 2.27 fewer deaths) per 1000 women who have been screened for a median of 7 y; NNS, 645 (95% CI, 441 to 1389)
- Meta-analyses of RCTs from WHO (6)
  - Ages 39 to 49 y: RR, 0.85 (95% CI, 0.75 to 0.96); 474 fewer deaths (95% CI, 115 to 792 fewer deaths) per 1 million women
  - Ages 50 to 69 y: RR, 0.79 (95% CI, 0.68 to 0.90); 1354 fewer deaths (95% CI, 645 to 2064 fewer deaths) per 1 million women
  - Ages 70 to 74 y: RR, 0.68 (95% CI, 0.45 to 1.01); 2218 fewer deaths (95% CI, 3734 fewer to 39 more deaths) per 1 million women
- Systematic reviews of RCTs from ACS (17)
  - Ages 39 to 49 y: RR, 0.85 (95% CI, 0.75 to 0.96); 15-y reduction in mortality, 40.6 deaths per 100 000 women; NNS, 2463
  - Ages 50 to 69 y: RR, 0.86 (95% CI, 0.75 to 0.99); 15-y reduction in mortality, 61.7 deaths per 100 000 women; NNS, 1620
  - Ages 60 to 69 y: RR, 0.69 (95% CI, 0.54 to 0.87); 15-y reduction in mortality, 211.8 deaths per 100 000 women; NNS, 472
  - Ages 70 to 74 y: RR, 1.12 (95% CI, 0.73 to 1.72)
- Meta-analysis of observational studies from USPSTF (15)
  - 25% to 31% risk reduction for ages 50 to 69 y
- Modeling (CISNET) (18)
  - Median number of breast cancer deaths prevented per 1000 women screened vs. no screening over lifetime (range across models)
    - Ages 40 to 74 y: biennial, 8 deaths (5–10 deaths); annual, 10 deaths (6–11 deaths)
    - Ages 45 to 74 y: biennial, 8 deaths (4–9 deaths); annual, 9 deaths (6–11 deaths)
    - Ages 50 to 74 y: biennial, 7 deaths (4–9 deaths); annual, 9 deaths (5–10 deaths)

Advanced breast cancer

- Meta-analyses of RCTs from USPSTF (15)
  - Ages 39 to 49 y: RR, 0.98 (95% CI, 0.74 to 1.37); ARR, 0 per 10 000 (not statistically significant)
  - Ages ≥50 y: RR, 0.62 (95% CI, 0.46 to 0.83); ARR, 5.6 per 10 000 (statistically significant)

False-positive results

- Observational studies from USPSTF (19)
  - Cumulative probability of receiving ≥1 false-positive result over 10 y
    - Annual, start age 40 y: 61% (95% CI, 59% to 63%)
    - Biennial, start age 40 y: 42% (95% CI, 41% to 43%)
    - Annual, start age 50 y: 61% (95% CI, 58% to 64%)
    - Biennial, start age 50 y: 42% (95% CI, 40% to 44%)
  - Rates highest in women with heterogeneously or extremely dense breasts who are either aged 40 to 49 y (65.5%) or are using combination hormone therapy (65.8%)
  - Rates lowest in women aged 50 to 74 y who receive biennial screening and have either breasts with scattered fibroglandular densities (39.7%) or almost entirely fat breast density (17.4%)

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ON MONDAY, APRIL 8, 2019

***Appendix Table 2*–Continued**

Meta-analyses of RCTs from CTFPHC for 7 y of screening (16)
- Ages 40 to 49 y: 294 of 1000 women will receive a false-positive result, and 43 will undergo a biopsy
- Ages 50 to 69 y: 294 of 1000 women will receive a false-positive result, and 37 will undergo a biopsy
- Ages 60 to 69 y: 256 of 1000 women will receive a false-positive result, and 35 will undergo a biopsy
- Ages 70 to 74 y: 219 of 1000 women will receive a false-positive result, and 30 will undergo a biopsy

Meta-analysis of observational studies from WHO (6)
- Pooled false-positive rate is 19.7% (cumulative risk of being recalled for further assessment at least once during 10 biennial screens performed from age 50 to 51 y until age 68 to 69 y)

Modeling (CISNET) (18)
- Median number of false-positive results per 1000 women screened vs. no screening over lifetime (range across models)
  - Ages 40 to 74 y: biennial, 1529 results (1100 to 1976 results); annual, 2941 results (2550 to 3742 results)
  - Ages 45 to 74 y: biennial, 1220 results (930 to 1599 results); annual, 2355 results (2185 to 3087 results)
  - Ages 50 to 74 y: biennial, 953 results (830 to 1325 results); annual, 1798 results (1706 to 2445 results)

Overdiagnosis

Meta-analyses of RCTs (17, 19)
- 19.0% (95% CI, 15.2% to 22.7%)
- Ages 40 to 49: 22.7% (CI NR)
- Ages 50 to 59: 16.0% (CI NR)

CTFPHC (16)
- Ages 40 to 49 y: 41% of identified invasive and in situ cancer cases 5 y after screening; 55% after 20 y of screening
- Ages 50 to 59 y: 25% of identified invasive and in situ cancer cases 5 y after screening; 16% after 20 y of screening

Observational studies (6, 17, 19)
- From 13 observational studies, overdiagnosis ranged from 0% to 54%

Modeling (CISNET) (18)
- Median number of cases overdiagnosed per 1000 women screened vs. no screening over lifetime (range across models)
  - Ages 40 to 74 y: biennial, 21 (12 to 38); annual, 30 (13 to 77)
  - Ages 45 to 74 y: biennial, 19 (11 to 34); annual, 28 (12 to 74)
  - Ages 50 to 74 y: biennial, 19 (11 to 34); annual, 25 (12 to 68)

ACS = American Cancer Society; ARR = absolute rate reduction; CTFPHC = Canadian Task Force on Preventive Health Care; NNS = number needed to screen; NR = not reported; RCT = randomized controlled trial; RR = relative risk; USPSTF = U.S. Preventive Services Task Force; WHO = World Health Organization.
* Evidence is derived from the highest-scoring included guidelines (ACS, CTFPHC, USPSTF, and WHO) and their associated evidence reviews (4-7, 15-18, 22).

"The USPSTF concludes that the current evidence is insufficient to assess the benefits and harms of DBT as a primary screening method for breast cancer. (I statement)

"The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of adjunctive screening for breast cancer using breast ultrasonography, MRI, DBT, or other methods in women identified to have dense breasts on an otherwise negative screening mammogram. (I statement)" (5).

WHO Recommendations

Women Aged 50 to 69 Years in Well-Resourced Settings

"In well-resourced settings, WHO recommends organized, population-based mammography screening programmes for women aged 50–69 years if the conditions for implementing an organized programme specified in this guide are met by the health-care system, and if shared decision-making strategies are implemented so that women's decisions are consistent with their values and preferences. (Strong recommendation based on moderate quality evidence)

"WHO suggests a screening interval of two years. (Conditional recommendation based on low quality evidence)" (6).

Women Aged 50 to 69 Years in Low-Resource Settings With Relatively Strong Health Systems

"In limited resource settings with relatively strong health systems, WHO suggests considering an organized, population-based mammography screening programme for women aged 50–69 years only if the conditions for implementing an organized programme specified in this guide are met by the health-care system, and if shared decision-making strategies are implemented so that women's decisions are consistent with their values and preferences. (Conditional recommendation based on moderate quality evidence)

"WHO suggests a screening interval of two years. (Conditional recommendation based on low quality evidence)" (6).

Women Aged 50 to 69 Years in Low-Resource Settings With Weak Health Systems

"In limited resource settings with weak health systems, where the majority of women with breast cancer are diagnosed in late stages and mammography screening is not cost-effective and feasible, early diagnosis of breast cancer through universal access of women with symptomatic lesions to prompt and effective diagnosis and treatment should be high on the public health agenda. Clinical breast examination, a low-cost screening method, seems to be a promising approach for these settings and could be implemented when the necessary evidence from ongoing studies becomes available" (6).

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ON MONDAY, APRIL 8, 2019

Women Aged 40 to 49 Years in Well-Resourced Settings

"In well-resourced settings, WHO suggests an organized, population-based screening programme for women aged 40–49 years only if such programme is conducted in the context of rigorous research and monitoring and evaluation, if the conditions for implementing an organized programme specified in this guide are met and if shared decision-making strategies are implemented so that women's decisions are consistent with their values and preferences. (Conditional recommendation based on moderate quality evidence)" (6).

Women Aged 40 to 49 Years in Low-Resource Settings With Weak or Relatively Strong Health Systems

"In limited resource settings with weak or relatively strong health systems, WHO recommends against the implementation of population-based screening programmes for women aged 40–49 years. (Strong recommendation based on moderate quality evidence)" (6).

Women Aged 70 to 75 Years in Well-Resourced Settings

"In well-resourced settings, WHO suggests an organized, population-based screening programme for women aged 70–75 years only if such programme is conducted in the context of rigorous research, if the conditions for implementing an organized programme specified in this guide are met by the health-care system, and shared decision-making strategies are implemented so that women's decisions are consistent with their values and preferences. (Conditional recommendation based on low quality evidence)" (6).

Women Aged 70 to 75 Years in Low-Resource Settings With Weak or Relatively Strong Health Systems

"In limited resource settings with weak or relatively strong health systems, WHO recommends against the implementation of population-based screening programmes for women aged 70–75 years. (Strong recommendation based on low quality evidence)" (6).

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Note: Guidance statements are "guides" only and may not apply to all patients and all clinical situations. Thus, they are not intended to override clinicians' judgment. All ACP guidance statements are considered automatically withdrawn or invalid 5 years after publication, or once an update has been issued.

Disclaimer: The authors of this article are responsible for its contents, including any clinical or treatment recommendations.

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