Breast Cancer Screening: Information for the Primary Care Physician

Roxsann Roberts, MD
Section Chief, MRI
Erlanger/EmCare Radiology

Disclosures
- No financial relationships with commercial entities producing health care products/services.

Breast Imaging Modalities
- Mammography — Screening and Diagnostic
- Ultrasound
- Tomosynthesis
- MRI
- Breast Specific Gamma Imaging (BSGI)
- Breast PET/PEM

Breast Cancer
- Steady increase ages 40 through 75
  - Note no abrupt change age 50
  - 10 year risk of breast cancer based on age:
    - Age 30: 0.44% (1 in 227)
    - Age 40: 1.47% (1 in 68)
    - Age 50: 2.38% (1 in 42)
    - Age 60: 3.56% (1 in 28)
    - Age 70: 3.82% (1 in 26)

- 2/3 women diagnosed with breast cancer have no significant risk factors

Breast Cancer Screening
- Mammographic screening: the only proven method to reduce number of deaths from breast cancer
  - Approximately 30% reduction in number since late 20th century
- Goal: Reduce mortality by detecting cancers at earliest stage
  - Stage 1 disease, >98% 5 year survival

Breast Cancer
- Annual breast cancer incidence rates per 100,000 women, function of age for invasive + in-situ cancers (orange) and invasive breast cancer only (maroon)
Breast Cancer Screening

- Breast cancer detection rate from a single mammography exam (per 1,000 examinations) in the Breast Cancer Surveillance Consortium (BCSC) 1996-2007. Age (years)
  - 40s: avg 2.18/1000 or 1/459

Cancer detection rate

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Detection Rate</th>
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<tbody>
<tr>
<td>40-44</td>
<td>1.69</td>
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<tr>
<td>45-49</td>
<td>2.60</td>
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<tr>
<td>50-54</td>
<td>3.23</td>
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<tr>
<td>55-59</td>
<td>4.20</td>
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<tr>
<td>60-64</td>
<td>4.70</td>
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<td>65-69</td>
<td>5.25</td>
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<td>70-74</td>
<td>5.95</td>
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<tr>
<td>75-89</td>
<td>6.96</td>
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<tr>
<td>Any age</td>
<td>4.00</td>
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Screening Recommendations

- ACR Recommendations:
  - Annually for asymptomatic women age 40 and older who are at average risk for breast cancer.
  - Asymptomatic women under age 40 who are at increased risk for breast cancer.
  - Woman with a 20% or greater lifetime risk for breast cancer based on breast cancer risk models: yearly starting by age 30, but not before age 25, or 10 years earlier than the age at which the youngest first-degree relative was diagnosed, whichever is later.
  - Woman with a history of chest (mantle) radiation received between the ages of 10 and 30: yearly starting 8 years after the radiation therapy, but not before age 25.
  - Woman with biopsy-proven lobular neoplasia, atypical ductal hyperplasia (ADH), ductal carcinoma in-situ (DCIS), invasive breast cancer, or ovarian cancer: yearly from time of diagnosis, regardless of age.

- Benefit: since the onset of regular screening mammograms in 1990, mortality rate from breast cancer (unchanged in the previous 50 years) has declined 30%

- For 1000 screened, approximately 100 recalled
  - 85 of these 100 – extra views or US will resolve
  - 20 will be followed
    - BI-RADS 3: less than 2% chance of cancer
    - 15 of 100 will be recommended for biopsy
    - 4-6 will have breast cancer
- Early detection – lumpectomy vs mastectomy/chemoradiation?

- Yearly evaluation?
  - Ages 40-49 and early 50s
    - More aggressive, faster growing cancers
    - Increased likelihood for nodal spread
  - Pre-clinical node-negative cancer prediction of spread
    - Age 40-49: 16%
    - Age 50-59: 7%
    - Age 60-69: 5%
  - Yearly screening older population?

- Mammography radiation dose
  - 0.4 mSv
    - 7 weeks background radiation
    - Background radiation for one year: 3 mSv
    - Denver – add 1.5 mSv
    - Radon – add 2.0 mSv
    - Computed Tomography (CT)-Abdomen and Pelvis: 10 mSv - 3 years background radiation
    - Computed Tomography (CT)-Head: 2 mSv - 8 months background radiation

- Age at which annual mammography screening should end: “there is no defined upper age limit at which mammography may not be beneficial”
  - Good health (5-10 year life expectancy?)
  - Will the patient undergo additional testing or treatment?
Screening Mammography

- No current breast issues
- Risk assessment?
- Comparisons or baseline?
- Digital mammography versus film screen

Breast Cancer Risk Assessment

Woman's age is 44 years.
Age at menarche was 13 years.
Age at first birth was 24 years.
Person is perimenopausal.
Height is 5 ft 5 ins.
Weight is 0 st 180 lb.
Woman has never used HRT.

Risk after 10 years is 2.384%.
10 year population risk is 2.145%.
Lifetime risk is 10.41%.
Lifetime population risk is 9.325%.
Probability of a BRCA1 gene is 0.013%.
Probability of a BRCA2 gene is 0.052%.

Film-Screen vs Digital Mmg

Film-Screen vs Digital Mmg

Screening Mammography

Screening Mammography

cancer.osu.edu
Screening Mammography

- Implants: Additional views needed

Screening Mammography

- BI-RADS mammographic lexicon
  - Density of breasts (newest lexicon changes):
    - The breasts are almost entirely fatty
    - There are scattered areas of fibroglandular density
    - The breasts are heterogeneously dense, which may obscure small masses
    - The breasts are extremely dense, which lowers the sensitivity of mammography
  - Note: With increasing age, there is a general decrease in density, with improved sensitivity

Screening Mammography

- Evaluation: Screening BI-RADS codes
  - 1: Negative
  - 2: Benign Findings
  - 0: Incomplete, Need additional imaging evaluation and/or prior mammograms for comparison.

- MQSA: Written report to referring physician ASAP but no later than 30 days from the date of mammography exam
- MQSA: Must send or give directly to all patients a written summary, in lay terms, of the results of the study no later than 30 days from the date of the mammographic examination
Diagnostic Mammography

- Possible radiographic abnormality detected on screening mammography
- Patients with a current breast issue:
  - With a specific focus of clinical concern including, but not limited to, mass, induration, axillary lymphadenopathy, some types of nipple discharge, skin changes, or persistent focal areas of pain or tenderness

- Patients following up for a probably benign exam
- Patients following up after treatment for known cancer or negative post biopsy
- Examination requires direct involvement of the radiologist for special views, physical breast examination, or consultation
- BI-RADS codes for diagnostic mammogram:
  - 1 or 2: Negative or benign findings
  - 3: Probably benign findings
  - 4 or 5: Suspicious or highly suspicious
  - 6: Known cancer

Diagnostic Evaluation

- Abnormal screening mammogram:
  - BI-RADS 0: What next?

- Diagnostic Mammography

- Diagnostic Ultrasound

- Breast MRI
Diagnostic Evaluation

- MQSA: BI-RADS® category 4 or 5 – reasonable attempt to communicate directly with the health care provider ASAP. Should occur within 3 working days from the date of interpretation, using either documented verbal communication or a written report. If unavailable, a report should be given to the responsible designee of the health care provider. The actual or attempted direct communication should be documented in the mammogram report.
- MQSA: BI-RADS® category 4 or 5 - reasonable attempt to communicate the results to the patient as soon as possible. This should occur within 5 working days from the date of interpretation. The actual or attempted communication should be documented.

Diagnostic Evaluation

- BI-RADS 3
  - Short-term follow-up for probably benign findings
    - Diagnostic mammogram or ultrasound follow up
    - Usually 6 month, can be shorter interval 3-4 month
- BI-RADS 4 or 5
  - Percutaneous biopsy
    - Ultrasound-guided
    - Stereotactic biopsy

Ultrasound-Guided Breast Biopsy

- Ultrasound-guided breast biopsy
- Stereotactic breast biopsy

Breast Density Issues

- “Dense Breasts”
  - Legislated information to mammography patients in Tennessee
- Breast Densities:
  - 10% Almost entirely fatty
  - 40% Scattered areas of fibroglandular density
  - 40% Heterogeneously dense breasts
  - 10% Extremely dense breasts
- Risk: “When risk is expressed relative to average breast density (between scattered areas of fibroglandular density and heterogeneously dense), the risk for the 40% of women with heterogeneously dense breasts is only about 1.2 times greater and the risk for the 10% of women with extremely dense breasts is only about 2 times greater. Therefore, breast density is not a major cancer risk factor.” breastdensity.info

Breast Density Issues

- **Per enactment of the Tennessee legislature, patients with dense glandular tissue will now be informed by letter of their breast density. The decision to pursue additional screening modalities should not be based on breast density alone. Rather it should come from a discussion between the patient and her breast health physicians, which includes all factors which may influence her decision to undergo additional imaging. Please note that other modalities of breast imaging including ultrasound, tomosynthesis and MRI are considered adjunctive tools and not replacements for mammography. For scientifically accurate information, please refer to the American College of Radiology website (acr.org) or www.breastdensity.info**
Breast Density Issues

• Dense breasts: Increased superimposed tissues
  • Can decrease sensitivity 10-20%

• What is the proper screening modality?
  – Mammography
    • “Only screening tool that has been demonstrated through large randomized trials to lower breast cancer mortality. Those trials included all breast densities.
    • While mammography sensitivity is somewhat lower in women with extremely dense breasts, it is still the best modality for population-based screening.
    • Mammography is the only test that can reliably detect suspicious calcifications. Such calcifications are often the first sign of in-situ cancers, which (in 20% of cases) coexist with otherwise invisible invasive cancers.”

Breast Density Issues

• Additional Screening?
  – Risk assessment may be helpful
    • Family history, personal history of atypia, other risk factors
    • Tyrer-Cuzick, BRCAPRO, Claus, BOADICEA, Gail (less recommended)
  – ACS Guidelines:
    • High Risk (20-25% or greater): Consider screening breast MRI adjunctively to mammography
    • Intermediate risk (15-20%): Consider screening MRI on individual basis
    • Low risk: Screening MRI not recommended

Breast Density Issues

• Screening Ultrasound
  – ACRIN (ACR Imaging Network) findings: Increase in detection of invasive cancers in conjunction with mammography (and better with MRI)
  – Cons: Increased rates of biopsy and false-positive exams
    • Improvement after the initial screening US but persistently increased recall rates, rates of biopsy and false-positive exams
    • Consider breast cancer risk factors, insurance coverage, tolerance for additional testing, including possibility of false positive biopsy
  • Breast Tomosynthesis
    – Emerging, promising

Breast Tomosynthesis

• Digital mammography – 2D
• Tomosynthesis – commonly referred to as 3D

• Observed 30% decrease in recall rates
• Larger observational study
  – Decrease in recall rates
  – Increase in cancer detection (including invasive cancers)
  – No significant increase in biopsy rates
  – Increase in PPV for recalls
  – Increase in PPV for biopsies
• Diagnostic use
  – One-view DBT shows better sensitivity and NPV in patients with fatty and dense breasts
There is a steady increase in breast cancer risk ages 40-75.

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Thank you!

Mahalo and Aloha!
References

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