Challenges to Delivery of High Quality Mammography

Overview of Current Challenges
Barbara Monsees, Washington University

Geographic Access, Equity and Impact on Quality
Tracy Onega, Dartmouth Medical School

Audits and the National Mammography Database
Carl D’Orsi, Emory University
Relevant Questions

How do we ensure broad access to high quality mammography?

What do patients need to understand about new technologies?

How does supplemental screening fit in?

How does the introduction of State laws mandating dense breast notification change expectations, outcome tracking?
Relevant Questions

What does MQSA require with respect to audits?
How does BIRADS address audits?
What tools are used to audit?
What are appropriate audit measures?
How often should audit data be reviewed?
What are reasonable goals for recall rates, detection rates, tumor size/stage?
What are reasonable tradeoffs for sensitivity/specificity?
Overview of Current Challenges

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Disclosures:
Chair, Breast Commission, American College of Radiology
No financial conflicts of interest
Breast Imaging includes screening and diagnostic mammography, ultrasound, MRI, image guided needle biopsy and other modalities

Expectations are high
Medicolegal implications are an issue
High volume
Variability in interpretation has been a problem
Double reading not feasible
More modalities/procedures can be helpful in patient management, but are time consuming
Who reads mammograms?

There are now more specialists who are dedicated breast imaging radiologists.

Digital mammography makes centralized interpretation of screening mammograms feasible; less workable for diagnostic evaluation, where a radiologist should be present.

Some groups use general radiologists to interpret screening mammograms or perform diagnostic workups, including breast ultrasound.

Almost no non-radiologists, if any at all, interpret mammograms.
Individuals who identify themselves as interpreting BI exams or Mammography

*Source: ACR*

<table>
<thead>
<tr>
<th>Job</th>
<th>Individuals</th>
<th>ACR members</th>
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</thead>
<tbody>
<tr>
<td>100% breast imaging</td>
<td>647</td>
<td>491</td>
</tr>
<tr>
<td>Spend time doing BI</td>
<td>7212</td>
<td>5208</td>
</tr>
<tr>
<td>Spend time doing Mammo</td>
<td>9050</td>
<td>6549</td>
</tr>
<tr>
<td>Both BI and Mammo</td>
<td>6835</td>
<td>4966</td>
</tr>
</tbody>
</table>
Mammography has improved

ACR Mammography Accreditation Program & MQSA

Technologists have learned how to produce better images with good compression and positioning

Digital Mammography: Technique factors less of an issue due to wider recording latitude and elimination of film processors

QC easier and more streamlined

Fewer lost exams & ease of transfer
When MQSA was reauthorized, a requirement was added re: sending patients a summary in lay terms within 30 days.

Communication of Results to Patients

Citation:

900.12(c)(2)(i),(ii): Communication of mammography results to the patients. Each facility shall send each patient a summary of the mammography report written in lay terms within 30 days of the mammographic examination. If assessments are "Suspicious" or "Highly suggestive of malignancy," the facility shall make reasonable attempts to ensure that the results are communicated to the patient as soon as possible.

(i) Patients who do not name a health care provider to receive the mammography report shall be sent the report described in paragraph (c)(1) of this section within 30 days, in addition to the written notification of results in lay terms.

(ii) Each facility that accepts patients who do not have a health care provider shall maintain a system for referring such patients to a health care provider when clinically indicated.
D.E.N.S.E.\textsuperscript{R} State Efforts
State Dense Breast Legislation Varies

- Type of notification (letter vs poster in breast center)
- Language: Some legislation
  - requires that notification inform whether women have dense breasts; others do not
  - addresses supplemental screening
  - addresses other risk factors
- All say to speak with health care provider
- Few mandate payment for supplemental screening
Requirements for reports & lay letters

<table>
<thead>
<tr>
<th></th>
<th>Lay letter sent</th>
<th>Lay letter density</th>
<th>Report density</th>
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<tbody>
<tr>
<td>FDA</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BIRADS</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

There is no guarantee that a women or her doctor will learn her breast density.
What is Mammographic Breast Density?

Relative amount of fibrous and glandular tissue which attenuates x-rays on a mammogram.

Does not correlate with clinical breast examination firmness or lumpiness.
Almost entirely fat
Scattered areas of fibroglandular density
Heterogeneously dense
Extremely dense

Estimate: women with dense breasts exceeds 25 million

Brian L. Sprague et al. JNCI J Natl Cancer Inst 2014;106:dju255
Breast Density and Sensitivity Mammography
(Film-Screen)

330,000 women from BCSC, 1996-98; 2223 cancers

<table>
<thead>
<tr>
<th>Density</th>
<th>Sensitivity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatty</td>
<td>88.2</td>
</tr>
<tr>
<td>Scattered</td>
<td>82.1</td>
</tr>
<tr>
<td>Hetero</td>
<td>68.9</td>
</tr>
<tr>
<td>Extremely</td>
<td>62.2</td>
</tr>
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</table>

### Mammo Sensitivity for Dense Breasts

**FFDM vs Film**

<table>
<thead>
<tr>
<th></th>
<th>Film-Screen</th>
<th>FFDM</th>
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<tbody>
<tr>
<td>Hetero</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>Extremely</td>
<td>68</td>
<td>84</td>
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</tbody>
</table>


Brian L. Sprague et al. JNCI J Natl Cancer Inst 2014

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Supplemental screening can detect additional mammographically occult breast cancers
# ACRIN 6666

<table>
<thead>
<tr>
<th></th>
<th>Prevalence Screen</th>
<th>Incidence Screens</th>
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<tbody>
<tr>
<td></td>
<td>Mammo</td>
<td>Mammo +US</td>
</tr>
<tr>
<td>Recalls (%)</td>
<td>11.5</td>
<td>26.6</td>
</tr>
<tr>
<td>Sent to bx (%)</td>
<td>2.4</td>
<td>10.2</td>
</tr>
<tr>
<td>Cancer yield of bx (%)</td>
<td>29.2</td>
<td>11.4</td>
</tr>
<tr>
<td>Cancer rate per 1000</td>
<td><strong>7.5</strong></td>
<td><strong>12.8</strong></td>
</tr>
<tr>
<td>Short term followup (%)</td>
<td>3.2</td>
<td>13.8</td>
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</tbody>
</table>

Berg et al, JAMA 2008; 299 (18): 2151
Published experience from CT shows that additional cancers can be detected by screening US

Hand held, performed by technologists

<table>
<thead>
<tr>
<th></th>
<th>Women studied</th>
<th>Incremental Cancer yield/1000</th>
</tr>
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<tbody>
<tr>
<td>Hooley</td>
<td>935</td>
<td>3.2</td>
</tr>
<tr>
<td>Weigert</td>
<td>8647</td>
<td>3.2</td>
</tr>
<tr>
<td>Parris</td>
<td>5519</td>
<td>1.8</td>
</tr>
<tr>
<td>ACRIN 1\textsuperscript{st} round</td>
<td></td>
<td>5.3</td>
</tr>
<tr>
<td>ACRIN subsequent</td>
<td></td>
<td>3.7</td>
</tr>
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</table>

Hooley et al, Radiology, Vol 265; 1, October 2012, p 59
Weigert and Steenbergen, The Breast J; Vol 18; 6, November 2012, p 517
Parris et al, The Breast J, Vol 19; 1, November 2013, p 64
ACRIN 6666:
Adding MRI after 3 annual screens with Mammo & US

<table>
<thead>
<tr>
<th>Modalities</th>
<th>AUC</th>
</tr>
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<tbody>
<tr>
<td>Mammo</td>
<td>0.63</td>
</tr>
<tr>
<td>Mammo + US</td>
<td>0.69</td>
</tr>
<tr>
<td>Mammo + US + MRI</td>
<td>0.95</td>
</tr>
<tr>
<td>Mammo + MRI</td>
<td>0.94</td>
</tr>
</tbody>
</table>

After 3 rounds of screening, 14.7 cancers were detected (per 1000) by MRI in women who had been already screened by Mammo + US.

Berg et al, JAMA 2012; 307 (13): 1394
High risk patient comes for screening MRI
Extremely dense mammogram is normal
Abbreviated Breast MRI… a Novel Approach to Breast Cancer Screening

FAST 3 min breast MRI
Additional cancer yield of 18.2/1000

Kuhl et al, J Clin Oncol 32: 2304
Conclusion: Use of CAD during screening mammography among Medicare enrollees is associated with increased DCIS incidence, the diagnosis of invasive breast cancer at earlier stages, and increased diagnostic testing among women without breast cancer.
Digital Breast Tomosynthesis (DBT)

Mammography misses approx 20% of breast cancers

Of recalls from screening, 10-20% due to superimposed breast tissue

Lack DBT data on incidence screening rounds

For prevalence screening round:

  DBT increases cancer detection

  DBT reduces recalls for additional evaluation

  DBT improves screening parameters in all but fatty breasts
<table>
<thead>
<tr>
<th>Study</th>
<th>Design Description</th>
<th>Increase CDR</th>
<th>Decrease recalls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciatto</td>
<td>Prospective; paired</td>
<td>51%</td>
<td>17%</td>
</tr>
<tr>
<td>Skaane</td>
<td>Prospective; paired</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td>Rose</td>
<td>Retrospective; non-paired</td>
<td>54%</td>
<td>34%</td>
</tr>
<tr>
<td>Haas</td>
<td>Retrospective; non-paired</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>Freidewald</td>
<td>Retrospective; non-paired</td>
<td>41%</td>
<td>15%</td>
</tr>
<tr>
<td>Durand</td>
<td>Retrospective; non-paired</td>
<td>4%</td>
<td>37%</td>
</tr>
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</table>
Thoughts:

Mammography quality has improved and advances such as DBT can improve screening parameters.

There are limitations to mammography and complementary technologies can improve cancer detection.

Who should have supplementary screening and with what methods?

The workforce is not standardized and varies in practice settings.