Provider Level Analyses of Screening Mammography Use in Women with Limited Life Expectancy

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Outline

- Two studies
  - Integrating Age and Comorbidity to Assess Screening Mammography Utilization
  - Variation Among Providers in Screening Mammography for Women with Limited Life Expectancies
Integrating Age and Comorbidity to Assess Screening Mammography Utilization
Background

Screening mammography

• Benefits
  • Early detection of breast cancer
  • Early treatment
  • Better survival

• Harms
  • False-positives and follow-up diagnostic tests
  • Over-diagnosis and over-treatment
Background (con’t)

- Current cancer screening guidelines base their recommendations primarily on age
  - USPSTF guideline
    - Biennial screening mammography in women aged 50-74 years
    - Individualized decision for women before the age of 50
    - Current evidence is insufficient to assess the additional benefits and harms of screening mammography in women 75 years or older.
Limitations of using age-cutoffs alone

- **Under-screening**
  - 40% healthy women aged 80-84 did not have a recent screening mammogram (Schonberg, MaCarthy et al. 2004)

- **Over-screening**
  - 25% women aged 70-74 years with severe cognitive impairment had a recent screening mammogram (Mehta, Fung et al. 2010)
  - 12% women aged 65-74 with advanced cancer at another site had a recent screening mammogram (Sima, Panageas et al. 2010)
Studies continue to use age cutoffs in evaluating screening mammography use

- For example:
  - a study found that poor self-reported health predicted nonadherence to mammography screening and concluded that women with poor health may need more support from their providers to be screened (Gierish, Earp et al. 2010)
Objectives

➢ To develop a methodological framework to
   • Predict life expectancy using both age and comorbidity
   • Define appropriate and inappropriate target population for screening mammography based on life expectancy

➢ To evaluate screening mammography utilization in Texas
   • life-expectancy method vs. age-cutoff method
Methods

- **Data Sources**
  - 100% Texas Medicare data from 2000-2007
    - Medicare enrollment files
    - Carrier files
    - Outpatient Statistical Analysis Files
    - Medicare Provider Analysis and Review files
Methods (con’t)

- Study Subjects
  - Two cohorts
    - The 2001 cohort – to estimate median survival time
    - The 2006 cohort – to estimate screening mammography rates
  - Include women
    - aged 67-90 in Texas
    - with 2-year full coverage of Pt A+Pt B, no HMO
    - no diagnosis of breast cancer or breast mass in the past 2 years
Methods (con’t)

2001 Cohort

Female Medicare age of 67-90 years as of 1/1/2001 and residing in Texas
(n=1,046,907)

Had full coverage of Medicare Parts A and B during 2001-2002
(n=927,034)

Without any HMO coverage during 2001-2002
(n=789,259)

Had no diagnosis of breast cancer and breast mass (ICD-9-CM: 174xx, 2330, and 61172) in the past 2 years
(final 2001 cohort, n=716,279)

2006 Cohort

Female Medicare age of 67-90 years as of 1/1/2006 and residing in Texas
(n=1,103,917)

Had full coverage of Medicare Parts A and B during 2006-2007
(n=979,397)

Without any HMO coverage during 2006-2007
(n=786,238)

Had no diagnosis of breast cancer and breast mass (ICD-9-CM: 174xx, 2330, and 61172) in the past 2 years
(final 2006 cohort, n=697,825)
Methods (con’t)

➤ Measures

• Screening mammography – algorithm by Freeman et al. (2002)
  • Bilateral mammogram
  • No BC, BM dx within the last 2 yrs
  • No any mammogram within the last 11 months

• Life expectancy predicted by
  • Age by 2-year interval
  • Comorbidity Index (none, 1, 2 and 3+)

Estimates of Median Survival Time from the 2001 Cohort → Life expectancy of the 2006 cohort
## Median Survival in Years, the 2001 Cohort

<table>
<thead>
<tr>
<th>Age</th>
<th>Median Survival in Years (95% CI) by Comorbidity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>67-68</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>69-70</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>71-72</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>73-74</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>75-76</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>77-78</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>79-80</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>81-82</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>83-84</td>
<td>&gt;7.0 (n/a)</td>
</tr>
<tr>
<td>85-86</td>
<td>6.4 (6.4, 6.5)</td>
</tr>
<tr>
<td>87-88</td>
<td>5.8 (5.7, 5.9)</td>
</tr>
<tr>
<td>89-90</td>
<td>5.1 (5.1, 5.2)</td>
</tr>
</tbody>
</table>
### Results (con’t)

#### Screening Mammography Use, 2006 Cohort

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Total Rate (%) of Screening Mammography by Comorbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>67-68</td>
<td>65711 (55.3)</td>
</tr>
<tr>
<td>69-70</td>
<td>59593 (54.7)</td>
</tr>
<tr>
<td>71-72</td>
<td>53536 (53.7)</td>
</tr>
<tr>
<td>73-74</td>
<td>49109 (52.4)</td>
</tr>
<tr>
<td>75-76</td>
<td>46117 (49.9)</td>
</tr>
<tr>
<td>77-78</td>
<td>41543 (46.7)</td>
</tr>
<tr>
<td>79-80</td>
<td>37820 (42.3)</td>
</tr>
<tr>
<td>81-82</td>
<td>33081 (37.4)</td>
</tr>
<tr>
<td>83-84</td>
<td>28085 (31.2)</td>
</tr>
<tr>
<td>85-86</td>
<td>21123 (25.5)</td>
</tr>
<tr>
<td>87-88</td>
<td>15344 (19.8)</td>
</tr>
<tr>
<td>89-90</td>
<td>10695 (13.3)</td>
</tr>
</tbody>
</table>

Life expectancy (years) – Unshaded: 7+; light shaded: 5 to 7; dark shaded: <5
Limitations

- Could not include other clinically relevant information associated with patients’ life expectancy (e.g., self-rated health, functional status, cancer, severity of comorbid illness) or with risk of breast cancer (e.g. family history)

- The maximum life expectancy we estimated was 7 years

- An individual survival probability may differ from the estimated life expectancy

- Could not evaluate the impact of patient preference in mammography decisions
Conclusions

- The life expectancy method results in better estimates of appropriate and inappropriate screening mammography utilization in the community.
- Future studies to evaluate population-based estimates of screening use should follow this direction.
Variation Among Providers in Screening Mammography for Women with Limited Life Expectancies
Background

- Receipt of screening mammography is commonly used as an indicator of high-quality primary care
- Women with limited life expectancy are unlikely to benefit from screening
Background (con’t)

Receipt of screening mammography among women with limited life expectancies is an indicator of over-utilization, not of high quality

- One quarter of women aged 70-74 years with severe cognitive impairment were screened
- 12% of those aged 65-74 with advanced cancer at another site were screened

The ideal quality indicator would include estimates of the

- Avoidance of overscreening
- Receipt of appropriate screening
Objectives

➢ To assess the feasibility physician level quality measure of screening mammography in women with an estimated life expectancy of less than 7 years
Methods

➢ Subjects

• Data Source: 100% Texas Medicare claims

Female Medicare age of 67-90 years as of 1/1/2008 and residing in Texas (n=1,218,987)

Had full coverage of Medicare Parts A and B during 2008-2009 (n=1,022,543)

Without any HMO coverage during 2008-2009 (n=788,136)

Had no diagnosis of breast cancer and breast mass (ICD -9-CM: 174xx, 2330, and 61172) in the previous 2 years (n=707,464)

Life Expectancy < 7 years (n=166,294)

Women (n=125,593) with an identifiable UCP (n=12,574) in Texas
Methods (con’t)

- Life Expectancy predicted by
  - Age by 2-year interval
  - Comorbidity Index (none, 1, 2 and 3+)

Estimates of Median Survival Time from the 2001 Cohort

Life expectancy of the 2008 cohort
Methods (con’t)

- **UCP**
  - **Definition**
    - physician who saw the woman on 2+ occasions in an outpatient setting for evaluation and management in 2007
      - CPT codes of 99201-99205 and 99211-99215
      - Physician who provided most evaluation and management, if a woman had 1+ identified physicians
      - Physician who provided most recent evaluation and management, if there were ties
  - **Characteristics**
    - Source: linked AMA master file
Methods (con’t)

- Screening Mammography
  - Bilateral mammogram (CPT code of 76091 or 76092)
  - No mammogram within the last 11 months (CPT code of 76090, 76091 and 76092)

- Analysis
  - Descriptive statistics
  - Multilevel modeling
    - Effect of UCP characteristics, adjusting for patient characteristics
    - UCP profiling (3,803 UCPs with 10+ patients)
  - Spearman rank correlation, Wilcoxon signed rank test
    - Stability of UCP profiling over time (2,800 UCPs with 10+ patients in both 2006 and 2008 cohorts)
Results

Screening mammography rate, by age and comorbidity

![Graph showing potential over-screening rate of mammography by age and comorbidity index](image)
Results (con’t)

- Screening mammography rate, by age and life expectancy

![Graph showing potential overscreening rate of mammography by age and life expectancy]
Results (con’t)

- Screening mammography rate, by UCP characteristics

![Graph showing screening mammography rate by various UCP characteristics]
Results (con’t)

- Multilevel analysis of UCP effects on screening mammography use in women with limited life expectancy

<table>
<thead>
<tr>
<th>UCP Characteristics</th>
<th>OR (95% CI)</th>
<th>Model 1 (UCP characteristics only)</th>
<th>Model 2 (add patient characteristics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years): &lt;50 vs. 50+</td>
<td>0.93 (0.90, 0.97)</td>
<td>0.92 (0.88, 0.95)</td>
<td></td>
</tr>
<tr>
<td>Sex: F vs. M</td>
<td>1.31 (1.25, 1.37)</td>
<td>1.29 (1.23, 0.31)</td>
<td></td>
</tr>
<tr>
<td>US Trained: N vs. Y</td>
<td>1.27 (1.22, 1.32)</td>
<td>1.25 (1.20, 1.31)</td>
<td></td>
</tr>
<tr>
<td>Board Certification: N vs. Y</td>
<td>0.91 (0.87, 0.94)</td>
<td>0.91 (0.88, 0.95)</td>
<td></td>
</tr>
<tr>
<td>Panel Size: Q1 vs. Q4</td>
<td>0.92 (0.86, 0.99)</td>
<td>0.86 (0.80, 0.93)</td>
<td></td>
</tr>
<tr>
<td>Panel Size: Q2 vs. Q4</td>
<td>0.87 (0.82, 0.92)</td>
<td>0.84 (0.79, 0.89)</td>
<td></td>
</tr>
<tr>
<td>Panel Size: Q3 vs. Q4</td>
<td>0.96 (0.91, 1.00)</td>
<td>0.94 (0.90, 0.98)</td>
<td></td>
</tr>
<tr>
<td>Specialty: FP vs. IM</td>
<td>0.74 (0.70, 0.77)</td>
<td>0.74 (0.70, 0.77)</td>
<td></td>
</tr>
<tr>
<td>Specialty: OB vs. IM</td>
<td>1.65 (1.42, 1.91)</td>
<td>1.73 (1.48, 2.01)</td>
<td></td>
</tr>
<tr>
<td>Specialty: Ger vs. IM</td>
<td>0.82 (0.64, 1.05)</td>
<td>0.89 (0.69, 1.14)</td>
<td></td>
</tr>
<tr>
<td>Specialty: Other vs. IM</td>
<td>0.67 (0.63, 0.71)</td>
<td>0.67 (0.63, 0.70)</td>
<td></td>
</tr>
</tbody>
</table>
Results (con’t)

- Profiling of UCPs with 10+ patients with a life expectancy less than 7 years in the 2008 cohort (n=3,803)

![Graph showing average rate of mammography overscreening. The average rate is 36.0%.]
Results (con’t)

- The agreement between UCP profiling between 2006 and 2008. The comparison only includes UCPs with 10+ patients with a life expectancy less than 7 years in both cohorts (n=3,803)

<table>
<thead>
<tr>
<th>2006 Cohort</th>
<th>2008 Cohort, row %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quintile 1 (13.9-37.4%)</td>
</tr>
<tr>
<td></td>
<td>Quintile 2 (27.5-32.7%)</td>
</tr>
<tr>
<td></td>
<td>Quintile 3 (32.8-38.3%)</td>
</tr>
<tr>
<td></td>
<td>Quintile 4 (38.4-45.9%)</td>
</tr>
<tr>
<td></td>
<td>Quintile 5 (46.0-74.7%)</td>
</tr>
<tr>
<td>Quintile 1 (11.4-23.6%)</td>
<td>47.5</td>
</tr>
<tr>
<td>Quintile 2 (23.7-28.8%)</td>
<td>29.3</td>
</tr>
<tr>
<td>Quintile 3 (28.9-34.2%)</td>
<td>14.3</td>
</tr>
<tr>
<td>Quintile 4 (34.3-42.5%)</td>
<td>7.7</td>
</tr>
<tr>
<td>Quintile 5 (42.6-78.7%)</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Spearman rank correlation coefficient = 0.65 (P<0.001)
Wilcoxon signed rank test: P=0.62
Results (con’t)
Summary of Results

- The overall screening rate in women with <7 yrs life expectancy was 31.3%.
- Age played a greater role than level of comorbidity in screening mammography use.
- Among UCPs with 10+ patients with limited life expectancy, 2.9% had significantly lower screening rates, 8.6% had significantly higher than average rates.
- UCP profiling was stable over time.
- OB/GYNs were more likely and Family Medicine physicians were less likely to screen patients with limited life expectancy compared to Internal Medicine physicians.
- Female and foreign-trained UCPs were more likely to screen patients with limited life expectancy.
Limitations

- No information on patient preferences
- Only age and comorbidity were used in life expectancy estimates
- The life expectancy estimates may lack precision at the individual level
- The life expectancy for the 2008 cohort were predicted from 2001 estimates. Life expectancy may change over time.
Conclusions

UCP over-screening rates should be considered together with the corresponding appropriate screening rates to achieve a balanced assessment of the quality of screening mammography services at the physician level.
Research Team

- Alai Tan, MD, PhD
- Yong-Fang Kuo, PhD
- Linda S. Elting, Dr.P.H
- James S. Goodwin, MD