Using your crystal ball – Incorporating prognosis in primary care of older adults

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Disclosures

None
Learning objectives

- Describe the importance of incorporating prognosis in care decisions of older adults
- Demonstrate the use of select evidence-based prognostic tools
- Discuss how to incorporate prognosis to inform common clinical decisions
- Develop confidence in communicating prognosis with older adults
Workshop structure

- Overview of content areas (28 min)
- Q&A (7 min)
- Small group communication exercises (30 min)
- Large group discussion (10 min)
- Wrap up and more Q&A (15 min)
Overview

- Why consider prognosis?
- What types of clinical decisions should lead to a consideration of prognosis?
- How can we estimate prognosis?
- How do we communicate prognosis effectively (without taking hours)?
Preventive vs Symptomatic Care

- Preventive Care: Actions (tests, treatments) taken before symptoms to avoid future illness
  - Cancer screening
  - Treatment for asymptomatic diabetes
  - Hypertension, hyperlipidemia, osteoporosis

- Symptomatic Care: Actions taken to lessen or eliminate current symptoms
  - Analgesics for low back pain
  - Treatment for symptomatic diabetes
Symptomatic care exposes patients to the risks of an intervention, but the potential benefits occur immediately.

- NSAIDs for back pain may lead to immediate renal insufficiency, but may also lead to immediate decrease in back pain.
Preventive Care: Timing of Risk and Benefits

- Preventive care exposes patients to risks of an intervention (usually immediately) so that patients can benefit later
  - Examples of Immediate Risks
    - Fluid shifts, perforation from colonoscopy
    - Hypoglycemia from insulin
    - Hypotension from bp meds
  - Examples of Delayed benefits
    - Decreased colorectal cancer (~10y)
    - Decreased diabetes–related vascular dz (8–15y)
Prevention for Older Adults

- For preventive care, this Lag time to Benefit (time between the intervention/risks and the benefits) cannot be ignored.

- **Why consider prognosis?**
  - For older adults with life expectancy < lag time to benefit, prevention may expose patients to risks with little chance they would survive to benefit
  - Considering prognosis allows targeting of prevention to those most likely to benefit
Geriatric Prevention Guidelines

- Guidelines now explicitly endorse this view, encouraging targeting prevention to patients with an extended life expectancy
  - Breast and Colorectal Cancer screening (USPSTF)
  - Intensive Glycemic Control (AGS/CHCF)
For cancer screening interventions, lag time-to-benefit ~10 years, meaning framework could affect decisions for older patients who have a ~10 year life expectancy.

Prevention is pervasive in medical practice (and often called Treatment)

- Many common diseases (diabetes, hypertension, hyperlipidemia, osteoporosis) are asymptomatic
- Treatments for asymptomatic diseases are actually prevention
What types of clinical decisions should lead to a consideration of prognosis?

- Any intervention that has immediate risks and delayed benefits
  - Cancer screening
  - Treatment for hypertension, diabetes
  - Decisions to pursue surgery versus non-surgical treatment (CABG vs med mgmt, TAVR vs operative repair, AAA: endovascular vs open)
Individualizing Prevention

When considering a preventive intervention for an older patient:

- 1) Determine patient’s life expectancy
- 2) Determine the intervention’s lag time-to-benefit
- 3a) If life expectancy $>>$ lag time-to-benefit, patient may benefit
- 3b) If life expectancy $<<$ lag time-to-benefit, patient unlikely to benefit
- 3c) If life expectancy $\sim$ lag time-to-benefit, patient preferences should drive decision
How can we estimate prognosis?
We identified 12 factors that accurately stratified older adults into groups at varying risk for mortality (AUC=0.82)
- 4 functional factors
- 4 comorbidity factors

Showed that considering function can improve the accuracy of mortality prediction in older adults
## 12-Factor Mortality Index

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-64</td>
<td>1</td>
<td>Diabetes Mellitus</td>
<td>1</td>
</tr>
<tr>
<td>65-69</td>
<td>2</td>
<td>Cancer</td>
<td>2</td>
</tr>
<tr>
<td>70-74</td>
<td>3</td>
<td>Lung Disease</td>
<td>2</td>
</tr>
<tr>
<td>75-79</td>
<td>4</td>
<td>Heart Failure</td>
<td>2</td>
</tr>
<tr>
<td>80-84</td>
<td>5</td>
<td>BMI &lt; 25</td>
<td>1</td>
</tr>
<tr>
<td>85+</td>
<td>7</td>
<td>Difficulty Bathing</td>
<td>2</td>
</tr>
<tr>
<td>Difficulty Managing Finances</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male sex</td>
<td>2</td>
<td>Difficulty Walking Several Blocks</td>
<td>2</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>2</td>
<td>Difficulty Pushing/Pulling Heavy Objects</td>
<td>1</td>
</tr>
</tbody>
</table>
Data: Adults 65+ that participated in NHIS from 1997–2000 (n=24,115)
Randomly selected 2/3 for development cohort and 1/3 for validation cohort
Mortality measured from interview date until death or end of the follow-up (12/31/2002)
4 classes of variables considered demographics, health behaviors, illness burden, and functional status (41 variables)
Methods

- Used Cox proportional hazard models
- Backward elimination, $p < 0.0001$ for retention
- Beta coefficients from final model used to determine point score for each individual in development cohort
- Calibration: expected to observed mortality (compared development cohort to validation cohort)
- Discrimination of the model: c–index
## Risk Calculator

1. How old is your patient?  
   - 65 - 69

2. What is the sex of your patient?  
   - Female  
   - Male

3. Is your patient a former or current smoker?  
   (> 100 cigarettes smoked in his or her lifetime)  
   - Current

4. Does your patient have a BMI score of less than 25?  
   - Yes  
   - No  
   
   BMI = $703 \times \left(\frac{\text{weight in pounds}}{\text{height in inches}^2}\right)$  
   [BMI calculator](#)

5. Does your patient have a history of cancer (including melanoma but not other skin cancers)?  
   - Yes  
   - No

6. Does your patient have diabetes mellitus?  
   - Yes  
   - No

7. Does your patient have COPD?  
   - Yes  
   - No

8. How many times has your patient been hospitalized overnight in the past year?  
   - 1 time

9. How does your patient self-rate his or her health?  
   - Fair

10. Is your patient dependent in at least one Instrumental Activity of Daily Living (IADL)? (IADLs include light housework, preparing meals, shopping, taking medication, using the telephone, arranging own travel, and managing money.)  
    - Yes  
    - No

11. Does your patient have difficulty walking ¼ mile (approximately a few city blocks)?  
    - Yes  
    - No

### Total Points: 15

Your best guess of five year mortality risk  
- 35%

[Calculate Risk](#)
# Calibration and Discrimination

Table 3. Validation of the Index: 5-Year Mortality in the Development and Validation Cohorts by Risk Group

<table>
<thead>
<tr>
<th>Quintile of risk</th>
<th>Development n</th>
<th>Mortality 5-year % (95% confidence interval)</th>
<th>Person-year rate (%)</th>
<th>Validation n</th>
<th>Mortality 5-year % (95% confidence interval)</th>
<th>Person-year rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,980</td>
<td>6 (5-8)</td>
<td>1</td>
<td>1,491</td>
<td>5 (4-7)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2,438</td>
<td>10 (8-12)</td>
<td>2</td>
<td>1,252</td>
<td>10 (8-13)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3,305</td>
<td>14 (12-16)</td>
<td>3</td>
<td>1,771</td>
<td>17 (15-20)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2,557</td>
<td>27 (25-29)</td>
<td>6</td>
<td>1,379</td>
<td>31 (28-35)</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>2,604</td>
<td>52 (49-54)</td>
<td>13</td>
<td>1,444</td>
<td>50 (47-54)</td>
<td>13</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>0-1</td>
<td>579</td>
<td>2 (1-4)</td>
<td>301</td>
<td>3 (1-6)</td>
<td>0.7</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>2-3</td>
<td>1,368</td>
<td>7 (5-10)</td>
<td>698</td>
<td>5 (3-8)</td>
<td>0.9</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>4-5</td>
<td>2,258</td>
<td>8 (6-9)</td>
<td>1,078</td>
<td>8 (6-10)</td>
<td>1.4</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>6-7</td>
<td>2,348</td>
<td>11 (10-14)</td>
<td>1,306</td>
<td>12 (10-15)</td>
<td>2</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>8-9</td>
<td>2,170</td>
<td>15 (14-17)</td>
<td>1,131</td>
<td>19 (16-23)</td>
<td>4</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>10-11</td>
<td>1,805</td>
<td>25 (23-28)</td>
<td>944</td>
<td>29 (25-33)</td>
<td>6</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>12-13</td>
<td>1,388</td>
<td>35 (32-38)</td>
<td>758</td>
<td>37 (32-42)</td>
<td>8</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>14-15</td>
<td>944</td>
<td>47 (32-42)</td>
<td>553</td>
<td>49 (43-55)</td>
<td>11</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>16-17</td>
<td>586</td>
<td>58 (52-63)</td>
<td>322</td>
<td>55 (48-62)</td>
<td>16</td>
</tr>
<tr>
<td>Quintile of risk</td>
<td>18+</td>
<td>438</td>
<td>71 (65-77)</td>
<td>246</td>
<td>62 (54-70)</td>
<td>19</td>
</tr>
</tbody>
</table>

c-index 0.75

Schonberg et al. JGIM, 2009
Incorporating life expectancy into EHRs

- Do the life expectancy tools based on comorbidity alone lead to similar conclusions as tools that incorporate patient report?
- *How comparable is comorbidity derived from insurance claims and from EHR data?*
4 Tools for short- and long-term life expectancy

- **Tan**: Claims-based; Medicare derived; comorbidities
- **Cho**: Claims-based; Medicare derived; comorbidities
- **Schonberg**: Patient-reported; Functional status
- **Lee**: Patient-reported; Functional status
Comparing different tools using MCBS

- Medicare Current Beneficiary Survey data links insurance claims
  - Allows for comparison of claims–based only measures with measures that incorporate patient self-report

- Use 2009/2010 waves for adults 66–90
- Calculate life expectancy according to each metric, divide into quartiles
Estimating limited (<25%) life expectancy (N=9,469)

<table>
<thead>
<tr>
<th></th>
<th>Cho</th>
<th>Tan</th>
<th>Schonberg</th>
<th>Lee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>45 (0.4)</td>
<td>428 (3.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Long term</td>
<td>1746 (14.1)</td>
<td>2209 (18.6)</td>
<td>2057 (18.1)</td>
<td>2044 (17.9)</td>
</tr>
</tbody>
</table>
## Estimating agreement between limited (<25%) life expectancy classifications

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Short term</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 4 agree</td>
<td></td>
<td>9036 (96.4)</td>
</tr>
<tr>
<td><strong>Long term</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 4 agree</td>
<td></td>
<td>6951 (77.1)</td>
</tr>
<tr>
<td>3 out of 4 agree</td>
<td></td>
<td>1392 (12.9)</td>
</tr>
</tbody>
</table>
Next steps: Integration into EHR

• Overall good agreement between different life expectancy predictors

• Claims–based method may be more readily adapted to tools that can be embedded into EHR
ePrognosis.org
Prognostic Indices for Older Adults
A Systematic Review

Lindsey C. Yourman, MD; Sei J. Lee, MD, MAS; Mara A. Schonberg, MD, MPH; Eric W. Widera, MD; Alexander K. Smith, MD, MS, MPH
Each bubble represents a prognosis calculator. Click on a bubble to view the calculator.
Eprognosis gets Half a Million Hits in the First Week
Tell us about the patient to find the best calculator

1. Where is the patient  Clinic (living at home) ▼
2. What time frame best fits the clinical issue?  4 - 10 years ▼
3. Is your patient 65 or older?  -- select -- ▼
## Lee Schonberg Index

- **Population:** Community dwelling adults aged 50 and older
- **Outcome:** All cause 4 and 10 year mortality
- **Scroll to the bottom for more detailed information**

### Are you a healthcare professional?
- No
- Yes

### Risk Calculator

1. **How old is your patient?**
   - 75-79

2. **What is the sex of your patient?**
   - Female
   - Male

3. **What is your patient's BMI?**
   - < 25

4. **Which best describes your patient's health in general?**
   - Good

5. **Does your patient have chronic lung disease, such as emphysema or chronic bronchitis?**
   - Yes
   - No

6. **Has your patient ever had cancer (excluding minor skin cancers)?**
   - Yes
   - No

7. **Does your patient have congestive heart failure?**
   - Yes
   - No

8. **Does your patient have diabetes or high blood sugar?**
   - Yes
   - No
10. Does your patient have difficulty walking 1/4 mile (several city blocks) without help from other people or special equipment?
   - Yes
   - No

11. During the past 12 months, how many times was your patient hospitalized overnight?
   - None

12. Because of a physical, mental or emotional problem, does your patient need the help of others in handling routine needs such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?
   - Yes
   - No

13. Because of a health or memory problem, does your patient have difficulty managing money - such as paying bills and keeping track of expenses?
   - Yes
   - No

14. Because of a health or memory problem, does your patient have difficulty with bathing or showering?
   - Yes
   - No

15. Because of a health problem, does your patient have difficulty pushing or pulling large objects like a living room chair?
   - Yes
   - No

Total Lee Index Points: 6
Total Schonberg Index Points: 8

Your best guess of 10 year mortality risk

15 - 23%
Schonberg 5 year mortality risk:

As illustrated by the graphic below, out of 100 community dwelling adults aged 65 and older with similar answers, 13 will die (shaded) and 87 will survive (un-shaded) over the next 5 years.

Risk calculators cannot predict the future for any one individual. Risk calculators give an estimate of how many people with similar risk factors will live and die, but they cannot identify who will live and who will die.
Lee 10 year mortality risk:

As illustrated by the graphic below, out of 100 community dwelling adults aged 50 and older with similar answers, 38 will die (shaded) and 62 will survive (un-shaded) over the next 10 years.

Risk calculators cannot predict the future for any one individual. Risk calculators give an estimate of how many people with similar risk factors will live and die, but they cannot identify who will live and who will die.
Lee Index

- This index was developed in 11,701 community-dwelling adults from the eastern, western and central United States who were interviewed in the Health Retirement Survey in 1998 (mean age 67, 57% female, 81% white, 12% 4-year mortality)
- The index was internally validated in 8009 Health Retirement Survey interviewees from the southern United States (mean age 67, 57% female, 71% white, 13% 4-year mortality)
- Discrimination: This risk calculator sorts patients who died from patients who lived correctly 82% of the time (c-statistic).

```
poor  moderate  good  very good  excellent

50%  60%  70%  80%  90%
```

- Calibration: The model was well calibrated across all risk levels with less than 3% difference between estimated and actual mortality rates.

Schonberg Index

- This index was developed in 16,077 community dwelling older adults who responded to the 1997-2000 National Health Interview (NHIS) (27% >80 years old, 60% female, 85% white, 17% 5-year mortality)
- The index was internally validated in a random sample of 8038 from respondents from the same data source from 2001-2004(27% >80 years old, 60% female, 85% white, 17% 5-year mortality)
- Discrimination: This risk calculator sorts patients who died from patients who lived correctly 75% of the time (c-statistic). The discrimination was the same in the independent validation study.

```
poor  moderate  good  very good  excellent

50%  60%  70%  80%  90%
```

- Calibration: The model was well calibrated across all risk levels with less than 10% difference between estimated and actual mortality.
CANCER SCREENING

- USPSTF – benefit/harms cannot be determined in 75+ age group
- Based on intermediate risk of 10 yr mortality, patient preferences play large role
What are you interested in screening for?

- Colorectal Cancer
- Breast Cancer
- Both Cancers
- Results Log

ePrognosis Cancer Screening
It is not clear that getting tested for breast cancer will help this person. This person’s thoughts and feelings should be the major driver of the decision.
Harms

Breast Cancer Screening

- Getting a mammogram may be uncomfortable or cause anxiety.

- Some women who get a mammogram will experience a false alarm. These women are told their mammogram is abnormal but additional tests do not show breast cancer. Some women find this experience caused anxiety.

- Additional tests include:
  - Additional mammograms
  - Breast ultrasounds
  - Breast biopsies

- A mammogram may find breast cancer that could never have caused problems or
Benefits

Breast Cancer Screening

- A mammogram is more likely to find breast cancer when it is small, improving a woman's chances of only needing a minor surgery.

- Getting a mammogram may lower a woman's chances of dying from breast cancer.

- Getting a mammogram may help a woman feel good about herself and her health.
Of 1000 women like this woman who get a mammogram, 100 will experience harm in the first year.
After 10 years, of 1000 women like this woman who got a mammogram, 1 will avoid death from breast cancer.
After 10 years, of the 1000 people like this person, 300 will die whether or not they got tested for breast cancer.
How do we communicate prognosis?
How to talk about prognosis – what patients think

- Research mostly done in oncology / end-of-life patients, some in older adults with serious illnesses
- Majority of older adults would like to know their prognosis (53–65% want to know if <5 years)
- Whether patients would like to discuss prognosis in the context of preventive care decisions is NOT clear
We propose two approaches

1: In the context of a specific clinical decision, we may allude to, but NOT explicitly discuss, life expectancy

2: In other cases, we may decide to *explicitly* discuss how long a patient has to live
At this point, the chance that you’ll die from a colon cancer is extremely small, so the screening test most likely will not help you live longer. On the other hand, the risks of the test are higher given your (age, comorbidities), so I think it may be ok to not get the test."
Approach 1: Colorectal cancer screening in a patient with <10 years life expectancy

“It would take about 10 years to show a difference between people who get this test and people who don’t, with everything else that you have going on with your health, it may make more sense to focus on (your heart disease) in the short term.”
Approach 2: When to explicitly discuss life expectancy

- If patient specifically asks
- As a motivator (i.e. for behavioral change)
- If patient has unrealistic expectations that is affecting important care decisions
- To help patient plan
Approach 2: How to bring it up in a stable patient

“Things have been going well lately, one of the things that I ask a lot of my older patients is whether they want to talk about what they anticipate for the future, how long they may live. Some people like to discuss this to better plan, some don’t like to talk about it. Either is ok with me, is that something you want to talk about?”
“You’ve had several hospital stays recently. My hope is that you will not have to go back anytime soon, but it’s also important to be prepared if you were to get sicker at some point.

One of the things that is important is for me to understand what your expectations are, what do you think is the likely course of your health? How long do you think you may live? Would you be open to share with me some of your thoughts?”
Ask – Tell – Ask

ASK
- Confirm patient would like to hear prognosis information
- Ask about patient’s own perception first

Tell
- For you and patient to decide how explicit
- Qualitative (did well, did not do well) vs. Descriptors (a few years) vs. Numbers
Ask – Tell – Ask

- ASK – explore feelings:
  - “How did that information make you feel?” “What is going through your mind right now?”

- Empathy
- Empowering patient
- Reassurance
- Hope
Questions?
Break out session

- 30 minutes small group communication exercise
- ***Please report back 2–3 pearls to the large group.