I’m Older and I Want More Insurance…
But I Can’t Remember Why!

Cognitive Tests for Elderly Underwriting:
What’s Happening in 2008?

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VP and Chief Medical Director
Gen Re LifeHealth

SEAC
Amelia Island, FL
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Outline

• Gen Re LifeHealth Elderly Underwriting Practice Survey, January 2008
• Alternatives for assessment of cognitive function
• Evaluation of tests for use in life insurance underwriting
Gen Re LifeHealth Survey

- Data collection January 2008
- 41 participating companies
- Mixture of large/small, stock/mutual, Gen Re clients/non-clients
- Selected results
Who is old?

At what age do you classify an applicant as “elderly”?

<table>
<thead>
<tr>
<th>Age of Applicant</th>
<th># of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>2%</td>
</tr>
<tr>
<td>65</td>
<td>15%</td>
</tr>
<tr>
<td>66</td>
<td>2%</td>
</tr>
<tr>
<td>70</td>
<td>46%</td>
</tr>
<tr>
<td>71</td>
<td>20%</td>
</tr>
<tr>
<td>75</td>
<td>7%</td>
</tr>
<tr>
<td>76</td>
<td>5%</td>
</tr>
<tr>
<td>81</td>
<td>2%</td>
</tr>
</tbody>
</table>
Prevalence of testing and test instrument

Is it your standard practice to test cognitive function in your elderly applicants? If yes, which of the following tests do or will you use?

<table>
<thead>
<tr>
<th>Type of Tests</th>
<th>Of Companies Who Currently Use</th>
<th>Of Companies Who Are Planning to Add</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed Word Recall 10-Word (DWR)</td>
<td>6 (55%)</td>
<td>6 (75%)</td>
</tr>
<tr>
<td>Clock Drawing Test (CDT)</td>
<td>6 (55%)</td>
<td>5 (63%)</td>
</tr>
<tr>
<td>Mini Mental State Exam (MMSE)</td>
<td>2 (18%)</td>
<td>1 (13%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (18%)</td>
<td>1 (13%)</td>
</tr>
<tr>
<td>Enhanced Mental Skills Test (EMST)</td>
<td>1 (9%)</td>
<td>0</td>
</tr>
<tr>
<td>Minnesota Cognitive Acuity Screen (MCAS)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

2007 SOA survey (data collection fall 2006): 19% of companies use cognitive test
### Rationale

What are your reasons for testing/not testing cognitive function?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to garner relevant information from existing requirements</td>
<td>16 (84%)</td>
</tr>
<tr>
<td>(e.g., attending physician statement)</td>
<td></td>
</tr>
<tr>
<td>Problems are too common to ignore</td>
<td>11 (58%)</td>
</tr>
<tr>
<td>Able to offer more competitive premium to those who pass the test</td>
<td>11 (58%)</td>
</tr>
<tr>
<td>Adverse selection, because applicant is concerned or may have failed</td>
<td>10 (53%)</td>
</tr>
<tr>
<td>test for another company</td>
<td></td>
</tr>
<tr>
<td>Information is usually evident in other requirements</td>
<td>12 (57%)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (48%)</td>
</tr>
<tr>
<td>Makes it harder to do business</td>
<td>7 (33%)</td>
</tr>
<tr>
<td>Abnormalities discovered in the tests are too rare to justify</td>
<td>3 (14%)</td>
</tr>
<tr>
<td>Tests are too expensive</td>
<td>1 (5%)</td>
</tr>
</tbody>
</table>

2007 SOA: cost ranked second as reason not to test
Consequences

Approximately how often does cognitive function testing result in a risk classification that differs from the assessment you would have made without the test?
Cognitive function in the community

Prevalence (non-institutionalized population)

Annual rate of progression from MCI to dementia = 7-15%
Mortality

- Cardiovascular Health Study powerful predictor of elderly mortality was cognitive impairment
- Regardless of definition or measurement, consistent result in numerous studies
## Review of Test Instruments

### Ideal test

<table>
<thead>
<tr>
<th>Cost</th>
<th>Clarity</th>
<th>Scoring</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick</td>
<td>Protocol</td>
<td>Quantitative</td>
<td>Evidence for relationship to outcome</td>
</tr>
<tr>
<td>No fee for use,</td>
<td>Scoring Familiar</td>
<td>Objective</td>
<td></td>
</tr>
<tr>
<td>score</td>
<td></td>
<td></td>
<td></td>
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</table>
Review of Test Instruments

- Mini-Mental State Examination
- Clock Drawing Test
- Minnesota Cognitive Acuity Screen
- Enhanced Mental Skills Test
  - Delayed Word Recall
MMSE

- Widest use, often benchmark to vet other tests
- Simple, quantitative, transparent
- Multiple cognitive domains
- Score range cumulative 0-30
  - age 80, > 12 yr education median 28
  - < 24 impaired
- Numerous points for extremely low-level function
- Knock-out answers?
- Ceiling effect by IQ, education limits sensitivity
- Copyright
- Extensive mortality evidence
MMSE and Mortality

Bassuk SS “Cognitive Impairment and Mortality in the Community-dwelling Elderly”
AM J Epidemiol 2000; 151:676-88
## Review of Test Instruments

- **Mini-Mental Status Examination**

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<td>✔</td>
<td>✔</td>
<td>?</td>
<td>✔</td>
<td>Weak on mild disease; image</td>
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Clock Drawing Test

- Executive involved in working memory and planning tasks: problem solving, complex attention, strategy formation, interference control, adaptation to changing environment
- Requires visuospatial, construction and executive
- Simple, transparent, quantitative (?)
- Mortality evidence

Clock Drawing Test

• CLOX protocol CLOX2-CLOX1 scoring for executive function

• Executive impairment one of the earliest changes, regardless of etiology. May precede memory in AD.

• “Executive function is also adversely affected by poor health, such as falls, pain, certain medications, and hypoxemia. This may explain our finding of an association of the CLOX1 score with mortality.”

## Review of Test Instruments

- **Clock Drawing Test**

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Enhanced Mental Skills Test

- CERAD 10 word lists (3)
  - 3 trials immediate recall
  - Interference task
  - Delayed recall
  - Score all 4, DWR cutoff for classification

- Proprietary scoring algorithm uses correspondence analysis to discriminate

- Position in list and order of recall

- Quantitative

EMST

- Statistics for MCI vs normal
- Telephone
- LifePlans, affiliated with MARC
- Will train anyone to administer
- Proprietary scoring

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<th>Sensitivity</th>
<th>Specificity</th>
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<tr>
<td>DWR</td>
<td>82</td>
<td>91</td>
</tr>
<tr>
<td>EMST</td>
<td>94</td>
<td>89</td>
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Minnesota Cognitive Acuity Screen

- Includes DWR
- Adds assessment of judgment, reasoning, orientation, comprehension, attention, repetition, naming, fluency, computation
- Telephone capacity
- Nation’s CareLink
- Proprietary scoring
- Quantitative
## Review of Test Instruments

- **Minnesota Cognitive Acuity Screen**

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</tr>
<tr>
<td>MCAS</td>
<td>✓</td>
<td></td>
<td></td>
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DelayeWord Recall

- Widely used in LTC for years
- Registration, memory domains
- Earliest deficit in DAT
- Simple, quantitative, transparent
- Language limitations

Knopman DS “A verbal memory test with high predictiv e accuracy” Arch Neurol 1989;46:141-145
Delayed Word Recall

Necessary to follow validated script:

• Step 1
  • “Now I am going to give you a list of 10 words which I will ask you to recall later in the interview. I would like you to repeat each word and use that word in a complete sentence. Again, this needs to be done in your head and you can’t use paper and pencil to write anything down, OK?”

  • Chimney
  • Salt
  • Harp
  • Button
  • Meadow

  • Train
  • Flower
  • Finger
  • Rug
  • Book
Delayed Word Recall

• Step 2
  – Repeat step 1 instructions

• Step 3
  – After step 2, tester sets a timer for 5 minutes, and continues other elements of the examination

• Step 4
  – When the timer rings, tester asks subject to recall all 10 words, and encourages the subject “until it is clear that subject is unable to continue.”

• Score = number of words recalled
Cognitive Test Comparison

- **DSST Score**
  - **Normal**: Blue bars
  - **Probable / Possible AD**: Orange bars
  - Score ranges from -4 to -55
  - Number of subjects per score range:
    - -4: 1
    - -9: 0
    - -14: 0
    - -19: 0
    - -24: 0
    - -29: 0
    - -34: 0
    - -39: 0
    - -44: 0
    - -49: 1
    - -55: 0

- **DWR Score**
  - **Normal**: Blue bars
  - **Probable / Possible AD**: Orange bars
  - Score ranges from 0 to 10
  - Number of subjects per score range:
    - 0: 18
    - 1: 20
    - 2: 22
    - 3: 24
    - 4: 26
    - 5: 28
    - 6: 30

- **MMSE Score**
  - **Normal**: Blue bars
  - **Probable / Possible AD**: Orange bars
  - Score ranges from 18 to 30
  - Number of subjects per score range:
    - 18: 1
    - 20: 0
    - 22: 0
    - 24: 0
    - 26: 0
    - 28: 1
    - 30: 0

Delayed Word Recall Validation

- Gen Re LifeHealth DWR Mortality Study
  - Laura Vecchione, MD
  - Eric Golus, FSA
  - J Insur Med. 2007;39:264-269
DWR Mortality Study

- Surrogate for elderly life insurance in force, conventional underwriting
- Population of LTCI applicants
  - Age 70 - 99, average 78.5
  - Up to 11.2 years of follow up, average 6.9 yr
  - 14,631 lives, 4,388 deaths
- LTCI underwriting action:
  - Issued (12,928)
  - Declined solely due to cognitive impairment (1,703)
- Mortality determination
  - Social Security Death Master File: Public record of all deaths
  - Match of applicant to SSDMF determines vital status and date of death
  - Observation period 1995-2006
Gen Re DWR Mortality Study 2006

1995 - 2006 DWR Mortality Study

MR (% of 2001 VBT)

266

109

2 8

DWR Score

0 50 100 150 200 250
### Review of Test Instruments

#### Delayed Word Recall

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<td>✓</td>
<td></td>
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Recommendations for Underwriting

- Assess cognitive function
  - 10 word delayed word recall
  - Clock drawing
- Validate
  - Instrument
  - Protocol
  - Mortality evidence
  - Appropriate population

- Make it quantitative
  - Objective
  - Underwriting performance
- Don’t innovate!
- Converge on a common standard
  - Paramed performance
  - Data analysis
- Don’t go last!!!