Assessing the older pilot: Why? What? When?

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I have the following financial relationships to disclose:

- Employee of: Emirates Airline

I will not discuss off-label use and/or investigational use in my presentation.
The Ageing Pilot

- The workforce is getting older
- “There are vital older people and there are worn out younger people.” WHO Ageing and Work capacity report 1993
- Age is not a good discriminator
- Then, what is?
Age and Function

- “An irreversible process starting at maturity and resulting in a number of deviations from the ideal state.” Murray-Bruce 2000
- Decline is non-linear
- Differences between individuals increase
- Many other factors
  - Genetics; Lifestyle; Exposures; Experience
Age and Function

- Muscle strength
- Aerobic capacity
- Hearing
- Vision
- Cognitive function
- Sleep
- Chronic disease and illness
  - CVD; Diabetes; Cancers
- Physiology

‘Healthy Cohort’
Population data not fully generalisable to the pilot population
What do we do in the U.A.E.?

- Multi-pilot crew / only one ≥ 60 years
- 6 monthly medical
- Additional medical requirements:
  - Psychology Assessment once at age 60
    - 3-4 hours (SMMSE; WMS-IV; NEO PI-R; BGT)
  - Alcohol screening once at age 60
  - Ophthalmology exam at age 60 and annually
  - Cardiology incl. EST at age 60 and annually
  - 6 monthly: ECG; Audio; Lipids; Gluc; Hb
What are we looking for?

- Sudden incapacitation risk
- Subtle incapacitation risk
- Functional reserve
  - ULR operations
  - Routine vs. Emergent operations
- Accidents in elderly pilots?
- Compensation: Experience
Risk Assessment Approach

Risk

- Hazard
- Likelihood
- Consequences
Screening a (relatively) Healthy Cohort

- Bayesian Theory
- Pre-test probability (prevalence)

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>True Positive</th>
<th>False Positive</th>
<th>True Negative</th>
<th>False Negative</th>
<th>Probability of Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% (10)</td>
<td>8 True +</td>
<td>99 False +</td>
<td>992 True -</td>
<td>20 False -</td>
<td>7.4%</td>
</tr>
<tr>
<td>10% (100)</td>
<td>80 True +</td>
<td>90 False +</td>
<td>810 True -</td>
<td>20 False -</td>
<td>47%</td>
</tr>
</tbody>
</table>

- Screening for conditions with low prevalence will lead to many false positives.
Cardiovascular Screening

- Atrial Fibrillation and CVD
- Resting ECG – 6 monthly
  - AF
  - Other Abnormalities (spec)
- Exercise Test
  - Low PPV
- prior CV Risk Assessment
- Imaging

<table>
<thead>
<tr>
<th>Age</th>
<th>AF Prev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-64</td>
<td>1.7%</td>
</tr>
<tr>
<td>65-69</td>
<td>4.0%</td>
</tr>
<tr>
<td>70-74</td>
<td>6.0%</td>
</tr>
<tr>
<td>75-79</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>CHD Prev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-44</td>
<td>1.2%</td>
</tr>
<tr>
<td>45-64</td>
<td>7.1%</td>
</tr>
<tr>
<td>≥65</td>
<td>19.8%</td>
</tr>
</tbody>
</table>
Vision

- AMD
- Glaucoma
- Cataract
- Others
- Annual Eye Exams – AME? Specialist?

<table>
<thead>
<tr>
<th>Age</th>
<th>AMD Prev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-64</td>
<td>0.2%</td>
</tr>
<tr>
<td>65-74</td>
<td>0.9%</td>
</tr>
<tr>
<td>75-84</td>
<td>4.6%</td>
</tr>
<tr>
<td>&gt; 84</td>
<td>13.1%</td>
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</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Glaucoma Prev.</th>
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</thead>
<tbody>
<tr>
<td>&lt;55</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>65</td>
<td>2%</td>
</tr>
<tr>
<td>80</td>
<td>4%</td>
</tr>
</tbody>
</table>

- Age
- Cataract 10 year Incidence
  - 43-83 years 10 year U.S. 54%
  - ≥ 49 years 10 year Aus 72%

Hearing

- Not controversial
Cognitive Decline

- Dementia, MCI, Other causes
- One of the biggest challenges
  - Test(s): sensitive, specific, easy acceptable etc.
  - Individual variation
  - Validation of tests

<table>
<thead>
<tr>
<th>Age</th>
<th>Prevalence of Dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 65</td>
<td>≤ 1.0%</td>
</tr>
<tr>
<td>&gt; 65</td>
<td>3-11%</td>
</tr>
<tr>
<td>&gt; 85</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Prevalence of Mild Cog Imp</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 65</td>
<td>17%</td>
</tr>
</tbody>
</table>
Cognitive Screening

- SMMSE
- MOCA: more sens. MCI
- Cog Screen AE
- Full psychometric testing
- Simulator testing
  - Multifactorial
  - Specificity?
- Repeat Testing?
In Summary: Screening Ageing Pilots

- Age itself is not a discriminator
- Pre-test probability/prevalence is critical
- High prevalence and/or high risk areas are:
  - Vision, hearing, cardiovascular, cognitive
- Cognitive screening
  - More useful against own baseline, repeated tests?
  - Fast, simple acceptable test > full if concerns
- Incorporate simulator assessment data?
References


viii. Varioius reviews from UptoDate.com


Questions?

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