The Ageing Pilot: What evidence should be used? A perspective from the UK...

Dr Stuart Mitchell
Disclosure Information

84th AsMA Annual Scientific Meeting
Dr Stuart Mitchell

I work for the UK Civil Aviation Authority
Opinions expressed are mine and not necessarily policy of the CAA

I have no financial relationships to disclose.
I will not discuss off-label use and/or investigational use in my presentation
6.22. Setting that against the risks referred to above, which the CAA has so far successfully addressed, and the fact that the CAA is not out of step with the majority of countries and international organisations, no doubt because of the evidence available to them, the Tribunal has concluded that age 60 policy for single pilot operations is a proportionate means of achieving the legitimate aim of the safety of public transport operations, including such helicopter operations.

6.23. Accordingly, the claim was dismissed.
• All Medical Certificates
  – No upper age limit

• Age Limitations to Commercial Air Transport (CAT) Privileges

27 Member States
Single Pilot Age 60
One-over one-under 60
Not over 65

FCL.065 Curtailment of privileges of licence holders aged 60 years or more in commercial air transport

(a) Age 60-64. Aeroplanes and helicopters. The holder of a pilot licence who has attained the age of 60 years shall not act as a pilot of an aircraft engaged in commercial air transport except:

(1) as a member of a multi-pilot crew; and

(2) provided that such a holder is the only pilot in the flight crew who has attained the age of 60 years.

(b) Age 65. The holder of a pilot licence who has attained the age of 65 years shall not act as a pilot of an aircraft engaged in commercial air transport.
(d) Operational limitation codes

(1) Operational multi-pilot limitation (OML — Class 1 only)

(i) When the holder of a CPL, ATPL or MPL does not fully meet the requirements for a Class 1 medical certificate and has been referred to the licensing authority, it shall be assessed whether the medical certificate may be issued with an OML ‘valid only as or with qualified co-pilot’. This assessment shall be performed by the licensing authority.

(ii) The holder of a medical certificate with an OML shall only operate an aircraft in multi-pilot operations when the other pilot is fully qualified on the relevant type of aircraft, is not subject to an OML and has not attained the age of 60 years.

(iii) The OML for Class 1 medical certificates may only be imposed and removed by the licensing authority.
The pilot system

**Sub-systems**
- Vision
  - Acuity
  - Field
- Speech & Hearing
- Sensorimotor / physical
- Neurocognitive
- Psychological/higher functions
- CVS
- Resp
- GI
- GU
- etc

**Failures**
- Slow vs acute
- Individual sub-systems in isolation, e.g. vision
- Subsystems that cause all sub-system failure e.g. CVS, Neuro

**Redundancy**
- Duplication e.g. Vision, hearing
- Sub-Systems that can lose large amounts of function before risk is substantial, e.g. musculoskeletal
## The pilot system: what to check

<table>
<thead>
<tr>
<th>Sub-systems</th>
<th>Medical</th>
<th>Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>– Acuity</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>– Field</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>Speech &amp; Hearing</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>Sensorimotor / physical</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>Neurocognitive</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>Psychological/higher functions</td>
<td>√</td>
<td>(√)</td>
</tr>
<tr>
<td>CVS</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Resp</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>GI</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>GU</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>etc</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>
Age Distribution of Class 1 & Fixed Wing & Rotary 31/3/2004

- Class 1 Fixed wing
- Class 2 Fixed wing
- Class 1 Rotary
- Class 2 rotary

Fixed wing pilots vs Rotary Pilots
Is age something we should worry about?

Male Death Rates per 1,000 Population
- England & Wales 2001

Age in years

16-19 25-29 35-39 45-49 55-59 65-69 75-79 84

British Heart Foundation Database
Is age something we should worry about?
UK Accident Database

All Accidents 1987-2006

Accidents per 1000 valid licence holders per year

Age

16-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
61-65
66-70
71-75
76+

Total Accidents
Fatal Accidents
EVANS S, R ADCLIFFE S-A.
The annual incapacitation rate of commercial pilots. 
Rate of “incapacitation” per annum (%) by age

<table>
<thead>
<tr>
<th>Age group</th>
<th>17-19</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60-69</th>
<th>70-79</th>
<th>80+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male incapacitations (%)</td>
<td>0 (0%)</td>
<td>2 (5%)</td>
<td>6 (15%)</td>
<td>11 (28%)</td>
<td>13 (33%)</td>
<td>7 (18%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Male pilots (%)</td>
<td>3 (0.02%)</td>
<td>1788 (11.50%)</td>
<td>5158 (33.20%)</td>
<td>4835 (31.1%)</td>
<td>3123 (20.10%)</td>
<td>581 (3.70%)</td>
<td>38 (0.24%)</td>
<td>2 (0.01%)</td>
</tr>
<tr>
<td>Percent Incapacitation rate per annum</td>
<td>0.00%</td>
<td>0.11%</td>
<td>0.12%</td>
<td>0.23%</td>
<td>0.42%</td>
<td>1.20%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
"Incapacitations", 2004

<table>
<thead>
<tr>
<th>Cause of Incapacitation</th>
<th>Number of events</th>
<th>Ages of pilots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>6</td>
<td>39, 52, 54, 58, 59, 64</td>
</tr>
<tr>
<td>Chest pain</td>
<td>2</td>
<td>48, 60</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>3</td>
<td>42, 50, 66</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>2</td>
<td>45*, 49</td>
</tr>
<tr>
<td>Cerebrovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>4</td>
<td>33, 42, 50, 59</td>
</tr>
<tr>
<td>Subarachnoid hemorrhage</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic attack</td>
<td>3</td>
<td>34*, 35*, 64*</td>
</tr>
<tr>
<td>Spontaneous pneumothorax</td>
<td>4</td>
<td>30, 40, 44, 62</td>
</tr>
<tr>
<td>Gastric ulcer</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>Perforated appendix</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Syncope</td>
<td>1</td>
<td>54</td>
</tr>
<tr>
<td>Bowel obstruction</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td>Biliary colic</td>
<td>1</td>
<td>51*</td>
</tr>
<tr>
<td>Migraine</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>Prolapsed intervertebral disc</td>
<td>1</td>
<td>52</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>2</td>
<td>24, 55</td>
</tr>
<tr>
<td>Vestibular disturbance</td>
<td>1</td>
<td>39*</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
<td></td>
</tr>
</tbody>
</table>

* Occurred in flight or in the simulator.
Cardiovascular disease (CVD) deaths vs cancer deaths by age (United States: 2008).
Age-specific male death rates from CHD, 1968-2003, UK (plotted as a percentage of the rate in 1968)

World Health Organization (2002)
World Differences

Death rates from CHD, men and women aged 35-74, 2000, selected countries


www.heartstats.org
Application of a Cardiovascular Disease Risk Prediction Model in United Kingdom Commercial Pilots (Houston Mitchell & Evans)

Distribution of 'High Risk' male pilots by age

CVD score (Binned)
10-year risk < 20%
10-year risk > 20%

Age in Years
Frequency

Frequency
Age in Years

Frequency
Application of a Cardiovascular Disease Risk Prediction Model in United Kingdom Commercial Pilots (Houston Mitchell & Evans)
Professional Flying

**Single Pilot**
- Insidious incapacitation may not be noticed
- Sudden acute incapacity more likely than not to cause accident
- Severe pain/distraction hazards flight but survival instincts are strong
- Need to have pilot with ‘no significant increased risk’

**Multi Pilot**
- Insidious incapacitation more likely to be noticed
- Sudden acute incapacity unlikely to cause accident (certainly in cruise, <1/100 in critical phase)
- Severe pain/distraction unlikely to hazards flight as second pilot can continue
- Can have pilots with higher risk due mitigation of 2nd pilot
My Personal View

• Class 1
  – Consider formalising CVS risk assessment before 65 and set limits for further testing
    • e.g. CV risk >20% in 10 yrs -> ETT
    • Particularly important for SPT >50 yrs
  – “2-over 60” ok for multi-pilot operations
  – 6-monthly proficiency checks remain a very good overall performance measure

• Class 2
  – Consider age-related competency checks
Questions
What Evidence should we use?

• Accident rates
  – Type of operation
    • Prof/Private
    • Single/multicrew
    • Aeroplanes/helicopters
    • Jet/piston
  – Licence
    • ATPL/CPL
    • PPL
  – Pilot experience
  – Pilot Recency

• Medical Fitness
  – Functional
  – Incapacitation risk
  – ‘Behavioural’

Prevention Tools
  – Flying proficiency tests
  – Medicals
Over 60 CI1 PT Assessment

Annual CV Risk Assessment (Age/BP/Chol/DM/Sm/LVH)

CVRA >10% in 10 yrs

Odd Ages (yrs) → Even age (yrs) → Odd Ages (yrs)

CVRA <10% 10yrs

Coronary Calcium Score

Exercise Test

Abnormal / unacceptable risk (FR/CCS/ETT)

Myoview scan or Stress Echo

Abnormal/ unacceptable

Unfit

Normal/ acceptable

Fit (OML restriction may be appropriate)

Normal / acceptable risk (FR/CCS/ETT)