Rising Overweight trends raise concerns for Obstructive Sleep Apnoea, in turn Aviation Safety

Sanjiv Sharma, Peter Clem, Mike Seah, Michael Drane
Rising Overweight trends raise concerns for Obstructive Sleep Apnoea, in turn Aviation Safety

- Background
- Aim
- Methodology
- Results
- Discussion
- Conclusion
Obesity and Obstructive Sleep Apnoea

Obstructive Sleep Apnoea (OSA)
- Commonest sleeping disorder
- Related to:
  - Body mass index (BMI)
  - Hip to waist ratio
  - Neck circumference

<table>
<thead>
<tr>
<th>BMI</th>
<th>Moderate – Severe OSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>11%</td>
</tr>
<tr>
<td>25 – 30</td>
<td>21%</td>
</tr>
<tr>
<td>&gt;30</td>
<td>63%</td>
</tr>
</tbody>
</table>

Figure: Distribution of BMI, people aged 18 and over, 1995 and 2011-12
“We must draw attention to the medical conditions that may affect sleep quality, such as obstructive sleep apnea (OSA), insomnia, and restless legs syndrome.”
Effects of OSA on Cognition

Likelihood of Performance Impairment

• Neurocognitive dysfunction in OSA*
  – Deficits
    • Attention/vigilance
      – Significant impairment with disease severity**
    • Executive function
    • Subdomains of memory function
      – Verbal and visual delayed long-term memory
  – Equivocal
    • global cognitive function
    • Immediate long-term memory
    • Working memory


Cognitive Benefits of Treatment of OSA

• Neurocognitive improvement*
  – Executive function
  – Delayed long-term memory
  – Global cognitive function

Beneficial Effects of Treatment of OSA

• Use of CPAP - Significant effect*
  – Quality of life
  – Mood
  – Daytime sleepiness
  – Work productivity

Civil Aviation Safety Authority (CASA) & Obesity

• Obesity warrants Risk Assessment:
  – Significant risk factor
    • Diabetes
    • heart disease
  • AND Sleep Apnoea

  – Sleep Apnoea - Likely to impair PERFORMANCE
Clinical Practice Guidelines
Raised BMI

BMI > 35
• Risk Analysis
  – Raised BMI assessment form
    • To determine need for sleep study to rule out OSA

BMI > 40
• Risk Stratification
  – Sleep Study
    • Diagnosis
    • Treatment
  – Operational (Ops) Check
    • Safety implications: likelihood of increased weight on safe operation of aircraft
BMI > 35: Raised BMI Assessment Form

RAISED BMI ASSESSMENT

NAME __________________________ ARN __________________________ DOB ___ / ___ / ___
Fasting BSL _____ mmol/L (Glucose Tolerance Test required if >=5.5 mmol/L **see note)
GTT result (if performed): Fasting: _____ mmol/L / 1 hr _____ mmol/L / 2 hr _____ mmol/L

RISK FACTORS (Any YES answer requires referral for a Sleep Study)
YES / NO Symptoms of obstructive sleep apnoea?
YES / NO History of congestive heart failure?
YES / NO History of atrial fibrillation?
YES / NO History of treatment of refractory hypertension?
YES / NO History of type 2 diabetes?
YES / NO History of nocturnal dysrhythmias?
YES / NO History of stroke?
YES / NO History of pulmonary hypertension?
YES / NO Epworth sleep score >8?
YES / NO Neck circumference >42cm for men and > 40cm in women?
YES / NO History of aircraft or motor vehicle accident within 10 years?

Referred for sleep study? YES / NO

CIVIL AVIATION SAFETY AUTHORITY
AIM
Aim

Study the outcome of Clinical Practice Guidelines among pilots with BMI > 35 for OSA
METHODOLOGY
Retrospective Analysis

- Accessed = 341 files
  - Inclusion criterion
    - Queried Medical Record System (MRS)
      - From 21 Mar 2016 to 8 Feb 2017
      - Sent email with an attachment of document ‘Reminder for requested reports’
  - Exclusion criterion
    - Established diagnosis of OSA
    - Found to have OSA, but did not provide sleep study report
- \( N = 290 \) (~85% of total files accessed)
RESULTS
BMI > 35: Screened for OSA

DAME/GP Assessed Sleep Study Not Required 48%

Underwent Sleep Study 32%

Administrative closure of application 20%

Figure: Outcome of Screening for Obstructive Sleep Apnoea (n=290)
Average BMI = 39.98 (+ 3.81) Range 35.08 – 49.31
Outcome of Screening for OSA

Figure: Diagnosis and Severity of Obstructive Sleep Apnoea, as per Sleep Study
Average AHI = 50.32 (± 30.36) Range 11.1 – 119
DISCUSSION
Outcome of the Study

- Retrospective study

- 48% of the sample
  - Assessed by GP/DAME’s based on CASA’s triage
    • Did not require sleep study

- ~60% of those who underwent sleep study
  - Moderate to severe OSA
    • Requiring active intervention to control OSA
CASA’s Approach to Obesity

• Pre-test probability
  – Higher BMI and other comorbid conditions*

* Furia A, Corvo S. ENAC aeromedical section experience on medical fitness decision following referral or consultation procedure. Italian J Aerospace Med; 2016;15: 70-79
CASAS’s Approach to Obesity

• Effectiveness of triage
  – Further follow up prospectively
  – Revise criterion for sleep study!

• Effectiveness of sleep study
  – Need for ensuring long term compliance
    • Usage of CPAP
    • Reduction and maintenance of weight
Regulatory Approach
Evidence of Control of OSA

• Federal Aviation Authority (FAA)
  – Special issuance

• UK Civil Aviation Authority (CAA)
  – CPAP – to be used at least 5H/night for 6 nights/week AND Sleep period before flight
  – CPAP machine usage report with flying logbook

• Transport Canada (TC)
  – Follow up report

• NZ Civil Aviation Authority (NZ CAA)
  – Follow up report
ICAO
Health Promotion and SMS/FRMS

• ‘Health Promotion’ by ICAO
  – Timely diagnosis with an eye on trends
    • Reduction in BMI
      – Forebodes well
    • Stability of BMI
      – Need follow up
    • Increasing BMI
      – Warrants stringent monitoring

  – Safety management system
    • Fatigue risk management system
CONCLUSION
Regulatory Implications of the Outcome of the Study

• Appropriate approach to stratify those at risk
  – Triage for screening
  – Sleep study for those with pre-test probability

• Need for studying available data for refining regulatory policies
Rising Overweight trends raise concerns for Obstructive Sleep Apnoea, in turn Aviation Safety