



Australian Government
Civil Aviation Safety Authority



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



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

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- Conclusion

Obesity and Obstructive Sleep Apnoea

Australia's health 2016

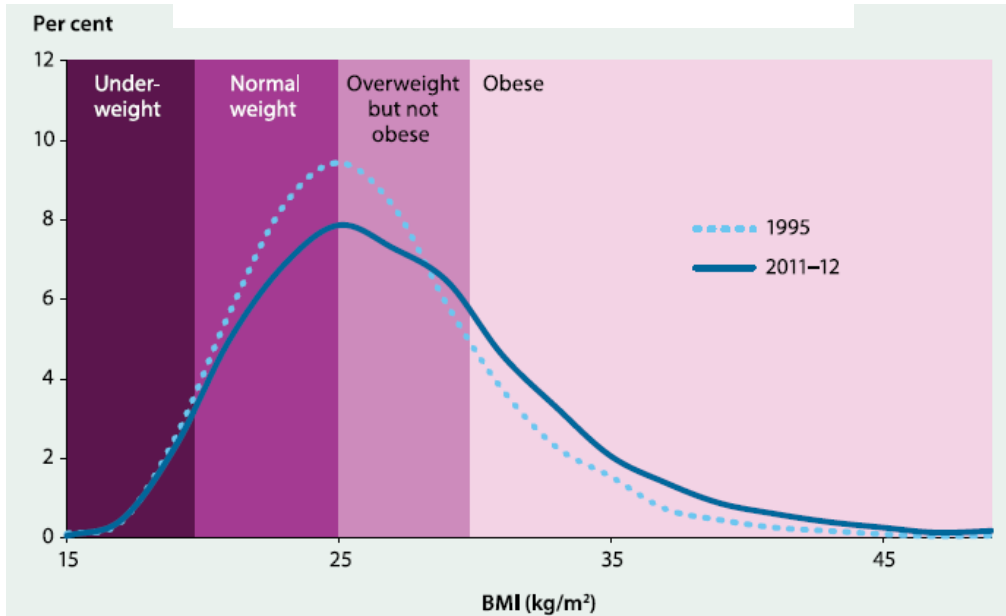
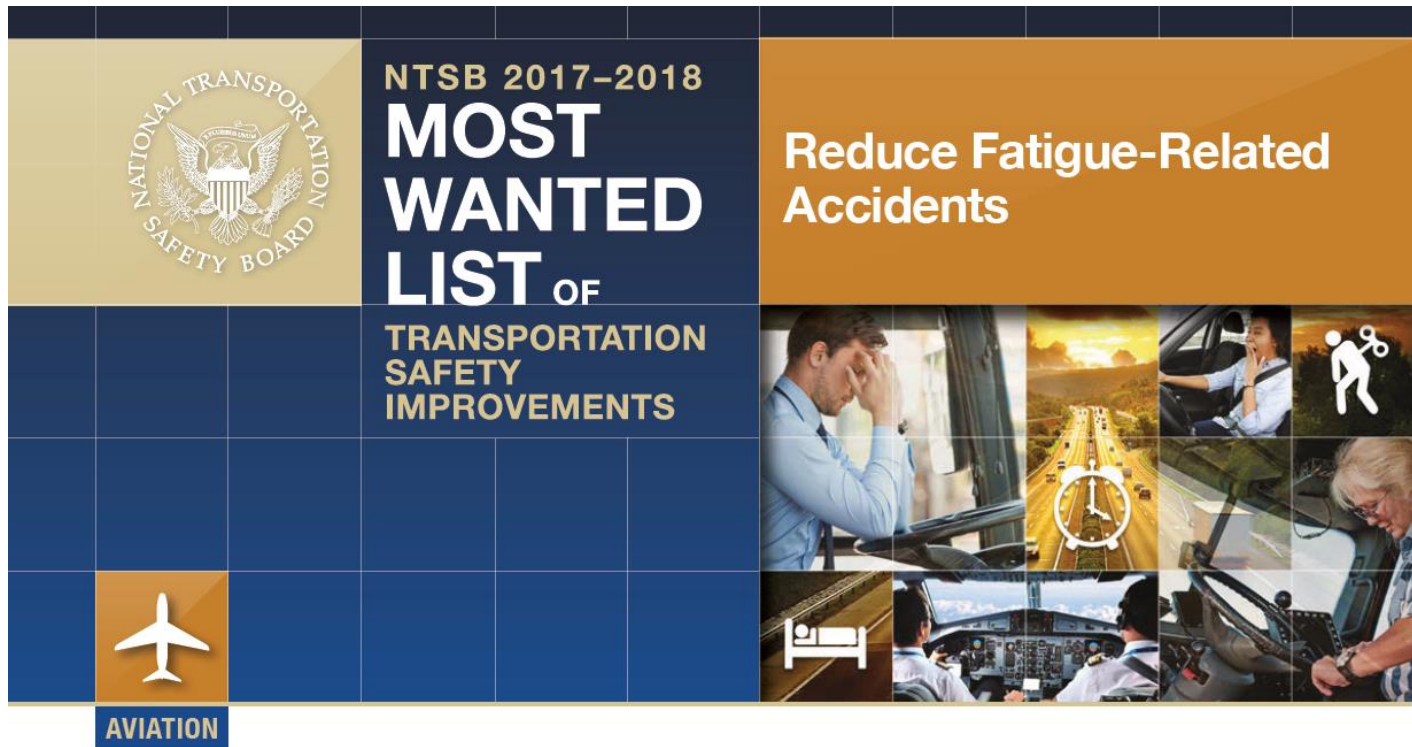


Figure: Distribution of BMI, people aged 18 and over, 1995 and 2011-12

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

BMI	Moderate – Severe OSA
<25	11%
25 – 30	21%
>30	63%



The graphic is a grid-based layout. The top-left cell contains the NTSB logo. The top-middle cell contains the title 'NTSB 2017-2018 MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS'. The top-right cell contains the subtitle 'Reduce Fatigue-Related Accidents'. The bottom-left cell contains an airplane icon and the word 'AVIATION'. The bottom-right cell is a collage of images related to fatigue: a pilot with a hand on his forehead, a road with a clock overlay, a driver on a mobile phone, a person with a backpack, a pilot in a cockpit, a person sleeping in a bed, and a close-up of a pilot's hands on the controls.

NATIONAL TRANSPORTATION SAFETY BOARD

NTSB 2017-2018
MOST WANTED LIST OF
TRANSPORTATION SAFETY IMPROVEMENTS

Reduce Fatigue-Related Accidents

AVIATION

*“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

* Bucks RA, Olaithe M, Eastwood P. Neurocognitive function in obstructive sleep apnoea: A meta-review. *Respirology* 2013; 18: 61–70

** Aloia MS, Arnedt JT, Davis JD *et al.* Neuropsychological sequelae of obstructive sleep apnea-hypopnea syndrome: a critical review. *J. Int. Neuropsychol. Soc.* 2004; 10(5): 772–85

Cognitive Benefits of Treatment of OSA

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

*

Beebe DW. Neurobehavioral effects of obstructive sleep apnea: an overview and heuristic model. *Curr. Opin. Pulm. Med.* 2005; 11(6): 494–500.



Beneficial Effects of Treatment of OSA

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

* Mokhlesi B, Ayas NT. Cardiovascular Events in Obstructive Sleep Apnea — Can CPAP Therapy SAVE Lives? N Engl J Med 2016; 375: 994-996



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 >42 cm for men and > 40 cm in women?

YES / NO History of aircraft or motor vehicle accident within 10 years?

Referred for sleep study? YES / NO

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

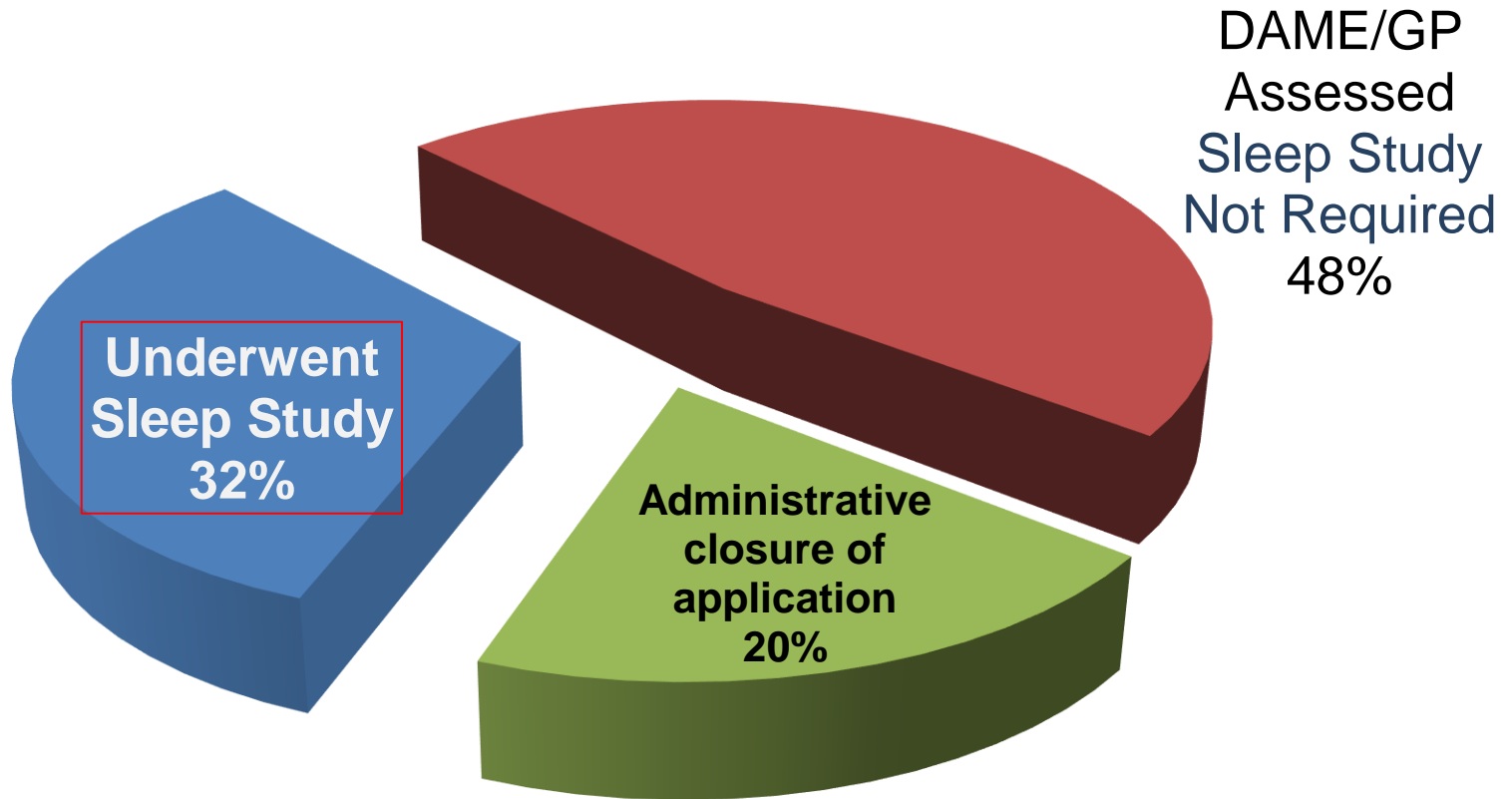


Figure: Outcome of Screening for Obstructive Sleep Apnoea (n=290)

Average BMI = 39.98 (\pm 3.81) Range 35.08 – 49.31

Outcome of Screening for OSA

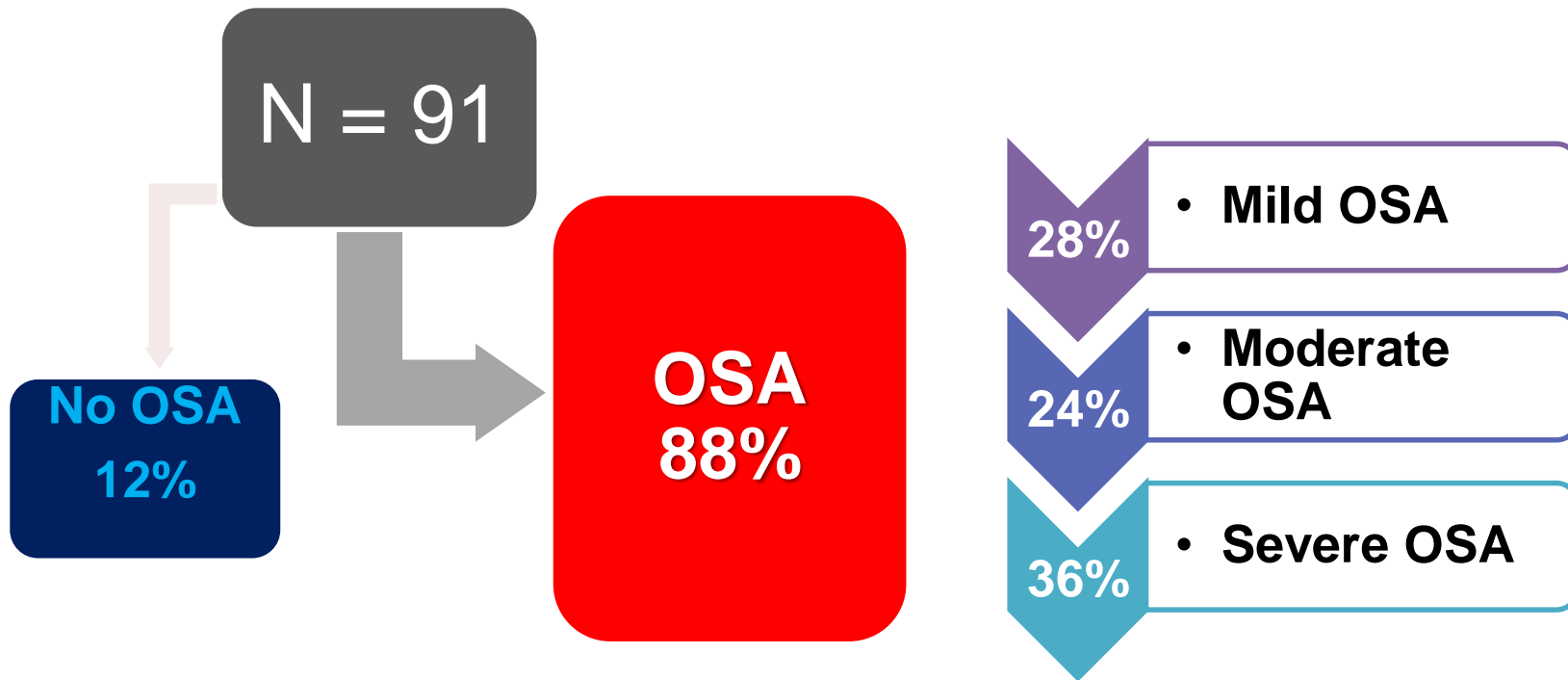


Figure: Diagnosis and Severity of Obstructive Sleep Apnoea, as per Sleep Study

Average AHI = 50.32 (\pm 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

CASA'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*

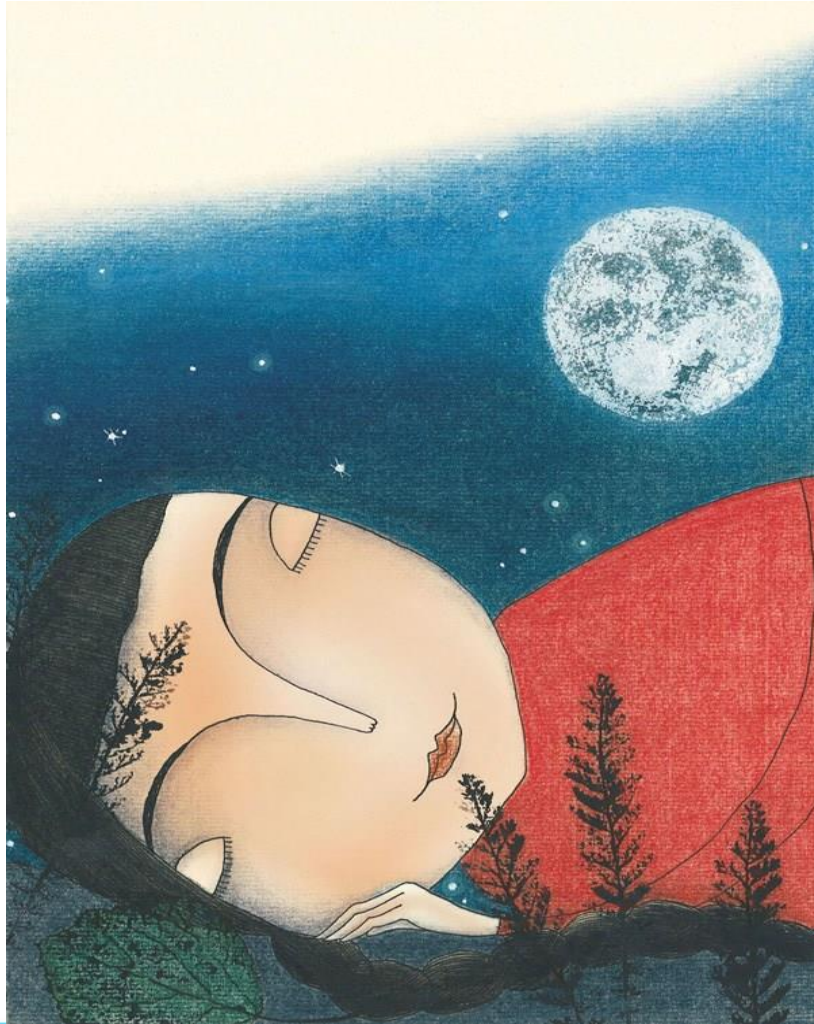


CONCLUSION



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



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