Update in Aviation Medicine

Dr Nicola Emslie
Air NZ Aviation Medicine Unit
Take Home Messages

• Relative hypoxia - 15% oxygen cf 21%
• Gas expansion 30%
• Stability of condition also key to safe travel
• Guidelines available to help
• Please consult us if any concerns or queries

Air NZ Aviation Medicine Unit:
ph: 09 256 3924
Nicola.Emslie@airnz.co.nz
Tim.Sprott@airnz.co.nz
MEDA form and guidelines

• www.airnewzealand.co.nz
Assessing fitness to fly

1. Is the person a risk to others? (infectious diseases)
2. Could flying exacerbate or complicate the condition?
3. Might the condition cause problems in flight that are difficult to deal with? (uncontrolled seizures)
4. Are there special requirements e.g. oxygen, escort?
Cabin pressure is automatically controlled in order to maintain a safe and comfortable environment – but it is not the same as sea level.

At 8,000ft:

- **Barometric pressure** ↓
- **Partial pressure oxygen** ↓
- **Gas volume** ↑
Cabin altitude 8000ft

- $\text{PaO}_2$ drops from 95 to 60 mmHg
- Equivalent to breathing 15% oxygen
- Healthy individuals experience 3-4% decrease in $\text{SaO}_2$
Cabin Altitude 8000ft

- Individuals with pre-existing cardiac, pulmonary or haematological disease – reduced baseline PaO$_2$ – more vulnerable to additional hypoxia
Pneumothorax

- Absolute contraindication to air travel
- May expand up to 30%
- CXR required confirming full resolution
- Wait 14 days before travel
- Chronic pneumothorax or severe cystic lung disease requires specialist assessment
COPD

- Should not travel if unwell
- 2L oxygen will correct hypoxia due to altitude in most cases, even quite severe disease
- Not fit to fly = cyanosis on ground despite supplementary O$_2$ or PaO$_2$ <55mmHg.
Rule of thumb

– \( \text{SaO}_2 \) on the ground, on air:
  - <93\% \textit{may} need oxygen
  - <88\% \textit{will} need oxygen
Oxygen assessments

• Simple – consider SaO$_2$ + exercise tolerance
  – Can they walk 100m with their hand luggage unassisted?
  – Can they walk 50m without SOB?
  – If Yes and SaO$_2$ $\geq$ 93%, likely ok without oxygen

• detailed assessments
  – 15% oxygen trial (HAST)
In-flight Oxygen

• Must be pre-arranged
• Emergency oxygen supply is for flight-related emergencies e.g. sudden decompression in the cabin. Limited supply. Must not rely on this for passengers.
• Oxygen bottles vs oxygen concentrators
Asthma

- Ensure medication carried on board
- Should not travel within 48h of significant exacerbation
- Cabin-air free of typical allergens – bigger risk is rushing about pre-flight and forgetting medication
Cardiovascular disease

- Myocardial infarctions
- Angina
- Cardiac Failure
- Valvular heart disease
Myocardial Infarction

British Cardiothoracic Society Guidelines

- **High risk patients** = EF<40% with signs and symptoms of heart failure or requiring further investigation/revascularization or device therapy). Discuss with AvMed Unit.

- **Moderate risk** = EF>40%, no evidence heart failure or inducible ischaemia/arrhythmia. Delay travel ≥10d.

- **Low risk** = 1st cardiac event, uncomplicated, age<65, successful reperfusion, EF>45%. Consider travel ≥ 3d.
Angina

- Carry GTN on board
- Consider wheelchair to the aircraft door, seat near toilet
- Supplementary oxygen + medical escort if severe or unstable
- If can walk 50m at mod pace without pain/SOB and no angina at rest, stable \( \rightarrow \) probably don’t need additional oxygen.
Other CVS conditions

- Heart failure, valvular disease, congenital cyanotic disease
  - Consider resting $\text{SaO}_2$, exercise tolerance, length of journey, general condition, stability
  - If can walk 50m and up a flight of stairs without chest pain or SOB probably don’t need oxygen
  - Consider seating arrangements, wheelchair
  - Oxygen not provided during stopover (Raffles HK)
  - Be more cautious after acute heart failure – 6 weeks, stable
Chicken Pox

Must not travel while still infectious. All lesions must be crusted over.

Submit Meda and carry letter explicitly confirming ‘not infectious’.
Cabin air and infectious diseases

- 50% cabin air drawn from outside, 50% recirculated through HEPA filters
- Air circulation such that risk of droplet spread from infectious passenger reduced
- Sitting in close proximity to an infectious person and fomites are biggest risks
Air flow in an aircraft
Ear Drum

Pain can be very severe → DO NOT FLY IF CANNOT EQUALISE EARS
Pregnancy

- Placental oxygen preferentially preserved
- Assuming – uncomplicated pregnancy, singleton, no history of premature/precipitate labour:
  - International flying permitted up to 36 weeks
  - Domestic or flights < 5h duration, flying permitted up to 38 weeks

- Considerations:
  - Multiple pregnancy (32 weeks INTL)
  - Medical complications in foetus
  - Letter confirming dates, fit to travel
Surgery

- Laparoscopic surgery – 3-5d
- Eye surgery/Ear surgery – depends on procedure (Note, cataract/corneal surgery - 24h)
- Major abdominal surgery – usually 10d – case reports of suture dehiscence due to pressure changes if travel too early
Broken bones

- Causes problems if limb swells within closed cast

- Lower limb cast - split if <48 hours since break/surgery

- Exit row not permitted for more room – have to be able bodied
Haematological conditions

• Generally fit to fly if Hb ≥ 95g/L.
• If due to chronic disease and compensated, Hb ≥ 80g/L.
• If lower or concurrent lung/cardiac disease, consider transfusion +/- supplementary O₂.
• Acute anaemia, check Hb > 24h after last blood loss, which must have ceased.
Adverse effects of alcohol are more marked at altitude...especially if combined with sleeping tablets.
Psychiatric conditions

- Consider stability, additional stresses of travel, ability to self-care, management of own medication, risk of deterioration
- May require an escort – friend/family or medical depending on severity
- Same reasoning applies for patients with dementia
Summary

• Relative hypoxia - 15% oxygen cf 21%
• Gas expansion 30%
• Stability of condition also key to safe travel
• Guidelines available to help
• Please consult us if any concerns or queries

Air NZ Aviation Medicine Unit:
ph: 09 256 3924