

INTRO:

- Safe apnoea time is the time before arterial haemoglobin oxygen saturation (SaO₂) decreases to 92%.
- A longer safe apnoea time gives clinicians more time to secure an airway.
- The elderly are more at risk of complications during the induction of anaesthesia, and experience biological changes to the pulmonary system.¹

AIM:

To exam the biological changes of the elderly and consider their effects on the pre-oxygenation process when using high flow nasal oxygenation (HFNO).

METHODS:

- We compared the safe apnoea time achieved after 3, 5 and 10 minutes of HFNO pre-oxygenation in a robust and validated computational simulation ^{2,3}
- Comparisons were made between 30 elderly virtual subjects and 30 non-elderly virtual subjects using the data from Table 1.

RESULTS:

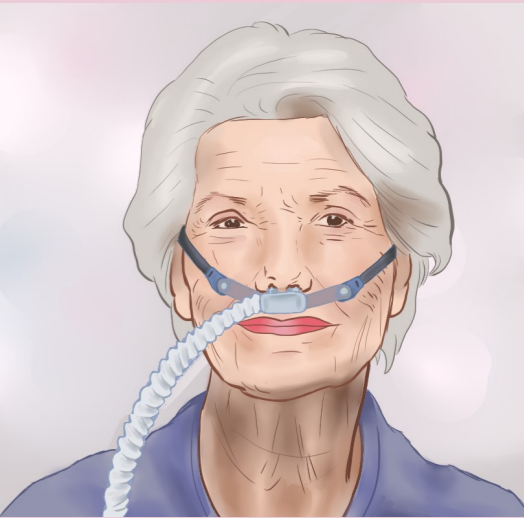
- Extending the duration of pre-oxygenation improves safe apnoea time.
- The extension is more effective in the elderly than non-elderly.

DISCUSSION:

- This has implications for clinical airway management during general anaesthesia and in resuscitation.
- The model presumed perfect health in the elderly. Comorbidities are likely to influence the findings; this will be the subject of future work.

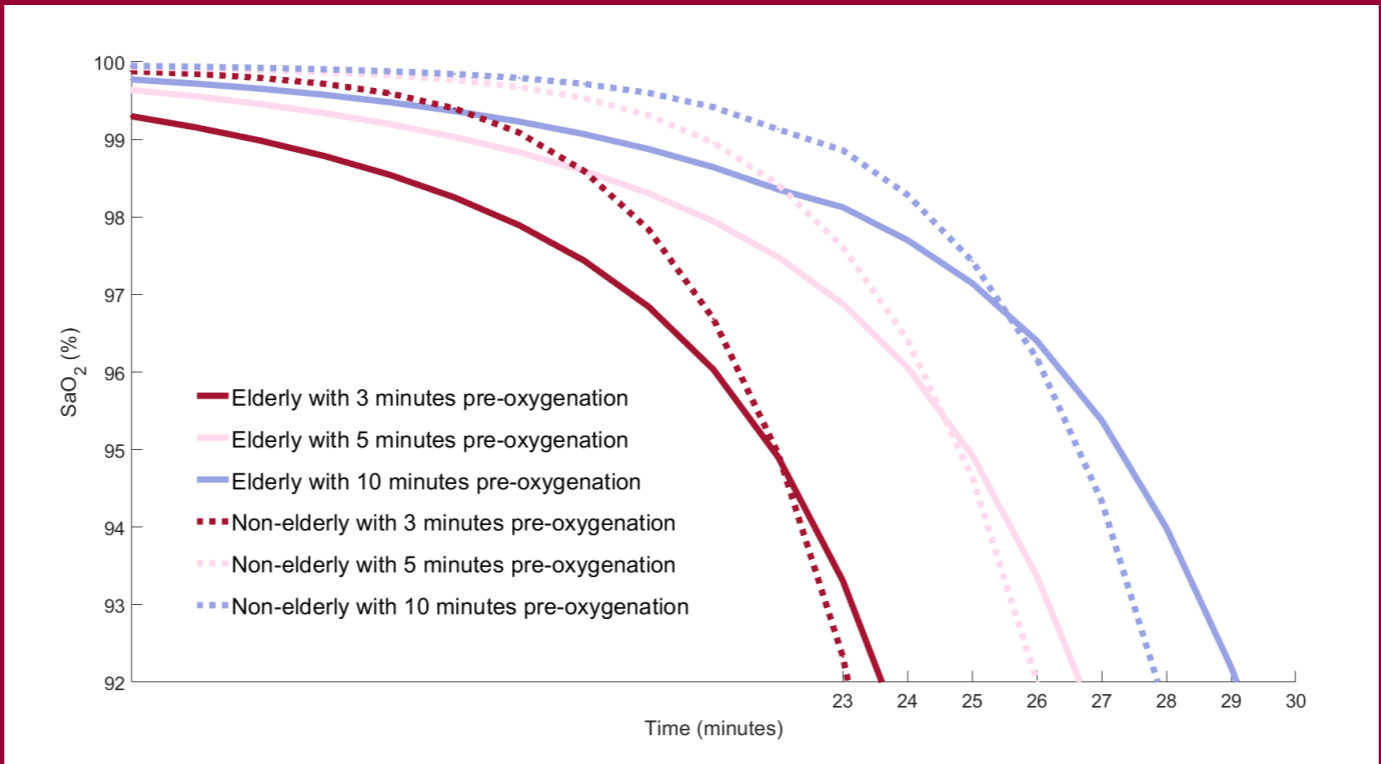
HFNO Pre-oxygenation Times in the Elderly: A Computational Modelling Study

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CONCLUSION:

Extending pre-oxygenation may result in a longer safe apnoea time for the elderly, when using high flow nasal oxygenation devices.



SaO₂ of elderly and non-elderly patients during apnoea after receiving 3, 5 and 10 minutes of pre-oxygenation.

	Non-elderly	Elderly
Weight (kg)	65–75	65–75
FRC (L)	2.5–2.6	2.9–3.1
VO ₂ (mL/min/kg)	3.3–3.7	2.3–3.5
Tidal volume (mL)	390–455	390–455
Ventilation rate (bpm)	10–14	12–25
Anatomical deadspace (mL)	100–200	127–370
Cardiac output (L min ⁻¹)	4.2–7	5.4–6.5
Heart rate (bpm)	60–100	63–76
Anatomical shunt (%)	1–5	12–17
Stroke volume (mL)	70	86.5
Threshold opening pressure of alveolar compartments (cmH ₂ O)	3–12	7.8–16.8

Table 1: Physiological values used to configure the pulmonary and cardiovascular systems of the 60 virtual subjects .

References:

1. Johnson KN, et al., Clinical interventions in aging, **10**, 1925 (2015);
2. Stolady D, et al., British Journal of Anaesthesia, **126**, 889 (2021);
3. Laviola M, et al., British Journal of Anaesthesia, **122**, e69 (2019);

SCAN FOR ABSTRACT AND MORE:



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