Intraoperative Oxygenation and Ventilation in Children: a U.K. Survey of Current Practice

L. Elgie, A. Miskovic, R. Nandi Great Ormond Street Hospital

Introduction

- There is minimal evidence for intra-operative protective ventilation strategies in paediatric anaesthesia
- Current consensus and research suggest targeting tidal volumes (VT) of 5-7mls^{-kg} [1] and avoiding FI_{O2} >0.8 in anaesthetised children with normal lungs [2]
- We surveyed paediatric anaesthetists to establish current practice in oxygenation and ventilatory strategies in children undergoing general anaesthesia (excluding children with congenital heart disease)
- We included questions on the use of nitrous

Methods

- An online survey link was emailed to the U.K. based members of the APAGBI
- Consultants were asked to answer questions in the following age groups: neonate, infant, 1-5/ 6-12/ 13-15 years old
- They were asked to give answers only on age groups they routinely anaesthetise

Results

- 221/594 U.K. based consultant members of the APAGBI responded (response rate 37.2%)
- 30% have been consultants for 10 years. The respondents work in a mixture of tertiary paediatric centres (65%), university teaching hospitals (10%) and district general hospitals (25%)
- The results are summarised in Figures 1-3 (responses to questions on FI_{O2} and nitrous during induction, maintenance and extubation) and the table below:

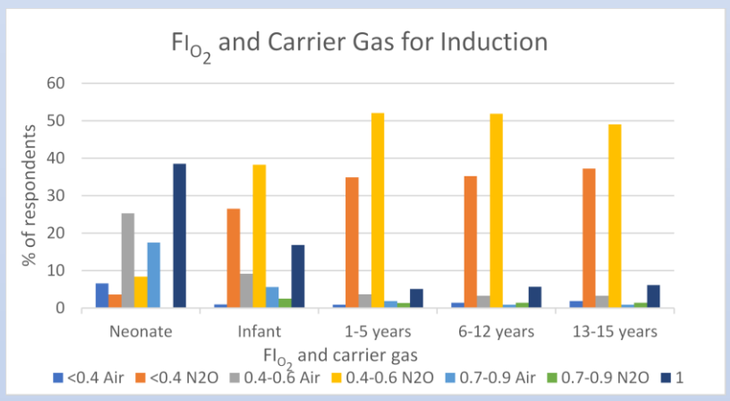

Figure 1. FI_{O_2} and carrier gas used for gas induction of anaesthesia.

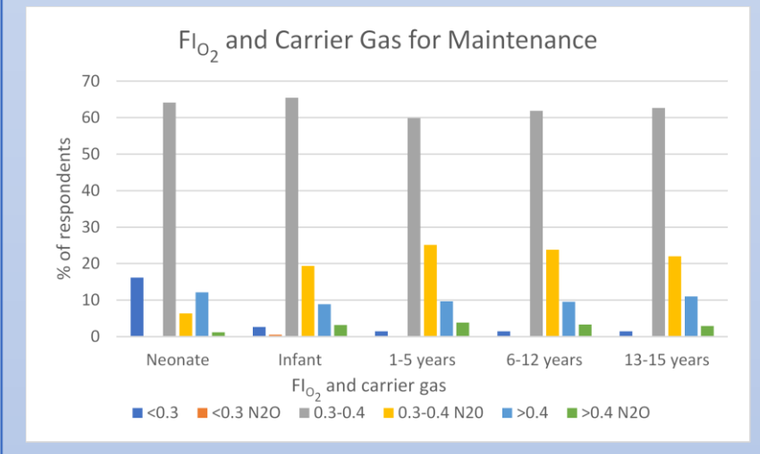

Figure 2. FI_{O_2} and carrier gas used for maintenance of anaesthesia.

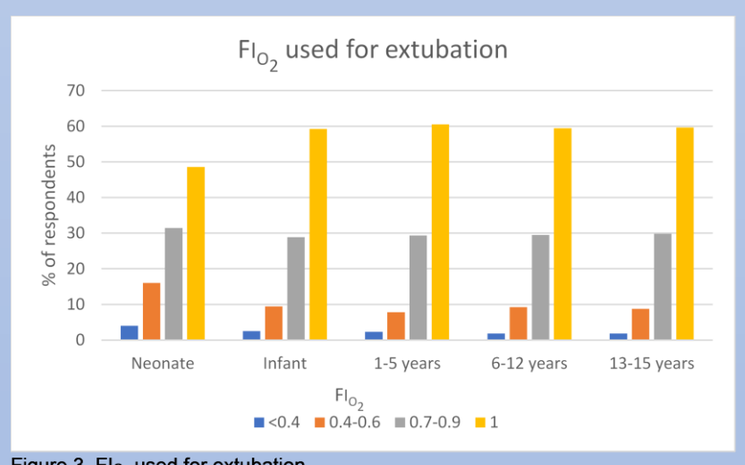

Figure 3. FI_{O_2} used for extubation.

Question		Neonate	Infant	1-5 years	6-12 years	13-15 years
When mechanically ventilating, presuming circuit compliance is taken into account, what V_T in mls.kg^{-1} do you target?	No V_T target	42%	27%	18%	16%	17%
	<=8	46%	59%	68%	70%	71%
	>8	12%	14%	14%	14%	12%
How do you assess adequacy of ventilation (without the presence of an arterial line to measure gas exchange)?	FE_{CO2}	92%	98%	99%	99%	99%
	Chest expansion	88%	73%	65%	65%	58%
	V_T	69%	76%	81%	81%	82%
	Other	26%	12%	10%	10%	10%
When mechanically ventilating through an endotracheal tube, what level of intraoperative PEEP do you set? (cmH_2O)	<4	7%	7%	8%	8%	8%
	4-5	79%	86%	89%	88%	87%
	>5	14%	6%	2%	3%	4%

Conclusions

- These results show varying practice among anaesthetists
- Oxygenation strategies in neonates seem to reflect the challenges of avoiding hypoxia versus avoiding hyperoxia
- Lung protective strategies are used less often in smaller children
- More research is needed to establish whether there is correlation between ventilatory strategies in paediatric anaesthesia and patient outcome

References

1. Kneyber MCJ, de Luca D, Calderini E et al. Recommendations for mechanical ventilation of critically ill children from the Paediatric Mechanical Ventilation Consensus Conference (PEMVECC). Intensive Care Med. 2017 Dec;43(12):1764-1780.

2. De la Grandville B, Petak F, Albu G et al. High inspired oxygen fraction impairs lung volume and ventilation heterogeneity in heathy children: a double-blind randomised controlled trial. Br J Anaesth 2019, 122(5):682-691