Transnasal Humidified Rapid Insufflation Ventilatory Exchange (THRIVE):

An Optimal Method of Preoxygenation for General Anaesthesia in Obstetrics

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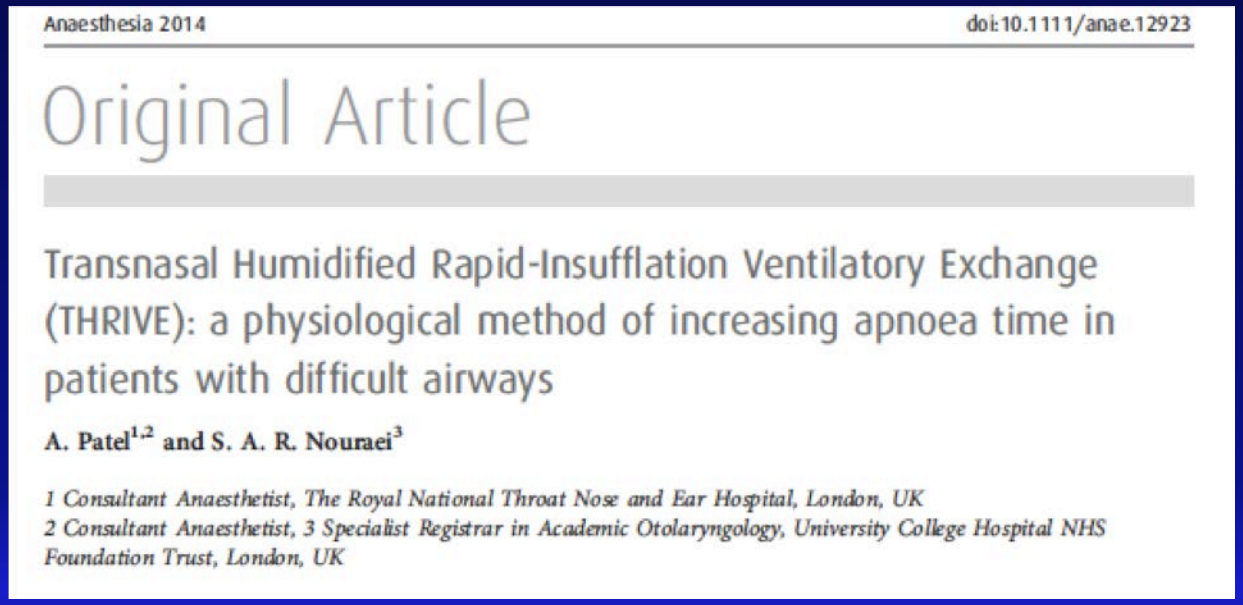
Aims

- Brief introduction on use of nasal O_2 therapy
- Benefits of THRIVE during RSI
- Our experience with THRIVE in obstetrics

Introduction

- Low Flow Nasal Cannula (LFNC) O_2 therapy
- High Flow Nasal Cannula (HFNC) O_2 therapy
- THRIVE



Anaesthesia 2014 doi:10.1111/anae.12923

Original Article

Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airways

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What is THRIVE?

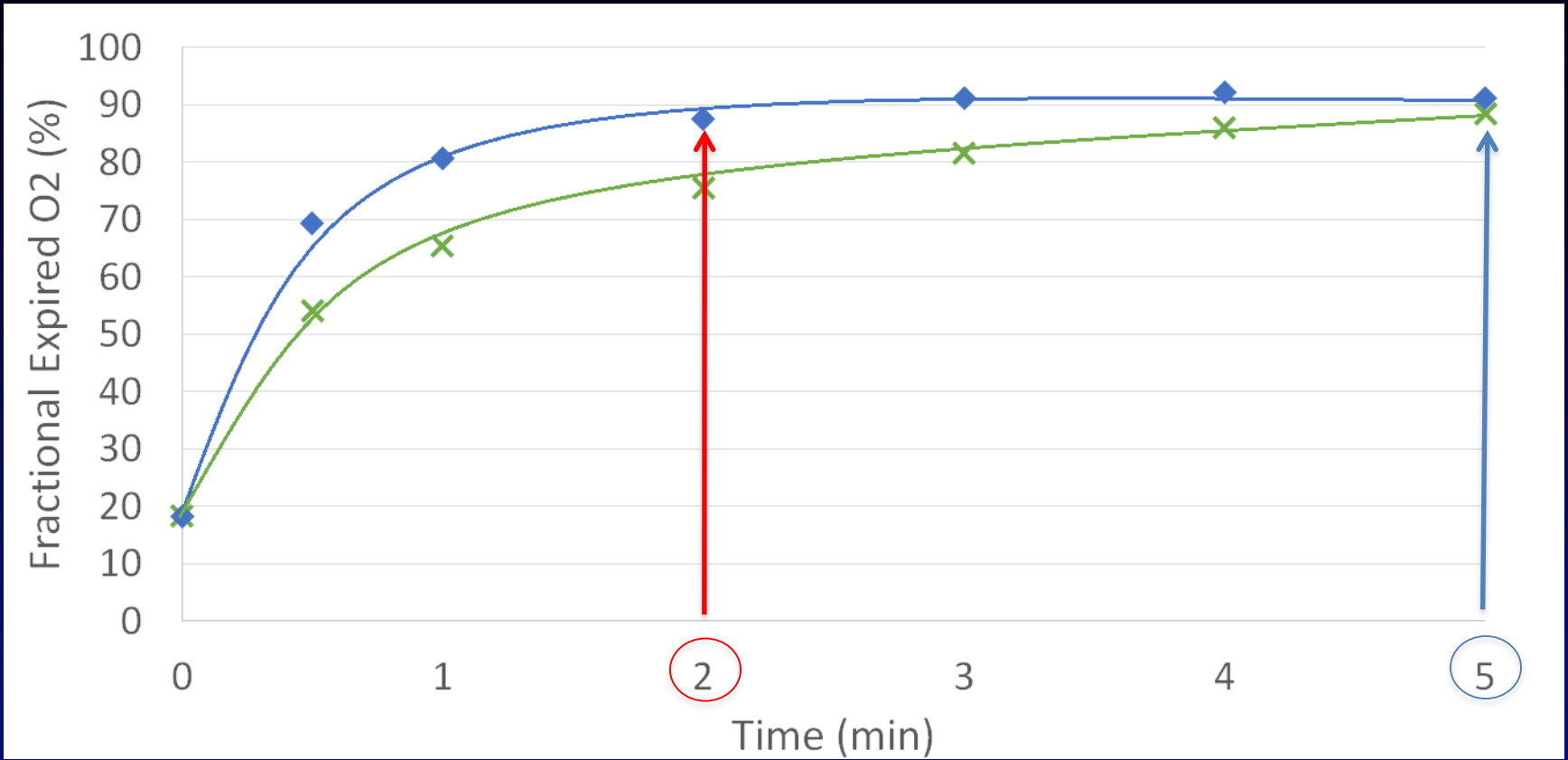
- Apnoeic oxygenation - *if* a patent airway
- CPAP of 3 - 7cmH_2O
- Dead space flushing

[1] Patel A and Nouraei S. **Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airways.** Anaesth 2015, 70(3): 323-29

Why Use THRIVE to Preoxygenate?

- Patel used THRIVE for oxygenation and ventilatory exchange– planned prolonged procedures

- We use THRIVE during RSI
  - Start PO whilst preparing drugs and equipment
  - Reach target of EtO_2 0.9 quicker



THRIVE ◆ Face Mask x

[2] Stolady et al. **Comparison of the rate of conventional bag-mask preoxygenation (CFMP) preoxygenation with THRIVE**. Poster presented at CARE 2015

Why Use THRIVE to Preoxygenate?

- PO continues *during* airway manipulation
- No loss of O_2 when suctioning pharynx
- Allows apnoeic oxygenation with *patent* airway
- More comfortable than CPO
- Can be used for extubation and recovery

[3] Stolady et al. **Pharyngeal oxygenation during apnoea following conventional pre-oxygenation and THRIVE.** International symposium in Critical Care and Emergency Medicine (ISICEM 2015)

Why use THRIVE in Obstetrics?

- GAs in obstetrics are high risk
- Increased incidence of difficult airway

  Kinsella SM, et al. **Failed tracheal intubation during obstetric general anaesthesia: a literature review**. *IJOA* 2015; 24: 356-74

- PO is known to be performed poorly

  Porter R, et al. **Preoxygenation for general anaesthesia in pregnancy: Is it adequate?** *IJOA* 2011; 20:363-5

- CPAP generated from the high flow may also improve the already compromised FRC

Why use THRIVE in Obstetrics?

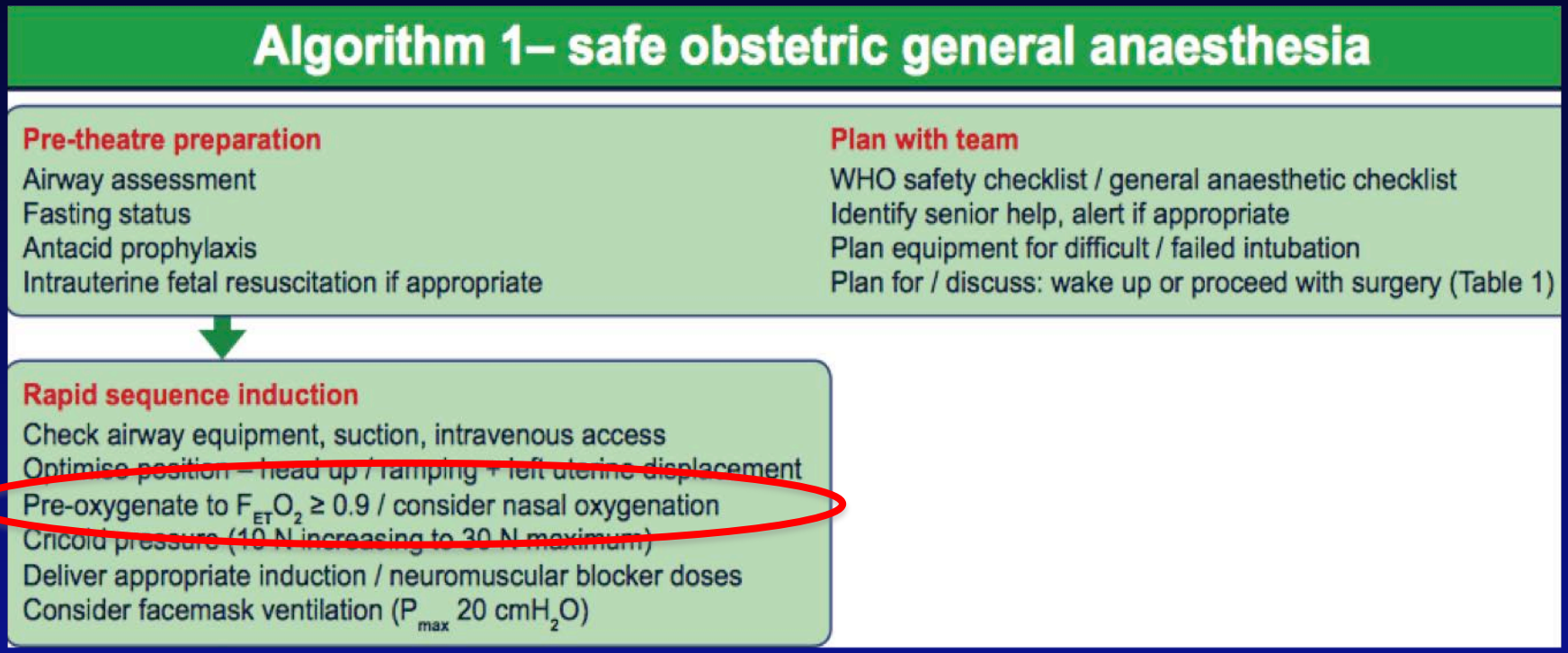
- Reduced exposure to obstetric GA during training

  Searle RD, et al. **Vanishing experience in training for obstetric general anaesthesia: an observational study**. IJOA 2008; 17: 233-7

- Any means of improving PO and extending the safe apnoea time is beneficial

Why use THRIVE in Obstetrics?

- New OAA/DAS guidelines suggest nasal oxygenation



[7] Mushambi MC, et al. **Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics**. *Anaesthesia* 2015; 70:1286-306

Our Experience with THRIVE

- R&D approval – service evaluation
- Primary objective
  - Assess if using THRIVE for PO is feasible in obstetrics
  - Assess the rate of oxygen desaturation
  - Share our experience with others
- Secondary objective
  - Neonatal outcomes

Method

- ALL obstetric GAs were included
- Anaesthetists choice of THRIVE vs standard
- If THRIVE used – started on arriving in theatre
- All other aspects of obstetric GA remained unchanged

Equipment

- Fisher & Paykel Optiflow system

Results

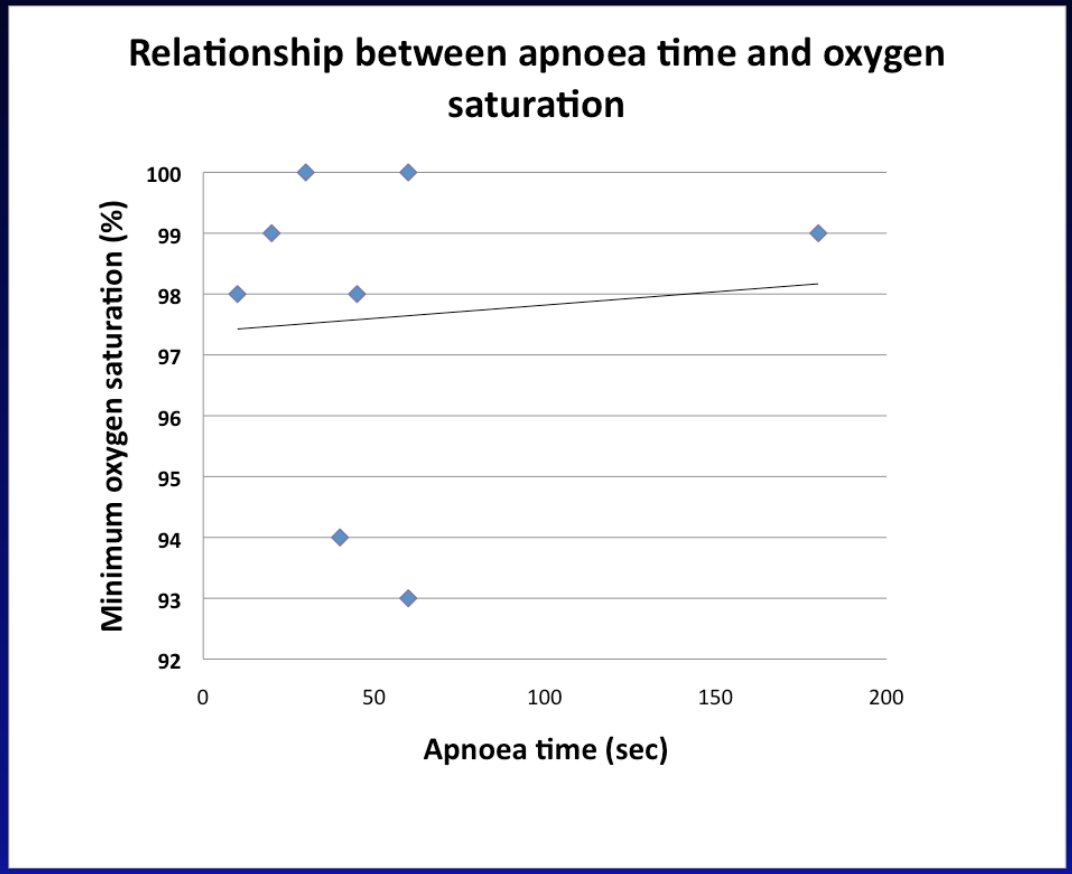
- 8/9 patients included
- Average BMI 31.5 (19 - 51)

Indication for Surgery	N = 9
Cat 1 LSCS	5
Cat 4 LSCS	1
Failed RA *	1
PPH	2

Results

- Average apnoea period 55s (10 – 180s)
- Laryngoscopy grade
  - Grade 1 (7)
  - Grade 2 (2)
- All patients intubated first time

Observations



Is Too Much Oxygen Harmful?

- Use of O_2 in El. LSCS
  - Lipid peroxidation without a significant increase in fetal PO_2
  - No benefit and *?potential harm*

- No benefit in El. LSCS with prolonged U-D time

[8] Khaw, KS et al. **Effects of high inspired oxygen fraction during elective caesarean section under spinal anaesthesia on maternal and fetal oxygenation and lipid peroxidation.** BJA 2002; 88: 4–5

[9] Khaw, KS et al. **Supplementary oxygen therapy for elective Caesarean section under spinal anaesthesia: useful in prolonged uterine incision-to-delivery interval.** BJA 2004; 92: 518–22

Is Too Much Oxygen Harmful?

- FiO_2 0.6 during Em. LSCS under RA
  - improved fetal oxygenation
  - with *no* increase in lipid peroxidation
  - *Potential benefit*

- All done under RA not GA

[10] Khaw K et al. **Supplementary oxygen for emergency caesarean section under regional anaesthesia.** BJA 2009;102(1):90-96

Is Too Much Oxygen Harmful?

- Increase in free radical activity during GA LSCS
  - *independent* of FiO_2 used

[11] Khaw K et al. **Effects of different inspired oxygen fractions on lipid peroxidation during general anaesthesia for elective caesarean section.** BJA 2010;105(3): 355-60

- THRIVE just used for PO
  - Usual gas mix once intubated successfully
- Our neonatal outcomes
  - Apgars all ≥ 7 at 1 min, all 9 at 5 min
  - All cord gases pH ≥7.2
- Benefit of improved PO and extended safe apnoea period out-weighed potential risks

Conclusion

- Well tolerated by awake patients
- Allows PO to start sooner and reach target quicker
- Allows peri-intubation oxygenation
- Extends the safe apnoea window
- Can be used during extubation and recovery

Thank You

References

[1] Patel A and Nouraei S. **Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airways.** Anaesth 2015, 70(3): 323-29

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[4] Kinsella SM, et al. **Failed tracheal intubation during obstetric general anaesthesia: a literature review**. IJOA 2015; 24: 356-374

[5] Porter R, et al. **Preoxygenation for general anaesthesia in pregnancy: Is it adequate?** IJOA 2011; 20:363-5

[6] Searle RD, et al. **Vanishing experience in training for obstetric general anaesthesia: an observational study**. IJOA 2008; 17: 233-7

[7] Mushambi MC, et al. **Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics**. *Anaesthesia* 2015; 70:1286-306

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[10] Khaw KS et al. **Supplementary oxygen for emergency caesarean section under regional anaesthesia.** BJA 2009;102(1):90-96

[11] Khaw K et al. **Effects of different inspired oxygen fractions on lipid peroxidation during general anaesthesia for elective caesarean section.** BJA 2010;105(3): 355-60

Setting it up

High flow meter
60+ L min^{-1}

Green O_2 Tubing

Diffusing "filter"

Humidification Chamber

Humidifier on

Breathing Circuit

Patient Bacterial Filter

Nasal Interface

It's easy and quick, warms up in 3-5 minutes
Keep ready for use
Leave ON