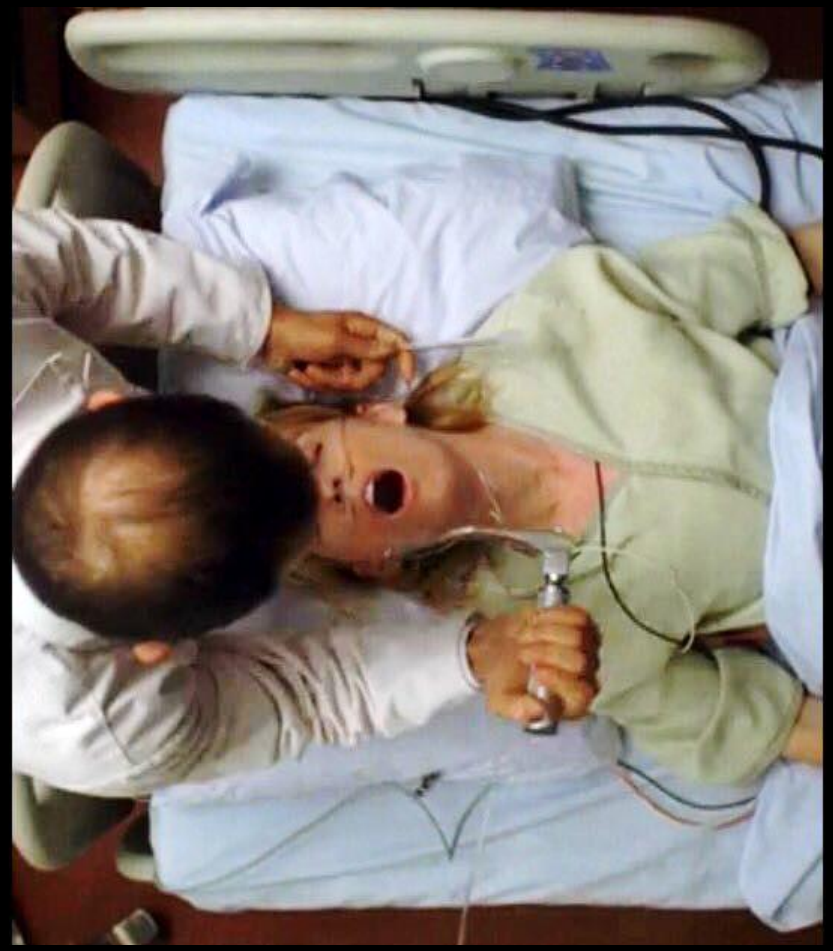
Not a systematic review!

AIRWAY UPDATE 2016

Current themes, new research and directions for the future

(Papers and themes emerging from late 2015 to end 2016)

THEMES IN 2016



- Clinical assessment – we suck
- New assessment methods – we still suck
- New devices – lack of robust evidence for improvement (we suck)
- Obstetric ~~airway~~ management – sucks
- OOT airway mx – everyone (including us) sucks
- Dealing with crises – Humans suck
- Suction devices - suck

Only thing that works is… ?


People say we cannot live without
LOVE
I think
OXYGEN
is more important.

AIRWAY ASSESSMENT

Difficult intubation incidence 1.86%

Unanticipated in 75-93% of cases

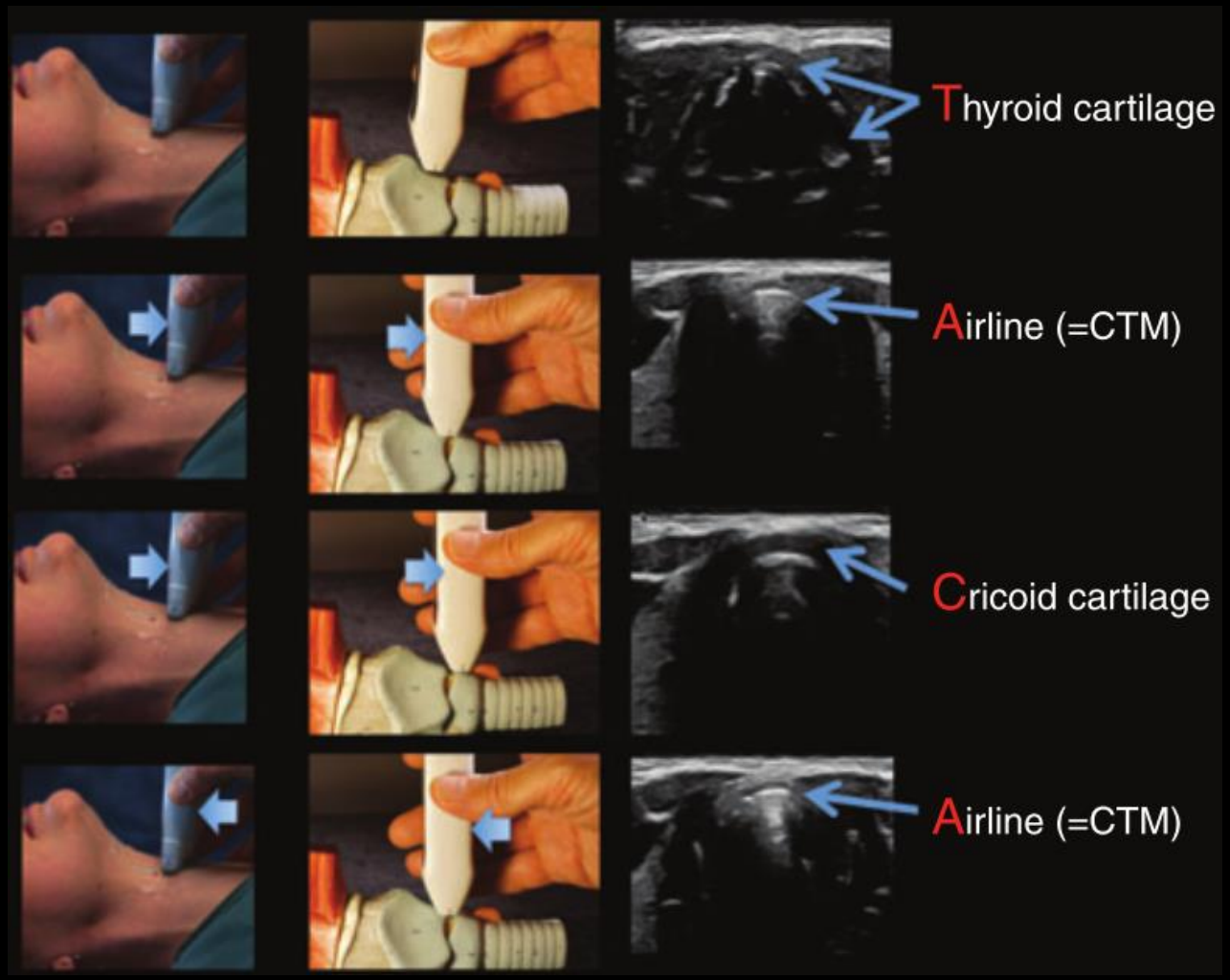
Difficult mask ventilation unanticipated in 94%

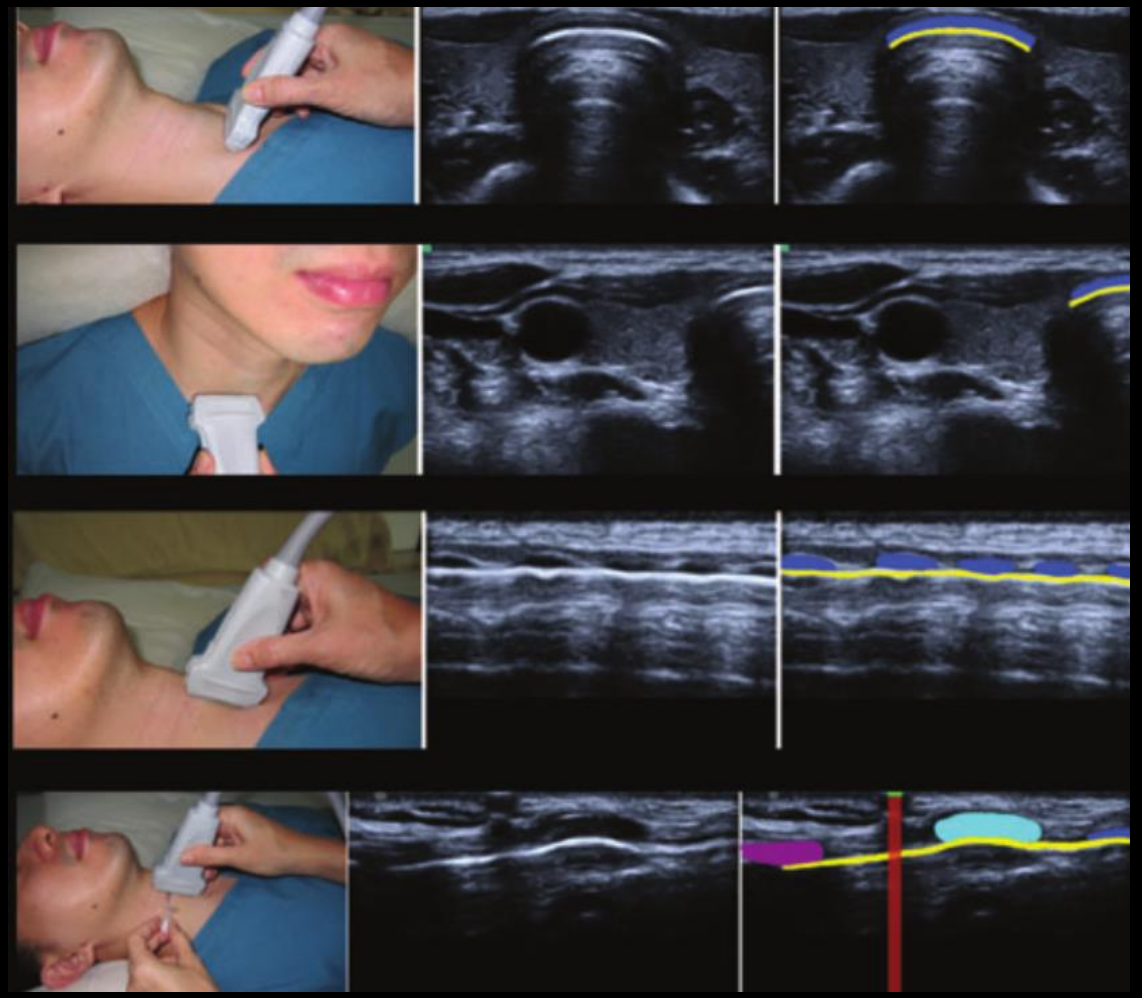
PHD THESIS DANISH MEDICAL JOURNAL

Preoperative airway assessment – Experience gained from a multicentre cluster randomised trial and the Danish Anaesthesia Database

Nørskov AK, Rosenstock CV, Wetterslev J, Astrup G, Afshari A, Lundstrøm LH. Diagnostic accuracy of anaesthesiologists' prediction of difficult airway management in daily clinical practice: a cohort study of 188 064 patients registered in the Danish Anaesthesia Database. Anaesthesia 2015, 70;272-281.

AIRWAY ULTRASOUND

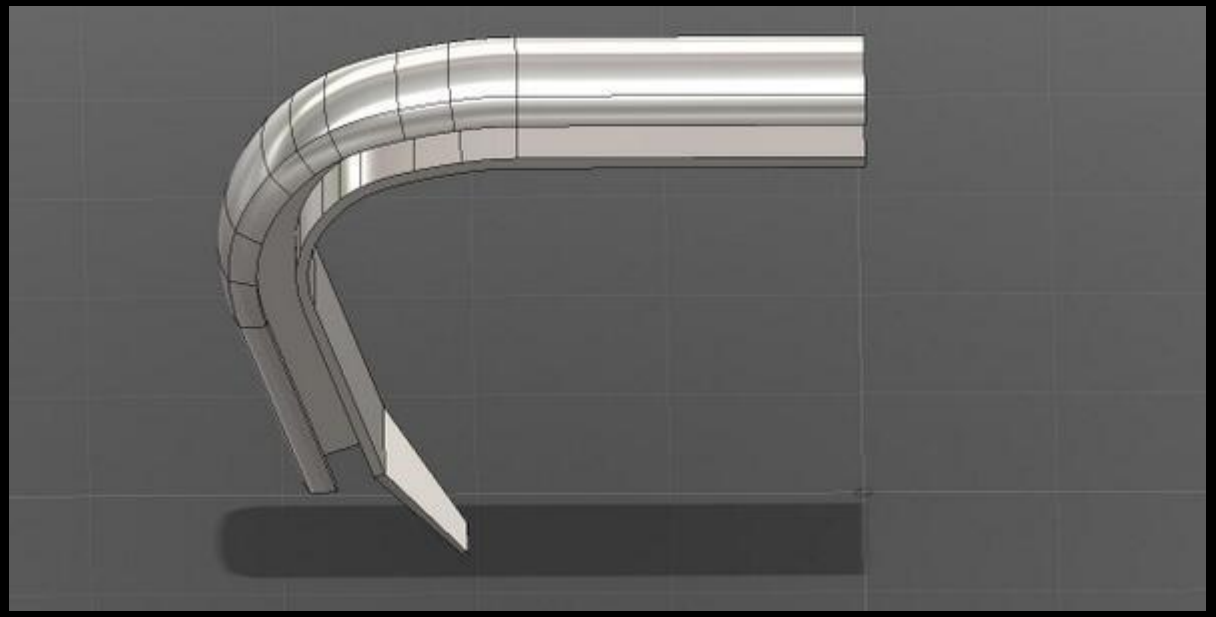


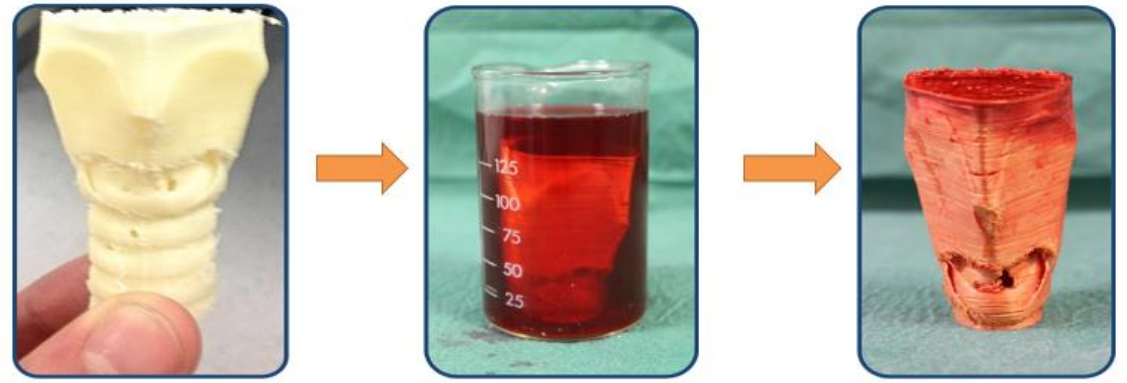


VIRTUAL ENDOSCOPY

https://www.youtube.com/watch?v=Aiez0FX-HOE

3D PRINTING IN AIRWAY MX





Novel Layfoam 40 airway model pre-, during and post immersion in deionised water

Complete 3D printed cricothyroidotomy model

Incised cricothyroidotomy model

3D Printing of Human Anatomy: The Production of Realistic Airway Models for Cricothyroidotomy Simulation

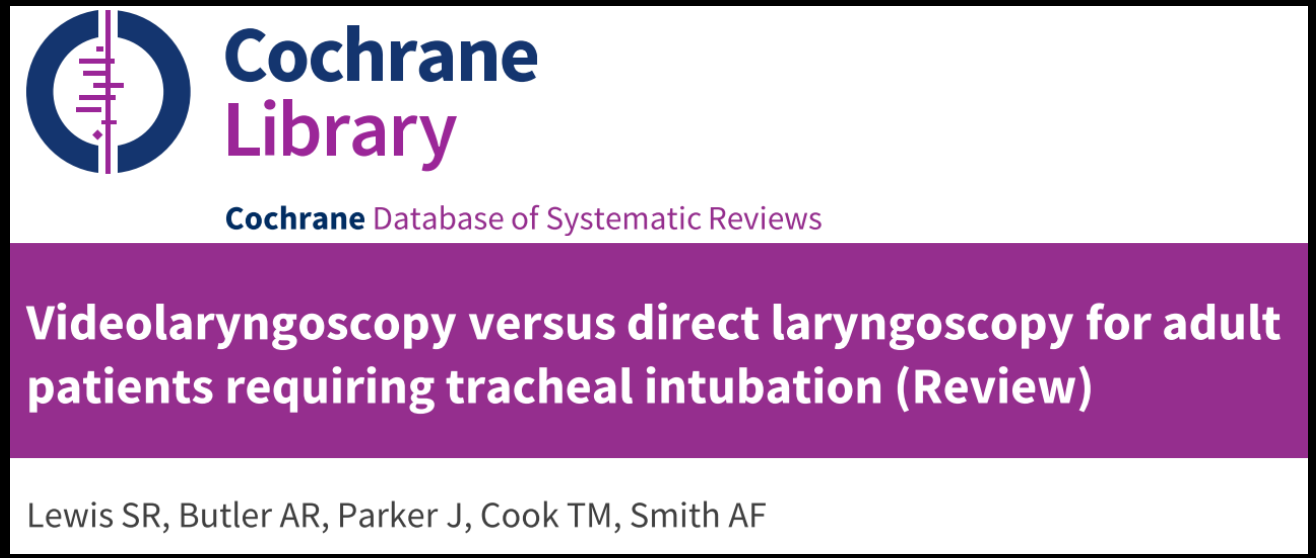
Michelle L. Smith [1], Tiarnan Byrne [1], Conan McCaul [2,3], Peter J. McMahon [4], Tomas Breslin [5], James F.X. Jones [1]

[1] Discipline of Anatomy, School of Medicine , University College Dublin, Ireland [2] The Department of Anaesthetics, Mater Misericordiae University Hospital, Dublin, Ireland [3] The Rotunda Hospital, Dublin, Ireland [4] The Department of Radiology, Mater Misericordiae University Hospital, Dublin, Ireland [5] The Accident and Emergency Department, Mater Misericordiae University Hospital, Dublin, Ireland

VL/DL

Cochrane systematic review

- Primary:
  - No difference in hypoxaemia
  - VL = fewer failed intubations
- Secondary:
  - VL improved glottic view
  - No difference in FPS
  - VL may reduce airway trauma
  - Subgroups: only CMAC better than DL
  - No difference with inexperienced VL users



Excellent commentary from George Kovacs: Lights Camera Action: Redirecting Videolaryngoscopy (Guest Post). *EMCrit Blog*. Published on December 9, 2016. http://emcrit.org/blogpost/redirecting-videolaryngoscopy/

TRAINING

"Do, or do not.

There is no try."

-Dumbledore

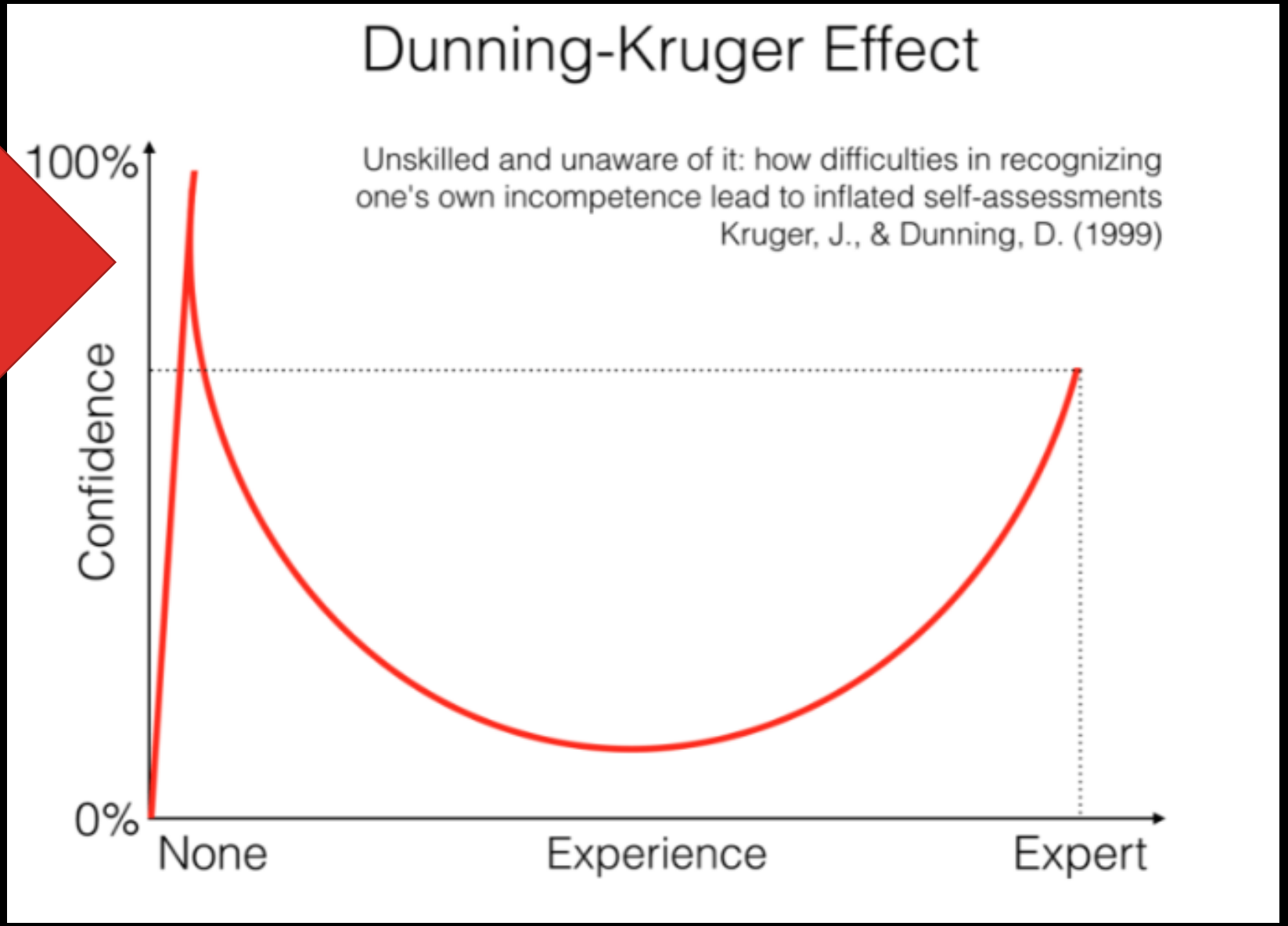
- What is expertise?
- How do we become experts?
- How do we *remain* experts?

British Journal of Anaesthesia **117** (S1): i13–i16 (2016)
Advance Access publication 8 June 2016 · doi:10.1093/bja/aew129

Is it time for airway management education to be mandatory?

P. A. Baker[1,2,*], J. Feinleib[3,4] and E. P. O'Sullivan[5]

Beware… Mount Stupid!



Mandatory?

Deliberate Practice

Repeat Performance

Problem Solving

Immediate Feedback

Clinical?

With great power comes great responsibility.

- Batman

Simulation?

Baker PA, Feinleib J, O'Sullivan EP. Is it time for airway management education to be mandatory? BJA 2016;117(suppl 1):i13-i6.

Sandra Viggers
http://scanfoam.org/go-sim-like-go-gym/

TRAINING TARGETS?

NAP4: 39% of adverse events during anaesthesia involve:

- Difficult/delayed intubation
- Failed intubation
- CICO

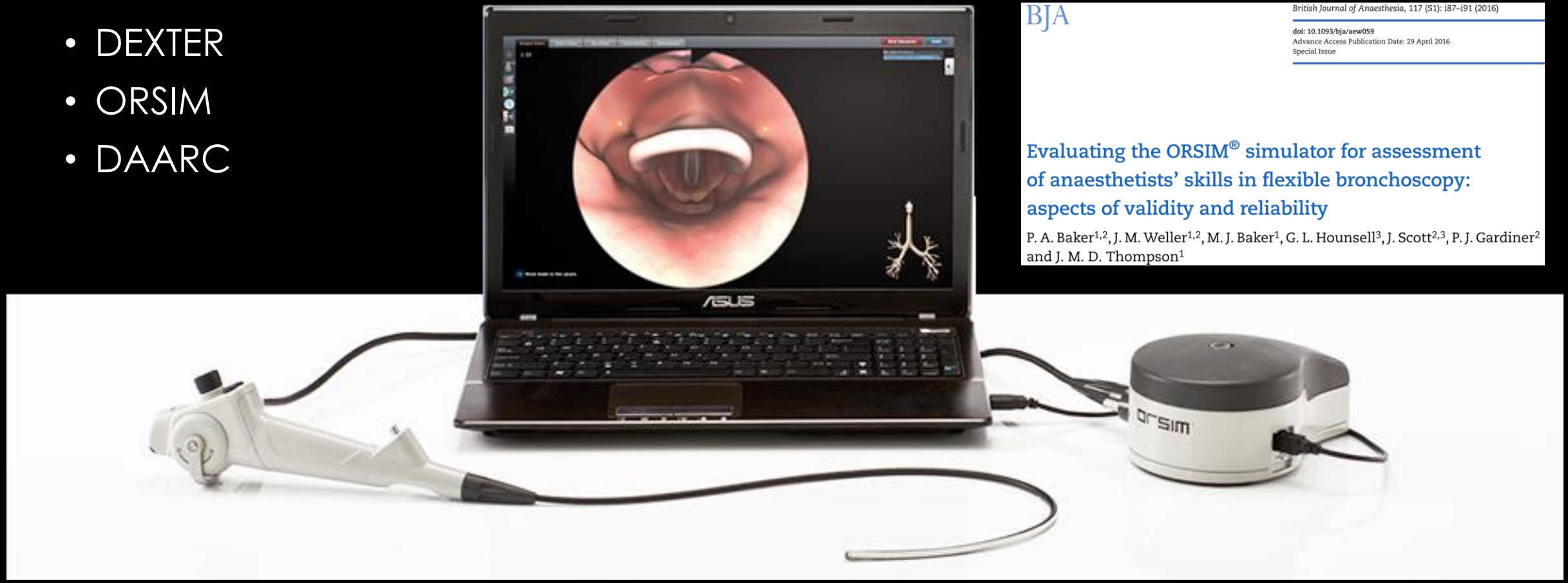
Of all anaesthesia deaths,

CICO = 25%

CICO *(ky-koh)*

GAMIFICATION

- DEXTER
- ORSIM
- DAARC



BJA

British Journal of Anaesthesia, 117 (S1): i87–i91 (2016)

doi: 10.1093/bja/aew059
Advance Access Publication Date: 29 April 2016
Special Issue

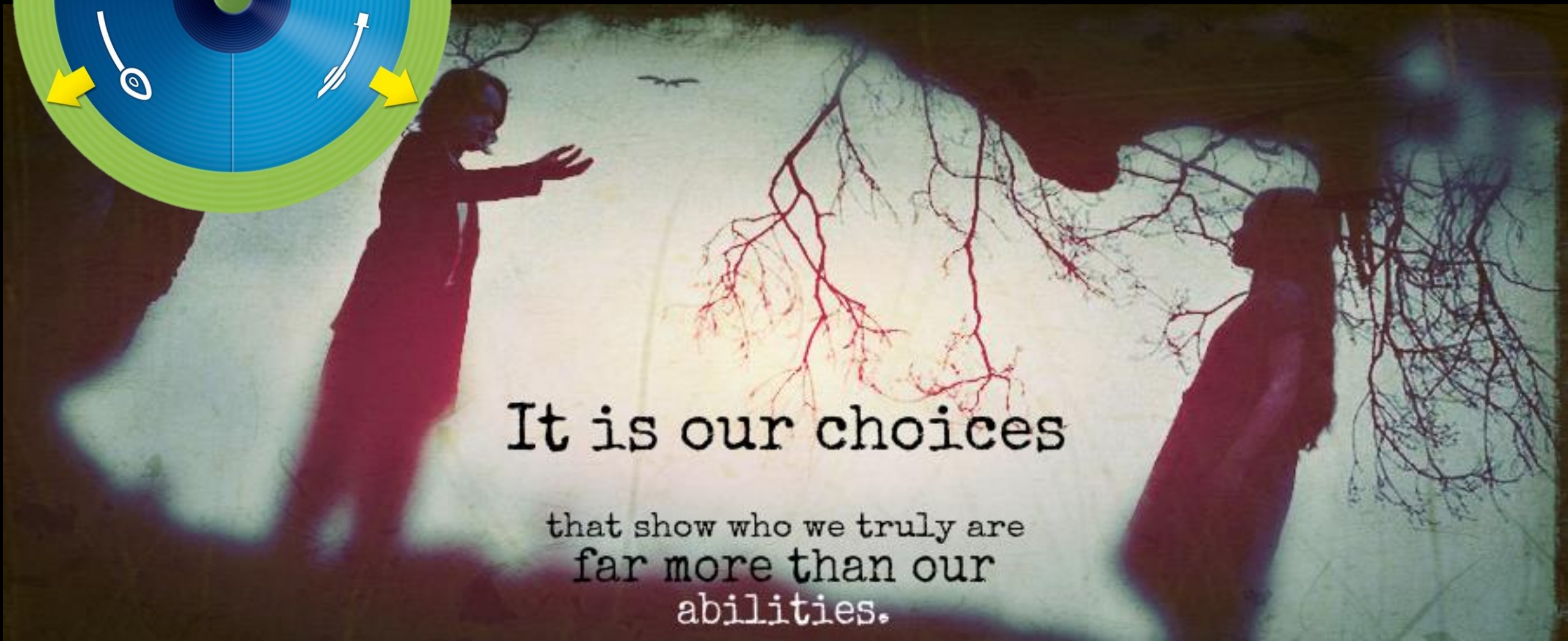
Evaluating the ORSIM® simulator for assessment of anaesthetists' skills in flexible bronchoscopy: aspects of validity and reliability

P. A. Baker[1,2], J. M. Weller[1,2], M. J. Baker[1], G. L. Hounsell[3], J. Scott[2,3], P. J. Gardiner[2] and J. M. D. Thompson[1]

https://www.youtube.com/watch?v=SrhOGhmI1cM

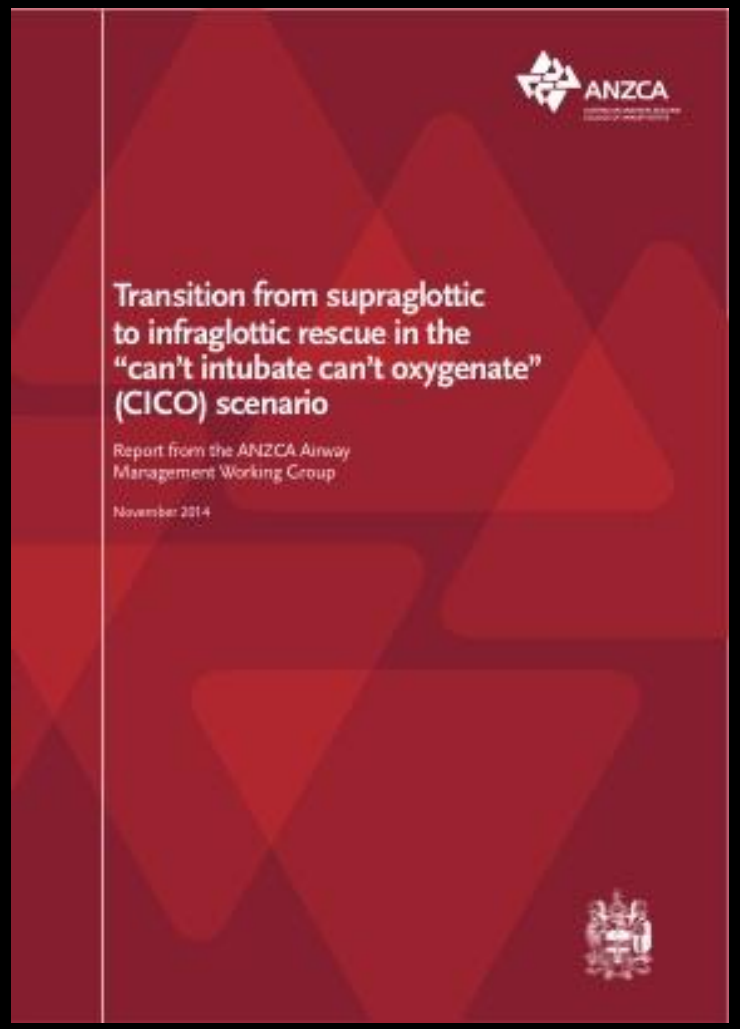
(ORSIM Overview Video - https://www.youtube.com/watch?v=SrhOGhmI1cM)

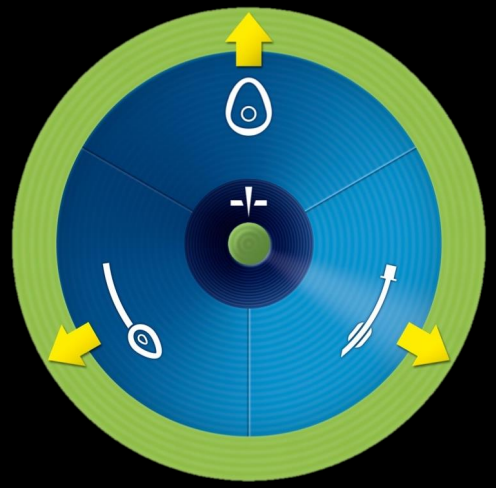
HUMAN FACTORS

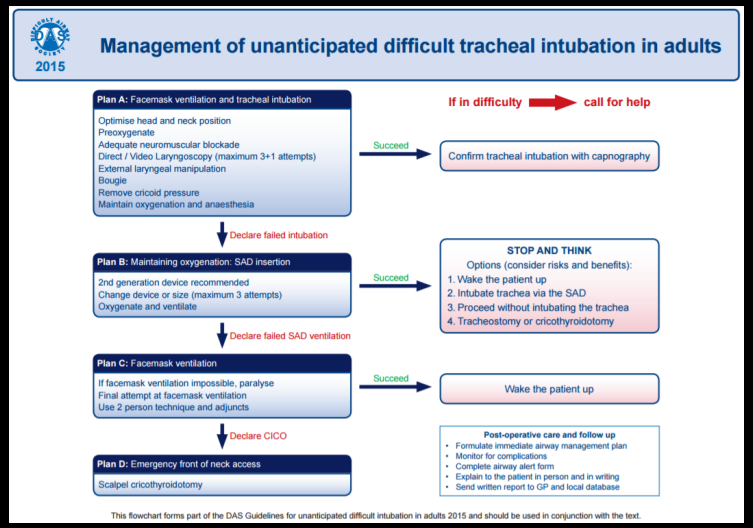


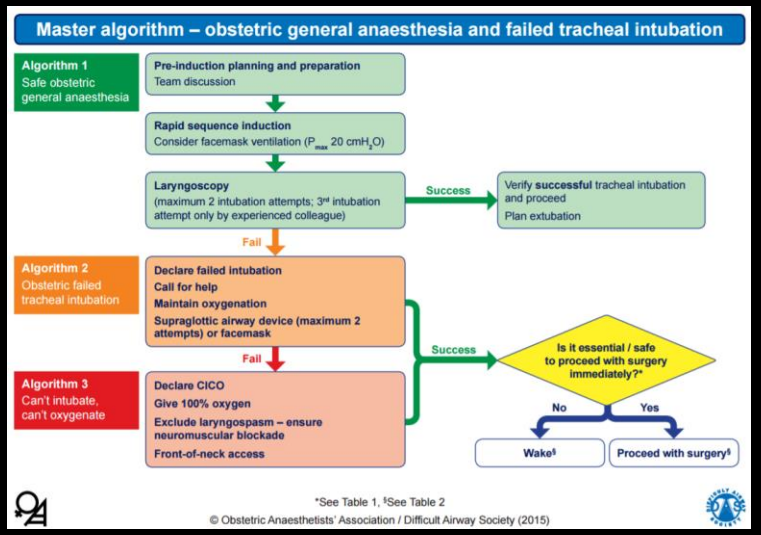
NEW GUIDELINES

- (DAS-OAA)
- DAS 2015
- Vortex 2
- ANZCA Transition
- Indian









Management of unanticipated difficult tracheal intubation in adults

2015

Plan A: Facemask ventilation and tracheal intubation

Optimise head and neck position
Preoxygenate
Adequate neuromuscular blockade
Direct / Video Laryngoscopy (maximum 3+1 attempts)
External laryngeal manipulation
Bougie
Remove cricoid pressure
Maintain oxygenation and anaesthesia

If in difficulty → call for help

Succeed → Confirm tracheal intubation with capnography

Declare failed intubation

Plan B: Maintaining oxygenation: SAD insertion

2nd generation device recommended
Change device or size (maximum 3 attempts)
Oxygenate and ventilate

Succeed →

STOP AND THINK

Options (consider risks and benefits):

1. Wake the patient up
2. Intubate trachea via the SAD
3. Proceed without intubating the trachea
4. Tracheostomy or cricothyroidotomy

Declare failed SAD ventilation

Plan C: Facemask ventilation

If facemask ventilation impossible, paralyse
Final attempt at facemask ventilation
Use 2 person technique and adjuncts

Succeed → Wake the patient up

Declare CICO

Plan D: Emergency front of neck access

Scalpel cricothyroidotomy

Post-operative care and follow up

- Formulate immediate airway management plan
- Monitor for complications
- Complete airway alert form
- Explain to the patient in person and in writing
- Send written report to GP and local database

This flowchart forms part of the DAS Guidelines for unanticipated difficult intubation in adults 2015 and should be used in conjunction with the text.

Plan D: Emergency front of neck access

Continue to give oxygen via upper airway
Ensure neuromuscular blockade
Position patient to extend neck

Scalpel cricothyroidotomy

Equipment:
1. Scalpel (number 10 blade)
2. Bougie
3. Tube (cuffed 6.0mm ID)

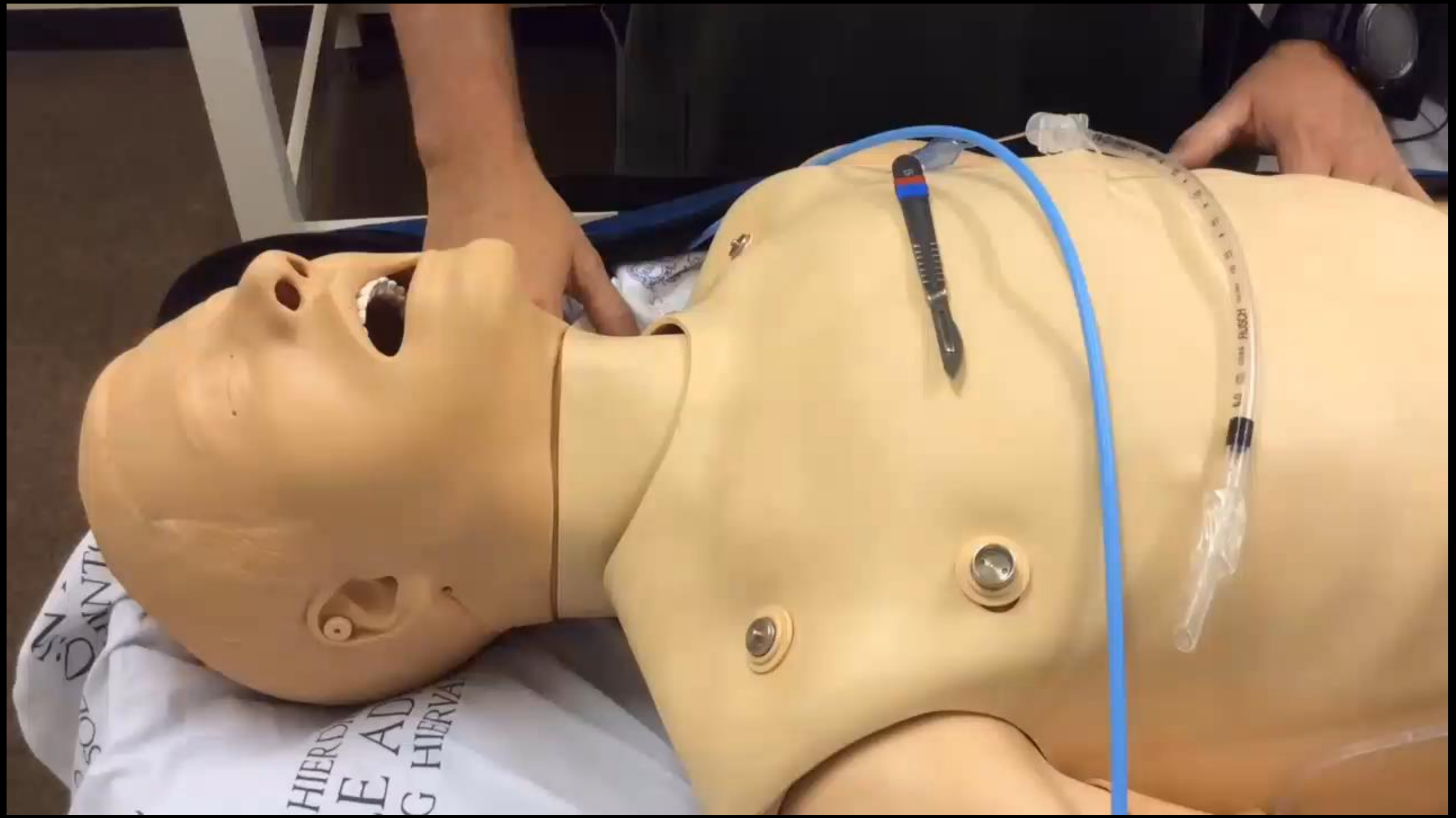
Laryngeal handshake to identify cricothyroid membrane

Palpable cricothyroid membrane

Transverse stab incision through cricothyroid membrane
Turn blade through 90° (sharp edge caudally)
Slide coude tip of bougie along blade into trachea
Railroad lubricated 6.0mm cuffed tracheal tube into trachea
Ventilate, inflate cuff and confirm position with capnography
Secure tube

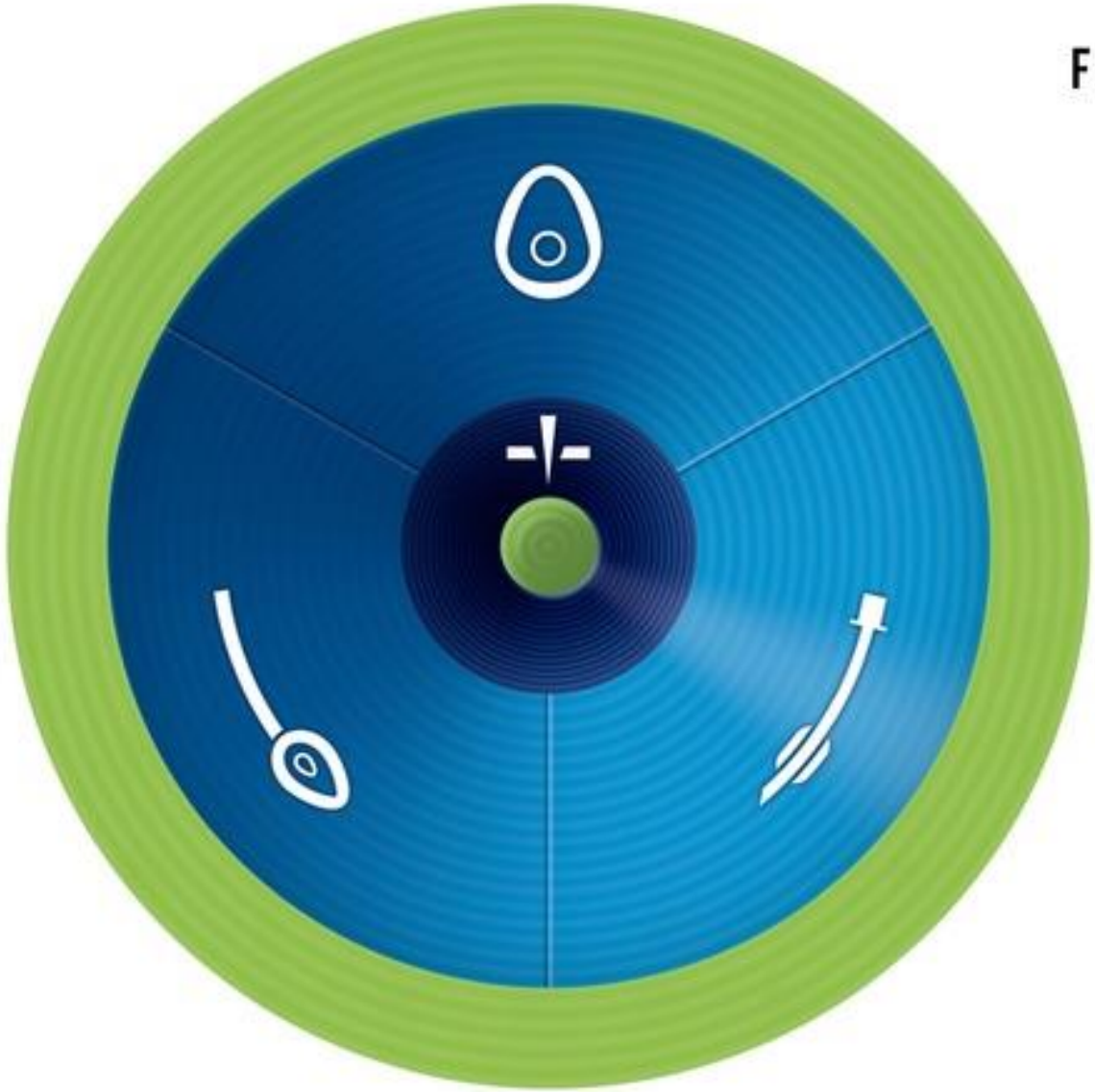
Impalpable cricothyroid membrane

Make an 8-10cm vertical skin incision, caudad to cephalad
Use blunt dissection with fingers of both hands to separate tissues
Identify and stabilise the larynx
Proceed with technique for palpable cricothyroid membrane as above



OpenAirway – DAS 2015 Surgical Cric https://www.youtube.com/watch?v=DuLPCAM6ZhA&t=1s

THE VORTEX



FOR EACH LIFELINE CONSIDER:

MANIPULATIONS:
- HEAD & NECK
- LARYNX
- DEVICE

ADJUNCTS

SIZE / TYPE

SUCTION / O_2 FLOW

MUSCLE TONE

MAXIMUM THREE ATTEMPTS AT EACH LIFELINE (UNLESS GAMECHANGER)
AT LEAST ONE ATTEMPT SHOULD BE BY MOST EXPERIENCED CLINICIAN
CICO STATUS ESCALATES WITH UNSUCCESSFUL BEST EFFORT AT ANY LIFELINE

BJA

British Journal of Anaesthesia, 117 (S1): i20–i27 (2016)
doi: 10.1093/bja/aew175
Advance Access Publication Date: 20 July 2016
Special Issue

SPECIAL ISSUE

The Vortex: a universal 'high-acuity implementation tool' for emergency airway management

N. Chrimes*

CANNULA VS. SCALPEL CRIC

BJA

British Journal of Anaesthesia, 2016, 1–3

doi: 10.1093/bja/aew107
Editorial

EDITORIAL

Need to consider human factors when determining first-line technique for emergency front-of-neck access

A. Timmermann[1,*], N. Chrimes[2] and C. A. Hagberg[3]

British Journal of Anaesthesia **117** (S1): i17–i19 (2016)
doi:10.1093/bja/aew219

The great airway debate: is the scalpel mightier than the cannula?

P. A. Baker[1,2,*], E. P. O'Sullivan[3], M. S. Kristensen[4] and D. Lockey[5,6]

Cannula:

- Familiarity vs. psychological barriers
- Training opportunities
- Pre-emptive use

Scalpel:

- Definitive; protective
- Suitable for impalpable anatomy
- Less fine motor requirement
- Better/easier ventilation

CICO STATUS

READY — PRIMED

- Call for Help
- Allocate Proceduralist
- Kit Out At Bedside & Confirm Contents

SET — POISED

- Open Kit & Prepare Equipment
- Identify Anatomy
- Infiltrate Adrenaline Containing LA[1]

GO — PERFORM

- Optimise Patient Position
- Initiate CICO Rescue

CICO STATUS ESCALATES WITH A UNSUCCESSFUL BEST EFFORT AT ANY LIFELINE*

Consider additional escalation in CICO Status if:

- Predicted difficult airway
- SaO2 <90%
- Rapidly deteriorating SaO_2
- Consecutive unsuccessful attempts at any two lifelines

***ENSURE BEST EFFORTS AT ALL 3 LIFELINES BEFORE DECLARING GO STATUS**

VortexApproach.org

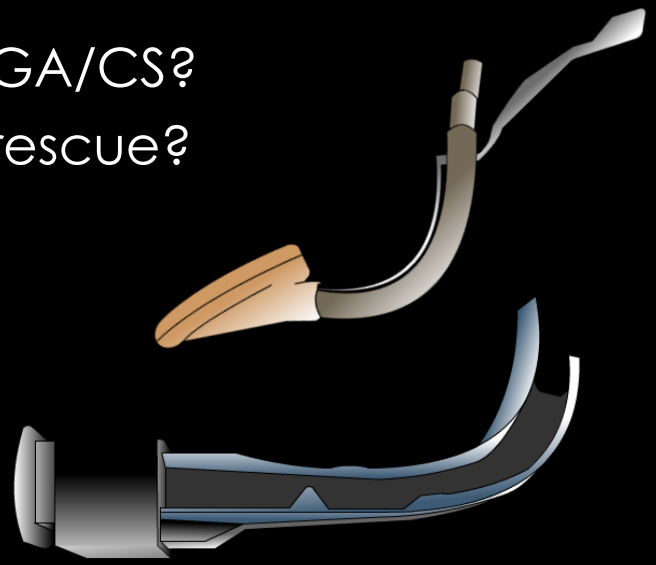
1 Time Permitting. Must not delay GO status

OBSTETRIC AIRWAY MANAGEMENT

- Paradox: Decreasing skill with increasing challenge
- Failed intubation reviewed: 1970 to present
  - We used to suck (Failure ~1:300)
  - We still suck (Failure ~1:440)
  - Failed intubation kills (~1:90)

- Should we use SGAs for GA/CS?
- Should we use SGAs for rescue?

- Should we use VL?



International Journal of Obstetric Anesthesia (2015) **24**, 356–374
0959-289X/$ - see front matter
http://dx.doi.org/10.1016/j.ijoa.2015.06.008
SPECIAL ARTICLE
ELSEVIER
www.obstetanesthesia.com

Failed tracheal intubation during obstetric general anaesthesia: a literature review

S.M. Kinsella,[a] A.L. Winton,[a] M.C. Mushambi,[b] K. Ramaswamy,[c] H. Swales,[d] A.C. Quinn,[e] M. Popat[f]

International Journal of Obstetric Anesthesia (2015) **24**, 137–146
0959-289X/$ - see front matter
http://dx.doi.org/10.1016/j.ijoa.2015.01.005
REVIEW ARTICLE
ELSEVIER
www.obstetanesthesia.com

Video laryngoscopes and the obstetric airway

S. Scott-Brown, R. Russell
Nuffield Department of Anaesthetics, John Radcliffe Hospital, Oxford, UK

CRICOID PRESSURE

Debate rages on

Does Cricoid Pressure Reduce the Risk of Aspiration?

This study has been completed.

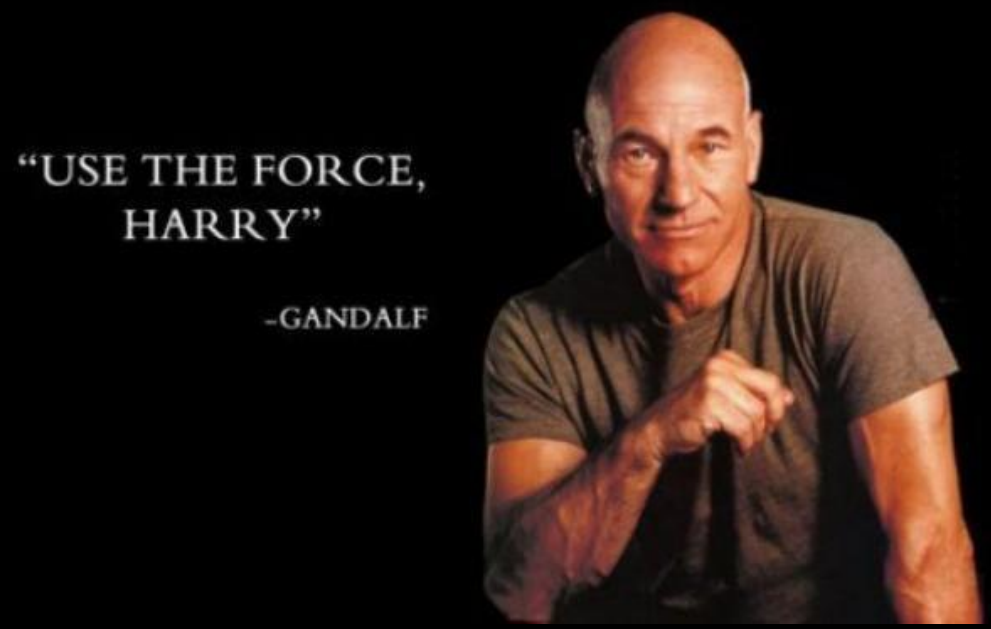
Sponsor:
Mayo Clinic

Collaborator:
Alfred I. duPont Hospital for Children

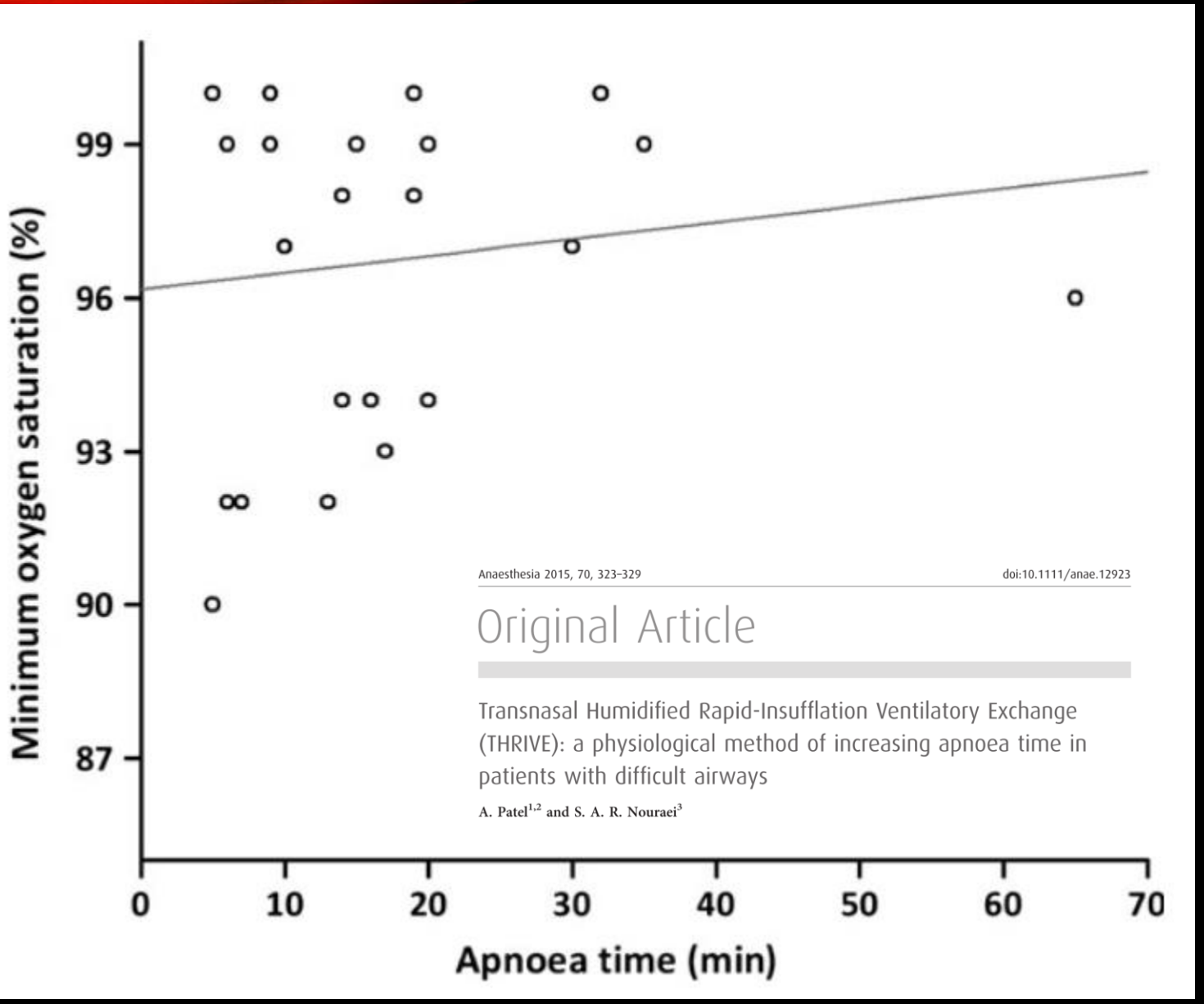
Information provided by (Responsible Party):
John (J Kyle) K. Bohman, M.D., Mayo Clinic

ClinicalTrials.gov Identifier:
NCT02058004

First received: January 26, 2014
Last updated: December 30, 2015
Last verified: December 2015
History of Changes



THRIVE



Anaesthesia 2015, 70, 323–329 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

A. Patel[1,2] and S. A. R. Nouraei[3]

APNEIC OXYGENATION IN MAN

M. Jack Frumin, M.D., Robert M. Epstein, M.D., Gerald Cohen, Ph.D.

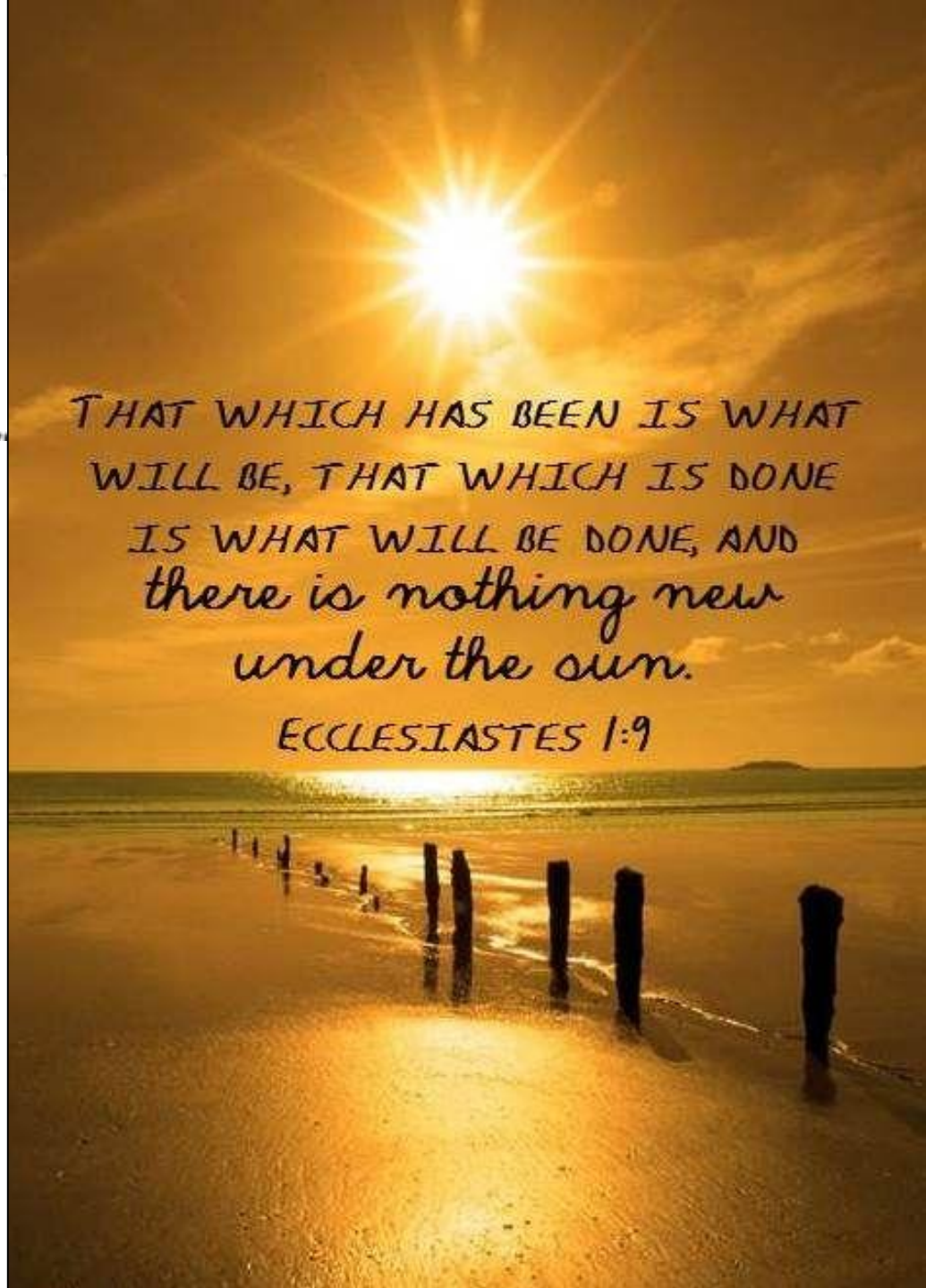
Accepted for publication June 25, 1959; presented at the Annual Meeting of the American Society of Anesthesiologists, Inc., Miami Beach, Florida, October 9, 1959. The authors are in the Departments of Anesthesiology and Biochemistry, College of Physicians and Surgeons, Columbia University, and the Anesthesiology Service, The Presbyterian Hospital, New York, New York.

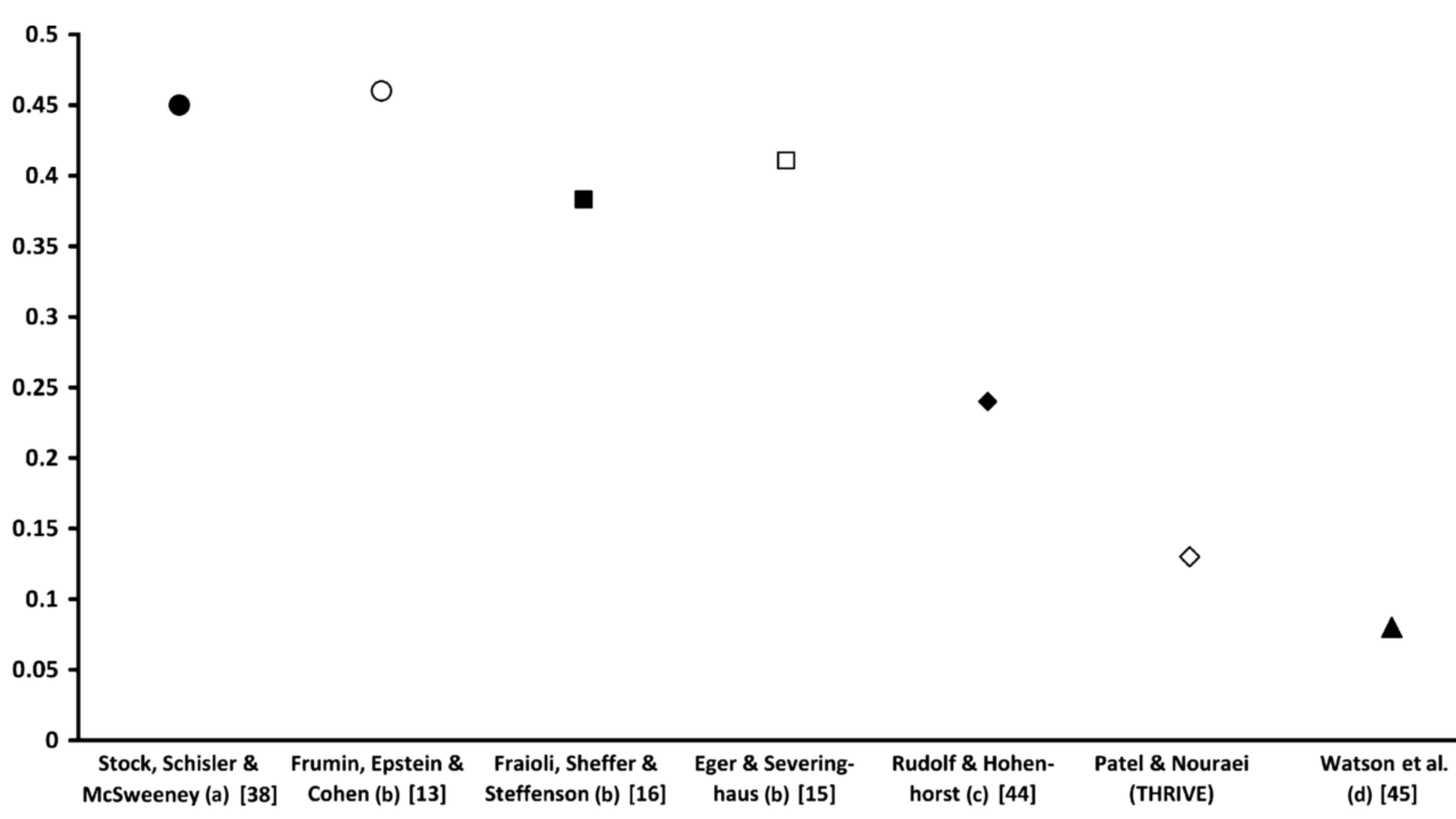
This report deals with prolonged suppression of respiratory function in man while full oxygenation and other vital functions are maintained. This phenomenon has been studied extensively in dogs and other laboratory animals, and was termed "diffusion respiration" by Draper, Whitehead and their collaborators [1, 2] and "apneic diffusion oxygenation (ADO)" by Holmdahl [3] who also reviewed the extensive literature in this subject.

The descriptive term "apneic oxygenation" first employed by Nahas [4] is used here instead of the other titles to avoid the misconception that the process of molecular diffusion in the conducting air passages brings oxygen to the alveoli from the outside environment. This misconception regarding mechanism was strengthened by an incomplete description of the process in an early report by Draper *et al.*[1] even though in a later report [2] it was stated that the *en masse* movement of gas down the trachea is responsible for the sustained high alveolar and blood oxygen levels. However, the exact mechanism responsible for this bulk movement was not presented explicitly. Objections to the term "diffusion" have been raised by Joels and Samueloff [5] and by Bartlett *et al.*[6] They have emphasized the interpretation accepted in this study of the mechanism responsible for this mass movement and Bartlett *et al.*[6] proposed the title of "aventilatory mass flow (AVMF)" for this phenomenon.

Methods

Eight essentially healthy patients scheduled for a variety of minor operations served as subjects. In four instances, the apneic period was produced while the surgical procedure was being performed, while in the remainder the operation was completed first. The subjects received 50–100 mg. of meperidine and 0.4 mg. of scopolamine approximately one hour before the induction of anesthesia. In all cases but one, 100 per cent oxygen was administered with a circle anesthesia apparatus for five minutes, then an hypnotic dose of 2.5 per cent thiopental was given intravenously followed by approximately 100 mg. of succinylcholine chloride. When relaxation was complete, a cuffed endotracheal catheter was inserted and a tight seal obtained by inflation of the cuff. Denitrogenation was accomplished by administering 100 per cent oxygen for a minimum of 30 minutes with the circle apparatus at a flow rate of at least 8 liters per minute. To insure unconsciousness through-




0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Stock, Schisler & McSweeney (a) [38]
Frumin, Epstein & Cohen (b) [13]
Fraioli, Sheffer & Steffenson (b) [16]
Eger & Severing-haus (b) [15]
Rudolf & Hohen-horst (c) [44]
Patel & Nouraei (THRIVE)
Watson et al. (d) [45]

ApOx only helps if:

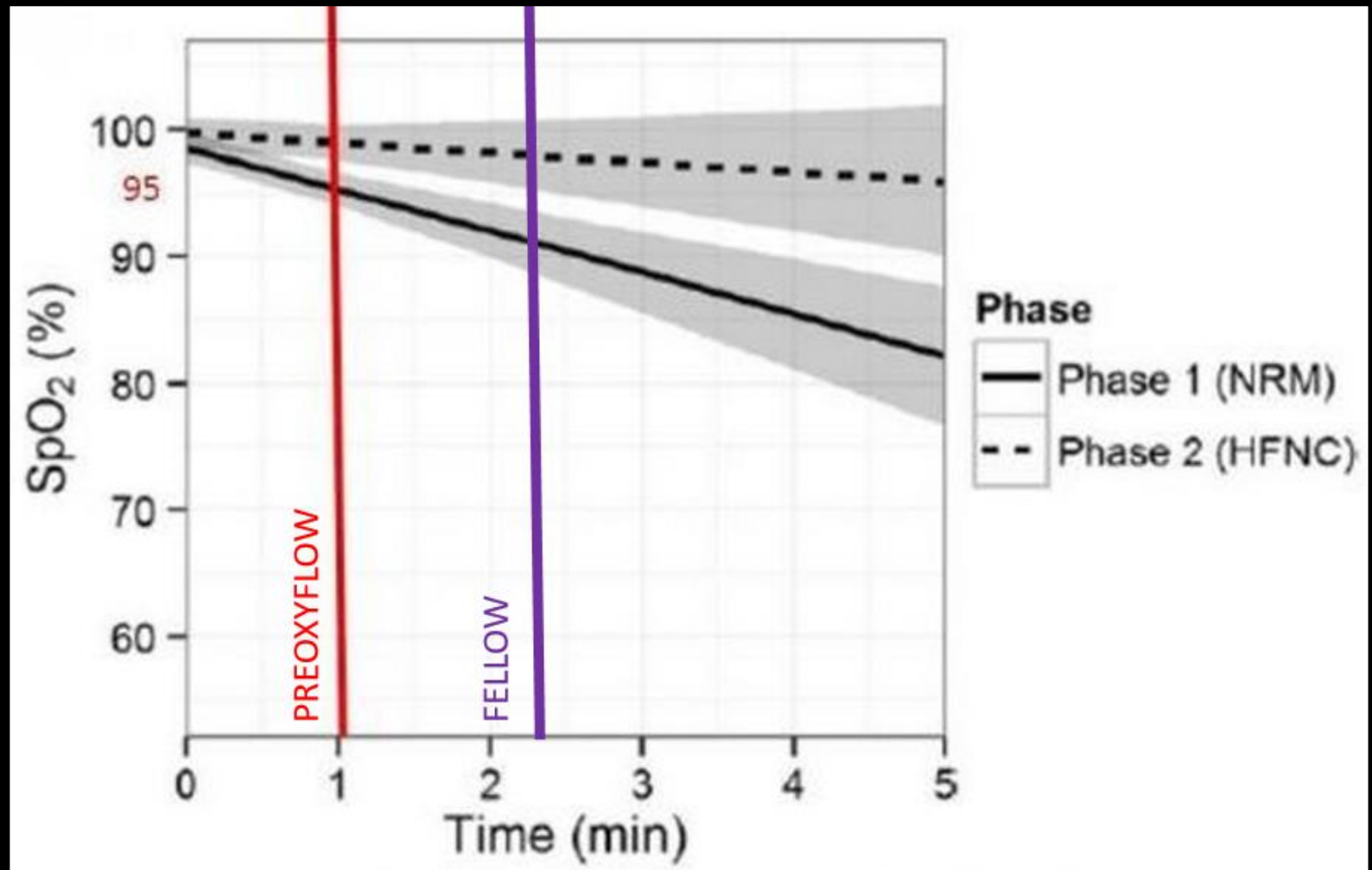
- Airway open
- Intubation delayed
- (Flow high)

Randomized Trial of Apneic Oxygenation during Endotracheal Intubation of the Critically Ill

Matthew W. Semler[1], David R. Janz[2], Robert J. Lentz[1], Daniel T. Matthews[1], Brett C. Norman[1], Tufik R. Assad[1], Raj D. Keriwala[1], Benjamin A. Ferrell[1], Michael J. Noto[1], Andrew C. McKown[1], Emily G. Kocurek[1], Melissa A. Warren[1], Luis E. Huerta[1], and Todd W. Rice[1]; for the FELLOW Investigators and the Pragmatic Critical Care Research Group

Use of High-Flow Nasal Cannula Oxygen Therapy to Prevent Desaturation During Tracheal Intubation of Intensive Care Patients With Mild-to-Moderate Hypoxemia*

Romain Miguel-Montanes, MD[1]; David Hajage, MD[2]; Jonathan Messika, MD[1,3,4]; Fabrice Bertrand, MD[1]; Stéphane Gaudry, MD[1,3,4]; Cédric Rafat, MD[1]; Vincent Labbé, MD[1]; Nicolas Dufour, MD[1,3,4]; Sylvain Jean-Baptiste, MD[1]; Alexandre Bedet, MD[1]; Didier Dreyfuss, MD[1,3,4]; Jean-Damien Ricard, MD, PhD[1,3,4]



Median duration of ETI in both groups in PREOXYFLOW trial and FELLOW trial (150s in HFNC, 132s in HFFM)

Figure from Miguel-Montanes *et al* PMID 25479117


"May the force be ever in your favor, Mr. Potter"
-Gandalf
(The Chronicles of Narnia)