



**ThinkAskLearn**  
Health Professional Education

**PreOxygenation and Prevention  
of Desaturation**

David Corkill  
Emergency Nurse Educator

www.thinkasklearn.com.au



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**Who is this man?**

- Sir Ivan Magill
- (1888-1986)
- Irish anaesthesiologist
- Pioneer Plastics esp faces
- Invented the ETT
- As well Magills Forceps



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**What did this man invent?**



- Professor Sir Robert Macintosh (1887-1989)
- Born in New Zealand
- First British Professor of Anaesthetics in Oxford in 1937

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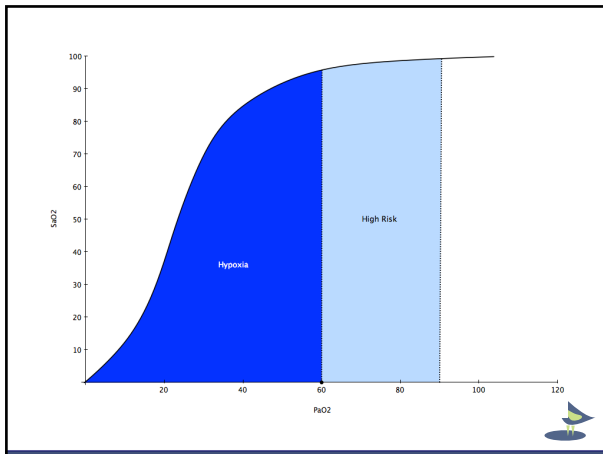
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AIRWAY REVIEW ARTICLE

# Procyonection and Prevention of Desaturation During Emergency Airway Management

Stefan E. Wenzler, MD, Fabian M. Lerman, MD

From the Department of Emergency Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts; New York, NY (Stefan E. Wenzler); and the Department of Emergency Medicine, Thomas Jefferson University, Philadelphia, PA (Lerman).

Patients requiring emergency airway management are at great risk of hypoxemia because of prolonged intubation attempts. High ventilatory pressures, airway obstruction, and reduced oxygenation are common sequelae of airway management. These factors can lead to hypoxemia and subsequent organ damage. The purpose of this review is to discuss the pathophysiology of hypoxemia during emergency airway management and to provide a systematic approach to the prevention and treatment of hypoxemia. The review covers the following topics: (1) the pathophysiology of hypoxemia during emergency airway management, (2) the prevention of hypoxemia during emergency airway management, (3) the treatment of hypoxemia during emergency airway management, and (4) the role of the emergency physician in the prevention and treatment of hypoxemia.

Submitted for publication 10/1/2010; accepted 10/1/2010.

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0883-5963/12/0000-0000\$10.00/0

## INTRODUCTION

Managing hypoxemic patients during emergency airway management is a challenge for the emergency physician. The pathophysiology of hypoxemia during emergency airway management is complex and involves multiple factors. The most common cause of hypoxemia during emergency airway management is inadequate ventilation. This can be caused by a variety of factors, including airway obstruction, inadequate tidal volume, and inadequate respiratory rate. Other causes of hypoxemia include decreased oxygenation, decreased hemoglobin, and decreased cardiac output. The purpose of this review is to discuss the pathophysiology of hypoxemia during emergency airway management and to provide a systematic approach to the prevention and treatment of hypoxemia.

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## WHAT IS THE RATIONAL FOR PROVIDING PROCYONECTION BEFORE TRACHEAL INTUBATION?

Procyonection is a drug that is used to prevent desaturation during emergency airway management. It is a short-acting, potent, and selective  $\alpha_1$ -adrenoreceptor antagonist. It is used to prevent desaturation during emergency airway management by blocking the  $\alpha_1$ -adrenoreceptors on the pulmonary vasculature. This causes vasodilation of the pulmonary vasculature, which increases blood flow to the lungs and improves oxygenation.

spaced, as the time until a patient requires a second dose of 80% to 90%, as the plasma level of desflurane is 0.5% to 1.0%. When the patient desaturates to a value that is 2% to 3% below the prehypertension dissociation curve, the patient should be intubated. The patient should be intubated as soon as possible, as the time to intubation is 10 to 15 minutes.

The standard evaluation of desflurane oxygenation is based on the patient's oxygen saturation. The patient's oxygen saturation should be monitored continuously during the procedure. The patient's oxygen saturation should be maintained at a level of 90% or higher. The patient's oxygen saturation should be monitored continuously during the procedure. The patient's oxygen saturation should be maintained at a level of 90% or higher.

In a study by Wenzler et al.,<sup>1</sup> the authors evaluated the effectiveness of desflurane oxygenation in patients requiring emergency airway management. The authors found that desflurane oxygenation was effective in preventing desaturation during emergency airway management. The authors found that desflurane oxygenation was effective in preventing desaturation during emergency airway management. The authors found that desflurane oxygenation was effective in preventing desaturation during emergency airway management. The authors found that desflurane oxygenation was effective in preventing desaturation during emergency airway management.

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Ideas

- Checklists
- BLS - bag valve mask
- Positioning
- Oxygen sources
- Drug selection
- Technology change



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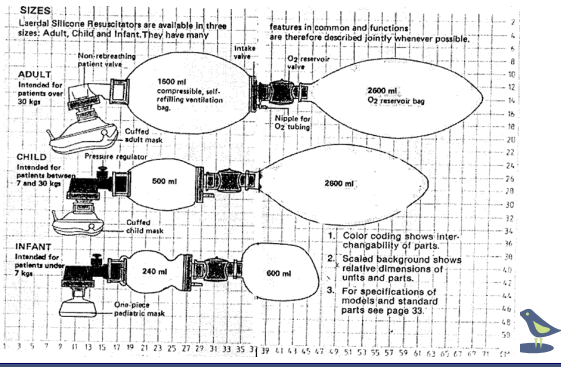
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Bag-Mask Ventilation



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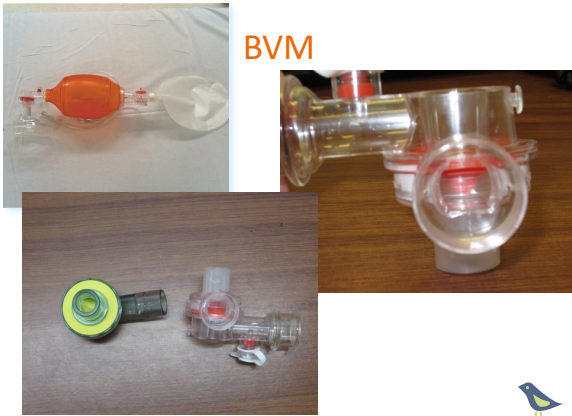
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BVM



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# Triple Manoeuvre



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## 2 Hand BVM – Great Seal!!!!!!

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Source Oxygen

- ‘Standard reservoir facemasks with the flow rate of oxygen set as high as possible are the recommended source of high FiO2 for preoxygenation in the ED’



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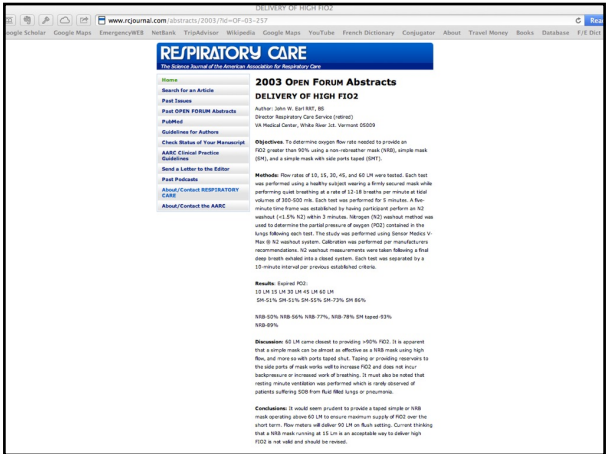
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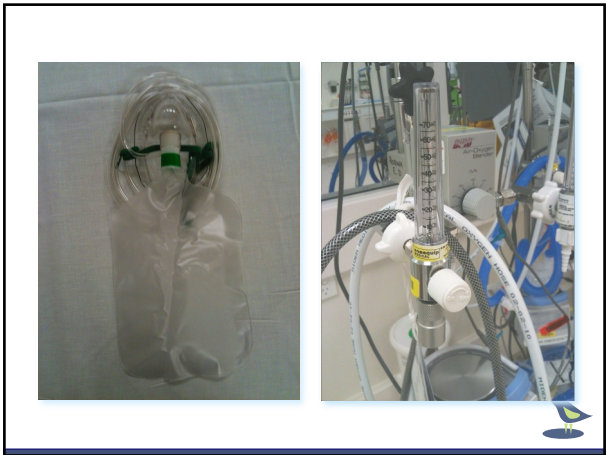
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Maximum flow?



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Efficacy of Preoxygenation with Tidal Volume Breathing

Comparison of Breathing Systems

Background: Preoxygenation before tracheal intubation is essential to reduce oxygen desaturation and delay the onset of hypoxemia during apnea. Various systems are used for preoxygenation. Designed specifically for preoxygenation, the Nasal Cannula uses a nasal cannula mask for inspiration and a mouthpiece for expiration. However, entry to the nasal mask and the mouthpiece may be obstructed during preoxygenation. This preoxygenation also compares the efficacy of preoxygenation using the standard circle system with the Nasal Cannula and the different mouthpiece bags.

Methods: Twenty consenting healthy volunteers were randomized to the Nasal Cannula or the standard circle system. Preoxygenation was performed using the standard circle system, the Nasal Cannula, and the mouthpiece bag. The efficacy of preoxygenation was assessed by the time to desaturation to SpO2 < 90%.

Results: The time to desaturation was significantly longer in the Nasal Cannula group than in the standard circle system group. The time to desaturation was significantly longer in the mouthpiece bag group than in the standard circle system group. The time to desaturation was significantly longer in the mouthpiece bag group than in the Nasal Cannula group.



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Pre Oxygenation - The solution



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CPAP/NIV for Preoxygenation

- Ballard et al 2006
- Similar Hypoxemic ICU patients - 57 pts total
- CPAP vs NRP 15 l/min 3 mins
- Preintubation sats 98% vs 93%
- During Intubation Sats 93% vs 81%
- 12 of control/2 NIV Sats below 80%
- 5 min post intubation 98% vs 94%



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Apnoeic Diffusion

- Taha et al 2006
- 4 big breaths/5l/min NP
- Cutoff 95% SpO<sub>2</sub> or 6 mins
- No desat for 6 min in NP group
- Control group Avg 3.65 mins
- Reproduced in Morbid obese groups



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In Practice

- 15l/min via NP for all patients
- Some studies show does not improve oxygenation
- Although they did have a 2% increase in sats
  - Study did not maintain airway opening techniques
- Not used to improve oxygenation in hypoxic patients but prevent desat



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Airways



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20 degree head up position



- Elective cholecystectomy extra **103 seconds**  
SpO2 of 95%
- BMI>35 extra 52 sec to SpO2 of 90%



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The Ramp



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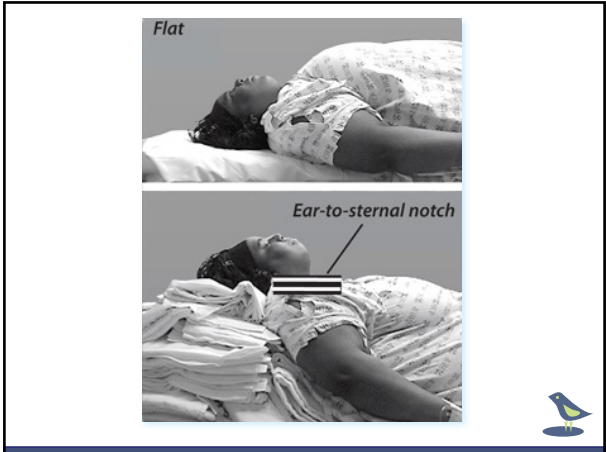
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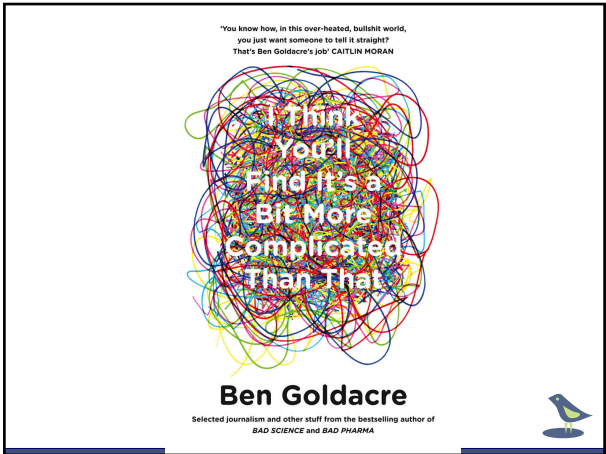
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**Head-Elevated Patient Positioning Decreases Complications of Emergent Tracheal Intubation in the Ward and Intensive Care Unit**

Nita Khandelwal, MD, MS,\* Sarah Khorsand, MD,† Steven H. Mitchell, MD, FRCPC‡ and Aaron M. Joffe, DO\*

ANESTHESIA & ANALGESIA April 2016 • Volume 122 • Number 4

- Retrospective analysis
- Study after change of practice and teaching
- Head up preferred
- 336 supine, 192 head up
- Significantly less likely to encounter difficult airway/hypoxia in sit up position
- Sit up position more likely down by senior (93%)



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### A Multicenter, Randomized Trial of Ramped Position vs Sniffing Position During Endotracheal Intubation of Critically Ill Adults

Matthew W. Semler, MD; David R. Jazay, MD; Derek W. Russell, MD; Jonathan D. Cassey, MD; Robert J. Lentz, MD; Aline N. Zouk, MD; Bennett P. deBoisblanc, MD; Jairo J. Santanilla, MD; Yasin A. Khan, MD; Aaron M. Jaffe, DO; William S. Stoller, MD, and Todd W. Rite, MD, for the Check-Up Investigators\* and the Pragmatic Critical Care Research

CHEST 2017; 152(4):712-722 Oct

- 260 patient randomised to sit up vs supine
  - 49 patients excluded due to urgency or position requirement
- No difference in saturation rates
- Worse view of vocal cords if sitting
  - More “difficult intubation”
- All intubations performed by trainee (reg)



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### Multicenter Comparison of Nonsupine Versus Supine Positioning During Intubation in the Emergency Department: A National Emergency Airway Registry (NEAR) Study

H. Hill Stoecklein, MD<sup>1</sup>, Christopher Kelly, MD<sup>1</sup>, Amy H. Kaji, MD, PhD<sup>2</sup>, Andrea Fantegrossi, MPH<sup>3</sup>, Margaret Carlson<sup>1</sup>, Megan L. Fix, MD<sup>1</sup>, Troy Madsen, MD<sup>1</sup>, Ron M. Walls, MD<sup>3</sup>, and Calvin A. Brown III, MD<sup>3</sup>, on behalf of the NEAR Investigators

- 2019



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### Sit up or supine intubation

- Retrospective review 11,480 patients
- 5% were intubated sitting up
- Significantly more likely to be obese or have a suspected difficult airway
- 1<sup>st</sup> pass success rate similar
- Difficult intubation similar
- ‘Needs RCT’
- Sit up to intubate if required



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### Should Bed Up Head Elevated (BUHE) be the New Standard Position for RSI in the ED?



- Tsan, S. E., Lim, S. M., Abidin, M. F., Ganesh, S., & Wang, C. Y. (2020). Comparison of Macintosh laryngoscopy in bed-up-head-elevated position with GlideScope laryngoscopy: a randomized, controlled, noninferiority trial. *Anesthesia & Analgesia*, 131(1), 210-219
- Murphy, D. L., Rea, T. D., McCoy, A. M., Sayre, M. R., Fahrenbruch, C. E., Yin, L., ... & Mitchell, S. H. (2019). Inclined position is associated with improved first pass success and laryngoscopic view in prehospital endotracheal intubations. *The American Journal of Emergency Medicine*, 37(5), 937-941.



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EMA

Emergency Medicine  
Australasia




Original Research

Open Access



**Bed tilt and ramp positions are associated with increased first-pass success of adult endotracheal intubation in the emergency department: A registry study**


Samantha Bennett BN, BEH (Pmed), PGCertNP (Periop), Hatem Alkhouri BAppSci, MSc, PhD   
Helen Badge BAppSc (OT), MAppSc, PhD ... [See all authors](#) ▾


First published: 10 July 2023 | <https://doi.org/10.1111/1742-6723.14276>


ORIGINAL ARTICLE

**Bed-up-head-elevated Position versus Supine Sniffing Position in Patients Undergoing Rapid Sequence Intubation Using Direct Laryngoscopy in the Emergency Department – A Randomized Controlled Trial**

Reddy, Admala Anudeep; Ayyan, S. Manu; Anandhi, D.; Ganessane, Ezhilkugan; Amrithanand, V. T.

[Author Information](#) 

*Journal of Emergencies, Trauma, and Shock* 17(2):p 58-65, Apr–Jun 2024. | DOI: 10.4103/jets/jets\_109\_23 



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### Routine Video





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When should patients be bagged?

- Risk/Benefit
- Over ventilation is more likely with inexperienced stressed providers making the use of a **ventilator** preferable to provide ventilation in hypoxic patients



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Cricoid Pressure



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Cricoid Pressure



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Surgical Airway



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Choice of Paralytic



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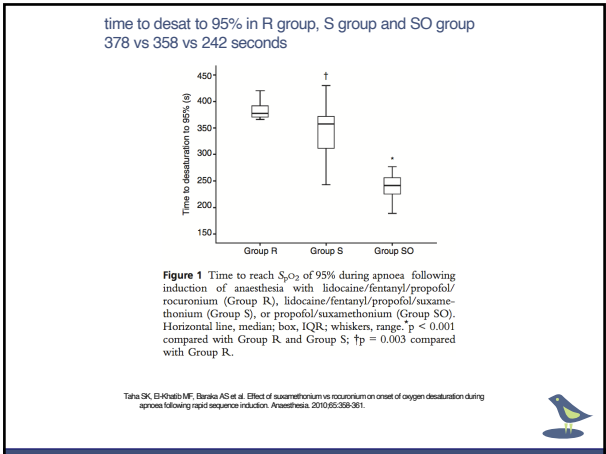
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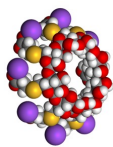
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### Reversal of Rocuronium

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### Issues with Sugammadex

- Time to draw up
- Correct dose (16mg/kg)
- Time to work
- Expense
- May make your job harder

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[illegible][illegible]

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# How do we heal medicine?



A man with dark hair and glasses, wearing a dark suit jacket over a white shirt, is speaking on a stage. He is gesturing with his right hand. The background is a solid red color. In the bottom right corner of the slide, there is a QR code.

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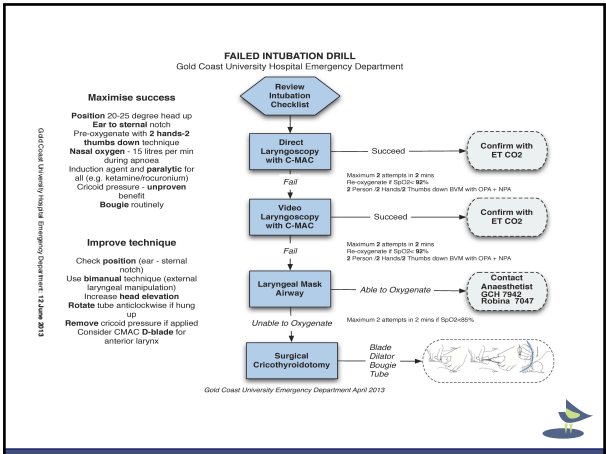
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**In Conclusion**

- Have a plan/checklist
- 2 hands for BVM
- High Oxygenation – Best Source
- BiPAP may assist preoxygenation
- Position patient 20 degrees
- Use nasal prongs 15l/min to prevent hypoxia
- Avoid ventilations in apnoeic period
- Abandon cricoid pressure
- Consider Roc instead of Sux



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