# Updates in Emergency Intubation for the Anesthesia Clinician

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## Goals and Objectives

- Evaluate Seminal Airway Management Clinical Trials From the Past 10 years
- Discuss Evidence Based Management of Emergency Intubations in the OR and ICU

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## Disclosures

Funding

- Patient-Centered Outcomes Research Institute
- Zellis Foundation

Conflicts of Interest

- I have no financial relationships with a commercial entity that is relevant to the content of this presentation.

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## PRAGMATIC CRITICAL CARE RESEARCH GROUP

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## prag·mat·ic

/prag'madik/

- *adjective*
- dealing with things sensibly and realistically in a way that is based on practical rather than theoretical considerations

- **Clinical Question → Evidence → "My Practice"**

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## Goldilocks Principle


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## Visual Learner (aka Lots of Slides)

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## Rapid Sequence Intubation

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## Father of RSI

- 1956, Published Seminal Research on Mouth-To-Mouth Rescue Breathing
- 1957, Wrote "ABC of Resuscitation", Adopted by the AHA for CPR and BLS
- 1958, Founded 1st US Intensive Care Unit in Baltimore (Baltimore City Hospital → Johns Hopkins)
- 1961, Founded UPMC Department of Anesthesiology
- 1970, First Described "Rapid Sequence Intubation"

**Peter Safar, MD**

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## Rapid Induction/Intubation for Prevention of Gastric-Content Aspiration

WILLIAM J. STEPT, M.D.
PETER SAFAR, M.D.
Pittsburgh, Pennsylvania*

1. Free-flowing IV
2. Check equipment
3. Insert NG tube
4. Remove foreign material
5. Pre-oxygenate
6. Sniffing position
7. Place TELE leads
8. Give "priming" paralytic
9. Administer sedative
10. Apply cricoid pressure
11. Administer paralytic
12. Wait for effective paralysis without ventilation

Anesthesia and Analgesia, 1970

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## Elective Intubation vs. RSI

- Elective Intubation (Operating Room)
  - Intubated for Elective Surgery, NPO
  - Normal(ish) Lung Function and Oxygenation
  - Not Critically Ill, No Shock, No Multiorgan Failure
- Rapid Sequence Intubation (OR, ICU, Anywhere)
  - Intubated for Emergency Surgery, Not NPO
  - Intubated for Acute Respiratory Failure
  - Critically Ill, Shock, Multiorgan Failure
  - **"Physiologically Difficult Airway"**

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## Patient Populations

- Operating Room
  - Intubated for Elective Surgery, NPO
  - Normal(ish) Lung Function and Oxygenation
  - Not Critically Ill, No Shock, No Multiorgan Failure
- Intensive Care Unit
  - Intubated for Acute Respiratory Failure, Not NPO
  - Baseline Chronic or Acute Lung Injury
  - Critically Ill, Shock, Multiorgan Failure
  - **"Physiologically Difficulty Airway"**

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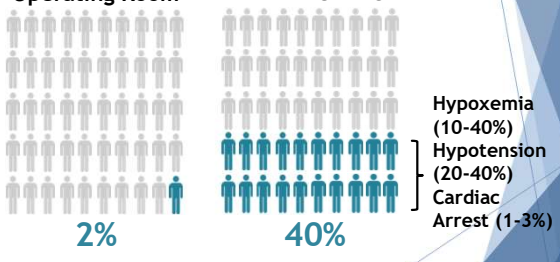
## Life Threatening Complications




Russotto et al. JAMA 2021

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## Epidemiology Primer (e.g. How-To Evaluate a Randomized Controlled Trial)

- Primary Outcome → Patient Centered
- Valid Power Analysis and Recruitment
  - Overestimating Incidence or Effect → False Negative / Type II Error
- Matched Patients (Table 1)
- Separation / Adherence to Protocol
- Statistical Analysis
- Strength / Limitations
- Applicability

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## Steps in Rapid Sequence Intubation

- Preparation (NGT Decompression)
- Pre-Oxygenation
- Pre-Induction Meds (Fluids + Vasopressors)
- Induction Meds (Amnestic + NMB)
- Cricoid Pressure
- Intubating Position
- Blade Choice (DL vs. VL)
- Blade Geometry

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## Prepare (NGT Decompression)

- Clinical Question – Should an NGT be placed for gastric decompression prior to emergency tracheal intubation?
  - Pro – Decreased Aspiration (Incidence and Severity)
  - Con – Increased Risk of Gagging and Vomiting, Epistaxis, Delayed Intubation, Tracheal Placement

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## Prepare (NGT Decompression)

- Best Evidence To Date → None
- My Practice → When Timing Permits, Place NGT in Patients at High-Risk of Aspiration
  (Full Stomach/Emesis/Bowel Obstruction)

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## Pre-Oxygenation

- Clinical Question - What is the Best Method of Pre-Oxygenation? (Face Mask vs. HFNC vs. NIV)

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## Pre-Oxygenation

- Best Evidence To Date → PreVent, FLORALI-2, PREOXI
  - PreVent - Post-Induction BMV vs. No Ventilation
  - FLORALI-2 – HFNC vs. NIV
  - PREOXI – Face-Mask vs. NIV

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## Pre-Oxygenation (PreVent, NEJM 2019)


The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 28, 2019 VOL. 380 NO. 9

Bag-Mask Ventilation during Tracheal Intubation of Critically Ill Adults

Jonathan D. Casey, M.D., David R. Janz, M.D., Derek W. Russell, M.D., Derek J. Vonderhaar, M.D., Aaron M. Joffe, D.O., Kevin M. Dischert, M.D., Ryan M. Brown, M.D., Aline N. Zouk, M.D., Swati Gulati, M.B., B.S., Brent E. Heideman, M.D., Michael G. Lester, M.D., Alexandra H. Toporek, M.D., Itay Bentov, M.D., Ph.D., Wesley H. Self, M.D., Todd W. Rice, M.D., and Matthew W. Semler, M.D., for the PreVent Investigators and the Pragmatic Critical Care Research Group*

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## Pre-Oxygenation (PreVent, NEJM 2019)

- Prospective RCT of Post-Induction BMV vs. No Ventilation
- Pro – Improved Oxygenation, Con – Aspiration Risk
- Primary Outcome → Lowest SpO2
- 7 ICUs in US, n=401
- BMV – 15LPM, RR 10, Peep Valve 5-10, Oral Airway, 2 Hands

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## Pre-Oxygenation (PreVent, NEJM 2019)

- Prospective RCT of Post-Induction BMV vs. No Ventilation
- Pro – Improved Oxygenation, Con – Aspiration Risk
- Primary Outcome → Lowest SpO2
- 7 ICUs in US
- Calculated Sample Size 350 Patients → Based on 5% Difference
- 667 Screened → 401 Randomized → 401 Included in ITT
- BMV – 15LPM, RR 10, Peep Valve 5-10, Oral Airway, 2 Hands

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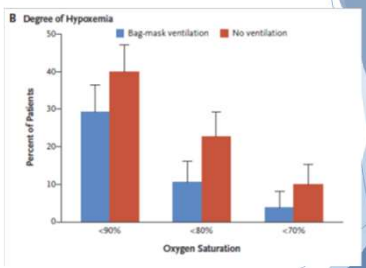
PreVent Trial

NEJM 2019

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## Pre-Oxygenation (PreVent, NEJM 2019)

- Primary Outcome – Median Lowest SpO2 → 96% BMV vs. 93% Control (p=0.01)
- Secondary Outcomes
  - Severe Hypoxemia (SpO2 < 80%) → 10.9% BMV vs. 22.8% Control (p=0.002)

  (SpO2 Differences Were Largest for Patients With Lowest SpO2 at Induction)
  - Aspiration and CXR Infiltrate → No Difference

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## Pre-Oxygenation (Pre-Vent, NEJM 2019)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - Unclear if Patient-Centered Outcome (SpO2 < 80%)
  - Pre-Oxygenation Method Not Controlled
  - Excluded Patients w/ High-Risk for Aspiration

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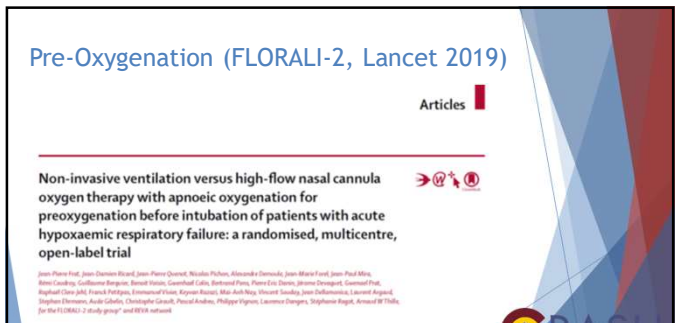
## Pre-Oxygenation (FLORALI-2, Lancet 2019)


Articles

Non-invasive ventilation versus high-flow nasal cannula oxygen therapy with apnoeic oxygenation for preoxygenation before intubation of patients with acute hypoxaemic respiratory failure: a randomised, multicentre, open-label trial

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## Pre-Oxygenation (FLORALI-2, Lancet 2019)

- Prospective RCT of NIV vs. HFNC
- Primary Outcome → Severe Hypoxemia (Sp02 < 80%) for ≥ 5 seconds
- 28 ICUs in France, n=313
- NIV – PSV Titrated to Goal TV 6-8ml/kg w/ PEEP 5, FiO2 100%
- HFNC – Flow 60L, Fi02 100%

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## Pre-Oxygenation (FLORALI-2, Lancet 2019)

- Prospective RCT of NIV vs. HFNC
- Primary Outcome → Severe Hypoxemia (Sp02 < 80%) for ≥ 5 seconds
- 28 ICUs in France
- Calculated Sample Size 320 Patients → Based on 15% Difference
- 745 Screened → 322 Randomized → 313 Included in ITT
- NIV – PSV Titrated to Goal TV 6-8ml/kg w/ PEEP 5, FiO2 100%
- HFNC – Flow 60L, Fi02 100%

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## Pre-Oxygenation (FLORALI-2, Lancet 2019)

- Primary Outcome – Severe Hypoxemia (Sp02 < 80%) → No Difference
  - 23% NIV vs. 27% HFNC (p=0.39)
- Secondary Outcomes
  - PF Ratio ≤ 200 → 24% NIV vs. 35% HFNC (p=0.046)
  - CXR Infiltrate and Pneumonia → No Difference
  - No Difference in Other Serious Adverse Events

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## Pre-Oxygenation (FLORALI-2, Lancet 2019)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - Underpowered (Based on 15% Difference)
  - Unclear if Patient-Centered Outcome (SpO2 < 80%)
- Did Not Exclude High-Risk Aspiration

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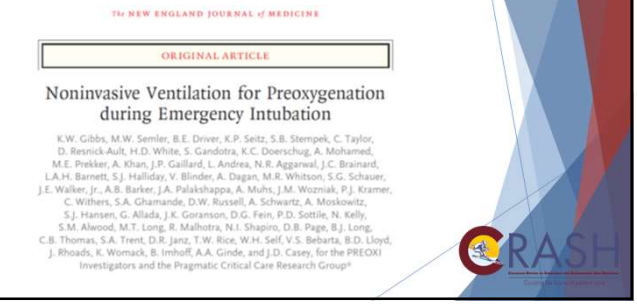
## Pre-Oxygenation (PREOXI, NEJM 2024)


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Noninvasive Ventilation for Preoxygenation during Emergency Intubation

K.W. Gibbs, M.W. Semler, B.E. Driver, K.P. Seitz, S.B. Stempek, C. Taylor, D. Resnick-Ault, H.D. White, S. Gandotra, K.C. Doerschug, A. Mohamed, M.E. Prekker, A. Khan, J.P. Gaillard, L. Andrea, N.R. Aggarwal, J.C. Brainard, L.A.H. Barnett, S.J. Halliday, V. Blinder, A. Dagan, M.R. Whitson, S.G. Schauer, J.E. Walker, Jr., A.B. Barker, J.A. Palakshappa, A. Muhs, J.M. Wozniak, P.J. Kramer, C. Withers, S.A. Ghamande, D.W. Russell, A. Schwartz, A. Moskowitz, S.J. Hansen, G. Allada, J.K. Goranson, D.G. Fein, P.D. Sottile, N. Kelly, S.M. Alwood, M.T. Long, R. Malhotra, N.I. Shapiro, D.B. Page, B.J. Long, C.B. Thomas, S.A. Trent, D.R. Janz, T.W. Rice, W.H. Self, V.S. Bebarta, B.D. Lloyd, J. Rhoads, K. Womack, B. Imhoff, A.A. Ginde, and J.D. Casey, for the PREOXI Investigators and the Pragmatic Critical Care Research Group*

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## Pre-Oxygenation (PREOXI, NEJM 2024)

- Prospective RCT of NIV vs. Oxygen Mask
- Primary Outcome → Severe Hypoxemia (Sp02 < 85%)
- 24 EDs/ICUs in US, n=1301
- NIV – BIPAP (IPAP ≥ 10, EPAP ≥ 5), FiO2 100%
- Oxygen Mask – Non-Rebreather Mask or BVM w/o Ventilation
- Post-Induction Ventilation At Discretion of Proceduralist

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## Pre-Oxygenation (PREOXI, NEJM 2024)

- Prospective RCT of NIV vs. Oxygen Mask
- Primary Outcome → Severe Hypoxemia (Sp02 < 85%)
- 24 EDs/ICUs in US
- Calculated Sample Size 1264 Patients → Based on 6% Difference
- 4567 Screened → 1301 Randomized → 1301 Included in ITT
- NIV – BIPAP (IPAP ≥ 10, EPAP ≥ 5), FiO2 100%
- Oxygen Mask – Non-Rebreather Mask or BVM w/o Ventilation
- Post-Induction Ventilation At Discretion of Proceduralist

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## Pre-Oxygenation (PREOXI, NEJM 2024)

- Primary Outcome – SpO2 < 85% → 9.1% NIV vs. 18.5% Oxygen Mask (p<0.001)
- Secondary Outcomes
  - SpO2 < 80% → 6.2% NIV vs. 13.2% Oxygen Mask
  - Cardiac Arrest → 0.2% NIV vs. 1.1% Oxygen Mask
  - Aspiration → No Difference
  - All Prespecified Subgroups Favored NIV (Obese, Severe AHRF, High APACHE II)

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## Pre-Oxygenation (PREOXI, NEJM 2024)

- Strengths
  - Pragmatic Prospective RCT, Multiple Sites
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
- Weaknesses
  - Unclear if Patient-Centered Outcome (SpO2 < 85%)
  - Control Arm was Primary NRB (not HFNC)
  - Post-Induction Ventilation Not Controlled (88% NIV vs. 31% Oxygen Mask)
  - Excluded Patients w/ Contraindication to NIV (e.g., High-Risk Aspiration)

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## Pre-Oxygenation

- Clinical Question - What is the Best Method of Pre-Oxygenation? (Face Mask vs. HFNC vs. NIV)
- Best Evidence To Date →
  - PreVent – Post-Induction BMV Reduces Hypoxemia
  - FLORALI-2 – No Difference or ? Reduced Hypoxemia w/ NIV
  - PREOXI – Reduced Hypoxemia w/ NIV
- My Practice → Pre-Oxygenation w/ NIV (Pre- and Post-Induction) Except In Patients w/ High-Risk of Aspiration (HFNC)
- Pragmatic Caveat – NIV Requires Resources

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## Pre-Oxygenation

- Should Occur In Head Up or Semi-Fowler Position at 30°
  - Improves FRC and Diaphragm Function

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## Pre-Induction Medications

- Clinical Question – Does a Pre-Induction Fluid Bolus or Vasopressors Reduce Incidence of Cardiovascular Collapse?

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## Pre-Induction Medications

- Best Evidence To Date → PREPARE II, INTUBE
  - PREPARE II – Fluid Bolus
  - INTUBE – Observational Trial

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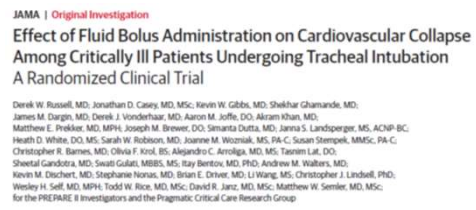
## Pre-Induction Meds (PREPARE II, JAMA 2021)


JAMA | Original Investigation

Effect of Fluid Bolus Administration on Cardiovascular Collapse Among Critically Ill Patients Undergoing Tracheal Intubation
A Randomized Clinical Trial

Derek W. Russell, MD; Jonathan D. Casey, MD, MSc; Kevin W. Gibbs, MD; Shekhar Ghamande, MD; James M. Dargin, MD; Derek J. Vonderhaar, MD; Aaron M. Joffe, DO; Akram Khan, MD; Matthew E. Prekker, MD, MPH; Joseph M. Brewer, DO; Simanta Dutta, MD; Janna S. Landsperger, MS, ACNP-BC; Heath D. White, DO, MS; Sarah W. Robison, MD; Joanne M. Wozniak, MS, PA-C; Susan Stempek, MMSc, PA-C; Christopher R. Barnes, MD; Olivia F. Krol, BS; Alejandro C. Arroliga, MD, MS; Tasnim Lat, DO; Sheetal Gandotra, MD; Swati Gulati, MBBS, MS; Itay Bentov, MD, PhD; Andrew M. Walters, MD; Kevin M. Dischert, MD; Stephanie Nonas, MD; Brian E. Driver, MD; Li Wang, MS; Christopher J. Lindsell, PhD; Wesley H. Self, MD, MPH; Todd W. Rice, MD, MSc; David R. Janz, MD, MSc; Matthew W. Semler, MD, MSc; for the PREPARE II Investigators and the Pragmatic Critical Care Research Group

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## Pre-Induction Meds (PREPARE II, JAMA 2021)

- Prospective RCT of Fluid Bolus vs. No Bolus
- Primary Outcome → Cardiovascular Collapse (New/Increased Vasopressors, SBP < 65, Cardiac Arrest)
- 11 ICUs in US, n=1065
- Fluid Bolus – 500mL Prior to Induction

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## Pre-Induction Meds (PREPARE II, JAMA 2021)

- Prospective RCT of Fluid Bolus vs. No Bolus
- Primary Outcome → Cardiovascular Collapse (New/Increased Vasopressors, SBP < 65, Cardiac Arrest)
- 11 ICUs in US
- Calculated Sample Size 1065 Patients → Based on 35% Difference
- 1576 Screened → 1067 Randomized → 1065 Included in ITT
- Fluid Bolus – 500mL Prior to Induction

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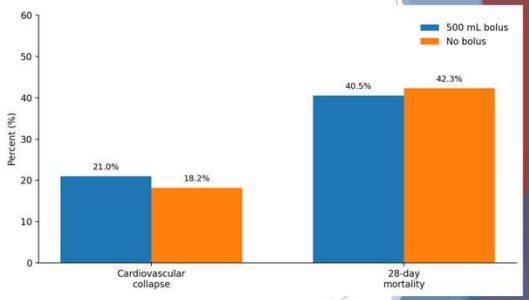
PREPARE II

JAMA 2022

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## Pre-Induction Meds (PREPARE II, JAMA 2021)

- Primary Outcome – Cardiovascular Collapse → No Difference
  - 21.0% Fluid Bolus vs. 18.2% Control (p=0.25)
  - Individual Components → No Difference
- Secondary Outcomes
  - 28d Mortality → No Difference
  - No Difference in Other Serious Adverse Events

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## Pre-Induction Meds (PREPARE II, JAMA 2021)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - 500mL Bolus Be Too Little
  - Did Not Control For Induction Agent (But No Difference Between Groups, Etomidate ~77%)
  - 15% Excluded Due to Emergency

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## Pre-Induction Meds (INTUBE, JAMA 2021)

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

**Intubation Practices and Adverse Peri-intubation Events in Critically Ill Patients From 29 Countries**

Vincenzo Russotto, MD; Sheila Nainan Myatra, MD; John G. Laffey, MD, MA; Elena Tassistro, MS; Laura Antolini, PhD; Philippe Bauer, MD, PhD; Jean Baptiste Lascarrou, MD, PhD; Konstanty Szuldrzyński, MD, PhD; Luigi Camporota, MD; Paolo Pelosi, MD; Massimiliano Sorbello, MD; Andy Higgs, MD; Robert Greif, MD; Christian Putensen, MD; Christina Agvald-Öhman, MD, PhD; Athanasios Chalkias, MD, PhD; Kristaps Bokums, MD; David Brewster, MD; Emanuela Rossi, MS; Roberto Fumagalli, MD; Antonio Pesenti, MD; Giuseppe Foti, MD; Giacomo Bellani, MD, PhD; for the INTUBE Study Investigators

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## Pre-Induction Meds (INTUBE, JAMA 2021)

- International Observational Trial
- Outcome → Major Adverse Events During Intubation
  - CV Instability
  - Severe Hypoxemia (Sp02 < 80%)
  - Cardiac Arrest
- 197 Sites from 29 Countries
- 2964 Patients Included in Analysis

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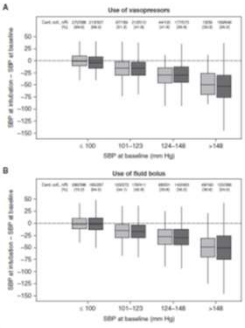


Anschutz

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## Pre-Induction Meds (INTUBE, JAMA 2021)

- Cardiovascular Instability → 42.6%
  (SPB < 65, SBP < 90 for > 30min, New/Increased Vasopressor, Fluid Bolus > 15mL/kg, Cardiac Arrest)
  - Mortality OR 2.47 (p<0.001)
- Significant Modifiable Variables
  - Pre-Induction Fluid Bolus → No Difference
  - Pre-Induction Vasopressors → No Difference
  - Propofol for Induction → Increased Risk (OR 1.23)

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## Pre-Induction Meds (INTUBE, JAMA 2021)

- Strengths
  - Large International Analysis
- Weaknesses
  - Observational Trial

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## Pre-Induction Medications

- Clinical Question – Does a Pre-Induction Fluid Bolus or Vasopressors Reduce Incidence of Cardiovascular Collapse?
- Best Evidence To Date → PREPARE II, INTUBE
  - PREPARE II – No Difference in CV Collapse w/ Fluid Bolus
  - INTUBE – No Difference in CV Collapse w/ Fluid Bolus or Vasopressors
- My Practice → No Fluid Bolus, Start Vasopressors or Increase Vasopressor Rate by ~20% for At Risk-Patients (e.g., Almost All) and Have Bolus Available at Bedside
- Pragmatic Caveat – No Available RCT on Vasopressors

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## Induction Medications

- Clinical Question – Which Amnestic and NMB is Best for RSI?
  - Efficacy (First-Pass Success)
  - Safety (Hypoxia, Cardiovascular Collapse, Mortality)

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## Induction Medications

- Best Evidence To Date →
  - Amnestic Agent - KETASED, EvK, RSI
  - Neuromuscular Blocker – Marsch, CURASMUR

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## Amnestic Medications (Background)

- Midazolam
  - Vasodilation w/ Large Doses, Slow Onset, Long Acting, Respiratory Depression
- Propofol
  - Potent Vasodilation and CV Collapse
- Ketamine
  - ? Improved Hemodynamics, ? CV Collapse
- Etomidate
  - Stable Hemodynamics, ? Adrenal Suppression

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## Amnestic Medications

- KETASED (Lancet 2009)
  - Prospective RCT in 77 ICUs and EDs in France, n=469
  - Primary Outcome → SOFA Score → No Difference
  - Secondary Outcomes → 28d Survival → No Difference
- EvK (Intensive Care Medicine 2022)
  - Prospective RCT in Single Center in US, n=801
  - Primary Outcome → 7d Survival → 77.3% Etomidate vs. 85.1% Ketamine (p=0.005)
  - Secondary Outcomes → 28d Survival → No Difference

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## Amnestic Medications (RSI, NEJM 2025)


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Ketamine or Etomidate for Tracheal Intubation of Critically Ill Adults

J.D. Casey, K.P. Seitz, B.E. Driver, K.W. Gibbs, A.A. Ginde, S.A. Trent, D.W. Russell, A.L. Muhs, M.E. Prekker, J.P. Gaillard, D. Resnick-Ault, L.J. Stewart, M.R. Whitson, S.C. DeMasi, A.E. Robinson, J.A. Palakshappa, N.R. Aggarwal, J.C. Brainard, D.J. Douin, T.K. Marvi, B.K. Scott, S.M. Alber, C. Lyle, S. Gandotra, G.W. Van Schaik, A.J. Lacy, K.C. Sherlin, H.L. Erickson, J.M. Cain, B. Redman, L.L. Beach, B. Gould, J. McIntosh, A.A. Lewis, B.D. Lloyd, T.L. Israel, B. Imhoff, L. Wang, A.B. Spicer, M.M. Churpek, T.W. Rice, W.H. Self, J.H. Han, and M.W. Semler, for the RSI Investigators and the Pragmatic Critical Care Research Group

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## Amnestic Medications (RSI, NEJM 2025)

- Prospective RCT of Etomidate vs. Ketamine
- Primary Outcome → 28d Mortality
- 14 ICUs and EDs in US (6 Medical Centers), n=2365
- Reference Ketamine (1-2 mg/kg) and Etomidate (0.2-0.3 mg/kg) Doses Included, Final Decision Up to Proceduralist

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## Amnestic Medications (RSI, NEJM 2025)

- Prospective RCT of Etomidate vs. Ketamine
- Primary Outcome → 28d Mortality
- 14 ICUs and EDs in US (6 Medical Centers)
- Calculated Sample Size 2308 Patients → Based on 5.2% Difference
- 3439 Screened → 2367 Randomized → 2365 Included in ITT
- Reference Ketamine (1-2 mg/kg) and Etomidate (0.2-0.3 mg/kg) Doses Included, Final Decision Up to Proceduralist

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## Amnestic Medications (RSI, NEJM 2025)

- Primary Outcome – 28d Mortality → No Difference
  - Ketamine 28.1%, Etomidate 29.1% (p=0.65)
- Secondary Outcomes
  - Cardiovascular Collapse → 22.1% Ketamine vs. 17.0% Etomidate (NNH = 20)
    - SBP < 65, New/Increased Vasopressors, Cardiac Arrest, Death
    - Sepsis, Vasopressors, or APACHE > 20 → NNH = 10
  - Ventricular Tachycardia → 1.0% Ketamine vs. 0.2% Etomidate

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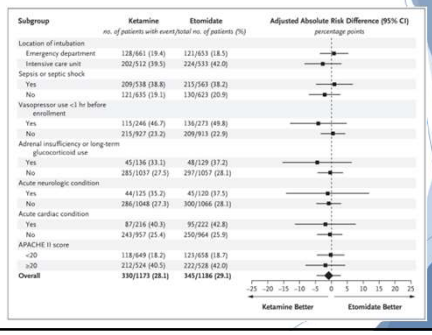
**No Difference Between Ketamine and Etomidate in Any Subgroup**

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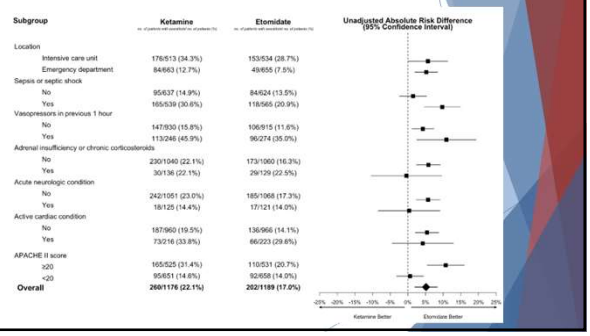
## Cardiovascular Collapse in Each Subgroup

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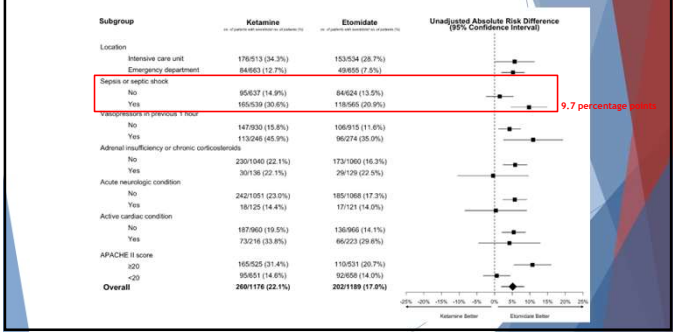
## Cardiovascular Collapse in Each Subgroup

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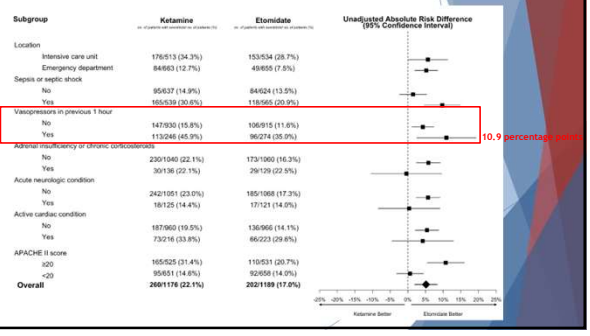
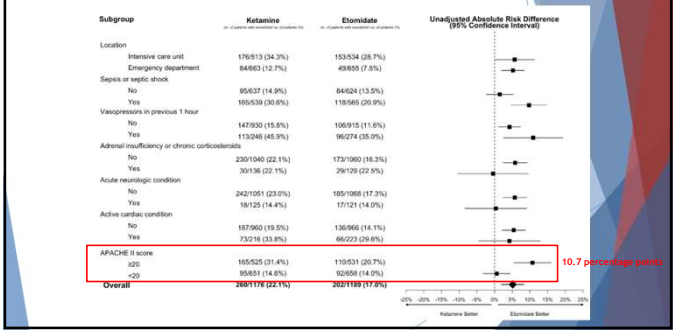
## Cardiovascular Collapse in Each Subgroup




63

## Cardiovascular Collapse in Each Subgroup




64

| Blood Pressure during Intubation | Ketamine (N= 1,176) | | Etomidate (N= 1,189) | | Absolute difference (95% CI) |
|---|---|---|---|---|---|
| Lowest systolic blood pressure, mmHg | 112 | [92-138] | 118 | [98-141] | -6 (-9 to -1) |
| <90 mmHg | 261 | (22.9%) | 197 | (17.0%) | 5.9 (2.7 to 9.2) |
| <80 mmHg | 164 | (14.4%) | 123 | (10.6%) | 3.8 (1.1 to 6.5) |
| <65 mmHg | 73 | (6.4%) | 64 | (5.5%) | 0.9 (-1.0 to 2.8) |
| Change in systolic blood pressure, mmHg | -7 | [-29 to 0] | -2 | [-20, 0] | -6 (-8 to -2) |
| >20 mmHg drop | 368 | (33.2%) | 274 | (24.3%) | 8.8 (5.1 to 12.6) |
| >30 mmHg drop | 265 | (23.9%) | 165 | (14.7%) | 9.2 (6.0 to 12.5) |
| >40 mmHg drop | 175 | (15.8%) | 119 | (10.6%) | 5.2 (2.4 to 8.0) |

*Nearly every blood pressure outcome measured was lower with ketamine than etomidate Data given as no. (%) or median [IQR]

65

| Hemodynamics during Intubation | Ketamine (N= 1,176) | | Etomidate (N= 1,189) | | Absolute difference (95% CI) |
|---|---|---|---|---|---|
| New or increased vasopressors | 251 | (21.3%) | 189 | (15.9%) | 5.4 (2.3 to 8.6) |
| Arrhythmia during intubation | 17 | (1.9%) | 8 | (0.9%) | 1.0 (-0.1 to 2.1) |
| Ventricular tachycardia | 9 | (1.0%) | 2 | (0.2%) | 0.8 (0.1 to 1.5) |
| Ventricular fibrillation | 1 | (0.1%) | 2 | (0.2%) | -0.1 (-0.5 to 0.3) |
| Heart rate <60 beats per minute | 9 | (1.0%) | 5 | (0.6%) | 0.5 (-0.4 to 1.3) |
| Cardiac arrest during intubation | 12 | (1.0%) | 10 | (0.8%) | 0.2 (-0.6 to 1.0) |
| Cardiac arrest within 1 hour of enrollment | 26 | (2.2%) | 20 | (1.7%) | 0.5 (-0.6 to 1.6) |

Data given as no. (%) or median [IQR]

66

## Amnestic Medications (RSI, NEJM 2025)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date (More than KETASED + EvK Combined)
- Weaknesses
  - Underpowered for 5% Difference
  - Cardiovascular Collapse Outcomes Difference 2/2 Vasopressor Use - ? Patient-Centered Outcome
  - ? Ketamine Overdose (Median 1.6 mg/kg)
  - Excluded Trauma Patients in ED

67

## Neuromuscular Blockers (Background)

- NMB Use vs. Non-Use (Lundstrom, Cochrane Review, 2018)
  - No NMB Use →
    - Difficulty Laryngoscopy RR 2.54 (p=0.0003)
    - Difficult Intubation RR 13.27 (p<0.0001)
    - Upper Airway Discomfort/Injury RR 1.37 (p=0.008)
- Succinylcholine
  - Hyperkalemia, Bradycardia, Cardiac Arrest, MH
- Rocuronium
  - Slower Onset, Risk of Awareness

68

## Neuromuscular Blockers (Marsch, CC 2011)

Marsch et al. Critical Care 2011, 15:R99
http://ccforum.com/content/15/4/R199

CRITICAL CARE

RESEARCH Open Access

Succinylcholine versus rocuronium for rapid sequence intubation in intensive care: a prospective, randomized controlled trial

Stephan C Marsch*, Luzius Steiner, Evelyne Bucher, Hans Pargger, Martin Schumann, Timothy Aebi, Patrick R Hunziker and Martin Siegemund

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## Neuromuscular Blockers (Marsch, CC 2011)

- Prospective RCT of Succinylcholine vs. Rocuronium
- Primary Outcome → Sp02 Decrease ≥ 5%
- Single ICU in Switzerland, n=401
- Succinylcholine 1mg/kg, Rocuronium 0.6 mg/kg

70

## Neuromuscular Blockers (Marsch, CC 2011)

- Prospective RCT of Succinylcholine vs. Rocuronium
- Primary Outcome → Sp02 Decrease ≥ 5%
- Single ICU in Switzerland
- Calculated Sample Size 250 Patients → Based on 20% Difference (Interim Power Analysis → 400)
- 579 Screened → 420 Randomized → 401 Included in ITT
- Succinylcholine 1mg/kg, Rocuronium 0.6 mg/kg

71

## Neuromuscular Blockers (Marsch, CC 2011)

- Primary Outcome - Sp02 Decrease ≥ 5% → No Difference
  - Succinylcholine 37% vs. Rocuronium 34%
- Secondary Outcomes
  - Sp02 ≤ 80% → No Difference (10% vs. 10%)
  - Time to Successful Intubation → 81 sec Succinylcholine vs. 95 sec Rocuronium (p=0.002)
  - Intubating Conditions, First-Pass Success, Intubation Attempts → No Difference

72

## Neuromuscular Blockers (Marsch, CC 2011)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
- Weaknesses
  - Not Powered for 20% Difference
  - Lower Rocuronium Dose (0.6mg/kg) Than Current SOC
  - All Direct Laryngoscopy

73

## Neuromuscular Blockers (CURASMUR, JAMA 2019)

JAMA | Original Investigation

**Effect of Rocuronium vs Succinylcholine on Endotracheal Intubation Success Rate Among Patients Undergoing Out-of-Hospital Rapid Sequence Intubation**
A Randomized Clinical Trial

Bertrand Guihard, MD; Charlotte Cholet-Xémard, MD; Philippe Lakhnati, MD; Benoit Vivien, MD, PhD; Claire Broche, MD; Dominique Savary, MD; Agnes Ricard-Hibon, MD; Pierre-Jean Marianne dit Cassou, MD; Frédéric Adnet, MD, PhD; Eric Wiel, MD, PhD; Juliette Deutsch, MD; Cindy Tissier, MD; Thomas Loeb, MD; Vincent Bounes, MD, PhD; Emmanuel Rousseau, MD; Patricia Jabre, MD, PhD; Laetitia Huiart, MD, PhD; Cyril Ferdynus, PhD; Xavier Combes, MD, PhD

74

## Neuromuscular Blockers (CURASMUR, JAMA 2019)

- Prospective RCT of Succinylcholine vs. Rocuronium
- Primary Outcome → First-Pass Success
- 17 EMS Units in France (Anesth or EM Physicians), n=1226
- Succinylcholine 1mg/kg, Rocuronium 1.2 mg/kg

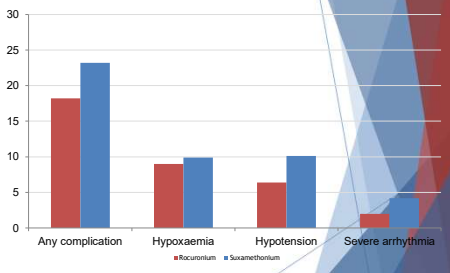
75

## Neuromuscular Blockers (CURASMUR, JAMA 2019)

- Prospective RCT of Succinylcholine vs. Rocuronium
- Primary Outcome → First-Pass Success
- 17 EMS Units in France (Physician Proceduralists)
- Calculated Sample Size 1204 Patients → Based on 7% Difference (Non-Inferiority Margin)
- 1326 Screened → 1248 Randomized → 1226 Included
- Succinylcholine 1mg/kg, Rocuronium 1.2 mg/kg

76

## CURASMUR Complications




Overall complications were lower with rocuronium (absolute differe
−5.0%; P = .04).

77

## Neuromuscular Blockers (CURASMUR, JAMA 2019)

- Primary Outcome – First Pass Success → No Difference
  - Succinylcholine 79.4% vs. Rocuronium 74.6% (Difference ~ 5%)
- Secondary Outcomes → No Difference
  - Hypoxemia
  - Hypotension
  - Cormack and Lehane Airway Grade, Intubation Difficulty, Intubating Condition
  - Other Serious Adverse Events

78

## Neuromuscular Blockers (CURASMUR, JAMA 2019)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - Not-Blinded, FPS at Discretion of Proceduralist
  - FPS 75-80% Low Compared to Other Studies
  - All Direct Laryngoscopy

79

## Induction Medications (Amnestic, NMB)

- Clinical Question – Which Amnestic and NMB is Best for RSI?
- Best Evidence To Date → RSI, Marsch, CURASMUR
  - Amnestic (RSI) - No Difference in Mortality, Less Cardiovascular Collapse w/ Etomidate vs. Ketamine
  - NMB (Marsch, CURASMUR) – No Difference in First Pass Success or Hypoxia
- My Practice → Etomidate and Rocuronium (Unless Early Planned Extubation)
- Pragmatic Caveat – Risk of Awareness with Long-Acting NMBs

80

## Induction Medications (Amnestic, NMB)

- Rocuronium 1.2mg/kg Actual Body Weight (Not Ideal or Adjusted Body Weight)

81

## Cricoid Pressure

- Clinical Question – Should You Use Cricoid Pressure During RSI?
  - Pro – Decreased Aspiration
  - Con – Inferior View, ? Increased Aspiration

82

## Pre-Oxygenation

- Best Evidence To Date → IRIS

83

## Cricoid Pressure (IRIS, JAMA Surg 2018)

JAMA Surgery | Original Investigation

**Effect of Cricoid Pressure Compared With a Sham Procedure in the Rapid Sequence Induction of Anesthesia**
The IRIS Randomized Clinical Trial

Aurélie Birenbaum, MD; David Hajage, MD, PhD; Sabine Roche, MD; Alexandre Ntouba, MD; Mathilde Eurin, MD; Philippe Cuvillon, MD, PhD; Aurélien Rohn, MD; Vincent Compere, MD, PhD; Dan Benhamou, MD; Matthieu Biais, MD, PhD; Remi Menut, MD; Sabiha Benachi, MD; François Lenfant, MD, PhD; Bruno Riou, MD, PhD; for the IRIS Investigators Group

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## Cricoid Pressure (IRIS, JAMA Surg 2018)

- Prospective RCT of Cricoid Pressure vs. No Cricoid Pressure
- Primary Outcome → Aspiration
- 10 ORs in France, n=3471
- Full Stomach (<6H Fasting) or > 1 Risk Factor for Aspiration
- All Patients Underwent RSI w/ Succinylcholine

85

## Cricoid Pressure (IRIS, JAMA Surg 2018)

- Prospective RCT of Cricoid Pressure vs. No Cricoid Pressure
- Primary Outcome → Aspiration
- 10 ORs in France
- Calculated Sample Size 350 Patients → Based on 5% Difference
- 3472 Randomized → 3471 Included in ITT
- Full Stomach (<6H Fasting) or > 1 Risk Factor for Aspiration
- All Patients Underwent RSI w/ Succinylcholine

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## Cricoid Pressure (IRIS, JAMA Surg 2018)

- Primary Outcome – Aspiration → No Difference
  - Cricoid Pressure 0.6% vs. Sham 0.5% (p=.14)
- Secondary Outcomes →
  - Pneumonia, HLOS, Mortality → No Difference
  - Cormack and Lehane Grade 3/4 → Cricoid 10% vs. Sham 5% (p<0.001)
  - Intubation Time > 30 sec → Cricoid 47% vs. Sham 40% (p<0.001)
  - No Other Difference in Serious Adverse Events

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## Cricoid Pressure (IRIS, JAMA Surg 2018)

- Strengths
  - Blinded Prospective RCT
  - Cricoid Pressure and Other Elements of Intubation Standardized
  - Largest Trial to Date
- Weaknesses
  - Observed Aspiration Rate was Low (0.5% vs. 2.8% Expected)
  - Excluded Pregnant Women

88

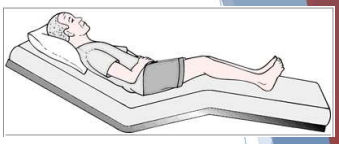
## Cricoid Pressure

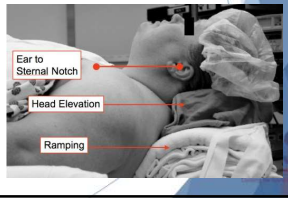
- Clinical Question – Should You Use Cricoid Pressure During RSI?
- Best Evidence To Date → IRIS
  - No Difference in Aspiration
  - Inferior Laryngeal View, Prolonged Intubation Time
- My Practice → No Cricoid Pressure

89

## Intubating Position

- Clinical Question – Which is the Best Intubating Position? (Head-Up vs. Ramp vs. Sniffing)
  - First-Pass Success
  - Oxygenation
  - Aspiration






90

## Intubating Position

- Prior Evidence - Rao (Anesh & Analg 2008, n=85)
  - RCT of Head-Up vs. Ramped Position
  - No Difference in First-Pass Success or Time to Intubation
- Best Evidence to Date → CHECK-Up Trial

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## Positioning (Check-UP Trial, Chest 2017)

[ Original Research Critical Care ]

CHEST

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

Matthew W. Semler, MD; David R. Janz, MD; Derek W. Russell, MD; Jonathan D. Casey, MD; Robert J. Lentz, MD; Aline N. Zouk, MD; Bennett P. deBoisblanc, MD; Jairo J. Santanilla, MD; Yasin A. Khan, MD; Aaron M. Joffe, DO; William S. Stigler, MD; and Todd W. Rice, MD; for the Check-UP Investigators* and the Pragmatic Critical Care Research Group

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## Positioning (Check-UP Trial, Chest 2017)

- Prospective RCT of Head-Up Position vs. Sniffing Position
- Primary Outcome → Lowest Sp02
- 2 x 2 Factorial Design (Checklist vs. SOC)
- 4 ICUs in US, n=260
- Head-Up "Ramped" Position → 25°

93

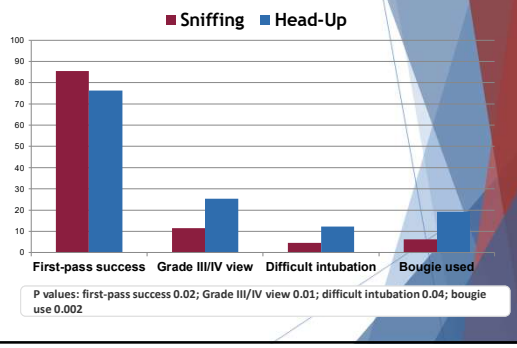
## Positioning (Check-UP Trial, Chest 2017)

- Prospective RCT of Head-Up Position vs. Sniffing Position
- Primary Outcome → Lowest Sp02
- 2 x 2 Factorial Design (Checklist vs. SOC)
- 4 ICUs in US
- Calculated Sample Size 248 Patients → Based on 5% Difference
- 309 Screened → 260 Randomized → 260 Included in ITT
- Head-Up "Ramped" Position → 25°

94

Check-UP Trial

CHEST 2017




P values: first-pass success 0.02; Grade III/IV view 0.01; difficult intubation 0.04; bougie use 0.002

95

## Positioning (Check-UP Trial, Chest 2017)

- Primary Outcome - Median Lowest Sp02 → No Difference
  - Heads-Up 93% vs. Sniffing 92% (p=.27)
- Secondary Outcomes
  - Grade III/IV → Sniffing 11.6% vs. Head-Up 25.4% (p=0.01)
  - "Difficult Intubation" → Sniffing 4.6% vs. Head-Up 12.3% (p=0.04)
  - First-Pass Success → Sniffing 85.4% vs. Head-Up 76.2% (p=0.02)
  - No Difference in Other O2 or Hemodynamic Outcomes

96

## Positioning (Check-UP Trial, Chest 2017)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - Factorial Design (Can't Rule Out Interaction with Checklist)
  - Proceduralists Were All Pulm or Crit Care Fellows
  - 75% of Intubations Were Direct Laryngoscopy

97

## Intubating Position

- Clinical Question – Which is the Best Intubating Position? (Head-Up vs. Ramp vs. Sniffing)
- Prior Evidence → Head-Up – Ramp
- Best Evidence to Date - CHECK-Up
  - Sniffing Position → Improved View, FPS and Decreased Difficult Intubation
- My Practice → Sniffing Position (Pre-Oxygenation in Head-Up or Semi-Fowler Position at 30°)
- Pragmatic Caveat - Ramped Position Not Practical in ICU

98

## Blade Choice (DL vs. VL)

- Clinical Question – Should Video-Laryngoscopy Over Direct Laryngoscopy Be 1st Line For All Intubations?
  - Pro – ? Improved First-Pass Success
  - Con – Healthcare Value, Resources, Emergencies

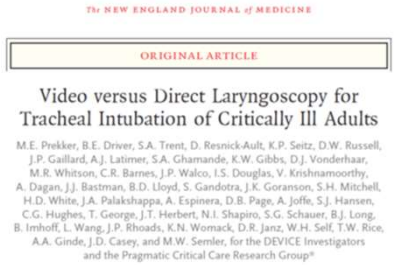
99

## Blade Choice (DL vs. VL)

- Best Evidence To Date → DEVICE, VLS

100

## Blade Choice (DEVICE, NEJM 2023)


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Video versus Direct Laryngoscopy for Tracheal Intubation of Critically Ill Adults

M.E. Prekker, B.E. Driver, S.A. Trent, D. Resnick-Ault, K.P. Seitz, D.W. Russell, J.P. Gaillard, A.J. Latimer, S.A. Ghamande, K.W. Gibbs, D.J. Vonderhaar, M.R. Whitson, C.R. Barnes, J.P. Walco, I.S. Douglas, V. Krishnamoorthy, A. Dagan, J.J. Bastman, B.D. Lloyd, S. Gandotra, J.K. Goranson, S.H. Mitchell, H.D. White, J.A. Palakshappa, A. Espinera, D.B. Page, A. Joffe, S.J. Hansen, C.G. Hughes, T. George, J.T. Herbert, N.I. Shapiro, S.G. Schauer, B.J. Long, B. Imhoff, L. Wang, J.P. Rhoads, K.N. Womack, D.R. Janz, W.H. Self, T.W. Rice, A.A. Ginde, J.D. Casey, and M.W. Semler, for the DEVICE Investigators and the Pragmatic Critical Care Research Group*

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## Blade Choice (DEVICE, NEJM 2023)

- Prospective RCT of VL vs. DL
- Primary Outcome → First Pass Success
- 17 ICUs and EDs in US, n=1417
- Blade Geometry Not Standardized

102

## Blade Choice (DEVICE, NEJM 2023)

- Prospective RCT of VL vs. DL
- Primary Outcome → First Pass Success
- 17 ICUs and EDs in US
- Calculated Sample Size 1920 Patients → Based on 5% Difference (Planned Interim Analysis at 1000 Patients)
- 1947 Screened → 1420 Randomized → 1417 Included in ITT
- Blade Geometry Not Standardized

103

## Blade Choice (DEVICE, NEJM 2023)

- Primary Outcome – First Pass Success → VL 85.1% vs. DL 70.8% ($p<0.001$)
- Secondary Outcomes →
  - Severe Complications → No Difference

  (Sp02 < 80%, SBP < 65, New/Increased Vasopressors, Cardiac Arrest, Death)
  - Safety Outcomes → No Difference

  (Esophageal Intubation, Teeth Injury, Aspiration)

104

## Blade Choice (DEVICE, NEJM 2023)

- Strengths
  - Pragmatic Prospective RCT
  - Patients Well Matched w/ Good Separation and Adherence to Protocol
  - Largest Trial to Date
- Weaknesses
  - Relatively Inexperienced Proceduralists (Average 50 Intubations)
  - Significant Inexperience w/ DL (~5% Proceduralists w/ > 25% of Previous Intubations w/ DL)

105

## Blade Choice (VLS, JAMA 2024)

JAMA | Original Investigation

**Video Laryngoscopy vs Direct Laryngoscopy for Endotracheal Intubation in the Operating Room**

A Cluster Randomized Clinical Trial

Kurt Ruetzler, MD; Sergio Bustamante, MD; Marc T. Schmidt; Federico Almonacid-Cardenas, MD; Andra Duncan, MD; Andrew Bauer, MD; Alparslan Turan, MD; Nikolaos J. Skubas, MD; Daniel I. Sessler, MD; for the Collaborative VLS Trial Group

106

## Blade Choice (VLS, JAMA 2024)

- Prospective RCT of VL vs. DL
- Primary Outcome → First Pass Success
- Single Site Academic OR in US (Cleveland Clinic), n=8429
- VL Standardized to Hyperangulated Blade w/ Rigid Stylet
- Stylet Use in DL Not Standardized

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## Blade Choice (VLS, JAMA 2024)

- Prospective RCT of VL vs. DL
- Primary Outcome → First Pass Success
- Single Site Academic OR in US (Cleveland Clinic)
- Calculated Sample Size 14,943 Intubations → Based on 5% Difference (Planned Interim Analysis at 25% / 50%)
- 15,796 Randomized → 8,429 Included in ITT
- VL Standardized to Hyperangulated Blade w/ Rigid Stylet
- Stylet Use in DL Not Standardized

108

## Blade Choice (VLS, JAMA 2024)

- Primary Outcome – First Pass Success → VL 98.3% vs. DL 92.4% (p<0.001)
- Secondary Outcomes →
  - Intubation Failure → VL 0.27% vs. DL 4.0% (p<0.001)

  (Switching Device, > 3 Intubation Attempts, Composite of Airway and Dental Injuries)
  - Airway / Dental Injuries → No Difference

109

## Blade Choice (VLS, JAMA 2024)

- Strengths
  - Pragmatic Prospective RCT
  - Experienced Proceduralists (80% Anesthesia Residents or CRNAs, 20% Anesthesia Fellows or Attendings)
  - Largest Trial to Date
- Weaknesses
  - Single Center Trial, Single Vendor (Verathon Glidescope)
  - Unclear Significance of Blade Geometry and Rigid Stylet (vs. VL Alone)

110

## Blade Choice (VL vs. DL)

- Clinical Question – Should Video-Laryngoscopy Over Direct Laryngoscopy Be 1st Line For All Intubations?
- Best Evidence To Date → DEVICE, VLS
  - DEVICE – VL Best (85.1% vs. 70.8%)
  - VLS – VL Best (98.3% vs. 92.4%)
- My Practice → Videolaryngoscopy 1st Line
- Pragmatic Caveat (DEVICE and VLS) → No Association Between Intubation Attempts and Complications

111

## Blade Geometry

- Clinical Question – Should A Standard or Hyperangulated Video-Laryngoscopy Blade Be Used as 1st Line for All Intubations?

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## Blade Geometry

- Best Evidence To Date → BLADESHAPE

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## Blade Geometry (BLADESHAPE, Anaesth 2024)

Anaesthesia 2024, 79, 957-966 doi:10.1111/anae.16326

Original Article

**Hyperangulated vs. Macintosh videolaryngoscopy in adults with anticipated difficult airway management: a randomised controlled trial**

Vera Köhl,[1] Viktor A. Wünsch,[1] Marie-Claire Müller,[1] Phillip B. Sasu,[1] Thorsten Dohrmann,[1] Tanja Peters,[1] Josephine Tolkmitt,[1] André Dankert,[1] Linda Krause,[2] Christian Zöllner[1] and Martin Petzoldt[1]

1 Department of Anaesthesiology, Centre for Anaesthesiology and Intensive Care Medicine, University Medical Centre Hamburg-Eppendorf, Hamburg, Germany
2 Institute of Medical Biometry and Epidemiology, University Medical Centre Hamburg-Eppendorf, Hamburg, Germany

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## Blade Geometry (BLADESHAPE, Anaesth 2024)

- Prospective RCT of VL with Hyperangulated vs. Standard Blade Geometry
- Primary Outcome → % Glottic Opening
- Single Site OR in Germany, n=182
- Included ENT Patients w/ Anticipated Difficult Airway (Standardized Assessment in Pre-Op Clinic)
- Hyperangulated Blade Standardized to Rigid Stylet

115

## Blade Geometry (BLADESHAPE, Anaesth 2024)

- Prospective RCT of Hyperangulated vs. Standard Blade Geometry
- Primary Outcome → % Glottic Opening
- Single Site OR in Germany
- Calculated Sample Size 182 Patients → Based on 16% Difference
- 2540 Screened → 182 Randomized → 182 Included in ITT
- Included ENT Patients w/ Anticipated Difficult Airway (Standardized Assessment in Pre-Op Clinic)
- Hyperangulated Blade Standardized to Rigid Stylet

116

## Blade Geometry (BLADESHAPE, Anaesth 2024)

- Primary Outcome – Median % Glottic Opening → Hyperangulated 89% vs. Standard 54% ($p<0.001$)
  - Assessed by Recorded Vido Review
- Secondary Outcomes →
  - First-Pass Success → Hyperangulated 97% vs. Standard 67% ($p<0.001$)
  - Intubation Failure → Hyperangulated 1% vs. 13% Standard ($p=0.002$)

(Conversion To Different Laryngoscope or Intubation Technique)

- No Difference in Serious Adverse Events

117

## Blade Geometry (BLADESHAPE, Anaesth 2024)

- Strengths
  - Blinded Prospective RCT, Appropriately Powered
  - Very Experienced Proceduralists (Practicing Anesthesiologists > 5yrs Experience)
  - Difficult Airway Inclusion Criteria
- Weaknesses
  - Primary Outcome Not Patient Centered
  - Single Site, Specific to ENT Patients
  - Single Vendor (Storz CMAC)
  - Unclear Significance of Rigid Stylet

118

## Blade Geometry

- Clinical Question – Should A Standard or Hyperangulated Video-Laryngoscopy Blade Be Used as 1st Line for All Intubations?
- Best Evidence To Date → BLADESHAPE
  - Hyperangulated Best (Glottic Opening 89% vs. 54%)
- * 100% Failed Intubations w/ Standard Blade (13) Were Successfully Intubated w/ Hyperangulated Blade
- My Practice → Hyperangulated 1st Line
- Pragmatic Caveat - ? Same for Less Experienced Clinicians

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## Summary

- Preparation (NG Tube Decompression) → Yes, When Indicated
- Pre-Oxygenation → NIV (or HFNC if Contraindications) in Head-Up or Semi-Fowler Position at 30°
- Pre-Induction Meds (Fluids + Vasopressors) → No Fluids, Yes Vasopressors
- Induction Meds (Amnestic + NMB) → Etomidate + Roc
- Cricoid Pressure → No
- Intubating Position → Sniffing
- Blade Choice (DL vs. VL) → VL 1st Line
- Blade Geometry → Hyperangulated 1st Line

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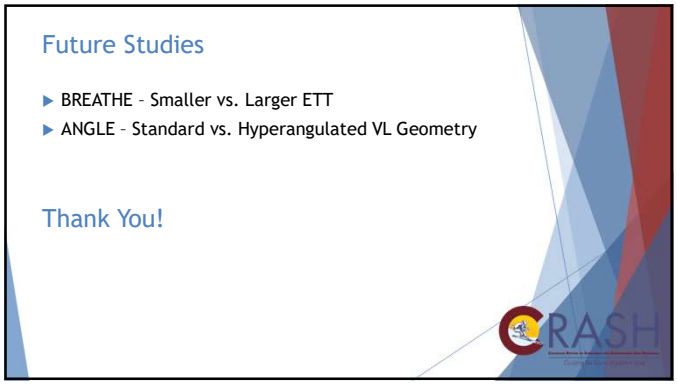
Future Studies
BREATHE – Smaller vs. Larger ETT
ANGLE – Standard vs. Hyperangulated VL Geometry
Thank You!
CRASH

121