Where We Are with RSI:  
A Look Through the Glottic Opening  
Benjamin Lawner, DO, MS, EMT-P, FACEP  
University of Maryland School of Medicine
THE USE OF NEUROMUSCULAR BLOCKERS AND ADVANCED SEDATION BY FIELD EMT-PARAMEDICS TO PROMOTE MORE EFFECTIVE AIRWAY MANAGEMENT IN ADULT TRAUMA PATIENTS WITH GLASGOW COMA SCALE OF 8 OR LESS

SUCCEINYLCHOLINE
ROCURONIUM
MIDAZOLAM

EMT-P Trial Study Proposal
County of San Diego Department of Health Services
Division of Emergency Medical Services

Principal Investigator
Mel A Ochs, MD, FACEP

Presented to California EMS Authority
December 16, 1996
Figure 1  San Diego County
Intubation success on trauma patients, based on Glasgow Coma Score (GCS). 1/1/95 through 6/30/95

<table>
<thead>
<tr>
<th>Glasgow Coma Score</th>
<th>Number of cases</th>
<th>Successful</th>
<th>Intubations Unsuccessful</th>
<th>No attempt</th>
<th>% Successful</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>9%</td>
</tr>
<tr>
<td>7</td>
<td>17</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>38%</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>50%</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>17%</td>
</tr>
<tr>
<td>3</td>
<td>71</td>
<td>44</td>
<td>14</td>
<td>13</td>
<td>50%</td>
</tr>
</tbody>
</table>

(Note: In GCS=3, the patients who were dead on scene were excluded in the above numbers. These included 10 successful intubations, 2 unsuccessful intubations, 13 not attempted.)
Rationale

• Mitigate increases in ICP
• Decrease incidence of hypoxia

All prehospital traumatically injured adult patients with a GCS of 8 or less will be intubated in the field beginning 1 Jul 97. Mortality rate and as well as rate of complications listed in the Trauma Registry for the patients intubated with, or subsequently receiving, neuromuscular blocking agents will be compared to the cohort of patients who were not intubated, and will be matched for AIS for head injury, AIS for other body regions, ISS and age.
The Jurisdiction and Set-Up

- San Diego county population of 3 M
- ALS provided by 12 agencies
- 120,000 transports per year
- 8 hour didactic course
- Continuous SpO2 monitoring
The Results

→ Increased scene time
→ Decreased pCO2
→ Increased hyperventilation

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>RSI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes on scene (mean)</td>
<td>16.4</td>
<td>22.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (mmHg)</td>
<td>138.4</td>
<td>138.6</td>
<td>0.907</td>
</tr>
<tr>
<td>SBP ≤ 90 mmHg (%)</td>
<td>6.4</td>
<td>6.8</td>
<td>1.000</td>
</tr>
<tr>
<td>ABG data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH (mean)</td>
<td>7.36</td>
<td>7.36</td>
<td>0.850</td>
</tr>
<tr>
<td>pO2 (mean in mmHg)</td>
<td>216</td>
<td>315</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>pCO2 (mean in mmHg)</td>
<td>38.3</td>
<td>34.9</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Base excess (mean)</td>
<td>-3.4</td>
<td>-4.3</td>
<td>0.002</td>
</tr>
<tr>
<td>Inadvertent hyperventilation (%)</td>
<td>8.0</td>
<td>15.4</td>
<td>0.014</td>
</tr>
<tr>
<td>Mean serum ethanol (mg/dl)</td>
<td>101</td>
<td>111</td>
<td>0.656</td>
</tr>
</tbody>
</table>

RSI, rapid sequence intubation; SBP, systolic blood pressure; ABG, arterial blood gas.
The Results

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Controls (%)</th>
<th>RSI (%)</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>24.2</td>
<td>33.0</td>
<td>1.6 (1.1–2.2)*</td>
</tr>
<tr>
<td>Head/neck AIS 3 or greater</td>
<td>30.3</td>
<td>41.1</td>
<td>1.6 (1.1–2.3)*</td>
</tr>
<tr>
<td>Non-aeromedical</td>
<td>24.3</td>
<td>33.0</td>
<td>1.6 (1.1–2.2)*</td>
</tr>
<tr>
<td><strong>Good outcome</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>57.9</td>
<td>45.5</td>
<td>1.6 (1.2–2.3)†</td>
</tr>
</tbody>
</table>
The Aftermath

The Impact of Hypoxia and Hyperventilation on Outcome after Paramedic Rapid Sequence Intubation of Severely Head-Injured Patients

Daniel P. Davis, MD, James V. Dunford, MD, Jennifer C. Poste, Mel Ochs, MD, Troy Holbrook, PhD, Dale Fortlage, BA, Michael J. Size, MD, Frank Kennedy, MD, and David B. Hoyt, MD

- 426 trial patients
- 59 had complete EtC02/Sp02
- Matched with 177 control patients
Fig. 1. Outcome variables used in logistic regression analysis included duration of preintubation $\text{Spo}_2$ below 90% (A); lowest preintubation $\text{Spo}_2$ recorded (B), lowest postintubation $\text{Spo}_2$ recorded (C), lowest ETCO$_2$ value (D), and final ETCO$_2$ value (E).
- Mortality in RSI 40.7% RSI vs 21.5%
- Adverse effect with profound desaturation
- Greater delta C02 seen with increased RR
- Association between lowest recorded ETc02 and mortality
- EtC02 values less than 25 mm Hg seen in 59% of patients
The Bottom Line Bad News:

• Study halted early due to increased mortality
• Hyperventilation was common- and lethal
• Complicated definition of “intubation success”
Fairfax One: Current RSI Program
Prehospital Rapid Sequence Intubation for Head Trauma: Conditions for a Successful Program.
Fakhry, Samir; MD, FACS; Scanlon, James; Robinson, Linda; MA, MS; Askari, Reza; Watenpaugh, Rolland; Fata, Paola; MD, FRCSC; Hauda, William; Trask, Arthur; MD, FACS

DOI: 10.1097/01.ta.0000217285.94057.5e
Retrospective RSI Review

Table 1  Characteristics of Study Population (n = 175)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>31.9 ± 19.2</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>74%/26%</td>
</tr>
<tr>
<td>Blunt mechanism</td>
<td>91%</td>
</tr>
<tr>
<td>ISS</td>
<td>25.7 ± 13.9</td>
</tr>
<tr>
<td>Head AIS</td>
<td>3.96 ± 1.19</td>
</tr>
<tr>
<td>GCS</td>
<td>4.8 ± 2.4</td>
</tr>
</tbody>
</table>
Results

Table 3 Results of RSI

<table>
<thead>
<tr>
<th>Result</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malpositioned ETT</td>
<td>5 (2.9%) right main stem bronchus</td>
</tr>
<tr>
<td></td>
<td>2 (1.2%) dislodged enroute</td>
</tr>
<tr>
<td>Arterial desaturation (&lt;92%)</td>
<td>4 (2.3%)</td>
</tr>
<tr>
<td>Arrival pCO₂, mean</td>
<td>36.7 ± 8</td>
</tr>
<tr>
<td>ICU length of stay (days)</td>
<td>6.2 ± 8.1</td>
</tr>
<tr>
<td>Hospital length of stay (days)</td>
<td>11.2 ± 18.5</td>
</tr>
<tr>
<td>Overall mortality</td>
<td>31%</td>
</tr>
</tbody>
</table>
## Fairfax Training Model

<table>
<thead>
<tr>
<th>TRAINING MODEL ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidates</td>
<td>Police officers with EMS and paramedic training</td>
</tr>
<tr>
<td>Initial training</td>
<td>Intensive advanced airway training</td>
</tr>
<tr>
<td>Competency evaluation</td>
<td>Preflight performance examination</td>
</tr>
<tr>
<td>Skills maintenance</td>
<td>3 days every 6 months; 20-40 supervised intubations, simulation</td>
</tr>
<tr>
<td>QI</td>
<td>RSI reviewed by medical director</td>
</tr>
<tr>
<td>Outcome</td>
<td>Small number of highly trained, very experienced operators</td>
</tr>
</tbody>
</table>
Components of a Successful RSI Program

• Evidence based
• **100% quality assurance**
• *Initial and ongoing training*
• Reliance on actual intubation encounters
• Pre-established minimums for competencies
• End tidal CO2
• Rigid protocolization
Rapid Sequence Induction Checklist

**Patient**
- Pre-oxygenate
  - 5 min 8 L/min O₂
- Position
  - 'sniffing the morning air'
  - 'RAMP' if obese
- If difficult airway anticipated, call Anaesthetist in charge (ext: 3186) for possible awake fibre-optic
  - Upper airway obstruction/trauma
  - Morbidly obese/OSA
  - C-spine immobilisation

**Equipment**
- "SOAPME"
  - Suction
  - Oxygen
  - Bag Valve Mask
  - Airway equipment
    - 2 laryngoscopes
    - 2 ETTs
  - Bougie
  - Pharmacological agents
    - Pretreatment
    - Induction agent
    - Paralytic agent
    - Ongoing anaesthesia
    - Vasoconstrictor
  - Monitoring equipment
    - SpO₂
    - ETCO₂
    - ECG monitoring
    - NIBP

**Team**
- Team leader
  - Consultant if available
- Airway doc
  - Must have anaesthetic experience
- Airway nurse
- Drugs
  - JMO/nurse
  - Scribe & timer
    - Nurse
  - Cricoid pressure
    - Optional JMO/nurse
  - If difficult airway anticipated, call Anaesthetist in charge (ext: 3185)

**Have a Plan**
- Know your back up airway plan
- See default strategy for failed RSI algorithm and let your team know if you are doing something different
  - Have a ventilator strategy
  - See Oxylog 3000 plus algorithm

modified from www.safetyintubation.com
“Regular training, standardization, and checklists to ensure task completion allow us to develop both individual and team cognitive resilience.”

T. Leeuwenburg. www.kidocs.org
Remember, Remember!

- Foundation critical to RSI success
- Initial training emphasis
- Strive for “ZERO MISS” but understand that successful placement is not the most ideal outcome measure
- Raise the intubation standard for RSI credentialing
A Meta-Analysis of Prehospital Airway Control Techniques Part I: Orotracheal and Nasotracheal Intubation Success Rates
Words of Caution

- Pooled data, retrospective
- Overall quality “poor”
- Success related to PLACEMEMENT only
- Higher success rates with RSI and DFI
- Lower success rates with trauma, non arrest, and pediatric patients
- Low rate of success for NTI
**Table 4. Subanalysis Results: Success Rate (%) and 95% Confidence Interval**

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>All Clinicians</th>
<th>All Nonphysicians*</th>
<th>Ground Paramedics</th>
<th>Nonphysician Flight Crews†</th>
<th>Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>86.5 (83.3–89.2)</td>
<td>86.3 (82.6–89.4)</td>
<td>87.5 (83.7–90.5)</td>
<td>88.1 (65.7–96.6)</td>
<td>91.8 (85.0–95.6)</td>
</tr>
<tr>
<td>Trauma only</td>
<td>73.7 (62.6–82.5)</td>
<td>69.8 (60.1–78.0)</td>
<td>73.7 (62.1–82.7)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Nontrauma only</td>
<td>88.6 (83.6–92.2)</td>
<td>—</td>
<td>87.9 (82.2–91.9)</td>
<td>—</td>
<td>94.0 (86.3–97.5)</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>91.2 (88.8–93.1)</td>
<td>—</td>
<td>91.1 (88.0–93.4)</td>
<td>—</td>
<td>91.8 (85.0–95.6)</td>
</tr>
</tbody>
</table>

**OROTRACHEAL INTUBATION POOLED SUCCESS RATES**

- Overall: 86.5%
- Trauma only: 73.7%
- Trauma only (non doc): 69.8%
- Non arrest only: 70.4%
<table>
<thead>
<tr>
<th></th>
<th>ALL CLINICIANS</th>
<th>ALL NON PHYSICIANS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RSI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>96.1 (94.5–97.3)</td>
<td>96.7 (94.7–98.0)</td>
</tr>
<tr>
<td>Trauma only</td>
<td>93.8 (89.8–96.3)</td>
<td>94.0 (89.2–96.7)</td>
</tr>
<tr>
<td>Nontrauma only</td>
<td>98.4 (96.9–99.1)</td>
<td>—</td>
</tr>
<tr>
<td><strong>DFI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>86.2 (79.9–90.8)</td>
<td>86.8 (80.2–91.4)</td>
</tr>
<tr>
<td>Trauma only</td>
<td>94.8 (16.8–99.9)</td>
<td>—</td>
</tr>
<tr>
<td>Nontrauma Only</td>
<td>87.1 (77.1–93.2)</td>
<td>—</td>
</tr>
</tbody>
</table>
Take Home Points to Ponder

- What defines success?
- Self reporting vs. verification
- Advocate for a ZERO percent miss rate
- Role for continuous waveform capnography

*Silvestri, et al, found that rate of tube misplacement was 23.3% without capnography and 0% with capnography.*
Take Home Points to Ponder

• Is NTI a viable rescue alternative?
• Should “DFI” be considered safer?
• RSI clearly associated with increased success
• Continued challenges with trauma/pediatrics
Where We Need to Go

• Ban RSI?
• Selective RSI?
• Increased training
• Increased oversight
• Continuing education
Is there an Ideal Prehospital RSI Protocol?

- Preparation
- Preoxygenation
- Pretreatment
- Paralysis
- Protection
- Placement
- Post intubation management
Preparation

- Two tubes
- Two blades
- Difficult airway plan
- Cricothyroidotomy equipment
- Suction
- Additional rescuer
Positioning
Ear to Sternal Notch

Head Elevation

Ramping
Pretreatment

- Lidocaine
- Fentanyl
- Defasciculating agent
- Atropine
2001

The authors could find no evidence that in acute traumatic head injury pretreatment with IV lignocaine/lidocaine before a RSI reduces ICP or improves neurological outcome. The evidence for such an effect and the benefit of pretreatment comes from 42 fully premedicated patients undergoing elective neurosurgery, with elective anaesthesia not RSI, for tumour resection. The evidence obtained from
Postintubation hemodynamic effects of intravenous lidocaine in severe traumatic brain injury

Chi-Chun Lin MD, Jiun-Hao Yu MD, Chih-Chuan Lin MD, Wen-Cheng Li MD, Yi-Ming Weng MD*, Shou-Yen Chen MD
Chi-Chun et al, 2012

- 101 patients
- 46 received IV lidocaine
- Retrospective study, isolated brain injury
- No significant changes in BP

**Conclusion:** Intravenous lidocaine in addition to RSI before endotracheal intubation was not associated with significant hemodynamic changes in patients with severe traumatic brain injury.
Atropine’s gone, too?

Should the routine use of atropine before succinylcholine in children be reconsidered?

- 41 children
- Group 1 received 20 mcg/kg atropine and 1.5 mg/kg SUX
- Group 1 received 1.5 mg/kg SUX
- ECG tracings continuously recorded

Georgina McAuliffe MB BS FRCA,
Bruno Bissonnette MD FRCPC,
Christine Boutin MD FRCPC*
<table>
<thead>
<tr>
<th>Time</th>
<th>Group S</th>
<th>Group AS</th>
<th>*P &lt; 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-induction</td>
<td>108 ± 25</td>
<td>108 ± 17</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>(70–165)</td>
<td>(83–140)</td>
<td></td>
</tr>
<tr>
<td>Pre-laryngoscopy</td>
<td>128 ± 24†</td>
<td>142 ± 15†</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(95–160)</td>
<td>(116–169)</td>
<td></td>
</tr>
<tr>
<td>Post-laryngoscopy</td>
<td>128 ± 18†</td>
<td>150 ± 13†</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(92–157)</td>
<td>(116–168)</td>
<td></td>
</tr>
<tr>
<td>2 mins post-laryngoscopy</td>
<td>117 ± 18†</td>
<td>149 ± 12†</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(78–146)</td>
<td>(123–165)</td>
<td></td>
</tr>
</tbody>
</table>

Mean ± SD; (range); NS = not significant; AS = atropine/succinylcholine; S = succinylcholine alone. †P < 0.05 compared with pre-induction value.
Induction and Paralysis

• Etomidate
• Propofol
• Ketamine
• Midazolam
• Fentanyl
Prevention of Hypotension and Hypoxia

- IV fluid bolus
- Push dose pressors
- Apneic oxygenation
- Hyperoxygenation
Draw up 1 mL of EPI

Draw up 9 mL Saline

10 mcg/mL EPI

Admin 5-20 mcg (0.5-2mL) q 1-5 mins
But Doc, How Can We Predict Which Patients are Going to Get Hypotensive?

....aren’t you glad you asked?
The prognostic factors of hypotension after rapid sequence intubation

Chih-Chuan Lin MD<sup>a,b</sup>, Kuan Fu Chen MD<sup>a,b</sup>, Chia-Pang Shih MHA<sup>c</sup>, Chen-June Seak MD<sup>a,b</sup>, Kuang-Hung Hsu PhD<sup>c,*</sup>

- ED based study
- 149 patients
- 28 patients hypotensive (<90 mm Hg before RSI)
- 121 patients in the control group (>90 mm Hg)
EXCLUSIONS

• Patients in profound shock
• Patients in cardiac arrest
• Patients receiving inotropic agents
• Patients receiving aggressive fluid resuscitation
• >3 intubation attempts
AFTER THE USUAL LOGISTIC REGRESSION MODELING

- Relative hypotension
- Sepsis
- COPD
- Use of lidocaine
- Use of albumin
- Low body weight
Predicators of the complication of postintubation hypotension during emergency airway management

Alan C. Heffner MD\textsuperscript{a,b,*}, Douglas S. Swords BA, MS IV\textsuperscript{b}, Marcy L. Nussbaum MS\textsuperscript{c}, Jeffrey A. Kline MD\textsuperscript{b}, Alan E. Jones MD\textsuperscript{b,d}

- Retrospective cohort
- ETI in large, urban ED
- Patients > 17 and had NO systolic BP <90 mm Hg for 30 or more mins
RESULTS

- Hypotension in 66/300 (22%)
- Patients with hypotension had increased mortality
- Examined patient specific factors associated with hypotension
<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preintubation SI</td>
<td>55.1</td>
<td>13-232</td>
</tr>
<tr>
<td>End-stage renal disease</td>
<td>3.7</td>
<td>1.1-13.1</td>
</tr>
<tr>
<td>Chronic renal insufficiency</td>
<td>3.4</td>
<td>1.2-9.6</td>
</tr>
<tr>
<td>Intubation for respiratory failure</td>
<td>2.1</td>
<td>1.0-4.5</td>
</tr>
<tr>
<td>Age</td>
<td>1.03</td>
<td>1.01-1.04</td>
</tr>
<tr>
<td>ACE inhibitor use</td>
<td>0.3</td>
<td>0.1-0.7</td>
</tr>
<tr>
<td>Intubation paralysis</td>
<td>0.04</td>
<td>0.003-0.4</td>
</tr>
</tbody>
</table>

Model fit: C statistic, 0.81; Hosmer-Lemeshow test, $P = .35$. 
**RS-Implications**

- "**Individualized**" selection of patients
- Consider hemodynamically stable induction agents at reduced dose
- Slow, low TV ventilation
- Empiric volume loading
- Vasopressor support

**SHOCK INDEX: HR/SBP**
Normal 0.5 to 0.7
Paralysis

• To fasciculate or not to fasciculate
• Succinylcholine 1.0-1.5 mg/kg
• Rocuronium 0.6-1.0 mg/kg
• Vecuronium 0.1 mg/kg
What SUX about SUX

- Depolarizing NB
- “Superior intubating conditions”
- Rapid onset
- Rapid offset
- Simple dosing
- Several contraindications
- Redosing problematic
What ROCS about ROC

• Less rapid onset
• Non depolarizing
• Simple dosing 1.0 mg/kg IV
• Extended duration of paralysis
• No redosing
Vexations over Vec

- Non depolarizing
- Inexpensive
- Shorten onset with increased dosing
- 0.1 mg/kg → 0.3 mg /kg IV
- Extended paralysis duration
• Longer time to sedation with rocuronium
• Intubating conditions more approximate SUX when ROC dose is increased
Post Intubation Management

- End tidal capnography
- Ventilator management
- Post intubation sedation
Ventilator Management

- Use IBW or PBW
- Protective lung ventilation
- 6 mL/kg
- Evidence in ARDS and non ARDS patients
Post Intubation Management: Sedation

- Prolonged paralysis → out
- Analgesia first → in
- Sedation increases ventilator compliance
- Tailor choices to patient condition
Prehospital Sedation: Midazolam

- Respiratory depression
- Hypotension
- May increase time on ventilator
- Dose dependent hypotension
- Short acting
- Increase delirium in elderly patients
Prehospital Sedation: Fentanyl

- Familiar
- Hemodynamically neutral
- No histaminergic response
- Well tolerated
- Adverse effects at higher doses
The New P’s of RSI

• Position
• Preparation
• Preoxygenation
• Prevention of hypotension
• Paralysis
• Placement of tube
• Protection of tube
• Post intubation management
Case Studies in RSI

80 yo F presents to the ED with confusion. Family reports three days of feeling “unwell” with associated vomiting and fever. Pt becomes more somnolent and confused; requires airway protection

T: 39
P: 130
BP: 90/50
R: 22
Spo2: 93%
Case #1

- Septic shock
- Relative hypotension
- Suspected acidosis
- Induction agent?
Case #2

22 yo M extricated from single vehicle vs tree. Pt is combative and experiences seizure. Suspected TBI. Pt’s teeth are clenched.

BP: 180/100

P: 56

R: 6/irregular

SpO2: 85% RA
Case #2

- Probable ICH
- Avoidance of hypoxia/hypotension
- Minimization of intracranial pressure
- Induction agent / paralytic?
Ketamine \(\rightarrow\) ICP

KETAMINE FOR EVERYTHING
Ketamine Koncern

• Literature from early 1970’s
• ICP increases found in patients with obstructive neurologic pathology
• May actually increase CBF
Ketamine does not increase intracranial pressure compared with opioids: meta-analysis of randomized controlled trials

- 5 trials, 198 patients
- ICP levels within first 24 hours following administration
- Patients received continuous infusions and bolus dosing
• Place nasal cannula
• Turn flow meter all the way up
PREOXYGENATE !!!!
Finally! An evidence based indication for normal saline and prehospital crystalloid!
Pretreatment → Forget about it!

- *Ketamine* 2 mg / kg
- *Rocuronium* 1 mg / kg
Pass the tube!

- DL or DL with VL back up
- Focus on tube delivery
- Have back up / rescue at the ready
- Cricothyroidotomy on standby
SUMMARY

• RSI has the potential to improve success and patient outcomes
• RSI must be implemented as part of a comprehensive educational and training initiative
• Protocolize the approach to RSI to minimize efforts and reduce cognitive load
• Remember the 8 P’s of RSI
Thank you!

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