Predictors of post-intubation hypotension in prehospital transport of adult trauma patients

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DISCLOSURES

- FB: Grants: 1T32HL135415 and T35DK065521
- JE: Grants: NINDS 1K23NS097629, UPMC Enterprise
- CMG: No relevant disclosures
- FXG: No relevant disclosures

BACKGROUND

- Intubation of adult trauma patients by HEMS personnel is common
- Hypotension is associated with increased mortality in adult trauma patients
- Many agencies have switched from succinylcholine to rocuronium for rapid sequence intubation

STAT MedEvac

- Critical Care Transport System, with flight nurse/paramedic teams
- Services a 30 Hospital Health System Covering 4 states
- 18 Bases with 21 Airframes and 2 Critical Care Ambulances
- 12,000 Critical Care Transports per year
  - >3,000 Mechanically ventilated patients per year
  - >500 Intubations per year and routinely performs Rapid Sequence Induction

STUDY AIM(S) / HYPOTHESES

- Determine the rate of post-intubation hypotension in adult trauma patients
- Identify independent predictors of post-intubation hypotension

METHODS

- Retrospective chart review of consecutive adult trauma patients intubated and transported by STAT MedEvac between January 2001 and June 2016
  - Adults > 18 years old
  - Trauma patients identified by dispatch category
  - Last systolic blood pressure prior to intubation > 90 mmHg (excluding those already hypotensive or in traumatic arrest)
- Primary Outcome:
  - SBP < 90 mmHg within 15 minutes of intubation

METHODS

- Looked for predictors of hypotension that would be available to crews treating patients (vital signs) or under their control (where to intubate, medication choice)
- We performed adjusted logistic regression to identify predictors (vital signs, drug usage) of post-intubation hypotension
  - Built our model using backward selection, checked for specification error, goodness of fit, collinearity and examined residuals for influential observations

RESULTS

- 4701 adult trauma patients were intubated

Baseline characteristic	Overall cohort (n = 4,701)
Age, years	44 ± 20
Female sex	1175 (25%)
Scene transport (vs. interfacility)	4086 (87%)
Location of trauma	
Head/Neck	4012 (86%)
Thoracic	1723 (37%)
Abdominal	567 (12%)
Pelvis	499 (11%)
Extremities	2045 (43%)

Measurements PTI*	
Heart Rate	99 ± 25
Systolic Blood Pressure	137 ± 32
SpO2	96 [95-100]
Respiratory Rate	18 ± 7
GCS (n = 2684)	
GCS 13-15	415 (15%)
GCS 8-12	475 (18%)
GCS 3-7	1794 (66%)
Lactate (n=469)	3.75 ± 2.8

Data are expressed as n (%), mean ± SD or median [IQR]

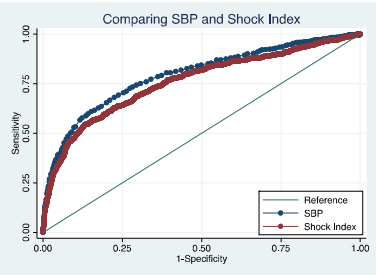
PTI = Prior to Intubation

RESULTS

- 14% of all patients had a SBP < 90 mmHg within 15 minutes of intubation
- 11% of patients not previously hypotensive became hypotensive

SBP Prior to Intubation (n)	% with SBP < 90 within 15 min.
< 100 (156)	41%
100-109 (283)	31%
110-119 (481)	17%
120-159 (2179)	8%
>=160 (946)	4%
SpO2 Prior to Intubation	
< 90 (388)	22%
91-93 (302)	16%
94-100 (3094)	8%

Systolic Blood Pressure vs. Shock Index as Predictor



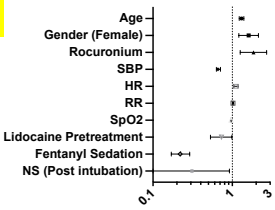
SBP AUC: 0.7939
Shock Index AUC: 0.7596
p = 0.0002

Adjusted Logistic Regression

Statistically Significant	aOR (95% CI)
Age (per decade)	1.31 (1.22-1.40)
Female	1.40 (1.06-1.85)
Rocuronium (vs succinylcholine)	1.83 (1.26-2.67)
PTI* SBP (per 10 mmHg)	0.66 (0.63-0.71)
PTI HR (per 10 bpm)	1.11 (1.05-1.18)
PTI SpO2	0.97 (0.95-0.98)
PTI lidocaine	0.70 (0.52-0.94)
Post-intubation** fentanyl	0.23 (0.18-0.30)
Post-intubation saline	0.30 (0.10-0.88)

*PTI = Prior to intubation
**Post-intubation interventions occurred before vital sign measurement declaring hypotension

Odds Ratios from Logistic Regression



DISCUSSION

- Post intubation hypotension is common
- What SBP should we aim for prior to intubation?
  - If your SBP < 120→1/4 chance of having post-intubation hypotension
  - How to resuscitate?
- Rocuronium use may be associated with increased rates of post intubation hypotension
  - A potential biologic mechanism for this could be histamine release

LIMITATIONS

- Retrospective analysis with data points manually entered into electronic medical record
- Data from a single agency
- Data taken from over 15 years increases the likelihood of unmeasured confounders

CONCLUSIONS

- Post-intubation hypotension is common
- What is the "safe" systolic blood pressure and SpO2 prior to intubation to avoid post-intubation hypotension
- Should we be quick to switch to rocuronium?
  - Further study is needed before changing protocols