

Society for Academic Emergency Medicine Annual Scientific Meeting 2017

PREDICTING RESPONSE TO NALOXONE IN PATIENTS WITH RESPIRATORY DEPRESSION IN THE PREHOSPITAL SETTING

A red ECG line graphic that starts as a horizontal line, then rises to a peak, falls to a trough, and rises again, ending in a sharp peak. It is positioned at the bottom right of the title area, overlapping the blue background and extending towards the right edge of the slide.

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Disclosures

The authors have no conflicts of interest to disclose

Objective

- To determine the utility of using levels of expired ETCO₂ in the prehospital setting as a criteria for determining response to naloxone in patients with respiratory depression and comparing ETCO₂ to current prehospital criteria that use Glasgow Coma Scale (GCS) score as an indication for treatment.

Predicting Response



Photo Credit: Enrico Serpe & Joel Quintana (OFD)

Methods

- Retrospective analysis of prospectively collected prehospital EMS data from a single EMS agency in Orange County, Florida
- January 2011 to December 2015
- Data included all patients given naloxone in the prehospital setting by paramedics for respiratory depression defined as a respiratory rate (RR) of ≤ 10 breaths/min

Methods

- The **main outcome measure** was the success of naloxone administration in reversing respiratory depression by increasing RR to ≥ 10 breaths/min
- Data was adjusted to account for dose of naloxone used
- Logistic regression and ROC curve analysis were conducted and expressed using 95%CI.

Descriptive Statistics

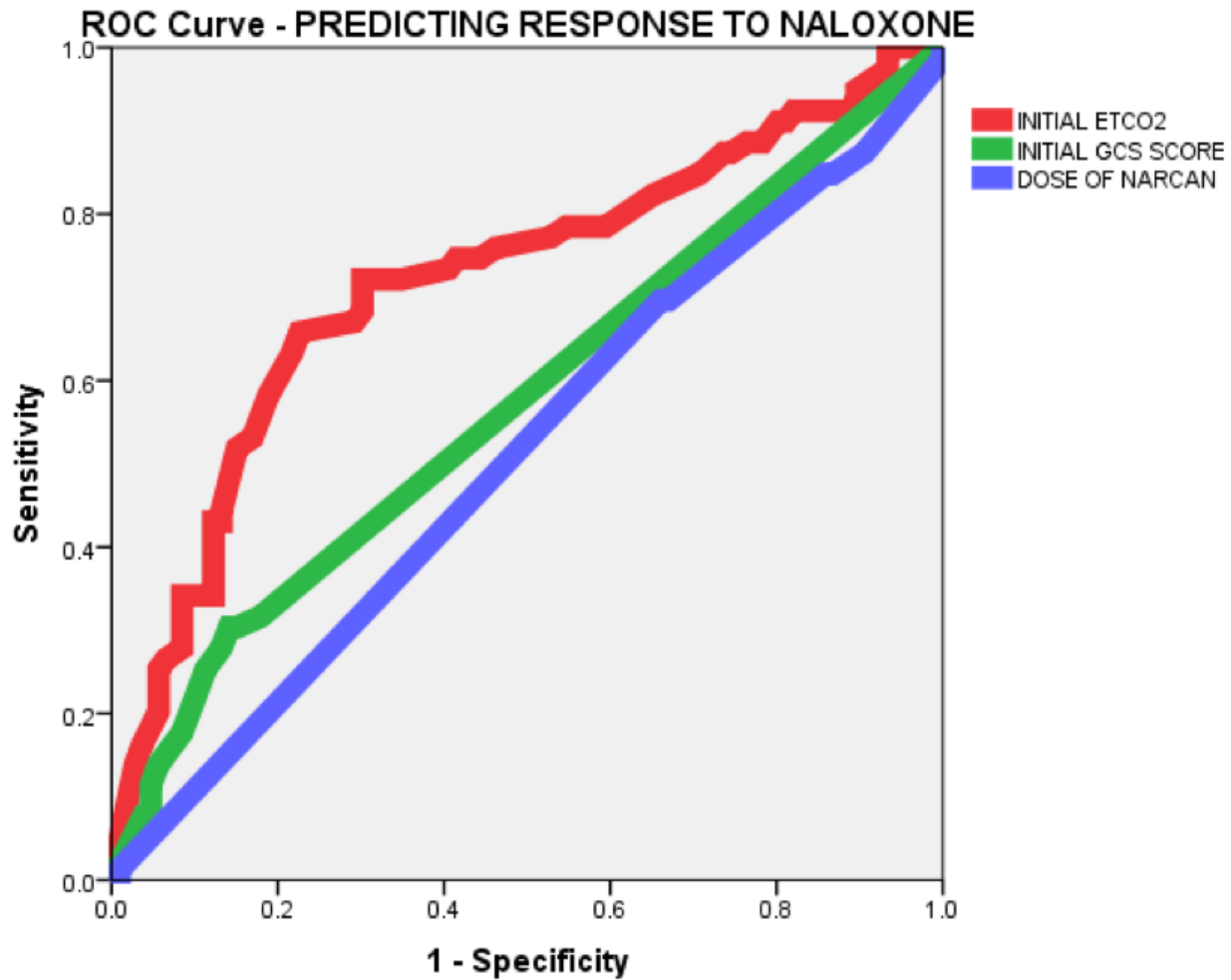
- 608 cases initially identified
- 185 cases had both ETCO₂ and GCS
- Patient age ($n = 185$, $M = 48$, $SD = 19$)
- Dose ($M = 1.6$ mg); max. 10 mg
- Routes of administration
 - Intravenous 126 (68%)
 - Intraosseous 29 (16%)
 - Intramuscular 4 (2%)
 - Nasal/Oral 26 (14%)

Results



- Naloxone reversed respiratory depression in 106 (57%) of cases.
- The area under the ROC curve for predicting response to naloxone
 - ETCO₂ was **0.72** (95% CI 0.64 - 0.80)
 - GCS score was **0.57** (95% CI 0.49 - 0.66)
 - Dose of naloxone **0.51** (95% CI 0.43 - 0.60)

ROC Curve



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Area Under the Curve Ranges



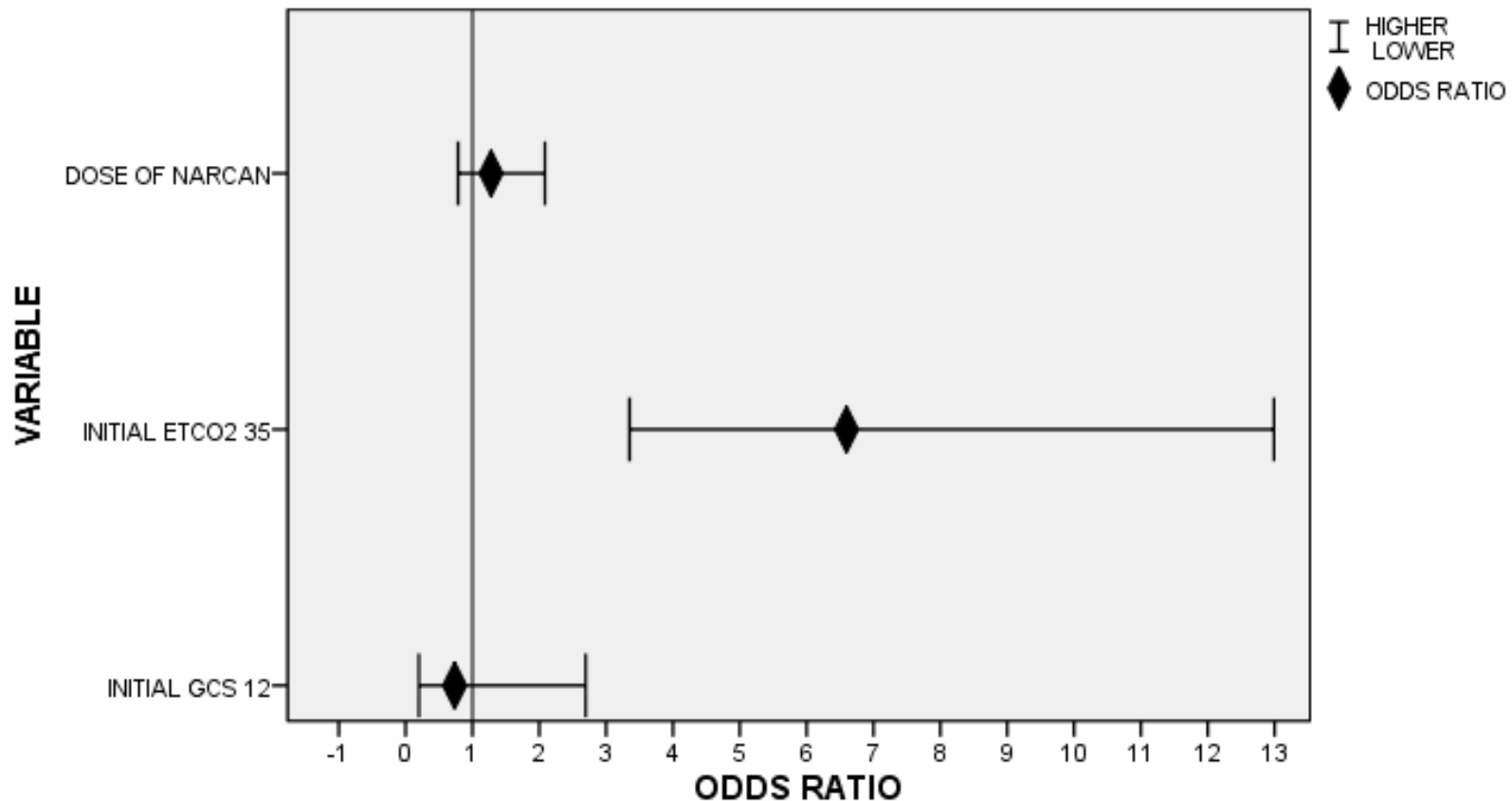
(Hanneman, Kposowa, & Riddle, 2013).

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Results

- Optimal cut-point for ETCO₂ 35 mmHg
- Adjusted odds ratios for successful reversal by naloxone
 - ETCO₂ \geq 35 mmHg = **6.6** (95% CI 3.4 - 13.0)
 - GCS \leq 12 = **0.7** (95% CI 0.2 - 2.7)
 - Dose of naloxone = **1.3** (95% CI 0.8 - 2.1)

Adjusted Odds Ratios



Current EMS Protocols

- The current EMS protocol used by this agency
 - Significantly altered mental status or respiratory depression
- The current study protocol used
 - GCS score ≤ 12 as criteria to administer naloxone
 - Respiratory rate ≤ 10 / min

Implications for Practice

- EMS providers **should** consider the use of ETCO₂ more frequently in determining the amount of naloxone to administer
- EMS protocols **should** consider the use of ETCO₂ prior to the administration of naloxone
- Respiratory rate ≤ 10 and ETCO₂ \geq or 35mmHg **should** be considered the criteria for the administration of naloxone

Conclusion

- Controlling for dose of naloxone, ETCO₂ was a better predictor of response to naloxone than GCS score in a prehospital population with respiratory depression
- The role of prehospital ETCO₂ in determining need for naloxone should be further investigated

Opportunities

- End-tidal (ETCO₂) should continue to be part of EMS Protocols

References

- Szumilas, M. (2010). Explaining Odds Ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 19(3), 227–229. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938757/>
- Hanneman, R., Kposowa, A. J., & Riddle, M. (2013). *Basic statistics for social research* (1st. ed). San Francisco, CA: Jossey-Bass.