PREDICTING RESPONSE TO NALOXONE IN PATIENTS WITH RESPIRATORY DEPRESSSION IN THE PREHOSPITAL SETTING: A RETROSPECTIVE ANALYSIS

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INTRODUCTION

The adoption of etCO2 and frequency of use in prehospital continues to increase. As the heroin and other narcotics continue to impact the lives of patients, it is important that protocols are updated to ensure the most efficient treatment modalities inclusive of etCO2 readings as a vital sign.

PURPOSE

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. **Research Question:** Is ETCO2 a better predictor of patient response to naloxone than GCS?

METHODS

- **Design**: Retrospective analysis
- **Population**: Convenience sample 1/11 to 12/15
- **Setting**: Orlando Fire Department (Orange County FL)
- **Inclusion:** patients given naloxone in the prehospital setting by paramedics for respiratory depression defined as a respiratory rate (RR) of ≤ 10 breaths/min
- **Procedure**: Logistic regression and ROC curve analysis
- **Primary outcome:** Reversal of respiratory depression by increasing RR to ≥ 10 per minute.

RESULTS

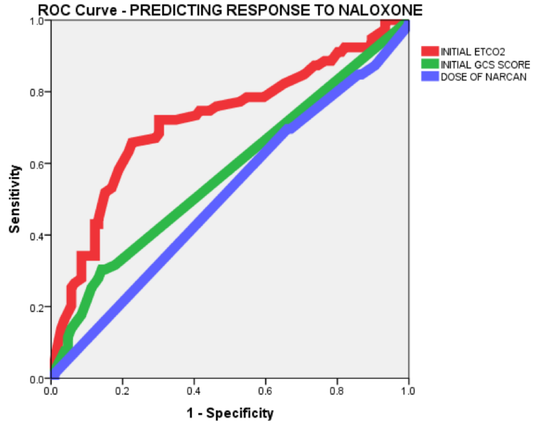

Figure 1. ROC Curve

- **Area under the ROC curve:**
  - ETCO2: 0.72 (95%CI 0.64-0.80)
  - GCS score: 0.57 (95%CI 0.49-0.66)
  - Dose of naloxone: 0.51 (95%CI 0.43-0.60)
- **Optimal cut-point for ETCO2:** 35mmHg

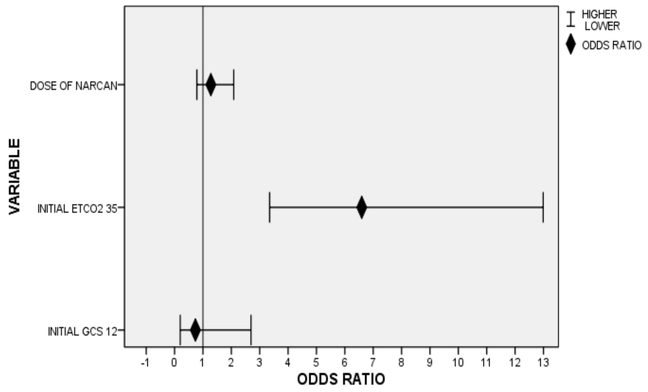

Figure 2. Adjusted Odds Ratio

- **Adjusted odds ratios for successful reversal by naloxone**:
  - Criteria = ETCO2 ≥35mmHg = 6.6 (95%CI 3.4-13.0)
  - Criteria = GCS ≤12 = 0.7 (95%CI 0.2-2.7)
  - Dose of naloxone = 1.3 (95%CI 0.8-2.1)

Figure 3 & 4. Capnography is a noninvasive, nasal cannula that measures ETCO2 and displays both quantitative and graphical depiction of the results.

RESULTS

- **Cases**: 608 cases initially
- **Inclusion:** 185 cases with ETCO2 and GCS recorded
- **Mean patient age:** 48 (*SD*19)
- **Mean dose:** 1.6 mg (maximum 10mg)
- **Routes of administration:** IV 126 (68%); IO 29 (16%); IM 4 (2%); nasal/oral 26 (14%).
- **Naloxone reversal:** 106 (57%) of cases.

CONCLUSION

- Controlling for dose of naloxone, ETCO2 is a better predictor of response to naloxone than GCS score in a prehospital population with respiratory depression.

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 ≥ or 35mmHg should be considered the criteria for the administration of naloxone.
- Keywords: end tidal carbon dioxide; naloxone; respiratory depression treatment