Determination of Respiratory Depression Measured by Capnography of Acutely Intoxicated Patients Presenting to an Urban Emergency Department

Colin Danko MS2, Vincent Au, MS2, Nancy S. Onisko, D.O., Katie Severson, M.D., Kurt Kleinschmidt, M.D.,
UT Southwestern Medical Center/Parkland Health and Hospital System

Introduction

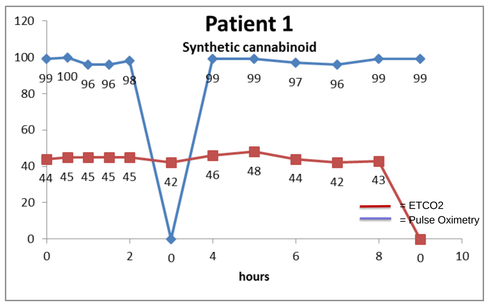
- The standard of care for monitoring the respiratory status of patients with altered sensorium until recently has been pulse oximetry and observation.
- While pulse oximetry measures peripheral arterial oxygen saturation, it does not adequately detect hypoventilatory status.
- We hypothesized that intoxicated patients would demonstrate clinically significant signs of hypoventilation and that ETCO2 monitoring may detect these changes earlier than pulse oximetry.

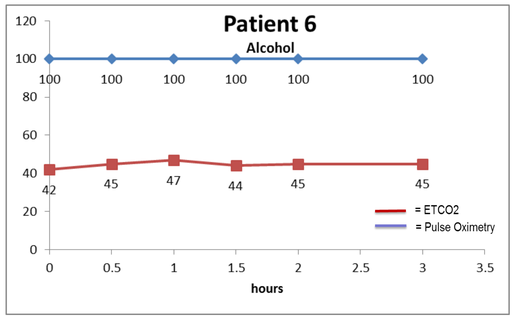
Methods

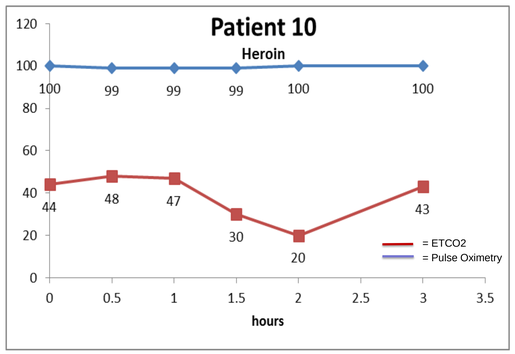
- This was a pilot observational data collection study of intoxicated patients presenting to a single urban emergency department between June 6, 2014 and August 1, 2014.
- Research Assistants (RA's) monitored the ED tracking board for patients presenting with chief complaints suggesting possible intoxication with drugs or alcohol.
- Patients eligible for the study were between the age of 18 and 80, had a baseline Riker Sedation Agitation Scale of less than or equal to 3, and presented with altered mental status that the treating ED physician believed to "possibly" or "probably" be due to intoxication.
- Vital sign data and end tidal CO2 readings were collected at Baseline, 30,60,90, and 120 minutes, then hourly there after.
- End points for data collection included 1) demonstration of alertness for at least 60 consecutive minutes, 2) disposition to home or another hospital department or 3)decompensating respiratory status that required bi-pap, c-pap, or intubation.

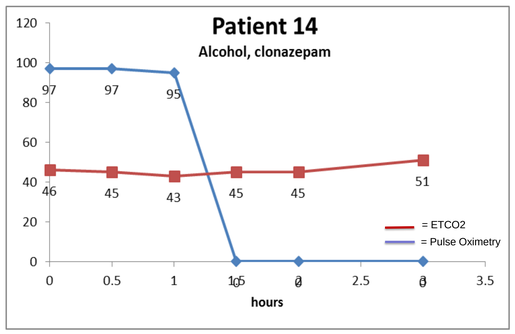
Results

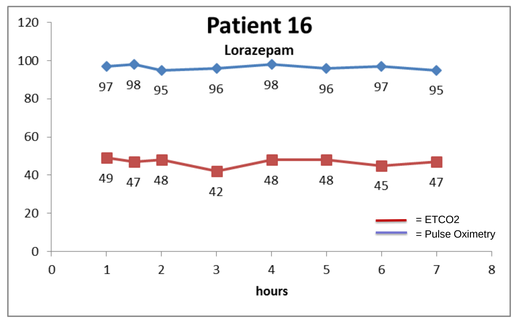
- Seven hundred ninety-four patients were screened for this study, and of those screened, 35 met all enrollment criteria and were assigned de-identified patient numbers. Six patients were excluded from the final data analysis (five for critical errors in ETCO2 data collection and one due to AMS not related to intoxication). Of the remaining 29 patients, 20 were male and 9 were female. Ages ranged from 19 to 54 years.
- Alcohol was one of the intoxicants in almost half of the patients (14). Other intoxicants included benzodiazepines, synthetic cannabinoids, cocaine, heroin, and diet pills. Several patients were exposed to more than one intoxicant.
- ETCO2 values of greater than 45mmHg were considered indicators of a hypoventilatory state.
- During the study there were a total of 19 episodes of hypoventilatory status as indicated by ETCO2 readings of greater than 45mmHg. During at least six of these hypoventilatory episodes, pulse oximetry detected normal oxygen saturation.
- Of the patients that experienced multiple episodes (more than two) of hypoventilatory status, two had used heroin and one had used 62mg of lorazepam.

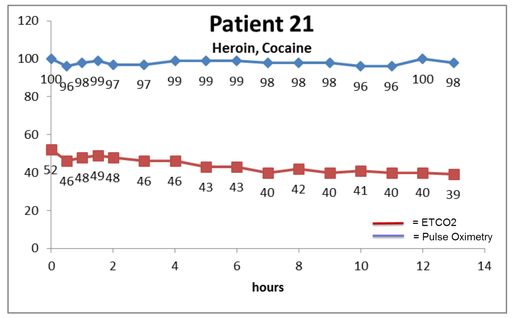


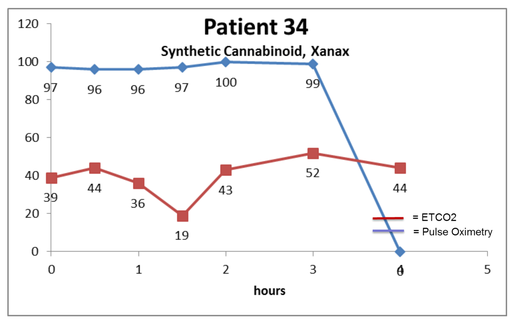












Conclusions

- End Tidal CO2 monitoring may provide a means to detect hypoventilatory status before pulse oximetry detects a significant change in arterial oxygen saturation.
- End Tidal CO2 monitoring should be the standard of care for patients presenting with intoxication associated with CNS depression.

Bibliography

1. Langhan, M. Acute alcohol intoxication in adolescents: Frequency of respiratory depression. *The Journal of Emergency Medicine, 44*(6), 1063-1069.
2. D'Arcy, Y. Turning the tide of respiratory depression. *Nursing, 43*(9), 38-45.
3. D'Arcy, Y. Eyeing capnography to improve PCA safety. *Nursing, 37*(9), 18-19.