

Effectiveness of Ventilation Utilizing the Bag-Valve-Device (BVD) Versus the Oxylator® FR-300 in Intubated Patients During Air Medical Transport

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Introduction

- Intubated patients are commonly ventilated using the bag-valve-device (BVD) during air medical transport, especially for short transports
- The Oxylator® FR-300 is a small, hand-held, oxygen-powered device which is pressure-regulated
- The device delivers a preset peak airway pressure of 20cmH₂O and maintains a PEEP of 2-4cmH₂O after passive exhalation
- The size and ease of use of the device are ideal for use in the prehospital setting

Objectives

- To compare the effectiveness of the BVD with the Oxylator among patients being mechanically ventilated during air medical transport
- To determine if ventilation and oxygenation were comparable at baseline, 2 and 5 minutes

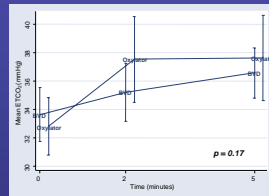
Methods

- Intubated patients being transported by UMass Memorial Life Flight were randomized to either the BVD or Oxylator
- Patients were excluded if they were less than 18, pregnant, had a known history of asthma, or had an ET tube less than 7.5mm
- A blinded Novametrix Tidal Wave monitor was used to collect data on end-tidal CO₂, respiratory rate, pulse rate, and oxygen saturation
- The primary outcome measure was effectiveness of ventilation (targeted oxygen saturation >95% and ETCO₂ of 30-45 mmHg) at 5 minutes with either device

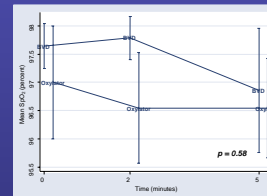
Oxylator Assembly



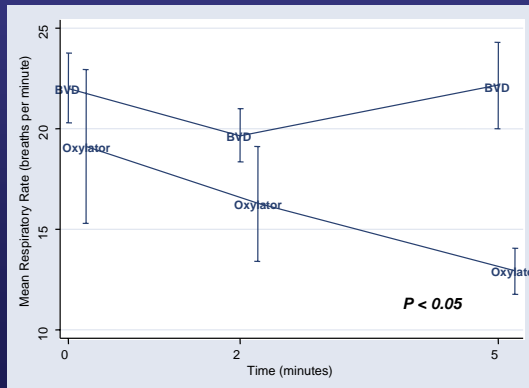
Comparison of Mean ETCO₂ Between the Oxylator and BVD



Comparison of Mean Oxygen Saturation Between the Oxylator and BVD

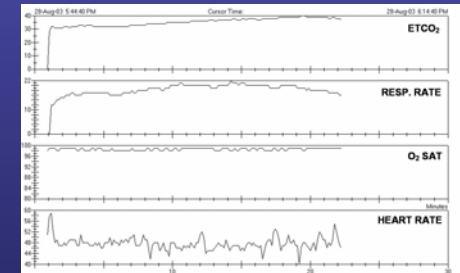


Comparison of Mean Respiratory Rate Between the Oxylator and BVD



Results

- 25 patients were enrolled during the pilot phase of the study
- 11 were randomized to the Oxylator® FR-300 (males=8) with a mean age of 65 years (range 18-88)
- 14 were randomized to the BVD (males=9) with a mean of 45 years (range 21-77)
- Mean ETCO₂ and oxygen saturation at baseline, 2 and 5 minutes were similar for the Oxylator and BVD
- Mean pulse rate was greater at 5 minutes for the BVD compared to the Oxylator, although this difference was not statistically significant
- Baseline (mean/SD) respiratory rate/minute with the Oxylator and BVD were 19/13 and 22/6, respectively; at 2 minutes 16/9 and 20/5, respectively; and at 5 minutes 13/4 and 22/8, respectively ($p < 0.05$)



Sample Tidal Wave recording

Conclusion

The results of the pilot phase of the study suggest that the effectiveness of ventilation is comparable between the BVD and Oxylator. However, the Oxylator appears to accomplish this with a lower and less variable respiratory rate when compared to the BVD. Additional studies will serve to clarify the usefulness of this new device.