APNEIC OXYGENATION DURING THE APNEA TEST FOR BRAIN DEATH

Jeffrey Stein, DO1; Marvi Rijhwani, MD1; Ernesto Brauer MD1
Department of Internal Medicine, Aurora Health Care Milwaukee, WI; Bellin Health Care, Green Bay, WI and University of Wisconsin, Madison, WI

PURPOSE
- Determine the change between the rate pO2 and pCO2 during different methods used during the apnea test and to identify variations in practices within the Aurora healthcare system.

BACKGROUND
Breathing incorporates ventilation and oxygenation. Ventilation is both an active and passive process where in contrast, oxygenation is the passive diffusion of oxygen across alveolar-capillary membrane. The ability to oxygenate without ventilate is termed apneic oxygenation. Variations of oxygen delivery during the apnea test are used throughout the US and guidelines differ based on hospital systems. The American Academy of Neurology guidelines recommend using either a suction catheter at the level of the carina with 6 L/min or attaching a T piece with continuous positive airway pressure at 10cm/H2O. The importance of oxygen delivery during this test is to prevent complications such as hypoxemia and cardiac arrhythmias.

METHODS
Data was collected retrospectively on brain dead patients older than age 18. Data points pulled from EPIC included serial arterial blood gases which were completed during the apnea test and patient demographics. The rate of change in pCO2 and pO2 was evaluated using both Mann-Whitney and two sample T-tests comparing a PEEP valve group to all other oxygenation methods.

RESULTS
Eight variations of the test were performed with median starting CO2 for the oxygenation and PEEP group of 43 and 44 mmHg respectively (95% CI 26-53, p=0.6771). Oxygenation group had a mean CO2 increase of 2.95 mmHg/min, whereas the PEEP valve group increased at 4.60 mmHg/min. No statistical significance found (p=0.0508). Neither was there significant difference between the rate of desaturation between the oxygenation and PEEP valve group, 6.53 mmHg vs 2.60 mmHg (p=0.5536) respectively.

CONCLUSIONS
- Our sample was was too small to achieve any statistical significance
- Most Common method of testing was pre-oxygenation
- Eight variations on how the apnea test was performed
- Average test duration was 5-10 minutes to increase pCO2 by 20 mmHg
- No rate of change difference in CO2 between oxygenation and PEEP valve groups
- PEEP valve does not “wash out” CO2 in lungs
- Unable to demonstrate a superior method of performing the apnea test
- Lack of testing and documentation standardization within our hospital system

REFERENCES
Wimalasena Y, Burns B, Reid C, Ware S, Habib K. Apneic oxygenation was associated with decreased desaturation rates during rapid sequence intubation by an Australian helicopter emergency medicine service. Ann Emerg Med. 2015;65:371-76.