COMPARISON OF NASAL AND FOREHEAD OXIMETRY ACCURACY AND PRESSURE INJURY IN CRITICALLY ILL PATIENTS

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Learning Objectives: Continuous pulse oximetry monitoring is the standard of care in critically ill patients. In patients with poor perfusion, clinicians can have difficulty obtaining an accurate oximetry measurement. Forehead sensors used in this patient population have been associated with device related pressure injury.

Methods: Patients (n=43) with demonstrated inability to obtain a peripheral signal (98%), on vasopressors (86%) or temperature < 35oC (19%) had a forehead sensor (if not already in place) and a nasal sensor applied. Arterial samples were measured by co-oximetry and values recorded from both sensors at time 0, 24, and 120 hours. Skin was assessed every 8 hours with relocation of the sensor to the opposite nare or forehead side. Sensor was removed when skin injury seen.

Results: Mean APACHE II score was 35.5 ± 8.5. Fourteen patients had all 3 measures, with 51% expiring prior to data collection completion. Most patients at each time period were on at least 2 vasopressors. Doses of norepinephrine, epinephrine and vasopressin were 0.21 ± .20 mcg/kg/min, .07 ± .07 mcg/kg/min, and .04 units/minute. Lab saturation measures ranged from 69.8%-97.8% with 18% of measures < 90%. More measures were within 3% of co-oximetry values for nasal alar (56%) compared to the forehead (44%). Measurement failures were 6% for nasal alar and 21% for forehead. Mean wear time was 66.2 hours for nasal and 37.4 for forehead. Thirteen patients developed a pressure injury with the forehead sensor (9 Stage 1, 3 Stage 2 and 1 deep tissue injury) and three (2 Stage 1, 1 Stage 2) with the nasal alar ($\chi 2 = 7.68$; p=.006). Two of the patients had ulcers identified at each site.

Conclusions: In this group of patients with decreased perfusion, nasal alar sensors had slightly better accuracy within acceptable clinical parameters of agreement and less measurement failures. However, some patients still provided challenges with obtaining an accurate signal. The nasal alar sensor had significantly less device related pressure injury although prevention of sensor related pressure injury may not be possible in all critically ill patients.