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Point of Care Testing Error in the ICU

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Background
In the two cases discussed here, POCT error led to an inappropriately aggressive course of respiratory support. These errors increased the risk of oxygen free-radical tissue damage because of high FiO₂. This highlights the need for careful monitoring and management of POCT errors in the ICU setting.

Case Reports

Patient 1: 46 yo F admitted for peritonitis who underwent abdominal washout and resection of perforated bowel. SICU course significant for septic shock and difficulty with ventilator weaning. On several POCT ABGs drawn over a few days, different arterial sites, discrepancy was noted between pulse oximetry (SpO₂) values and oxygenation lab values (PaO₂ and SaO₂) obtained from POCT ABG (figure 1). At the time care was delivered, the assumption was made that oxygen saturation as measured by pulse oximetry was less accurate than POCT ABG values, as we rarely have suspicion of ABG values but commonly experience spurious pulse oximetry values. An investigation of potential causes of a falsely elevated SpO₂ was undertaken (figure 2). This failure to reveal any reasonable explanation for the discrepancy between SpO₂ and the POCT ABG PaO₂ values. On the 5th day described here, inconsistencies in patient 2’s POCT ABG and SpO₂ were noted. After demonstrating the discrepancy on simultaneous draws from patient 2, patient 1’s care was focused on SpO₂ values and POCT ABGs were no longer used (figure 3).

Patient 2: 59 yo M sustained polytrauma in an encounter with a forklift. On H/D3 serial POCT ABGs showed paO₂ in the 50-60 mmHg range while SpO₂ remained at 100% (figure 4). This apparent discrepancy in oxygenation values raised suspicion for error. Potential errors of SpO₂ were eliminated as in figure 2. Because of very high suspicion for erroneous ABG POCT values, a single ABG draw was tested simultaneously on several different POCT machines and central laboratory testing, demonstrating a notable difference in oxygenation values between the POCT and central lab, but consistency among the POCT (figure 5). This procedure was repeated with yet another POCT machine and again showed a large discrepancy in oxygenation. At this point oxygen intervention algorithms were made to patient 1 and patient 2 based on pulse oximetry values. Central lab was used for repeat ABGs as necessary.

Discussion
In the two cases discussed here, POCT error led to an inappropriately aggressive course of respiratory support. These errors increased the risk of oxygen free-radical tissue damage because of high FiO₂. This highlights the need for careful monitoring and management of POCT errors in the ICU setting.

References

Abbreviations
- POCT: point-of-care testing
- SpO₂: Pulse oximeter saturation
- SaO₂: Arterial oxygen saturation
- PaO₂: Partial pressure of oxygen in arterial blood
- FiO₂: Fraction of inspired oxygen
- ABG: Arterial blood gas