

The Use of Pleural Fluid pH in POCT

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Pleural Fluid pH determination has diagnostic, therapeutic, and prognostic value in exudative pleural effusions. "The major value of pleural fluid pH is to determine the need for chest tube drainage in parapneumonic effusions and to determine the response to sclerosing agents in patients with malignant pleural effusions."¹ Specimens should be collected anaerobically to reduce pH change due to room air contamination. To this end analysis is best done in a POCT setting using a blood gas instrument although some testers use pH paper or pH meters both of the later can introduce an error in the result because of air contamination.

We compared 2 blood gas instruments using two different venues against two different predicate methods, a pH meter and another blood gas instrument that had been previously validated for pleural fluid pH.

Background and Objectives: Pleural fluid (PF) pH measurements have not always been available using pH meters. The most appropriate way to measure pleural fluid pH is under anaerobic conditions using a blood gas instrument. Unfortunately until late blood gas instruments did not have FDA approval for pleural fluid specimens. Our objective was to evaluate how much error occurred using a pH meter because of air exposure.

Methods:

Hospital A: Previously tested PF specimens were spiked with calibration verification material (CVM) using 1 or 2 drops of CVM to 1 ml of pleural fluid. 20 samples were set up for comparison between the new blood gas FDA cleared method and the previously in house validated blood gas method.

Hospital B: Approximately 20 pleural fluid specimens were utilized. Testing was performed using red-topped collection tubes. The PF sample was collected via needle aspiration and transferred directly into the collection tube. Sample volume was about 5mls. The specimen was transported to the blood gas lab and analyzed immediately. For analysis, the specimen was transferred from the collection tube to a standard 5 ml syringe using a blunt needle. It was analyzed using a blood gas analyzer. The comparison analysis was completed on the remaining portion of the sample using a Corning pH meter.

Both hospitals used a Siemens RAPIDPoint 500 blood gas instrument as the FDA approved Method.

Results:

Hospital A: Linear regression analysis produced a correlation coefficient of 0.98 with a slope of .94 and an intercept of 0.41. The average difference between the blood gas instrument and the pH meter was 0.016.

Hospital B: The correlation Coefficient was .45 with a slope of 0.33 and an intercept of 4.9. The average difference was 0.110. This data is to be expected, as there is exposure to room air when taking a measurement on the pH meter.

Conclusion: We have shown that the use of a pH meter for pleural fluid samples will not provide a high degree of accuracy and that running samples on a blood gas analyzer more accurately reflect the patient condition due to the reduction of air contamination during analysis.

¹Houston, M, Am J Surg. 1987 Sep;154(3):333-7