

Analytical Performance of Point of Care Blood Gas Analyzers In The Operating Theaters

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Background

The immediate impact of blood gas test results on patient care favors the use of blood gas analyzers as point-of-care-testing (POCT) devices. It is vital for the purpose of patient care to assure that all analyzers installed in the same unit give comparable results. The objective of this study was to evaluate the analytical performance of 6 point of care Roche cobas b221 blood gas analyzers in measuring blood gases and whole blood electrolytes in the Operating Theaters setup (OR).

Methods : Total of 60 blood gas samples were evaluated in this study for method comparison using heparinized arterial and capillary blood that were collected in the OR from adult and pediatric patient. Twenty samples were analyzed at each site immediately upon collection. Correlation for blood gases [pH, partial pressure of carbon dioxide (pCO_2), partial pressure of oxygen (pO_2)] and whole blood electrolytes [sodium (Na^+), potassium (K^+), chloride (Cl^-), and ionized calcium (Ca^{2+})] were calculated for each machine. Regression analysis was used for the validation and allowable systematic error. Precision study was done on quality control solutions at three different concentration levels for each test and coefficients of variation (CVs) were calculated. Linearity was done using 5 different concentrations spanning the analytical range for each test.

Results: All % CVs were consistent with those claimed by the manufacturer for all tests at all three concentration levels. % CVs of level 1 for pH, pCO_2 , pO_2 , Na^+ ; K^+ , Cl^- , and Ca^{2+} were less than or equal to 0.08, 2.72, 8.20, 0.93, 0.95, 1.96, 1.00, level 2; 0.06, 1.74, 5.38, 0.55, 0.53, 0.97, 1.20, and level 3; 0.07, 2.74, 4.51, 0.53, 0.74, 0.87, 1.43 respectively. All analyzers showed satisfactory correlation between the results for all tests, the correlation coefficients were less than or equal to 0.975 for all tests. pH, pCO_2 , pO_2 , Na^+ ; K^+ , Cl^- , and ionized Ca^{2+} were linear over a measured range of 6.87-7.70, 12-126 mmHg, 24-457 mmHg, 90-173 mmol/L, 2.0-8.8 mmol/L, 68-131 mmol/l and 0.42-2.59 mmol/L, respectively.

Conclusion: Overall performance of cobas b 221 system was acceptable, it provided reliable results for all tests in all operating theaters setup.