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Evaluating the Correlation of Monitored ETCO2 and PaCO2 via ABG
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BACKGROUND / INTRODUCTION

• Arterial Blood Gases (ABGs) are obtained to assess a patient's level of oxygenation, ventilation, and acid-base balance. ABGs are obtained via an in-dwelling catheter or through an invasive artery puncture (fig 1).
• Expense of an arterial puncture is $133 per puncture. Expense of ABG analyzation is $32. Many patients in the ICU receive several punctures daily.
• PaCO2 is the partial pressure of arterial carbon dioxide in the blood via the ABG.
• ETCO2 is end tidal (exhaled) carbon dioxide monitored via a ventilator circuit noninvasively (fig 2). ETCO2 monitoring cost is $1080 via the ventilator per day.
• This research focused on if there is a positive correlation between ETCO2 and PaCO2. If so, can we rely on ETCO2 to predict PaCO2 and decrease the amount of ABGs obtained?

METHODS

• During this research we collected data from 100 adult patients in ICUs at LVHN who had ABGs performed.

RESULTS / OUTCOMES

• Of the 100 patients, 80% (n=80) had a positive ETCO2 and PaCO2 correlation one standard deviation off of the mean.
• The mean was 4.4 and the standard deviation was 5.2.
• Therefore, one standard deviation off of the mean was 1 and 10.
• The 20% (n=20) who's PaCO2 and ETCO2 difference did not fall one standard deviation off of the mean had some sort of chronic lung disease, respiratory failure, and/or shock.
• A Bell Shaped Curve was created to help analyze the distribution of the results of the data collection (fig 3).

CONCLUSIONS

• After first ABG, if the difference between ETCO2 and PaCO2 is between 1 and 10 in a relatively stable ventilated patient, we can rely on ETCO2 to give an accurate value of PaCO2, thus the level of ventilation.
• The positive correlation can help manage and adjust the ventilator parameters without relying solely on an ABG.

FUTURE IMPLICATIONS

• Based on this research data, there is the potential that the number of ABGs obtained can be reduced. This reduction could decrease cost and length of patient stay.
• This could also reduce patient discomfort, including risk for infection and nerve damage, associated with the ABG procedure.
• Patient care could be improved, allowing staff to be more attentive to ventilator settings and changing patient clinical status.
• LVHN is already requiring an ETCO2 measurement with every ABG puncture to help assess the reliability and potential other benefits from this research.

REFERENCES