

Evaluating the Correlation of Monitored ETCO₂ and PaCO₂ via ABG.

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Published In/Presented At

Galantini, S., Miller, K., Rabert, A., (2017, July, 31) *Evaluating the Correlation of Monitored ETCO₂ and PaCO₂ via ABG*. Poster presented at LVHN Research Scholar Program Poster Session, Lehigh Valley Health Network, Allentown, PA.

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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?



Fig 1



Fig 2

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).

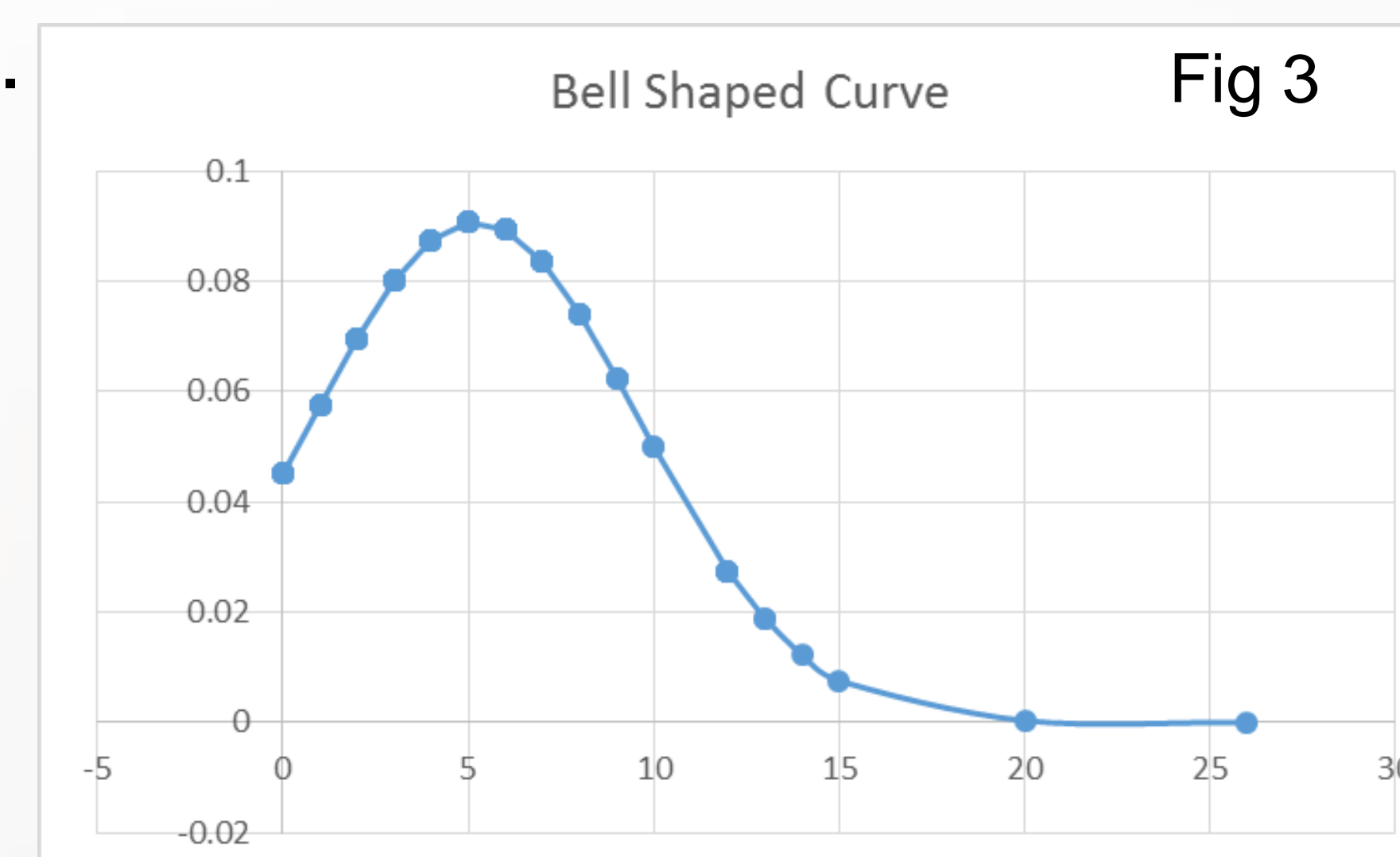


Fig 3

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.

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METHODS

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

Recorded PaCO₂ value from ABG and ETCO₂ value from ventilator for each patient via medical record.

Assessed the difference of PaCO₂ and ETCO₂ values.

Calculated mean and standard deviation of the difference between PaCO₂ and ETCO₂ of patients who had ABGs.

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