

## Evaluating the Correlation of Monitored ETCO<sub>2</sub> and PaCO<sub>2</sub> via ABG.

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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.
- PaCO<sub>2</sub> is the partial pressure of arterial carbon dioxide in the blood via the ABG.
- ETCO<sub>2</sub> is end tidal (exhaled) carbon dioxide monitored via a ventilator circuit noninvasively (fig 2). ETCO<sub>2</sub> monitoring cost is \$1080 via the ventilator per day.
- This research focused on if there is a positive correlation between ETCO<sub>2</sub> and PaCO<sub>2</sub>. If so, can we rely on ETCO<sub>2</sub> to predict PaCO<sub>2</sub> 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.

Recorded PaCO<sub>2</sub> value from ABG and ETCO<sub>2</sub> value from ventilator for each patient via medical record.

Assessed the difference of PaCO<sub>2</sub> and ETCO<sub>2</sub> values.

Calculated mean and standard deviation of the difference between PaCO<sub>2</sub> and ETCO<sub>2</sub> of patients who had ABGs.



Fig 1



Fig 2

## RESULTS / OUTCOMES

- Of the 100 patients, 80% (n=80) had a positive ETCO<sub>2</sub> and PaCO<sub>2</sub> 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 PaCO<sub>2</sub> and ETCO<sub>2</sub> 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).

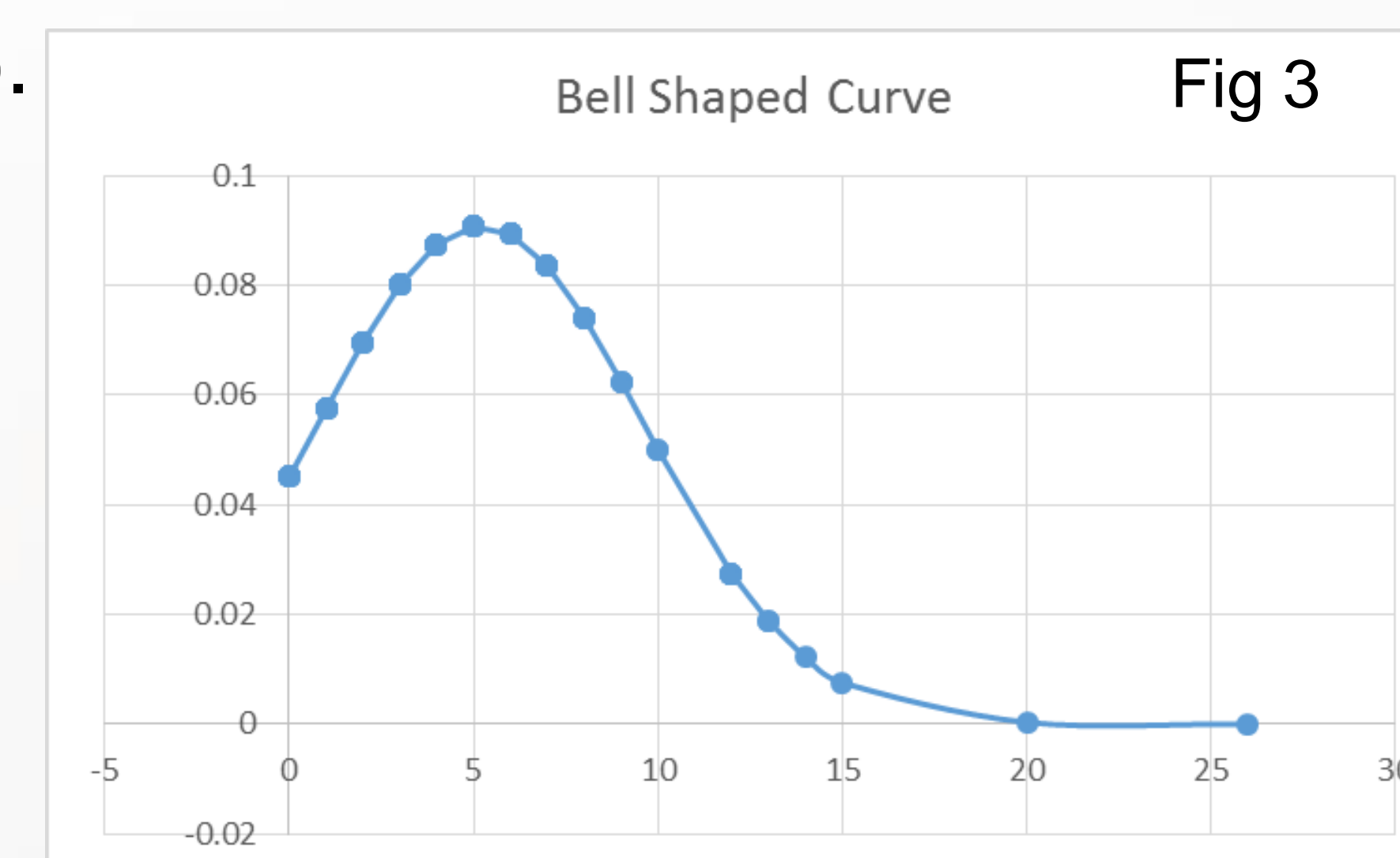


Fig 3

## CONCLUSIONS

- After first ABG, if the difference between ETCO<sub>2</sub> and PaCO<sub>2</sub> is between 1 and 10 in a relatively stable ventilated patient, we can rely on ETCO<sub>2</sub> to give an accurate value of PaCO<sub>2</sub>, 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 ETCO<sub>2</sub> measurement with every ABG puncture to help assess the reliability and potential other benefits from this research.

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