

**UC Davis**  
**Anesthesiology and Pain Medicine**

**Title**

An observational study of intraoperative transpulmonary pressure and intrathoracic pressure changes associated with ventilator management of tidal volume and positive-end-expiratory pressure (PEEP)

**Permalink**

<https://escholarship.org/uc/item/9f55h37p>

**Authors**

Patel, Aneri

PEI, Heidi

Fleming, Neal

**Publication Date**

2023

**Data Availability**

The data associated with this publication are not available for this reason: N/A

## Background

- SVV is the change in stroke volume during inspiration and expiration due to changes in intrathoracic pressure and consequent variations in venous return.
- SVV to assess fluid status and guide intraoperative fluid management.
- SVV utility was established using TV of 8 ml/kg while ARDSNet recommendations suggest 6 ml/kg is preferable.

## Methods

- IRB approved study with written consent obtained
- Adult patients with elective procedures requiring general anesthesia and mechanical ventilation
- Ventilation parameters assigned according to table 1 below
- Esophageal balloon catheter to measure intrathoracic pressure changes.
- After stabilization, the following measurements were recorded: BP, SVV and CO (Edwards ClearSight continuous non-invasive arterial blood pressure),
  - Esophageal pressure
  - Lung compliance,
- One-way ANOVA used to analyze the changes in all measured parameters with comparison to changes in sets of TV and PEEP.

TV and PEEP changes do not significantly affect SVV and can be used to guide intraoperative fluid management with any of these ventilator settings.

## Results and Discussion

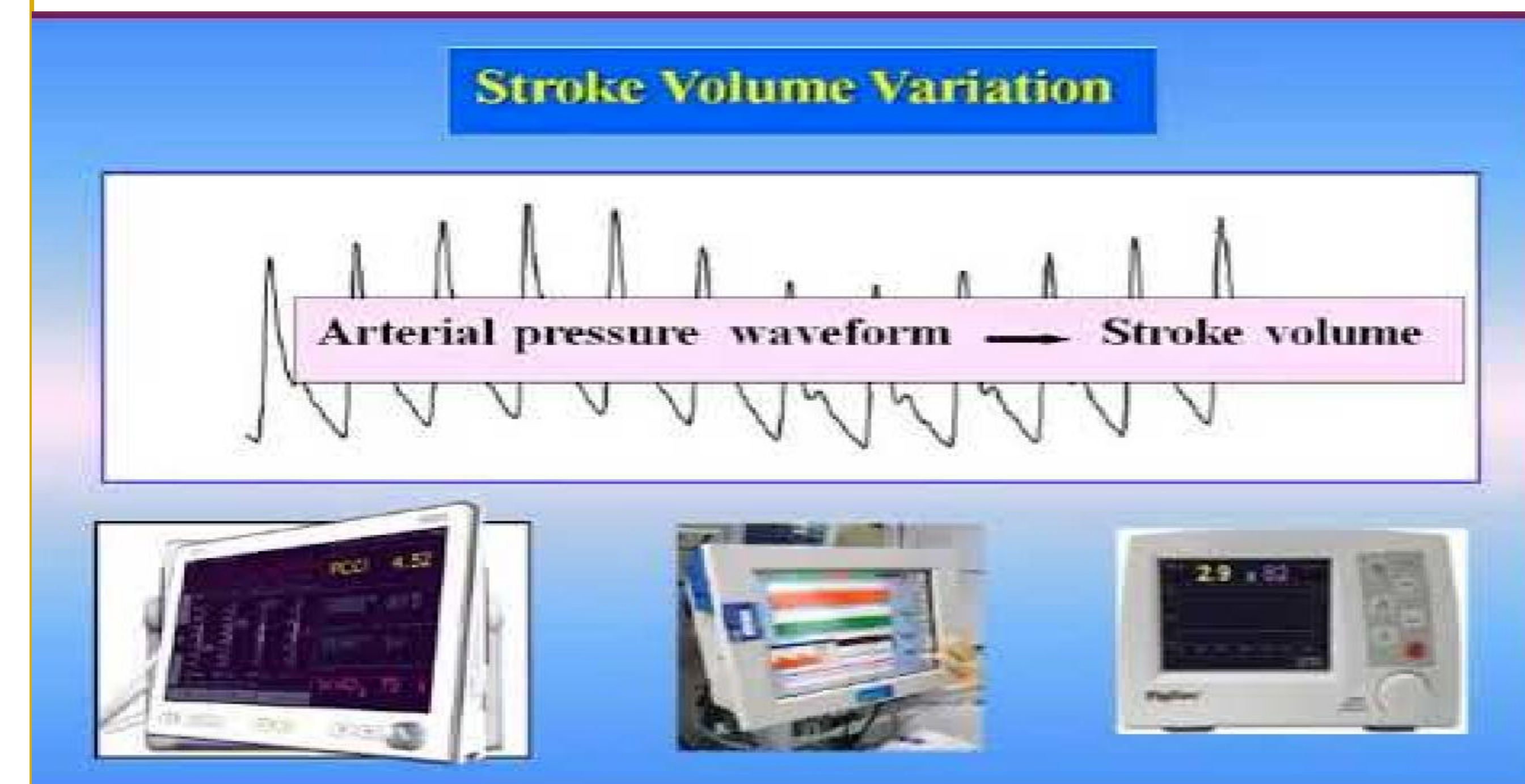
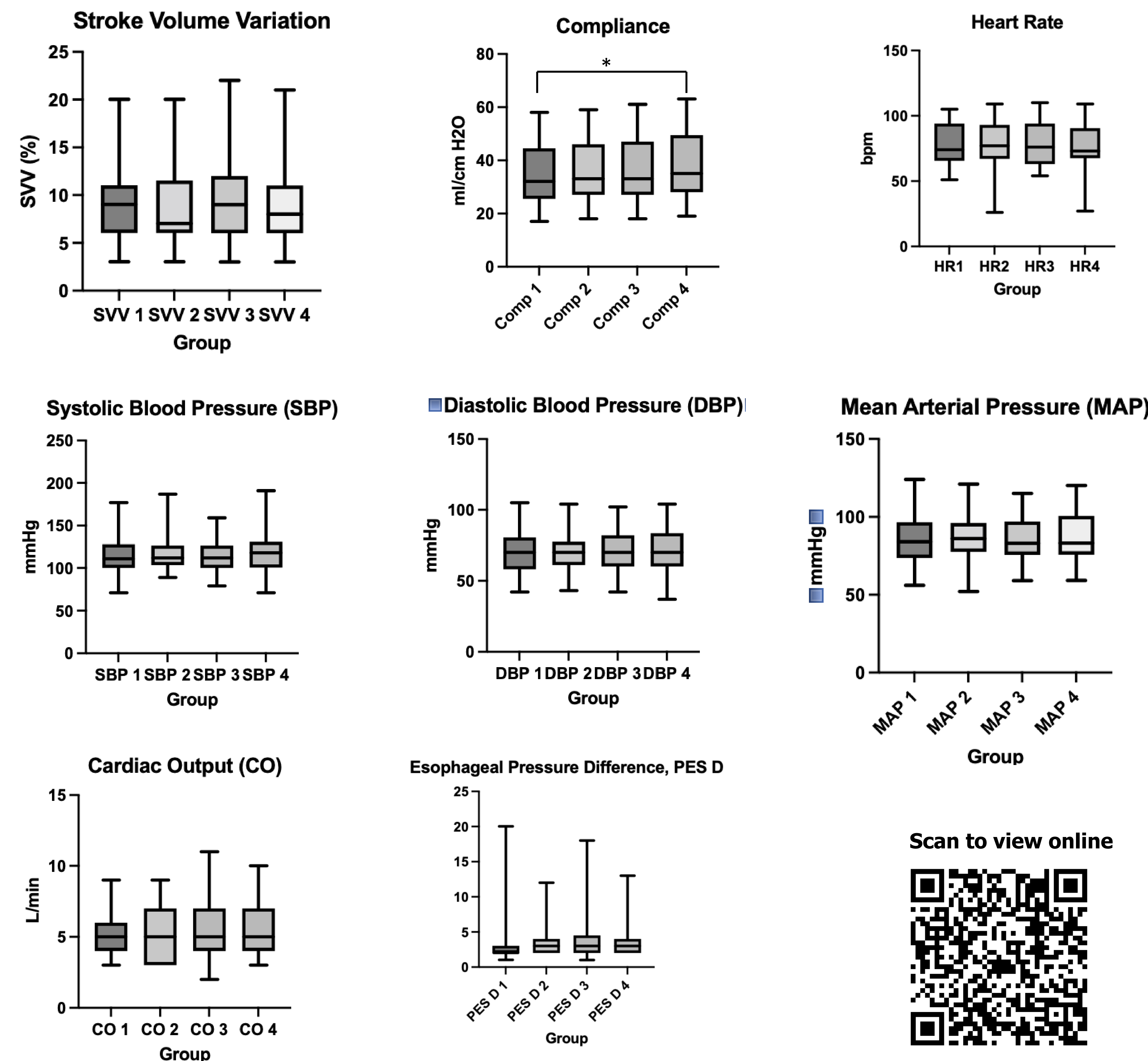


Fig 2: Stroke volume variation

## Limitations

- Limited sample size given the variation in the measurements.
- Single-institution study
- Data collection varies by clinical situation and surgical requirements

## Future Directions

- Data from this study was used as a basis for a power calculation to confirm these preliminary observations.
- Using alpha 5.0%, beta 20%, and defining significant change in SVV as +/- 30%, will require observations in 120 patients. Plans are underway to complete this data collection.

## References

1. Marik, et al, Chest 2008; 134(1):172-8
2. Berkenstadt, et al., Anesth Analg 2001; 92(4):984-9.

Scan to view online

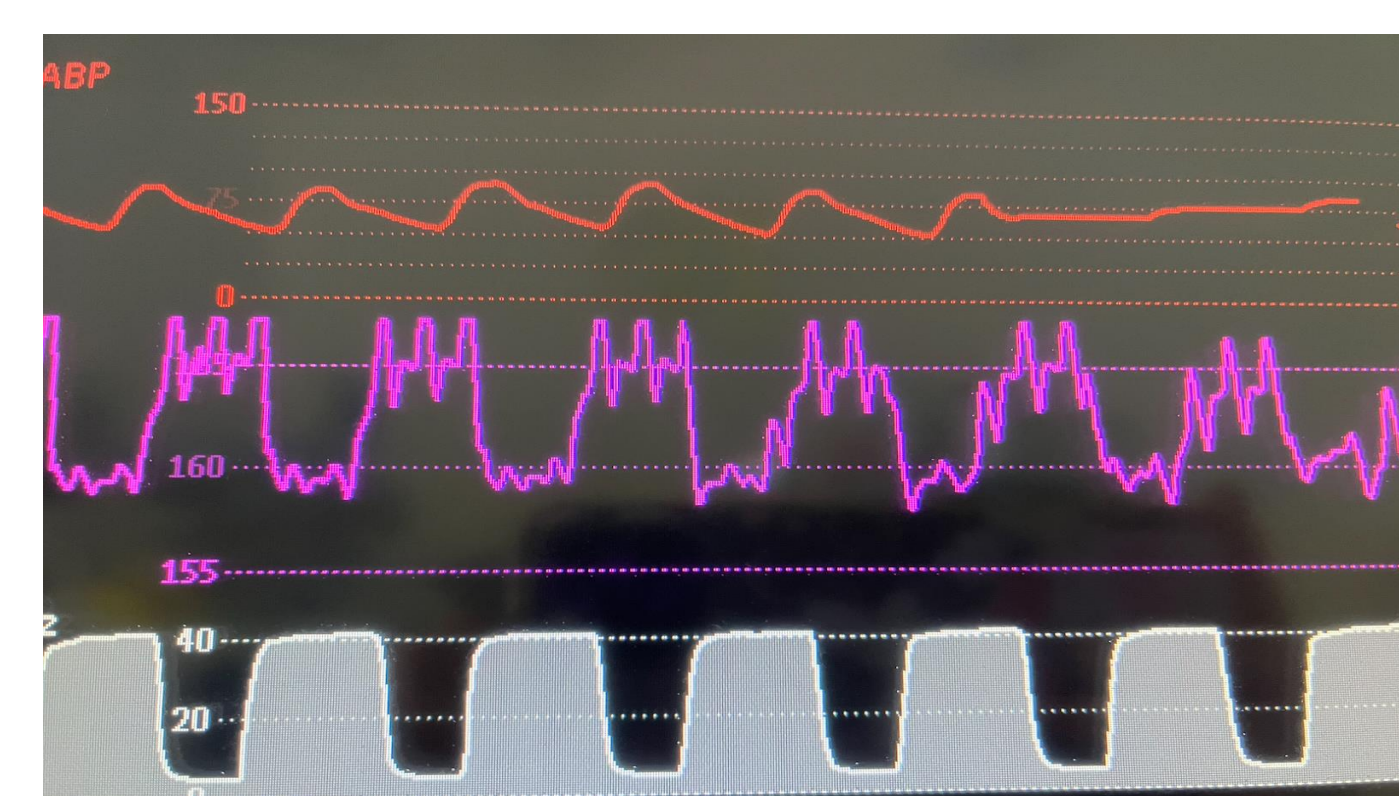


Fig 1: Arterial blood pressure waveform

| TV ml/kg | PEEP 0 | PEEP 5 |
|----------|--------|--------|
| 6        | 1      | 2      |
| 8        | 3      | 4      |

Table 1: Tidal Volume and PEEP parameters for ventilation