An Audit of Tracheal Cuff Pressure Measurement in an Intensive Care Unit within a District General Hospital in the UK

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Background and Aims

Background of Audit

- Measurement of Cuff Pressure within Intensive Care Units is often not routine[1]
- Cuff Pressures, when recorded, are often not within the appropriate range[2]
- Manufacturers' recommended ranges lies between 20-35cmH_20.
- Problems of over inflation involve mucosal ischaemia, tracheal erosion or, stenosis (this may be worsened by concomitant use of inotropes or, hypotension).
- Problems of under inflation involve respiratory gas leakage (especially during positive pressure ventilation) along with a suboptimal barrier seal to oropharyngeal secretions.

Aims of Audit

- To establish the rate of recording of Cuff Pressures within the Intensive Care Unit.
- To record the Pressure value and (if relevant) appropriateness with respect to the value of PEEP.
- To record the patient's Blood Pressure with respect to patient's baseline.
- To ascertain if the patient had concomitant use of Inotropes.
- Target sample size was laid down at 50 intubated days (100 readings)

Method

- Audit Design

- Utilised an established audit recipe from the Royal College of Anaesthetists (RCoA),UK (Nightingale).
- Decision was taken for recording to be completed by Nursing Staff who were briefed prior to commencement of the audit period.
- A brief pilot using the recording form was performed to establish usability of the data sheet.
- Staff were instructed to complete recordings with the use of a manometer at the change of each Nursing Shift (x 2 per 24 hours).
- The target sample size was set at 100 readings (equivalent to 50 intubated days).
- At the end of the audit period feedback would be provided to enable the possibility of further audit loops.

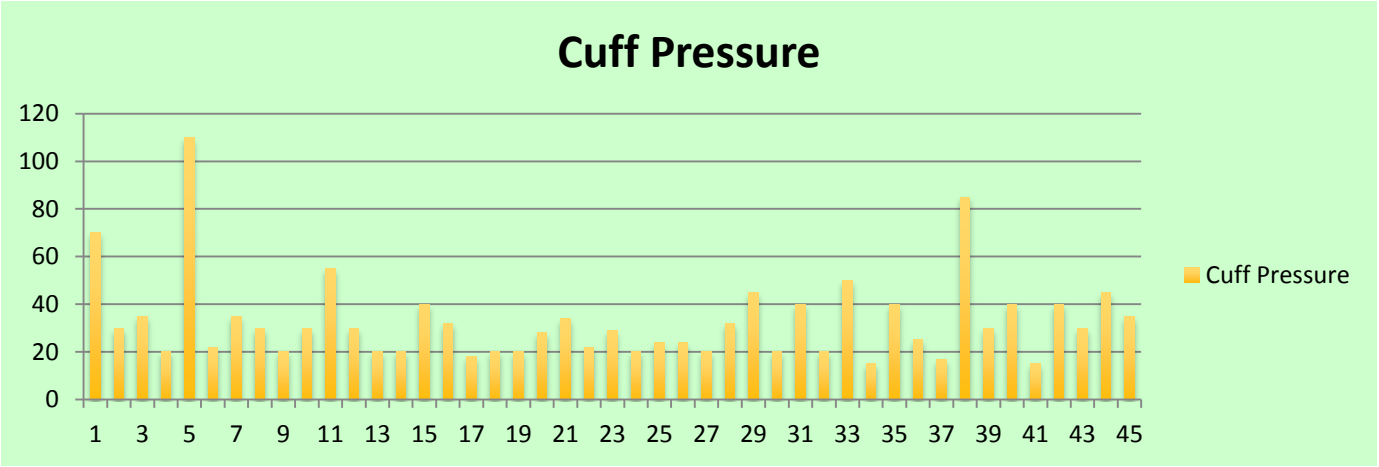
- Audit form

1. Cuff Pressure value?
2. PEEP value (if appropriate)?
3. Hypotension relative to patient baseline?
4. Inotrope use?
5. Is the cuff correctly inflated within target range?

Results

- Overall 45 measurements were gained during the audit from a target sample size of 100 (28 patients - with a possible maximum of 142 measurements).
- Completion rate for eligible patients was therefore 31.6%.

- 12 of the measurements taken were above 35cmH20 = High (26.6%).
- 4 of the measurements taken were below 20cmH20 = Low (8%).
- 29 of the measurements taken were within recommended range (65%).



Results

- High cuff pressure group – 75% (9/12) were recorded as correctly inflated (range = 40-110).
  1 was dropped to recommended range (1/12). Remainder had no more measurements.

- Low cuff pressure group – 50% (2/4) were recorded as correctly inflated (range = 15-18).
  1 was increased to recommended range (1/4). Remainder had no more measurements.

- Peak Airway Pressure/PEEP
  High cuff pressure group - Peak Airway range 16-34, mean = 26 (PEEP range 5-13, mean =7.1).
  Low cuff pressure group – Peak Airway range 21-30, mean = 23.5 (PEEP range 5-10, mean =5).
  (Sample mean Peak Airway Pressure = 14.5. Sample mean PEEP 7.8).

- Hypotensive relative to baseline
  High cuff pressure group – 42% were recorded as hypotensive (n = 12).
  Low cuff pressure group – 50% were recorded as hypotensive (n = 4).
  (Sample hypotension rate 29%, n = 45).

- Inotropes used
  High cuff pressure group – 92% (n = 12).
  Low cuff pressure group – 25% (n = 4).
  (Sample use of inotropes 66%, n = 45).

Discussion

- Audit Limitations

- Measurements taken by multiple Nursing Staff but who were aware of the audit process.
- RCoA recommended the designation of a single Medic for data collection.
- Overall sample size obtained during the audit period less than target (n=45).
- Measurements outside the reference range numbers were limited (n=16).
- Enhanced validity would have been achieved by increasing the duration of the audit period.

- Audit Recommendations

- Results and discussion to be presented to Department to raise awareness and encourage ongoing practice improvement.
- Patients would benefit from further audit cycles over an increased period to improve reliability of good practice.
- Incorporation of cuff pressure monitoring and measurement within a checklist system.
- This would be best done at the start of each Nursing shift as part of a formal check process.

Conclusion and Acknowledgements

- Summary

- Formal recording of cuff pressures within ICU at the time of recording was 31% (n=45).
- Of the measurements taken, 34% lay out with the Manufacturer's recommended range.
- For measurements outside the range there was a higher Peak Airway Pressure (26 in high cuff pressure group, 23.5 in low cuff pressure group, 14.5 sample mean) with a lower value of PEEP (7.1 in high cuff pressure group, 5 in low cuff pressure group, 7.8 sample mean).
- For measurements outside the range there appeared to be a higher rate of hypotension relative to baseline (42% in high cuff pressure group, 50% in low cuff pressure group, 29% in sample).
- For higher measurements there was an increased use of inotropes (92% in high cuff pressure group, 25% in low cuff pressure group, 66% in sample).

- Conclusion
- Scope exists to improve upon formal cuff pressure recording within this Intensive Care unit.
- Scope exists for increased awareness of the potential complications of over or, under inflation.
- Scope exists for increased awareness of the compounding effects of hypotension, inotrope use and positive airway pressure upon inflation complications.

- Acknowledgements
- David Love°, Derek Hedderley Intensive Care Charge Nurse, Intensive Care Nursing Staff at Borders General Hospital.

- References

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