How to measure tracheostomy tube cuff pressure

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Rationale and key points
This article explores the process and principles of measuring tracheostomy tube cuff pressure and the associated evidence base. It discusses the indications for tracheostomy tube cuff pressure measurement and identifies potential complications associated with the procedure.
- Regular measurement of tracheostomy tube cuff pressure is essential to prevent complications associated with tracheostomy tube placement.
- Tracheostomy tube cuff pressure should be between 20mmHg and 25mmHg.

Reflective activity
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1. How this article might change your practice when checking tracheostomy tube cuff pressure.
2. Positive elements of care delivery and those that could be enhanced. Subscribers can upload their reflective accounts at: rcni.com/portfolio.

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Preparation and equipment
- The equipment required should be available before commencing the procedure, including:
  - A cuff pressure manometer.
  - Emergency equipment (suction and oxygen).
  - A stethoscope.
  - A 10mL syringe.
  - Non-latex gloves and an apron.
- The practitioner should explain the procedure to the patient and gain their consent to proceed. If the patient lacks capacity to make decisions regarding treatment, the practitioner must act in the patient’s best interests (Mental Capacity Act 2005).
- The practitioner should wash and dry their hands and put on personal protective equipment (gloves and an apron).

Procedure
1. Attach the cuff pressure manometer to the pilot balloon of the tracheostomy tube.
2. Note the pressure reading, which should be 20-25mmHg.
3. If it is not, adjust the pressure reading to 20-25mmHg by inflating the cuff with air to increase the pressure, or by removing air from the cuff to decrease the pressure. A 10mL syringe may be used to remove air from the cuff, or the air can be removed directly using certain cuff manometers.
4. Use the stethoscope to check for the noise of escaping air at the suprasternal notch (Figure 1). This suggests that the seal between the tracheal mucosa and the tracheostomy cuff is not complete. If necessary, add air to the pilot balloon until the leak can no longer be heard and recheck the tracheostomy tube cuff pressure.
5. Complete a respiratory assessment and ensure that the patient is comfortable.
6. Remove the gloves and apron and wash and dry your hands.
7. Clean the cuff manometer according to local guidelines.
8. Document the procedure and findings in the patient’s notes.
9. Raise any concerns with an appropriate senior practitioner.

**Evidence base**

The cuff pressure is defined as the pressure in the cuff of a tracheal tube, exerted against the mucosal tissue of the trachea to hold the tube in place (Figure 2). The tracheostomy cuff is an inflatable balloon near the end of the tube that creates a seal against the tracheal wall (Figure 3). This seal assists with airway protection and effective ventilation.

Tracheostomy tube cuff pressure must be measured regularly to prevent complications associated with tracheostomy tube placement. If the pressure is too low, air and pressure may be lost from the lungs, leading to an increased risk of aspiration of saliva or gastric contents because the patient’s airway is unprotected. If the pressure is too high, the patient has an increased risk of tissue damage and necrosis, tracheal stenosis and tracheoesophageal fistulas (Sengupta et al. 2004).

The tracheal mucosa blood supply is occluded at a tracheostomy tube cuff pressure of 30-32mmHg (Mallett et al. 2013). Such high pressures prevent the delivery of oxygen to the small capillaries supplying the tracheal mucosa, resulting in ischaemia and necrosis. This suggested maximum pressure of 30mmHg was based on healthy volunteers (Lowthian 1997). Critically ill patients are more likely to have a lower blood pressure, resulting in underperfusion of the tracheal mucosa. Therefore, a maximum pressure of 25mmHg is considered a safer upper limit for all patients, with a recommended tracheal pressure range of 20-25mmHg for tracheostomy tube cuff inflation (Lorente et al. 2007).

If a high cuff pressure is required to create and maintain a seal with the tracheal mucosa, this can indicate malposition of the tracheostomy tube, tracheomalacia or use of an inappropriately sized tube. If a persistent cuff leak is identified, it is essential to assess for tube displacement; a practitioner who has advanced airway management skills should assess the patient and a chest X-ray should be taken and reviewed. Cuff leaks and loss of cuff pressure can be distressing for a conscious patient. If a persistent cuff leak is identified, practitioners should prepare the patient for tracheostomy removal and replacement of the tracheostomy tube, and support them to minimise distress.

A variety of tracheostomy tubes are available. Low-volume, high-pressure cuffs are generally
not used because the pressure exerted on the trachea is high and the risk of damage is increased. Tracheostomy tubes with a high-volume, low-pressure cuff are the safest option. These allow a larger area of the trachea wall to come into contact with the cuff, while exerting less pressure.

Cuff pressure manometers are hand-held devices that are used to measure tracheostomy tube cuff pressures in the trachea. These pressures should be checked after placement of the tracheostomy tube, at any time if a cuff leak is suspected, whenever air is added to or removed from the cuff, following anaesthesia and during patient assessment. The Department of Health (2011) recommends tracheostomy tube cuff pressure assessments every four hours.

Disclaimer: please note that information provided by Nursing Standard is not sufficient to make the reader competent to perform the task. All clinical skills should be formally assessed at the bedside by a nurse educator or mentor. It is the nurse’s responsibility to ensure their practice remains up to date and reflects the latest evidence.

References

Department of Health (2011) High Impact Intervention: Care Bundle to Reduce Ventilation-Association Pneumonia. tinyurl.com/m2aw6qz (Last accessed: September 8 2015.)


