Tracheostomy Care: At a glance

Julie Patton – Senior Lecturer, Adult Nursing, Northumbria University

This article will:

- Understand the rationale for tracheostomy insertion
- Be able to identify the different types of tracheostomy tube
- Explore the nursing care required for people who have tracheostomies
- Be familiar with contemporary guidelines on tracheostomy care
- Understand the problems that can arise in patients with a tracheostomy and know how to resolve them.

Tracheostomy

The creation of surgical airways in the form of a tracheostomy is common procedure where an incision is made into the trachea and a tube inserted (Serra 2000) (Diagram of a tracheostomy). Tracheostomies can be temporary or permanent and are categorised as either percutaneous or surgical insertion. It is important for healthcare practitioners to be able to distinguish the differences between tracheostomies and laryngectomies as collectively these patients may be referred to as 'neck breathers' but there are significant differences in the resultant anatomy (McGrath *et al.*, 2012). A tracheostomy is performed to help patients breathe. A laryngectomy involves the removal of the larynx and separation of the airway from the mouth, nose and oesophagus, usually because of cancer.

Patients with tracheostomies are considered to be high risk and have many complexities associated with their care, due to this, historically they were cared for within specialised areas

such as ear, nose and throat and critical care environments. Although the total number of tracheostomies performed in the National Health Service (NHS) is unknown, the literature suggests that it is a common procedure (Kollef, et al 1999; Brook et al., 2000; Young and Newman, 2000; Gilony et al., 2005). It is particularly comon in critical care environments with approximately 15,000 procedures carried out in the UK annually and approximately 24% of critically ill patients have the procedure (Intensive Care Society (ICS), 2014). More than 5000 tracheostomies are performed in England in head and neck surgery yearly (National Tracheostomy Safety Project (NTSP) 2013). With the pressure on intensive care beds and the drive to de-escalate care, patients with tracheostomies are increasingly being cared for more frequently on general wards and therefore nurses working in a range of clinical (and community) settings will be required to care for patients with tracheostomy tubes.

Rationale for tracheostomy insertion

Tracheostomy insertion is rarely a primary procedure and usually a response to a patient's actual or potential deterioration in clinical condition and are routinely performed as part of the ongoing management of critically ill patients (Cameron *et al.,* 2009). Despite earlier studies (Arabai *et al.,* 2004; Griffiths *et al.,* 2005; Scales *et al.,* 2008) the ICS (2014) recognise that early versus late tracheostomy insertion have failed to show benefits from early procedures in terms of a reduction in mortality or hospital length of stay. Indications for placing tracheostomy tubes include for ventilation, airway obstruction, airway protection, facilitated weaning from mechanical ventilation and removal of secretions (Morris, *et al* 2013; Myatt, 2015).

Types of tracheostomy

Tracheostomies can be categorised as either temporary or permanent and depending on the mode of insertion will be either surgical or percutaneous. A temporary tracheostomy will

usually be carried out as an elective procedure to facilitate long-term airway management and the patient will potentially maintain a patent upper airway. Whereas a permanent tracheostomy (or laryngectomy) will result in the patient breathing through the stoma for the rest of their life as there is no patent upper airway (Dougherty and Lister 2008).

Surgical tracheostomies are performed under general anaesthetic and although have largely been replaced by the percutaneous method is still performed on patients undergoing head and neck surgery or those at risk of bleeding (NTSP 2013, ICS 2014). Percutaneous tracheostomy insertion is carried out at the critical care bedside under a local anaesthetic, requires fewer resources and may result in less scarring than a surgical insertion. However, in the initial period following insertion displacement of a percutaneous tracheotomy will result in the stoma closing whereas a surgical tracheostomy stoma will remain patent (NTSP, 2013).

The tracheostomy tube will be distinguished by the presence or lack of a cuff. Cuffed tubes are predominately used within the critical care environment to facilitate mechanical ventilation when a patient is unable to protect their own airway through coughing or swallowing (National Confidential Enquiry into Patient Outcome and Death (NCEPOD), 2014). It is vital that cuff pressures are monitored and the pressure remains within the manufacturer's guidance to avoid damage to the tracheal lining, persistent high pressures may result in tracheal stenosis (NTSP, 2013; NCEPOD, 2014). Uncuffed tubes are used in patients who do not require invasive respiratory support and have an effective gag and cough reflex. Depending on the patients requirements tracheostomy tubes can be further categorised by the absence or presence of a removable inner cannula and the presence of a fenestration (hole) (Table 1).

Table 1: Types of tracheostomy tubes

Tube type	Description

cuffed	These have a soft balloon around the distal end of the tube to seal the airway and allow positive pressure ventilation.
Uncuffed / Mini-tracheostomy	Used in patients who require a tube in the longer term and who need secretions clearing frequently. A mini-tracheostomy may be used to assess a patient's suitability for weaning and decannulation
Fenestrated tubes	These have openings on the outer curvature and may be used to facilitate weaning.

(Russell 2005)

Nursing care and complications

Tracheostomy insertion allows for a reduction in the use of sedation and patients to be discharged from critical care to general wards. Once discharged from critical care environments the usual progression is from reliance on the tracheostomy as an airway to mouth breathing and subsequent de-cannulation (removal). Throughout this trajectory, proficiency in nursing care and interventions is essential to ensure adequate ventilation, oxygenation and communication. Without this specialist level of care, patients are at risk of life threatening complications. Despite this, research continues to demonstrate that anxiety and a lack of competence amongst nurses caring for these patients is evident (Day *et al.*, 2002; Freeman, 2011).

Complications can arise following tracheostomy insertion immediately, short term or long term. Life threatening immediate and short term complications include; haemorrhage, tube

blockage through mucous plugging and accidental tube displacement. Long term issues include: tracheal stenosis (narrowing of the trachea owing to the formation of scar tissue or malformation of the cartilage in the trachea), problems with the stoma site (such as bleeding, infection, cellulitis, abscess formation and granulation tissue formation) (Russell, 2005) Without prompt interventions any of these problems can lead to death, with 50% of airway related deaths being associated with tube displacement (McGrath *et al.,* 2012). The NTSP (2013) refer to these incidences as red flags and emergencies and requires rapid assessment utilising an ABCDE approach. NCEPOD (2014) identified that practitioners caring for patients with tracheostomies should possess the appropriate expertise gained through mandatory training and their trust's evidence based guidelines.

Providing appropriate suctioning, humidification of inspired oxygen, maintaining a patent inner tube, monitoring cuff pressures and securing of the tracheostomy tube can assist in prevention of immediate and short-term complications associated with tracheostomies. The 'TRACHE' care bundle developed by Great Ormond Street Hospital (2019) identified six main areas of concern when caring for a person with a tracheostomy

Table 2. The 'TRACHE' bundle for tracheostomy care

TRACHE acronym for the six areas of concern for tracheostomy care
T apes: Keep the tracheostomy tube secure
R esus/ Emergency Care: know the resuscitation procedure
A irway Clear: Use the correct suction technique
C are of the Stoma and neck
H umidity: essential to keep tube clear
E mergency equipment

(Great Ormond Street Hospital 2019)

Tracheal suction is essential in the removal of secretions from the respiratory tract. Indications for the need for suctioning include audible secretions; reduce $Sa0_2$, reduced breath sounds, deterioration in arterial blood gases and evidence of cyanosis (Mallett, *et al*, 2013). This procedure does carry risks of bleeding, hypoxia and hypoxaemia and bronchoconstriction (Pederson *et al.*, 2009), therefore correct techniques, understanding of related anatomy, the appropriate suction pressure and choice of catheter size is essential.

The selection of suction catheter size will depend on the internal diameter of the tracheostomy; the recommendation is that the catheter should be no larger than half the internal diameter of the tracheostomy (NTSP 2013). Suction pressures can range from as little as -80 mmHg up to -300 mmHg although a maximum pressure of -150mmHg being suitable for most patients with a time duration of no longer than 15 seconds (NTSP 2013:52, Credland 2016). Historically and possibly ritualistically normal saline installation prior to suctioning was used to facilitate the removal of secretions but Wang *et al.*, (2017) found that this can significantly lower SaO_2 levels 5 minutes after suctioning.

Humidification of inspired air is vital as 'neck breathing' bypasses the normal route of inhalation where air is warmed moistened and filtered via the upper airways. McGrath *et al.*, (2012), Mallett, *et al* (2013), and the NTSP (2013) have identified that artificial humidification is mandatory when a tracheostomy is in situ. The type of humidification system used will depend on patient requirements.

The main rationale for cleaning of the inner cannula is the prevention of blockages through the mechanical removal of debris. Although NTSP (2013) state that the inner cannula should be removed and cleaned at least once per 8-hour shift period, to prevent obstruction of the lumen

with secretions, findings from NCEPOD (2014) were that 4 hourly cleaning was preferred. However, if thick, viscous or copious secretions are present more frequent cleaning may be required.

A replacement inner cannula should be available at the bedside in case of blockage and immediate replacement required (ICS 2014). Patient positioning should be considered when cleaning inner cannulas an upright position with the neck slightly extended can facilitate an easier removal of the inner cannula. The ICS (2014) recommend using an aseptic technique for this procedure. Remove and clean soiled non disposable cannulas with 0.9% sterile saline or water, soaking inner cannulas is not recommended as this increases the risk of exposure to pathogens.

Monitoring of the distal cuff pressure using a hand held cuff pressure manometer should take place at the beginning of each shift, or following any procedure where movement of the tube may have taken place e.g. dressing/tape change, patient re-positioning, if there is an audible leak, or following any changes in the volume of the cuff. Over inflation the cuff may result in tissue damage, necrosis and tracheoesophageal fistulas as tracheal mucosal blood supply is occluded at a tracheostomy cuff pressure of 30-32mmg Hg (Mallett *et al* 2013). A maximum pressure of 25mmg Hg is considered as a safe upper limit with a range of 20-25 mmgHg being recommended (Lorente et al 2007).

.The displacement of a tracheostomy tube can cause a life-threatening situation therefore appropriate securing of the tube is essential (McGrath, *et al.*, 2012; NTSP 2013; ICS, 2014). Changing of the stoma dressing and tracheostomy tapes must involve 2 people to prevent accidental tube displacement (Freeman, 2011) and should be carried out utilising an aseptic technique at least once in a 24-hour period (ICS, 2014). It should be possible to place 1-2 fingers between the neck and the tapes to prevent complications of skin damage and reduced

cerebral blood flow (Mallett et al 2013). During this time assessment of the stoma can take place noting any signs of infection or wound breakdown cleaning the stoma with 0.9% sterile saline and replacing soiled dressings (NTSP 2013, ICS 2014).

NCEPOD (2014) recommend that all NHS Trusts have an up to date protocol to manage patients with tracheostomies and NTSP (2013) recommend that essential information is displayed at the patient bedside alerting health professionals to the presence of a tracheostomy and that emergency algorithms should be displayed along with readily available emergency equipment. In addition to organisational guidance, nurses must possess the appropriate knowledge and skills to maintain patient safety and to determine adequate respiratory function. As nurses are the main caregivers and frequently first responders (Freeman, 2011; McGrath Bates *et al.*, 2012) an adequate understanding of the anatomy and physiology of the respiratory system and upper airways is essential to be able to competently assess patients' needs and respond to emergency airway situations (Taylor *et al.*, 2015).

Conclusion

Placement of a tracheostomy tube is a common procedure and can facilitate timely weaning from mechanical ventilation. Consistent standardised care delivery is essential to maintain patient safety and prevent complications. Utilising the TRACHE (GOSH 2019) acronym can assist nurses in ensuring safe and effective care through cleaning of the inner cannula, securing the tracheostomy tubes, suctioning and humidification to facilitate the removal of secretions and early recognition of deterioration.

Reference List

Arabai Y, Haddad S, Shirawi N, Shimemira A. (2004) Early tracheostomy in intensive care trauma patients improves resource utilisation: a cohort study and literature review *Critical Care* 8 R347-R352

Brook AD, Sherman G, Malen J, Kollef BH. (2000) Early versus late tracheostomy in patients who require prolonged mechanical ventilation. *American Journal of Critical Care* 9 (5): 352-359.

Cameron T, McKinstry A, Burt S, Howard M, Bellomo R, Brown D, Ross J, Sweeny J, O'Donaghue F (2009). Outcomes of patients with spinal cord injury before and after introduction of interdisciplinary tracheostomy team. *Critical Care and Resuscitation* 11 14-19

Credland N (2016) How to suction via a tracheostomy Nursing Standard 30 (28) 36-38

Day, T, Farnell, S, Haynes, S, Wainwright, S, & Wilson-Barnett, J (2002). Tracheal suctioning: An exploration of nurses' knowledge and competence in acute and high dependency ward areas. *Journal of Advanced Nursing*, 39(1), 35–45.

Dougherty L, Lister S (eds) (2015) *Tracheostomy and laryngectomy care* The Royal Marsden Hospital Manual of Clinical Nursing Procedures Ninth Edition Wiley Blackwell Oxford pp. 393-394

Edgtton-Winn, M, & Wright, K (2005). Tracheostomy: A guide to nursing care. *Australian Nursing Journal*, 13(5), 17–20.

Freeman, B, Isabella, K, Lin, N, & Buchman, T (2000). A meta-analysis of prospective trials comparing percutaneous and surgical tracheostomy in critically ill patients. *Chest*, 118 (5), 1412–1418.

Freeman S. (2011) Care of adult patients with a temporary tracheostomy *Nursing Standard* 26 (2) 49-56

Gilony D, Gilboa D, Blumstein T, Murad H, Talmi YP, Kronenberg J, Wolf M. (2005) Effects of tracheostomy on well-being and body image perceptions. *Otolaryngology-Head and Neck Surgery* 133 (3) 366-371

Great Ormond Street Hospital for Children (2019) Tracheostomy: care and management review: available at: https://www.gosh.nhs.uk/health-professionals/clinical-guidelines/tracheostomy-care-and-management-review (accessed on: 07.08.2018).

Griffiths J, Barber V, Morgan I, Young J. (2005) Systematic Review and meta-analysis of studies of the timing of tracheostomy in adult patients undergoing artificial ventilation *British Medical Journal* 330-1243

Intensive Care Society Standards (2014) *Standards for the Care of Adult Patients with a Temporary Tracheostomy*. The Intensive Care Society, London.

Kollef MH, Ahrens TS, Shannon W. Clinical predictors and outcomes for patients requiring tracheostomy in the intensive care unit. *Critical Care Medicine* (1999); 27 1714-1720.

Lorente L, Lecuona M, Jimenez A Mora ML, Sierra A (2007). Influence of an endotracheal tube with polyurethane cuff and subglottic secretion drainage on pneumonia. *American Journal of Respiratory and Critical Care Medicine* 176 (11) 1079-1083

Mallett J, Albarran J, Richardson A. (2013) *Critical Care Manual of Clinical Procedures and Competencies* Wiley-Blackwell Chichester pp:91-96

McGrath, B, Bates, L, Atkinson, D, & Moore, J (2012). Multidisciplinary guidelines for the Management of tracheostomy and laryngectomy airway emergencies. *Anaesthesia*, 67, 1025–1041.

Morris I, Whitmer A, McIntosh E. (2013) Tracheostomy care and complications in the intensive care unit *Critical Care Nurse*. 33 (5) 18-31

Myatt R. (2015) Nursing care of patients with a temporary tracheostomy Nursing Standard 29 (26) 42-49

National Confidential Enquiry into Patient Outcome and Death (2014). *On the right Trach? A review of the care received by patients who underwent a tracheostomy*. National Confidential Enquiry into Patient Outcome and Death (NCEPOD) London

National Tracheostomy Safety Project (2013) *NTSP Manual 2013*. http://www.tracheostomy.org.uk/storage/files/Comprehensive%20Tracheostomy%20Care.pdf (Accessed: 26/7/ 2018.)

Pederson CM, Rosendahl-Neilson M, Hjermind J, Egerod I (2009) Endotracheal suctioning of the adult intubated patient-what is evidence? *Intensive and Critical care Nursing* 25 (1) 21-30

Russell C. (2005). Providing the nurse with a guide to tracheostomy care and management *British Journal of Nursing* 14 (8) 428-433

Serra A. Tracheostomy care *Nursing Standard* (2000) 14: 45-55

Scales D, Thiruchelvam D, Kiss A, Redelmeier D. (2008) The effect of tracheostomy timing during critical illness on long term survival. *Critical Care Medicine* 36 2547-2557

Taylor, V Ashelford, S Fell, P Goacher, P (2015) Biosciences in nurse education: is the curriculum for practice? Lecturer's views and recommendations from across the UK. *Journal of Clinical Nursing* 24 (19-20) 2792-2806

Wang, CH, Tsai, JC, Chen, SF, Su, CL, Chen, L, Tam, Kw (2017) Normal saline installation before suctioning: A meta-analysis of randomized control trials. *Australian Critical Care* 30 260-265

Young D, Newman DA, Cuthbertson BH et al (2013) Effect of Early vs late tracheostomy placement on survival in patients receiving mechanical ventilation: the TracMan randomized trial. *Journal of American Medical Association* 309 (20) 2121-2129