Position Statement:

Tracheostomy Management
Acknowledgements

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Background

The New Zealand Speech-language Therapists’ Association (NZSTA) identified the need for a position statement and/or clinical guideline for speech-language therapists (SLTs) managing tracheostomy patients in New Zealand. A working party was formed to determine if an existing clinical guideline from one of the Association’s Mutual Recognition Agreement (MRA) partners or any other international sources would be appropriate for use in the New Zealand context. The working party identified six such clinical guidelines/position statements. The *Speech Pathology Australia (2013) Tracheostomy Management Clinical Guideline. Melbourne: Speech Pathology Australia* was deemed the most comprehensive document for NZSTA both in terms of rigour of development and relevance to New Zealand SLTs.

An in-depth review of this guideline was conducted to identify any areas that needed modification in order to assist SLTs working in New Zealand in applying the guideline to their practice. These modifications and additions have been incorporated into this position statement.
Aim

This position statement aims to be relevant to the management of both children and adults with tracheostomies and to support practice across the breadth of services of New Zealand (i.e. rural and urban, community and hospital-based). The position statement and the supporting documents referenced must always be used within the context of local governance (i.e. the clinician’s/manager’s own organisation’s policies and procedures).

The position of the NZSTA

It is the position of the New Zealand Speech-language Therapists’ Association (NZSTA) that working in the field of tracheostomy is within the scope of practice of speech-language therapists.

The NZSTA endorses the use of the *Tracheostomy Management Clinical Guideline (Speech Pathology Australia, 2013)* as the overarching guiding document for its members working in the field of tracheostomy.

This guideline should be interpreted with the unique New Zealand context in mind. As health professionals working in New Zealand and members of the New Zealand Speech-language Therapists’ Association, we are committed to upholding the Treaty of Waitangi and to reducing health inequities. Clinicians utilizing this guideline should ensure their practices are culturally appropriate and demonstrate the importance of holistic views of health and wellbeing that include physical, mental, social and spiritual elements, especially with persons who identify as Māori.

The amendments and additions listed below provide guidance and clarification for clinicians applying the Tracheostomy Management Clinical Guideline (Speech Pathology Australia, 2013) to clinical practice in New Zealand.
Modifications/Amendments to the *Tracheostomy Management Clinical Guideline (Speech Pathology Australia, 2013)* for the New Zealand Context.

**Terminology**

- *speech pathologist (SLP)* refers to/is interchangeable with *speech-language therapist (SLT)*
- *speech pathology* refers to/is interchangeable with *speech-language therapy or speech therapy*
- when *Speech Pathology Australia* is used in a sentence, such as “Speech Pathology Australia supports an evidence based approach to assessment and management in the area of tracheostomy”, *Speech Pathology Australia* is interchangeable with *The New Zealand Speech-language Therapists’ Association*.
- *state/territory* is interchangeable with *national/district*

**Documentation references**

- where the *Speech Pathology Australia Code of Ethics (2010)* and/or *Principles of Practice (2001)* are referred to, SLTs working in New Zealand should refer to the *NZSTA Principles and Rules of Ethics (2015)* and *NZSTA Scope of Practice (2012)*

- where the *Speech Pathology Australia Scope of Practice (2003)* document is referred to, SLTs working in New Zealand should refer to the *NZSTA Scope of Practice (2012)* document.
Guideline amendments by section

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| 33   | 15.4        | Credentialing & Competency | Please refer to your own organisational policies & procedures. These sit under individual employers in New Zealand. Please also refer to:  
  - NZSTA Return to Practice Policy for examples of appropriate supervision logs and competencies documents for SLTs extending their scope of practice into a new specialist area. |
| 38   | 16.1        | Education/ Professional Development | Please also refer to:  
  - The NZSTA Professional Development Policy, 2014  
Simulation Training for Tracheostomy Management is also available in New Zealand through The University of Auckland annually. For further information contact Anna Miles a.miles@auckland.ac.nz |
| 41   | 19.8        | Indemnity cover & insurance | This is country-specific. Please refer to NZSTA Indemnity insurance advice http://www.speechtherapy.org.nz/page/about-slt/indemnity-insurance/  
Please also check with your employer that you are covered for the scope of practice that you are undertaking. |
| 42   | 20          | Future directions | Research into the effectiveness of Simulation Training for Tracheostomy Management is currently being conducted in New Zealand as well as in Australia. For further information contact Anna Miles a.miles@auckland.ac.nz |
| 49   | 22          | Support Groups Patient and carer support groups | Please also refer to:  
  - www.tracheykids.co.nz  
  - www.makaton.org.nz  
  - www.nzsl.vuw.ac.nz/signs  
  - www.voicethruyourhands.org.nz  
  - www.passy-muir.com |
| 51   | 23          | References | Please also refer to:  
**Related documents**

This guideline should be read in conjunction with the New Zealand Speech-Language Therapists’ Association core documents including:

- Tracheostomy training programme for therapists working with adult patients (2013)
- NZSTA VFSS Guideline (2011)
- NZSTA Scope of Practice (2012)
- NZSTA Professional Development Policy (2014)
- Competency-based Occupational Standards for Speech Pathologists (5) (2011)
- NZSTA Full Member Return to Practice Framework (2015)

**Review**

This position statement is to be reviewed every five years following Speech Pathology Australia’s review of their Clinical Guideline. The review, which will be overseen by the NZSTA Executive Council, must also consider if the externally sourced clinical guideline continues to be suitable for NZSTA members. The related NZSTA documents listed above are reviewed every five years.
Clinical Guideline

TRACHEOSTOMY MANAGEMENT

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Summary

- It is the position of Speech Pathology Australia that working in the field of tracheostomy is within the scope of practice of speech pathologists and that this area is recognised as advanced practice. Further training and credentialing is recommended for areas of advanced practice (Speech Pathology Australia, 2003).

- This paper aims to provide current best practice and evidence in the area of tracheostomy management however does not provide a ‘how to’ approach. In some areas, there is divided opinion amongst experts in the literature and there is a limited amount of research available.

- Speech pathologists play an essential role in the management of communication, dysphagia, input into the decannulation pathway and education in the area of tracheostomy.

- A multidisciplinary team approach provides optimal care for patients with a tracheostomy. The speech pathologist is an integral member of the team and should work collaboratively as part of a team, and the roles and responsibilities of the team members will be governed by the employing facility.

- Speech Pathology Australia supports an evidence based practice approach to assessment and management in the area of tracheostomy.

- Speech Pathology Australia encourages speech pathologists to commit to professional development, seek support and supervision as required, and maintain and update knowledge and skills in the area of tracheostomy.

- Speech pathologists should adhere to the guidelines of their employing body and the local, State and Commonwealth laws and regulations.

- Speech pathologists should work within their scope of practice and if extended practice is considered, the appropriate training and credentialing should occur within the facility as endorsed by the facility.

- Consistent, accurate recording and documentation of all areas of patient management should occur.

- Projects on tracheostomy management should be incorporated into general departmental quality assurance and quality improvement programs.
Evidence-based Recommendations

Speech pathology is a scientific and evidence-based profession and speech pathologists have a responsibility to incorporate best available evidence from research and other sources into clinical practice (Evidence-Based Practice in Speech Pathology, Speech Pathology Australia, 2010).

These guidelines have been developed to provide recommendations in the management of the patient with a tracheostomy according to the latest evidence in the literature.

The evidence to support these guidelines has been graded according to the National Health and Medical Research Council (NHMRC) guide. In 2009, the NHMRC developed a more extensive evidence hierarchy for classifying the literature, and this is outlined in the table below. When there has been minimal evidence in the literature, but the expert working party has reached consensus on the recommendations or clinical experience supports this statement, this has been given a grading of Good Practice Point-Clinical Opinion (GPP-C).

Table 1 NHMRC Levels of Evidence (2009)

<table>
<thead>
<tr>
<th>Level</th>
<th>Intervention</th>
<th>Diagnostic accuracy</th>
<th>Prognosis</th>
<th>Aetiology</th>
<th>Screening intervention</th>
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<td>I</td>
<td>A systematic review of level II studies</td>
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<td>II</td>
<td>A randomised controlled trial</td>
<td>A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation</td>
<td>A prospective cohort study</td>
<td>A prospective cohort study</td>
<td>A randomised controlled trial</td>
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<td>III-1</td>
<td>A pseudorandomised controlled trial</td>
<td>A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among nonconsecutive persons with a defined clinical presentation</td>
<td>All or none</td>
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<td>A pseudorandomised controlled trial</td>
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<td>III-2</td>
<td>A comparative study with concurrent controls: -non-randomised experimental trials -cohort study -case-control study -interrupted time series with a control group</td>
<td>A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence</td>
<td>Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial</td>
<td>A retrospective cohort study</td>
<td>A comparative study with concurrent controls: -non-randomised experimental trials -cohort study -case-control study</td>
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<td>III-3</td>
<td>A comparative study without concurrent controls: -Historical control study -Two or more single arm study -Interrupted time series without a parallel control group</td>
<td>Diagnostic case-control study</td>
<td>A retrospective cohort study</td>
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<td>IV</td>
<td>Case series with either post-test or pre-test/post-test outcome</td>
<td>Study of diagnostic yield</td>
<td>Case series, or cohort study of persons at different stages of disease</td>
<td>A cross-sectional study or case series</td>
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1. Origins of the paper

The original Tracheostomy Management Position Paper was developed in 1996 and revised in 2005. Credentialing (2009) and Competency-Based Occupational Standards (CBOS) for Speech Pathologists (2011) specify that tracheostomy is an advanced practice for speech pathologists and requires further training and/or workplace credentialing. It is therefore acknowledged that specific guidelines are required in this area of advanced practice. Updating the content of this document provides opportunity to modify the format from a Position Paper into a Clinical Guideline in keeping with other recently updated Speech Pathology Australia Clinical Guidelines.

This paper has been informed by the Tracheostomy Working Party, current available best evidence, and consensus opinion.

2. Overview and purpose

The Tracheostomy Management Clinical Guideline is intended to provide information about the speech pathology management of the neonate, child and adult with a tracheostomy. This guideline is not intended to provide a ‘how to’ manual, but rather a guideline of tracheostomy specific information and management principles based on current evidence and consensus. It is recognised that the management of the patient with a tracheostomy should be a multidisciplinary approach; however this clinical guideline specifically focuses on the role of the speech pathologist, with reference to multidisciplinary team members as appropriate.

The role of the speech pathologist and subsequent management and intervention will vary according to the clinical setting, patient needs and age. It is recognised that there are areas of controversy within the profession in the management of the patient with a tracheostomy and these will be discussed in this document.

This guideline should be read in conjunction with Speech Pathology Australia Association core documents including: Principles of Practice (2001), Scope of Practice (2003), Credentialing (2009), Code of Ethics (2010), Competency-based Occupational Standards for Speech Pathologists (2011), and also Position Papers and Clinical Guidelines.

3. Background

3.1 Definition

The terms ‘tracheostomy’ and ‘tracheotomy’ are often used interchangeably in the literature and in practice, but they have two slightly different meanings (Mitchell et al., 2012). A ‘tracheotomy’ refers to the surgical procedure that creates an opening between the trachea and the midline skin surface of the neck. ‘Tracheostomy’ refers to the opening created by the tracheotomy procedure. A tracheostomy can be performed percutaneously or surgically and the choice of insertion method is a medical decision. A tracheostomy tube is then inserted into the opening, and the tube occupies approximately two-thirds of the tracheal lumen.

Indicators for a tracheostomy tube include:
- maintenance of an airway (e.g. reduced level of consciousness, upper airway obstruction, intubation difficulties)
- to protect the airway from gross aspiration (swallowing impairment)
- removal of tracheal secretions (e.g. excessive secretions/poor cough)
- to wean from ventilation
- long-term mechanical ventilation

(Groves & Durbin Jnr, 2007; Intensive Care Society Standards, 2008)
In the paediatric population, the most frequent indication for tracheostomy is upper airway obstruction (Davis, 2006; Leung & Berkowitz, 2005; Tantinikorn, Alper, Bluestone, & Casselbrant, 2003; Zenk et al., 2009), while Kraft et al. (2011) reported the need for long-term mechanical ventilation as the leading cause. Other indications include neurological deficit, craniofacial anomaly, cardiopulmonary insufficiency, neuromuscular indication, bilateral vocal cord paralysis, and subglottic stenosis (Davis, 2006; Kraft et al., 2011; Leung & Berkowitz, 2005; Tantinikorn et al., 2003; Zenk et al., 2009).

The majority of the patients tracheotomised in the intensive care unit (ICU) will have been intubated with an endotracheal tube (ETT) prior to the tracheostomy. An endotracheal tube is a tube that passes into the mouth or nose, through the pharynx and between the vocal cords into the trachea in order to provide an artificial airway to connect to mechanical ventilation. Complications can occur with both the ETT and tracheostomy (Refer to 15.6.1).

Benefits of a tracheostomy tube over an ETT include improved patient comfort and reduced need for sedation (Blot et al., 2008; Bosel et al., 2013; Krishnan, Elliot, & Mallick, 2005; Nieszkowska et al., 2005), potential for eating, speaking, and mobilizing, reduced harm to the laryngeal structures (Tadie et al., 2010), and faster weaning from ventilation (Griffiths, Barber, Morgan, & Young, 2005; Holevar et al., 2009; Krishnan et al., 2005).

3.2 Patient Groups

Speech pathologists manage patients with a tracheostomy across the continuum of care (i.e. neonatal and acute care, rehabilitation, extended care facilities, and community settings including home or residential care facilities) and age groups. Patients with a tracheostomy are seen across a wide range of diagnostic groups and medical areas.

Diagnostic categories for patients with a tracheostomy include, but are not limited to:

1. Neurological conditions, including
   - Stroke
   - Acquired/traumatic brain injury
   - Progressive neurological condition
   - Encephalitis/meningitis
   - Tumor
   - Congenital neuromuscular disease
   - Cranial nerve damage
   - Neonatal maturation conditions (e.g. Central hypoventilation syndrome)

2. Surgical conditions, including
   - Head and neck cancer
   - Neurosurgery
   - Spinal cord injury
   - Craniofacial
   - Cardiothoracic/thoracic
   - Laryngotracheal anomalies (e.g. tracheal and subglottic stenosis, bilateral vocal cord paralysis, laryngomalacia, tracheomalacia)
   - Burns
   - Trauma
   - General surgical patients with complications/medical comorbidities
   - Tracheosophageal anomalies (e.g. tracheosophageal fistula)
   - Craniofacial anomalies and syndromes (e.g. Pierre-Robin sequence, Crouzon’s, Opitz-Frias, Goldenhaar, Treacher-Collins)
   - Laryngeal or pharyngeal neoplasms in children (e.g. haemangioma)

3. Medical conditions, including
   - Pneumonia
   - Radiation therapy to the head and neck
   - Anaphylaxis
- Complex patients with multiple medical comorbidities
- Extended ICU admission and associated critical weakness

4. Respiratory conditions
- Bronchopulmonary dysplasia (BPD)
- Chronic neonatal lung disease (CNLD)
- Acute respiratory infections
- Acute/chronic obstructive airway disease (COPD/COAD)
- Obstructive sleep apnoea

This guideline does not address patients with a laryngectomy. Please refer to the Speech Pathology Australia Laryngectomy Clinical Guideline (2013).

3.3 The tracheostomy pathway
A tracheostomy may be inserted as an emergency procedure (to secure an airway following trauma), electively as part of planned surgery (e.g. head and neck surgery) or following intubation (e.g. ICU). The final goal is decannulation (removal of the tracheostomy tube) in the majority of cases once the tracheostomy is no longer indicated and timely, safe decannulation is a priority (Refer to 14.0).

Management of the patient with a tracheostomy is preferably overseen by a multidisciplinary team (Refer to 7.3) including speech pathology (Refer to 6.0). Speech pathology involvement in tracheostomy management may include assisting the patient to tolerate successful periods of cuff deflation and saliva management, re-establishing verbal communication (e.g. finger occlusion or speaking valve), establishing other forms of communication, conducting swallow assessments to re-establish oral intake, providing dysphagia rehabilitation, and providing input into the decannulation decision. All of these steps may progress easily and quickly with nil complications, or may require high level problem solving and an extended period of time. The order in which these areas are addressed will depend on the individual patient.

Paediatrics
Infants with a tracheostomy will also generally have had a protracted time on endotracheal ventilation (either orally or transnasally) associated with preterm birth and bronchopulmonary dysplasia, or respiratory distress syndrome. Infants receiving immediate tracheostomy usually have craniofacial syndromes or airway obstruction. The insertion of the tracheostomy tube in the paediatric population is more technically complicated than adults due to the smaller, more pliable trachea and size of the operating field. Paediatric tracheostomy also has higher mortality, morbidity and complication rates than in adults (Parilla, Scaran, Guidi, Galli, & Paludetti, 2007). Additional to the speech pathology steps mentioned above, developmental feeding and communication assessment and treatment need to be included.

4. Incidence and prevalence
Estimates of the incidence and prevalence of tracheostomy vary widely in the literature. The varied methodologies used in different studies appear to have an impact on the rates reported. There is minimal information available regarding incidence in Australia therefore numbers from Scotland and the USA are provided for information and not comparison purposes.

Adults
Each year more than 7000 people receive a tracheostomy in Australia and New Zealand (Health Roundtable).

Incidence rates within large tertiary hospitals in Australia for adult populations indicate that 4-10% of adults admitted to intensive care units receive a tracheostomy, or a range of 102-202
tracheostomies performed per year in an ICU (Choate, Barbetti, & Currey, 2009; Freeman-Sanderson, Togher, Phipps, & Elkins, 2011; Tobin & Santamaria, 2008). It is common for the majority of adults to be decannulated prior to hospital discharge (Choate et al., 2009; Freeman-Sanderson et al., 2011; Tobin & Santamaria, 2008).

In the USA a range of 0-59% of adults admitted to intensive care units with acute respiratory failure receive a tracheostomy, with a mean rate of 19.6% (Nathens et al., 2006).

Data from a Scotland record base over the period of 1996 to 2005 indicated an increase in the incidence of tracheostomy from 9.96 to 19.29 per 100,000 of Scotland’s adult population (NHS Quality Improvement Scotland, 2007).

Paediatrics
Tracheostomies are predominantly performed in children and infants under the age of two and usually for long term rather than short term airway management (Abraham, 2003). There is often a second peak age occurring in adolescents of 15-18 years of age, with approximately 80% associated with trauma (Carr, 2007). Generally males outnumber females 2:1 (Alladi, Rao, Das, Charles, & D’Cruz, 2004).

In the USA, prevalence figures for tracheostomy in 1997 were 6.6 per 100,000 child-years in children 0-18 years (Lewis, Carron, Perkins, Sie, & Feudtner, 2003).

Scotland has reported prevalence rates of 2.47 tracheostomies performed per 100,000 in children aged 0-12 years, and 1.55 per 100,000 in those aged 13-17 years (NHS Quality Improvement Scotland, 2008).

5. Changes and trends
There have been a number of changes and advances in tracheostomy management. As a consequence of the increasing number of patients with a tracheostomy, the role of the speech pathologist has increased and expanded. Changes that have occurred include:

- Advanced medical technology resulting in increased survival of the critically ill patient.
- Increased tracheostomy insertion with (1) the introduction of the percutaneous technique (Krishnan et al., 2005), and (2) early tracheostomy associated with reduced mechanical ventilation and ICU length of stay (Griffiths et al., 2005).
- Increased pressure for ICU beds with subsequent push for earlier ward transfer resulting in more patients with a tracheostomy being dispersed throughout the acute and sub-acute facilities (Green & Edmonds, 2004; Paul, 2010).
- Increased consumer involvement in health care and decision making.
- Increased understanding of the psychological impact of lack of communication in early stages of recovery (Donnelly & Wiechula, 2006; Magnus & Turkington, 2006; Sherlock, Wilson, & Exley, 2009).
- Increased recognition of the benefits of a multidisciplinary team (MDT) approach including a ‘dedicated’ MDT to monitor and review the patients from the critical care setting to the ward (Cameron et al., 2009; Cetto et al., 2011; de Mestral et al., 2011; Tobin & Santamaria, 2008).
- Greater variety of tracheostomy tubes, some of which either enable communication (e.g. above cuff suctioning tubes) or are specifically designed to assist communication (e.g. The Blom Tracheostomy Tube System, Talking Tracheostomy Tubes). These advances have allowed greater involvement from the speech pathologist regarding tube choice for some patients.
- Increased use of Fiberoptic Endoscopic Evaluation of Swallowing (FEES) and its innovative potential with the tracheostomised patient, including the ventilated patient (Hales, Drinnan, & Wilson, 2008).
- Extended scope of practice for the speech pathologist such as tracheal suctioning.
6. Role of the speech pathologist

6.1 Overview
Speech pathology involvement should occur as part of a multidisciplinary team. The complex interrelationships between respiration, swallowing and communication dictate that experienced speech pathologists play an integral role in managing patients with a tracheostomy.

The role of a speech pathologist in tracheostomy management will also be determined by the policies and procedures of the employing organisation. Professional roles, responsibilities, and boundaries at the organisational level should be defined and adhered to. Within the multidisciplinary team, the speech pathologist should practice within their scope of practice but understand the role and important aspects of care from other disciplines. For example, stoma care and humidification must be understood and problems in these areas identified by all team members but remain the domain of nursing and physiotherapy. The speech pathologist must also be aware of possible risks and complications inherent in tracheostomy management and need to adhere to the policies and procedures of the organisation and relevant state and federal legislation.

Referral to speech pathology for management of patients with a tracheostomy may include:
- Saliva management and readiness for cuff deflation towards decannulation
- Communication status and options (e.g. speaking valve, communication board)
- Swallowing function for oral intake
- Non-nutritive oral stimulation programs
- Developmental feeding and communication therapy

The speech pathologist may play a number of roles in the area of tracheostomy management including direct patient management, or as a consultant, educator, researcher or patient advocate.

Patient management
In conjunction with the multidisciplinary team, patient management may include:
- Choice of the appropriate tracheostomy tube in relation to voice and secretion management issues
- Assessment and management of saliva/secretions
- Timing and progression of cuff deflation
- Cuff management including cuff pressure management
- Discussion with physiotherapist/nurse re: cough and airway clearance
- Use of above cuff suctioning
- Use of tracheal suctioning (extended scope of practice)
- Assessment and management of vocal fold function and phonation (in conjunction with ENT)
- Screening of upper airway patency (in conjunction with ENT)
- Involvement in the selection of the appropriate tracheostomy weaning pathway
- Contributing to decannulation decision making
- Assessment of swallowing function, recommendations for oral intake and implementation of strategies to ensure safe and effective swallowing
- Swallowing rehabilitation for saliva and/or oral intake
- Assessment and management of communication, including voice, speech, language, Augmentative and Alternative Communication (AAC), communication strategies, parent-child interaction and infant cues
- Establishing voice using finger occlusion in the presence of a deflated cuff or cuffless tube
- Introduction and use of speaking valves in the presence of a deflated cuff or cuffless tube
- Use of above cuff voicing or other specialised talking tracheostomy tubes
- Discharge planning for patients with long term tracheostomy
• Assisting with trouble shooting for the patient in the home and direction to appropriate profession as required
• Patient and family education re: tracheostomy tubes and management
• Patient advocacy

**Education and counselling**
The speech pathologist has an integral role with education and counselling of patients and/or carers, prior to and/or post insertion of the tracheostomy tube.

Topics covered will vary according to the patients’ medical status, the patients’ type and degree of impairment, whether the tracheostomy is short or long term, current stage along the continuum of tracheostomy management, organisational policies and procedures, the recognised role of the speech pathologist within the facility, the skill level of the speech pathologist, and the roles and skills of other team members.

Education should include the use of visual information such as diagrams, and can include anatomical models (e.g. Tracheostomy Observation Model/T.O.M.) or samples of tracheostomy tubes to aid understanding.

Education of other health professionals is also within the role of speech pathology.

**6.2 Scope of practice**
It is the position of Speech Pathology Australia that management of patients with a tracheostomy is within the scope of practice of speech pathologists (Scope of Practice, 2003), but is recognised as an advanced practice (CBOS, 2011). Therefore additional and specialist training is required and thus is not a competency expected of new graduate speech pathologists.

The scope of practice of a speech pathologist in tracheostomy management will also be determined by the policies and procedures of the employing organisation and also the skill base of the clinician.

**Prerequisite skills**
The speech pathologist should demonstrate competency in dysphagia, and relevant aspects of neurological disorders, respiratory disorders, voice disorders and selection and management of AAC prior to managing patients with a tracheostomy.

It is essential that credentialing or tracheostomy competency as defined at the facility, be obtained before the speech pathologist independently manages patients with a tracheostomy or adequate support provided (Refer to 15.4).

**Ventilator dependent patients**
It is the position of Speech Pathology Australia that it is within the scope of practice of speech pathologists to be part of the team that manages patients who have a tracheostomy and are ventilated. This area requires advanced knowledge and skills and additional elements of competency (Refer to 15.4).

**Paediatrics**
The paediatric population has unique needs and requires the speech pathologist to be equipped with the appropriate advanced knowledge and skills. Additional to the pre-requisite skills mentioned above, competency training in paediatric dysphagia and management of infants/children in the neonatal intensive care, special care and paediatric ICU is required. Speech Pathology Australia recognises that it is within the scope of practice of speech pathologists to be part of the team that manages paediatric patients with a tracheostomy.

**Extended scope of practice**
Some organisations have supported speech pathologists to perform roles relating to tracheostomy management which are considered extended scope by Speech Pathology Australia (e.g. independent tracheal suctioning). In these instances speech pathologists are
strongly advised to seek formal approval, credentialing, ongoing training and support and legal advice from their employing body.

7. Service delivery

7.1 Overview
As outlined in the Principles of Practice (Speech Pathology Australia, 2001) effective service delivery models are expected to be utilised for patient service. Speech pathologists may see a variety of clients across a broad spectrum:

- **Populations**
  - Neonate/infant
  - Paediatric
  - Adult
- **Settings**
  - Hospital (Paediatric and Adult)
    - Neonatal Intensive Care Unit and Special Care Nursery
    - Intensive Care Unit
    - Specialised weaning unit
    - Acute wards
    - Rehabilitation
    - Palliative care
    - Outpatient
  - Home based
  - Residential care
  - Schools
  - Workplace
- **Services delivered**
  - Assessment
  - Diagnosis
  - Intervention
  - Discharge planning or transfer of care

Consideration should be given to issues such as:
- Patient and carers’ needs
- Level of expertise of the treating speech pathologist
- Speciality skills of other team members
- Facilities/resources available
- Policies and procedures of the organisation and local, state and federal legislation

7.2 Service delivery options
Models of service delivery include but are not limited to:
- Individual or group
- Telehealth
- Specialist clinics
- Consultation
- Multidisciplinary, interdisciplinary, and transdisciplinary team management
- Family/client centred care
- Advocacy
- Education and training of client, carer, families and health professionals
- Resource development and provision

Speech pathologists managing patients with a tracheostomy may work across a variety of service delivery models.
7.3 Multidisciplinary Tracheostomy Teams

There is a growing recognition that tracheostomy care crosses many professional boundaries and no single discipline or service is adequately equipped to manage the needs of this complex, challenging patient group. Optimal management can be provided by a team of tracheostomy experts of which the speech pathologist is a core member. Each member should practise within their professional scope of practice but also should understand the important aspects of care provided by other disciplines. In situations where a formal tracheostomy team is not in place, the speech pathologist must seek to manage the patient in conjunction with a team.

A growing body of literature has reported on the use of a ‘dedicated tracheostomy team’ as an ideal model for tracheostomy care (Cameron et al., 2009; Cetto et al., 2011; de Mestral et al., 2011; Hunt & McGowan, 2005; Norwood, Spiers, Bailiss, & Sayers, 2004; Pandian, Miller, Marek, & Adam, 2012; Parker et al., 2010; Tobin & Santamaria, 2008). A recent systematic review concluded that tracheostomy teams have been shown to reduce the length of time to decannulation, reduce length of stay, increase use of speaking valves, reduce adverse events, and have associated cost savings (Speed and Harding, 2012). Other studies have also reported the benefits of tracheostomy teams for special populations including Traumatic Brain Injury (Le Blanc et al., 2010) and paediatric populations (Torre et al., 2011).

The members of the “teams” in each of the studies to date have been site specific and vary in terms of the discipline that leads the team and who participates in the team. However, typical core members of a team specific for tracheostomy management may include the medical officer, nurse, physiotherapist, and speech pathologist. Extended team members that may be involved include, but are not limited to, ear nose and throat specialist, intensivist, and respiratory physician. Ideally and increasingly these teams offer interdisciplinary education where all team members understand the roles and basics of tracheostomy care within all disciplines.

For the individual who has a long-term tracheostomy and speech pathology input is in the home, residential care, school or workplace, there may be less access to all members of the MDT. The speech pathologist should liaise with the individual’s medical officer/general practitioner and other relevant staff.

7.4 Support Groups

7.4.1 Patient Support Groups

Tracheostomy/ventilation support groups exist for individuals and families. This can take the form of ‘in person’ or ‘on line’ support groups (Refer to appendix). Support groups aim to provide education, support and a network for people with tracheostomies and their families. The support groups can be facilitated within the health facilities, or they can be instigated and managed by patients with tracheostomies or their family. Speech pathologists may be involved with initiating and facilitating support groups for individuals with a tracheostomy and their family/carers.

The speech pathologist should be aware of support groups available and how they can be accessed.

7.4.2 Healthcare Provider Support Groups

A variety of state and national groups have been established for health professionals managing patients with a tracheostomy. Some are specifically for speech pathologists and others are multidisciplinary. The groups vary with regard to whether tracheostomy is the main focus or one of many topics that form the terms of reference of the group. These include tracheostomy interest groups, evidence based practice groups and email list serves (Refer to appendix).
8. Tracheostomy tubes

8.1 Types of tubes

There are a variety of types and features of tracheostomy tubes available to suit the clinical needs of the individual with a tracheostomy. Often, each facility has particular brands of tubes that they are more familiar with and are contracted to use.

Tubes can vary in a number of ways and possess different features including:

- **Single/double cannula**: Some tubes are designed to be used with an inner cannula to facilitate cleaning of the tube which aims to reduce the risk of the tube obstructing with secretions. However, the inner cannula will reduce the lumen of the tracheostomy tube and the impact on respiratory work may need to be considered. It is recommended that facilities have a policy regarding inner cannula use and care.

- **Cuffed/cuffless**: A cuffed tube has a cuff that is positioned circumferentially around the distal end of the outer surface of the tracheostomy tube within the trachea that inflates like a balloon. It can be filled with air, water or foam. The purpose of the cuff is to create a seal for ventilation or to minimise the risk of leak of aspirated saliva.

  - With an inflated cuff, lung air is unable to reach the larynx as it travels in an out of the tracheostomy, and thus voicing is not possible. The cuffless tube is not designed for people requiring ventilation (exception being some individuals with long-term ventilation e.g. cervical spinal cord injury) or those at risk of saliva aspiration (Refer to 10.0).

- **Fenestrated**: This is a double cannula tube that has a hole cut out (window or fenestration) on the superior surface of the outer cannula at the angle of the tube.

  - The inner cannula can be fenestrated or non-fenestrated which when the fenestrated inner cannula is insitu, allows air to flow up through the tube to the larynx to facilitate voicing. This is usually in conjunction with a cuffless tube or a deflated cuff. It is generally not recommended for people with copious secretions or aspiration risk.

  - There is low level evidence to suggest that fenestrated tubes should be used with caution and for specific reasons only, due to the potential risk of abrasion and granulation formation if poorly positioned (Siddharth & Mazzarella, 1985).

- **Above-cuff line**: This tube has an extra suction line that runs along the outside shaft of the tube and ends just above the cuff. This allows for removal of secretions that may be pooled above the cuff, or allows for application of air to travel up to the larynx for voicing for the person requiring an inflated cuff (Refer to 11.3.2).

- **Mini-tracheostomy**: The mini-tracheostomy tube is a much narrower tube than the standard tracheostomy tube. It is used for suctioning purposes, not as an artificial airway. It is cuffless and is not suitable for a person with saliva aspiration or those requiring ventilation.

- **Tube material and shape**: Tubes can be made of a variety of materials each with their own benefits, including plastic (polyvinyl chloride, silicone and silastic) and metal (silver or stainless steel). Generally, the initial tube inserted will be plastic. Tubes can also vary with their angle or curve to improve the fit of the tube in the trachea.

- **Tube size/diameter**: Tube size will be determined by the medical officer based on endoscopic assessment. Each brand of tube varies in diameter sizing, and will have its own sizing chart, so it is important to be aware of these differences if changing between different brands. Infants under one year of age usually require neonatal sized tubes, while those older have paediatric sized tubes.

- **Tube length**: The length of the tube can be of standard length (most commonly), an adjustable length, or can be of a specified extended length, as required by the individual. The medical officer performing the tracheotomy will determine the required length of the tube.
• **Other specialised communication tubes:** A variety of ‘communication’ tracheostomy tubes are also available, including inner cannula with integrated speaking valves, speaking tubes with inner cannula with other valving, the Blom Tracheostomy Tube System, or Talking Tracheostomy Tube.

### 8.2 Speech Pathology role in advocacy for tube choice

Tube selection should take into account size, shape, as well as the functional needs of the individual, including communication (Mitchell et al., 2012). Final tube selection is the decision of the medical officer inserting the tube. There are particular tracheostomy tubes that may facilitate swallowing and communication with features such as fenestration, above-cuff suction lines, talking tracheostomy tubes, or the Blom Tracheostomy Tube System, and the speech pathologist can advocate for these particular tracheostomy tubes. It is therefore essential for the speech pathologist to be familiar with the variety of tracheostomy tubes available and understand the advantages and disadvantages of the tubes. In paediatrics, the speech pathologist may suggest tube sizes with respect to the amount of leak available to use speaking valves. This may also occur for adults, in discussion with the medical officer, but for tube change rather than initial tube placement.

### 9. Ventilation overview

Mechanical ventilation is used in a variety of situations where patients have compromised respiratory function. Ventilation can be provided in two ways:

1. **Non Invasive Ventilation** (e.g. iron lung, cuirass, rocking bed, and most commonly mask or mouthpiece)
2. **Invasive Ventilation** - positive pressure ventilation via ETT or tracheostomy tube.

The person can be fully dependent on the ventilator or require intermittent ventilation with periods of unaided breathing.

Those who require mechanical ventilation fall into two main groups:

1. **Acute care patients managed in intensive care units or special weaning units**
2. **Individuals on long term mechanical ventilation managed in the hospital or community setting including home and residential care**

Each group has very different needs and goals. In general, acutely unwell patients who are ventilated will be less stable and will require greater caution when treatment interventions are considered. Speech pathology interventions to improve communication and swallowing for a patient who is invasively ventilated have the potential to cause inadequate ventilation, cardio/respiratory instability and death. The clinician must always work as part of the interdisciplinary team and take direction from the treating medical team. Speech pathologists generally do not make hands on ventilator adjustments, which is the role of the medical officer, physiotherapist, respiratory therapist or nurse. However, local organisational policies will dictate this. Adequate ventilation for the patient is always the priority during any session. Strong communication amongst team members must occur in order that the goals of intervention are clearly understood by all. During any given intervention it is important for the team to discuss who will be responsible for which aspects of the session. It is always wise to establish the experience level of each team member prior to sessions in which ventilation adjustments are indicated.

Procedures for the ventilated person in the community most likely will be set in place and training established for family/carers to manipulate the ventilator as required under guidance of the medical officer.
10. Cuff management

10.1 Overview
When the cuff is inflated on a cuffed tracheostomy tube, the larynx is separated from the lungs. There are two primary purposes of the cuff. One is to provide a closed circuit for the person on mechanical ventilation. The other purpose is to minimise the risk of aspirated secretions from entering the lungs. However it should be highlighted that an inflated cuff does not completely safeguard against leak of aspirated material as secretions pooled on top of the inflated cuff can leak around the cuff into the airway (Coffman, Rees, Sievers, & Belafsky, 2008; Dikeman & Kazandjian, 2003; Hess, 2005; Winklmaier, Wust, Schiller, & Wallner, 2006). Coffman et al. (2008) demonstrated a significant leak of saliva around the inflated cuff of various tracheostomy tubes using human saliva on laryngeal models. There is also a risk of increased bacteria in secretions which are pooled on top of the cuff (Dikeman & Kazandjian, 2003) which can leak around the cuff into the airway, thus introducing pathogens into the airway. The cuff can be filled with air (most common), water or foam. Cuff management involves the entire multidisciplinary team and thorough communication between all members is essential to ensure safe practice and to determine professional roles.

10.2 Assessment and progression of cuff deflation
The assessment of an individual’s ability to tolerate cuff deflation and swallow their saliva is usually the first step toward decannulation and in most facilities is done at the request of the medical team. There is nil information in the literature to clarify which MDT member is responsible for this, but the speech pathologist’s scope of practice and skill base with dysphagia indicates a role for saliva swallowing management. The speech pathologist may be involved prior to or at the time of the initial cuff deflation in order to determine the individual’s ability to swallow saliva. Intervention to improve saliva management may need to be considered to facilitate the cuff deflation process (Refer to 12.0). The swallow frequency and integrity, amount and type of secretions, suctioning frequency, ability to cough, and the ability to protect the airway are some of the features the speech pathologist should take into consideration when determining the individual’s ability to swallow saliva. Tracheostomy tubes which allow above cuff secretions to be removed prior to cuff deflation (e.g. Portex Suctionaid, Shiley Evac) aid in decreasing the individual’s reactivity and intolerance of cuff deflation. Also, they provide insight into whether saliva is pooling above the cuff and potentially being aspirated.

Recommendations around the frequency and duration of cuff deflation may be made by the speech pathologist in conjunction with the multidisciplinary team and should be determined on an individual basis and guided by local policies and procedures (Dikeman & Kazandjian, 2003). There is no evidence to support or negate a standardised cuff deflation protocol. It may be that the cuff remains deflated after initial assessment or there may be a regime where there are set periods each day in which the cuff is deflated with gradual increments until deflated at all times. However, there is general consensus that at least 24 hours of cuff deflation should be tolerated prior to decannulation (Braine & Sweby, 2006; Thompson-Ward, Boots, Frisby, Bassett, & Timm, 1999).

Some individuals may never be suitable to undertake cuff deflation trials and will need to have the cuff inflated permanently. Others may progress promptly to a continuously deflated cuff, but may need the tube for airway patency. In that situation, at the medical request, the tube may be changed to a cuffless tube, and the involvement of the speech pathologist may be diminished if dysphagia, aspiration and communication are no longer a concern.

If the cuff is a foam cuff, it is unable to be deflated due to a self-inflating feature, and thus is not suitable for cuff deflation trials or speaking valve/spigoting.

10.3 Cuff pressure
Monitoring cuff pressure is necessary to ensure the cuff is not under or over-inflated and this is generally performed by nursing staff. If the cuff is under-inflated, there is a greater risk of
the aspirated material entering the lower airway, or inadequate ventilation when mechanically ventilated. Over-inflation may result in tracheal complications due to the excessive pressure on the tracheal wall, such as ulceration of the mucosa, stenosis, tracheoesophageal fistula, and tracheo-innominate fistula.

To prevent damage to the tracheal mucosa, the pressure exerted by the cuff onto the tracheal wall should not exceed the tracheal capillary pressure (Dikeman & Kazandjian, 2003; Hess, 2005). The advent of high-volume low-pressure cuffs has minimised, but not removed this risk.

There is great variability in the literature regarding the ‘safe pressure’ for an inflated cuff. Safe pressures suggested in the literature include 15-25cmH2O (11-18 mmHg) (McHardy & Chung, 1999; Russell & Matta, 2004; Somri, Fradis, Malatskev, Vaida, & Gaitini, 2002); 20-40cm H2O (15-30 mmHg) (Conway & Mackie, 2004) and 27-34cm H2O (20-25 mmHg) (Heffner & Hess, 2001), but Dikeman and Kazandjian (2003) suggest that a set cuff pressure may not be suitable in every situation, and features such as ventilation or position may impact on the pressure required. Much of the literature recommends the use of a cuff pressure manometer to confirm cuff pressure (Dikeman & Kazandjian, 2003; Heffner & Hess, 2001; Russell & Matta, 2004); however Morris, Zoumalan, Roccaforte, and Amin (2007) suggest this as just one part of an overall cuff management protocol.

Cuff pressure measurement does not however determine if a cuff seal against the tracheal wall has been achieved. Methods to inflate a cuff and determine if a seal has been achieved include minimal occlusive volume and minimal cuff leak technique. Squeezing the pilot balloon is not an appropriate method to check for cuff seal adequacy (Fernandez, Blanch, Mancebo, Bonsoms, & Artigas, 1990).

The speech pathologist should adhere to the organisational policies and procedures regarding cuff management including methods to inflate the cuff, checks for adequacy of a cuff seal, and cuff pressure measurement methods and amounts.

10.4 Suspected cuff leak and the role of the speech pathologist

Signs of a cuff leak may include inadequate ventilation or increased suction/secretions. If a cuff leak is evident, then discussion with the team should be initiated (i.e. problem-solving, monitoring, decision-making regarding need for tracheostomy change). Management of a cuff leak is not within the scope of practice of a speech pathologist, however, the speech pathologist can contribute information to the MDT, but the ultimate management decision lies with the medical officer.

10.5 Issues specific to the ventilated population

Initial cuff deflation trials in an acute patient who is invasively ventilated must be approached with caution and approved by the treating medical team with liaison with the physiotherapist and nurse. Suitability for cuff deflation may differ depending on whether the patient is acutely ventilated or long-term ventilated (e.g. cervical spinal cord injury). The role of the speech pathologist within the MDT with the patient on mechanical ventilation needs to be clearly established in the particular facility. The initial session with the speech pathologist should always occur with a medical officer, nurse or physiotherapist (Hixon & Hoit, 2005) and the independence of the speech pathologist for subsequent sessions will be guided by the MDT and facility. When the cuff is deflated a leak is imposed in the ventilator circuit and adjustments to the ventilator may be required to maintain adequate ventilation due to escape of air through the upper airway. The speech pathologist should conduct a thorough assessment of the individual’s ability to manage oral secretions prior to and post cuff deflation; however this role may vary depending on the facility. The MDT and patient can usually advise if cuff deflation is well tolerated and if any ventilator adjustments are required when the cuff is deflated.
10.6 Paediatric considerations with cuffs
Older children may have cuffed tubes, particularly adolescents, depending on the presenting aetiology. However, younger children usually have cuffless tubes due to the pliability (delicacy) of the trachea and larynx predisposing them to complications from the cuff. Additionally, the size of the structures of the larynx and vocal folds relative to the tracheal and pharyngeal space acts as a natural cuff. If a younger child has a leak, usually a larger diameter tube will be inserted, taking up more of the tracheal space, in preference to using a cuffed tube. However cuffed tubes may be used in younger children who require high pressure ventilation or those requiring nocturnal ventilation (Eber & Oberwaldner, 2006).

11. Communication

11.1 Overview
The ability to voice and/or communicate can be impacted upon either by the presence of the tracheostomy or by the condition necessitating tracheostomy insertion. A tracheostomy redirects airflow away from the vocal folds, impacting on voice quality or preventing voice.

Six strategies have been described to facilitate effective communication with individuals with a tracheostomy including establishing a communication-friendly environment, assessing functional skills, anticipating the individual’s needs, facilitating lip-reading, AAC, and educating the person with a tracheostomy, family and staff about communication strategies (Grossbach, Stranberg, & Chan, 2011).

An inability to communicate effectively may place the individual at risk medically (Hemsley et al., 2001) and can cause anxiety, frustration and fear (Patak et al., 2006). Foster (2010) and Donnelly and Wiechula (2006) reported that individuals with a tracheostomy placed a high value on the necessity of communication and this was central to the individual experience.

Dysphonia may be present due to the underlying conditions, damage from intubation/s, disuse atrophy and complications such as formation of granulation tissue (Nixon, Ramsay, & Mackenzie, 2010) and referral to an ENT may be necessary.

11.2 Assessment
Thorough assessment of the individual’s ability to communicate is required in order to determine the nature and extent of the impairment, to formulate an appropriate management plan, and to determine the unmet needs for communication to allow participation with communication partners and the environment (Beukelman & Mirenda, 2005). This may require involvement with the MDT (e.g. occupational therapist, physiotherapist or teacher).

The Speech Pathology Australia Clinical Guideline-Augmentative and Alternative Communication (AAC) (2012) and CBOS (2011) discuss aspects to consider when assessing communication.

If assessment reveals the potential to communicate verbally, then further assessment for voicing options such as digital occlusion, speaking valve, or specialised tracheostomy tubes should be considered. Assessment for use of an electrolarynx could also be considered.

11.3 Intervention

11.3.1 Speaking valves or digital occlusion for communication
It is possible to restore voice in many people with a tracheostomy who are free of laryngeal or pharyngeal dysfunction by digitally occluding the tube or using a speaking valve (Dikeman & Kazandjian, 2003; Hess, 2005) when the cuff is deflated or in the presence of a cuffless tube. Digital occlusion can be used as an airway patency screen for suitability for a speaking valve (Dikeman & Kazandjian, 2003; Hess, 2005), or the primary method to allow voicing. The
speaking valve was initially developed for voicing/communication and is a recognised means of enabling verbal communication for the person with a tracheostomy (Dikeman & Kazandjian, 2003; Hess, 2005).

The speaking valve is a small device with a one-way valve that is placed on the hub of a tracheostomy tube only when the cuff is deflated or with a cuffless tube. The valve opens on inhalation to allow the inspiratory breath, but closes on exhalation. This allows the exhaled air to be re-directed up to the vocal cords, to provide the opportunity for voicing. Digital occlusion follows the same principles.

Speaking valves are available in a variety of brands and differ in size, shape, design, valve resistance, and compatibility with tracheostomy and respiratory equipment. They may be either bias open or bias closed, referring to the resting position of the diaphragm on the valve. The bias open design may result in incomplete closure during exhalation, resulting in unwanted expiratory flow through the valve, thereby limiting airflow through the upper airway and potentially compromising the ability to voice (Zajac, Fornataro-Clerici, & Roop, 1999). Specific brands and models of speaking valves can also be utilised with mechanical ventilation.

Reference should be made to the specifications and information provided by individual speaking valve manufacturers, and the speech pathologist should be aware of the indications and contraindications for use (Dikeman & Kazandjian, 2003; Hess, 2005). Some of the contraindications include: inability to deflate the cuff, foam-filled cuff, severe medical instability, upper airway obstruction, and thick, copious secretions. The tube needs to be adequately sized to allow space around the tracheostomy tube for lung air to travel up around the tube to the larynx. If the individual does not tolerate digital occlusion or the speaking valve, then the clinician may need to consider a referral to ENT or other medical specialty for airway patency assessment.

Making recommendations for assessment and use of speaking valves is within the scope of speech pathology practice, provided medical consent is obtained.

11.3.2 Above-cuff voicing tubes

There are a number of tracheostomy tubes that follow a particular principle in design that can be used for communication. The tube resembles a conventional tracheostomy tube, however as an additional feature, contains an external line that joins to an internal line running along the shaft of the tracheostomy tube and opening in the trachea just above the tracheostomy tube cuff. This tube is designed for individuals who cannot tolerate cuff deflation due to ventilator dependence or risk of aspiration (Dikeman & Kazandjian, 2003). Some of these tubes have been designed for the purpose of voicing, and thus allow air to be administered via the external line and the air travels upwards to the larynx to facilitate voicing with an inflated cuff. Other tubes with this feature have been designed for the purpose of removal of secretions that have pooled above the cuff. However, due to the design, these tubes can be used for both purposes of secretion removal or voicing facilitation.

Determining if a person is suitable for an above-cuff access tracheostomy tube for communication should be a multidisciplinary decision but can be advocated by the speech pathologist, but one should be aware of the indications and limitations (Dikeman & Kazandjian, 2003). A number of studies have examined the voice quality and methods to optimise the voice quality with the above-cuff tubes designed specifically for communication, with the voice being reported as different to normal voice and harsh (Leder, 1990; Leder & Astrachan, 1989; Leder & Traquina, 1989; Sparker, Robbins, Nevlud, Watkins, & Jahrsdoerfer, 1987). Several limitations to the use of this type of tube include increased tube changes, poor voice quality, difficulties with the air flow via the air port and increased practice and training to be able to produce voice (Hess, 2005).

There has been no research specifically in the use of above-cuff tubes designed for secretion removal (e.g. Portex Blue Line Ultra Suctionaid) and their use for voicing. However Husain, Gatward, and Harris (2011) in a letter to the editor noted the potential for airway injury and
drying with the insufflation of non-humidified air directly into the larynx and also the potential to increase the risk of ventilated acquired pneumonia (VAP) if the subglottic secretions are not fully aspirated before insufflating air.

There are strict recommendations guiding when this type of tube can be used for voicing post insertion due to the risk of subcutaneous emphysema therefore discussion with the medical team prior to use is essential.

Despite some of the limitations noted, this type of tube should still be considered as a voicing option for the individual who is unable to tolerate a deflated cuff.

11.3.3 AAC
It is essential for speech pathologists working with individuals with a tracheostomy to consider AAC. The Speech Pathology Australia Clinical Guideline – Augmentative and Alternative Communication (2012) should be read in conjunction with this document.

AAC options to consider include non-electronic options (e.g. gesture, mouthing, head movement, symbol, picture, alphabet and word boards, writing, visual scanning) and high technology electronic options (e.g. computer technologies and speech generating devices, electrolarynx) (Grossbach et al., 2011).

11.4 Issues specific to the ventilated population
Early intervention for communication in acute patients on mechanical ventilation, who are otherwise stable, is deemed appropriate where safe and medical clearance has been obtained (Hoit, Banzett, & Brown, 2006), but requires caution, team work and advanced training.

11.4.1 Oral communication - inflated cuff
When the tracheostomy cuff cannot be deflated, options for oral communication include:
   i) Above-cuff voicing tubes which allow suctioning of above-cuff secretions and voicing in the presence of an inflated cuff (Refer to 11.3.2)
   ii) The Blom Tracheostomy Tube System
The Blom Tracheostomy Tube System has a design significantly different to the conventional tracheostomy tube to enable speech via a cuffed tracheostomy tube. For ventilated patients, the Blom speech cannula is inserted into a fenestrated cuffed outer cannula. Inspired air flows from the ventilator to the lungs, but is redirected by the speech cannula on exhalation through the fenestration above the inflated tracheostomy cuff. For the non-ventilated patient, the Blom low profile valve is inserted whilst the cuff remains inflated. As per mechanical ventilation, all expired air exits through the vocal cords for speech. Successful and audible speech has been reported (Kunduk et al., 2010; Leder et al., 2012). More evidence is needed on the use of this newer device, particularly on the individual’s perceptions and potential for use.

11.4.2 Oral communication – deflated cuff
When the tracheostomy cuff can be deflated, ventilator supported speech options include:
   i) Leak speech with ventilator adjustments
   ii) Passy Muir Speaking Valve (PMSV) in line with the ventilator

Individuals deemed appropriate for either of these methods need careful discussion and decision making from the entire MDT, but particularly the medical officer. It is essential for the speech pathologist working in this area to understand the normal speech breathing cycle in order to manage the differences in the ventilated speech cycle (Hoit et al., 2006). Tracheal pressure is rarely as constant during ventilated supported speech as it is during normal speech breathing (Hixon & Hoit, 2005; Hoit, Banzett, Lohmeier, Hixon, & Brown, 2003). The initial work in the area of speech and ventilation was with long term ventilated patients with

The aim of the team is to maximise speech production whilst maintaining adequate ventilation. Cuff deflation imposes a leak in the ventilator system which can compromise ventilation. During the initial cuff deflation assessment the treating medical officer or in some centres the physiotherapist or nurse establishes ventilator settings that provide adequate ventilation. The speech pathologist assesses speech under those settings and makes further recommendations for adjustments which may optimise speech.

The clinical decision of using leak speech (i.e. deflated cuff) with ventilator adjustments or a PMSV in line with the ventilator is related to clinician familiarity and comfort of the user. Leak speech with no ventilator adjustments, whereby speech is generally during the inspiratory phase, may be characterised by long pauses, short phrases, and variable loudness and quality (McBean, Ward, Murdoch, Cahill, Solley, Geraghty, & Hukins, 2009). However, ventilator adjustments can help overcome the speech problems associated with leak speech (Dikeman & Kazandjian, 2003; Hoit et al., 1994, 2003, 2006; McBean et al., 2009; Prigent, 2003; Tippet, 2001).

Ventilator adjustments that improve leak speech include increasing the Positive End Expiratory Pressure (PEEP) and inspiratory time. McBean et al. (2009) and Hoit et al. (2006) reported that using these adjustments resulted in speech that is as good as speech using the PMSV in line with the ventilator. In general 8-10cm of PEEP is enough to improve the volume and phrase duration. High PEEP (15cmH2O) has been shown to replicate speech produced with a PMSV in line (Hoit et al., 2003). Some ventilators can be programmed to have cuff up and cuff down ventilator settings. These ventilator settings make it simple for nursing staff to change between settings to allow leak speech without changing the ventilator circuit. Any changes in the ventilator setting have to be approved by the medical officer and will depend on the medical and ventilatory status of the individual. The speech pathologist does not make hands on ventilator adjustments, unless endorsed by the facility.

When using a PMSV in line, other ventilator setting modifications may need to be made, and this is to be discussed with the medical officer.

11.5 Issues specific to the paediatric population

11.5.1 General communication issues

Children with tracheostomy tubes are at risk for speech and language delay due to the presence of the tube itself, the underlying impairment or condition (e.g. genetic syndromes with cognitive impairment as part of the phenotype, neurological impairment), high risk of coexisting chronic middle ear problems, lengthy hospitalisations and periods of poor health, and inadequate muscle strength due to conditions such as chronic lung disease, neuromuscular disorders or spinal cord injuries (Eber & Oberwaldner, 2006). Factors affecting speech and language development in neurologically normal children with tracheostomy tubes include age at time of intubation, and duration of tracheostomy until decannulation (Jiang & Morrison, 2003). More negative impact (lower speech and language scores/ages) was found in children who received their tracheostomy when they were less than 12 months of age or prelinguistic period, than children who had tracheostomy tube insertion in the linguistic period (having had some experience with vocalisations and oral communication). Decannulation by 15 months of age gave a good outcome (Jiang & Morrison, 2003). One study found that children who were decannulated during the prelinguistic period had speech and language function commensurate to their intellectual function (Simon, Fowler, & Handler, 1983).

Every effort should be made to assess and support the early development of communication including parent-child interaction, teaching carers to read infant cues, provide opportunities for oral exploration (toys and oral sensorimotor programs), support use of manual signing systems, and AAC where appropriate. Communication assessment and management for linguistic and literate children and adolescents follow similar principles as described for adults,
11.5.2 Speaking valve use
Use of speaking valves is advocated where possible in young infants and children who meet anatomical criteria and other indicators (Davis, 2006; Eber & Oberwaldner, 2006; Sherman et al., 2000) and may ameliorate some of the effects of presence of the tube on communication development. One study reported immediately improved vocalisations following speaking valve placement including audible crying, non-specific vocalisations, word approximations, single words and short phrases dependent upon age (Hull, Dumas, Crowley, & Kharasch, 2005).

PMSV tolerance was found in 83% in a study of 29 children considered eligible for a speaking valve trial and success was characterized by oxygen saturation at ≥88%, no changes in colour, heart rate or respiratory rate, no increase in respiratory effort above baseline, and minimal to no agitation (Engelman & Turnage-Carrier, 1997). Tolerance criteria would need to be discussed with the medical team. Although some children are considered anatomically suitable for the valve, they appear to not tolerate it. Brigger and Hartnick (2009) consider this due to elevated transtracheal pressures, and have described a method to modify the PMSV by drilling a 1/16 inch hole in the plastic housing distal to the valve membrane. They have found improved tolerance of the PMSV following this modification. They also described a method to determine transtracheal pressure and advocate that this is performed for all children who fail the PMSV evaluation. They suggest that children with transtracheal pressures of ≤10 cm H2O use the standard PMSV, and a modified (drilled) PMSV is trialed for children with pressures >10 cm H2O. Speech pathologists are cautioned that this may invalidate the warranty of the valve if modified and should discuss this with the treating medical officer.

PMSVs can be used successfully in-line for ventilator assisted children (Engelman & Turnage-Carrier, 1997; Hull et al., 2005; Passy, Baydur, Prentice, & Darnell-Neal, 1993), however assessment for this needs to be conducted in the Paediatric ICU with physiotherapy, nursing and/or medical assistance.

<table>
<thead>
<tr>
<th>Communication Key Statements</th>
<th>Highest Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>The speaking valve should be trialled with adults as a communication option if nil contra-</td>
<td>Level IV</td>
</tr>
<tr>
<td>indications</td>
<td></td>
</tr>
<tr>
<td>Leak speech or in-line speaking valve should be considered with individuals who are</td>
<td>Level III</td>
</tr>
<tr>
<td>ventilated if medically stable and multidisciplinary team in agreement, and no contra-</td>
<td></td>
</tr>
<tr>
<td>indications</td>
<td></td>
</tr>
<tr>
<td>A specialty tracheostomy tube for voicing should be considered if cuff deflation during</td>
<td>Level III</td>
</tr>
<tr>
<td>mechanical ventilation is not possible and prolonged ventilation is anticipated</td>
<td></td>
</tr>
<tr>
<td>Children should be assessed for suitability for use of a speaking valve to support verbal</td>
<td>Level IV</td>
</tr>
<tr>
<td>communication, if medically stable and suitable anatomical structure/airway patency</td>
<td></td>
</tr>
<tr>
<td>In the event of failure of PMSV attempts with children, assessment of transtracheal</td>
<td>Level IV</td>
</tr>
<tr>
<td>pressure should be performed and consideration for drilling PMSV be undertaken by the</td>
<td></td>
</tr>
<tr>
<td>multidisciplinary team</td>
<td></td>
</tr>
</tbody>
</table>
Assessment of communication (including parent-child interaction, infant cues, verbal, gestural, and AAC) should be conducted as soon as practicable, and individualised management plan determined to reduce the effects of the presence and duration of the tracheostomy tube on communication development in infants and young children.

<table>
<thead>
<tr>
<th>Level IV</th>
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</table>

## 12. Swallowing

### 12.1 Overview

The person with a tracheostomy may or may not have dysphagia (Dikeman & Kazandjian, 2003; Russell & Matta, 2004) and oral intake may or may not be appropriate. Therefore, the assessment of swallowing is indicated to determine the presence of dysphagia, and to guide the speech pathologist in establishing the most appropriate management/rehabilitation plan for food/liquid and saliva. Liaison with the MDT and medical clearance is essential.

Swallowing dysfunction in the individual with a tracheostomy is multifactorial. They may have medical conditions that could predispose them to dysphagia and dysphagia may be present prior to placement of the tracheostomy or as the medical condition progresses. Presence of a tracheostomy tube, cuff status, occlusion status, and mechanical ventilation has been discussed in the literature as potential contributors to dysphagia (Refer to 12.2.3 and 12.2.4). The speech pathologist should have an understanding of the clinical considerations typical for all individuals with dysphagia such as age (Baskin, Panagopoulos, Parks, & Kormisar, 2005; Leder, 2002), acute and chronic illnesses, cognitive status, nutrition, respiratory status and care setting.

The person with a tracheostomy is more likely to have come from a more severe illness background necessitating ventilation and tracheostomy. Factors such as critical illness myopathy and polynuropathy, prolonged effects of neuromuscular blocking agents, deconditioning due to muscle disuse, and sepsis can negatively affect the neuromuscular function of the whole body (Bolton, 2005) including that of the oropharynx and larynx. Impact of an ETT prior to the tracheostomy should also be taken into consideration (Refer to 15.6.1). The Clinical Guideline-Dysphagia (Speech Pathology Australia, 2012) should be read in conjunction with this guideline.

### 12.2 Assessment

There is no universally accepted protocol or set of considerations that speech pathologists rely on when evaluating dysphagia in individuals with a tracheostomy other than those typically adopted when conducting dysphagia assessments for individuals without a tracheostomy. Dikeman and Kazandjian (2003) and Russell and Matta (2004) outline steps to consider when assessing the person with a tracheostomy, and the Clinical Guideline-Dysphagia (Speech Pathology Australia, 2012) should also be referred to. Speech pathologists may have input into the development, implementation and evaluation of facility specific protocols for dysphagia management in the area of tracheostomy. Readiness for swallowing evaluation will be determined by the individual’s medical condition, level of alertness, clinical progress, respiratory recovery/status and age. Information required from the MDT to determine suitability for assessment may include: cough strength, cough response to suctioning, suctioning frequency, type and colour of secretions, level of alertness and positioning.

Liaison with an ENT may be beneficial, however in most cases, ENT assessment of the anatomical structures is not performed routinely unless specifically indicated.

Assessment of the individuals’ ability to swallow saliva must also be conducted in order to plan effective therapy and to progress cuff deflations. An oromotor assessment includes assessment of the oromusculature function, dentition, saliva control in the oral stage, oral
hygiene and the presence of primitive reflexes (Hales, 2004). Cuff deflation will further evaluate saliva swallowing and secretion management.

Cuff status or use of a speaking valve may impact on swallow function, but the evidence is inconclusive of which is the most ideal for swallowing (Refer to 12.2.4 and 12.3.2). For these reasons assessment should be performed in conditions suitable for the individual to determine the optimal swallowing condition.

The frequency of swallowing assessment will largely depend on the individual’s condition and needs and rate of change. Consideration should also be given to the care setting, staffing and equipment resources, access to instrumental swallowing evaluation, supervision for oral feeding as well as staff knowledge, skills and training as these will vary across the continuum of care and will impact upon speech pathology assessment and management.

12.2.1 Clinical Assessment
While instrumental evaluation of swallowing function is considered ideal in providing the most accurate assessment of swallowing function for oral intake (Ding & Logemann, 2005), a clinical swallowing evaluation (CSE) may be the primary and only form of assessment for a large number of people with a tracheostomy (Ward, Jones, Solley, & Cornwell, 2007; Ward, Morgan, McGowan, Spurgin, & Solley, 2012). Adjuncts to the clinical swallow evaluation may include use of pulse oximetry and cervical auscultation.

12.2.2 Blue dye
The Evans Blue Dye Test (EBDT) is a procedure where a small amount of blue dye (methylene blue or blue food colouring) is added to saliva and secretions from the tracheostomy tube are monitored for evidence of aspiration. The Modified Evans Blue Dye Test (MEBDT) is an extension of this whereby food or fluid is coloured.

Issues discussed in the literature regarding the Blue Dye Test (BDT) relate to safety of blue colouring and assessment validity. Safety concerns relate to reports of systemic absorption of large quantities of blue dye in enteral feed in patients with sepsis (USA Food and Drug Administration [FDA], 2003) where death has occurred. The FDA states that although these reports are not evidence of a causal relationship between the deaths and administration of blue dye, they are indicative of the need for care when giving patients blue colouring.

Cross contamination has also been raised as a concern and single use vials are recommended (File, Tan, Thomson, Stephens, & Thompson, 1995).

Validity has been examined in a number of papers comparing blue dye in a clinical bedside assessment with instrumental swallow evaluation, with mixed findings regarding sensitivity and specificity (Belafsky, Blumenfeld, LePage, & Nahrstedt., 2003; Brady, Hildner, & Hutchins, 1999; Peruzzi, Logemann, Currie, & Moen, 2001). Evidence suggests that blue dye may detect moderate to large amounts of aspiration but has not been demonstrated to reliably detect trace aspiration (Dikeman & Kazandjian, 2003; Swigert, 2003).

There is no standardised protocol regarding quantity of blue dye required to stain the saliva/food/fluid (Belafsky et al., 2003; Dikeman & Kazandjian, 2003; Donzelli, Brady, Wesling, & Craney, 2001; Hales, 2004; Metheny et al., 2002; O’Neill-Pirozzi, Lisiecki, Momose, Connors, & Milliner, 2003). Due to safety concerns, Swigert (2003) concluded that the amount used should be kept to a minimum and only used with specific individuals who are medically indicated.

Clinicians should understand the safety and validity issues, adhere to the policies and procedures of the employing body, use the type of colouring supported by the facility, and seek medical clearance for any use of blue colour. Particularly in children, allergy and intolerance status to food colouring should be ascertained prior to the use of food dyes.
12.2.3 Impact of the tracheostomy tube on swallowing

The literature is mixed as to whether the presence of a tracheostomy tube has a direct impact on swallowing. Many patients with a tracheostomy in the hospital setting particularly, have had an ETT in the period leading up to tracheostomy insertion and the ETT has its own set of complications which should be taken into consideration (Conlan & Kopec, 2000) (Refer to 15.6.1). Conlan and Kopec (2000) reported that individuals intubated for greater than seven to ten days may be at higher risk of upper airway injury and thus impact on voice and swallowing. A significant amount of the literature reports that the presence of a tracheostomy tube does not cause increased dysphagia and aspiration (Donzelli, Brady, Wesling, & Theisen, 2005; Kang, Choi, Yun, Kim, & Ryu, 2012; Leder & Ross, 2000; Leder & Ross, 2010; Sharma et al., 2007). Leder, Joe, Ross, Coelho, and Mendes (2005) suggest that the removal of a tracheostomy tube does not improve swallowing ability. Terk, Leder, and Burell (2007) found that hyoid bone movement and laryngeal excursion were not significantly impacted by the presence of a tracheostomy tube. Recent research has found that laryngeal elevation, pharyngeal constriction and oesophageal opening are unlikely to be impacted on by the presence of a tracheostomy (Ka ng et al., 2012) which is contrary to earlier literature and clinical opinion which suggested they may (Bonanno, 1971; Feldman, Deal, & Urquhart, 1966; Nash, 1988). Shaker et al. (1995) found the duration of vocal cord closure to be shorter with a tracheostomy. Overall the emerging body of evidence would appear to indicate that dysphagia leading to aspiration in the tracheostomised population is most likely due to pre-existing comorbidities or other medical factors surrounding the individual such as the severity of the illness, the exposure to drugs, critical illness, respiratory failure, medical comorbidities, age and the initial reason for tracheostomy insertion (Carlos et al., 2011; Romero et al., 2010; Terk, Leder, & Burell, 2007).

It is also important to consider the impact a tracheostomy has on smell and taste as this may have some degree of impact on motivation for and enjoyment of oral intake (Lichtman et al., 1995; Dikeman & Kazandjian, 2003).

12.2.4 Impact of cuff status on swallowing

The literature is mixed as to whether cuff status has an impact on swallowing, and there has been no consensus reached as to the ideal situation. Cuff status may not alter the risk of aspiration (Suiter, McCullough, & Powell, 2003).

Ding and Logemann (2005) hypothesised silent aspiration with an inflated tracheostomy cuff was due to desensitisation of the larynx and pharynx leading to decreased awareness of aspiration and diminished cough reflex. An inflated cuff will prevent generation of a cough reflex making it difficult to clear aspirated material from the upper airway, and a deflated cuff will also impact on cough strength (Suiter & Leder, 2007).

However, McGowan, Gleeson, Smith, Hirsch, and Shuldham (2007) found that some individuals who had the cuff inflated due to mechanical ventilation requirements were able to commence oral trials after FEES determined no evidence of aspiration. Other studies have also reported safe swallowing with an inflated cuff (Goldsmith, 2000; Suiter et al., 2003). If the cuff is to remain inflated, there may need to be consideration for momentary deflation during the assessment to assess for evidence of aspiration (Dikeman & Kazandjian, 2003).

Other mechanisms of swallowing including hyoid bone movement and laryngeal excursion have been found not to be affected by tracheostomy tube cuff status during normal swallowing (Leder et al., 2005; Terk et al., 2007).

Due to the literature being divided, oral intake should be considered and assessed with an inflated or deflated cuff depending on the needs and medical condition of the individual. The individual who is unable to have the cuff deflated for medical or respiratory reasons could indicate a more fragile or volatile status, so suitability for a swallow assessment may need further consideration and discussion with the medical officer.
12.2.5 Use of instrumentation

Most authors advocate the use of instrumental evaluation of swallowing for individuals with a tracheostomy and dysphagia (Brady et al., 2006; Hales, Drinnan, & Wilson, 2008; Leder & Suiiter, 2013; O’Neil et al., 2003; Rigui, 2007). Safety of oral intake can be determined under varied conditions such as cuff status, speaking valve/occlusion and compensatory or rehabilitation techniques. The VideoFluoroscopy Swallowing Study (VFSS) and FEES assessments are the two most widely used instrumental techniques for objective evaluation of swallowing and both have been applied to individuals with a tracheostomy. Silent aspiration has been reported in the literature for individuals with a tracheostomy (Hales et al., 2008; Leder, 2002) and thus instrumental swallowing assessment can assist with providing further information.

Each instrumental evaluation method has its advantages and disadvantages and both provide valuable information that cannot be obtained with CSE alone, but they require technical skill in application and interpretation. However access to both of these procedures can be limited due to availability, transport/mobility issues and associated costs. Also, not all individuals with a tracheostomy will be suitable for these methods of evaluation and both procedures have contra-indications. Refer to the Speech Pathology Australia Position Paper FEES (2007) and Clinical Guideline VFSS (2013).

FEES allows direct visualisation of the pharynx and larynx (Hales et al., 2008; Leder, 2002) which is of particular benefit when determining saliva management i.e. the presence of secretions, type and ability to clear (Leder & Sasaki, 2001). Visual confirmation of pooled secretions can be evaluated and is highly predictive of aspiration of food and liquid (Donzelli, Brady, Wesling, & Craney, 2003; Murray, Langmore, Ginsberg, & Dostie, 1996) and penetrated secretions significantly linked to aspiration of oral intake (Hales et al., 2008). The latter study also suggested other FEES observations that may be useful in the decannulation pathway (Refer to 14.3.3). The portability of FEES makes it more accessible and can be performed at the bedside, which is of benefit for the more critically ill patient; however, one must consider that FEES is an invasive procedure. Leder and Sasaki (2001) suggest a FEES protocol for the individual with a tracheostomy.

There is also an opportunity to grossly evaluate sensation by extending the procedure to include sensory threshold testing (Fibreoptic Endoscopic Evaluation of Sensory Testing-FEEST).

For the person with a tracheostomy who is able to be mobilised, VFSS is a widely used instrumental tool for the assessment and management of oral intake (Martin-Harris, Logemann, McMahon, Schleicher, & Sandidge, 2000).

Other instrumental techniques for evaluation of swallowing include manometry, manofluorography, multichannel intraluminal impedance testing, ultrasonography, electromyography, and scintigraphy. However, these techniques are not widely available in a clinical setting and there are currently limitations with regards to their standardisation, reliability and validity.

12.3 Intervention

12.3.1 Dysphagia rehabilitation

Once dysphagia and the aetiology have been identified and medical clearance sought, a rehabilitation program should be planned (Dikeman & Kazandjian, 2003). The dysphagia and potential aspiration may be demonstrated with oral intake and/or saliva. If failure to progress to cuff deflations and decannulation is related to saliva aspiration, then expert opinion suggests that the person requires dysphagia rehabilitation to assist with the saliva swallow.

Interventions for dysphagia have been outlined in the Clinical Guideline-Dysphagia (Speech Pathology Australia, 2012) and these can be considered when planning rehabilitation for the individual with a tracheostomy with a dysphagia for food/fluid and/or saliva.
Due to the nature of the condition that necessitated the tracheostomy, it may be that the individual may be unable to actively participate in the rehabilitation program (e.g. traumatic brain injury), and passive treatment techniques may need to be considered such as taste, tactile and/or thermal stimulation (Pelletier & Dhanaraj, 2006; Pelletier & Lawless, 2003; Steele & Miller, 2010). Much of the literature in the taste/thermal stimulation pertains to findings in animals or with healthy adults (Steele & Miller, 2010) or to swallowing of a bolus rather than saliva (Pelletier & Dhanaraj, 2006; Pelletier & Lawless, 2003).

When planning rehabilitation, the clinician should consider any contraindications either due to the tracheostomy being in situ or those associated with this critically ill population. The effort and coordination required to perform some techniques (e.g. effortful swallow, supraglottic swallow, super supraglottic swallow or laryngeal closing exercises) may cause excessive stress in weaker patients (Dikeman & Kazandjian, 2003). Suiter et al. (2012) in a discussion on the ASHA website suggested that some postural changes may be associated with risks for individuals with a tracheostomy. For example a chin tuck may risk tracheostomy tube dislodgement or a Shaker manoeuvre may result in accidental decannulation, fistula or ulcerations. There is no research evidence to contradict this, so expert opinion suggests caution when using particular manoeuvres.

Cuff status and speaking valve use during therapy will depend on the needs and status of the individual (Refer to 12.2.4 & 12.3.2).

Overall, therapy conducted by speech pathologists may reduce dysphagia but further investigations are required to investigate which components of swallowing therapy are most effective (Geeganage, Beavan, Ellender, & Bath, 2012).

12.3.2 Speaking valves or occlusion for swallowing

Some authors suggest that using a speaking valve may improve swallowing ability by improving pharyngeal sensation and normalising pharyngeal pressure (Dettlebach, Gross, Mahlmann, & Eibling, 1995) and restoring the post-swallow protective expiration of air into the upper airway (Prigent et al., 2012). A number of earlier studies suggest that the use of a speaking valve can reduce aspiration (Dettlebach et al., 1995; Eibling & Gross, 1996; Elpern, Okonek, Bacon, Gerstung, & Skrzynski, 2000; Gross, Mahlmann, & Grayhack, 2003; Stachler, Hamlet, Choi, & Fleming, 1996; Suiter et al., 2003). Some studies have suggested that subglottic airway pressure is impacted upon by the presence of a tracheostomy tube (Eibling & Gross, 1996; Suiter et al., 2003) and thus postulated that via the use of a speaking valve, subglottic airway pressures are restored and thus swallowing is facilitated.

However, Hull, Dumas, Crowley, and Kharasch (2005) and Leder (1999) reported no change in swallowing ability with or without a speaking valve, indicating that by restoring subglottic pressure, the swallow was not always facilitated.

A few studies have looked at the impact of occlusion on swallowing rather than speaking valve, and found that occlusion status did not affect the swallow ability (Donzelli, Brady, Wesling, & Theisen, 2006; Leder et al., 1996; Leder, Joe, Hill, & Traube, 2001).

Even though the literature is mixed as to the benefit of occlusion or speaking valve on swallowing, other benefits have been suggested due to the partial restoration of normalised physiology, including improved olfaction and taste, improved ability to cough and clear secretions, and restored sensation (Dikeman & Kazandjian, 2003; Lichtman et al., 1995). These may in turn benefit the swallow and thus should be assessed on an individual basis.

12.4 Swallowing issues specific to the ventilated population

Those individuals who require ventilation have greater respiratory compromise than those who are non-ventilated and thus have increased medical fragility. Leder (2002) suggested a difference in the incidence and type of aspiration between those individuals with a
Tracheostomy requiring long term mechanical ventilation compared to acutely ill patients with a tracheostomy requiring short term mechanical ventilation.

The same swallowing considerations must be assessed and managed in the person who is ventilated as in the person who is spontaneously breathing. The speech pathologist must establish the underlying cause of any swallowing impairment and assess if the individual can protect his/her airway from oral secretions. The individual who is ventilated should be medically stable, and be able to manage oral secretions prior to consideration of oral intake (Tippet, 2000). However, this may vary depending on the reason for ventilation and whether there is an underlying swallowing impairment.

Oral intake must be assessed cautiously. Instrumental swallowing assessment should be considered in the person on mechanical ventilation if suitable. FEES, in particular, may be the more appropriate study in this instance, as it can be performed at the bedside and the anatomy and secretion management can be visualised.

Cuff status and use of a speaking valve will need to be considered on an individual basis. Tippet (1991, 2000) reported that aspiration in people who are fully ventilated with a deflated cuff may be reduced because the ventilator exhaled breath provides additional expiratory support to assist in clearing the upper airway.

12.5 Feeding and swallowing issues specific to the paediatric population

Little data is available regarding the specific effects of the presence of a tracheostomy tube on swallowing function in infants and young children. The larynx is positioned higher and posteriorly in infants with limited range of hyoid elevation and anterior movement. Thus, the presence of a tracheostomy tube in infants may offer little effect on hyoid elevation, but have more impact on factors such as subglottal pressure and swallow-respiratory timing. One study using videofluoroscopy investigated four infants (14 months to 2.9 years) with a tracheostomy tube compared to one child without (14 months), and found a delayed swallow response in 45% of swallows with associated laryngeal penetration in tracheostomised infants (100% with thin, 50% with pureed). Only 1 infant had thin fluid aspiration. The infant with no tracheostomy had superior excursion of the arytenoids and epiglottis during swallowing, compared to all infants with a tracheostomy tube (Abraham & Wolf, 2000).

A more recent study investigated oropharyngeal function in 80 children with a tracheostomy aged 0-3 years where 68.75% of the tracheostomies were performed on infants less than one year of age (Norman, Louw, & Kritzinger, 2007). Following review of clinical and VFSS data, dysphagia signs were evident in 64/80 children and within this subgroup of 64, deficits noted in the oral phase (81%), pharyngeal phase (60.9%), and oesophageal phase (79.7%). Pharyngeal phase difficulties included delayed or absent swallow (48%), nasopharyngeal backflow (33%), laryngeal penetration (56%) and aspiration (50%). These findings possibly reflect the combined effect of having the tracheostomy tube in situ, in conjunction with dysphagia associated with the underlying medical conditions.

Expert opinion suggests children’s feeding and swallowing skills should be evaluated as soon as medical clearance is obtained. Non-nutritive oral sensorimotor programs, ‘mealtime’ routines, tube feeding regimens mimicking normal mealtimes if tolerated, and messy play, etc, should be incorporated into the daily routines of children who need to remain nil by mouth with long term tube feeding. This will support normalisation and development of oral sensorimotor skills, and ameliorate the effects of oral suctioning and invasive procedures in preparation for future oral feeding. Instrumental evaluations, more commonly VFSS and, less commonly in very young infants, FEES, should be used as indicated to assess swallowing and determine appropriate recommendations in children.

Similar to adults, speaking valves could be used to support swallowing during oral feeding if tolerated.
### Swallowing Key Statements

<table>
<thead>
<tr>
<th>Statement</th>
<th>Highest Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphagia in individuals with a tracheostomy is a complex issue resulting from medical co morbidities necessitating tracheostomy placement rather than the presence of the tracheostomy tube itself.</td>
<td>Level III</td>
</tr>
<tr>
<td>A clinical swallowing evaluation by a speech pathologist should be considered for the adult with a tracheostomy at risk of dysphagia.</td>
<td>GPP-C</td>
</tr>
<tr>
<td>There is a risk of silent aspiration in individuals with a tracheostomy.</td>
<td>Level III</td>
</tr>
<tr>
<td>The speaking valve could be considered during the swallowing assessment if clinically indicated.</td>
<td>Level III</td>
</tr>
<tr>
<td>The blue dye test could be considered as an adjunct in the swallow assessment of an individual with a tracheostomy for screening for greater than trace aspiration, if medically suitable.</td>
<td>Level IV</td>
</tr>
<tr>
<td>Instrumental evaluation of swallowing should be utilised if possible, in individuals with a tracheostomy who are considered at risk for dysphagia.</td>
<td>Level III</td>
</tr>
<tr>
<td>Children should be given a clinical feeding evaluation, supported by instrumental studies (VFSS, FEES) to determine safety for oral intake as soon as medically indicated and appropriate management plan determined</td>
<td>Level IV</td>
</tr>
</tbody>
</table>

### 13. Suctioning

#### 13.1 Overview

The role of suctioning for speech pathologists is continually changing with differential practices within the profession. Some organisations have supported speech pathologists to perform roles outside of the Speech Pathology Australia Scope of Practice such as tracheal suctioning. Suctioning is a procedure used to remove substances from the trachea, pharynx, nose or mouth either through a natural orifice (nose or mouth) or artificial tubing (ETT, tracheostomy tube, nasal or oral airway) (Overend et al., 2009). Traditionally, professions such as physiotherapists, respiratory therapists, nurses and physicians perform tracheal suctioning to promote secretion clearance and airway patency. In the home setting, individuals with the tracheostomy and/or parents/families/carers may be trained in this procedure, usually by nursing staff or physiotherapists, prior to discharge.

The literature for safe evidence based practices and technique for suctioning is varied and inconsistent and identifies a need for further work in many areas related to suctioning practice for all health care professionals.

#### 13.2 Oral suctioning

Oral suctioning is an important component of comprehensive oral care and reduces the risk of aspiration pneumonia in individuals with a tracheostomy (Sole, Penoyer, Bennett, Bertrand, & Talbert, 2011). Information in the literature about the frequency of performing oral suctioning is minimal and oral suctioning is considered “ongoing monitoring” rather than a part of the suctioning process (Sole et al., 2003). Oral suctioning is within the scope of practice for speech pathologists (Tracheostomy Management Position Paper, 2005, Speech Pathology Australia); however there are no policies or procedures available in the literature for speech pathologists regarding the processes for performing oral suctioning. The clinician is advised to adhere to the policies and procedures at the organisational level.
13.3 Above cuff line suctioning

Above cuff line suctioning is within the scope of practice for speech pathologists (Tracheostomy Management Position Paper, 2005, Speech Pathology Australia) and allows for secretions to be removed from above the cuff from specialised tracheostomy tubes. This is performed by attaching a syringe or suction apparatus to the above-cuff line suction port which enables removal of subglottic secretions in order to reduce the risk of leak of aspirated material down around the cuff. This has been shown to reduce the risk of developing aspiration pneumonia (Overend et al., 2009). Whether the above cuff secretions are removed via a syringe or suctioning will be guided by the facility. There is however minimal information in the literature on policies and procedures for above cuff line suctioning for speech pathologists.

13.4 Tracheal suctioning

Nasopharyngeal, pharyngeal and tracheal suctioning is considered extended scope of practice for speech pathologists (Speech Pathology Australia, 2005), and those intending to engage in this practice must be credentialed (Speech Pathology Australia, 2009). Current research indicates speech pathologists participating in tracheal suctioning are doing so after undertaking formal suctioning competency training programs within their facilities (Ward et al., 2007; Ward et al., 2012) and it is an emerging practice for speech pathologists. There is no published research relating to skill development or competency attainment in tracheal suctioning for nurses, physiotherapists or speech pathologists, and there are currently no recognised national or international standards which health care professionals need to abide by for suctioning of a tracheostomy (Clinical Education Queensland, 2011). There is little in the literature to suggest exclusive capability of specific professionals in performing tracheal suctioning. The provision of adequate education to ensure competency is of foremost importance.

Acquiring competence in tracheal suctioning requires an in depth understanding in specific areas (Moore, 2003). Undertaking tracheal suctioning can be hazardous with significant side-effects which the clinician should be aware (Day, Farnell, & Wilson-Barnett, 2002).

Suctioning guidelines are facility dependent and it is important that the speech pathologist undertake tracheal suctioning only with the support and completion of a competency training package within their organisation.

<table>
<thead>
<tr>
<th>Suctioning Key Statements</th>
<th>Highest Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracheal suctioning is extended scope of practice for speech pathologists and it is not appropriate for speech pathologists to perform this task unless credentialed by the employing body</td>
<td>GPP-C</td>
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</tbody>
</table>

14. Decannulation

14.1 Overview

Decannulation refers to the removal of the tracheostomy tube. Evidence regarding clinical indications for and procedural steps towards decannulation is limited. Criteria and processes are often population and institution dependent and may be influenced by traditional practices (Engels, Bagshaw, Meier, & Brindley, 2008). A systematic approach is preferable to ad-hoc weaning and decannulation, however in light of the many variables that can influence patient outcomes; management approaches should allow flexibility to address the needs of each individual (Braine & Sweby, 2006; Doerksen, Ladyshewsky, & Stansfield, 1994; Yu, 2010).

Tracheostomy presence has associated risks, complications and psychosocial impact on the individual therefore timely removal is the goal; yet premature decannulation particularly in...
borderline patients can have severe consequences (Chadda et al., 2002; Gao et al., 2008). While the decision-making process may be multidisciplinary, the end decision to decannulate should be made and documented by a medical officer, and is typically performed by nursing or medical staff. The physical act of removing or changing a tracheostomy tube is not within speech pathology scope of practice.

Decannulation processes can vary according to the clinical site and setting in which the speech pathologist operates. The clinician should be aware of the rationale for and impact of decannulation pathways and must ensure familiarity with their relevant organisational policies and procedures.

14.2 Decannulation criteria
In the absence of research evidence, expert opinion and clinical consensus regarding decannulation criteria are often reported (Mitchell et al., 2012; Stelfox et al., 2008). There is some agreement within disciplines (Mitchell et al., 2012), however across the multiple specialist groups involved in tracheostomy management there is no consensus regarding indications or criteria for decannulation (Marchese, Corrado, Scala, Corrao, & Ambrosino, 2010; Veelo et al., 2008).

The following areas may be considered prior to decannulation; some are essential, but not all may be necessary:
- Resolution of initial need for tracheostomy
- Liberation from mechanical ventilation
- Airway patency
- Medical stability
- Respiratory stability
- Effective cough for airway clearance
- Airway protection from gross aspiration
- Controlled secretions (oral and pulmonary)
- Oxygenation
- No imminent surgery requiring endotracheal airway management
- Adequate level of consciousness
- Ability to tolerate tracheostomy occlusion
- One-way decannulation (i.e. palliation)

14.3 Decannulation procedures
Cuff deflation is an initial step in the decannulation pathway to which additional procedures may then be applied. There is little agreement regarding selection, timing, and application of these procedures across clinical areas and disciplines. Decannulation processes reported in the literature are primarily expert opinions, descriptions, decision-making flowcharts and protocols specific to patient populations and clinical settings. Only one study compares two protocols: (1) an occlusion protocol (i.e. capping/spigoting/corking) requiring tube downsizing prior to decannulation, and (2) 24-48 hours of cuff deflation followed by decannulation (provided tracheal access was no longer required) (Thompson-Ward et al., 1999). In this study, patients following the cuff deflation only pathway achieved decannulation sooner and underwent fewer tube changes, with associated cost savings and no difference in adverse events. It is important to note however that this research was based on retrospective cohort comparison data and therefore more rigorous RCT evidence is needed to validate any specific decannulation pathway.

14.3.1 Prolonged occlusion
Processes facilitating tracheostomy occlusion (e.g. downsizing, cuffless tube, fenestrated tube) have historically been utilised to disable the functions of the tracheostomy while in situ and “test” the individual’s airway patency, airway clearance and airway protection prior to decannulation. Occluding a tracheostomy tube by placing a cap, spigot, cork or plug on the
hub of the tracheostomy tube requires a person to breathe through reduced tracheal space as they inhale and exhale around the tube. Experimental testing of occluded tracheostomy tubes has shown increased airway resistance and potential for increased work of breathing, which may hinder progression towards decannulation in borderline patients (Dellweg, Barchfield, Haidl, Appelhans, & Kohler, 2007; Hussey & Bishop, 1996).

Downsizing or changing to a cuffless tube may increase the tracheal space and thus may be considered to facilitate occlusion or speaking valve. However, by virtue of tracheostomy tube presence, the tracheal space for respiration is reduced.

Changing to a fenestrated tube may allow increased airflow at a lower resistance compared to a standard tube as the air passes through and around the tube during occlusion (Hussey & Bishop, 1996). However, this is only effective if the fenestration sits correctly within open tracheal space. Siddharth and Mazzarella (1985) reported on 4 cases of tracheal granulation potentially related to the use of a fenestrated tube. They suggested that if the fenestration is incorrectly situated and adjacent to tracheal tissue the fenestration cannot be utilised for airflow and the risk of granulation is increased.

Tolerance of tracheostomy occlusion may indicate readiness for decannulation but is not necessarily influential in decision making (Stelfox et al., 2008).

Recommendation for prolonged tracheostomy occlusion is a medical decision and does not fit within speech pathology scope of practice. However, there may be specific challenging cases whereby the speech pathologist may consider high level discussion with the medical officer and team.

14.3.2 Speaking valve in the decannulation pathway

Improved comfort is reported when comparing speaking valve use to complete occlusion in individuals with long-term tracheostomies (Le, Aten, Chian, & Light, 1993). Speaking valves have been discussed for communication and swallowing (Refer to 11.3.1 & 12.3.2). The impact of speaking valve use on decannulation decision-making has not been well examined. Tolerance of a speaking valve is not a valid test of airway patency as information is provided on the passage of air on exhalation only (Johnson, Campbell, & Rabkin, 2009). Dynamic respiratory changes observed under normal bi-directional breathing conditions (e.g. tracheomalacia) may therefore not be identified.

14.3.3 Objective and instrumental evaluation

Consensus and expert opinion supports that a tracheostomy is no longer required when airway clearance, airway patency, and gross airway protection are demonstrated (Christopher, 2005; O’Connor & White, 2010; Stelfox et al., 2008). Evaluation of these criteria is largely subjective and there is considerable variation in approach.

Few objective measures of cough strength, airway resistance and airway pressure exist that are practical and applicable across patient populations (Bach & Saporito, 1996; Chan et al., 2010; Gao et al., 2008; Johnson et al., 2009), although cough peak flow of >160L/min in alert cooperative patients has been shown to be conducive to decannulation (Bach & Saporito, 1996).

Incidence of obstructive airway lesions has been reported as high as 67% in people with tracheostomies (Law, Barnhart, Rowlett, de la Rocha, & Lowenberg, 1993) therefore instrumental assessment of airway patency via bronchoscopy or fibreoptic endoscopic evaluation may be useful. However, not all identified airway lesions result in a clinical airway obstruction (Law et al., 1993; Raghuraman, Rajan, Marzouk, Mullhi, & Smith, 2005; Sue & Susanto, 2003). Hales et al. (2008) reported that FEES identified previously unknown clinical findings primarily relating to laryngeal function in 44% of individuals, which may influence decision making regarding airway patency and suitability for decannulation.
Other processes that may be utilised in the decannulation pathway include sleep study, bronchoscopy, digital occlusion, and mini-tracheostomy.

**14.4 Decannulation issues specific to the paediatric population**

In paediatrics, the traditional decannulation technique involved sequential downsizing of the tube, with partial or complete plugging of the tube. This is done as part of a hospital admission with 1:1 nursing observation over the decannulation period (Sherman et al., 2000). Previously, this process could take two to several weeks, however in recent years, Australian paediatric hospitals have taken on the Great Ormond St protocol which involves a hospital admission period and the tube is gradually downsized, spigoted, decannulated and monitored over a period of approximately five days (Waddell, Appleford, Dunning, Papsin, & Bailey, 1997) or slightly longer at six days for children under 18 months (Kubba, Cooke, & Hartley, 2004). Alternatively, the ‘one-stage decannulation procedure’ (Sherman et al., 2000) is increasingly being used in paediatrics. In this procedure the child undergoes an endoscopic examination of the airway, which is examined during spontaneous breathing, and the tube is removed during the procedure. This requires appropriate anatomical and functional patency of the airway, and often the child may have had a downsized tracheostomy tube for use with a speaking valve prior to this procedure. Children are monitored for 24-48 hours after decannulation. The one stage technique allows for prompt recognition and management of anatomical factors (e.g. granulation tissue) which may hinder decannulation using the traditional approach (Mitchell et al., 2012; Sherman et al., 2000).

‘Decannulation panic’ is a phenomenon reported in children whereby decannulation fails despite an endoscopically confirmed patent airway with no obvious pulmonary or neurological abnormality (Black, Baldwin, & Johns, 1984). This may be due to reduced pulmonary function, particularly if the tube has been inserted due to an underlying pulmonary issue or diagnoses associated with respiratory muscle fatigue (e.g. respiratory distress syndrome, acute pulmonary oedema). Pulmonary function testing is recommended for this group (Aubier, 1989; Mallory et al., 1985).

**14.5 Post decannulation**

Speech pathologists should be aware of organisational policies and procedures regarding:
- Management post decannulation (e.g. stoma dressings, post decannulation observations)
- Signs of poor tolerance of decannulation (e.g. increased respiratory effort, use of accessory muscles, diaphoresis, distress, stridor)
- Complications post decannulation (e.g. poor stoma healing, bleeding)
- Failed decannulation (e.g. recannulation, resuscitation status)
- Emergency notification procedures and contacts (e.g. code blue, personnel)

**14.6 Failure to decannulate**

In some instances, the initial decannulation may be unsuccessful, but a subsequent attempt may be successful. A 2-5% decannulation failure rate has been reported as acceptable amongst physicians and respiratory therapists (Stelfox et al., 2008). Further assessment, for example, by an ENT may be necessary, and in some instances intervention may be required to facilitate decannulation (e.g. surgery, stenting).

**14.6.1 Long-term tracheostomy**

Not all individuals with a tracheostomy are successfully decannulated and they may remain tracheostomised for the long-term. Reasons for this may include, but are not limited to, upper airway compromise, need for invasive mechanical ventilation, access to chest secretions, aspiration and decisions regarding palliative management (Russell & Matta, 2004). Medical advances and technology have facilitated the transition of individuals with a tracheostomy...
from the acute hospital setting to the home/residential setting and thus to the workplace and school environment.

An MDT approach is essential for discharge planning and ongoing management due to the complexities of individuals with a tracheostomy; however the MDT members involved will depend on the reason for the tracheostomy. Coordinated liaison between the discharging facility and the community team is essential. Early discharge planning, appropriate destination selection, patient/carer training and education, support networks, equipment provision planning, planned tube changes and scheduled follow-up appointments are essential (Barnett, 2005; Bowers & Scase, 2007; Joseph, 2011; Lewarski, 2005; Montagnino & Mauricio, 2004; Vanker et al., 2013) and self-care and independence encouraged as goals (Russell & Matta, 2004). The tracheostomised and ventilated individual in the home requires advanced specialist management from a coordinated MDT.

If dysphagia for saliva/oral intake and communication management is ongoing, then the speech pathologist involvement should continue. When the person is discharged from the acute/rehabilitation setting to home or the residential setting, the speech pathologist should provide all the necessary information to the individual, family/carer, receiving speech pathologist and other health professionals involved with ongoing liaison as required. Workplace and school environment may also need to be included in the education/information provision and ongoing support. Children, in particular, will require a high level of supervision and care due to the hazards, and depending on age, significant ongoing speech pathology for communication development.

The speech pathologist in the community may have less exposure to individuals with a tracheostomy, due to the small numbers living in the community, and they are advised to work within their scope of practice and skill base and seek support and assistance from more experienced clinicians as required.

<table>
<thead>
<tr>
<th>Decannulation Key Statements</th>
<th>Highest Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-48 hours cuff deflation and tolerance of saliva where tracheal access is no longer required is recommended as one of the criteria for decannulation.</td>
<td>Level III</td>
</tr>
<tr>
<td>If an occlusion pathway is followed in the decannulation pathway, the tracheostomy tube is best to be downsized and cuffless however this is not speech pathology scope of practice.</td>
<td>Level III</td>
</tr>
<tr>
<td>If an occlusion pathway is followed in the decannulation pathway, a correctly positioned fenestrated tube could be considered, however this is not speech pathology scope of practice.</td>
<td>Level IV</td>
</tr>
<tr>
<td>An incorrectly positioned fenestration increases the risk of granulation.</td>
<td>Level IV</td>
</tr>
</tbody>
</table>

15. Services management

15.1 Principles of Practice

The Principles of Practice document (Speech Pathology Australia, 2001) provides a guide for the achievement of high standards of service and service management, beyond the professional CBOS (Speech Pathology Australia, 2011). It describes the range of processes to be used within an organisations in the provision of quality speech pathology services to clients, including principles related to ethics, client services, service management, education of others, and research.
15.2 Referral Process
The referral process to a speech pathology service is site specific but is expected to be clearly defined and documented (Principles of Practice, Speech Pathology Australia, 2001). The referral can originate from a wide variety of sources, including medical officer, nurse, allied health members, teacher, or the patient or family/carer, however should be cleared with the treating medical officer.

15.3 Documentation
Documentation must comply with the Speech Pathology Australia Association documents including: Principles of Practice (2001), Code of Ethics (2010) and CBOS (2011). The documentation should also be in accordance with the policies of the employing body. It is the professional responsibility of the speech pathologist to be aware of the employing body’s policy on confidentiality and access to records. The privacy and health record laws vary across the states and territories, and the speech pathologist should be familiar with the laws of their state/territory.

Specific documentation for individuals with a tracheostomy should include:
- Reason for the tracheostomy and method and date of insertion
- Type and size of tracheostomy tube
- Period of intubation prior to tracheostomy and reasons for failed extubation/s
- Date of tracheostomy tube changes
- Cuff status prior to and post speech pathology session
- Communication options including AAC, speaking valve, specialised communication tubes
- Communication and cognitive function
- Swallowing function
- Management changes and rationale for changes
- Outcome of therapeutic intervention e.g. aspiration of food/fluid trialed, non-tolerance of speaking valve
- Acknowledgement of ENT/airway patency assessment
- Pre and post decannulation entries

15.4 Credentialing and Competency
Credentialing is the process of validating an individual’s qualifications, skills, experience, training and/or competency to perform certain procedures or service activities against a set of recognised standards (Credentialing, Speech Pathology Australia, 2009). Speech Pathology Australia stipulates that ‘Speech Pathology Australia does not have a role in credentialing practice skills beyond CBOS entry level, however strongly supports workplace credentialing of advanced practice skills’ and also that a structured competency framework be established in the workplace. Credentialing is particularly important in high-risk clinical areas where the speech pathologist has the potential to cause harm or advanced practice areas.

The speech pathologist and the employer must take responsibility to ensure there are systems in place to formalise the development of knowledge, skills and competency in line with organisational policies and procedures. Credentialing or competency achieved in one facility will not necessarily be transferrable to another facility.

Currently there is no formalised national competency program in the area of tracheostomy management for speech pathologists; however increasing numbers of facilities have, or are establishing in-house competency programs (Ward et al., 2008; Ward et al., 2012).

Ward et al. (2012) reported that by having a formal tracheostomy competency training program in place, clinicians reported greater number of hours of supervision prior to independent patient management and they felt more knowledgeable on current evidence.
Basic skills and knowledge
Some of the skills and knowledge that may be considered as necessary for independent management may include, but are not exclusive to:

- Speech pathologist’s role and role of the multidisciplinary team and ability to work cohesively within a team
- Indications for a tracheostomy
- Methods of tracheostomy insertion
- Types of tracheostomy tube designs, features and indications for use
- Anatomical and physiological changes following tracheostomy
- Impact of the tracheostomy tube and cuff status on swallowing and other physiology
- Complications of the tracheostomy tube
- Impact and complications of the ETT
- Oral suctioning and above-cuff suctioning (for designated tubes)
- Communication options, indications, and risks including use of speaking valves and specialised communication tubes
- Assessment and management of saliva tolerance, cuff deflation management and cuff pressure management
- Assessment and management of swallowing impairment
- Understanding of the indications and limitations of blue dye
- Knowledge of when to refer to instrumental swallowing assessment
- Ability to recognise signs of respiratory fatigue, increased work of breathing, respiratory distress and respiratory failure
- Decannulation pathway/process at one’s facility
- Emergency procedures and universal precautions for the facility
- Knowledge of suctioning and humidification procedures
- Knowledge of general stoma and tracheostomy care
- Knowledge of modes of oxygen delivery and familiarity with relevant equipment
- Knowledge of policies and procedures of the organisation and speech pathology department including tracheostomy, infection control and emergency procedures
- Knowledge of relevant Speech Pathology Australia documents and guidelines

Clinicians who have had a number of years of specific experience and/or additional education/training in the management of individuals with a tracheostomy may be considered as having more specialist skills. Some of the extra skills required may include:

- Expertise and specialist skills with a variety of specialty diagnostic groups such as acute neurosurgery, head and neck surgery, burns, spinal, slow to recover neurological patients
- Knowledge and use of instrumental examination (e.g. FEES)
- Contribution to the development and maintenance of tracheostomy programs, competency programs, policies and/or procedures at a local, statewide or national level
- Teaching and supervision specific to tracheostomy
- Development and facilitation of relevant research projects
- Extended scope of practice skills (e.g. tracheal suctioning)

Advanced Skills/Ventilator assisted Specialist skills
The skill set required for independent management of the ventilator dependent individual is recognised as more advanced and requires additional knowledge, training and skills over and above those required by clinicians managing non-ventilated individuals. Ward et al. (2012) reported that 75% of the speech pathologists surveyed in the United Kingdom felt confident in managing the non-ventilated tracheostomy patient, however less than 50% felt confident managing the ventilated patient.

Additional skills and knowledge for working with ventilator dependent individuals may include:

- Knowledge of diagnostic populations requiring mechanical ventilation
- Knowledge of the progression of medical conditions that may require increasing dependence on mechanical ventilation
15.5 Leadership and supervision
As tracheostomy management is recognised as an advanced practice, senior and experienced clinicians have a role in leadership and supervision. It is recommended the new clinician to tracheostomy undergo a supervision process when developing skills in this area. If there is no senior clinician in the workplace with advanced skills, or no competency program in place, it will be necessary for the clinician to establish links with tertiary facilities or investigate formalised mentoring programs to obtain guidance and supervision to develop the necessary skills. Speech Pathology Australia does not support clinicians undertaking advanced practice skill without being strongly linked to a mentor with considerable expertise and/or to a speech pathology department with specialty in the particular area of advanced practice. It is also recommended that ongoing supervision and support will be required as case complexity increases.

15.6 Issues and risk management
The presence of a tracheostomy tube and the speech pathology management of that individual carry risks for both parties. The individual with a tracheostomy often presents with complexities due to the significant medical condition necessitating the tracheostomy, medical fragility, and possible ventilation which may increase the risks.

The speech pathologist should adhere to organisational policies and procedures, as well as local, State and Commonwealth laws. By ensuring a sound training and credentialing process, risks should be minimised and the risk management pathway streamlined.

15.6.1 Complications of endotracheal and tracheostomy tubes
The presence of an ETT or tracheostomy tube can be linked to a number of complications. Some of these may impact on the person’s swallowing and voice, and thus the speech pathology management. These include, but are not limited to:

Endotracheal tube
Complications can occur to the individual as an immediate response to the insertion of the ETT or to the ongoing presence of the tube. Some of these include:

- Trauma to the mouth and pharynx
- Spinal cord injury
- Damage to the recurrent laryngeal nerve
- Subcutaneous emphysema
- Hypoxemia
- Rupture of the oesophagus
- Cardiac complications
- Laryngeal trauma (due to the position/movement of the tube on the vocal cords) – necrosis, granuloma, stenosis, laryngeal web, vocal cord impairment
- Tracheal trauma – tracheal stenosis

(Kaur & Heard, 2008)

**Tracheostomy tube**

The insertion of the tracheostomy tube or the ongoing presence of the tube can result in complications. The complications can occur immediately, or can be intermediate or late complications. Controversy exists in the literature regarding the risks and complications of the surgical versus percutaneous insertion methods, but potential tracheostomy complications include, but are not limited to:

- Obstruction of the tracheal tube due to sputum plugging or tube mal-position
- Incorrect placement of the tube
- Accidental decannulation
- Pneumothorax
- Subcutaneous emphysema
- Haemorrhage during insertion, removal or at any time with a tracheostomy tube insitu. Significant bleeding can indicate a rare complication of tracheo-innominate fistula which can be fatal
- Suctioning trauma
- Oedema of laryngeal and tracheal structures
- Tracheostomy stoma infection or distortion
- Tracheitis
- Tracheal trauma – granuloma (at the stoma site), stenosis
- Pressure necrosis of the tracheal wall
- Tracheomalacia
- Suprastomal collapse
- Tracheoesophageal fistula
- Complications on re-cannulation (e.g. stoma collapse, loss of airway, risk of respiratory arrest)
- Risk of granulation with fenestration tubes

(Fikkers et al., 2004; Scalise et al., 2005; Seidman, Sinz, & Goldenberg, 2011; Zias et al., 2008)

Children have a high complication rate of up to 60%, associated with the presence of the tracheostomy tube, and mortality rate of 0.5-3% of tube related issues, predominantly due to accidental decannulation and blockage of the tube (Eber & Oberwaldner, 2006).

**15.6.2 Risk management in speech pathology service provision**

There are certain areas in the management of tracheostomy that can present specific risks to the person with the tube, which may be due to speech pathology intervention or may impact on speech pathology management. The clinician must be aware of these and there should be a risk management strategy in place to ensure patient safety. These include but are not limited to:

- Impact of cuff deflation or cuffless tubes with regards to saliva management and aspiration risk
- An inadequate or ineffective cough may limit the ability to clear oral and/or tracheal secretions from the airway which places the individual at risk of sputum retention/plugging
- Inadequate humidification can impact on the viscosity of the secretions leading to sputum retention/plugging
- Individuals are at risk of chest infections/pneumonia secondary to increased pulmonary secretions, inadequate clearance of secretions, and risk of saliva aspiration
A single lumen tracheostomy tube has an increased risk of obstructing with secretions, particularly if humidification and suctioning care is compromised.

The potential impact of an inner cannula on respiratory work due to its narrowing of the tracheostomy tube lumen.

Contra-indications in the use of the speaking valve or prolonged occlusion (e.g. inflated cuff, upper airway obstruction, too large a tracheostomy tube, foam cuff, severe COPD, copious aspiration).

The impact of a blocked tracheostomy tube.

Contra-indication of blue dye in specific populations.

Impact of cuff deflation, speaking valve and/or oral intake on mechanical ventilation.

15.6.3 Infection control
Speech pathologists must adhere to the infection control policies of the organisation. Due to the nature of the tracheostomy there is the potential for increased exposure to bodily fluids, so strict policies must be followed, which may include the use of varied personal protective equipment (e.g. goggles, gloves, gowns).

15.7 Policy making
It is recommended that speech pathology services develop policies and protocols within the facility regarding tracheostomy management. This may involve policies specific to speech pathology management and/or multidisciplinary policies and guidelines. To develop policies in this area, it would be expected that the clinician has specialist skills in the area of tracheostomy or be able to liaise with clinicians with expertise in the area. It is particularly important that these policies cover such controversial areas as blue dye, decannulation practices, spigoting, and equipment provision.

15.8 Resources and equipment

15.8.1 Equipment required by speech pathologists
There are specific resources that a speech pathologist working with individuals with a tracheostomy needs to have access to, to ensure safe and effective management. This includes, but is not limited to:

- Speaking valves
- Selection of AAC options
- iPad/AAC apps library
- Cuff pressure manometer
- Disposable syringes for cuff inflation/deflation, above cuff secretion removal
- Equipment for education and demonstration (e.g. tubes, tracheostomy TOM demonstration model)
- Personal protective equipment (gloves, aprons, protective eyewear)

Depending on the employing body, these may be funded by the speech pathology service or the organisation.

15.8.2 Equipment required by individuals with a tracheostomy
In the acute hospital setting, all the necessary equipment for the patient with a tracheostomy will generally be provided by the organisation. However, funding for the trial and provision of electronic AAC will vary between facilities and states, so this needs to be explored by the clinician.

The speech pathologist should be aware of organisational and state/territory guidelines regarding provision and reimbursement of equipment for when a person with a tracheostomy is discharged to the community.
16. Education

16.1 Professional Development
Speech pathologists should strive to continually update and extend their professional knowledge and skills through professional development activities and/or engaging the support of a mentor or supervisor (Principles of Practice, 2001; Code of Ethics, 2010, Speech Pathology Australia). The speech pathologist and the service have joint responsibility to identify the training and development needs of the individual. Engagement in self-education activities is recommended including: accessing library services and resources; attending conferences, in-services, workshops, courses; using online information services; teleconferences; peer network meetings; involvement in special interest groups.

Ward, Agius, Solley, Cornell, and Jones (2008) and Ward, Morgan, et al. (2012) reported that speech pathologists are eager to access further professional development and training to target specific areas of need in tracheostomy care. Interdisciplinary tracheostomy education is being instituted in many centres. Interprofessional and international tracheostomy workshops, symposiums and excellent on-line supports are being offered. New training initiatives using human mannequin simulation are also being explored as viable training models for skills development in tracheostomy management (Ward, Baker, et al., 2012). Consensus papers (Clinical Consensus Statement Tracheostomy Care 2012), International Tracheostomy Quality Collaborative (The Tracheostomy Collaborative – Improving Global Care, 2012) and Tracheostomy Special Interest Groups (Refer to appendix) are emerging as avenues through which more information on interdisciplinary tracheostomy care is being shared.

16.2 Clinical Education
Speech Pathology Australia views student supervision as a professional responsibility and strongly encourages members of the profession to embrace the benefits of student supervision (Principles of Practice, 2001; Scope of Practice, 2003; Clinical Education Position Statement, 2005; Code of Ethics, 2010; CBOS, 2011; Professional Self Regulation, Speech Pathology Australia).

As tracheostomy management is an advanced practice area, student supervision with this group should be well monitored and competency as a graduating student is not expected. Speech pathology students should be provided with opportunities to observe or participate in assessment/intervention with individuals with a tracheostomy where possible, but the capacity for this will vary at different facilities.

16.3 Staff Education
It is in the scope of speech pathology to educate staff in areas specific to speech pathology (Principles of Practice, 2001; Scope of Practice, 2003; CBOS, 2011, Speech Pathology Australia). Target audiences may include medical staff, allied health staff, nurses, teachers, community staff, family/carers and others. Topics covered will vary according to the role of the speech pathologist within the specific facility, type of facility and needs of the individual with the tracheostomy.

17. Research

17.1 Evidence based practice
As previously acknowledged, speech pathology is a scientific and evidence based profession and speech pathologists have a responsibility to incorporate best available evidence from research and other sources into clinical practice (Evidence-Based Practice in Speech Pathology, 2010, Speech Pathology Australia). It is important for clinicians to keep themselves updated of literature and ongoing research in the area of tracheostomy, and also
other areas that may link in with tracheostomy management (e.g. dysphagia, FEES, VFSS, laryngectomy, AAC).

Within the area of tracheostomy management, there are a number of controversial areas, which are discussed in this guideline. However, there are a number of issues regarding the literature for tracheostomy including: a limited amount of literature on the topic, low level evidence base, and the sample sizes are typically small. Thus, when searching for evidence, speech pathologists may find that little consensus exists in the literature or between experts in some areas to then determine best practice.

17.2 Research
Clinicians are encouraged to keep updated on the current literature, to then be able to identify gaps where research could be considered. There is a strong need for further research in the area of tracheostomy management. The role of the speech pathologist has expanded, but only a small body of literature specific to speech pathology practice exists. Assistance in conducting the research may be sought from associated academic/professional research units and/or universities and Speech Pathology Australia. If a clinician is involved in research, it is important to abide by the Speech Pathology Australia Code of Ethics (2010) and the research format should be consistent with the organisation’s ethical procedures and/or guidelines. Reporting of the research both within and outside of the profession is also encouraged by Speech Pathology Australia.

17.3 Outcome Measures
There is no published literature regarding outcome measures specific to tracheostomy and speech pathology. There is literature that examines non-speech pathology topics in the area of tracheostomy, such as comparing percutaneous and surgical insertion methods and timing of tracheostomy (i.e. early versus late), however there is nil pertaining to speech pathology specific information. The Dysphagia Clinical Guideline (2012) refers to specific outcome measures for dysphagia which can be utilised for the dysphagia management of individuals with a tracheostomy. The Royal Brisbane Hospital Outcome Measure for Swallowing has 3 of the 10 levels that are applicable to adults with a tracheostomy regarding tolerance of saliva with cuff deflation trials (Ward & Conroy, 1999).

18. Ethical considerations
It is fundamental that speech pathologists observe the highest standards of integrity and ethical practice and abide to the Code of Ethics (Speech Pathology Australia, 2010).

In many situations, the individual with a tracheostomy has progressed from being intubated and ventilated in a critical care environment to a tracheostomy. As a result, there are a number of ethical dilemmas that may arise and the clinician should be guided by the medical intervention plan, organisational policies and local, state and federal laws. The individual with a tracheostomy has the right to be informed of their condition and prognosis, and also the right to refuse treatment. There may need to be consideration and discussion of end-of-life decision making and quality of life preferences. There are a number of instances where the speech pathologist is an integral member of the team and ethical decision making between the multidisciplinary team and individual/family/carer may be necessary. Examples of this include:

- Assessment of the cognitive and language ability and provision of communication options to determine the individual’s ability to participate in and consent to or refuse treatment in conjunction with the medical team
- Decision making around the individual with a significant dysphagia and non-tolerance of cuff deflation despite rehabilitation and the management options (e.g. long term tracheostomy, laryngectomy, one-way decannulation)
- Consideration of oral intake for quality of life for the individual who has a significant dysphagia and aspiration of oral intake
19. Legal issues

19.1 Code of Ethics
Speech pathologists should adhere to the Speech Pathology Code of Ethics (2010) and to any codes, policy and procedures relevant to their employing body.

19.2 Legislation
It is recommended speech pathologists be conversant with the legislation that applies in the state or territory in which they practice.

19.3 Duty of Care
Duty of care is a legal term describing the relationship, in this case, between the individual and parent/caregiver and the speech pathologist. The speech pathologist owes a duty of care to his/her patient and caregiver. A breach of duty of care leaves one liable to civil action for a claim of damages (compensation) if legal action is taken by the individual under your care or parent/caregiver(s) or carer. A breach of duty may result from one or several specific actions whilst under the care of the speech pathologist. For example, a failure to act when action was required, or a statement made that in the eyes of the law amounts to “negligent misstatement”. The duty involves using the same degree of care that a “reasonable” speech pathologist would exercise in the circumstances. Whether or not there has been a breach would be determined by what other speech pathologists working in the same field would have done in the circumstances. Consequently, it is the duty of the speech pathologist to be aware of recent literature in their field, current practices carried out by peers, adhering to workplace policies and procedures and being conversant with Speech Pathology Australia Association documents.

19.4 “Proxy” Interventions
Where a speech pathologist does not carry out the intervention but has instructed and supervises someone else i.e., student speech pathologist carrying out the intervention, the law would hold the advising/supervising speech pathologist liable just as if they were carrying out the intervention themselves. The law refers to this as “vicarious liability.” In other words, the same standard of care would be required if the speech pathologist was holding him/herself out as the person with the knowledge and skills. The fact that he/she did not actually carry out the intervention would be irrelevant in the eyes of the law. Therefore it is necessary for “proxies” to exercise the same standard of care as that required of the speech pathologist instructing or supervising them, and for all documentation (i.e. Individual Education Plans, progress notes, negotiated contracts) regarding “proxy” interventions to be maintained. In addition, the service plans must include adequate time and resources to train “proxies” and monitor programs. However, as tracheostomy management is recognised as an advanced practice, it is less likely that there will be ‘proxy’ intervention.

19.5 Standard of Care
“Standard of care” is synonymous with ‘duty of care’ (Moffet & Moore, 2011). The prevailing standards of the relevant profession are taken into account when determining duty and standards of care, providing these standards are themselves reasonable (Legal Services, Victorian Government Department of Human Services, 2000). Situations should also be examined to determine whether it would be reasonable for a person to do more than just comply with the professional standards.
New graduates, individuals re-entering the workforce or speech pathologists trained outside of Australia should ensure they meet CBOS (Speech Pathology Australia, 2011) and other requirements deemed necessary by Speech Pathology Australia. Accordingly they should be competent to manage non-complex patients. As tracheostomy management is considered advanced practice, the necessary support, education and credentialing will need to be
considered by the clinician and employing body, as outlined earlier in this document. The ability to manage complex clients will necessarily require additional guidance, supervision and/or training. Speech pathologists should advise their employing body or the service provider if they require additional training to meet the duties outlined in their work contract.

19.6 Consent for speech pathology involvement
Informed consent refers to the patient and/or parent(s)/caregiver(s) being fully informed and aware regarding the service, assessment, interventions, treatment and role of the speech pathologist in this clinical area. For people who are at an age of being able to consent, if there is the presence of an intellectual disability, cognitive impairment, language impairment, a mental health problem that in the opinion of the speech pathologist does not allow for the ability to consent to services, this needs to be resolved in line with organisational policy/procedures. In such circumstances, the parent(s)/caregiver(s) may be required to consent. Service provision should not commence without consent being formally clarified.

Consent requirements vary in different states and territories. A young person may provide consent depending on the particular state’s law of age of consent. In some states and territories the attendance at an appointment is implied as consent.

Situations may arise during the treatment process where verbal consent is requested of the patient or parent(s)/caregiver(s). For example, a case being handed over to another clinician for a one-off session or a young person’s request that the clinician make contact with their educational setting without written consent being initially arranged. Ideally, written consent should be obtained in these instances but where verbal consent has occurred then this should be documented by the speech pathologist in the individual’s file.

Informed consent for speech pathologists undertaking research in this clinical area requires that the speech pathologist make contact with the appropriate governing Ethics Committee of the service. Research should not be undertaken without full ethics approval.

19.7 Privacy and freedom of information legislation
Speech pathologists are required to comply with all relevant Commonwealth and State laws regarding client privacy and freedom of information legislation. The storage, duration and appropriate means of disposal of client information should be as specified by organisational and state/territory requirements.

19.8 Indemnity cover and insurance
It is the responsibility of each speech pathologist to ensure they have appropriate professional indemnity cover and public liability. Professionals should be aware that there may be instances where the employing body will not necessarily indemnify them for their actions. It is recommended that all practicing Speech Pathology Australia members have professional indemnity insurance.

Speech pathologists should clarify the insurance situation for accidental loss, theft or damage to resources during transport with their insurer.

19.9 Service guidelines
It is recommended that speech pathologists adhere to the approved guidelines of the employing body in terms of clinical and service management.
20. Future directions

Medical advancement is increasing the survival rate of individuals with a tracheostomy, including very preterm infants, and tracheostomies are being performed more frequently. This, in combination with an ageing population, will potentially impact on the number of individuals with a tracheostomy and the role of the speech pathologist.

The role of the speech pathologist within the multidisciplinary team for this population is now well recognised both at the individual level and at the level of ‘dedicated facility multidisciplinary tracheostomy teams’.

However, a review of the literature reveals a small amount of research and generally low quality evidence base in the tracheostomy areas specific to speech pathology, and the opinions are divided. This therefore makes it challenging for the practicing clinician to be fully informed by the evidence. There are areas that require the commencement of research and other areas that require further research. This would be beneficial for both the paediatric and adult areas and in both the non-ventilated and ventilated groups. Some of these areas include:

- Impact of the tracheostomy tube on swallowing
- Impact of cuff status on swallowing
- Impact of the speaking valve on swallowing
- Benefits of new specialised communication tubes such as above cuff voicing tubes and the Blom Tracheostomy Tube System
- The relationship between fenestrated tubes and abrasion/granulation development
- Benefits of early saliva swallow rehabilitation for the acute patient for pre-cuff deflation suitability
- Use and suitability of a speaking valve as an airway patency screening/assessment tool
- Speech pathology and tracheal suctioning
- Further standardisation of the MBSImP (Modified Barium Swallow Impairment profile) (Martin-Harris et al., 2008) to include the tracheostomy population
- Impact of the timing of insertion and duration of tracheostomy on feeding and swallowing developmental outcomes in children.

As tracheostomy management is recognised as advanced practice, the skills and knowledge required to manage this area independently is therefore facility guided. A consistent management pathway or competency program across the nation, with appropriate facility or state-wide modifications, could possibly be considered to ensure a more standardised speech pathology approach to the individual with a tracheostomy.

Methods of training and support to achieve competency is challenging with this population due to limited exposure in some facilities, and rural and remote access. Simulation training is being utilised by a variety of professions (e.g. medicine, physiotherapy, podiatry, and nursing) and has been shown to be an effective teaching tool (Howard, Ross, Mitchell, & Nelson, 2010; Parker & Myrick, 2009; Wayne et al., 2010). It allows for ‘no harm to the patient or clinician’ in the simulated scenario, repetitive drills, and consistent training. Access to simulation training equipment is increasing across Australia, and the use of simulation for tracheostomy management training for speech pathologists is being trialed within Australia currently (Ward, Baker, et al., 2012). Also, the developments in telehealth services and its successful use in other areas of speech pathology (Burns et al., 2012) suggests there is potential for this modality to be explored further as a modality for providing remote training or supervision/support for tracheostomy management.

Tracheal suctioning is an emerging area for speech pathologists as an extended scope of practice, and its’ progression should be facilitated and monitored as appropriate.
21. Conclusions

Speech Pathology Australia recognises that management of the individual with a tracheostomy is within scope of practice of the speech pathologist and is considered advanced practice, and training and credentialing in the workplace is recommended.

The individual with a tracheostomy is ideally managed by a multidisciplinary team and the speech pathologist is an integral member of that team and should work collaboratively within the team to ensure holistic care.

This clinical guideline aims to provide the best available evidence for provision of service to this challenging population. However, the evidence is mixed in a number of areas, and thus this document should be used as a guide, and the needs of the individual with a tracheostomy should be considered on an individual basis. There are a number of controversial areas within the area of tracheostomy management, and it is important that the clinician abide by the policies, protocols and role responsibilities within their organisation.
22. Appendix

Appendix A: Support Groups

Support groups
Patient and carer support groups

- Aaron’s Tracheostomy Page
  www.tracheostomy.com/

- Tracheostomy Support Group New Zealand
  http://tracheostomysupport.co.nz

- Neckbreathers Yahoo Online Support Group
  http://health.groups.yahoo.com/group/NeckBreathers

- Facebook tracheostomy group
  http://www.facebook.com/#!/groups/63417059663/

- Facebook tracheostomy group
  http://www.facebook.com/#!/groups/252981091539

Healthcare provider support groups

- Global Tracheostomy Collaborative (GTC)
  www.globaltrach.org
  Contact: Tanis.CAMERON@austin.org.au

- National Tracheostomy Safety Project
  www.tracheostomy.org.uk

- Tracheostomy Review and Management Service,
  Austin Health
  www.tracheostomyteam.org

- NSW Tracheostomy and Critical Care Discussion Evidence Based Practice Group
  Contacts: sdeery@stvincents.com.au or rblack2@stvincents.com.au

- Victorian Critical Care and Tracheostomy Interest Group
  (CCTIG)
  Contact: martin.checklin@mh.org.au

- National Tracheostomy Google Group
  Speech-pathology-critical-care-and-tracheostomy@googlegroups.com
Appendix B: Useful Resources

Useful resources for tracheostomy management

Text books

Toys
- www.passy-muir.com

Oral motor toys and colouring books are available to assist in paediatric patient education and therapy

Other Websites
- Tracheostomy Observation Model/T.O.M.
- www.passy-muir.com
- www.tracheostomyteam.org
- www.tracoe.com
- www.covidien.com
- www.smiths-medical.com
23. References


food colouring dye—further evidence of the significance of gastric colonization preceding nosocomial pneumonia. *Infection control and Hospital Epidemiology*, 16(7), 417-418.


The Health Roundtable. Available online at: www.healthroundtable.org


