



Adult Airway Management - Clinical Practice Standard

1. Purpose

The purpose of this policy is to establish minimum practice standards for the care of Adult Airway Management throughout the WA Country Health Service (WACHS).

Removing unwanted variation in clinical practice and following best practice guidelines has been found to reduce inappropriate care (overuse, misuse and underuse) thus improving health outcomes, reducing preventable harm and decreasing wastage.

Further information relating to specialty areas including Child and Adolescent Health Service (CAHS), Women and Newborn Health Services (WHNS) can be found via [HealthPoint](#) as they are not covered in this policy.

The Clinical Standard Practice (CPS) does not include specific procedural airway management information for the community setting.

2. Scope

All medical, nursing, midwifery and allied health staff employed within the WACHS.

All health care professionals are to work within their scope of practice appropriate to their level of training and responsibility.

Further information may be found via [HealthPoint](#) or the [Australian Health Practitioner Regulation Agency](#).

3. Procedural Information

Where care requires specific procedures that may vary in practice across sites, staff are to seek senior clinician advice.

- [Appendix 1: Manual Manoeuvre](#)
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4. Considerations

Staff should assess the patients' airway using the look, listen and feel anything approach taught in the ABCDE systematic approach of patient assessment of the critically ill.

If a patient is experiencing airway difficulties, initiate Code Blue, 'Medical Emergency', as per endorsed local site escalation process.

1. Effective management of the difficult airway requires specialised skills development and appropriate staff, facilities and equipment that are in good working order.
2. Sites are to develop procedures that facilitate formal debriefing after a difficult airway incident.
3. If a patient is determined to be at risk, and appropriate staffing, skills and equipment are not readily available; the patient should be transferred to the care of a higher level facility or team as soon as possible.
4. The safe and effective use of cricoid pressure or Sellick's manoeuvre is debatable and as such is presented throughout the CPS as an option for consideration in its use or not by the individual practitioner^{3,5,6}.
5. Staff are to comply with the specific requirements for hand hygiene, aseptic non-touch technique and personal protective equipment, in alignment with the WACHS Infection Prevention and Control Policy.

5. General Information

Airway management is an essential skill for clinicians caring for critically ill or injured patients and may be defined as the application of therapeutic interventions that are intended to affect gas exchange in patients.

Airway management is required to provide a patent airway and adequate ventilation and circulation, these are prerequisites for maintaining life and failure to appreciate the basic principle can lead to avoidable deaths and unplanned admission to critical care^{7,8}.

A number of devices and techniques are used to achieve airway management including bag mask ventilation (BMV), extraglottic devices (EGDs), oral or nasal endotracheal intubation and surgical airway management techniques.

Recognising and responding to clinical deterioration should be a priority for the multidisciplinary team and any WACHS employee involved in clinical care should be able to assess Airway, Breathing, Circulation, Disability and Exposure (ABCDE) up to their level of responsibility.

6. Difficult Airway

A difficult airway is one for which a pre-intubation examination has identified attributes that are likely to make laryngoscopy mask airway (LMA), or surgical airway management more difficult. This also includes those patients with a history of difficult or failed intubation by an experienced operator.

In Emergency Departments (ED), airways can be potentially more difficult due to multiple factors, including:

- Positioning e.g. C-Spine precautions preventing optimal position, and
- Patient factors e.g. not fasted, actively vomiting, airway swelling / oedema / acute deterioration etc.

Identification of a difficult airway is a key component of the approach to airway management for any patient and is a key branch point on the main airway algorithm. The key reason being that a patient should not be administered a neuromuscular blocking medication unless one has a measure of certainty that gas exchange can be maintained if laryngoscopy and intubation fail^{4,10}.

7. Can't Intubate Can't Oxygenate (CICO) Vortex approach (Appendix 12)

A CICO scenario may occur if a provider has embarked on a certain course of airway management and has identified that intubation by that method is not going to succeed, requiring the immediate initiation of a rescue sequence.

A CICO scenario exists when either of the following conditions is met:

- Failure to maintain acceptable oxygen saturations during or after one or more failed laryngoscopic attempts, or
- Three failed attempts at orotracheal intubation by an experienced intubator, even when oxygen saturation can be maintained.

8. Patient Monitoring

Any patient who has ongoing airway management should have continuous monitoring of vital signs inclusive of: Continuous electrocardiogram (ECG), HR, O₂ saturations, BP, continuous (waveform) capnography, (+/-RR if spontaneously breathing),

Refer to:

- [ANZCA Guidelines](#)
- [ACEM Guidelines](#)
- [Clinical Observation and Assessments CPS \(physiological, neurovascular, neurological and fluid balance\)](#)

9. Clinical Communication

Critical Information

Critical information, concerns or risks about a consumer are communicated in a timely manner to clinicians who can make decisions about the care.

Clinical Handover

Information exchange is to adhere to the [DOH Clinical Handover Policy](#) using the iSoBAR framework.

When airway adjuncts are used, ensure to document:

- insertion date and time
- type, position and size of adjunct
- length of time left insitu
- amount and type of secretions removed on suctioning
- ventilator assistance required
- monitoring plan and expected date of removal
- other relevant information.

Documentation

An individualised management plan, including details regarding airway management, is to be documented in the patient's health records as soon as practicable, and in relation to the specific requirements for clinical risk prevention and management.

At a minimum the plan must consider:

- patient history and presence of comorbidities
- diagnosis and treatments for clinical conditions
- medications, psychosocial and cultural factors that could influence patient monitoring
- frequency and type of specific observations
- site requirements, patient education and consent
- any restrictions to interventions associated with advance health directives (AHD) or similar.

10. Pre-Procedure Key Points

- The patient/next of kin, where possible, has received information relating to the intended procedure, and has given appropriate consent
- Patient identification and procedure matching processes are undertaken
- To maintain patient privacy and dignity
- Offer the presence of a chaperone where appropriate to patient and clinician requirements
- Provide the opportunity for an accredited interpreter and/ or Aboriginal Liaison Officer where appropriate to the patient's language or communication requirements. [WA Health Language Services Policy](#).

11. Staffing Requirements

Staff involved in adult airway management, are required to maintain the level of competency that is required for undertaking their specific role.

Staff are to consider the following points, at a minimum:

- A level of competency that is required for staff in resuscitation and medical emergencies is outlined in [WACHS Resuscitation, Education and Competency Assessment Policy](#)
- All clinical staff must be trained and proficient in basic life support and the airway management procedure that they are undertaking. WACHS sites will develop, adapt or provide access to basic life support and airway management training for the clinical workforce, including mechanisms for monitoring participation and assessing competence
- Acute care sites – A system must be in place for ensuring access at all times to at least one clinician, either on site or in close proximity, who can practice advanced life support
- Always consider the number of staff required to provide adult airway management safely, and
- The following are minimum staffing requirements for Emergency Endotracheal Intubation (ETI):
 - Only suitable trained and competent medical staff are to perform endotracheal intubation
 - Nurses/midwives/anaesthetic technicians/physiotherapists/respiratory technicians to assist with equipment, ventilation, ETT securement and post intubation management according to level of competency.

12. Equipment Required

Airway management equipment should be readily available and easily accessible in clinical areas.

Equipment selection should be based on the priorities of maintaining oxygenation, ventilation and avoiding trauma.

Guidelines on equipment to manage a difficult airway during anaesthesia are available from www.anzca.edu.au. (link below)

[Guidelines on Equipment to Manage difficult Airway During Anaesthesia](#)
[Guidelines for the Management of Evolving Airway Obstruction: Transition to the Can't Intubate Can't Oxygenate Airway Emergency](#)

- Bag-valve ventilation device mask in a range of sizes with the ability to connect to an oxygen supply
- Oropharyngeal airways in a range of sizes
- Suction equipment including wide bore rigid suction catheter (Yankauer sucker) and soft, flexible Y suction catheters in a range of sizes

- Laryngoscopes with spare globes and a range of sizes
- Endotracheal tubes (ETT) in a range of sizes
- Laryngeal Mask Airways (LMA) in a range of sizes
- ETT introducer - bougie
- Magill forceps
- CO2 detection equipment (ideally continuous waveform capnography)
- Equipment must be appropriate for the age/size of the patient.
- Specific sites may have pre-prepared equipment packs where contents may vary
- Equipment must be checked, serviced and calibrated in accordance with manufacturer's recommendations to ensure reliability and accuracy, and
- Staff must follow the manufacturer's operating instructions.

13. Procedure / Airway Assessment /Respiratory

Assess airway using the look, listen and feel approach taught in the ABCDE systematic approach of patient airway assessment.

Position

- What position does the patient hold themselves in?
- Are they sitting upright to help facilitate breathing?
- Are they leaning forward?
- Are they flat?
- Are they unconscious?

Colour

- The colour of the patient's skin and mucous membrane is only marginally useful and oximetry should be used as an indicator of haemoglobin saturation.

Ability to speak

Use of accessory muscles:

- A patient who is in respiratory distress uses additional muscles to breathe. These include, sternocleidomastoid, intercostal, scalene and abdominal muscles.

Rate and depth of breathing

- Assess the patients respiratory rate is above or below normal level, referring to the Observational Record Chart (ORC)
- In an emergency situation, it is difficult to assess lung volumes, so observing depth of breathing is an important indicator.

Pattern of breathing - Are there any distinctive patterns of breathing such as:

- Cheyne Stokes – Waxing and waning respiration with periods of apnoea
- Kussmaul’s respiration – deep sighing respirations
- Biot’s respiration – irregular breathing in depth and timing
- Hyperventilation – increased rate and depth of breathing

Shape and expansion of the Chest:

- When performing a respiratory assessment, it is important to consider both the shape and expansion of the chest. For example, the anteroposterior diameter may change for a number of reasons and not just because of an underlying respiratory problem¹².

Considerations - Patient positioning:

Oxygenation is reduced in the supine position so fully conscious patients should be nursed in the most upright posture possible unless:

- Immobilisation is required for suspected or actual skeletal or spinal trauma (special consideration should be given to patients with spinal cord injury about the sustainability of upright positioning for respiratory function).
- The patient is symptomatically hypotensive.
- The unconscious patient should be managed in the coma position or elevated sniffing position (ear to sternal notch; face parallel with the ceiling) during intubation

<http://www.anzca.edu.au/front-page-news/cico-and-front-of-neck-access>

14. Airway clearance

- Look and remove foreign material from the mouth before opening the airway to avoid migration of any foreign material into the trachea.
- Mouth should be opened and turned slightly downwards, when in coma position, to allow any obvious foreign material to drain using gravity.
- Remove loose dentures.
- Remove secretions, blood or vomitus from the oropharynx and external nares by using a Yankauer suction catheter or soft flexible Y-suction catheter connected via suction tubing to a suction device.

15. Compliance Monitoring

Evaluation, audit and feedback processes are to be in place to monitor compliance.

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Employment Policy Framework](#) issued pursuant to section 26 of the [Health Services Act 2016](#) (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

16. Records Management

[Health Record Management Policy](#)

17. Relevant Legislation

(Accessible via: *Western Australian Legislation or Com Law* sites)

- *Carers Recognition Act 2004*
- *Disability Services Act 1993*
- *Health Practitioner Regulation National Law (WA) Act 2010*
- *Medicines and Poisons Act 2014*
- Medicines and Poisons Regulations 2016
- *Privacy Act 1988*

18. Relevant Standards

[National Safety and Quality Health Service Standards](#) (Second edition 2017) –

- Recognising and Responding to Acute Deterioration Standard

19. Related WA Health Policies

[Clinical Handover Policy](#)

[Recognising and Responding to Acute Deterioration Policy](#)

[WA Health Consent to Treatment Policy](#)

[National Hand Hygiene Initiative in Western Australian Healthcare Facilities](#)

[Western Australian Patient Identification Policy 2014](#)

20. Relevant WACHS documents

[Airway Suctioning Clinical Practice Standard](#)

[Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#)

[Clinical Observation and Assessments CPS \(physiological, neurovascular, neurological and fluid balance\)](#)

[Documentation CPS](#)

[Mechanical Ventilator – Portable Policy](#)

[Non Invasive Ventilation Clinical Practice Standard](#)

[Oxygen Therapy and Respiratory Devices – Adults Clinical Practice Standard](#)

[Resuscitation, Education and Competency Assessment Policy](#)

21. WA Health Policy Framework

[Clinical Governance, Safety and Quality Policy Framework](#)

22. Acknowledgement

Acknowledgment is made of the previous SMHS / WACHS site endorsed work used to compile this Adult Airway Management Clinical Practice Standard 18 March 2015.

23. References

1. Horton CL, Brown CA, 3rd, Raja AS. Trauma Airway Management. *The Journal of emergency medicine*. June 2014;46(6):814-820.
2. Hung O, Murphy MF. *Management of the difficult and failed airway*. 2nd ed. New York: McGraw-Hill Medical; 2012.
3. Walls RM, Murphy MF. The difficult airway in adults. *UpToDate*. Waltham, MA: UpToDate; 2014.
4. Difficult airways. *Journal of Perioperative Practice*. 2013;23(9):11-11.
5. Butler J, Sen A. Towards evidence-based emergency medicine: best BETs from the Manchester Royal Infirmary. BET 1: Cricoid pressure in emergency rapid sequence induction. *Emergency Medicine Journal*. Feb 2013;30(2):163-165.
6. Chewter M. Cricoid pressure: are we doing it right? *Journal of Perioperative Practice*. 2011;21(10):342-345.
7. Basic Life Support: Airway. ARC and NZRC Guideline 2010. *Emergency Medicine Australasia*. 2011;23(3):248-251.
8. Australian Resuscitation Council, New Zealand Resuscitation Council. ARC guideline 4: airway. *ARC Guidelines*. East Melbourne, Vic: Australian Resuscitation Council; 2014.
9. Chen Z. Basic Life Support: Clinician Information (evidence summary). Adelaide: Joanna Briggs Institute; 2013
10. Apfelbaum JL, Hagberg CA, Caplan RA, et al. Practice guidelines for management of the difficult airway: an updated report by the american society of anesthesiologists task force on management of the difficult airway. *Anesthesiology*. 2013;118(2):251-270.
11. Brown CA. The decision to intubate. *UpToDate*. Waltham, MA: UpToDate; 2013.
12. Higginson R, Jones B. Assessment and management of airway and breathing. *Nursing & Residential Care*. 2013;15(3):140-145.
13. Hassall S, Butler-Williams C. Assessment of airway and breathing in adults. *British Journal of Neuroscience Nursing*. 2010;6(6):288-291.
14. Airway management. *Journal of Perioperative Practice. Procurement Guide*. 2013;2(4):5-5.
15. Wittels KA. Basic airway management in adults. *UpToDate*. Waltham, MA: UpToDate; 2014.
16. Liu J, Novack J, Aitchison R, Aitchison P, Wang E, Kharasch M. Adult resuscitation summary. *Dis Mon*. May 2013;59(5):168-181.
17. Bauman KA, Hyzy RC. Endotracheal tube management and complications. *UpToDate*. Waltham, MA: UpToDate; 2014.

18. Joanna Briggs Institute. Endotracheal Tube: Insertion (recommended practice). Adelaide: Joanna Briggs Institute; 2013
19. Australian Resuscitation Council. Australian Resuscitation Council Guidelines. Australian Resuscitation Council; 2010: <http://www.resus.org.au/policy/guidelines/>.
20. Weingart SD, Levitan RM. Preoxygenation and prevention of desaturation during emergency airway management. *Annals of Emergency Medicine*. 2012;59(3):165-175.e161.
21. Joanna Briggs Institute, Jahan N. Laryngeal Mask Airway: Clinical Information. [Evidence Summaries]. 2012; Available from: JBI Connect+.
22. Frey MV. Management of the Airway During Critical Situations. *RT: The Journal for Respiratory Care Practitioners*. 2013;26(2):8-11.
23. Walls RM, Murphy MF. *Manual of emergency airway management*. 3rd ed. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2008.

24. Related Professional Bodies and Resources

[Australasian College for Emergency Medicine \(ACEM\)](#)

[Australian and New Zealand College of Anaesthetists \(ANZCA\)](#)

[Australian and New Zealand Intensive Care Society \(ANZICS\)](#)

[Australian Resuscitation Council \(ARC\)](#)

[Australian Resuscitation Council. Australian Resuscitation Council Guidelines](#)

[Australian Society for Emergency Medicine \(ASEM\)](#)

[Difficult Airway Society \(DAS\)](#)

[National Tracheostomy Safety Project](#)

[Tracheostomy Management Resources](#)

[The Vortex Approach to Airway Management \(British Journal of Anaesthesia\)](#)

25. Definitions

Carer	A person who provides personal care, support and assistance to another individual who needs it because they have a disability, a medical condition (including a terminal or chronic illness) or a mental illness, or are frail and/or aged.
Patient	A person who is receiving care in a health service organisation

26. Appendices

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Appendix 1: Manual Manoeuvre

Optimum patient positioning through manual manoeuvre can relieve airway obstruction and assist further ventilation intervention and management if required. If the airway is found to be clear of foreign material it is important to ensure the tongue does not cause an obstruction.

The collapsed or unconscious patient experiences a loss of tone in the muscles of the throat and neck which may result in the soft palate, epiglottis or tongue obscuring the airway⁸. The most common methods for ensuring the tongue does not obstruct the airway are **head tilt**, **chin lift** and **jaw thrust**^{7,8,15}.

Key points prior to commencing procedure

Opening of the airway takes precedence over C-spine injuries.

Jaw thrust can be used if a cervical spine (C-spine) injury is suspected.

Procedure

Head Tilt / Chin Lift



Figure 1: Head tilt (Courtesy of RPH Medical Illustrations)



Figure 2: Chin lift (Courtesy of RPH Medical Illustrations)

Jaw Thrust

In the presence of a cervical spinal injury (or suspected), jaw thrust is the safest manual approach for establishing and maintaining a patent airway^{7,8,15}.



Palm of hands are placed on the head to maintain neutral position and avoid cervical flexion / extension.

Thumbs are placed on cheekbones

Fingers are hooked behind the angle of mandible and used to lift the mandible anteriorly

Check airway patency after manoeuvre using look, listen and feel technique

Figure 3: Jaw Thrust (Courtesy RPH Medical Illustrations)

Appendix 2: Acute Foreign Body Airway Obstruction

A Foreign Body Airway Obstruction (FBAO) can partially or completely obstruct the airway and is a life threatening emergency that can result in hypoxia and respiratory or cardiac arrest.⁸

Symptoms of Airway Obstruction

Breathing Difficulty
Cyanosis
Gasping for air

Dyspnoea / Choking
Wheezing
Unconsciousness

Altered consciousness
Panic
Vomiting

Key points prior to commencing procedure

If the patient is able to cough, this should be encouraged. A spontaneous cough is more effective than any manoeuvre.

Visible foreign material may be removed by the use of suction, WACHS Airway Suctioning Clinical Practice Standard CPS.

If the foreign material is too difficult to remove while the patient is supine (e.g. vomitus, blood) it may be easier to turn them onto the lateral position. At the same time suction may be applied to assist in the removal of foreign objects.

Suctioning may cause airway trauma, stimulate coughing or gagging, laryngospasm, bronchospasm, hypoxia from delays in ventilation with tracheal tube suctioning and / or vagal stimulation can result in bradycardia and hypotension.

Active attempts to physically clear the airway should only be performed if:

- there is a strong suspicion of foreign body aspiration,
- cough is ineffective, dyspnoea is worsening
- airway opening manoeuvres fail to maintain an adequate airway⁸

Potential problems during or post procedure

During the procedure, caution must be exercised in the use of fingers to clear the airway, as the rescuer may inadvertently push foreign objects further down into the airway and is at risk of being bitten.

Following successful treatment for FBAO, foreign material may remain in the upper or lower respiratory tract and cause complications later. Patients with a persistent cough, difficulty swallowing or the sensation of an object being stuck in the throat must be assessed further.

Abdominal thrusts can also cause serious internal injuries and all patients so treated must be assessed for injury in hospital.

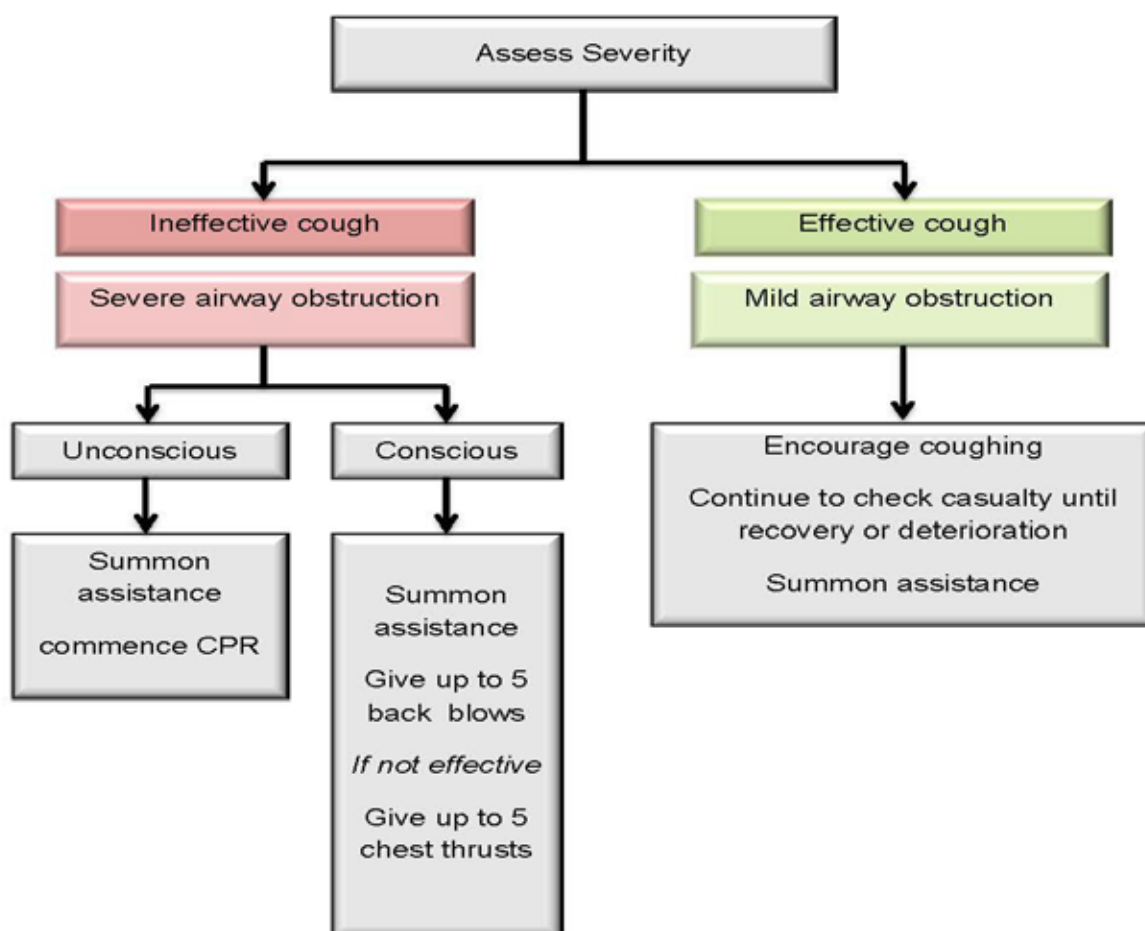
Early Complications

Acute Respiratory Distress Pleural perforation and pneumothorax Cardiac Arrest
 Laryngeal Oedema Respiratory Depression or arrest

Procedure

The minimum practice standard for WACHS clinical staff is to follow this flowchart that has been amended from the Australian Resuscitation Council (ARC) and New Zealand Resuscitation Council (NZRC) FBAO (Choking) algorithm⁸.

It is important to distinguish the emergency from other conditions that can cause sudden respiratory failure e.g. Asthma, Acute Coronary Syndrome (ACS), Cerebral Vascular Accident (CVS), drug overdose, epilepsy etc.



Each time the airway is opened the patients' mouth should be quickly checked for any foreign body that has partly been expelled.

If these measures fail and the airway remains obstructed, staff that are appropriately trained are to:

- attempt to visualise the vocal cords with a laryngoscope
- remove any visible foreign material with forceps or suction,
- if this fails or it is not possible and you are trained in the technique, perform needle cricothyroidotomy.

Post Procedure

Staff are to:

- consider possible causes for the acute FBAO and action prevention strategies as required
- assess patients swallowing status
- assess the patients adequacy of food and fluid intake
- monitor for signs of chest infection
- educate the patient regarding FBAO risk factors
- debrief the patient and carer
- consider need for further medical or surgical assessment e.g. bronchoscopy, x ray, surgery.

Appendix 3: Oxygen and Manual Ventilation

A ventilation facemask enables the clinician to ventilate and oxygenate a patient with a ventilating device.

A Bag-Valve-Mask device with a face mask provides a rapid means of ventilating the patient. Ventilation can be achieved in an emergency even in the absence of a source of O₂.

Self-inflating bag-mask device can be used prior to the placement of a definitive airway.



Figure 1: Self-inflating bag-mask device.

Key points prior to commencing procedure

- Leave dentures in place, when possible as this maintains the curvature of the mouth
- Use of a bag-mask device is a two person procedure
- Size the mask so that it does not cover the eyes and does not extend beyond the chin allowing for a tight seal between the mask and the face
- Connect to high concentration (100%) oxygen via oxygen flow meter and deliver the highest flow rate (15L/min) possible
- It may be used in conjunction with an Oropharyngeal Airway (OPA) Nasopharyngeal Airway (NPA), or Endotracheal Tube (ETT)
- Bag-Valve-Mask (BVM) respiration support may be essential due to inadequate spontaneous ventilations
 - BVM ventilation is contraindicated in the presence of complete upper airway obstruction, until the upper airway is clear (may mean after a surgical airway has been secured)
 - BVM ventilation is relatively contraindicated after paralysis and induction (because of the increased risk of aspiration).

Potential problems during or post procedure

Inadequate positioning of the patient or improper mask positioning / holding may impede adequate ventilation.

Maintaining a seal on patients without teeth can be problematic as they develop deep furrows on either side of their mouth when their mouth is closed. In this situation the mask is placed on the face with the mouth wide open. The lower edge of the mask is placed in the cleft of the chin, while the pointed edge of the mask is placed over the bridge of the nose.

Equipment

BVM with reservoir	Oxygen connecting tubing	Oxygen source
Suction	Nasal Pharyngeal Airway (NPA)	Oral Pharyngeal Airway (OPA)

Procedure

Perform manual manoeuvre to open the airway

Ensure a seal between the mask and face using the “C-E grip” or “thenar eminences technique”

Lift the mandible up into the mask, rather than pushing the mask down onto the face



C-E Grip:

Create two opposing semi circles with the thumb and index finger of each hand to form a ring around the mask connector and hold the mask on the patients face.

With the remaining fingers, lift the mandible up into the mask.

Figure 2: “C-E Grip” (Courtesy of RPH Medical Illustrations)



“Thenar Eminences”

Place both thumbs opposing the mask connector using, “thenar-eminences” technique to hold the mask on the patients’ face.

The other four fingers are placed under the mandible to apply jaw lift.

Figure 3: “thenar-eminence” technique (Courtesy of RPH Medical Illustrations)

Once the seal and position are obtained, “bagging” can commence and staff are to:

Squeeze the self-inflating bag for about 1 second and then release

Aim to administer a volume that corresponds to normal chest movement

Respiratory Arrest: 10 ventilations per minute

Cardiac Arrest: Deliver 2 ventilations after every 30 compressions

Cardiac Arrest with Advanced Airway (ETT or LMA in situ): 6-10 ventilations per minute without interrupting chest compressions.

Post Procedure

Post procedure requirements are dependent upon the clinical reason for BVM ventilation and as such post procedure care will be guided by the clinician on an individual patient need.

The following should be considered with all BVM:

- Assess the adequacy of ventilation by improving colour and oxygen saturation.
- Monitor for air leak and adjust mask and/or hand position in an attempt to reduce air leak if required.
- Consider the use of an OPA or a NPA if there appears to be inadequate chest rise, despite correct positioning and good seal.
- Be cognisant of increasing gastric distension.
- Staff are to evaluate the causes of airway management problems, likelihood of requiring further airway and/or ventilatory support and manage as indicated.
- Staff are to assess the patient need for ongoing ventilatory support and manage as indicated.
- Staff are to assess the patient need for ongoing ventilatory support and consider more advanced airway management if this is required briefly during the procedural sedation or upon waking from general anaesthetic.
- Staff to replace equipment used as per site guidelines.

Appendix 4: Oropharyngeal Airway

An oropharyngeal airway (OPA) consists of a flange, a short bite block section and a curved body shape to fit over the back of the tongue to hold it away from the posterior pharyngeal wall.¹⁶

Key points prior to commencing procedure

Do not insert an airway adjunct if the patient has an intact gag reflex or actively resists.

Oral intubation is the preferred approach for definitive airway management in the emergency setting.

An OPA does not protect the airway from aspiration. In order to maintain airway patency, suction should be performed adjacent to and not through the airway.

Do not insert an airway adjunct if the patient has an Advance Health Directive (AHD) that states the patient does not want airway adjunct insertion in medical emergencies. An AHD or not for CPR order will not apply in the case of urgent treatment for suspected suicide, [Guardianship and Administration Act 1990](#) as amended by Acts Amendment (Consent to Medical Treatment) 2008.

Potential problems during or post procedure

Placement may cause airway trauma

Laryngospasm

Precipitate vomiting/aspiration in patient with intact gag reflex

Incorrect size or placement can potentially exacerbate airway obstruction

Intolerance may require removal

Procedure

Oropharyngeal Adjunct



An oropharyngeal adjunct (OPA) is an adjunct extending from the lips of the pharynx, preventing the tongue from occluding the airway. It can facilitate secretion removal via suctioning.

Figure 1: Oropharyngeal Airway (Courtesy of RPH Illustration)

Sizing



Line up the OPA with a length corresponding to the vertical distance between the patients' incisors and the angle of the jaw. Alternatively, the correct size OPA can be determined by measuring from the corner of the mouth to the tragus of the ear.

Figure 2: Sizing or oropharyngeal airway (Courtesy of RPH Illustration)

Insertion



Insert correctly sized OPA into oral cavity with the end pointing upward facing the roof of the mouth. Once 1/3 has been inserted, rotate 180 degrees over the tongue and gently advance until the flange rests against the teeth with the lips resting over the top holding the OPA in place. Maintain head tilt, chin lift, jaw thrust and reassess airway using the look, listen, feel technique.

Figure 3: Insertion of oropharyngeal airway (Courtesy of RPH Medical Illustration)

Appendix 5: Nasopharyngeal Airway

Nasopharyngeal airway (NPA) is an airway adjunct used in patients with potential or actual airway obstruction. A nasopharyngeal airway is a soft rubber or plastic tube that is inserted into the patient's nostril. It follows the curvature of the nasopharynx and the tip should sit in the posterior pharynx. They are useful adjuncts for relieving upper airway soft tissue obstructions and to facilitate suction.¹⁶

Key points prior to commencing procedure

Oral intubation is the preferred approach for definitive airway management in the emergency setting.

May be better tolerated than an OPA in semi-conscious patients with an intact gag/cough reflex.

A Nasopharyngeal airway has a smaller diameter and as such can block more easily.

Caution required with patients presenting on anticoagulation due to the high risk of causing epistaxis which will in turn complicate airway management.

Consider staffing requirements prior to commencing procedure.

Potential problems during or post procedure

Insertion may cause airway trauma, particularly epistaxis as well as laryngospasm and bronchospasm.

Incorrect size or placement will compromise effectiveness.

May exacerbate injury in base of skull fracture by potentially displacing into the cranial vault.

Can stimulate a gag reflex in sensitive patients, precipitating vomiting or aspiration.

Do not insert an airway adjunct if the patient has an Advance Health Directive (AHD) that states the patient does not want airway adjunct insertion in medical emergencies. An AHD or not for CPR order will not apply in the case of urgent treatment for suspected suicide [Guardianship and Administration Act 1990](#) as amended by Acts Amendment (Consent to Medical Treatment) Act 2008.

Procedure

The NPA should reach from the tip of the nose to the ear lobe (Size 6-7mm is suitable for adults).

Gently check the patency of the nostril to be utilised.

Clear any obstruction or debris using a Yankauer Sucker and/or forceps.

Lubricate the outside of the NPA with water based lubricating jelly, whilst being careful not to occlude the end. See Figure 1 below – Nasopharyngeal Airway (NPA).

Gently insert NPA into the nostril with the bevel facing the nasal septum. See Figure 2 below – Nasopharyngeal Insertion. Advance carefully along the floor of the nasopharynx, following its natural curvature until the flange rests against the nostril. Proceed gently without force to avoid damaging the highly vascular nasal mucosa. If resistance is encountered, stop immediately and reattempt insertion in the patients other nostril.



Figure 1: Nasopharyngeal airway (Courtesy of RPH Medical Illustrations)



Figure 2: Nasopharyngeal airway insertion (Courtesy of RPH Illustration)

Post Procedure

Once in position, reassess airway by observing for improvements in patients respiratory status.

Apply manual ventilation or oxygenation as required.

Suction secretions via tube as is necessary.

Do not leave the nasopharyngeal airway (NPA) insitu longer than 8 hours.

Appendix 6: Emergency Endotracheal Intubation

Emergency Endotracheal Intubation (ETI) is an advanced airway procedure where an orotracheal tube is placed under direct vision through the larynx into the trachea. It provides a protected airway whilst enabling ventilation and a route for oxygenation and suctioning^{17,18}. In addition to providing optimal isolation and patency of the airway, intubation allows ventilation with 100% oxygen and suctioning of the airway¹⁹.

Whilst the LMA is considered a 'definitive airway', Endotracheal intubation remains the gold standard for airway maintenance and airway protection in cardiopulmonary resuscitation (CPR), for expert/competent clinicians.

Indications

The placement of the tube provides an artificial airway and may be required for the following clinical indications:

- Secure or maintain an airway in the unconscious or obtunded patient.
- Secure the airway in the presence of swelling e.g. post-operative, trauma, burns and during anaesthetic procedures.
- Treat or prevent respiratory or ventilatory failure as defined by O₂, PaO₂, PaCO₂ levels
- Tracheobronchial suction in the patient who is unable to effectively clear their secretions and whose respiratory state is compromised as a result.
- Bronchial tree protection and prevention of aspiration of gastric contents, in the patient who is unconscious or in a decreased neurological state. Other indications may include depressed gag reflex and vocal cord palsies.
- Application of intermittent positive pressure ventilation (IPPV), for example, during resuscitation, anaesthetic procedures, in respiratory failure and any state in which mechanical ventilator support is required.

Key points prior to commencing procedure

- May be done as an emergency, rapid sequence induction, depending on the clinical needs of the patient.
- Is performed by medical staff that have been trained in the technique, or under direct supervision of senior medical staff.
- Staff to consider risk categorisation of patients during pre-oxygenation, sequence of pre-oxygenation and prevention of desaturation.
- Is a team procedure:
 - One person to directly assist the MO with the ETT insertion
 - One person to apply cricoid pressure or Sellick's manoeuvre, if this is requested by the MO. If cricoid pressure or Sellick's manoeuvre is requested, pressure will be applied to the cricoid cartilage and not removed until directed to do so (or if the patient vomits).

- ETT sizing depends on the patient’s physical morphology, airway view and clinical condition.
- Intubation equipment must be available and accessible.
- Fasting of the patient for a minimum of 6 hours should precede elective intubation.

If a patient dies and the death is reportable to the Coronial Investigation Unit, ETT must not be removed or interfered with. Permission must be given by the Coronial Investigation Unit for removal.

If endotracheal intubation is attempted during resuscitation, ongoing CPR must be maintained and attempts at intubation should not interrupt cardiac compressions for more than 5 seconds¹⁹.

Potential problems during or post procedure

Endotracheal intubation (ETI) procedure may cause prolonged apnoea: hypoxia, oesophageal intubation or right main bronchus intubation.

If high cuff pressures are required to stop leak as part of the post procedure, check the: ETT position (if the ETT is placed too high this can contribute to high pressures)

Consider need to replace with larger ETT size

May cause aspiration

Possibility of cuff leak and tube occlusion

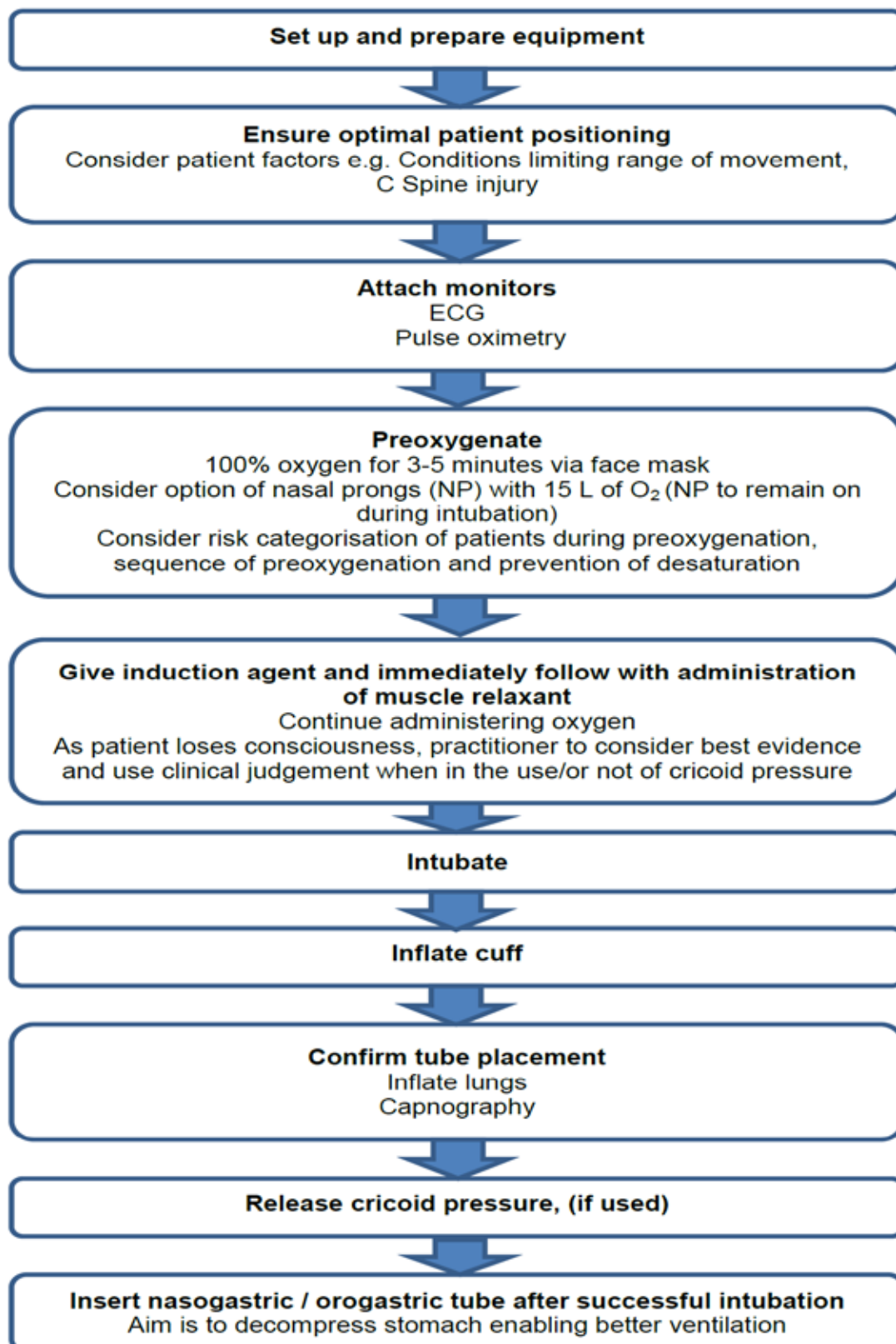
Laryngeal injury.

Equipment

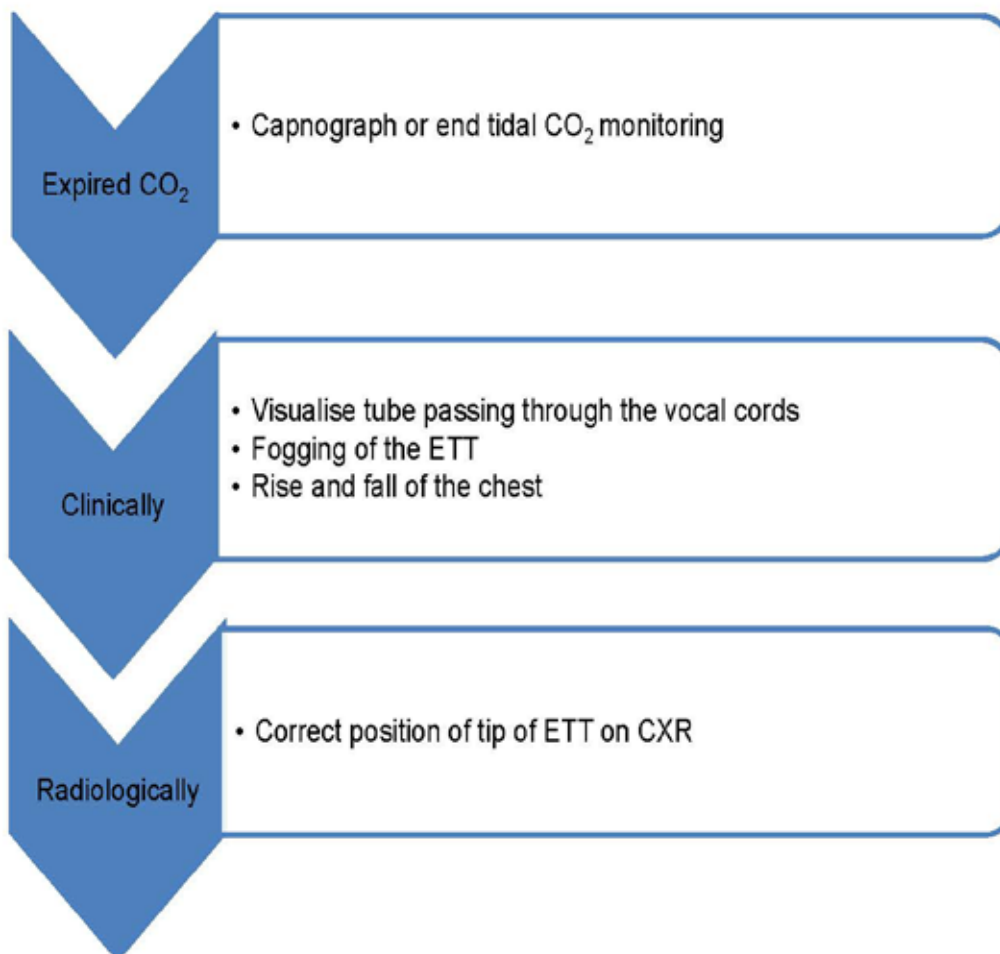
10ml syringe	Oropharyngeal airway in a range of sizes
Laryngeal mask airways (LMA)	ETT introducer, bougie and Magill's forceps
Water based lubricant	Capnography device
Length of cotton tape, or alternative device to secure ETT	Laryngoscopes with spare globes and a range of sizes
Bag and Mask in a range of sizes with the ability to connect to an oxygen supply	
Suction equipment including wide bore rigid suction catheter(Yankauer sucker) and soft, flexible Y suction catheters in a range of sizes	
Endotracheal tubes (ETT) in a range of sizes (In an emergency situation a 7 or 8mm is usually used for a woman and 8 or 9mm is usually used for a man)	
Pharmaceutical agents as requested by MO	

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Procedure



Confirming correct positioning of ETT



Post Procedure

Following the successful insertion of an ETT, resuscitation if required, is to be followed as per Advanced Life Support (ALS) courses, International Liaison Committee on Resuscitation (ILCOR) guidelines as agreed by WACHS sites and individual clinician skill/training.

Clinician to consider, arterial blood gas (ABG) levels to assess patient's clinical status and to confirm satisfactory oxygenation levels.

Maintain fixation of the ETT by attaching cotton tape, or alternative device to secure ETT.

Elective removal of an ETT from the airway of a patient must be performed in the presence of a medical officer suitably skilled in intubation.

Do not tape naso/orogastric tube to ETT except in patients with facial burns

Documentation

Refer to the [documentation](#) section of this CPS and additional points listed below:

- Intubation date and time
- Number of attempts to intubate
- Grade of view (if difficult e.g. Mallampati score, vomit etc.)
- ETT size
- Position of ETT at patients teeth/gums (in centimetres)
- Cuff pressure
- Confirmation that chest x ray was performed
- Equal air entry and rise and fall of chest and position confirmed as satisfactory by MO
- Any pharmaceuticals that were administered
- Ventilator settings (once attached)
- Patients vitals e.g. SpO₂, pulse, capnography reading, and
- Any complications during, or caused by procedure.

Appendix 7: Laryngeal Mask Airway/i-gel

A laryngeal mask airway (LMA) is a supraglottic airway device that is used to secure the airway in an unconscious patient, with its main advantage being that it does not require laryngeal visualisation for adequate placement or neuromuscular blockade. The LMA forms a seal around the glottis in the hypopharynx, and the tip of the LMA rests against the upper oesophageal sphincter. The cuff of the LMA is in contact with the base of the tongue and the piriform fossa. Upon inflation the cuff forms a low pressure seal over the glottis with ventilation more efficient and easier than with a bag and facemask.^{2,21}

Key points prior to commencing procedure

- The LMA is available in sizes 1-6 with the size selected based on the patients weight and size of hypopharynx²¹
- Must only be inserted in a patient that is deeply unconscious.

While endotracheal intubation is the, 'gold standard' for securing an artificial airway during resuscitation, if skilled and experienced professionals in this technique are not available or endotracheal intubation fails, then the use of an LMA may be warranted.

Potential problems during or post procedure

Regurgitation and aspiration	Laryngospasm	Stimulation of a gag reflex
Airway obstruction	Bronchospasm	Unable to provide adequate airway

Equipment

The equipment listed below are suggested and should be customised to meet the specific needs, preferences and skills of the clinicians and health care facility.

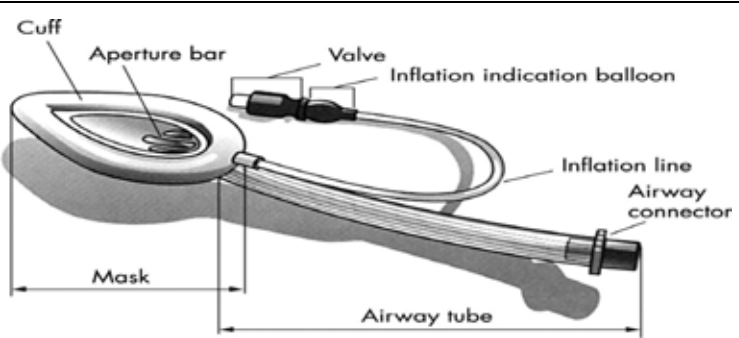
Appropriately sized laryngeal mask	Water based lubricant
Bag/mask connected to oxygen	50ml syringe
Yankauer suction catheter-operational and adjacent patient	Bag/tube connection device (bodai swivel connector)
Endotracheal tape tie	

Procedure

Prepare a correctly sized LMA and have a smaller LMA available should insertion difficulties arise.

Open LMA and place face down, with tube uppermost and attach 50ml syringe.

Gently remove air from cuff ensuring deflation.

Size	Weight	
Size 1	<5kg	 <p>Figure 1: Laryngeal mask airway</p>
Size 1 ½	5-10kg	
Size 2	10-20kg	
Size 2 ½	20-30kg	
Size 3	30-50kg	
Size 4	50-70kg	
Size 5	70-100kg	
Size 6	>100kg	

Generously lubricate the upper most surface of the cuff, taking care to ensure ventilation ports (located on the underside of the cuff) remain patent.

Device to be passed, handling the upper tube portion of the device to reduce the risk of contamination.

Flex the patient’s head slightly and extend neck. Apply jaw thrust and maintain during insertion until LMA is in position or as requested by staff inserting device.

Inflate the cuff with air (do not hold the LMA during inflation to allow the LMA to self-position). The tube will lift out of the mouth by 1-2cm as the cuff finds its correct position, pushing the larynx forward.

Post Procedure

Once in position, the staff inserting the LMA will reassess airway and monitor for improvement in the patient’s respiratory status.

Following satisfactory placement has been confirmed, secure mask using a tape tie around the patient’s head.

Ventilate patient as required using bag/mask +/- connector.

If tube insertion is unsuccessful within 30 seconds, reoxygenate the patient via bag/mask ventilation before attempting another insertion.

Documentation

Refer to the [Documentation CPS](#) and additional pints listed below:

- Date and time of LMA insertion or adjustment
- Size of LMA inserted
- Position at lips
- Amount of air instilled into cuff, and
- Air entry on auscultation

Appendix 8: Emergency Cricothyroidotomy

Cricothyroidotomy is indicated as a rapid means to definitively secure or rapidly circumvent obstruction of a patient's airway when inability to restore adequate oxygenation would have potentially catastrophic results.²² With Cricothyroidotomy, an opening is made in the cricothyroid membrane to establish an airway.

There are three main approaches to cricothyroidotomy: needle cricothyroidotomy, percutaneous cricothyroidotomy (using the Seldinger technique) and surgical cricothyroidotomy. Another approach to cricothyroidotomy is called the rapid 4-step technique (RFST). This technique involves a scalpel, a tracheal hook, a tracheostomy tube and consists of the following 4 steps: palpation, stab incision, inferior traction, and tube insertion. Although the RFST is faster than the standard surgical technique, it has been shown to have a higher complication rate.

Indications

In an emergency situation, the following are considered to be some main reasons for performing a cricothyroidotomy first rather than attempting to open or clear the patient's airway by other methods:

- Known previous difficult failed intubation
- Tumour, Cancer or other disease or process causing mass effect
- Previous Maxillofacial, laryngeal or oral surgery and or radiotherapy
- Upper Airway stenosis or congenital deformities
- Oropharyngeal oedema e.g. anaphylaxis, and/or
- Foreign Body Obstruction.

Trauma to the face / neck resulting in upper airway occlusion or unidentifiable anatomy. This can include:

- Burns (thermal or chemical)
- Strangulation / hanging
- Motor Vehicle Accident, and
- Gunshot Wound.

Key points prior to commencing procedure

Equipment for emergency tracheal access should be available at every WACHS hospital site. It is recommended that this equipment is located at WACHS sites on difficult airways trolleys or in medical emergency trolleys in critical care areas such as intensive care units and emergency departments for 'cannot intubate, cannot oxygenate' (CICO) scenarios.

Emergency cricothyroidotomy must only be performed by those medical officers trained in the technique or under direct supervision of senior medical staff. Medical officers must be familiar with the indications, contraindications, complications and procedure of this type of rescue airway.

Consider clinical indication for cricothyroidotomy, as unnecessary delay could eventuate in death of the patient.

Contraindications

- Availability of a less invasive means of securing the airway
- Patients <12 years old (needle technique may be used but formal tracheostomy is preferred)
- Laryngeal fracture or disease due to infection or trauma
- Pre-existing or acute laryngeal pathology
- Tracheal transection with retraction of trachea into mediastinum
- Anatomical landmarks obscured by gross haemorrhage/surgical emphysema, etc.
- Inability to identify landmarks, and/or
- Underlying anatomical abnormality.

Potential problems during or post procedure

Complications	Techniques to prevent complication
Thyroid membrane incision	Attention to anatomy; vertical skin incision; confirm position of the cricothyroid membrane after skin incision.
Intraoperative /postoperative bleeding	Incise directly over the cricothyroid membrane in the midline; vertical skin incision; then horizontal incision in inferior half membrane; avoid the thyroid isthmus.
Subglottic stenosis	Use a small-bore tube; avoid long-term use (>72 hours).
Dysphonia/hoarseness	Use a small tube; point inferiorly to avoid cords; avoid tracheal cartilage damage by not using force.
Laryngeal damage	Avoid oversized tube and excessive traction on the thyroid cartilage during insertion.
Tube misplaced in bronchus	Avoid insertion of too much of tube length so as not to enter the right main bronchus.
Pulmonary aspiration	Protect the upper airway by suction and positioning.
Tracheal stenosis	Use a low-pressure balloon cuff.

Equipment

The equipment listed below is suggested and should be customised to meet the specific needs, preferences and skills of the clinicians and health care facility.

Needle Cricothyroidotomy

Antiseptic solution	Syringe (10ml) filled with 5ml of normal saline
Lignocaine	Angiographic catheter (14 gauge or larger)
Sterile materials	Personal Protection Equipment (for all staff involved with procedure)
Sterile gauze pads	Jet Insufflator or Leroy

Surgical Cricothyroidotomy

Antiseptic Solution	No.11 scalpel blade
Lignocaine	Bag-Valve-Mask (BVM)
Syringe (10ml)	Tracheal hook
Hemostat	Tracheal dilator (Trousseau dilator) or spreader
Sterile drape/gown/gloves	Endotracheal tube (cuffed size 6.0)
Mayo scissors	Tracheostomy tube (cuffed size 4) non-fenestrated with trocar

There is an increased risk of blood exposure during cricothyroidotomy and therefore appropriate Personal Protective Equipment (PPE) must be utilised.

Procedure

An opening is made in the cricothyroid membrane to establish an airway with either a needle/small cannula or with a surgical (open) technique.

Below are example procedures to assist staff:

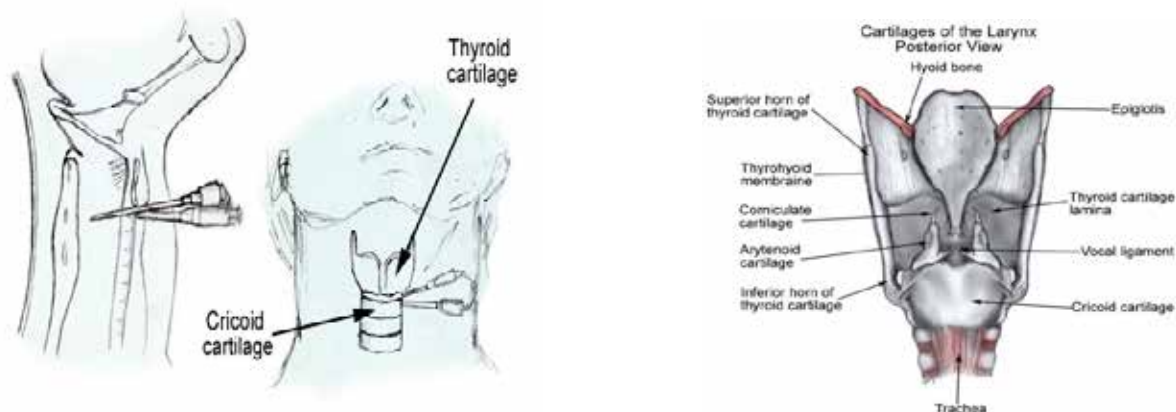
Needle cricothyroidotomy

1. Place the patient supine and, assuming there is no cervical spine injury, extend the neck using a pillow under the shoulders. However, the procedure can be performed with the patients head in the neutral position.

Ensure difficult airway trolley requested with anaesthetic consultant and anaesthetic technician.

Prepare a sterile field, including cleansing with antiseptic solution and apply lignocaine (if time allows and is indicated).

Identify anatomic landmarks (as can be seen over the page)



2. Palpate the thyroid cartilage (the first prominent landmark on the anterior neck) the cricoid cartilage (caudal to the thyroid cartilage), and the area between them, which is the cricothyroid space that contains the membrane.

Run a finger down the front of the neck in midline and find the sternal notch superiorly, in the upper border of the thyroid cartilage. Below this is a depression between the thyroid and cricoid cartilages – the cricothyroid membrane.

Stabilise the cricothyroid membrane with one hand between finger and thumb.

The assisting clinician passes a 12G or 14G BD Instyrt IV cannula to the clinician completing the procedure.

The cricothyroid membrane is pierced with the cannula attached to a syringe (with 2-3mls of saline), aiming at 45 degrees to the skin, caudally in the sagittal plain.

Aspirate as the needle is introduced and confirm position by withdrawal of air; slide the cannula over the needle into the airway. A distinct pop can be felt as the needle traverses the membrane and enters the trachea. In addition, air bubbles will appear in the fluid filled syringe.

The catheter is then advanced over the needle, which is the removed.

Ensure oxygen tubing is connected to oxygen flow meter and when requested, turn oxygen flow meter on (10-15L/min).

Attach the jet ventilation device and ventilate at 40-50lb per square inch or 15L/min.

Secure the tube with appropriate device or tape.

- Note:** Expiration is not possible through the cannula so with complete upper airway obstruction of the upper airway, reduce the oxygen flow. A needle cricothyroidotomy can usually only be used for 30-45 minutes before CO₂ retention becomes significant.

Percutaneous Cricothyroidotomy (Seldinger Technique)

1. Follow points 1-8 of needle cricothyroidotomy (see above).
2. Remove the syringe from the needle, and advance the guide wire through the needle. Remove the needle once the guide wire is in place.
3. Use the scalpel to make a small stab incision in the skin close to the guide wire.
4. Place the dilator into the airway catheter, and insert the 2 devices together over the wire.
5. Remove both the dilator and the guide wire once the airway tube is secured in the trachea.
6. Secure the tube in place with appropriate device or tape.

Surgical cricothyroidotomy

Identify anatomy – If able to do so:

1. Stabilise the cricothyroid structures with middle finger and thumb of non-dominant hand at the level of the cricothyroid membrane.
2. Make a vertical incision with the scalpel, at least 3cm long and centred over the cricothyroid membrane.
3. Punch the scalpel through the cricothyroid membrane and cut side to side, so as to open the membrane.
4. Once the scalpel is removed, place the index finger of the non-dominant hand into the incision to ensure that the airway has been opened, whilst also keeping the middle finger and thumb of the dominant hand insitu, to maintain position.
5. Guide the bougie along the index finger into trachea.
6. Insert ETT 6.0 over the bougie and into the trachea.
7. Confirm position of the ETT with etCO₂ and auscultation.
8. Secure ETT
9. If unable to identify anatomy:
10. Make a midline incision along the majority of the neck.
11. Bluntly dissect with fingers of both hands to find cricothyroid / trachea.
12. Once cricothyroid / trachea located stabilise with the non-dominant hand and follow the procedure as above.

Post Procedure

Securing ETT / airway (post-surgical airway)

The most appropriate technique utilised is to be in accordance with site endorsed instructions, or at the discretion of the clinician as per recognised standards of practice.

Recognised options for securing an ETT / airway (post-surgical airway) include:

Utilise equipment's own securing device if available e.g. trache and trache tape.

If using an ETT via the cricothyroid membrane, cotton tape is tied to ensure that the carotid / jugular, is not compressed. This often requires a piece of adhesive tape bilaterally so as to ensure that loose cotton tape does not slip up or down the neck. It is important to mark the ETT at the skin so that it can be easily seen if the ETT has migrated in or out.

If entry point to the airway is through the trachea below the cricoid, it may require a suture that has gone around at least one tracheal ring below the incision site (especially if a horizontal cut made in the trachea during an emergency; with risk of near transection of the trachea). This suture can either then be tied around the tube, left with a long tail (clearly labelled), or tied off after also going through the skin of the neck. This is to ensure that the trachea either can't retract down into the chest or provides ability to retrieve it, if this occurs.

For jet insufflation – Secure with a single staff member whose role is to hold it in place while further airway management occurs.

Arrange definitive airway management at the earliest opportunity if required.

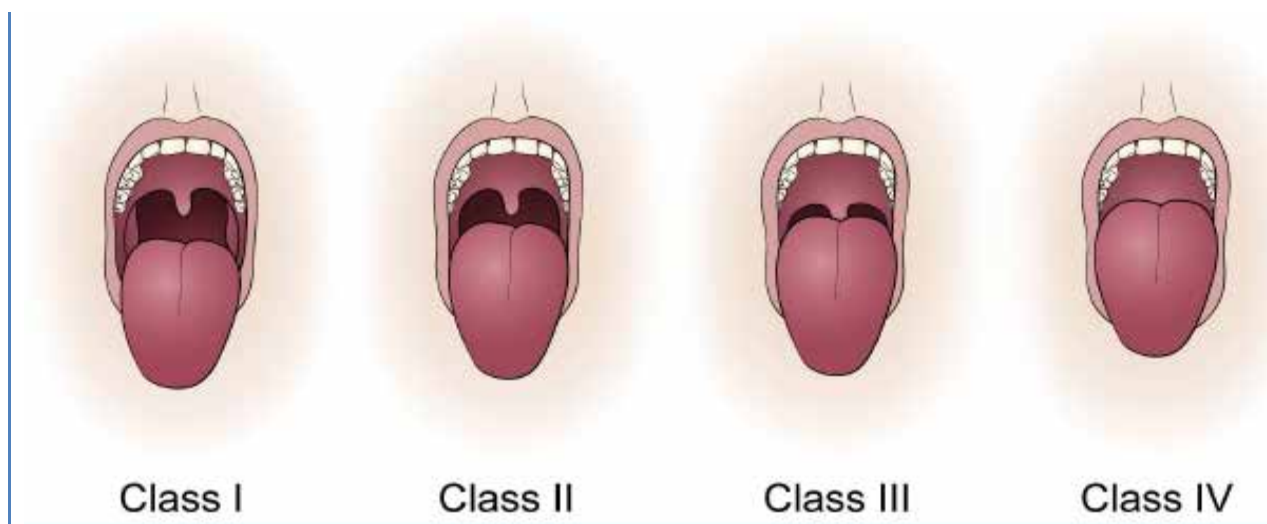
Appendix 9: Airway Mnemonics

MOANS: Difficult bag-mask ventilation^{2,23}

M	Mask seal, high Mallampati grades (test of visual assessment of the distance of the tongue base to the roof of the mouth), Minimal jaw protrusion, or Male gender: Facial hair, crusty blood on the face or a disruption of lower facial continuity are the commonest examples of conditions that may make an adequate mask seal difficult.
O	Obese or Obstructing lesions: Patients who are obese, parturients (women in labour) or at term and in patients with upper airway obstruction, angioedema, Ludwig angina (a rare bacterial infection on the floor of the mouth underneath the tongue), upper airway abscesses and epiglottitis are often difficult to ventilate adequately by bag and mask.
A	Age more than 55 is associated with a higher risk of difficult BMV.
N	No teeth or Neck radiation: An adequate mask seal may be difficult in the edentulous patient as the face tends to cave in. An option is to leave dentures in situ if available.
S	Snoring or Stiff: For the former, check for sleep apnoea, an increasingly important consideration in anaesthetic practice.

LEMON: Difficult laryngoscopy and intubation^{2,23}

L	Look externally: A litany of physical features have been associated with difficult laryngoscopy and intubation.
E	<p>Evaluate (3-3-2 rule): The size of the mandible, the distance between the mentum and the hyoid bone and the extent of mouth opening are all important geometric determinants of the success of laryngoscopy. These relationships are represented by the 3-3-2 rule. The rule describes three measurements found in normal patients:</p> <p>3: This assessment indicates the ease of access to the airway. A normal patient can open his mouth sufficiently to permit three of his own fingers to be placed between the incisors. Adequate mouth opening facilitates both insertion of the laryngoscope and obtaining a direct view of the glottis.</p> <p>3: This assessment provides an estimate of the volume of submandibular space. A normal patient is able to place three of his fingers along the floor of the mandible between the mentum and the neck / mandible junction (near the hyoid bone).</p> <p>2: This assessment identifies the location of the larynx relative to the base of the tongue. A normal patient is able to place two fingers in the superior laryngeal notch (i.e. the space between the superior notch of the thyroid cartilage and the neck / mandible junction, near the hyoid bone). If the larynx is too high in the neck, direct laryngoscopy is difficult or impossible because of the angles that have to be negotiated to permit visualisation.</p>
M	<p>Mallampati score: The Mallampati classification is a simple scoring system that may help predict a difficult intubation.</p> <p>The Mallampati class, ranging from I to IV, relates the amount of mouth opening to the size of the tongue and provides an estimate of space for oral intubation by direct laryngoscopy. Mallampati class I or II predicts easy laryngoscopy, class III predicts difficulty and class IV predicts extreme difficulty.</p>



- O** **Obstruction/Obesity:** There are three cardinal signs of upper airway obstruction: muffled voice; difficulty in swallowing secretions, either because of pain or obstruction; and stridor. The first two signs do not ordinarily herald imminent total upper airway obstruction. The presence of stridor generally indicates that the diameter of the airway has been reduced to 4.0mm or less. Upper airway obstruction should always be considered a difficult airway and managed with extreme care. The administration of small doses of opioids and benzodiazepines to manage anxiety may induce total obstruction as the stenting tone of the upper airway musculature relaxes.
- N** **Neck mobility:** The ability to position the head and neck is one of the six components of achieving an optimal view of the larynx on oral laryngoscopy. Although there is some dissension, the ‘sniffing the morning air’ positioning (neck flexion, head extension)of the head and neck, when possible. While cervical spine immobilisation alone may not constitute a difficult laryngoscopy, airway practitioners should be cautious in managing patients with limited cervical spine movement.

RODS: Difficult use of an extraglottic device 2,23

- R** **Restricted mouth opening:** Depending on the extraglottic device (EGD) to be employed, more or less oral space may be required.
- O** **Obstruction:** Upper airway obstruction at the level of the larynx or below. An EGD will not bypass this obstruction. The use of an LMA can be potentially difficult in patients with lingual tonsillar hypertrophy.
- D** **Disrupted or Distorted airway:** The, ‘seat’ and ‘seal’ of the EGD may be compromised. Seal may be exceedingly difficult or impossible to achieve with a fixed flexion deformity of the neck, or with an upper airway distortion.
- S** **Stiff lungs or cervical spine:** Ventilation with an EGD may be difficult or impossible in the face of substantial increases in airway resistance e.g. severe asthma or decreases in pulmonary compliance e.g. pulmonary oedema.

Appendix 10: Components of the Preoperative Airway Physical Examination^{2,10}

Airway Examination Component	Non reassuring findings
Length of upper incisors	Relatively long
Relationship of maxillary and mandibular incisors during normal jaw closure	Prominent “overbite” (maxillary incisors anterior to mandibular incisors)
Relationship of maxillary and mandibular incisors during voluntary protrusion of mandible	Patient cannot bring mandibular incisors anterior to (in front of) maxillary incisors
Interincisor distance (distance between the upper and lower incisors)	Less than 3cm
Visibility of uvula	Not visible when tongue is protruded with patient in sitting position e.g. Mallampati class > 2
Shape of palate	Highly arched or very narrow
Compliance of mandibular space	Stiff, indurated, occupied by mass, or non-resilient
Thyromental distance (distance between the thyroid notch and the tip of the jaw with the head extended)	Less than three ordinary finger breadths
Length of neck	Short
Thickness of neck	Thick
Range of motion of head and neck	Patient cannot touch tip of chin to chest or cannot extend neck

Appendix 11: Techniques for Difficult Airway and Ventilation Management ^{2,10}

Techniques for Difficult Airway Management	Techniques for Difficult Ventilation
Awake intubation	Two person mask ventilation
Blind intubation (oral or nasal)	Oral and nasopharyngeal airways
Fiberoptic intubation	Supraglottic airway
Intubating stylet or tube changer	Intratracheal jet stylet
Supraglottic airway as an intubating conduit	Rigid ventilating bronchoscope
Laryngoscope blades of varying design and size	Invasive airway access
Light wand	Light-guided intubation
Video laryngoscope	Illuminating & optical elements

Appendix 12: The Vortex Approach

The Vortex implementation tool is the core of the broader Vortex Approach which provides a comprehensive array of resources to facilitate all phases of airway advanced airway care including airway assessment, development of an airway strategy and performance of airway interventions in both the routine and emergency setting.

The focus of the Vortex Approach is on providing "implementation tools" for real-time use during the process of airway management. In addition it provides "foundation resources", to be referred to prior to undertaking airway management, that teach clinical teams how to use the Vortex Approach.

Implementation Tools: the Vortex Approach incorporates a suite of implementation tools designed to facilitate both the preparation and intervention phases of advanced airway care. These aim to present information in a manner that is simple enough to be accessible to teams during clinical practice. These adjunctive tools work in an integrated fashion with the primary Vortex tool using the same concepts and language.

Foundation Resources for the Vortex Approach: "implementation" tools will not be effective without prior familiarity and training to lay a foundation for their use. The Vortex Approach therefore provides a number of "foundation" resources that establish understanding of the background principle specific to the Vortex Approach and proficiency in the team behaviours required for its successful implementation.

Technical Foundation Material: effective airway management requires that clinicians have a foundation in the requisite technical knowledge, skills and attitudes that make them competent to make appropriate decisions in response to the prompts provided by the Vortex and implement the chosen interventions. Although the resources of the Vortex Approach provide a limited amount of technical material, the bulk of this technical content should be derived from other recognised airway management resources and formal airway training programs. The Vortex Approach then provides a template to prompt team recall and application of this technical background material in real-time. Thus the Vortex Approach should not be viewed as an alternative to the major airway algorithms but as a complementary resource, designed to facilitate implementation of the management recommendations outlined by these training tools and improve the performance of clinical teams.

The Vortex serves to maximise opportunities to establish alveolar oxygen delivery by:

- Facilitating effective [planning](#) for airway management
- Facilitating efficient best efforts at each of the three upper airway [lifelines](#).
- Encouraging appropriate decision making when any of these are successful and the [Green Zone](#) is entered.
- Promoting early [priming](#) for [CICO Rescue](#) as an airway crisis evolves.
- Facilitating rapid recognition of the need for CICO Rescue.

Note: [The Vortex is recommended by the Australian & New Zealand College of Anaesthetists as an educational resource for the CICO emergency response module](#)

(Internet: The Vortex Approach to Airway Management: <http://vortexapproach.org/> downloaded 21 December 2018)