

## Topic Overview: Surgical Airway and Difficult Airway Algorithm

### Module Airway Module A4-2

Date of last update: 30<sup>th</sup> October 2012

### Objectives

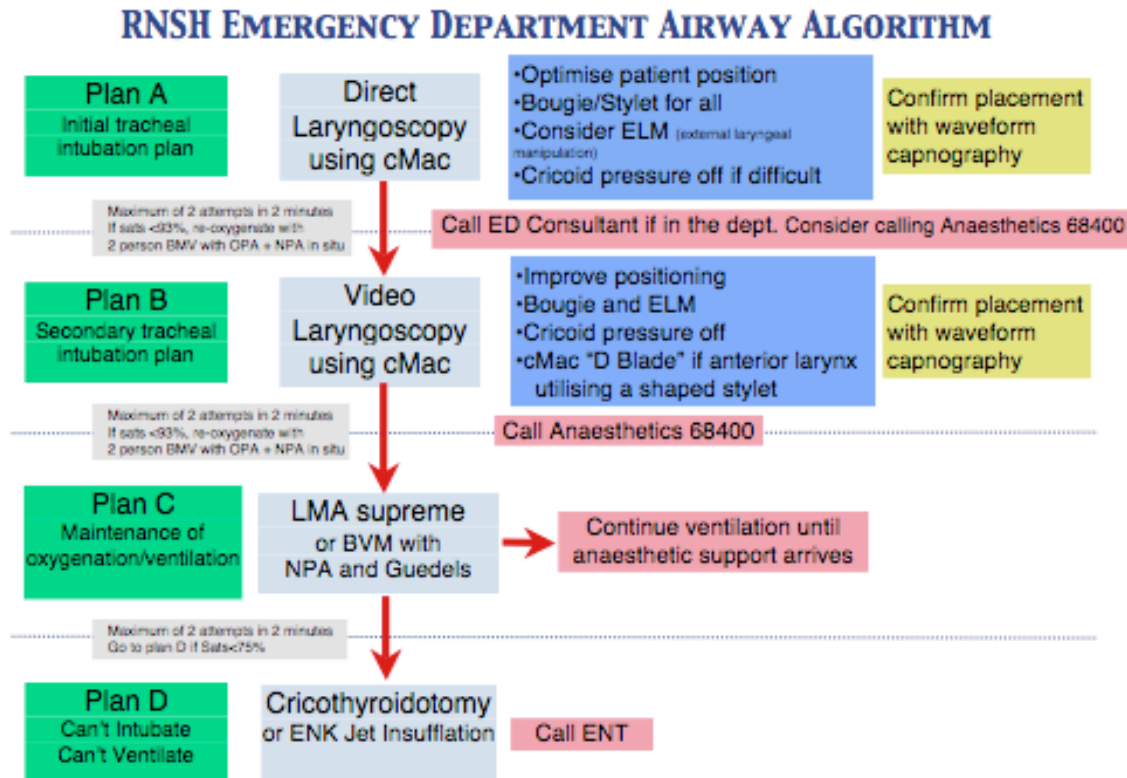
1. To review the difficult airway algorithm
2. To rehearse the use of the Melker kit and the Bougie-assisted cricothyroidotomy
3. To practise crisis resource management skills required for a structured team approach

**Take home message:**  
**Patients don't die from failure to intubate.....they die from failure to oxygenate**

In previous EdWISE modules it has been highlighted that the management of the airway in the Emergency Department requires training, preparation and planning. Simple airway manoeuvres and adjuncts are the first line technique in all episodes of airway management; these should be rehearsed regularly and optimised when facing any difficulty to achieve adequate oxygenation and ventilation.

When performing any Rapid Emergency Intubation (REI), the difficult airway algorithm should be communicated to the entire team by the team leader or airway clinician, the plan should include instructions for the rare complication of a can't intubate, can't oxygenate situation.

Figure 1: Emergency airway plans



Developed by T. Fogg, J. Kennedy, J. Vasilakidis; Version 1.4 08/09/12.

Based on an algorithm by George Douros from Austin Health

This project was possible due to funding made available by Health Workforce Australia

Figure 1 demonstrates a suggested difficult airway algorithm, this version is used by Royal North Shore Hospital's Emergency Department. It is advised that your department develops an algorithm suiting your local resources and practices. Returning at any stage to effective BVM ventilation, with adjuncts, in most cases will avoid the need to move further down the pathway, whilst waiting for assistance to arrive.

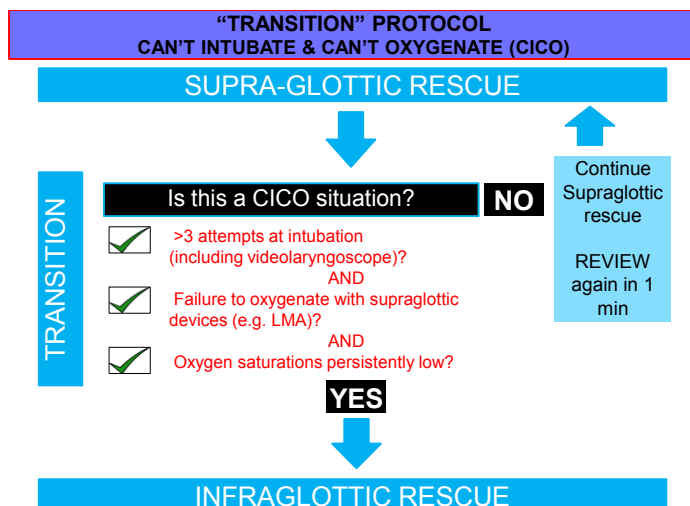
It is suggested that the first attempt should be aided by a bougie or intubating stylet with the patient in the optimal intubating position, the sniffing or ear to sternal notch position.

A second attempt should be proceeded by calling for further assistance and optimization of the attempt with positioning, technique alteration or operator change. Avoidance of hypoxia is essential during these attempts, pauses for improving oxygenation through BVM ventilation are often required.

In the event of inability to intubate, which may be due to anatomical, pathological or operator difficulty the use of an LMA is advised as an interim step. This will facilitate improved ventilation and oxygenation whilst awaiting further support, especially if BVM ventilation proves difficult or tiring. This has reduced the incidence of can't intubate, can't oxygenate situations. If an LMA has been inserted as a result of difficulty, it is strongly advised that this is not removed until the optimal intubating conditions have been achieved. This may include a senior anaesthetist immediately available or transfer to the operating theatre for fibre-optic or surgical airway with ENT present.

In the rare event that BVM ventilation, intubation and insertion of LMA are unable to oxygenate the patient this is a Can't Intubate, Can't Oxygenate situation and the algorithm will progress to Plan D – the infraglottic rescue.

Figure 2 : Criteria to support transition from Plan C (Supraglottic rescue) to Plan D (Infraglottic rescue)

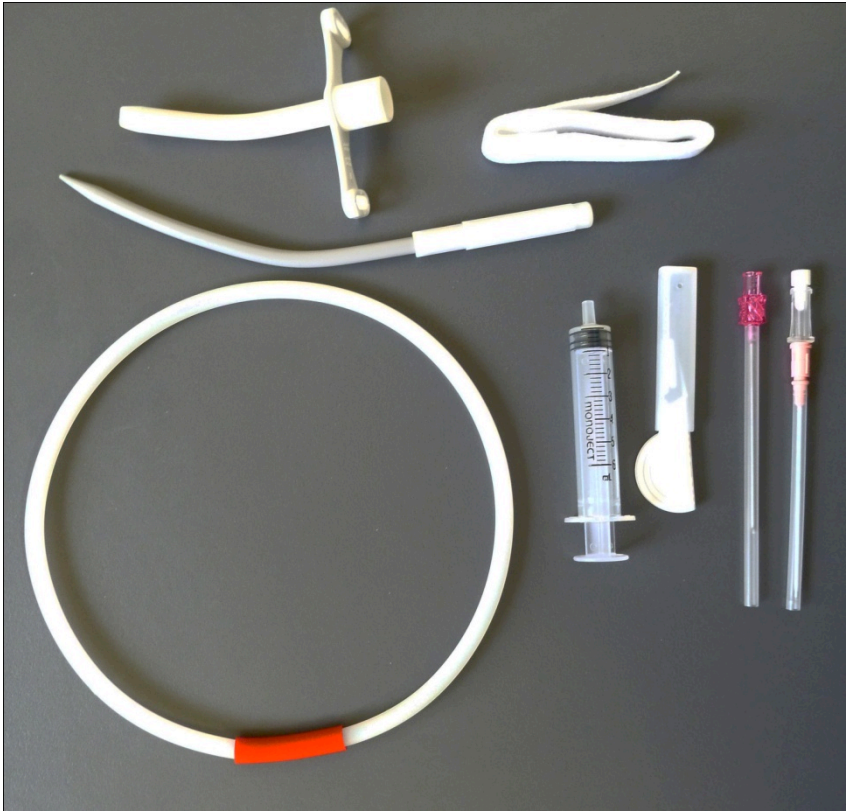


With permission of a Head and Working group for the Royal Health Continuing Education (RICE) (Stream 1) 'Cricoidly Obstructed Airway Workshop' Contact [education@nsh.health.nsw.gov.au](mailto:education@nsh.health.nsw.gov.au) 2012

Options for infraglottic rescue include needle cricothyroidotomy or surgical cricothyroidotomy (with a commercial kit or with a scapel).

This event should be announced with “This is a Can’t Intubate, Can’t Oxygenate Situation”, so that all members of the team are aware of the events which will follow and why this is occurring.

Figure 3: Melker Kit



#### Melker Kit Procedure:

Clear communication is essential during this rare, but life-saving procedure.

For a right hander come from the right hand side of the bed with all your equipment open and ready.

Stabilise the airway with your left hand.

The cricothyroid membrane is a palpable gap between the lower edge of the thyroid cartilage and the upper edge of the cricoid cartilage. It is important to extend the neck to assist identification.

After cleaning the area (and in a patient who is not unconscious infiltrating with a few mls of 1% Lignocaine with 1 in 1000 adrenaline), use the needle with syringe attached to enter the cricothyroid membrane at 45 degrees to the skin. Aspirate as you go. You will know you have entered the airway when you aspirate air.

Once you have entered the airway, carefully remove the syringe and feed down the wire. This shows the importance of a knowledgeable assistant, clear communication and preparation so the wire is easily available.

Make sure the soft end of the wire is fed down. The wire can be fed down 5-10cm.

When inserting the dilator and cannula over the wire make sure you keep the 2 components together. Also to enter the airway it can be tight requiring a slight “screwing” motion.

The wire and dilator come out pretty easily, just make sure you always hold on to the white cannula whilst removing the dilator.

Once the cannula is in place it should be secured with the included straps, with the operator supporting the device until this has occurred. Bag Valve ventilation should be performed in the same way as through an endotracheal tube, then the ventilator utilised.

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There are a few complications worth considering with the Melker system.

**Complications:**

- Haemorrhage.
- Creation of a false passage.
- Going through the back of the trachea.
- Unable to advance the wire (changing angle may help).
- Subglottic stenosis (later).
- Infection (later).

There is an E-learning video of this procedure on the EdWISE moodle website.

**Bougie-Assisted Cricothyroidotomy**

This is an open technique where the cricothyroid membrane is opened with a scalpel allowing the insertion of a bougie. It is often favoured by those clinicians with a surgical background and head to head it has been found to be quicker and more successful than the Melker kit.

Equipment: Scalpel, Bougie with Coude tip, 6.0ETT and a 5 or 10ml syringe.

The right handed practitioner will be on the right of the bed, stabilising the airway with your left hand.

Commencing with a vertical incision is useful in the patient with big, swollen necks (unfortunately often the very patients you need to perform a cricothyrotomy on) as it helps you locate the membrane and away from larger vessels.

Then rotate and puncture the cricothyroid membrane horizontally.

Having a finger (or tracheal dilators) in the airway means you can make sure you do not lose position (especially in the partially conscious patient).

Feed the bougie into the cricothyroid membrane, as the bougie is advanced it can be felt tapping against the tracheal rings.

The Endotracheal tube is then railroaded over the bougie into the airway, remove the bougie and then inflate the ETT cuff.

BVM ventilation is then performed and the tube secured.

A video demonstrating Bougie-Assisted Cricothyroidotomy is available on the EdWISE E-learning moodle.

**Post intubation care and ongoing management of the condition, cause, complications and co-morbidities must occur after the surgical airway.**

**References**

- Heard et al. The formulation and introduction of a can't intubate can't ventilate algorithm into clinical practice. Anaesthesia, 2009, 64:601-608
- Henderson et al. The Difficult Airway Society guidelines for management of the unanticipated difficult intubation. Anaesthesia 2004, 59:675-694
- Carley et al. Rapid sequence induction in the emergency department: a strategy for failure. Emergency Medical Journal 2002: 19:109-113

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