Royal College of Anaesthetists

Difficult Airway Society

Tayside Mastery Learning Programme

Unanticipated Difficult Airway Management and Emergency Front-of-Neck Airway (eFONA)

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LEARNING OUTCOMES

By reviewing this pack, a trainee should gain an understanding of the following:

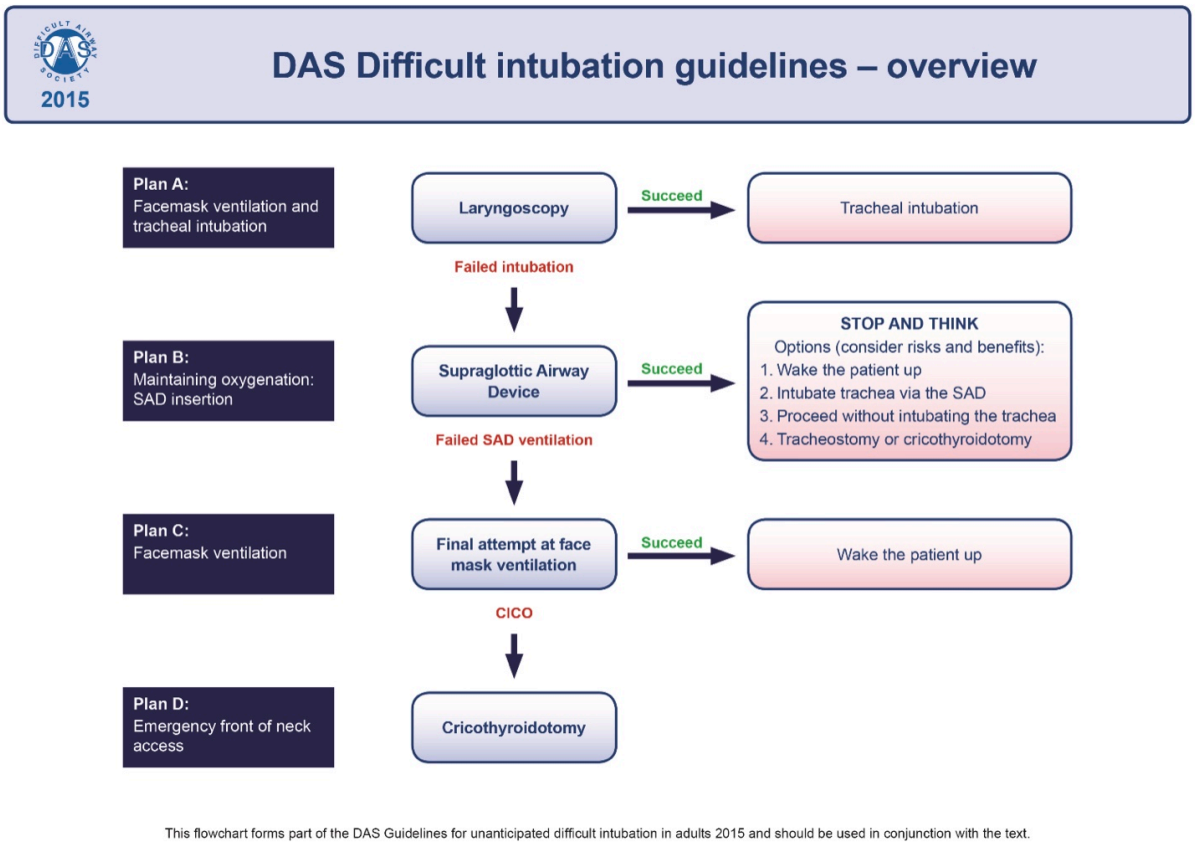
1. the underlying principles of managing the unexpectedly difficult airway.
2. the practice of managing the unexpectedly difficult airway.
3. the practice of performing emergency front of neck airway.

UNANTICIPATED DIFFICULT AIRWAY MANAGEMENT AND EMERGENCY FRONT-OF-NECK AIRWAY (EFONA)

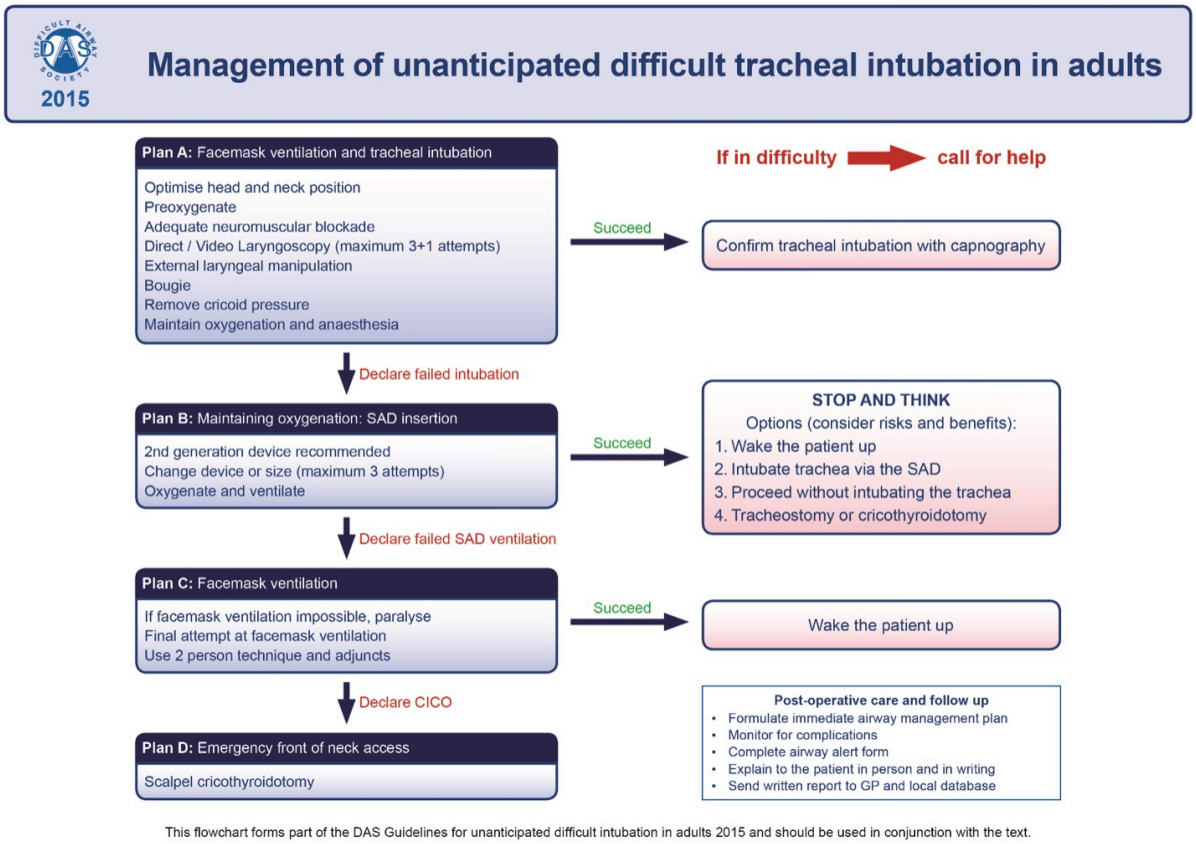
The purpose of airway assessment is to identify potential features which may make airway management difficult. This allows an airway plan to be made that anticipates the identified features and addresses them. For example, one may choose to use an awake technique in a patient who is morbidly obese with poor mouth opening. Cases such as these, although challenging at times, often allow sufficient time for decision making and strategy planning. Airway assessment, however, is not an exact science and situations may arise in which a difficult airway is encountered unexpectedly.

The Difficult Airway Society (DAS) has published algorithms to help with the management of the unanticipated difficult airway and you will hear about them a lot during the first few weeks of your anaesthetic training. The guideline for the management of unanticipated difficult intubation comprise a series of plans, Plans A–D, which should be moved through sequentially, following best efforts at each stage, when managing the unanticipated difficult airway. These provide the team with a structured management comprising of safe and familiar skills.

The guideline also contains prompts to increase the chances of success at each stage, along with reminders that if ventilation is achieved at any point following declaration of failure, waking the patient up must be considered. You will notice that at **each stage the absolute priority is oxygenation** – oxygenation is crucial for patient survival, intubation is not.



This flowchart forms part of the DAS Guidelines for unanticipated difficult intubation in adults 2015 and should be used in conjunction with the text.



Can't intubate, can't oxygenate

In the event of failing to manage the airway by endotracheal intubation (Plan A), insertion of a supraglottic airway device (Plan B) or rescue face mask ventilation (Plan C), a "can't intubate, can't oxygenate" (CICO) scenario should be declared to the team and Plan D must be implemented.

The Royal College of Anaesthetists has carried out a number of national audit projects and the fourth project was concerned with complications of airway management. To date, it is the largest survey of its kind in the world.

The 4th National Anaesthetic Project (NAP 4) made a number of recommendations to reduce the likelihood of entering a CICO scenario. These included:

- thorough airway assessment and planning
- effective pre-oxygenation to prolong the time prior to desaturation
- limiting the number of attempts at intubation to prevent causing iatrogenic trauma and swelling to the airway
- moving through the airway strategy in an appropriately timely fashion to maximise the chances of a rescue attempt succeeding prior to the development of life-threatening hypoxia.

The authors of NAP4 note that if one aspect of airway management was predicted to be difficult, the likelihood of other aspects being difficult is increased, and one should have a higher index of suspicion that eFONA may ultimately be required. Conversely, a CICO scenario may occur in patients who have no adverse predictive features. It may also be precipitated in situations where mask ventilation has initially been possible, but the airway deteriorates as a result of trauma caused by repeated instrumentation. Thus, one should limit the number of intubation attempts and recognise the need to change something between subsequent attempts rather than repeating something that previously failed. NAP4 also reminds anaesthetists that, as well as being a risk factor for both difficult mask ventilation and intubation, obesity increases the speed of onset of hypoxia.

The authors of NAP4 identified common themes when analysing the reports of patients who came to harm. These included:

- Stress, resulting in task fixation and poor communication between teams.
- Equipment problems and use of inappropriate or unfamiliar techniques.
- Delay in diagnosing a CICO situation.
- Delays in decision-making. In particular, delay in performing eFONA when face mask ventilation, supraglottic airway and endotracheal intubation had failed.
- Lack of training in skills and drills.
- Lack of understanding of guidelines.

Human factors

It is well documented in the literature that human factors and ergonomics contribute to adverse outcomes in airway management. Task fixation, poor team communication and cognitive overload are particularly relevant.

Encountering a CICO situation is highly stressful for any anaesthetist. Stress is a major cause of cognitive overload and reduces the ability of individuals to think logically, communicate properly or perform tasks effectively.

Successful communication between teams performing airway management is critical. The whole team should know the airway strategy and be aware of the triggers that should prompt transition to the next stage in this strategy. In a case where difficulty is anticipated, for example, the airway plan will be discussed at the safety brief and anaesthesia may be induced in theatre with the surgeons scrubbed and ready to perform eFONA. For these reasons, human factors training and team-based training, in addition to training in eFONA technical skills, is strongly recommended.

No mention of human factors with respect to eFONA would be complete without a reference to the tragic case of Elaine Bromiley, and the work of her husband, Martin, who has led to many changes in the teaching of human factors in healthcare.

This link will take you to a video of Mr. Bromiley explaining what happened to his wife:
https://www.youtube.com/watch?v=JzlvgtPIof4

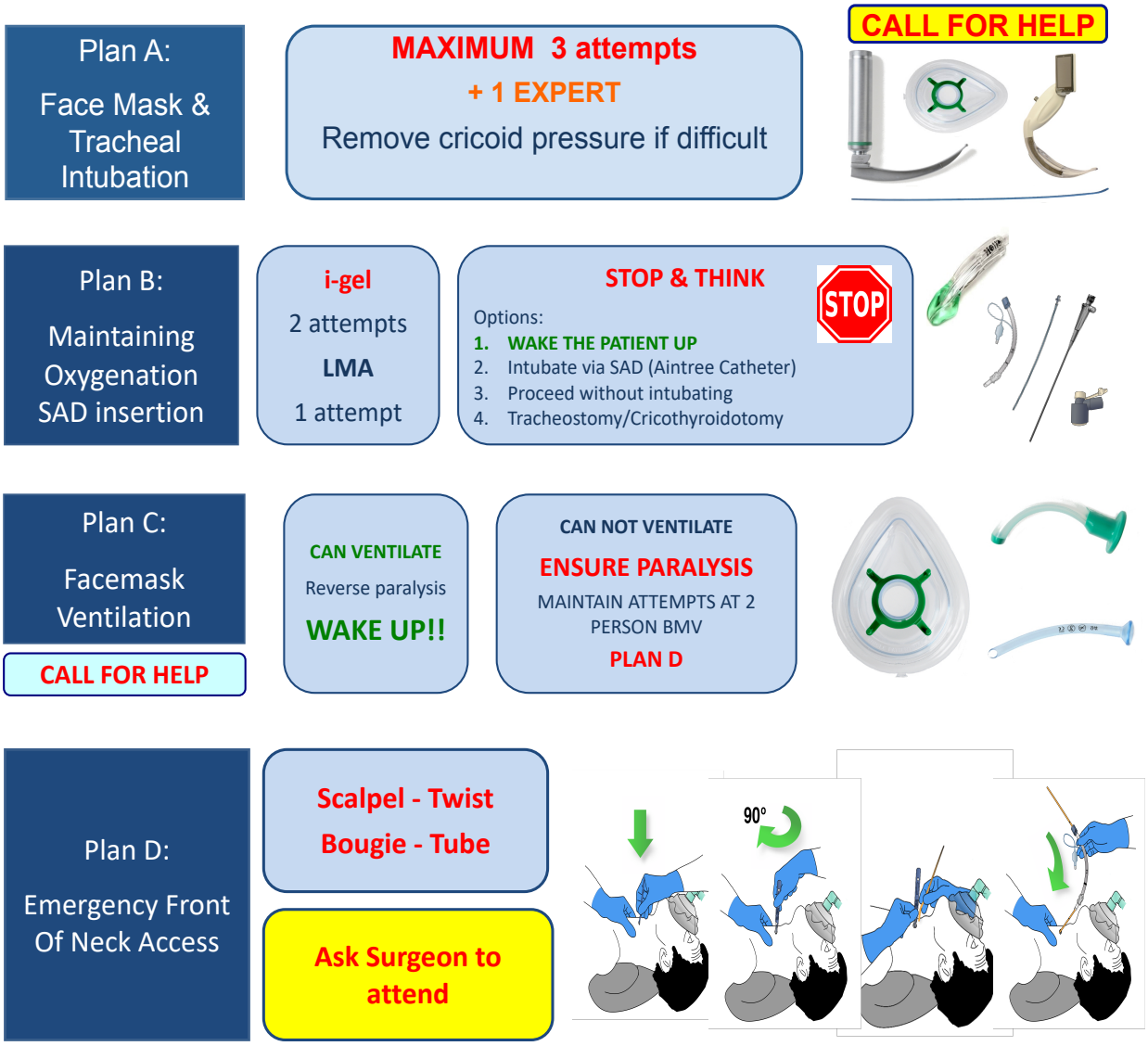
The DAS guideline provides a management structure and, as a widely known and followed algorithm, should provide the team with a common thought process, allowing all members to contribute to the problem and sharing the cognitive load. Other tools can be used in conjunction to guide best efforts at each stage. An excellent example of this is the Vortex approach (vortexapproach.org). This cognitive tool promotes the “best effort” principle at managing each airway technique: face-mask ventilation, supraglottic airway and endotracheal intubation. For each technique, best effort should consider the utility of:

- manipulations – patient or device positioning, or external laryngeal manipulations
- adjuncts – such as bougies, oropharyngeal and nasopharyngeal airways
- size – adjustment size or type of device
- suction or flow
- muscle tone – is the patient sufficiently deep and adequately paralysed?
- experience – at least one attempt should be made by the most experienced clinician available.

Equipment – airway rescue trolleys

Airway Rescue Trolleys (ARTs) are trolleys that contain all the kit needed to rescue an airway which has been unexpectedly difficult. Standardised ARTs are present in all areas where anaesthetics are routinely given. See how many you can spot on your travels! The drawers of the ARTs are designed to

mirror each of the steps of the DAS guidelines from A to D. Each drawer contains the kit you may require to best manage the airway.



Note the difference from the Anticipated Difficult Intubation Trolley, which contains the kit you would need for dealing with an anticipated difficult airway. The *distinction between the two* is really important as they *do not* contain the same kit and you must be sure what you are asking for!

Fig 1: An Anticipated Difficult Intubation Trolley (left) and an ART (right).

Emergency Front of Neck Airway (eFONA)

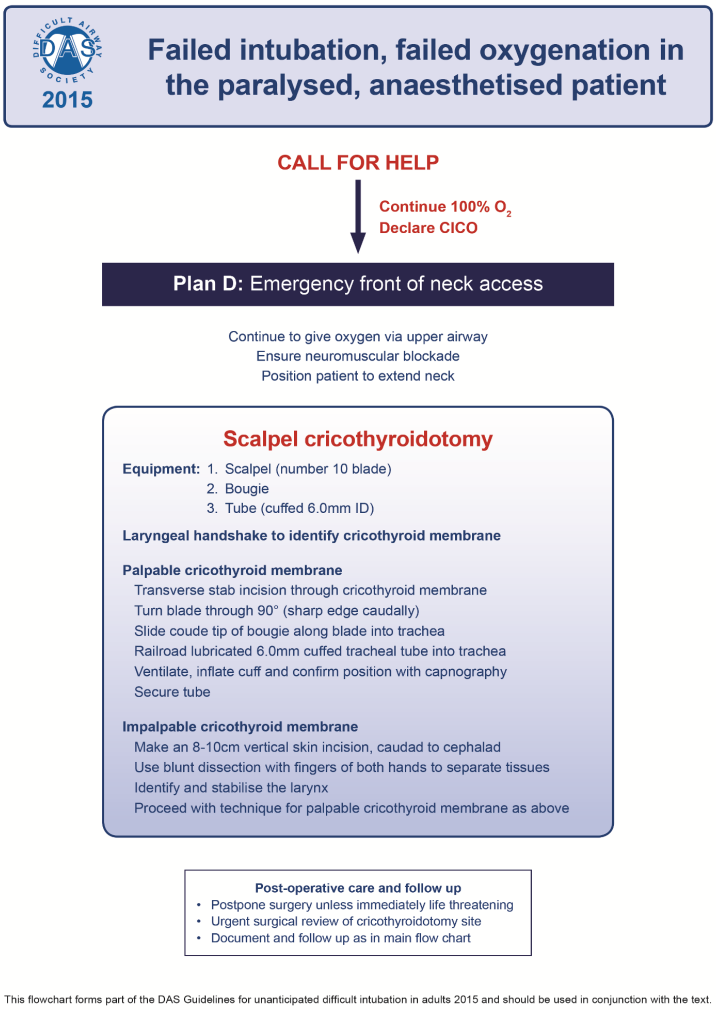
The final step, Plan D, is emergency front of neck airway (eFONA), also known as emergency

cricothyroidotomy. eFONA is a life-saving intervention in airway management, which aims to restore oxygenation, preventing hypoxia and cardiac arrest.

Fortunately, the CICO emergency is extremely rare. However, the consequences of such events can be catastrophic and account for 25% of all anaesthesia-related deaths. NAP4 noted that eFONA carried an incidence of between 1 in 12,500–50,000 anaesthetics, with a much higher rate in ICU and ED settings. Although the majority of "theatre" attempts at eFONA reported to NAP4 involved patients having head and neck surgery, attempts also occurred in patients with no airway pathology.

TECHNIQUE – PLAN D eFONA

The current guidelines for optimal technique are based on expert consensus opinion. The UK professional bodies (including DAS and RCoA) recommend Scalpel Cricothyrotomy – the "Scalpel-bougie-tube" technique, which is outlined below.



This video from DAS shows all the steps in action:
https://das.uk.com/content/video/fona

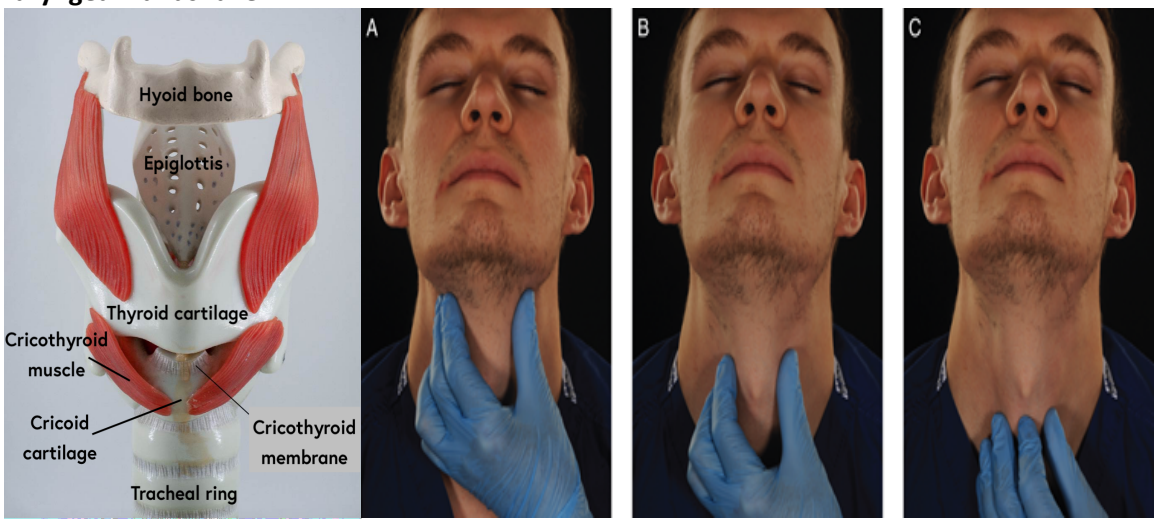
Relevant anatomy

The cricothyroid membrane should be identified in all patients before induction of anaesthesia, awake intubation techniques or before extubation in ICU. DAS recommend the three-step "laryngeal handshake" technique to identify the cricothyroid membrane.

Failure to palpate anatomical landmarks because of overlying tissue should lead to an alternative technique involving a "cut-down" and blunt dissection to then identify the structures beneath. Another

option, if skilled and equipment is immediately available, identification of landmarks can be carried out by ultrasound.

Laryngeal handshake



The laryngeal handshake involves: (A) The index finger and thumb grasp the top of the larynx (the greater cornu of the hyoid bone) and roll it from side to side. The bony and cartilaginous cage of the larynx is a cone, which connects to the trachea. (B) The fingers and thumb slide down over the thyroid laminae. (C) Middle finger and thumb rest on the cricoid cartilage, with the index finger palpating the cricothyroid membrane.

The cricothyroid membrane is a dense fibroelastic ligament in the anterior neck. It connects the thyroid cartilage (superiorly) to the cricoid cartilage (inferiorly). This is the site of cricothyroidotomy. Caudal to the cricoid cartilage lie the tracheal rings. The second and third tracheal interspaces lie deeper in the neck and are the common sites of airway access in elective and emergency tracheostomy.

Management post eFONA

If eFONA has been performed, the patient should be kept anaesthetised and senior clinicians (anaesthesia, critical care, head and neck surgery) called immediately for conversion to a more definitive airway. This may be tracheal intubation or formal tracheostomy. Imaging will required to ascertain if any traumatic complications, for example oesophageal injury, have occurred. The patient is likely to require ICU transfer.

There should also be a debrief for the whole team and discussion at the M&M meeting.

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Price TM, McCoy EP. Emergency front of neck access in airway management. *BJA Educ* 2019;**19**(8):246e253.

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Unanticipated Difficult Airway Checklist Date:

Trainee name: Tutor:

Step	1st attempt	2nd attempt
Pre-procedure		
Assessment of patient and airway		
Ensure trained assistant and senior supervision		
Confirm airway plan with anaesthetic assistant		
Perform WHO sign in		
Full monitoring including capnography		
Ensure patent IV access		
Procedure		
Plan A	**1st attempt**	**2nd attempt**
Optimise head and neck position		
Preoxygenate		
Adequate neuromuscular blockade		
Laryngoscopy & intubation (Max 3 + 1 attempts)		
Calls for help		
Tries to improve view between attempts (BURP, GEB, changes laryngoscope)		
Maintain oxygenation and anaesthesia		

Plan A – SUCCEED	1st Att.	2nd Att.	Plan A – Failure	1st Att.	2nd Att.
Confirms tracheal intubation with capnography			Declares "failed intubation"		
Suggests proceeding with surgery or waking patient			Moves to Plan B		

Plan B – SAD Insertion	1st attempt	2nd attempt
Attempt insertion of second-generation SAD (Max 3 attempts)		

Plan B – SUCCEED	1st Att.	2nd Att.	Plan B – Failure	1st Att.	2nd Att.
Confirm ventilation with capnography			Declares "failed SAD ventilation"		
Wake the patient			Moves to Plan C		
Suggests intubation via SAD					
Proceed without intubation					

Plan C – Face mask Ventilation	1st attempt	2nd attempt
Attempts face mask ventilation		
Ensures adequate paralysis		
Uses 2-person technique		

Plan C – SUCCEED	1st Att.	2nd Att.	Plan C – Failure	1st Att.	2nd Att.
Confirms ventilation			Declares "can't intubate can't oxygenate		
Wakes the patient up			Moves to Plan D		
Plan D – eFONA			1st attempt	2nd attempt	
Locates cricothyroid membrane					
Scalpel – makes transverse incision and twists scalpel					
Bougie – inserts GEB					
Tube – railroads well lubricated size 6.0 mm ETT					
Confirms ventilation with capnography					
Post-procedure					
Formulates immediate airway management plan					
Monitors for complications					
Suggests completing airway alert form					
Suggests explaining to patient in person & writing once awake					
Suggests writing to GP					
Throughout					
Demonstrates effective leadership and communication					
Recognises a deteriorating situation early					
Demonstrates good decision making					

Comments

eFONA Checklist: Date:

Trainee name: Tutor:

Step	1st attempt	2nd attempt
Pre-procedure		
Attempts at rescue oxygenation via upper airway		
Declares CICO		
Ensure neuromuscular blockade		
Stand on patients left hand side if you are right-handed (reverse if left-handed)		
Ensure the patients head is extended		
Procedure		
Performs a laryngeal handshake to identify the laryngeal anatomy		
Stabilises larynx and identifies cricothyroid		
Scalpel – makes a transverse incision		
Twists scalpel 90 degrees and applies traction towards them		
Swaps scalpel to opposite hand		
Bougie – inserts down side of scalpel, advances 10cm towards patients feet		
Removes scalpel		
Tube – railroads a lubricated size 6.0 mm over the bougie		
Removes the bougie		
Inflates the cuff and confirms ventilation with capnography		
Secures the tube		
Post-procedure		
Postpones surgery unless immediately life threatening		
Organises urgent surgical review of cricothyroidotomy site		
Documentation of airway management		
Throughout		
Appropriate communication with assistant/team		
Aware of CICO scenario and the need to restore oxygenation promptly		

Pass mark:19/21

Comments