

Guideline

Neonatal Difficult Airway Guideline

1 Scope

To be used Trust-wide in the background of a neonate with a difficult airway.

CUH has 1 neonatal difficult airway trolleys (NDAT) which can be found in:

- Neonatal Unit, Rosie Hospital

2 Purpose

To support skilled healthcare practitioners within Cambridge University Hospitals (CUH) in the safe management of an anticipated or unanticipated neonatal difficult airway.

This guideline is to be used only in conjunction with current skills and knowledge, suitable for the clinical setting.

3 Abbreviations

APA	Association of Paediatric Anaesthetists
DAS	Difficult Airway Society
ETT	Endotracheal tube
FONA	Front of neck access
NICU	Neonatal intensive care unit
NPA	Nasopharyngeal airway
OPA	Oropharyngeal airway
NDAT	Neonatal difficult airway trolley
RCoA	Royal College of Anaesthetists
SGA	Supraglottic airway

4 Indications

A neonatal difficult airway trolley is increasingly becoming a part of a standard national requirement in a neonatal unit. This is with the recognition of the increasing number of neonates with a difficult airway.

The NDATs must be standardised all across the Trust and is intended for use in both anticipated and unanticipated difficult airway scenarios and for both difficult to intubate and difficult to oxygenate scenarios.

5 Undertaken by (staff groups)

Any skilled healthcare practitioner capable of recognising a potential or actual neonatal difficult airway scenario can implement use of the difficult airway guideline (Appendix1) and trolley (Appendix 2 – 6).

6 Considerations and planning for use

All the staff who are potentially involved in an intubation scenario should have a working knowledge of the contents of the NDAT (Appendix 2- 6) and of the neonatal difficult airway algorithm (Appendix1).

The potential intubation scenarios may include, but are not limited to:

- Planned intubation for a procedure
- Unplanned intubation for a procedure
- Unplanned intubation in an emergency scenario
- Semi-elective intubation in an emergent scenario
- Planned replacement of an endotracheal tube

Staff who may potentially be involved in an intubation scenario should know where to find the NDAT and video laryngoscope.

7 Trolley contents

Contents of all NDAT should match the accepted Trust's neonatal difficult airway trolley contents list (Appendix2-6). Any deviation from this **must** be explicitly approved by the paediatric difficult airway working group.

The trolley contents layout has been designed to facilitate an **A-B-C plan** to performing an intubation, where:

- **Plan A** is to provide sufficient oxygenation via effective ventilation, leading to a successful tracheal intubation
- **Plan B** is to maintain oxygenation while enhanced ventilation and or intubation techniques are used.
- **Plan C** is for specialist trained staff to form a new, emergency, airway in the front of the neck (FONA), in a life-threatening 'Can't intubate, Can't oxygenate' situation or in scenarios where ventilation is possible but intubation is not.

A summary of each drawer's contents is as follows:

Drawer 1 (white) contains equipment to facilitate mask ventilation (**Plan A**). This includes: an anaesthetic circuit to provide oxygen; a range of face mask sizes with Ambu bag; basic airway adjuncts including a nasopharyngeal

airway (with tape to secure), oropharyngeal airway, nasogastric tubes and a 10 ml feeding syringe (Appendix 2).

Drawer 1 (White) does not contain any equipment different to what might be found on the neonatal unit. It has however been included to enable members of the airway team to have a fresh supply of kit readily available in a familiar format.

Drawer 2 (Green) contains equipment to facilitate tracheal intubation (**Plan A**). This includes: standard laryngoscope handle and Miller blade (size 0, 00 & 1), a McCoy laryngoscope handle and blade, spare batteries for the handle; neofit, tape, scissors to secure the airway; different size ET tubes (2.0- 4) (Appendix 3).

Drawer 3 (Amber) contains items to facilitate advanced rescue techniques (**Plan B**). This includes: a prompt card to remind users to consider using a video laryngoscope and to consider getting early specialist help (if this hasn't been sought already); a supraglottic airway device (I Gel size 1*); Airtraq intubating devices; bougie and video laryngoscope blades (Miller 00, 0 & 1) (Appendix 4)

Drawer 4 + 5 (Red) contains equipment for the specialist airway team (ENT and paediatric anaesthetist) to gain emergency front of neck access (FONA) using an open or a needle technique (**Plan C**).

If the specialist (usually a paediatric anaesthetist) needs to use the needle technique then the Manujet device is required and consumables in the 'Needle FONA pack'.

If the specialist (usually an ENT surgeon) needs to use the open technique then the sterile 'Emergency paediatric tracheostomy (FONA)' set needs to be opened on top of the trolley and consumables in the 'Open FONA pack' need to be opened, whilst attempting to maintain their sterility as much as is reasonably possible. Size 2.5, 3.0, 3.5 neonatal, uncuffed, Shiley tracheostomy tubes should be available (Appendix 5)

The side of trolley a range of catheters for suctioning/to manage gastric distension (Appendix 6)

A laminated copy of neonatal difficult airway guidelines; and a laminated copy of the approved Trust's NDAT contents list.

*licenced for use in >2kg but authors would support use in >1.5kg at 34 weeks gestational age or more (Banwal et al 2018)

8 Neonatal Difficult Airway Guidelines

There is currently no standardised National guideline for neonatal difficult airway management; a multidisciplinary team within CUH has produced the algorithm in Appendix A following extensive discussion and benchmarking.

The purpose of the algorithm is to support in early recognition of the difficult airway in a neonate and limit multiple attempts at intubation to avoid trauma. It encourages the use of airway adjuncts to enhance ventilation and oxygenation. It highlights the importance of gaining senior help early and where appropriate to enable early mobilisation of other specialties.

This guideline when followed sequentially should highlight any difficulty in securing a definitive airway and act as a prompt to in seeking appropriate help when intubating a neonate:

Plan A

The recognised need to intubate but initial tracheal intubation attempt is difficult - initiate **Plan A**

Mask ventilation should be optimised.

NICU consultant should be contacted

Conditions should be optimised prior to further attempt at intubation by second person.

Drawer 1

Plan B – recognised difficult airway

Failed intubation by 2 separate individuals (2 attempts each) but good ventilation should then instigate **Plan B**.

- NDAT trolley should be available
- Plan B
- Airway adjuncts in **Drawer 2 (Green)** , and **Drawer 3 (Amber)** should be used to provide optimal conditions depending on the case where skills allow
- NDAT equipment should only be used by members of the respective teams (neonatal, ENT & anaesthetic team) who have competence for the same.
- Low threshold for calling in help from ENT and paediatric anaesthetist
- If a senior NICU member (eg Consultant) fails to intubate at this stage **Plan C** should be instigated (even if mask ventilation remains adequate)

Plan C – Can't intubate, Can't Ventilate

Rapid recognition of the can't ventilate can't intubate (CICV) or where multiple intubation attempts* have been made as per plan A and B but failed should instigate **Plan C** and **Drawer 4/5 (red)**.

- NICU consultant, ENT team and Paediatric Anaesthetist (the latter 2 contacted via switchboard) should be contacted urgently

- In the CICV situation front of neck access should be acquired as soon as possible either by needle cricothyroidotomy and jet ventilation by an anaesthetist or alternatively emergency tracheostomy by ENT. If the most rapid way of oxygenating the neonate is with needle cricothyroidotomy (eg. ENT is not available) then this option is to be used and a tracheostomy should be performed at the earliest opportunity to enable adequate ventilation.
- If front of neck access is successful the neonate should be moved when safe for a formalisation of a tracheostomy in theatre

In an adequately ventilated patient endoscopic airway surgery may alleviate the need for tracheostomy. This decision should be made by the airway team. Safe transfer to an airway theatre should be facilitated for this.

| * 2 attempts by 3 different people with a senior clinician performing at least 2 of these.

9 Trolley maintenance

| It is responsibility of the neonatal team in NICU for checking and stocking up the NDAT.

The NDAT should have a tamper tag in situ, which should be checked along with any contents alongside the trolley, such as the video laryngoscope, on a daily basis. The trolley contents should be fully checked on a weekly basis, with the tamper tags being removed and replaced and stock rotated upon expiration.

The sterile 'Emergency paediatric tracheostomy (FONA)' set in **Drawer 4/5** will maintain sterility for 12 months, providing there is no damage to the packaging. When approaching this 'Expire date', if packaging becomes damaged or if the set has been opened please send the set (with all instruments inside) to Sterile Services for reprocessing; ideally the set should be 'Fast Tracked'. Each clinical area is responsible for ensuring their set is returned to their NDAT promptly.

The Manujet in **Drawer 4/5** will require regular servicing, usually every 12 months. When approaching this 'Do not use after' date please send the device to Clinical Engineering. Each clinical area is responsible for ensuring their Manujet is returned to their NDAT promptly.

The reusable McCoy blade in **Drawer 2** will require cleaning after use. This can be done by sending them to Sterile Services in a similar manner to the sterile set in **Drawer 4/5**.

The paediatric laryngoscope handle in **Drawer 2** are single use and disposable.

The reusable video laryngoscope blades will require cleaning after use. This can be facilitated by sending them to sterile services for the same.

10 Monitoring compliance with and the effectiveness of this document:

To ensure that the Trust complies with this guideline, the following elements will need to be addressed:

Difficult airway related critical incidents reported in the Trust are reviewed by patient safety and the patient risk team who will identify any areas of concern and then lead any subsequent training or clinical improvements in conjunction with involved teams

When complaints or clinical queries are received it is essential to evaluate the service provision for our patients and their carers; we should question whether our care guidelines or protocols appropriately support the delivery of excellent safe care.

If the NDATA is used for a case with a difficult airway the authors of this document should be informed by their Trust email accounts. This will enable an audit of outcomes of the difficult airway pathway and the NDATA.

11 References:

- *Checking Anaesthetic Equipment Guideline*, Hartle et al, Anaesthesia, 2012
- *Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults*, Frerk, C., Mitchell, V., McNarry, A., Mendonca, C., Bhagrath, R., Patel, A., O'Sullivan, E., Woodall, N., Ahmed, I., *BJA: British Journal of Anaesthesia*, Volume 115, Issue 6, December 2015, pp 827–848
- *NAP4 Report and findings of the 4th National Audit Project of The Royal College of Anaesthetists*, Cook, T., Woodall, N., Frerk, C., 2011, pp 8-10
- *Paediatric intensive care and neonatal intensive care airway management in the United Kingdom: the PIC-NIC survey*, Foy, K., et al, Anaesthesia, 2018, vol 73, issue 11, pp 1337-1344
- *The PIC-NIC survey: Capnography and neonatal intensive care – a reply*, Cook, T., et al, Anaesthesiology, 2019, volume 74, issue 1, pp 118-120
- Black, A. E., Flynn, P. E., Smith, H. L., Thomas, M. L. and Wilkinson, K. A. (2015) *Development of a guideline for the management of the unanticipated difficult airway in pediatric practice*. Paediatric Anaesthesia, 25: 346-3621
- Bansal SC, Caoci S, Dempsey E, Trevisanuto D, Roehr CC. The laryngeal mask airway and its use in neonatal resuscitation: a critical review of where we are in 2017/2018. neonatology. 2018;113(2):152-61

- Liroy J, Sobol SE, editors. Disorders of the neonatal airway: fundamentals for practice. Springer; 2015 Jan 7.

12 Resources (available on Merlin):

- Neonatal Difficult Airway Guideline (Appendix1)

Document history

Authors	J Bewick/ S Job/ K Watson
Reviewed by	
Department	Cambridge University Hospitals NHS Foundation Trust, Hills Road, Cambridge, CB2 0QQ www.cuh.org.uk
Contact number	01223 216162
Publish/Review date	
File name	
Version number/Ref	

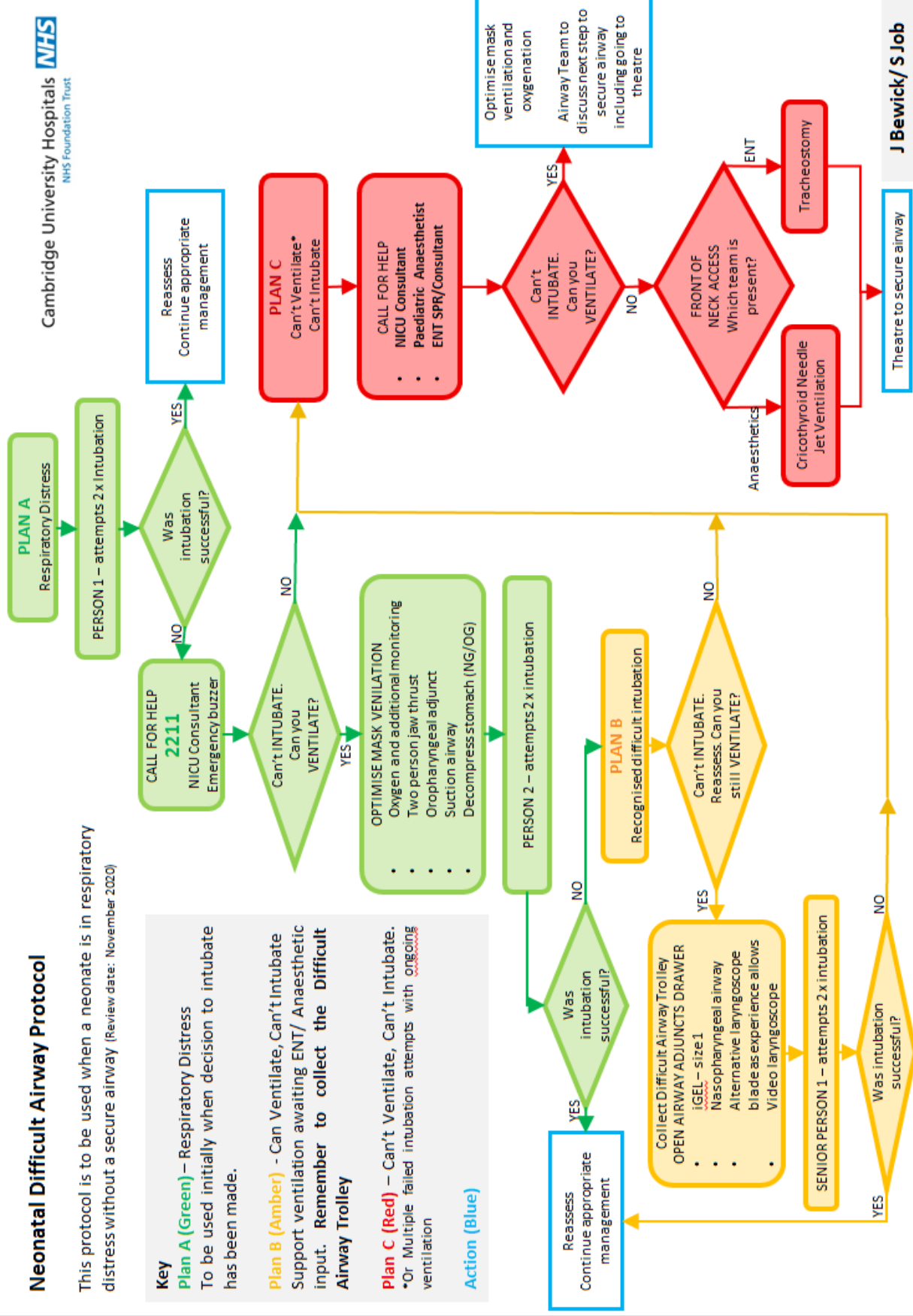
Neonatal Difficult Airway Protocol

This protocol is to be used when a neonate is in respiratory distress without a secure airway (Review date: November 2020)

Key

- Plan A (Green)** – Respiratory Distress To be used initially when decision to intubate has been made.
- Plan B (Amber)** – Can Ventilate, Can't Intubate Support ventilation awaiting ENT/ Anaesthetic input. Remember to collect the Difficult Airway Trolley
- Plan C (Red)** – Can't Ventilate, Can't Intubate. *Or Multiple failed intubation attempts with ongoing ventilation

Action (Blue)



Appendix 2

Mask ventilation (Plan A)		
Drawer 1 (white)	Item	Qty
	T-piece anaesthetic circuit	2
	Oasis Open Head Ring - Infant / Adolescent	1
	Neonatal mask - 35 mm	1
	Neonatal mask - 42 mm	1
	Neonatal mask - 50 mm	1
	Round face mask - 1	1
	Anaesthetic face mask - 0	1
	Anaesthetic face mask - 1	1
	NPA - 2.5	1
	NPA - 3.0	1
	OPA - 000	1
	OPA - 00	1
	OPA - 0	1
	ENFit NG - 6Fr	1
	ENFit NG - 8Fr	1
	ENFit purple syringe - 10ml	2

Appendix 3

Tracheal intubation (Plan A)		
Drawer 2 (green)	Item	Qty
	Paed laryngoscope handle	2
	Optilube 5g sachet	2
	Durapore	1
	NEO-fit ETT grip	1
	1 box of AA batteries (replace when 3 left)	1
	5 mL syringe	1
	Miller 00	1
	Miller 0	1
	Miller 1	1
	Robertshaw 0	1
	Robertshaw 1	1
	Seward 1	1
	MICROCUFF ETT - 3.0	2
	MICROCUFF ETT - 3.5	2
	Portex Ivory ETT - 3.0	1
	Portex Ivory ETT - 3.5	1
	Portex Ivory ETT - 4.0	1
	Uncuffed ETT - 2.0	2
	Uncuffed ETT - 2.5	2
	Uncuffed ETT - 3.0	2
	Uncuffed ETT - 3.5	2
	Uncuffed ETT - 4.0	2

Appendix 4

Difficult airway techniques (Plan B)		
Drawer 3 (orange)	Item	Qty
	iGel size 1	1
	Airtraq - 0 (infant)	1
	10 mL syringe	1
	Optilube 5g sachet	2
	Anti-fog solution	1
	Swivel elbow with seal around port	1
	Prompt card	1
	Videolaryngoscope blade Miller 00, 01	1 each
	Bougie 5ch	1
	McCoy 1 + handle	1

Appendix 5

Cannula FONA (Plan C)		
Drawer 4(red)	Item	Qty
	Manujet	1
	10cm three-way tap and tail	1
	Three-way tap	1
	CO ₂ tubing	1
	IV extension tubing	1
	16G Jet-vent-cannula	1
	16G Venflon	1
	5 mL syringe	1
	Saline pod (10mL)	1

Surgical FONA (Plan C)		
Drawer 4(red)	Item	Qty
	Tracheostomy set	1
	Bivona uncuffed, neonatal tracheostomy tube - 2.5	1
	Shiley uncuffed, neonatal tracheostomy tube - 3.0	1
	Facemask with visors	5
	10mL syringe	1
	Size 11 disposable scalpel on handle	1
	Size 15 disposable scalpel on handle	1
	Suction tubing	1
	4/0 vicryl suture (W9520)	1
	3/0 prolene suture (W8021)	1
	Head torch	1

Appendix 6

Side of trolley	Item	Qty
	Introducer/ Stylet - 2 mm	2
	6 Fr suction catheter	2
	8 Fr suction catheter	2
	10 Fr suction catheter	2
	Neonatal difficult airway guidelines	1
	Trolley contents list	1