



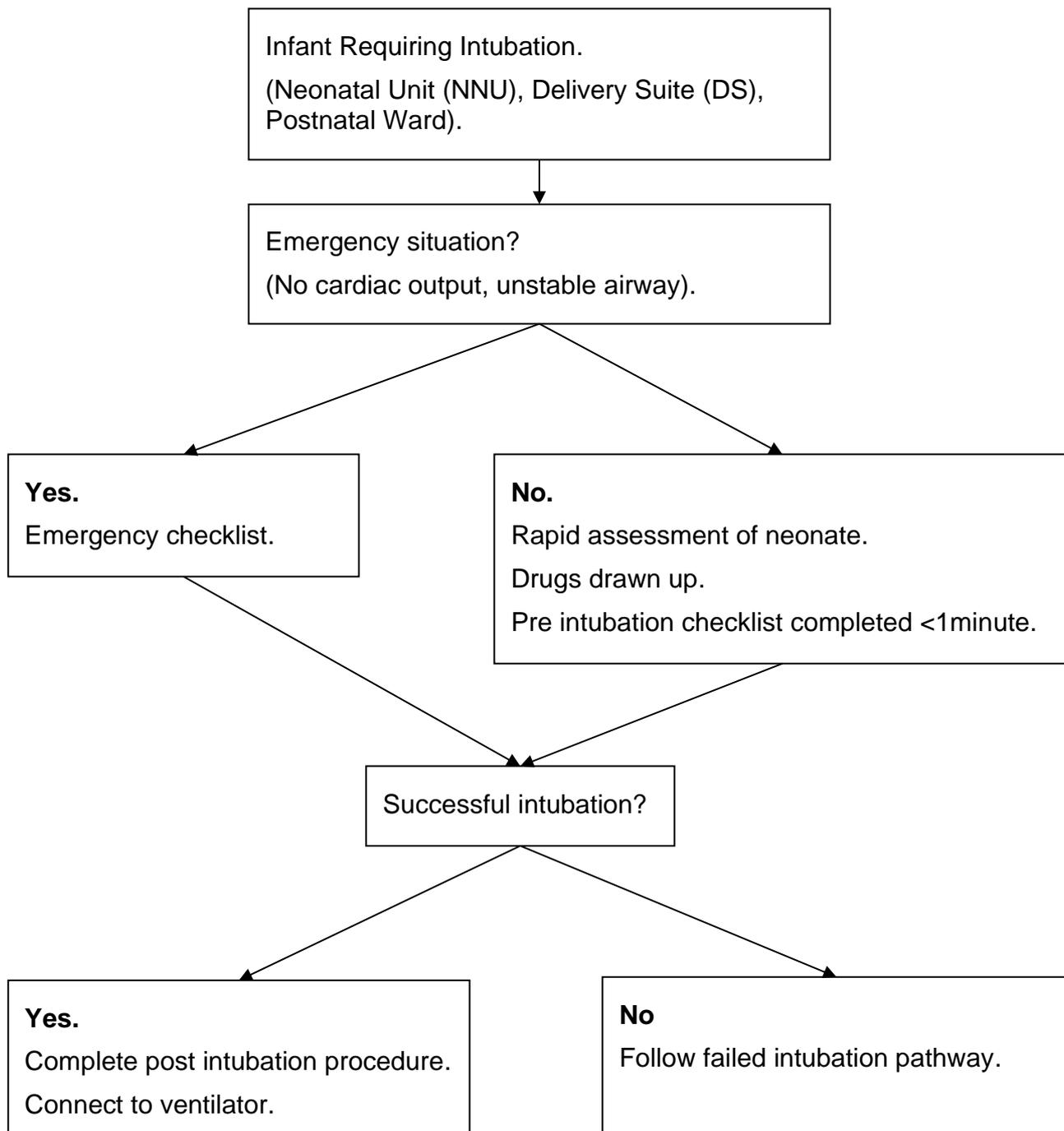
**Royal Cornwall Hospitals**  
NHS Trust

# **Neonatal Intubation and Management of the Difficult Airway Clinical Guideline**

**V3.0**

**November 2024**

## Summary



## 1. Aim/Purpose of this Guideline

- 1.1. Outline the process for emergency or elective intubation of neonates in NNU, Delivery Suite or maternity wards by the neonatal team.
- 1.2. Outline the procedure for failed intubation/ management of the difficult airway.
- 1.3. Manage cases where additional preparation or procedures may need to take place prior or during intubation.
- 1.4. This version supersedes any previous versions of this document.

### **Data Protection Act 2018 (UK General Data Protection Regulation – GDPR) Legislation.**

The Trust has a duty under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed, and documented. We cannot rely on opt out, it must be opt in.

Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 please see the Information Use Framework Policy or contact the Information Governance Team.

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## 2. The Guidance

### 2.1. Introduction

- 2.1.1. In the emergency situation a priority is often establishing a definitive, secure airway to optimise resuscitation. The default option for this, in most neonatal cases, will be oral endotracheal intubation. This can often be achieved with the minimum of equipment and preparation. If complications occur, however a lack of preparation can result in a worse outcome.
- 2.1.2. Intubation is not a procedure without risk and there is associated morbidity and mortality with intubation. Recurrent attempts at intubation in the extreme preterm neonate are associated with an increased risk of (intraventricular haemorrhage) IVH. Administration of medications may exacerbate or unmask cardiovascular instability.
- 2.1.3. Intubation in anything but the emergency setting should always occur with the presence of the consultant on call unless a delay will be detrimental to patient care.

## 2.2. Training

- 2.2.1. Standards for airway safety are laid out in the [BAPM \(British Association of Perinatal medicine\) Neonatal Airway Safety Standard](#) link here.
- 2.2.2. All medical staff should undergo annual airway testing as part of their NLS (newborn life support) assessment, at a level appropriate for their training/ role.
- 2.2.3. All medical staff attending delivery should also aim to attend neonatal simulation training (AIRWOLf) 3 monthly to support correct NLS and airway management.

## 2.3. Pre-Intubation Assessment

- 2.3.1. Pre-Intubation checklists should be used in all intubations. For non-emergency intubations the Neonatal intubation checklist is available on all emergency trolleys. There is an abridged version on all resuscitaires on delivery suite for emergencies.
- 2.3.2. Baseline observations; including heart rate, respiratory rate, saturations, blood pressure (BP), capillary refill and assessment of perfusion and handling. Neonates with any signs of current or potential instability should have fluid boluses pre-drawn and ready to give. Consideration to pre-drawing doses of adrenaline should be made for any neonate rapidly deteriorating.
- 2.3.3. Neonates with congenital cardiac disease may need different choice or doses of medications for intubation.
- 2.3.4. Assessment of airway; exclusion of obvious airway abnormality should occur pre-intubation. Intubation of neonates with Trisomy 21, micrognathia, craniofacial/ neck abnormalities or clefts should be undertaken only by Advanced Neonatal Nurse Practitioners (ANNPs), Senior Trainees or Consultants. Attendance of an Ear, Nose and Throat (ENT) Consultant/ Registrar should be considered in any neonate with concern about airway abnormality.
- 2.3.5. Patient positioning should be optimised. The incubator should be at an appropriate height for the operator; the patient should be accessible and placed so the head is midline, in line with the body. A neck/ shoulder roll can be used if their airway position is not optimal due to large occipital size.
- 2.3.6. Appropriate vascular access should be obtained pre procedure. Ideally an unstable neonate should have 2 points of IV (intravenous) access prior to administration of any medication.

## 2.4. Equipment

- 2.4.1. As a minimum the following equipment should be available: (Additional airway equipment is in the bottom drawer of the emergency trolley).
  - Laryngoscope handle with appropriate size Miller blade (size 00, 0 or

1). Light should be bright, constant and remain on during extension of blade.

- Appropriate size endotracheal tube (ETT) and next size down ETT, with introducer if required.
- Waveform capnography (must be switched on and active). Paedicap CO2 should only be used in event of waveform capnography failure
- Appropriately sized ETT fixation device (Neobar/ Neofit) and correct tape if needed.
- Nasogastric tube.

2.4.2. The area around the bedspace should be cleared to enable unrestricted access to the patient. Equipment at the bedside should be checked and include:

- Working suction with black suction catheter attached. A mini Yanker sucker should be available.
- Neopuff with appropriate pressure and correct sized mask. 100% O2.
- Continuous patient monitoring; Saturations, echocardiogram (ECG) heart rate, BP (either continuous if invasive or 5-minute cycle if NIBP (non-invasive blood pressure measurement)) and respiratory rate.
- Either a blanket or bubble wrap to allow thermal control during intubation.
- Ventilator connected, settings checked and ready.
- A copy of the intubation checklist and difficult airway algorithm is on the airway trolley.

## 2.5. Medication

The standard medication regime for intubation of neonates at Royal Cornwall Hospitals NHS Trust (RCHT) is:

- **Atropine: 20mcg/kg.**

Prevents/ reduces bradycardia due to suxamethonium/ vagal stimulation. Does not stop bradycardia due to hypoxia.

- **Fentanyl: 4 mcg/kg.**

Rapid onset analgesia/ anxiolytic. May rarely cause chest wall rigidity (if given fast, reverses with suxamethonium) or hypotension (consider reduced dose/ alternative agent in hypotension/unstable/complex congenital cardiac disease). Can be given over 1minute with a 1minute flush.

- **Suxamethonium: 2 mg/kg.**

Rapid onset short acting muscle relaxant. Partial effects may persist for up to 10 minutes. Caution in hyperkalaemia. Caution in babies with significant congenital hypotonia, consider discussion with SONAR or use of alternative agent (e.g., rocuronium) prior to intubation in these patients.

## **2.6. Staff Roles**

2.6.1. Emergency intubation in the arrested/ peri-arrest patient should be performed by an experienced practitioner.

2.6.2. In the stable neonate, having a non-emergency intubation, junior trainees (ST (Senior Trainee)1-2) / trainee ANNPs can be allowed to intubate, providing the following procedure is followed:

- A senior trainee / Consultant / experienced ANNP should always be present and supervising. Maximum of 2 attempts.
- The airway appears normal.
- Neonate >27 weeks corrected gestational age (CGA).
- Any significant cardiovascular or respiratory deterioration should result in a more experienced operator taking over.

## **2.7. Intubation**

Once the neonate has been assessed, the equipment and area prepared and any drugs/ boluses pre-drawn, the neonate can be intubated.

The room should be quiet with minimal distractions. Parents have a right to remain, but they should be warned that they might find the procedure upsetting. They should have a staff member allocated to support them.

The tube should be passed through the cords under direct vision. If this does not happen first time, follow the failed/ difficult intubation pathway.

## **2.8. Failed/ Difficult Intubation Procedure**

If the initial attempt at intubation is unsuccessful, put Oxygen up to 100% and make sure nasogastric tube (NGT) is in place to avoid complications of prolonged mask ventilation, a change should be made to the approach, positioning, or technique of intubation. This could consist of:

2.8.1. If a difficult airway was noted by an experienced operator, a difficult airway should be declared and documented in the notes.

2.8.2. Consider whether intubation remains the best option.

2.8.3. Laryngeal Mask Airway (LMA) if the airway is difficult and intubation is not possible. Size 0 (babies <2kg- difficult airway box and airway trolley) or size 1 (babies >1.25kg) are available.

2.8.4. Repositioning. Ensure head is line with midline and ear is at level of sternum. Ensure head is not overextended when airway is instrumented.

- 2.8.5. Use of larger/ smaller blade if view obscured. (Consider 00 blade in <27 weeks). Use of smaller ETT if selected size does not pass through vocal cords.
- 2.8.6. Laryngeal manipulation/ cricoid pressure / BURP (Backwards, Upwards, Right, Pressure). The cords of neonates are often anterior. Ensure cricoid pressure is directly downwards (not pushing to left side of patient). Consider using right hand to move the larynx into view before asking assistant to hold whilst you intubate.
- 2.8.7. Change of operator. If a more experienced operator is available, no more than 2 attempts should occur before change in operator. Where a baby is unstable, is expected to have a difficult airway or when there has been no success intubating after 2 attempts, further attempts should be undertaken by the most experienced operator.
- 2.8.8. If a partial view of the cords is obtained or a smaller tube will not pass, try passing a bougie before advancing the ETT over the top. A size 2.0 is in the emergency airway kit (consider in ex-prems if larger tube will not pass).
- 2.8.9. Video Laryngoscope or Airtraq. If the view is limited due to a small jaw/ abnormal airway consider using an alternative device. The video laryngoscope is available on NNU. The Airtraq is within the difficult airway box.
- 2.8.10. Nasopharyngeal airway (NPA)- in infants with micrognathia / clefts. These can be used to give nasal intermittent positive pressure ventilation (NIPPV) via the ventilator.
- 2.8.11. Contact ENT consultant on-call if difficult airway expected, if no airway can be maintained despite all the above, or in can't intubate can't ventilate situation. Front of Neck Access / Surgical airway should not be inserted by anyone other than an experience ENT surgeon.

## **2.9. Post Intubation Management**

- 2.9.1. Once the ETT is inserted correct placement should be confirmed both with waveform capnography and by auscultation, ensuring equal air entry. Most ETT should be at around Patient Weight (kg) + 6 cm (or use Neomate app). However, this can be inaccurate and correct position should always be confirmed on auscultation and on chest x-ray (CXR). The ETT should then be secured, surfactant given if necessary, and the infant connected to the ventilator.
- 2.9.2. The patients CO<sub>2</sub> should be monitored using waveform capnography on NNU via the monitor.
- 2.9.3. A gas should be taken within 1 hour.
- 2.9.4. A CXR on all newly intubated infants should ideally be taken within 1 hour, although this can be delayed if other procedures are required.
- 2.9.5. A loading dose, followed by a continuous infusion of Morphine should be

given to all ventilated term infants to ensure they remain comfortable and improve ventilator compliance.

- 2.9.6. Routine use of sedation in babies <32 weeks should be avoided; pain score and assessment of ventilator compliance should be used to guide use of sedation in these infants.
- 2.9.7. An appropriate ventilator mode in line with trust guidelines should be chosen.
- 2.9.8. Assessment of the infant who acutely deteriorates once intubated should follow the DOPE acronym:

**D. Dislodged ETT** (not at correct length, not ventilating, no EtCO<sub>2</sub>)- remove.

**O. Obstructed ETT** (Tube at correct length, no/little EtCO<sub>2</sub>)- suction, if no improvement remove.

**P. Pneumothorax.** (Unequal A/E. EtCO<sub>2</sub> present. Often cardiovascular compromise.) Cold light- if acutely unstable/ peri-arrest- decompress with butterfly without waiting for CXR (2nd ICS, mid clavicular line). Continue to insert drain if pneumothorax persists.

**E. Equipment failure.** If all above negative and improves with hand ventilation, consider equipment failure. Check all connections. If persists, change ventilator.

## 2.10. Endotracheal Tube Change

- 2.10.1. Elective tube change should follow the same pre procedure as new intubation.
- 2.10.2. Instrument the airway to obtain a view of the current ETT passing through the cord.
- 2.10.3. Remove the old ETT and replace it with a new, all whilst maintaining a view of the cords.
- 2.10.4. Consider using a bougie, especially in the known difficult airway to maintain a path through the cords.

## 2.11. The Difficult Airway - Special Cases

- 2.11.1. Extrinsic compression e.g., cystic hygroma/ micrognathia/ cleft palate.
  - Airway management may be challenging, and diagnosis is often made at delivery. If there is concern the airway may be difficult then a consultant must be called, the difficult airway box ready and consideration of calling senior ENT support.
  - Use of an NPA (nasopharyngeal airway) +/- NIPPV (non-invasive positive pressure ventilation) to prevent the need for intubation or allow time for more support is often appropriate. Consider nursing

these infants prone (only when monitored).

#### 2.11.2. Oesophageal Atresia

If there is a tracheoesophageal fistula, intubating these neonates can precipitate progressive respiratory compromise due to non-decompressible abdominal distension. Intubation should only occur in cardiac arrest, apnoea or on advice of a tertiary unit consultant.

#### 2.11.3. Congenital Diaphragmatic Hernia

Early intubation following IM administration of muscle relaxants and opiates during delivery is the preferred management. See UHB neonatal guideline on management of these infants.

#### 2.11.4. Sub-glottic stenosis / Tracheal stenosis / airway oedema

May be congenital/ due to trauma, or secondary to prolonged ventilation in ex-prems. Utilisation of a smaller than expected ETT is often the only way to manage the airway. Pre extubation dexamethasone is sometimes used to reduce the airway swelling to facilitate extubation.

### 2.12. Failed Intubation Pathway- Including Difficult Airway

Please see appendix 3.

## 3. Monitoring compliance and effectiveness

Information Category	Detail of process and methodology for monitoring compliance
Element to be monitored	Neonatal intubation and management of the difficult airway.
Lead	Neonatal Audit and Guidelines Lead.
Tool	Excel.
Frequency	As directed by audit findings.
Reporting arrangements	Neonatal Audit and Guidelines meeting.
Acting on recommendations and Lead(s)	Neonatal Audit and Guidelines meeting.
Change in practice and lessons to be shared	Required changes in practice will be identified and actioned within 3 months.

## 4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the [Equality Diversity](#)

[And Inclusion Policy](#) or the [Equality and Diversity website](#).

#### 4.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

## Appendix 1. Governance Information

Information Category	Detailed Information
<b>Document Title:</b>	Neonatal Intubation and Management of the Difficult Airway V3.0
<b>This document replaces (exact title of previous version):</b>	Neonatal Intubation and Management of the Difficult Airway V2.2
<b>Date Issued/Approved:</b>	November 2024
<b>Date Valid From:</b>	November 2024
<b>Date Valid To:</b>	November 2027
<b>Directorate / Department responsible (author/owner):</b>	Dr. Charlotte Lea; Neonatal Consultant
<b>Contact details:</b>	01872 252667
<b>Brief summary of contents:</b>	Approach to Neonatal Intubations, management of complications and the difficult airway
<b>Suggested Keywords:</b>	Neonatal, intubation, airway, difficult airway
<b>Target Audience:</b>	<b>RCHT:</b> Yes <b>CFT:</b> No <b>CIOS ICB:</b> No
<b>Executive Director responsible for Policy:</b>	Chief Medical Officer
<b>Approval route for consultation and ratification:</b>	Neonatal Guidelines Group
<b>Manager confirming approval processes:</b>	Caroline Chappell
<b>Name of Governance Lead confirming consultation and ratification:</b>	Tamara Thirlby
<b>Links to key external standards:</b>	None Required
<b>Related Documents:</b>	None Required
<b>Training Need Identified?</b>	No
<b>Publication Location (refer to Policy on Policies – Approvals and Ratification):</b>	Internet and Intranet

Information Category	Detailed Information
Document Library Folder/Sub Folder:	Clinical/ Neonatal

### Version Control Table

Date	Version Number	Summary of Changes	Changes Made by
30 June 2018	V1.0	Initial issue.	Unknown.
November 2020	V1.1	Tweaks to failed intubation pathway made based on BAPM guidance.	Dr. Chris Bell; Neonatal Consultant
November 2021	V2.0	No change to guidance.	Dr. Chris Bell; Neonatal Consultant
November 2021	V2.1	Requirement for consultant presence added to guidance and flow chart.	Dr. Chris Bell; Neonatal Consultant
July 2023	V2.2	Updated to new Trust format. Author updated. Appendix 4 added.	Dr. Charlotte Lea; Neonatal Consultant
November 2024	V3.0	Full review and update to new Trust format. Links added to BAPM airway standards and annual testing as per NLS assessment. Requirement to attend AIRWOLf simulation training added. Requirement for pre-intubation checklist for all intubations added. Capnography added to guidance. Update to suxamethonium for congenital hypotonia. Fentanyl guidance updated. Failed intubation information updated.	Dr. Charlotte Lea; Neonatal Consultant

**All or part of this document can be released under the Freedom of Information Act 2000**

**All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.**

**This document is only valid on the day of printing.**

### **Controlled Document**

This document has been created following the Royal Cornwall Hospitals NHS Trust [The Policy on Policies \(Development and Management of Knowledge Procedural and Web Documents Policy\)](#). It should not be altered in any way without the express permission of the author or their Line Manager.

## Appendix 2. Equality Impact Assessment

### Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity, and Inclusion Team  
[rcht.inclusion@nhs.net](mailto:rcht.inclusion@nhs.net)

Information Category	Detailed Information
<b>Name of the strategy / policy / proposal / service function to be assessed:</b>	Neonatal Intubation and Management of the Difficult Airway Clinical Guideline V3.0
<b>Directorate and service area:</b>	Neonatal
<b>Is this a new or existing Policy?</b>	Existing
<b>Name of individual completing EIA</b> (Should be completed by an individual with a good understanding of the Service/Policy):	Neonatal Audit and Guidelines Group
<b>Contact details:</b>	01872 252667

Information Category	Detailed Information
<b>1. Policy Aim - Who is the Policy aimed at?</b>  (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)	Aimed at clinical staff who manage newborns.
<b>2. Policy Objectives</b>	Ensure appropriate assessment, preparation, and management of all intubations occurring in RCHT on neonates by neonatal staff.
<b>3. Policy Intended Outcomes</b>	As above.
<b>4. How will you measure each outcome?</b>	Audit
<b>5. Who is intended to benefit from the policy?</b>	Neonatal patients.

Information Category	Detailed Information
<b>6a. Who did you consult with?</b> (Please select Yes or No for each category)	<ul style="list-style-type: none"> <li>• Workforce: Yes</li> <li>• Patients/ visitors: No</li> <li>• Local groups/ system partners: No</li> <li>• External organisations: No</li> <li>• Other: No</li> </ul>
<b>6b. Please list the individuals/groups who have been consulted about this policy.</b>	<b>Please record specific names of individuals/ groups:</b> Neonatal Audit and Guidelines Group
<b>6c. What was the outcome of the consultation?</b>	Approved.
<b>6d. Have you used any of the following to assist your assessment?</b>	<b>National or local statistics, audits, activity reports, process maps, complaints, staff, or patient surveys:</b> No

**7. The Impact**

Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

Protected Characteristic	(Yes or No)	Rationale
<b>Age</b>	No	
<b>Sex</b> (male or female)	No	
<b>Gender reassignment</b> (Transgender, non-binary, gender fluid etc.)	No	
<b>Race</b>	No	Any information provided should be in an accessible format for the parent/carer needs- i.e., available in different languages if required/ access to an interpreter if required.

Protected Characteristic	(Yes or No)	Rationale
<b>Disability</b> (e.g. physical or cognitive impairment, mental health, long term conditions etc.)	No	Those parent/carers with any identified additional needs will be referred for additional support as appropriate- i.e., to the Liaison Team or for specialised equipment.  Written information will be provided in a format to meet the family's needs e.g., easy read, audio etc.
<b>Religion or belief</b>	No	
<b>Marriage and civil partnership</b>	No	
<b>Pregnancy and maternity</b>	No	
<b>Sexual orientation</b> (e.g., gay, straight, bisexual, lesbian etc.)	No	

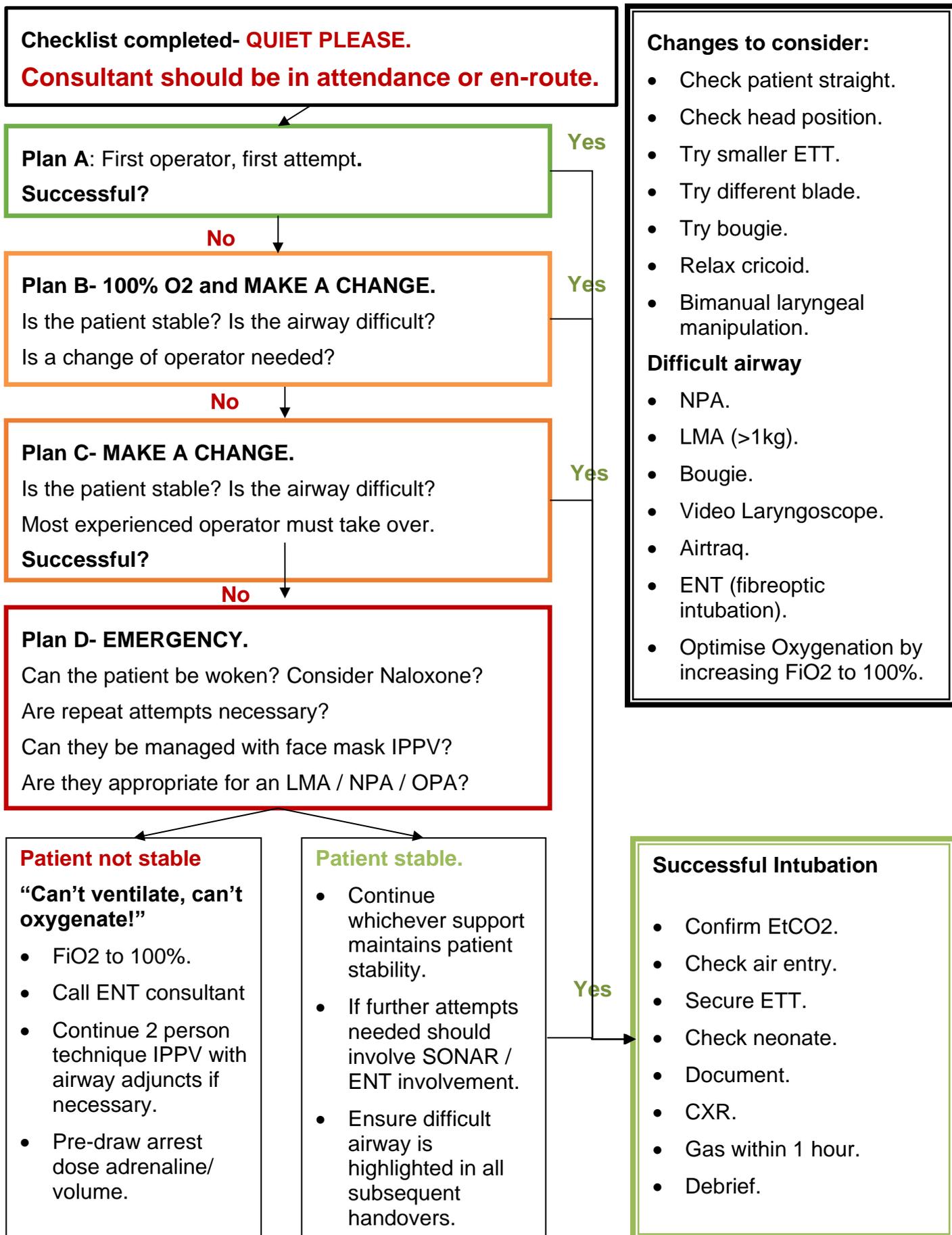
**A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.**

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

Name of person confirming result of initial impact assessment: Neonatal Audit and Guidelines Group

**If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here:**  
[Section 2. Full Equality Analysis](#)

# Appendix 3. Failed Intubation Pathway- Including Difficult Airway



## Appendix 4. Using a Bougie to Upsize an Endotracheal Tube (ETT)

- Need to change ETT identified and confirmed.
- Intubation checklist completed.
- Disconnect from ventilator leaving end tidal co2 monitor in situ and ventilate using neopuff circuit.
- Current ETT held securely by operator and fixation removed.
- View of ETT passing through vocal cords obtained by operator with video laryngoscope.
- Disconnect Neopuff and end tidal CO2.
- Assistant passes bougie through ETT.
- Operator identifies when bougie has passed through vocal cords by direct vision.
- Assistant holds bougie securely as operator displaces ETT maintaining a direct view of the cords and the bougie passing through them.
- Assistant guides ETT off the bougie whilst the bougie is secured by the operator.
- Assistant threads new ETT over bougie and to the baby's mouth – this should be via the right-hand side of the mouth for the best view.
- Operator passes ETT through the vocal cords – using gentle rotation if required, maintaining direct vision throughout.
- Operator holds ETT securely.
- Assistant removes bougie.
- End tidal CO2 monitor and Neopuff reconnected, and ventilation breaths given.
- ETT position confirmed.
- ETT secured.
- Baby re-established on ventilator.
- Chest x-ray requested.
- As per intubation checklist- the operator and assistant need to be alerted to any sign of compromise and the baby supported as per NLS.
- If required and safe to do so- this can be rehearsed using the training head and bougie box.