

# Clinical Guideline: Premedication for non-emergency endotracheal intubation in the neonate

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**For use in:** Neonatal units in East of England (X 17)

**Used by:** Medical and nursing staff in neonatal units across EoE

**Key Words:** Neonate, Endotracheal intubation, and premedication

**Review due:** 01 September 2023

**Registration No:** NEO-ODN-2020-6

**Approved by:**

<b>Neonatal Clinical Oversight Group</b>	
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**Ratified by**

<b>Date of meeting</b>	<b>24<sup>th</sup> September 2020</b>
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Version	Date	Author	Reason for change
1	2005	Dr M James	Original version
2	Sept 2015	Dr S Narayanan	New format, change from Morphine to Fentanyl/Remifentanil/use of pain score
3	June 2020	Dr S Narayanan	Update of guideline. Key changes: Inclusion of Propofol as sedative agent, Viby-Morgensen score to assess quality of intubation experience, Remifentanil removed from this version

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## **Introduction:**

Endotracheal intubation is a common procedure performed in the neonatal population. This procedure causes pain and discomfort and frequently results in significant physiological disturbances i.e. hypoxia, bradycardia, systemic hypertension and raised ICP.<sup>1</sup> In preterm infants these physiological disturbances increase the risk of intraventricular haemorrhage. Evidence suggests that with premedications the procedure is quicker, easier and with less physiologic disturbance.<sup>2</sup> More importantly, reducing pain and discomfort has far reaching positive effects and pain relief is an ethical obligation for those providing care for these vulnerable newborns.

## **Aim of the guideline:**

Provide evidence-based recommendations for use of a medication or combination of medications prior to non-emergency (elective) endotracheal intubations in neonates.

To improve quality and success rate of intubations whilst reducing risks of trauma and physiological instability which could result in poor short/long term outcomes.

## **Areas outside the remit of this guideline:**

These guidelines **DO NOT** apply to emergency intubation as part of resuscitation.

These guidelines **DO NOT** cover the practical aspects of the endotracheal intubation procedure.

*\*\*\*These guidelines **DO NOT** cover premedication for Less Invasive Surfactant Administration (LISA) – refer to LISA guideline\*\*\**

## **Precautions:**

Intravenous access, continuous heart rate and oxygen saturation monitoring are pre-requisites. This guideline assumes the presence of one or more individuals competent in advanced airway skills.

Airway/breathing maneuvers should be applied as per NLS guidelines.

Use of end tidal CO<sub>2</sub> monitoring devices such as Pedi Cap is recommended.<sup>3</sup>

## **Preparation:**

At least two people (of whom one should be trained in neonatal resuscitation and qualified in speciality nurse) should be involved in the procedure including a dedicated

1. assistant not involved in any other aspect of the infant's care. Second checker for medication administration is required. Use of a checklist is recommended.
2. Follow the UK Resuscitation Guidelines to ensure infant is clinically stable during the period of preparation. Ensure all equipment is on hand – laryngoscope, appropriate ET tube sizes,

suction catheter, tube fixation kit, end tidal CO2 detectors such as PediCap and stethoscope. Ensure the resuscitation equipment is working including the suction machine.

3. Establish IV access. Administer pre-medication **in the order of** Fentanyl, Atropine and Suxamethonium OR Propofol on its own as per doses in table 1.
4. Use a neonatal pain assessment tool (Neonatal Infant Pain Score - NIPS) during procedure.

### **Analgesia:**

An ideal analgesic agent should have rapid onset and short duration of action with no or minimal adverse effect on respiratory mechanics, and predictable pharmacokinetic properties. None of the currently available medications fit this profile, however, opioids come closest to fulfilling these characteristics. Though Morphine has traditionally been used for this indication, synthetic opioid such as Fentanyl is considered superior because of its rapid onset and short duration of action.<sup>4,5</sup> There are some concerns regarding **chest wall rigidity** with synthetic opioid use – however this can be readily reversed by naloxone use or more appropriately minimized by **slow administration**, and **co-administration** of a rapid acting muscle relaxant.

**Recommendation:** Synthetic opioid (Fentanyl) is superior to Morphine for analgesia during non-emergency intubation.

### **Sedation:**

American Academy of Pediatrics and Canadian Pediatric Society guidelines<sup>4,5</sup> do not recommend stand-alone use of sedative/hypnotic agents as these do not necessarily alleviate pain. However, more recently published NICE guideline for specialist respiratory care for preterm infants NG124<sup>6</sup> recommends Propofol on its own as an alternative to analgesic/muscle relaxant combination. However, a subsequent large dose finding study has reported that it is difficult to achieve effective sedation without the occurrence of significant side effects (e.g. hypotension) with a single Propofol bolus dose. In summary, within the context of use within East of England Neonatal Network, it was discussed at the network clinician forum (July 2020) and it was agreed that **evidence around sedation,**

**Propofol in particular is poor and adverse effect profile is high. Therefore, it was agreed that network guideline would not recommend Propofol use.**

**Recommendation:** Pure sedative drugs including Propofol not recommended

These agents prevent bradycardia during intubation and decrease airway secretions. Atropine and Glycopyrrolate are effective vagolytic agents but no direct comparative studies have been performed in neonates. Due to its wider use and familiarity most clinicians prefer atropine over glycopyrrolate.<sup>5</sup>

**Recommendation:** Atropine should ideally be used as a vagolytic agent during neonatal intubation to PREVENT bradycardia

**Muscle relaxants:**

Muscle relaxation to facilitate intubation minimizes the rise in intracranial pressure that occurs during awake intubation. The ideal muscle relaxant should have rapid onset and short duration of action with minimal effects on heart rate and blood pressure. Succinylcholine (Suxamethonium Bromide) has been shown to result in faster intubation with less bradycardia and less trauma to oral/nasal passages.<sup>8</sup>

**Recommendation:** Suxamethonium is the preferred muscle relaxant for neonatal intubation.

**Documentation:**

Premedications must be prescribed and signed for prior to administration. Documentation should include

- Indication for intubation & Informed verbal consent from parent
- Observations pre and post procedure
- Number of attempts, name of person (s) performing the procedure
- Adverse events during procedure
- Endotracheal tube size, level at which secured
- Methods used to identify correct tube placement (Chest movements, air entry, End Tidal CO2 detector)
- Position of endotracheal tube on CXR
- Document quality of intubation e.g. Viby-Mogensen score<sup>9</sup>

**TABLE 1: Drugs for premedication for non-emergency intubation**

**(Preferred option) – [Prefilled syringes (CIVAS) preferable]**

**Option 1:**

Medication	Preparation	Dose	Administration	Onset, peak and duration of action	Side effect
<b>FENTANYL</b> (Analgesic, Controlled Drug)	50 micrograms/ml 2ml size  Diluent: 0.9% sodium chloride or 5% <u>glucose</u>	<b>2 micrograms/kg</b> (Range 1 – 4 micrograms/kg) <sup>6</sup> <b>IV <u>slowly over 1-2 minutes</u></b> followed by a slow 0.9% sodium chloride flush  Repeat dose of 3 micrograms/kg can be given if required	Draw 0.2mls (10micrograms) and dilute to 1ml with glucose 5% in a 1ml syringe = 10micrograms/ml, then give 0.1- 0.4 mls for each Kg of baby's weight	Onset of action: IV- almost immediate  Peak effect: 5-15 minutes  Duration of analgesic effect: 30 – 60 minutes	Chest wall rigidity (can be reversed with naloxone or muscle relaxant), seizure-like activity, respiratory depression, bradycardia
<b>ATROPINE</b> (Vagolytic)	600 micrograms/ml 1ml size  Dilution not recommended	<b>20 micrograms/kg</b> stat rapid IV bolus <sup>6,7</sup>	Draw up 0.033mls (20 micrograms) for each kg of baby's weight  Alternatively, dilute to 60 micrograms/ml solution (0.1 ml from 600 micrograms/ml solution to 0.9 ml of 0.9% sodium chloride) & draw up 0.33 ml for each Kg of baby's weight	Onset of action: Immediate  Peak effects: 12-16 min, Duration of action: 4-6 hrs	Tachycardia (self resolving)
<b>SUXAMETHONIUM</b> (Muscle Relaxant)	50 mg/ml 2ml size  <b>in fridge</b> 0.9% Sodium chloride or 5% glucose	<b>2 mg/kg</b> stat IV bolus <sup>6,7</sup>	Draw 0.2ml (10mg) and dilute to 1ml with 5% glucose in a 1ml syringe = 10 mg/ml then draw up 0.2ml (2 mg of diluted solution) for each Kg of baby's weight	Onset of action: 1-2 minutes Duration of action: 5-10 minutes	Bradycardia especially after second dose of suxamethonium, transient hyperkalemia, malignant hyperthermia
<b>NALOXONE</b> <b>(Opioid Antagonist – to reverse Fentanyl related respiratory depression or chest wall rigidity)</b>	400 micrograms/ml solution for injection  OR Available as 400	10 micrograms/kg IV bolus  Can be repeated every 2-3 minutes to a cumulative dose of 100 micrograms/kg if necessary BUT risks	Draw 01 ml (40 micrograms) and dilute to 1 ml with 0.9 % sodium chloride = 40 micrograms/ml then draw up 0.25 ml for each Kg of baby's weight	Onset of action: 1-2 minutes  Duration 3-4 hours	Arrhythmias Hypertension Hypotension (rare)

	micrograms/ml Minijets	complete reversion of opioid analgesia			
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**Audit standards:**

Standard	Compliance expected
Premedication use according to guideline during non-emergency intubation	100 %
Intubation documented using standard proforma (appendix 1)	100 %
A competent practitioner (Registrar or ANNP or consultant) must be present during procedure	100 %
Excellent or Good score on quality of intubating conditions on Viby-Mogensen score	85 %

**Viby-Mogensen Score**

Variables	Acceptable		Not Acceptable
	Excellent (1)	Good (2)	Poor (3)
<b>Ease of laryngoscopy (Jaw relaxation)</b>	Easy	Fair	Difficult
<b>Vocal cord position</b>	Abducted	Intermediate	Closed
<b>Vocal cord movement</b>	None	Moving	Closing
<b>Airway reaction (cough, gag)</b>	None	Slight	Sustained (>10s)
<b>Movement of limbs</b>	None	Slight	Vigorous

Quality of intubating conditions were judged as “excellent” if all scored 1 (dark green zone), “good” if any scored 2 (light green zone), and “poor” if any scored 3 (red zone)<sup>9</sup>

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# Appendix 1: Intubation Checklist

Name: \_\_\_\_\_  
 DOB: \_\_\_\_\_  
 NHS no / Hosp no: \_\_\_\_\_

## NEONATAL INTUBATION CHECKLIST (for intubation in Neonatal Unit ONLY) (READ OUT & CHECK before procedure)

 DD: MM: YY

 HH: MM

GA: \_\_\_\_\_ Weight (kg): \_\_\_\_\_

### DECISION TO INTUBATE/RISK ASSESSMENT:

- Indication for intubation:  
\_\_\_\_\_
- Elective/Emergency (circle as appropriate)
- Have you informed the consultant? YES / NO
- Have you informed the parent? YES / NO
- Is difficult airway anticipated? YES / NO  
(If yes, inform /discuss with anaesthetist/ENT)
- Have you notified the Paediatric registrar and asked for assistance? YES / NO
- **TEAM MEMBER CHECK:**  
 2 X Neonatal nurses  Dedicated scribe   
 Registrar  Consultant   
 SHO/ANNP   
 Stand-by nurse / Paediatric registrar

### EQUIPMENT CHECK:

- Appropriate size mask X 2
- Tom Thumb flow 6 – 8 L/min
- Oxygen blender (FiO2) set appropriate to GA
- PIP/PEEP: 20/5 (Preterm) 25/5 (Term) or as appropriate to clinical situation
- Self-inflating bag ready  Suction
- Conventional Laryngoscope X 2
- Video Laryngoscope
- Correct size ET tube  (& 1 size down), Introducer
- Have you checked ET fixation length?  (Refer to table)
- PediCap  Stethoscope  Neofit
- Cannula checked & flushed  NG aspirated
- Ventilator checked  Intubation drugs prescribed

What if planned course of action NOT SUCCESSFUL?  
**DISCUSS & AGREE**

**IS EVERYONE HAPPY TO PROCEED?** 

**TEAM ROLES:** Ensure two people with advanced airway skills present? If not, **PAUSE**, d/w with consultant before you proceed (unless immediate threat to patient's life)

### Assign roles (print names/grade)

- Intubator  \_\_\_\_\_
- Intubator's assistant  \_\_\_\_\_
- Drug administrator  \_\_\_\_\_
- Scribe  \_\_\_\_\_

Premedications: \_\_\_\_\_ Prescribed at: HH : MM

Sequence: F/A/S, F/S/A, F/S or Other \_\_\_\_\_

Fentanyl: Start HH : MM Finish HH : MM

Fentanyl & follow on flush given slowly over 2-3 minutes: YES / NO

If no, reason why: \_\_\_\_\_

Atropine: HH : MM Suxamethonium HH : MM

GA (weeks)	Body wt.	ET size	Length at lips
<28	500 – 899	2.5	5.5
	700 – 899	2.5	6.0
	900 – 1000	2.5	6.5
28 – 34	1001 – 1499	2.5 – 3.0	7.0
	1500 – 1899	3.0	7.5
	1900 – 2499	3.0	8.0
> 34	2500 – 3000	3.0 - 3.5	8.5
	3000 – 4200	3.5	9.0
	> 4200	3.5	10

Adapted from NRP 7<sup>th</sup> edition & Chung et al <https://doi.org/10.1016/j.pedneo.2017.10.001>

### Viby-Mogensen Score (To assess quality of intubation)

Variables	Acceptable		Not Acceptable
	Excellent (1)	Good (2)	Poor (3)
Ease of laryngoscopy	Easy	Fair	Difficult
Vocal cord position	Abducted	Intermediate	Closed
Vocal cord movement	None	Moving	Closing
Airway reaction	None	Slight	Sustained
Movement of limbs	None	Slight	Vigorous

Quality of intubating conditions were judged as "excellent" if all scored 1 (dark green zone), "good" if any scored 2 (light green zone) and "poor" if any scored 3 (red zone)

VB score: 1 / 2 / 3

(circle the maximum score from table)

## Appendix 2: Intubation Notes

Name: \_\_\_\_\_  
DOB: \_\_\_\_\_  
NHS no / Hosp no: \_\_\_\_\_

### INTUBATION NOTES



DD:MM:YY



HH:MM

INTUBATION: (Time commenced: HH:MM)

Pre-oxygenated to: \_\_\_\_\_ % FiO<sub>2</sub>: \_\_\_\_\_ %

Observations: HR: \_\_\_\_\_ SpO<sub>2</sub>: \_\_\_\_\_ Mean BP: \_\_\_\_\_

Intubated by: \_\_\_\_\_ Grade: \_\_\_\_\_

Number of attempts: \_\_\_\_\_

Earlier attempts by:

Attempt 1: \_\_\_\_\_ (Name) \_\_\_\_\_ (Grade) Time: HH:MM

Attempt 2: \_\_\_\_\_ (Name) \_\_\_\_\_ (Grade) Time: HH:MM

Attempt 3: \_\_\_\_\_ (Name) \_\_\_\_\_ (Grade) Time: HH:MM

Desaturations < 85 %: YES/ NO, Bradycardia < 100 / min: YES / NO

If YES, lowest Sats: \_\_\_\_\_ Duration: \_\_\_\_\_ min

If YES, lowest HR: \_\_\_\_\_ HR: \_\_\_\_\_ min

Pedicap bright yellow: YES / NO

Time intubation completed: HH:MM Conventional or Video Laryngoscopy (please circle)

ET fixed at: \_\_\_\_\_ cm at lips Air entry: equal / right / left

Check X-ray ET position: \_\_\_\_\_, Adjusted: YES /NO,

Repeat X-ray Tube position (if done): \_\_\_\_\_

#### Additional notes:

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Signature (Intubator): \_\_\_\_\_ Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Signature (Scribe): \_\_\_\_\_ Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_



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## Exceptional Circumstances Form

Form to be completed in the **exceptional** circumstances that the Trust is not able to follow ODN approved guidelines.

Details of person completing the form:	
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First name:	Email contact address:
Surname:	Telephone contact number:
Title of document to be excepted from:	
Rationale why Trust is unable to adhere to the document:	
Signature of speciality Clinical Lead:	Signature of Trust Nursing / Medical Director:
Date:	Date:
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Please email form to: [mandybaker6@nhs.net](mailto:mandybaker6@nhs.net) requesting receipt.  
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