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

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Approved by:

Neonatal Clinical Oversight Group	
Clinical Lead Matthew James	**Matthew James**

Ratified by

Date of meeting	**24th September 2020**

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.[1] 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.[2] 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 CO2 monitoring devices such as Pedi Cap is recommended.[3]

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 in 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.[4,5] 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[4,5] 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[6] 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 to wider use and familiarity most clinicians prefer atropine over glycopyrrolate.[5]

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.[8]

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[9]

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**
FENTANYL (Analgesic, Controlled Drug)	50 micrograms/ml 2ml size Diluent: 0.9% sodium chloride or 5% glucose	**2 micrograms/kg** (Range 1 – 4 micrograms/kg)[6] IV **slowly over 1-2 minutes** 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
ATROPINE (Vagolytic)	600 micrograms/ml 1ml size Dilution not recommended	**20 micrograms/kg** stat rapid IV bolus[6,7]	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)
SUXAMETHONIUM (Muscle Relaxant)	50 mg/ml 2ml size **in fridge** 0.9% Sodium chloride or 5% glucose	**2 mg/kg** stat IV bolus[6,7]	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
NALOXONE **(Opioid Antagonist – to reverse Fentanyl related respiratory depression or chest wall rigidity)**	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			

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)
Ease of laryngoscopy (Jaw relaxation)	Easy	Fair	Difficult
Vocal cord position	Abducted	Intermediate	Closed
Vocal cord movement	None	Moving	Closing
Airway reaction (cough, gag)	None	Slight	Sustained (>10s)
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)[9]

References:

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6. Specialist neonatal respiratory care for babies born preterm [NG-124] – April 2019 https://www.nice.org.uk/guidance/ng124/chapter/Recommendations#sedation-and-analgesia
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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 PROCEEED?

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:** H H : M M

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 – 699	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 7th 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)

East of England Neonatal ODN

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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: _____ % FiO2: _____ %

Observations: HR: _____ SpO2: _____ 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:

_____

_____

_____

_____

_____

_____

_____

_____

_____

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.

<table>
<tr><td colspan="2">Details of person completing the form:</td></tr>
<tr><td>Title:</td><td>Organisation:</td></tr>
<tr><td>First name:</td><td>Email contact address:</td></tr>
<tr><td>Surname:</td><td>Telephone contact number:</td></tr>
<tr><td colspan="2">Title of document to be excepted from:</td></tr>
<tr><td colspan="2">Rationale why Trust is unable to adhere to the document:</td></tr>
<tr><td>Signature of speciality Clinical Lead:

Date:</td><td>Signature of Trust Nursing / Medical Director:

Date:</td></tr>
<tr><td>Hard Copy Received by ODN (date and sign):</td><td>Date acknowledgement receipt sent out:</td></tr>
</table>

Please email form to: mandybaker6@nhs.net requesting receipt.

Send hard signed copy to: Mandy Baker
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