



<b>CLINICAL GUIDELINE</b>	
<b>Extubation: Planned and Unplanned</b>	
<b>Scope (Staff):</b>	Nursing and Medical Staff
<b>Scope (Area):</b>	NICU KEMH, NICU PCH, NETS WA
<b>Child Safe Organisation Statement of Commitment</b>	
CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.	

**This document should be read in conjunction with this [DISCLAIMER](#)**

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## Aim

To remove the endotracheal tube and maintain the baby successfully on non-invasive ventilation, while minimising the degree of atelectasis and trauma.

The decision to extubate should be made by a senior doctor especially in < 28 week gestation baby.

## Background

Evidence suggests that earlier extubation in very preterm neonates may reduce the risk of chronic lung disease. This benefit may be offset by the risk of increased instability on non-invasive support and potential trauma of repeated intubations. Readiness for extubation of extreme preterms should be determined by a Consultant with consideration of FiO<sub>2</sub>, age, ductus, caffeine prescription, pre-extubation gas and ability to spontaneously ventilate. A spontaneous breathing test may be useful in extreme preterms where by the neonate is placed on endotracheal CPAP for up to 3 minutes. If the baby breathes well and maintains HR and O<sub>2</sub> saturations during this time, extubation is less likely to fail in the first 72 hours. This should not be done immediately prior to extubation due to the risk of atelectasis and should be suspended if there is significant desaturation or bradycardia.

In the surgical baby the level of analgesia and sedation will determine time of extubation and a spontaneous breathing test may also be useful.

A further consideration should be the amount of leak around the ETT. A good leak with a reasonable size ETT is reassuring whilst a minimal or no leak might suggest significant tracheal oedema.

Post-extubation stridor is a potential complication of extubation. There are risks and benefits to prescribing dexamethasone in this scenario. The consultant may decide dexamethasone treatment is warranted immediately before or after extubation on a case by case basis.

## Planned Extubation

### Key Points

- There is always a risk that the neonate may deteriorate once the endotracheal tube has been removed. It is important that resuscitation and reintubation equipment is available in the event that it may be needed, and
- Medical staff must be made aware of an extubation commencing, and be present in the nursery.
- If the neonate requires suction this should be performed prior to extubation. Endotracheal suction may cause atelectasis. Allow the neonate to recover post ETT suction - when the neonate has stabilised on pre-suction ventilator settings, extubation should be performed.
- Most preterm neonates will be extubated to continuous positive airway pressure (CPAP) to prevent atelectasis.
- CPAP may be contraindicated in some neonates following abdominal surgery (if unsure discuss with surgeon).
- It is beneficial for the neonate to be nursed prone following extubation. The prone position improves oxygenation due to mechanical advantages on chest wall expansion. Positioning of the neonate is dependent upon their condition, surgical neonates may not be able to be positioned prone.
- Extubation can be performed in either an incubator or on a radiant warmer.

## Procedure

Endotracheal extubation is a **two**-person procedure, one of which should be a NNT or a doctor.

Steps	Additional Information
1. Apply transcutaneous monitoring (if appropriate) and allow to stabilise before extubation.	
2. Check if the neonate has had or requires caffeine.	
3. Set up a trolley for <a href="#">intubation</a>	Refer to Intubation clinical guideline
4. Have suction and a NeoPuff or Laerdal bag and mask available	Ensure appropriate size mask is available
5. Ensure nCPAP or nasal cannula is set-up if required	Pre-warm humidification circuit
6. Place infant in supine position. Head midline	
7. Using adhesive remover, remove tape	Skin tears can occur if tape is not removed effectively
8. Withdraw the endotracheal tube smoothly.	
9. If nCPAP required, apply promptly and secure	If an oral ETT is in position, nCPAP can be placed before ETT removal.
10. Suction the oro-nasopharynx as needed	
11. If plan is not to extubate to nCPAP and oxygen required, apply nasal cannula with low flow O <sub>2</sub> (PBF)	
12. Observe the infant for increased signs of respiratory distress	
13. Document the procedure and inform the parents	
14. Measure and record a blood gas one hour post extubation or as ordered.	

## Unplanned Extubation

Extubation of a patient that was not immediately planned, i.e. an accidental extubation.

### Prevention

- Early recognition that securing method compromised.
- Hourly inspection of endotracheal tube taping (Neobar® or brown tape) to ensure it remains securely attached to baby's face and endotracheal tube.
- Prioritise endotracheal tube re-strap if the securing method is noted to be compromised/loose particularly during Golden hour after admission.

**NOTE:** The re-strap does not need to coincide with care times.

- When handling an intubated infant at least **2** members of staff are required, with one staff member supporting the ventilator tubing and ETT.

## Clinical Presentation

A high index of suspicion for unplanned or accidental extubation is required when caring for intubated patients. Unplanned or accidental extubation may present in the following ways:

- Sudden clinical deterioration with decrease in heart rate and oxygen saturation.
- Loss of chest wall movement with ventilation.
- Increase in leak noted by ventilator.
- Loss of end tidal CO<sub>2</sub> detection.
- Loss of air entry sounds on auscultation.
- Audible cry.

## Management of unplanned extubation

1. Press urgent assist bell and commence airway support.
2. Stop continuous milk feeds if these are running. Aspirate gastric contents
3. Medical staff to promptly attend to manage.
4. Confirm unplanned extubation (consider use of CO<sub>2</sub> detector or visual inspection with laryngoscope).
5. Remove endotracheal tube and gastric tube. Be careful of removing existing tape; use adhesive remover as required.
6. Assess ventilation status and provide CPAP, or mask IPPV if required.
7. Ensure continuous ECG and Saturation monitoring.
8. Re-intubate if required, secure endotracheal tube, replace gastric tube and decompress stomach. Refer to [Intubation](#) clinical guideline.
9. Chest X-ray to confirm endotracheal tube location/position.
10. Update parents and document in progress notes.

## Documentation required

Date and timed entry of unplanned extubation into progress notes, action taken, CXR confirmation and continuing plan of care by medical staff.

Complete Unplanned Extubation chart (nursing staff)

- What method of endotracheal securement was used: brown tape or Neobar®. Sizes of ETT & Neobar®, pre and post unplanned extubation.
- When ETT strapping was last checked and what the condition was.
- Detailed observations including WOB and outcome.
- What was occurring around time of unplanned extubation, eg. Active baby, cares of baby, baby weighed, kangaroo care.

*Complete CIMS form: MANDATORY*

Suggested coding for CIMS report

- SAC 1: any resuscitation involving drugs, ECM or escalation of intensive care or death.

- SAC 2: any reintubation deemed traumatic or eventful but without the use of drugs or ECM.
- SAC 3: unplanned extubation with return to previous level of care and uneventful reintubation or for any baby who has an unplanned extubation and continues on CPAP or Self Ventilating.

## Suspected Blocked ETT

### Prevention

May require routine ETT suctioning if secretions prolific and tenacious.

Signs of blocked ETT

- Increased WOB.
- Air entry reduced or absent.
- Increasing ventilatory requirements.
- Fluctuation in vital signs falling saturation levels and bradycardia.
- Loss of end tidal CO<sub>2</sub> wave form and reading if complete obstruction or a sudden significant rise in etCO<sub>2</sub> reading if partial blockage (Note: there may be other causes for a sudden rise in etCO<sub>2</sub> e.g. a pneumothorax).

### Management

- Inform medical staff.
- Attempted suctioning if suspected blocked ETT refer to [Endotracheal Suctioning Guideline](#).
- Consider removal of ETT.

### Documentation

- Date and timed entry of episode into the progress notes.
- Action taken by attending medical staff.
- Continuing plan of care.

#### Related CAHS internal policies, procedures and guidelines

Neonatology guideline

- [Intubation](#)

#### References and related external legislation, policies, and guideline

1. Attar MA, Donn SM. Mechanisms of ventilator-induced lung injury in premature infants. *Semin Neonatal* 2002;7:353–60.
2. Thomson MA, Yoder BA, Winter VT, et al. Delayed extubation to nasal continuous positive airway pressure in the immature baboon model of bronchopulmonary dysplasia: lung clinical and pathological findings. *Pediatrics* 2006;118:2038–50.
3. Apisarnthanarak A, Holzmann-Pazgal G, Hamvas A, et al. Ventilator-associated pneumonia in extremely preterm neonates in a neonatal intensive care unit: characteristics, risk factors, and outcomes. *Pediatrics* 2003;112:1283–9.
4. Walsh MC, Morris BH, Wrage LA, et al. Extremely low birthweight neonates with protracted ventilation: mortality and 18-month neurodevelopmental outcomes. *J Pediatr* 2005;146:798–804.

5. Ammari A, Suri M, Milisavljevic V, et al. Variables associated with the early failure of nasal CPAP in very low birth weight infants. J Pediatr 2005;147:341–7.
6. Kamlin CO, Davis PG, Argus B, et al. A trial of spontaneous breathing to determine the readiness for extubation in very low birth weight infants: a prospective evaluation. Arch Dis Child Fetal Neonatal Ed 2008;93:F305–6.
7. Kamlin CO, Davis PG, Morley CJ. Predicting successful extubation of very low birthweight infants. Arch Dis Child Fetal Neonatal Ed 2006;91:F180–3.

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