GUIDELINE

Extubation: Planned and Unplanned

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

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.

Risk

Inappropriate management of extubation which may lead to prolonged and multiple attempts at intubation and associated complications.

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 the extreme preterm should be determined by a consultant with consideration of FiO_2, age, ductus, caffeine prescription, pre-extubation gas and ventilator settings (low MAP) and ability to spontaneously ventilate.

A spontaneous breathing test may be useful in the extreme preterm whereby the neonate is placed on endotracheal CPAP for up to 3 minutes. If the baby breathes well and maintains HR and O_2 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

- 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.
- 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.
- Morphine infusions to be ceased at least 6 hours prior to extubation, consider withholding enteral feeds for 60 minutes prior to extubation (to reduce aspiration or vomiting)
- 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.

Weaning and improving extubation success

- It is recommended that weaning from ventilation prior to extubation follows an individualised weaning plan which considers disease processes and physiology. Algorithms based on scenarios and modes of ventilation used can also aid the decision-making process. Weaning method should be planned and it is important to consider the post-extubation support.
- Consider best modality to offer optimum continuous distending pressure (CDP): use of CPAP (preferred), HFNC, synchronized and non-synchronized NIPPV (where available).
- Permissive hypercapnia: PCo2 between 45-65 mmHg and pH>7.2 (
- Medications
    - Caffeine (ensure optimised dose prior to extubation)
    - Corticosteroids: (consider pre-extubation in patients with significant BPD or concerns about airway oedema) refer to Dexamethasone
- Optimal nutritional support and developmentally supportive care

If weaning from HFOV or HFJV to CV, it is feasible to directly extubate to NIV/ CPAP at MAP<10 with FiO2<.0.4 Consider switching to CV prior to extubation if MAP and FiO2 higher than these parameters.

Appendix 1: Weaning algorithm on VG ventilation

Appendix 2: Weaning algorithm on pressure-controlled (PC-AC and PC-SIMV) ventilation

Extubation Procedure

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

See Appendix 3: Extubation checklist and timeline, Appendix 4: Difficult extubation

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 reintubation; note current ETT size and placement. 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 O2 (PBF)
12. Observe the infant for increased signs of respiratory distress
13. Document the procedure and inform the parents (prefer to use words ‘trial of extubation’)
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. Risk factors for unplanned extubation include patient movement, manipulation of the ETT, inadequate sedation, inadequate securement of ETT, restlessness or agitation, inadequate staffing, unclear plan for extubation.

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_2 detection.
- Loss of air entry sounds on auscultation.
- Audible cry.

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.

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_2 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/DMR, action taken, CXR confirmation and continuing plan of care by medical staff. Complete the Intubation and Extubation record MR493.00

- 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.

ALWAYS notify the incident in the DATIX CIMS database. 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_2 wave form and reading if complete obstruction or a sudden significant rise in etCO_2 reading if partial blockage (Note: there may be other causes for a sudden rise in etCO2 e.g. a pneumothorax).

Management

- Inform medical staff.
- Attempted suctioning if suspected blocked ETT refer to Ventilated Neonate: Nursing Care Of guideline
- Consider removal of ETT.

Documentation

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

Related CAHS internal policies, procedures and guidelines
Neonatology Clinical Guidelines • Intubation • Ventilated Neonate: Nursing Care Of • Ventilation: Conventional Neonatal Medication Monographs • Caffeine • Dexamethasone

References and related external legislation, policies, and guidelines

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This document can be made available in alternative formats on request.

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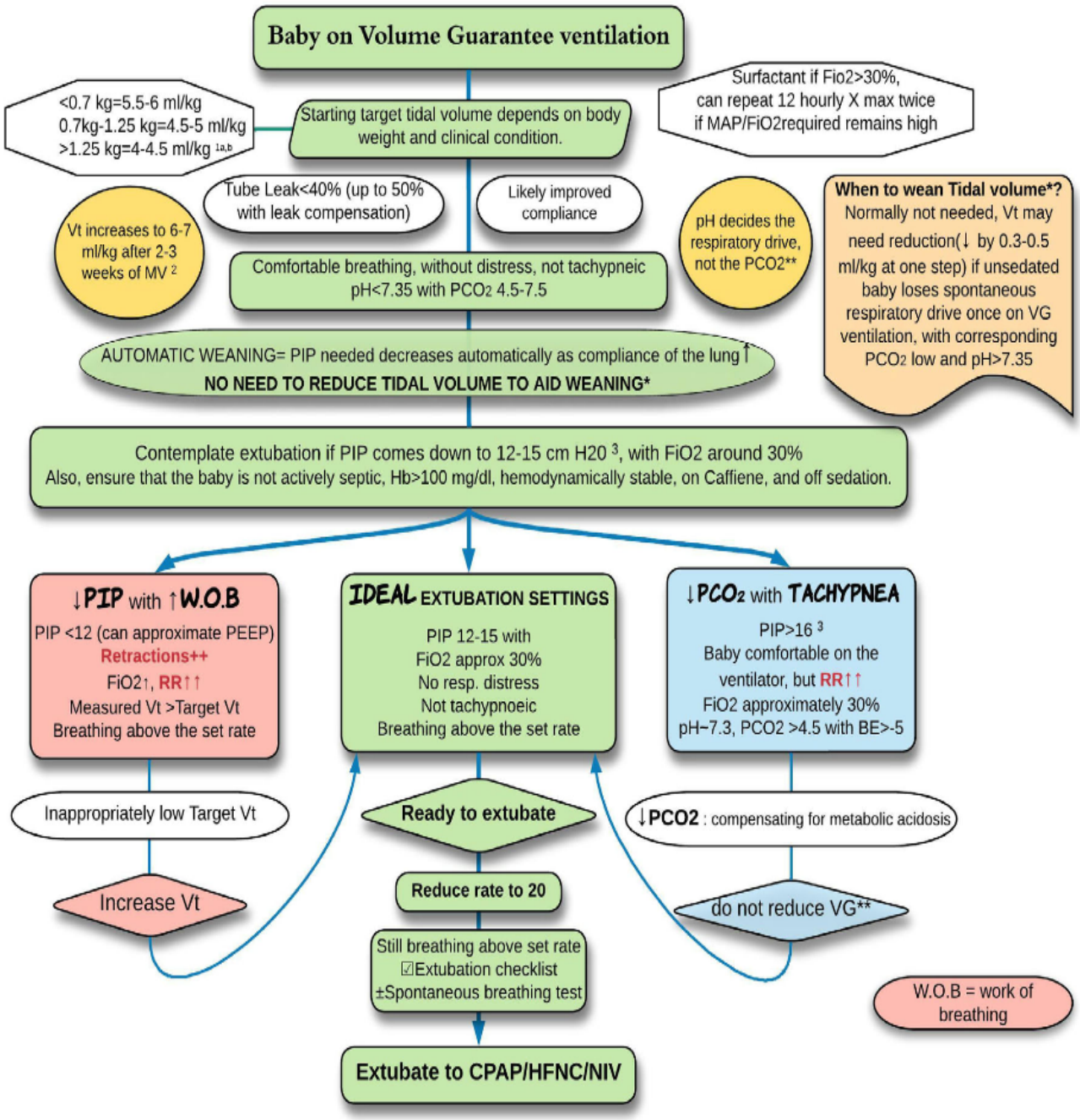
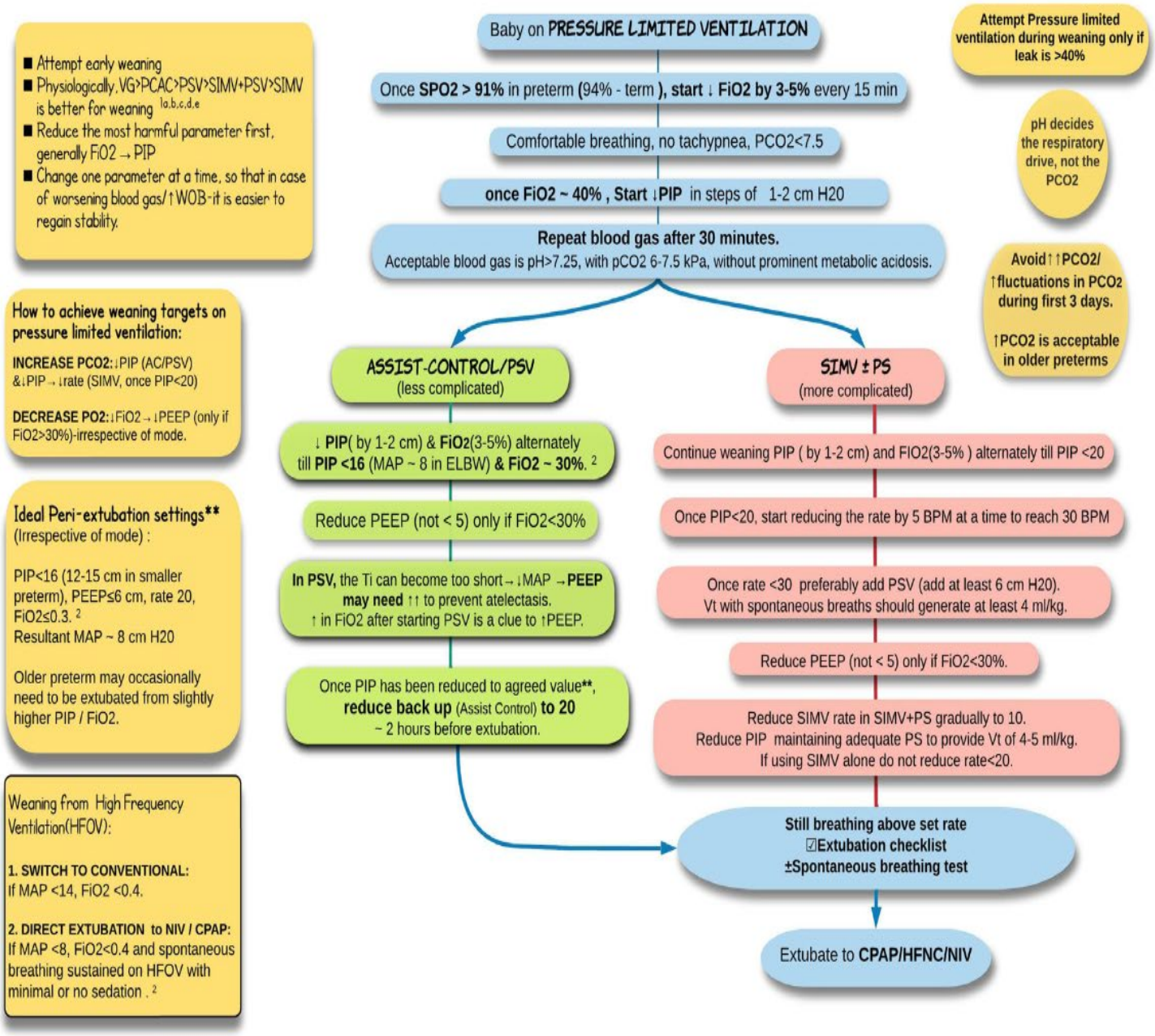
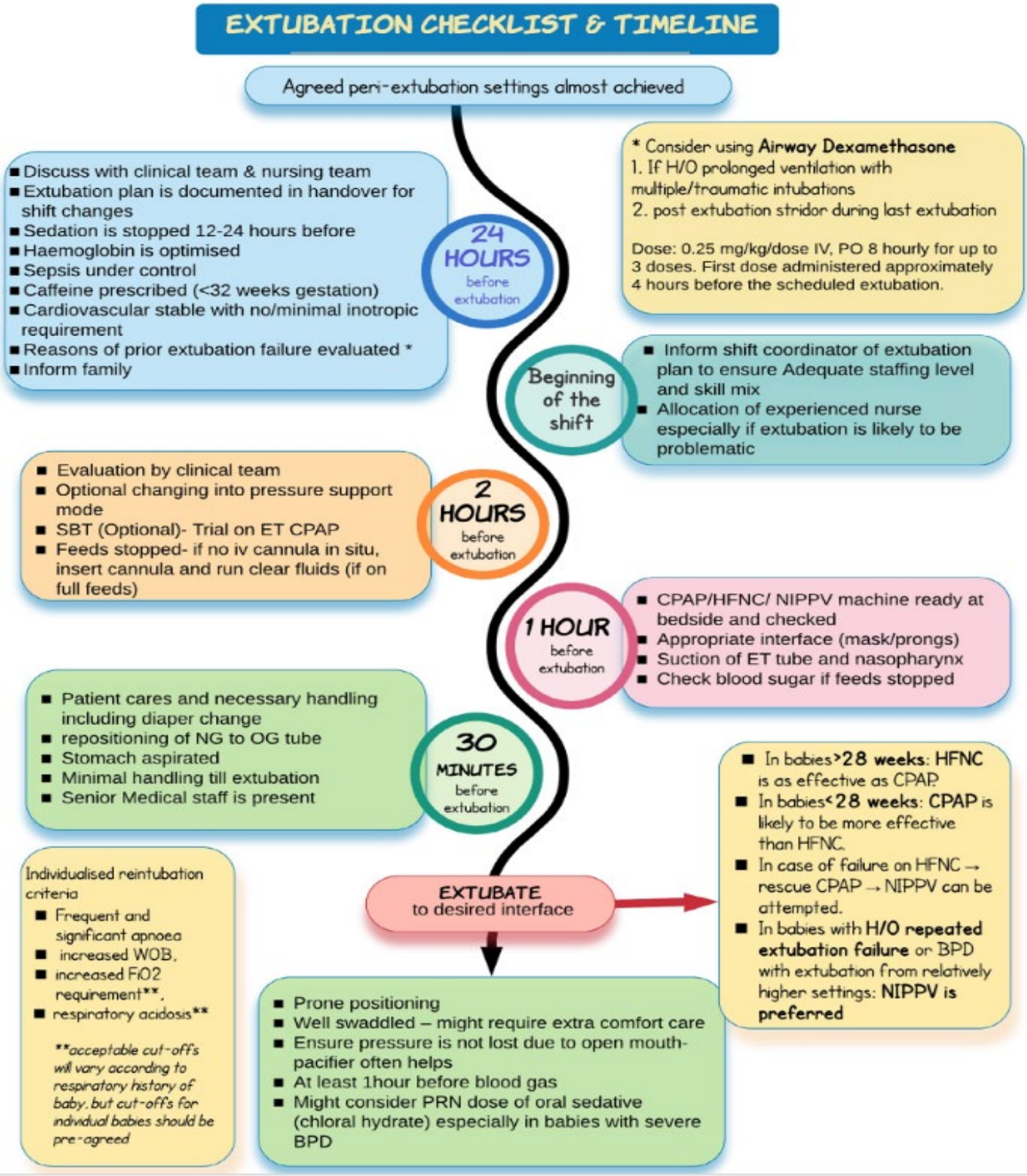
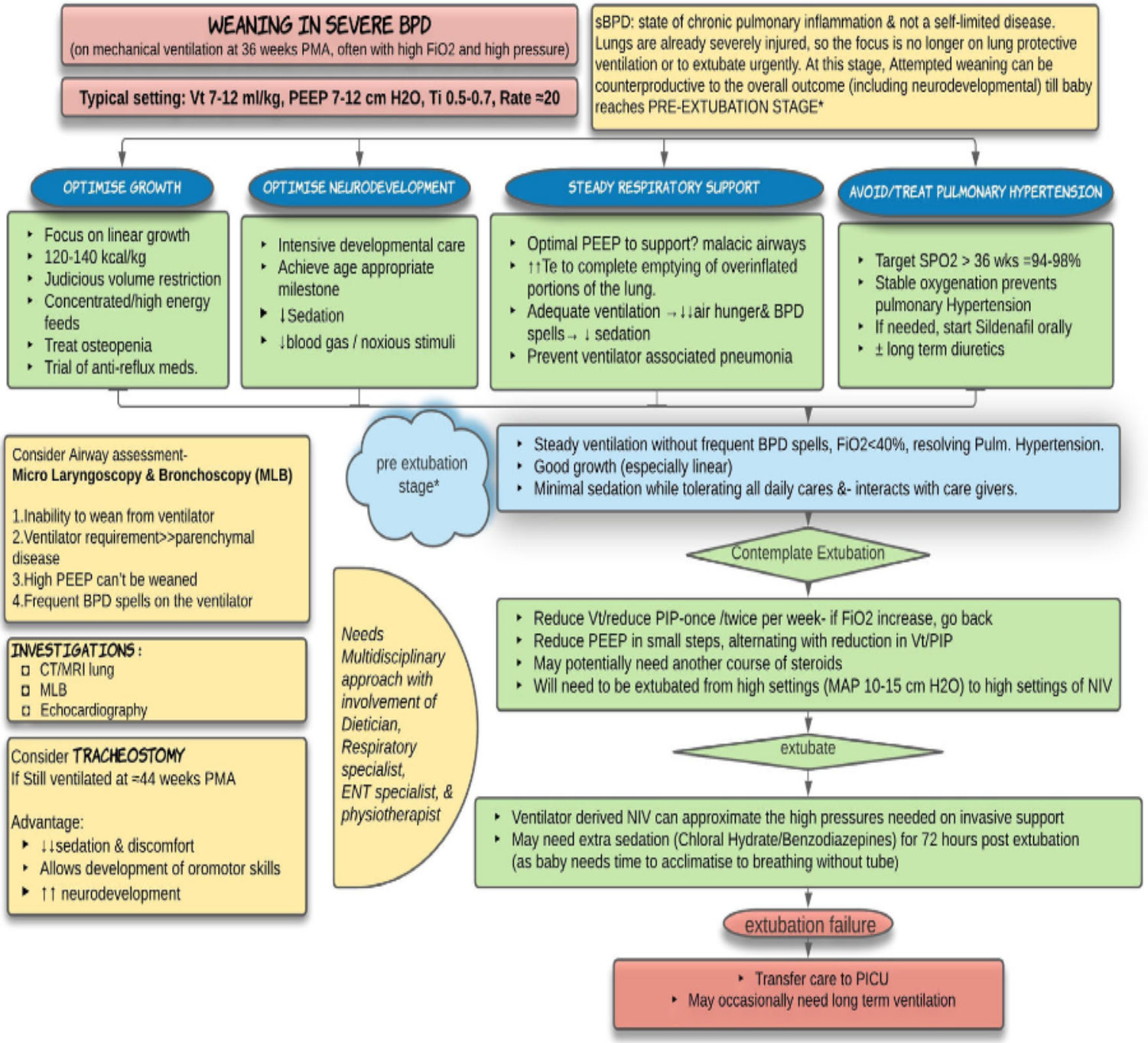
Appendix 1 - Weaning algorithm on VG ventilation[1]



Appendix 2: Weaning algorithm on pressure-controlled (PC-AC and PC-SIMV) ventilation[1]



Appendix 3: Extubation Checklist and Timeline[1]



Appendix 4: Difficult Extubation[1]