Extremely Premature Neonatal Retrieval

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	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

Contents

Contact NETS 3
Equipment 3
Resuscitation 3
Airway and Intubation 4
CPAP 6
Temperature 7
Circulation 8
Glucose Requirements 10
Blood Pressure 10
Laboratory Considerations 11
Emotional Support 11
NETS Logistics 12


NETS Call for
Impending preterm delivery < 28 weeks
NETS Consultant to be in conference
To check whether has been discussed with senior obstetric staff at KEMH
If no discussion so far
4 way conference
referring team, NETS, (RFDS) & Obs team
Transfer possible
Transfer not possible
RFDS/St John Ambulance organise transfer of baby in utero
To prepare for delivery
NETS team to dispatch
NETS SR
NETS NURSE
+/_ consultant
To ensure some one who is skilled in airway is available
Paed/ Anesthesisa/ED
Airway
Breathing
Circulation
Drugs
Equipment

Contact NETS

- Any mother at risk of preterm delivery at a non high-risk hospital with a level 3 NICU should be preferentially transferred in utero. A decision on where to deliver baby or transfer in utero is to be made by KEMH Obstetric team, who can be contacted directly via KEMH switchboard on 6458 2222 or via NETS WA call conference.
- If KEMH obstetric team has advised the mother is required to deliver at a non-tertiary hospital, please contact NETS to enable logistical and priority preparations take place, even if the baby has not yet been delivered. Due to the large geographical distances in Western Australia this make take several hours for a team to arrive.

Equipment

- Neohelp™ or available clean cling wrap and thermal mattress.
- Resuscitaire preferably with T piece, full cylinders (oxygen and air)
- Turn on resuscitaire to ensure warm environment when baby is born by setting heater to 100%
- If no T piece is available, consider bag and mask ventilation.
- Neonatal resuscitation mask (size: 35mm or 42mm)
- Intubation kit (laryngoscope, tube size 2.5 and 3.0; CO2 detector) or CPAP kit
- Suction unit
- Stethoscope
- Ambient room temperature controls. This may require a call to your engineering department to increase the temperature in your location.

Resuscitation

This is a quick reference. Refer to Neonatal Clinical Guideline: Resuscitation Algorithm of the Newborn for further information.

Inflation of the lungs is the most essential step in resuscitation.Effective inflation of lungs with good chest wall rise will usually result in improvement from the patient (rise in heart rate & SaO2, colour improving and improved tone).

- Initial positive pressure ventilation settings:
  - PIP 25/ PEEP 5. Note: the preterm patient can often have ‘stiff’ lungs and may require increased PIP in stabilisation process.
  - Flow: 8L
  - Respiratory rate 40-60 (determined by operators’ occlusion time on T piece)

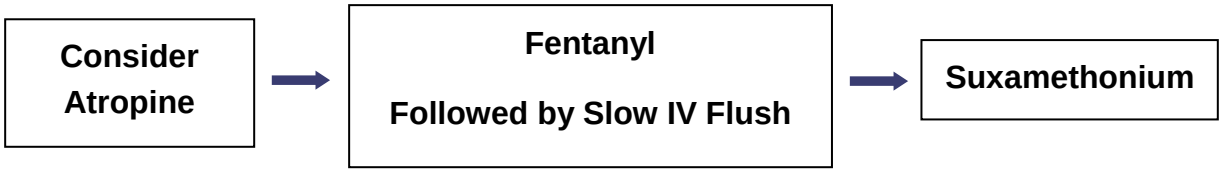
  - Oxygen: set blender to FiO2 0.30 and titrate accordingly to target oxygen saturation (SaO_2) based on acceptable SaO_2 limits detailed in the Neonatal Clinical Guideline: Monitoring and Observation Frequency

- Adrenaline for preterm infants <34 weeks:
  - Use adrenaline 1:10,000 0.5ml first dose via ETT
- Thereafter, administer adrenaline via UVC (inserted 3 – 5cm ensuring blood can be withdraw on pull back) followed by a NaCl 0.9% flush 2-3mls. Repeat every 3-5mins if HR remains <60bpm with chest compressions 3:1 ratio (120 events per minute)
- Fluid bolus for shocked/compromised infants
  - 10ml/kg NaCl 0.9%
  - Consider O negative packed red blood cells 10-20ml/kg in major bleed/abruption.

Airway

Intubation

- Extremely premature infants may require intubation due to surfactant deficiency, poor oxygenation, and/or secondary apnoea. This is a two-person procedure with a minimum of one staff member competent at intubation.
- If no staff member is competent at intubation continue using T piece IPPV with a mask.
- Premedications should be considered unless it is an emergency intubation. Medications should be prescribed and drawn up ready for use. You can access the NETS WA app or NETS WA website to utilise the drug calculator to assist with prescribing.



- Please note Fentanyl should be given slowly over 3 – 5 minutes with a slow flush over 1-2 minutes due to the risk of chest rigidity. If this does occur you may require a higher PIP and slightly longer inspiratory time to override the rigidity.
- All equipment should be set out and easily accessible to staff performing procedure. See Figure 1.

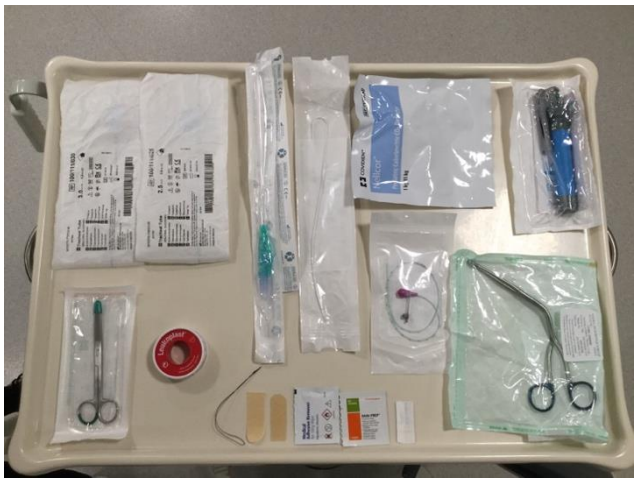


Figure 1: Intubation equipment including required ETT size and 1 size below.

Additional equipment not pictured: Suction & T piece device.

- See the table below as a guide for intubation tube size based on weight and gestation.

Corrected Gestation (Weeks)	Actual Weight (Kg)	ETT Depth at Lip (cm)	ETT Size (mm)
23-24	<0.6	5.5- 6.0	2.0- 2.5
25-26	0.7-0.8	6.0	
27-29	0.9-1.0	6.5	
30-32	1.1-1.4	7.0	2.5- 3.0
33-34	1.5-1.8	7.5	

- All intubations should be confirmed with visualisation of the ETT through the cords and a positive change on a CO_2 detector (Pedicap^{TM}) along with stabilisation in observations HR> 100, SaO_2 > 93% and equal chest wall movement.
- Securing of the ETT effectively is essential. See Figure 2. Check at several stages for correct tube placement at lips (and every 30-60 mins thereafter) and equal air entry.
- All intubated patients require a chest X ray to confirm correct ETT placement. Please insert gastric tube prior to Xray.
- Please upload Xray images to PACS if possible, so NETS can review images of ETT/Line placement.

Figure 2: How to secure an oral ETT

Breathing

CPAP

CPAP increases functional residual capacity in the lungs, prevents alveolar collapse and reduces work of breathing, therefore improving gas exchange. Ideally this is delivered via a CPAP system such as a snorkel system or Hudson setup if available. If this is not available, use of PEEP via T piece is a suitable alternative.

- As a general guide most preterm babies < 32 weeks will require a CPAP as the minimum for respiratory support.
- CPAP should be commenced at 5-6 cm/H_20 and a flow of 5-8L/min. NETS will advise if a higher pressure is required.
- CPAP hat size: To determine the correct hat size measure the circumference from the nape of the neck, across the ears to the middle of the forehead (like a turban)
- If able, position the patient prone, ¼ prone (Figure 3) to optimise lung expansion.

Figure 3: Preterm infant on CPAP positioned ¼ prone

- If using the Hudson CPAP system, it's important to ensure a good ‘seal’ around the nose. To assist in this, “Comfeel” with holes for the nostrils can be applied

ensuring patent airway. The bottom water chamber where PEEP is set should bubble with an effective seal.

Prong Size	Patient weight
Size 0	< 700 grams
Size 1	700 – 1250 grams
Size 2	1250 – 2000 grams

- All patients requiring CPAP should have an orogastric tube inserted for gastric decompression, with confirmed placement via pH indicator of 5.5 or below. For appropriate size see table below:

Gastric tube size	Patient weight
5G (polyurethane)	< 850 grams
5G	> 850g to ≤1500g feeding only
6G	> 1500g feeding and/or free drainage
8G	Surgical cases and/or free drainage

Temperature

Pre-delivery

- Where able increase the theatre/birth suite and nursery room temperature to 25°c. You may need to contact your hospital shift engineer to do this.
- A hat and pre-warmed blankets should be available. If you have a Neowrap or Neohelp™ please use in addition to above. See post delivery for specific instructions for Neohelp™.
- Turn on resuscitaire to 100% heater output, manual setting prior to delivery.

Post delivery

- Target temperature: 36.5°C - 37.4°C.
- If you have a Neohelp™, you may make a small hole in right wrist area for a SaO_2 probe, place baby right after birth in the Neohelp closing drawstring around head and close Velcro, do not dry the patient prior when using this device, Figure 4.
- If movement of the baby to another location is required delay turning off warmer if possible and wrap baby in warm blankets to reduce heat loss.
- Monitor temperature per axilla every 15 minutes. A cold preterm baby can become unwell quickly.

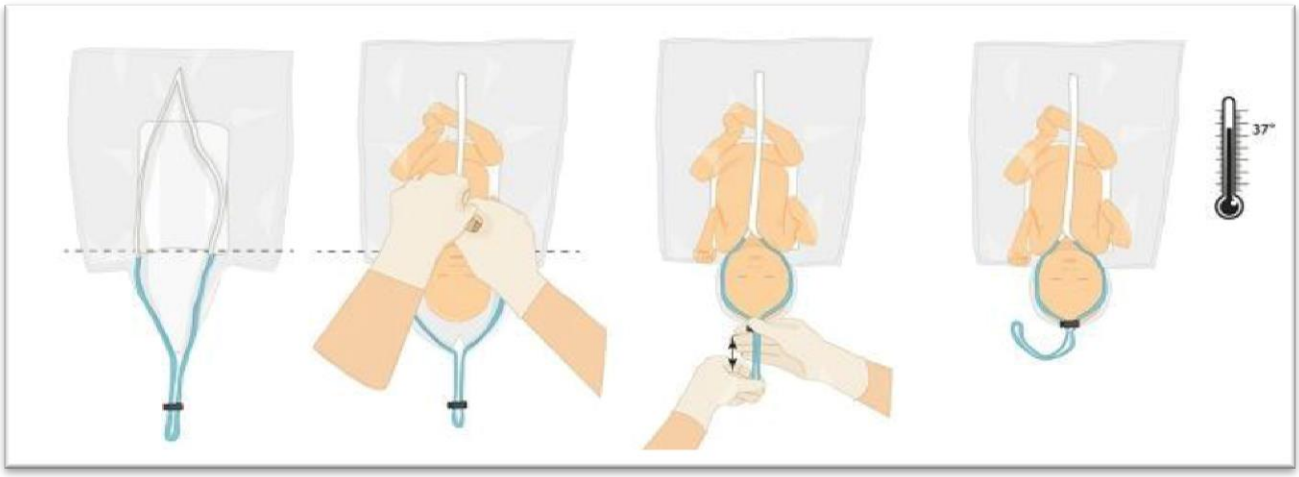


Figure 4. Correct position of baby in Neohelp ™

Circulation

- A peripheral intravenous catheter (PIVC) will often suffice for extreme preterm infants. Umbilical venous and arterial lines are alternatives and may be inserted depending on the size and clinical condition of the baby. Umbilical access may be deferred until arrival at KEMH/PCH. The best option will be discussed on a case-by-case base with NETS WA.
- All peripheral and central lines should to be inserted under surgical aseptic technique. Skin prep UVC/UAC insertion: 1% Chlorhexidine solution > 27 weeks gestation or povidone-iodine 10% solution ≤27 weeks gestation. Refer to Neonatal Clinical Guideline Umbilical Arterial and Venous Catheters (UAC/UVC) Insertion, Management and Removal if necessary.
- All lumens of central lines require heparinised fluid to be running with 0.5Units/mL heparin. Refer Fluid Management guideline.
- Ensure infants with umbilical lines in situ are not wrapped, have nappies or booties on. The umbilicus and lower limbs should be visible at all times to check for adequate perfusion and potential bleeding (via umbilicus).

UVC Insertion distance		UAC Insertion Distance		
Shoulder - Umbilicus Distance (cm)	UVC insertion length	Shoulder - Umbilicus Distance (cm)	Low UAC	High UAC
9	5.7	9	5.0	9.0
10	6.5	10	5.5	10.5
11	7.2	11	6.3	11.5
12	8.0	12	7.0	13.0
13	8.5	13	7.8	14.0
14	9.5	14	8.5	15.0
		15	9.3	16.5
		16	10.0	17.5
		17	11.0	19.0
		18	12.0	20.0

- Placement of umbilical lines must be confirmed by abdominal x-ray (AP & Lateral). Any changes in placement should be clearly documented in the notes and re x-rayed to confirm correct placement.
- Lines with tips in the liver should not be used. Lines may be pulled back 1-2cm to a low-lying level and used until alternative access is gained within 24-48hrs.
- UAC line placement at T6 – T9 is preferable however it is accepted at L3-L4. In the instance of low lines, monitor lower limbs and buttock due to increased risk of vascular compromise.
- Note central lines are NOT to be advanced post initial insertion due to infection risk. If advancement is required, a new line must be inserted.

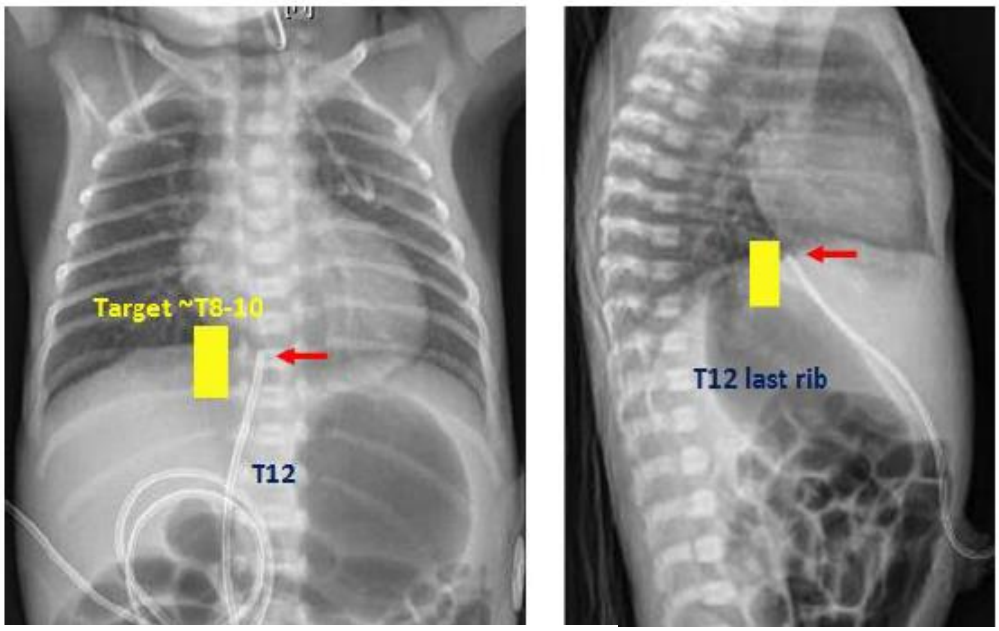


Figure 5. Correct position of **UVC**

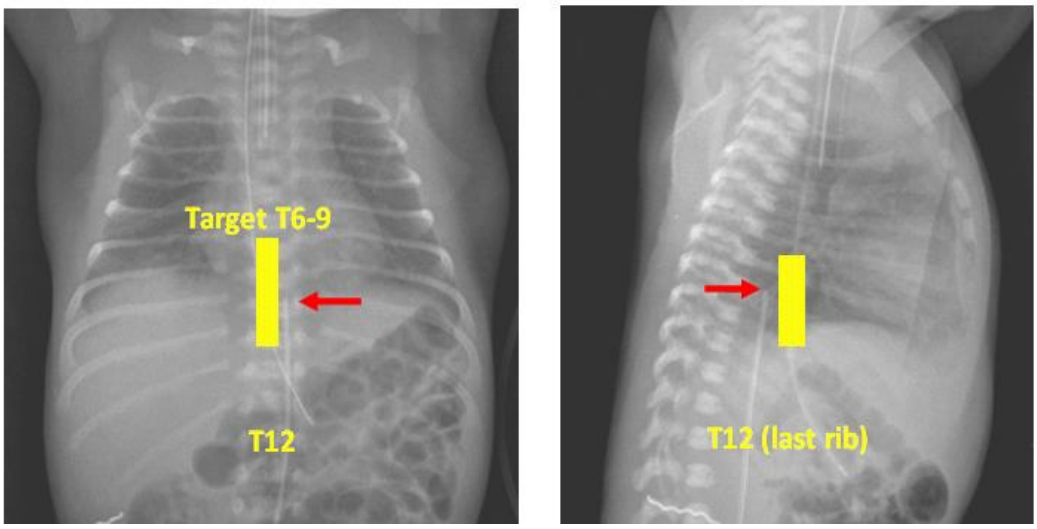


Figure 5: Correct position of **UAC**

Glucose requirements and fluid volumes

- Preterm neonates between 27-34 weeks usually require 80mL/kg/day on day 1.
- Extreme Preterm neonate's ≤ 27 weeks usually require 100-120mL/kg/day due to increased insensible fluid losses on day 1.
- Commence fluids as follows once line placement is confirmed. Changes are then made based on blood gas analysis for individual patient requirement.

Glucose Fluid requirement via UVC/ PIV (Note: UVC requires Heparin 0.5u/mL)	Gestation
5% Glucose	≤ 27 weeks
10% Glucose	> 27 weeks
Fluid requirement for UAC	**Gestation**
Sodium Chloride 0.45% + 0.5 u/mL Heparin	≤ 27 weeks
Sodium Chloride 0.9% + 0.5 u/mL Heparin	>27 weeks

Table 5: Fluid requirements and additives according to gestational age

Blood pressure

- Blood pressure can be measured non-invasively (BP cuff) or invasively (arterial line).
- For very and extremely preterm infants, a good rule of thumb is to aim for the baby's gestational age as the desired minimum mean blood pressure. As example a 28 week gestation patient would have an approximate mean of 28mmHg.

- Blood pressure management should be discussed with NETS. This includes fluid management, and in special cases the choice of inotropes.

Laboratory considerations

- Close monitoring of blood glucose levels and blood gases should occur during the stabilisation phase.
- All preterm infants require a blood culture, full blood count (FBC), and a CRP level.
- In case of suspected chorioamnionitis, please send a placental swab (fetal and maternal sides) to your laboratory for microbiology analysis.
- Additional tests might be requested and could include coagulation profile, liver function and kidney function tests.
- A gastric aspirate and ear swab is required for all preterm neonates.
- To perform additional tests at Perth Children's Hospital, please keep the placenta (double bagged) in a container with a lid. Label with both maternal and baby stickers for NETS WA to take with them.
- Maternal requirement: Please also collect 5ml of EDTA blood from the infant's mother. This tube needs to have a hand written label and a transfusion request form signed and dated by the person who took the sample included.

Emotional Supports

- Delivery of an extremely preterm infant in a peripheral hospital is usually unexpected and can easily overwhelm local resources. The delivery and subsequent transfer of an extremely preterm infant can be very distressing for the parents especially if they cannot travel to Perth in a timely fashion.
- NETS WA prioritise admission of the non-surgical preterm infant <32 weeks to KEMH.
    - If the mother is unwell, arrangements to transfer the mother to KEMH are made directly with the KEMH hospital manager and admitting medical staff.
    - If the mother requires a hospital bed but KEMH cannot provide admission, an alternative option to try is Osbourne Park Hospital who consider admissions of mothers without a baby for 24hrs. Arrangements need to be made directly with OPH.
- If the baby is being admitted to PCH please, discuss bed availability for the mother with PCH 3B midwife or shift coordinator. Minimum requirements are:
    - 4 hr post vaginal delivery.
    - 48hr post caesarean section, and self-caring.

- Parents should be given the opportunity to see and touch their infant prior to transfer. This may be after the NETS team have stabilised the infant and loaded them into the NETS cot.
- Parents must be provided with clear explanations, including written detail of how to contact the team caring for their baby. Parent information leaflets should be left with the family. NETS can assist with these conversations and documentation on retrieval.

NETS Logistics

- *Medical:* The NETS doctors on call should attend, a consultant neonatologist may also be consideration to attend.
- *Nursing*: Where a transport is undertaken using RFDS for the infant <32 weeks, the NETS nurse who is neonatal trained should attend, along with the RFDS flight nurse. This **MUST** be conveyed to RFDS during the initial call from NETS due to flight requirements and logistics.
- A transport team should be mobilised as soon as possible after initial referral of an EP/ELBW infant. The receiving Consultant at KEMH SCN3 will be conferenced into the initial referral call and all subsequent calls regarding ongoing stabilisation, management and transportation of the patient.
- As far as possible, all EP/ELBW infants should be transported directly to KEMH SCN unless there is a clear indication (e.g. a surgical condition). This decision must be made by the NETS consultant, in consultation with the KEMH consultant as appropriate.
- The KEMH NICU team should be updated with the ETA and the clinical condition and respiratory support settings when the NETS team have departed from the referring hospital with the patient.

Direct phone lines	NETS Hotline	1300 NETS WA (1300 6387 92)
	PCH Ward 3B	6456 3466
	PCH Switchboard	6456 2222
	KEMH Switchboard	6458 2222
	KEMH Nursery 3	6458 2030

Related CAHS internal policies, procedures and guidelines
Neonatology Guidelines • Monitoring and Observation Frequency • Resuscitation Algorithm of the Newborn • Umbilical Arterial and Venous Catheters (UAC/UVC) Insertion, Management and Removal NETS WA Guidelines • Fluid Management

Useful resources (including related forms)
CAHS Internet: NETS WA

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

Document Owner:	Neonatology		
Reviewer / Team:	NETS WA		
Date First Issued:	March 2005	Last Reviewed:	13th April 2021
Amendment Dates:		Next Review Date:	13th April 2024
Approved by:	Neonatology Coordinating Group	Date:	27th April 2021
Endorsed by:	Neonatology Coordinating Group	Date:	
Standards Applicable:	NSQHS Standards:  Child Safe Standards: 1,10		

Printed or personally saved electronic copies of this document are considered uncontrolled

Healthy kids, healthy communities

Compassion | Excellence | Collaboration | Accountability | Equity | Respect

Neonatology | Community Health | Mental Health | Perth Children's Hospital