

RETRIEVAL CARE OF THE EXTREMELY LOW BIRTH WEIGHT INFANT - NETS

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

Extremely Low Birth Weight Infant.

- <28weeks and/or <1000g
- Always ask for clinical support when not comfortable with these low gestations
- It is preferable for a skilled neonatal clinician to lead or supplement the team for these retrievals. Ideally, that should be a neonatologist
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Rationale

- Seek any opportunity to avoid ex-utero transfer by timely, safe in-utero transfer
- Avoid hypothermia/cold stress
- Reduce trans-epidermal water loss (TEWL)
- Preserve skin integrity and prevent infection
- Reduce morbidity and mortality in extremely low birth weight (ELBW) infants
- Support the premature lung

Disclaimer

This document is available on-line as a stimulus for interchange of knowledge and ideas in the field of Neonatal and Paediatric Retrieval. It is provided "as-is" and without support or warranty of any kind. Many of our guidelines may not be appropriate for use in retrieval settings other than NETS NSW, especially in non-Australian environments.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st December 2018	Review Period: 3 years
Team Leader:	Staff Specialist	Area/Dept: NETS

CHANGE SUMMARY

- Due for review with some changes throughout guideline
- **9/7/20:** Minor review. Amended temperatures on pages 3 and 4 to be consistent with other guidelines.

READ ACKNOWLEDGEMENT

- NETS Clinical Staff are to read and acknowledge they understand the contents of this guideline

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Definition

- <28weeks and/or <1000g

Rationale

- Avoid hypothermia/cold stress
- Reduce trans-epidermal water loss (TEWL)
- Preserve skin integrity and prevent infection
- Reduce morbidity and mortality in extremely low birth weight (ELBW) infants
- Support the premature lung
- Both nurses and doctors should ask for clinical support when not comfortable with these low gestations
- It is preferable for a skilled neonatal clinician to lead or supplement the team for these retrievals. Ideally, that should be a neonatologist

Infection Control

- Universal precautions
- Strict hand washing and use of Antibacterial Gel to cleanse hands prior to touching baby
- No rings, watches, etc. Roll sleeves up to the elbow and tie hair back

Procedures

Temperature and humidity control

- This is always a priority while establishing adequate airway, breathing and circulation
- At delivery immediately wrap baby loosely in plastic wrap 'clingfilm' (GLAD wrap®) or place in oven bag without drying. This prevents evaporative heat loss and prevents insensible water loss. When placing in oven bag cut a hole in the sealed section and place over head, leaving head exposed. Place Velband®™ or knitted hat to prevent heat loss from head.
- Open care system radiant heater with servo temperature control. Be mindful of overheating. Keep sides of open cot up at all times to prevent convective heat loss. Place on warmed blankets to prevent conductive heat loss. Remove all wet linen
- Avoid hypothermia (Temp < 36.5°C) as cold stress will lead to surfactant inactivation and hypoglycaemia increasing mortality and morbidity
- Avoid hyperthermia (Temp > 37.5°C) which will increase insensible water loss
- Target normothermia with an axillary temperature range of 36.5-37.2°C

- If baby passes urine - replace plastic wrap and document passage of urine
- Avoid draughts, close doors, keep baby away from air conditioning ducts. Increase ambient temperature to 25°C where temperature control is possible i.e. theatre.
- Maintain infant in flexed position by 'nesting'
- Place baby in a double walled pre-warmed incubator and on warmed gel headrest as soon as procedures and stabilisation are completed
- Space blanket may be placed over incubator to reduce radiant heat loss or cover crib with baby blanket for privacy.
- Use sterile plastic drapes during umbilical catheter insertion or when any sterile procedure performed (do not use cloth drapes). Always ensure servo control in place prior to using plastic drape to prevent hypothermia and leave baby wrapped in 'cling film' (GLAD wrap®); only exposing umbilicus and face
- Deliver warm inspired gases as appropriate via humidifier – only use 100mL of sterile water as humidifier base is calibrated by biomed for this amount to heat
- Adjust incubator temperature as required. The neutral thermal environment or thermo neutral zone (TNZ) (environmental/incubator temperature) for ELBW infant on first day of life is usually >36.5°C
- Monitor skin temperature continuously and record 30 minutely and per axilla temperature at least hourly
- In the retrieval environment, it is not possible to nurse the infant in an humidified environment. Therefore occlusive skin wrapping with 'cling film' is used. The 'cling film' should be placed loosely around the infant, so that evaporation from the infant's own skin provides a humidified environment.
- Initial intravenous maintenance fluid of 60-80mL/kg/day Glucose 10% as guided by receiving neonatologist

To preserve skin integrity and prevent infection

- Use Duoderm® / Coloplast® as a base between skin and tape in securing umbilical lines
- Use Hydrogel® products for all electrodes and to secure skin temperature probe
- Where possible and with adequate skill available umbilical access should be obtained. When this is not possible peripheral IV cannulation should be achieved by the most experienced team member. Peripheral cannulation should avoid those vessels traditionally used for insertion of percutaneous intravenous catheters (PICC line) as these babies will all require this in the next few days of life. These vessels would include the long saphenous and cephalic veins.
- Use Steristrips® and Tegaderm® dressing for peripheral cannulae and secure armboards with Micropore® or similar. Fluff tape or double tape to maintain skin integrity
- Transcutaneous electrodes should not be used as they can strip the immature epidermis and cause burns
- Silicone based, no-sting barrier film should be avoided in the first week of life. It can be considered after this time under the Duoderm®, Hydrogel products, Steristrips and Tegaderm® if there are problems with adherence. Protect the infant from inhaling the fumes that evaporate.

- **Never** use urine bags - cotton balls are used for assessing urine output and for urinalysis
- **Never** use alcohol-based solutions as they will burn the skin. Use aqueous chlorhexidine as an antiseptic solution. Never allow antiseptic solution to pool in plastic wrap or around the baby as this can also result in burns

Ventilatory support

- At birth, the ELBW infant may require mask ventilation or CPAP via Neopuff® . This should be provided using the least amount of pressure to move the chest.
- CPAP at a pressure of 6-8 cm H₂O with bi-nasal short prongs (with humidified /warmed gas/oxygen) may be tried if the infant has good respiratory effort with minimal respiratory distress
- Many will require intubation with a 2.5mm ETT for surfactant administration and respiratory support. Those decisions should be part of the discussion with the referral hospital; whether that is the destination neonatal ICU or not. If a referral hospital neonatologist has not been engaged, the NETS' consultant may advise on treatment
- Assess chest movement constantly post surfactant administration, ensuring adequate but not excessive chest wall movement – wean ventilation (PIP) appropriately
- Reasonable settings to commence ventilation are pressures of 20/5 with a rate set at 60bpm; IT 0.3seconds
- Target the SpO₂ 90-95% and titrate FIO₂ accordingly, start at a FIO₂ of 40%. Set alarms 88-96.
- Check ABG 20 minutes' post surfactant
- Avoid acidosis, hyperoxia, hypocapnoea & excessive hypercapnoea by maintaining: pH> 7.25; PaCO₂: 45-60 mmHg (permissive hypercapnia); SpO₂ 90-95%
- Place 8 FG gastric tube to vent the stomach and aspirate regularly

Circulation

- ELBW infants are often hypotensive, however hypovolaemia is uncommon. It is essential to normalise temperature and provide adequate respiratory management before considering giving a fluid bolus to improve blood pressure or central capillary perfusion
- Blood pressure should be recorded continuously if possible or non-invasively measured every 30 minutes
- Venous and arterial access in ELBW babies is often best achieved via the umbilicus, however in selected cases, especially larger babies who are cardiovascularly stable, peripheral IV access may be considered adequate. In some cases a peripheral IV cannula may be considered first to enable delivery of intubation medications or IV fluid (in hypoglycaemia) prior to attempting umbilical access
- Peripheral arterial lines should be avoided (where umbilical arterial access is possible), in ELBW babies due to the risk of peripheral vascular compromise and ischaemic injury.
- Umbilical lines inserted in this context are central lines and insertion is a sterile procedure. Ideally a 3.5F double lumen UVC and a 3.5F single lumen UAC will be

inserted. Line position should always be assessed with X ray. This differs from an emergency resus UVC which is inserted rapidly during a resus and is usually a single lumen (and is replaced with a sterile line following successful resuscitation)

- It is difficult to define 'normal' BP values in ELBW infants. For infants who are < 30 weeks gestation, the 10th percentile of the mean BP is approximately equal to the gestational age. For example, a 24-week infant has a 10th percentile mean BP of 24mmHg.
- Low blood pressure is rarely due to hypovolaemia and is more commonly related to low cardiac output and cardiovascular adaptation to systemic vascular resistance in the first 24 hours of ex utero life. Given that, most neonatologists would **not** commence inotropic support without giving a small fluid bolus to ensure adequate circulating volume. Excessive volume may be harmful.
- Use of inotropes and fluid boluses should be discussed on the initial call including advice from the receiving neonatologist
- Ideally ultrasound assessment of the baby's cardiovascular status will guide treatment. Ultrasound allows differentiation of low blood flow and low systemic vascular resistance as to the cause of low blood pressure. Low blood flow is treated with an inotropic agent (first line dobutamine) whereas low systemic vascular resistance is treated with vasoconstrictor (dopamine or noradrenaline depending on receiving unit preference and vascular access)
- As a guide, if mean blood pressure is below the gestational age for >20minutes, give 10mL/kg 0.9% sodium chloride and commence dobutamine at 5-10micrograms/kg/min unless clinically you are suspecting sepsis. If septic commence with dopamine or consider noradrenaline (UVC required); dose range 0.05micrograms/kg/min to 0.5micrograms/kg/min
- If central/umbilical line unavailable, dobutamine infusion may be given temporarily via a peripheral IV line
- Commence dobutamine at 5-10 micrograms/kg/min. If further inotrope is required consider adding dopamine or noradrenaline as above.
- Dopamine is commenced at 5 micrograms/kg/min and can increase up to 10micrograms/kg/min as necessary.
- Adrenaline and hydrocortisone should be considered if BP remains unresponsive to other agents. **The NETS team should discuss the continuing clinical care with the receiving neonatologist and the parents if the ELBW infant is requiring this level of support**
- If using a peripheral cannula for inotropic infusion the site will require close monitoring. Vasopressor extravasation may lead to tissue ischaemia and necrosis. It is always preferable to use a centrally placed UVC. If unable to place umbilical lines at referring hospital wrap umbilicus within the cling-film around the baby to maintain moisture and humidity as discussed above
- Do not wrap the umbilicus with saline gauze as this will make the baby cold

Monitor blood sugar level (BSL)

- Check BSL and commence IV 10% glucose infusion at 60-80mL/kg/day
- If initial BSL 1.5- 2.7mmol/L check 30 minutes after commencement of fluids
- If BSL is <1.5mmol/L check infusion site and give a bolus of 2mL/kg of 10% glucose, followed by maintenance infusion. If refractory hypoglycaemia discuss with neonatologist the appropriate management. This may include increasing infusion rate or glucose concentration
- Check BSL 30 minutes after intervention
- Subsequent BSL monitoring should be 1-2 hourly, minimum 4 hourly on long retrievals
- If BSL is greater than 10mmol/L discuss management with receiving neonatologist

Infection

- There is a high risk of perinatal sepsis in preterm delivery, especially after spontaneous preterm labour and in the presence of respiratory distress
- Intravenous antibiotics should be given after obtaining blood culture
- The recommended antibiotics are IV penicillin 60mg/kg 12-hourly and IV gentamicin 5mg/kg once only

General care

- Vitamin K 0.5 mg should be given IV/IM at or soon after birth and this information conveyed to the receiving clinicians as this route of administration may require a repeat dose
- Minimal gentle handling
- If mother not being transferred immediately, encourage breast milk expression (encourage mother and local staff to facilitate)
- The placenta should be retained for histopathological examination
- Oral sucrose 24% should be given for all painful procedures at 0.05 mL/dose (max 10 doses in 24 hour period)
- Minimuffs™ should be applied to protect the newborn's hearing in noisy vehicles
- Sedation often isn't required at these gestations and if given, the bolus dose of morphine administered at intubation usually provides sufficient analgesia/sedation for the duration of a retrieval. If further sedation is required, consider another bolus of 50-100 micrograms/kg first. If required a morphine infusion may be commenced at 5 -10 micrograms/kg/hr.
- Midazolam should never be used in the ELBW infant due to extreme risk of hypotension

Outcomes

- ELBW babies are at high risk of death and long term neurodevelopmental impairment. Outcomes vary with gestational age, birthweight and clinical factors including antenatal steroid coverage and comorbidities
- In NSW/ACT the lower limit for intensive care is 23 weeks gestation. When outborn the risk of death or severe neurodevelopmental disability at 23 weeks gestation is very high

- Discussions with families should reflect the risk of these outcomes and it may in some cases be appropriate to withdraw life sustaining measures in preference for a palliative approach in consultation with the NETS and receiving unit consultants. On retrieval this would most likely be due to severe and unresponsive respiratory or circulatory failure. If an option for telephone antenatal counselling exists with family and receiving consultant or NETS consultant this should be undertaken
- For further information refer to references 12, 13

Related NETS Policies

1. General Retrieval Care of the Neonate
2. Thermoregulation in the Neonate
3. Surfactant - Curosurf; administration
4. Management of Neonatal Hypoglycaemia
5. Umbilical vessel cannulation
6. NETS presence at preterm birth

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