NETS
Part of the Sydney Children's Hospitals Network

NEONATE – GENERAL CARE IN RETRIEVAL - NETS

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Nearly half of NETS retrievals are for a neonate.
- This is a general guide to preparing and transporting neonatal patients whilst providing full intensive care monitoring and management.

CHANGE SUMMARY

- Updated document due to required review. No major changes.
- **10/01/22:** Minor review, updated Date Effective to 1st January 2022
- **03/03/22:** Minor review. Updated step 20 on pg 5, ensuring ventilator circuit is on port hole side of crib

READ ACKNOWLEDGEMENT

- All NETS clinical staff are to read and acknowledge they understand the contents of this guideline

Approved by:	SCHN Policy, Procedure and Guideline Committee	NETS Executive
Date Effective:	1st January 2022	**Review Period:** 3 years
Team Leader:	Staff Specialist	**Service:** NETS

Rationale/Background

Nearly half of NETS retrievals are for a neonate.

This is a guide to prepare and transport whilst providing full intensive care monitoring and management.

Equipment or specific requirements

- Observation folder, CCL, PDR sheets, NETS information envelope, NETS mascot (sugar glider)
- Neonatal fridge drugs (cooler bag 7 freezer block)
- Curosurf® – 240mg and 120mg (in with fridge drugs cooler pouch)
- Ice blocks for therapeutic cooling for infants that may satisfy 'cooling' criteria
- Transilluminator
- NETS neonatal retrieval system compatible/appropriate for mode of transport
- NETS neonatal pack
- Blood gas analyser and case with appropriate cartridges
- Defibrillator if required
- C-Mac Video Laryngoscope (selected cases)
- Consider extra air cylinder for preterm infants in referring hospitals without medical air or when fixed wing used

Procedure

Prior to departure check:

1. Neonatal pack intact with blue security clip
2. Collect Curosurf® and place in insulation pack with freezer block
3. Sign out refrigerated neonatal drugs and place in insulated pack with freezer block
4. Place transilluminator in retrieval system drawer for fixed and rotary wing
5. Print NETS drug calculator
6. Collect NETS documentation (CCL, PDR & retrieval paperwork)
7. Collect blood gas analyser & enough cartridges (at least 2 of each CG4/CG8)
8. Consider if defibrillator is required

Outbound clinical team:

1. Obtain clinical information from Coordinator (phone in for additional details en route, if departing before primary conference call has ended and/or as required)
2. Ensure equipment is loaded correctly, secure and connected

3. Review call sheet
4. Discuss worst case, best case scenario & anticipated 'First Look' management with a plan of care
5. Calculate & crosscheck resuscitation drug doses and fluid rates
6. Anticipate need to draw up intubation/resuscitation drugs and/or Prostin VR® (alprostadil) as soon as possible at referring hospital; subject to clinical assessment

At Referring Hospital:

- On arrival, move promptly to the location of the patient; with support and guidance from local staff if unfamiliar with the geography or needing security access
- If transported by a NETS EVO, take essential resuscitation equipment with you; leaving the life support system to be unloaded and moved by the EVO
- If transported by non-NETS staff, ensure all equipment is unloaded from the aircraft and/or road vehicle and secured to the stretcher or hospital trolley. These vehicles may not be the same for the next leg. If a clinical priority one has been assigned, ensure the team is efficient in moving equipment from the vehicle and expedite team moving to the patient
- Remove jumpers, watches and jewellery
- Wash hands
- Introduce yourself to nursing and medical personnel and receive joint handover

'First Look':

1. Make immediate assessment of neonate's condition; determine immediate priorities e.g. is urgent resuscitation required?
2. Document first look observations. Obtain full neonatal and maternal history and review x-rays, pathology and other results.
3. Check blood glucose level if not done in the last two hours.

Introduction to Parents

On first contact with parents, introduce yourselves. Briefly explain your role and the overall plan. Being aware of what local clinicians have already said to the family, explain what your assessment is of the neonate's condition, your proposed interventions and approximate time for stabilisation. Assure parents that they will receive further updates on their baby's condition and that your plan would be to not leave the hospital before they have a chance to see their baby.

Following First Look:

1. If access to the patient is obstructed or the space provided is inadequate to allow correct placement of retrieval equipment, request referring staff to move the objects necessary to allow appropriate access. Any equipment in use on another patient must only be handled by referring hospital staff. NETS staff are not to handle adjacent patients and their equipment, unless asked by referring hospital staff to assist in moving

equipment which might be obstructing the retrieval stabilisation area. Throughout the retrieval no equipment should be placed on the incubator canopy.

2. Ideally, assessment and stabilisation is conducted on an open care system. If the baby is in an incubator, consider transferring the baby to open care for better access and less handling.
3. NETS staff position the NETS neonatal life support system to the left side of the open care to facilitate optimal ergonomics of care and a safe working environment:
   - minimal gap between system and bed
   - system height adjusted up so that ventilator controls are easily accessible
   - power lead and gas cable adjacent to wall fittings
   - neonatal system ventilator circuit easily reaches patient without crossing staff access pathways
   - leaves access for an assistant during intubation procedures
4. The neonatal system should be connected to external power and gas sources; oxygen and medical air
5. Turn incubator on and set desired incubator temperature according to TNZ (thermal neutral zone)
6. Ensure procedure trolley/sharps container and rubbish bin are available
7. Perform a thorough physical examination
8. The doctor and nurse should together formulate a plan of action
9. If the baby is intubated check position of endotracheal tube, usually by checking the position of the endotracheal tube marker at the vocal cords. Document measurement of tube at lips/nares
10. Check all lines and tubes for patency and security i.e. need for re-strapping
11. NETS EVO can return to the ambulance for any additional equipment required
12. Connect neonate to retrieval monitoring system, directing all leads to the left of the body. These include ECG leads, skin temperature probe, SpO_2
13. Envelope leads with undercast padding (Webril®) Remember to check femoral pulses before covering leads with Webril®. Only necessary if the baby is on CPAP or intubated & ventilated.
14. Transfer or commence maintenance intravenous fluid infusion
15. Ensure all connections are luer-locked
16. A long FG8 OGT should be in situ. The distal end should be attached to a 20mL syringe with the plunger withdrawn to >10mL mark
17. Check if placenta has been sent for histopathology. If not, request that be done locally. Where no local service, consider need to bring to receiving hospital in a sealed container. Indications for bringing with baby are situations where the baby is gravely ill and may die – keeping baby and placenta together is beneficial for post mortem
18. Request maternal blood. Ensure NETS Cross-match Form (04/01) is completed by referring staff collecting blood and the NETS' team leader
19. **Prior to loading neonate:**

- Teleconference (through NETS Coordination) with accepting consultant (or delegated fellow) to discuss the management plan
- Check temperature and verify incubator temperature setting
- Position resuscitation bag with correct sized mask on system and re-check function
- Check air entry. Determine need for ETT suction
- Use cloth nappy to envelope neonate, lines, drains and OGT and secure with nappy pin
- Ensure all lines are free from entanglement prior to transfer
- Both team members are required to transfer the neonate to the transport incubator
- Assess appropriateness of parent to travel. Post-partum mothers within 24 hours of delivery are not escorted by NETS' teams

20. **Once neonate is loaded**:
    - Immediately after transfer, check air entry and chest movement. Check ETT remains in correct position without kinking, twisting or tension. Check measurement at lips/nares again. Position limbs with IAL/IVL so that sites can be seen without having to disturb internal environment of incubator
    - Ensure ventilator circuit and IV lines are not occluded.
        i. The ventilator tubing should be directed along the porthole side of the crib to allow easy visualisation and access for trouble shooting
    - Secure neonate in neonatal harness
    - Check identification arm bands
21. Take baby to mother or invite parents to come and see (and touch) their baby. Discuss the neonate's condition and proposed interventions in the near future
    - Give parents the printed destination sheet. Mark the name of the destination hospital, ward name, address and phone number
    - Give the parents the NETS information envelope and NETS mascot

In Transit - Special Considerations:

- External environment/temperature:
    - Space blanket can be used to cover incubator to protect against radiant heat loss or gain
- Apply ear muffs to neonate who is muscle relaxed and for those travelling by rotary or fixed wing aircraft
- Altitude: Certain conditions will not tolerate altitude; especially where the neonate requires high oxygen concentration or has a trapped gas/liquid. Flight nurse/pilots must be made aware of any altitude restrictions/preferences
    - For patients ventilated in low FiO_2, request a high CPA (8,000-10,000 ft) to extend air supplies
    - Record observations when reaching cruise level and on descent

- Equipment:
  - If medication is required in transit, place what you require on the transport system
  - If travel time >2hours consider checking an ABG and BGL on route – prepare equipment prior to travel
- Record HR/RR/skin temperature/SpO_2 readings/ventilator settings 15-30 minutely
- Ensure limbs are securely immobilised on arm boards to prevent dislodgement of cannulae or extravasation of intravenous fluids but not so that the circulation is compromised. Ensure the cannula insertion site is visible
- Check that all connections are secure and that there is no leakage

At Receiving Hospital:

- Introduce team and parent if accompanying the team
- Position NETS ICU system on the left hand side of the crib /open care system in which the infant will be nursed and lift system to a good working level.
- Driver/service assistant (DSA) will locate free air &oxygen outlets and power to attach the ICU system to wall gas & power supply. If unavailable, notify receiving staff so that they can provide access.
- Doctor gives a team handover
- **On admission:**
  - Record admission observations including axillary temperature
  - If an arterial line is insitu obtain an ABG and BGL while still connected to the NETS ventilator
  - Transfer the baby to the referring open care or crib when all parties are ready
  - Continue monitoring until accepting parties have their own attached
  - Continue all therapy until adequate handover
  - NETS team stays in charge of baby until baby is in receiving hospital bed and disconnected from NETS' ventilator
- **Prior to departure:**
  - Complete retrieval documentation and leave duplicate copies
  - Collect all NETS equipment before departure

Documentation

- Write in referring hospital notes documenting procedures, management plan; including name of destination hospital and consultant
- Write NETS team notes

Additional Notes:

- Teleconference at any time that there are concerns about the treatment or progress of the neonate
- If the patient appears to need treatment or equipment which is not included in the NETS life support system or part of our standard equipment, the team should contact the duty consultant to discuss the clinical need
- Clinical equipment from the referring hospital, ambulance service or other agencies should not be used by the NETS' team as NETS cannot be responsible for its effectiveness, safety, security and reliability in use. This includes domestic respiratory support devices

The team is responsible for all NETS equipment left behind or lost. It is the team's responsibility to promptly advise CCC and report this as a 'fault' by email (Faults@NETS.health.nsw.gov.au) with as much detail as possible and the team's actions to recover the item(s).

Educational Notes

Atmosphere: A thin layer covering the earth which contains various gases; including water vapour. Gravity compresses the gas with the greatest pressure closest to the earth.

Dalton's Law: Total pressure of a gas is the sum of component (partial) pressures of individual gases. While the proportions remain the same at altitude, the absolute amount of each gas decreases. That is, the partial pressure drops for each gas at altitude.

Boyle's Law: States that at a constant temperature the volume of a gas is inversely proportional to its partial pressure. For example at 8,000ft volume will increase 30%

Henry's Law: Concerns the solubility of a gas in solution, and states "...the quantity of a gas dissolved in a liquid is proportional to the partial pressure of the gas in contact with the liquid…"

Charles' Law: States that at a constant volume, pressure is directly proportional to absolute temperature. For each 1,000 feet gained in altitude, temperature will drop 2°C

References:

1. Joseph M. Hageman, J.R. Neonatal Transport: A 3-day-old neonate with hypothermia, respiratory distress, lethargy and poor feeding; 2002; Journal of Perinatology; Vol 22(6); pp 506-509.
2. Browning Carmo K. Terrey A: Stabilising the newborn for transfer – Basic Principles; 2008; Australian Family Physician; Vol 37(7); pp 510-514