

Guideline

Developmental care during transport of the Neonate

1 Scope

For use within the Paediatric and Neonatal Decision Support and Retrieval Service (PaNDR) for the East of England.

2 Purpose

To provide interventions to promote neurodevelopmental support for preterm infants during transport.

To promote their physiologic stability during transport and aim to improve the neurodevelopmental outcome for preterm infants.

To reduce environmental stress during the transfer process

3 Definitions and abbreviations

Preterm infant: Infant born at less than 37 weeks gestation

Developmental care: A broad category of interventions and practices designed to minimise stress of the neonatal environment.

4 Introduction

- Developmental care aims to offset the disadvantages of premature birth or perinatal problems by supporting each infant's personal development agenda, ensuring best possible outcomes.
- Developmental care includes a variety of practices designed to manage the environment & promote a stable infant to reduce the stress of transport.
- There are adopted various measures to ensure that infants are positioned, contained, secured and feel safe during what can be a very stressful journey for them.
- Therefore developmental care is viewed as an expansion of neonatology in which evolving infant and family systems interface with the biological, environmental & psycho-emotional risks of preterm birth (1).

- Little *et al* suggested that developmental care interventions should be implemented with thought and consistency during neonatal transport as this may reduce and prevent neurodevelopmental complications.
- They also documented that neonatal transport teams are in a fundamental position to decrease complications and improve outcome in neonates during transfers (2, 3).

5 Supportive positioning

The aim of this is to provide a comfortable and supportive environment for the baby. It should promote optimal physiological, neurological and musculoskeletal development for the preterm and vulnerable infant and influence stability, skin integrity, thermal regulation, bone density, sleep facilitation and brain development (4). Preterm infants have weak muscle tone, which improves at around 36/40 and are unable to maintain flexion. In utero infants are supported by the amniotic fluid and contained by the limited space of the uterus (4).

5.1 The aim of positioning strategies

- To promote a comfortable and supportive environment for each individual baby.
- Encourage balance between flexion and extension.
- Stimulate active flexion of trunk and limbs.
- Allow for more symmetrical posture.
- Enhances midline orientation.
- Achieves a more rounded head and permits active head rotation.
- Mimics the physical boundaries of the uterus, encouraging and maintaining a more flexed position.
- Counteract the forces of gravity (4).
- Maintains a comfortable position whilst still allowing movement.

5.2 Positioning aids and patient comfort in transport

- Incubator cover to provide light and some sound protection and to provide privacy
- Bendy bumpers.
- Molnlycke Z-flo fluidised positioner -reduce adverse effects of vibration on both baby & tubing (2).
- Prone positioning cushion.
- 'Neo-Teneco Rectangle' - non-toxic gel filled infant positional aid

- Restraints to maintain infant's position & safety during transfer.

5.3 Prone position

This position is thought to be preferable when compared to supine, in that it aids digestion, minimises reflux, stabilises the chest wall and improves the quality of sleep (5, 6). Gastro-oesophageal reflux is reduced and gastric emptying is optimised (1,5).

Prone position has also been associated with changes in cerebral blood flow velocity due to pressure on the vertebral artery caused by neck movement (4, 7).

Safety should be prioritised with regards babies who have umbilical lines (UAC, UVC or both) in situ.

*****DO NOT USE the Neo-Teneco Rectangle gel filled positioning aid when positioning prone*****

Method:

- Assess the infant and make sure that this position is suitable.
- Ensure that monitoring is in place.
- The infant lies on his chest with the hands flexed towards the face, shoulders softly rounded, knees tucked under the abdomen and bottom in the air.
- Use positioning aids to maintain an effective prone positioning if required on transfer. In prone positioning, gravity has its greatest effect. Lying prone supports the sternum and rib cage. This is beneficial for infants with respiratory compromise as it improves oxygenation, ventilation and lung compliance.
- Hips aligned and softly flexed.
- The baby should be on a soft mattress to prevent head moulding.
- Deep boundaries should be provided. The ideal position is with arms and legs flexed into the body, hands free to touch the face and rolls or 'snuggler' placed along both sides and around the flexed legs for containment and flexion if baby needs a high level of support (8).

Prone positioning aids:



- The cushion is shaped to support the natural curvature of the shoulders and optimum alignment of the head and body. Infants achieve a relaxed, flexed position without exerting too much pressure on the knees and elbows.
- Cut-outs on either side of the cushion allow the infant's bent arms to rest.
- The support provided to the pelvis makes it easier to position the infant's legs.
- Wipe with clinell wipes between infant use
- **Sizes:** XS: <800g
S: 800g – 1.2kg
M: 1.2kg – 2.0kg

'Neo-Teneco Rectangle' - non-toxic gel filled infant positional aid can be used as a neck roll for pressure relief. This should be covered with a muslin cloth or used under a sheet and not be in direct contact with the patient's skin.

5.4 Molnlycke Z-flo fluidised positioner



The mattress should be covered using a single sheet. The mattress can be contoured and moulded to meet the infant's developmental/positional needs.



- The heat of the mattress is maintained by the incubator temperature. The incubator should always be plugged in, turned on and set to 36°C at base to maintain temperature.
- If the mattress is cold it can be soaked in hot water to reheat quickly.
- Wipe clean with Tristel solution between each transfer.
- Dispose of mattress if it becomes damaged/ split.

6 Environment

- Loud noise can have a detrimental effect on preterm infants. It can increase stress causing increased blood pressure and heart rate and decreasing oxygen saturations and increased oxygen consumption (9).
- American Academy of Paediatrics recommends below 45dB, not exceeding 65dB (9).
- Above 90dB for more than eight hours has potential to damage adult cochlea therefore the more immature cochlea is more sensitive to damage (9).
- Ototoxic medication increases sensitivity to noise.
- Actual noise level in an incubator can range between 56-72dB this can be dependent on the mode of respiratory support in use i.e. CPAP and ventilators (10). During neonatal transport noise levels may reach higher than recommended for a neonatal intensive care unit. Macnab (9) has suggested that noise levels should not exceed 60dB.
- Zahr (11) and Purdy (12) suggest that infants wearing earmuffs demonstrate improved stability of oxygen saturation levels and sleep pattern is increased (1)

6.1 Reducing noise

- Padded incubator covers to be used where possible.
- Apply gel ear plugs and either ear defenders or a hat to secure. Use the whole plug and do not divide it or remove parts of Gel. – reduces noise by 20-30dB
- Apply Sonic Muffs- Acoustic Earmuffs – early application can help to calm babies whilst the transfer process is being facilitated. – Reduces noise by 7 – 10 dB

- Use gauze tucked into eye masks over the ears to reduce noise on transfers or protecting ears by other means if Gel Plugs or Ear Defenders are not suitable. Will provide some reduction in ambient noise
- All infants requiring ambulance transfer should be considered for auditory protection with a combination of the above as available: silicone ear plugs with the addition of earmuffs. Particular consideration should be for premature babies (<37 weeks gestation)



6.2 Reducing light levels

- The retina and visual cortex are the last of the senses to develop.
- Constant light disturbs diurnal rhythms and arouses the central nervous system.
- The iris does not constrict until 32 weeks therefore the infant has very limited ability to reduce light entering the eye, the eyelid is very thin therefore more light can enter the eye even when the eye lids are closed (14).
- Stress responses are demonstrated in these infants to sudden increases in light levels – lower oxygen saturation (15)
- Reduce lighting with the use of incubator covers.
- Adjustable lighting levels where possible (15)
- Protect infant's eyes post ROP screening on transfers using an eye mask.
- Use eye mask to protect preterm eyes from ambulance lighting during transfer.



7 Temperature management

Maintaining a thermal neutral regulation environment for the infant can be challenging during transport. However this is essential in the immediate and subsequent infant management. Failure may result in cold stress or hyperthermia which may cause adverse metabolic effects (16, 17).

- Use of a Molnlycke Z-flo fluidised positioner.
- Maintaining infant temperature with continuous monitoring of skin probe temperature during transfers.
- Performing and documenting axilla temperature on arrival to the referring unit, axilla temperature on transfer to the incubator, regular axilla temperature every 30 minutes if temperatures unstable on a unit, every 15 minutes skin mode temperature whilst on transfer and an axilla temperature at the receiving unit.
- Increase or decrease ambulance temperature accordingly to environment temperature.
- Ensure ambulance doors are closed promptly once incubator has been loaded into the ambulance.
- Ensure heater is on in the ambulance to maintain environment temperature.
- Set incubator temperature according to the referring unit's incubator. Adjust accordingly to infant's temperature.
- Use of a Neohelp™ suit in the extreme preterm infant under 1kg or if unable to maintain thermoregulation.
- Use of a transwarmer where clinically indicated to maintain thermoregulation.



Neohelp™ suit



Transwarmer

Transwarmer Mattress
Temperature when activated 40°C (24°C from start)
activate:

- The mattress should be activated and used according to the manufacturer's instructions.
- Locate metal disc and grasp with thumb and forefingers of both hands.
- Flex (bend) disc rapidly until crystals begin to form.
- Massage pack to soften and to increase the activation rate.
- After pack is fully activated, indent centre with palm to form a small nest.
- Lay infant in nest on the non-woven fabric surface.
- Regularly check infant's skin for redness and monitor infant's temperature.
- Transwarmer should not be used in conjunction with another heat source (BAPM safety issue Jul 2019)

8 Monitoring compliance with and the effectiveness of this document

The PaNDR team will monitor compliance with this document by undertaking regular audits which will be reported back to the consultants and PaNDR team. The effectiveness of providing developmental care on transfers will be monitored and audited for service performance and criteria for best practice.

9 References

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17. Cinar N.D., Filiz T.M. Neonatal Thermoregulation. JNN 2006; 12 (2): 69-74.
18. BAPM safety issue – Transwarmer Mattress. <https://www.bapm.org/articles/44-safety-issue-transwarmer-mattresses>

10 Associated documents

- Bliss, 2014. Your special care baby; a guide for parents.
- BLISS, 2016. Available at <https://www.bliss.org.uk/about-neonatal-care>
- Boxwell Neonatal Intensive Care Nursing. Routledge. London.[IV]
- Clinical Guideline Developmental Care EOE 2019
- Cooper surgical Transwarmer Warming Infant Transport Mattress
- Draegar Incubator User's Manual
- Poppy report 2009. Parents of premature babies project
- Z-Flo mattress user notes – supplied with mattress



Equality and diversity statement

This document complies with the Cambridge University Hospitals NHS Foundation Trust service equality and diversity statement.

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It is the responsibility of all staff to ensure they are using the latest version of a document.

Document management

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