Neurodevelopmental care: tips and tricks for parents in special care

While observing practice on the neonatal unit, I noticed that some aspects of developmental care, for instance kangaroo care, are widely praised and practised, while others are not so well known or employed quite as much.

As part of a work-based learning university module for special care/high dependency, I focused on four main topics concerning neurodevelopmental care to inform parents and nursing staff. As part of this work I produced an informative poster, which I share here with you. This was designed to benefit parents and staff and help with the choice of appropriate instruments to aid infants of different gestational ages to reach their neurodevelopment potential.

1. The cycled light approach

Preterm infants can start developing circadian behavioural rhythms at 30 weeks' gestation – a dark-light cycle.[1] The circadian system matures progressively after birth, requiring regular visual stimulation after 40 weeks' gestation.[2] While light does not appear to be essential for the early development of the fetus or preterm infant, a lack of sufficient light to be able to see during the critical period of visual development post-term, could be detrimental to vision.[3]

Most neonatal units have adopted the use of dimmed lights, within the range of 10-600 lux. However, changes in light due to treatment and procedures, do not consider the developing diurnal patterns of the infant.[4] Infants may experience intense arousal effects from light and noise in the neonatal unit and may remain in transitional states with closed eyes, neither asleep nor available for social contact.[4]

Previous research has demonstrated that cycled lighting can be beneficial for the secretion of growth hormone and that the establishment of circadian patterns and post-natal weight gain among preterm infants are improved in neonatal units that employ the cycled light strategy.[1]

Following Family and Infant Neurodevelopmental Education (FINE) recommendations,[5] the information poster advises the introduction of two hours of daylight per day starting at 32 weeks gestational age, progressing to reach eight hours at term equivalent age and aiming for darkness at night.

2. Auditory stimulation

Auditory learning begins *in utero*.[3] The noisy environment of the neonatal unit can be detrimental to the development of the auditory system[2] and infants in a neonatal unit are relatively deprived of the maternal voice and stimuli for early language learning, which may affect communication skills later in life.[6] A study found that infants receiving an increased amount of parent talk during their hospital stay had higher language and cognitive scores at seven- and 18-months corrected age.[4]

While some parents perceive talking, singing or reading to their infant as an intervention that they can easily and happily carry out, others may find it difficult to talk to their child in the neonatal unit environment,[8] or may find talking through the incubator walls pointless and lacking intimacy.[6] The poster aims to encourage parents to engage in 'conversation', singing or reading to their infant to help establish a bond between parent and child.

3. Visual stimulation

Infants born prematurely have an increased risk of visual deficit and visual processing problems, due to the incomplete formation of eye structures and the environment of the neonatal unit (eg lights too bright/dark, lack of visual stimulation), which can affect the development of both the eye and the central nervous system.[3] A newborn's color vision is limited and generally in grey scale.[9] From around 34 weeks corrected gestational age, infants are able to fix their gaze. Research found that infants are responsive to high contrast visual patterns; typically, black and white patterns elicit more fixation compared to low contrast patterns.[10-12] Furthermore, a complex stimulus will have a sensitising effect on the infant's looking behaviour, alluding to basic processing skills that correlate to later cognitive performance.[12]

The poster encourages the adoption of visual stimuli in the form of black and white boards or a cot mobile for the awake and alert infant, being mindful of their behavioural cues to avoid over-stimulation. It also reminds parents to remove such distractions from their child's cot space, as they may find it difficult to break their gaze.

4. Tummy time

By the time a preterm infant reaches term-equivalent age, it has a strong flexor tone, resistance and ability to make smooth movements. At this stage of development, prone positioning of the infant facilitates actions such as lifting the head and weight-shifting across the shoulders and pelvic muscles, which will eventually lead to independent sitting, crawling and manipulation of objects. Supporting positional and movement development will contribute to locomotor, spatial, cognitive and social development.[13]

An unintended consequence of the 'Back to Sleep' campaign to prevent sudden infant death syndrome (SIDS), has led to a reduction in the practice of tummy time. Research reports infants obtain less than 30-60 minutes of tummy time, the recommended time to prevent positional plagiocephaly.[14,15] A lack of prone experience can result in late achievement of developmental milestones and contribute to skull and facial asymmetry.[13]

With regards to tummy time, the poster aims to encourage parents to independently position their infant and participate in tummy time activities. Access to stimulating objects and parental attention will increase the infant's tolerance of the position to help improve muscular strength.[15]

Yours sincerely

Beatrice Ramunno Neonatal Staff Nurse, Trevor Mann Baby Unit, University Hospitals Sussex NHS Foundation Trust, Brighton
b.ramunno@nhs.net

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The information poster designed by Beatrice Ramunno for neurodevelopmental care in the neonatal unit. *Illustrations kindly provided by Carlos Peralta (Instagram @purplecamaleonpics).*

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Good practice for the cleaning and handling of incubators and other equipment

UK Health Security Agency

The UK Health Security Agency has issued guidance on good practice for infection prevention and control in neonatal units. The advice says that, in the absence of effective cleaning, harmful bacteria can persist in neonatal units resulting in colonisation, infections and unit outbreaks with associated morbidity and mortality. Potential pathogens including the NRCS-A (multidrug-resistant) clone of *Staphylococcus capitis* have been found within the neonatal environment, predominantly on the surfaces and component parts of equipment within a bedspace area, including incubator surfaces and door ports, dedicated stethoscopes, incubator blankets and less commonly on shared equipment, such as milk warmers.

Among other regular control measures, it is vitally important that incubators and other equipment are always cleaned appropriately and managed to the highest standards. This includes incubators in neonatal units, theatre, and ambulance transfer vehicles. To minimise the risk of harbouring serious pathogens within incubators, units should continue to adhere to the following recommendations for good infection prevention and control:

- Follow the manufacturer's instructions for cleaning, ensuring the incubator is dismantled fully to allow for thorough cleaning of all components, including the air inlet filter.
- Allocate sufficient time and space for incubator cleaning. It can take 40-120 minutes allowing for disinfectant contact and drying time.
- Ensure all staff have received training on incubator cleaning, including principles around good cleaning methods, eg working from clean to dirty, wiping in an S-shaped pattern, etc.
- Clean frequent touch points (eg door handles and latches) at least three times a day.
- Clean the external surface of the incubator, at least once a day as a minimum.
- If using the humidifier, clean the reservoir and change the (sterile) water every day.
- Ensure a full terminal disinfection of the incubator is performed when the incubator is vacated.
- Ensure appropriate cleaning processes, cleaning agents and disinfectants are used through regular audits.
- If occupied for >7 days, undertake terminal disinfection on the used incubator at least every seven days (neonate to be moved to a clean pre-prepared incubator).
- Provide enough incubators to allow for one (or more) to always be ready at short notice.
- Cover incubators that have been cleaned and not in use. Store in a designated area, away from any risk of contamination (eg splashes from sinks).
- Check mattresses for breaches when vacated – where possible, unzip the mattress and check the insert for any stains. Replace if found to be breached.
- If blankets are used on top of the incubator, clean and replace them daily. If washed on the unit, use a minimum temperature of 65°C for 10 minutes.
- Minimise the use of soft toys and mementos in the environment around the neonate, ensuring frequent cleaning.
- Ensure good hand hygiene practice.
- Ensure safe glove usage.
- Ensure parents and carers are aware of the importance of a clean environment in the prevention of infections.

There are large evidence gaps in this area and in the absence of current national guidance for this vulnerable population, staff are encouraged to gather evidence to inform future practice.