



GUIDELINE

SUBJECT: Developmental Care Principles in NICU

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PERSON RESPONSIBLE FOR MONITORING AND REVIEW:

Jennifer Ormsby CNC Newborn Services(Relieving)

COMMITTEE RESPONSIBLE FOR RATIFICATION AND REVIEW:

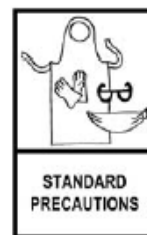
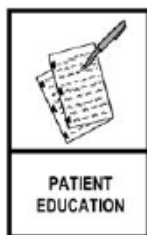
Management Executive Committee NICU

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Disclaimer:

It should be noted that this document reflects what is currently regarded as a safe and appropriate approach to care. However, as in any clinical situation there may be factors that cannot be covered by a single set of guidelines, this document should be used as a guide, rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. It does not replace the need for the application of clinical judgment to each individual presentation.

S.W.P.



Rationale

- Recognition of the importance of assessment and management of stress in optimising preterm infant development.
- Gain an understanding that infants < 36 weeks cannot cope with more than one stimulus at a time
- Utilisation of Als Synactive theory (Als, 1999) in developmental care principles
- Implementation of environmental modifications and strategies to reduce exposure to excessive cortisol levels
- Provision of individualised care to enhance developmental care principles
- Support the philosophy of 'Partnership in care'

Outcomes

- Improvements in neurodevelopmental stability and growth
- Reduction in unnecessary stress to premature infants
- Improved parental involvement in care
- Improvement in infants ability to self regulate
- Improvement in staff's ability to provide individualised care

Assumed Knowledge

- Development of the pre-term infant
- Impact of neonatal care on neurodevelopment of infant.
- Infant behavioural cues
- Understanding of developmental care and "Positive Touch" approach
- Universal infection prevention and control procedures

Modifying the Environment

In the neonatal intensive care unit, large amounts of inappropriate sensory input are processed by the premature infants' immature, developing brain at the expense of normal foetal brain growth and development (Graven, 2008). Research has shown that infants born prematurely have significantly less cortical grey matter (Inder et al. 2005).

Research also indicates that chronic repetitive stress and sustained exposure to glucocorticoids can have damaging effects on brain development (Caldji et al. 2000).

Very low birth weight infants are less able to modulate attention, take brief breaks from processing information, and habituate to stimuli. Thus the preterm is easily overstimulated and less able to deal with the multiple sources of stimuli they are exposed to in the NICU environment (Gardner & Goldson, 2011).

The environment should be considered in relation to infants and care givers to encourage family centred care, for example utilising La Fuma™ chair for kangaroo care and the breast feeding room and recliners available for breastfeeding.

The following modifications can be made to the nursery environment with the aim to reduce external stimuli, and therefore reduce unnecessary stressors:

- **Lighting-** Bright light may have a damaging effect on the development of the immature visual system. The eyelids of a very premature infant are thin and mostly open. Until 32-34 weeks when the pupil begins to constrict, the infant cannot moderate the amount of light entering the eye (Warren & Bond, 2010).

Recommendations for maximum required lighting levels (Warren & Bond, 2010):

- ambient lighting= **below 300lux**
- work top task e.g. measuring medications= **500lux**
- delicate medical procedures= **1000lux**
- most activities can be carried out in **100-300lux**

Recommendations for standards for a NICU:

- lights should be adjustable for a range from **10-600lux** not including light for direct procedures (White, 2007)

Therefore the following is recommended:

- Lights to be turned off whenever possible i.e. unless required for a procedure. Make use of the individual bay lights.
- Avoid direct light exposure to the infants eyes
- Use crib covers on incubators to minimise direct light. Crib covers with flaps allow for adjustment of light at the same time allowing the infant to be observed.
- Protect REM sleep

- **Noise-** Noise can have an impact on an infant's behaviour and can increase the risk of sensorineural hearing loss in preterm infants (Gardner & Goldson, 2011). "Excessive auditory stimulation creates negative physiological responses such as apnoea and fluctuations in heart rate, blood pressure and oxygen saturation". Exposure to prolonged excessive noise can increase the preterm infants risk for hearing loss, abnormal brain and sensory development, and speech and language problems later in life (Brown, 2009).

Noise levels in the NICU are significantly higher than that experienced by an infant in the womb. For example the background noise during the foetal experience is about 50dB compared with background noise in the NICU being over 70 dB.

Recommended noise levels:

- Ambient noise= 50dB
- Infant sleep disturbed at 70dB
- *Recommended Standards for Newborn ICU Design* indicates that overall continuous sound in NICU patient care area should not exceed:
 - an hourly loudness equivalent (Leq) sound level = 45 dB
 - a maximum sound level (Lmax) (one second) = 65 dB.

Therefore the following is recommended to minimise noise in the NICU:

- reduce noise as much as possible
- silence alarms as soon as possible
- close incubator portholes gently
- don't place anything on top of incubators
- monitor infants near phones; sinks
- talk quietly around the bedside
- do not call out to other staff members across the room
- do not have a radio on in the nursery. (Brown, 2009)

- **Bedding and boundaries-** use nesting or swaddling when appropriate to provide positioning support (see *Positioning Guideline, 5.3.6* for more detail)
- **Smells-** avoid exposing infants to chemical smells and perfume as it can interfere with the infant being able to identify their parents' unique smell (Warren & Bond, 2010). Parents may choose to place a small piece of cloth with their scent beside in their infant's cot for infants that are monitored. This can be discussed with medical and nursing staff.
- **Visual array-** . Infants at 28 weeks can fix and follow however visual stimulation at this age can be very tiring and stressful. Infants less than 34 weeks are exposed to enough visual stimulation in the nursery environment and do not need extra input. After 34 weeks infants may begin to display cues indicating that they are ready for more stimulation (Gardener & Goldson, 2011). If introducing visual stimulation it is important to note the following:
 - introduce gentle stimulation during their quiet alert state and in a calm atmosphere and offer the infant support such as containment
 - at this stage infants prefer a human face over toys
 - avoid strong contrasting visual images within the infant's visual field e.g. black and white designs.
 - present one form of stimulation at a time
 - if an infant appears to be overwhelmed by visual stimulation you may notice gaze aversion, staring or 'shut down' behaviour

Infant Cues and Behavioural States

An understanding of behavioural states is essential for adequate assessment of the infant which enables individualised care.

"The key to supporting mutually satisfying parent-infant interaction is to give parents the ability to understand their infant's level of communication through their behaviour. Once parents understand their infants' behaviour, they will be in a better position to respond to and interact with their infant in an appropriate and developmentally supportive way" (Creger, 1995)

There are five developmental subsystems that can be used to assess premature infant behaviour:

1. Autonomic or physiological responses
2. Motor development
3. State control
4. Attention and interactional behaviours
5. Self-regulation

(Adapted from Als, 1999)

SUBSYSTEM	INSTABILITY	STABILITY
1. Autonomic		
RESPIRATORY	Pauses, gasping, changes in HR, RR, BP, pO ₂ , pCO ₂	Smooth, regular rate
COLOUR	Mottled, flushed, pale, cyanotic	Pink, stable colour
VISCERAL	Hiccups, gagging, spitting up, grunting	Stable viscera- no signs of instability
MOTOR	Tremors, startles, twitches, coughs, sneezes, yawns	No sign of instability

2. Motor		
FLACCIDITY	Gape face, low tone in trunk limp extremities	Muscle tone consistent- appropriate for PCA
HYPERTONICITY	Leg extensions, sitting on air, salutes, finger splays, arching, tongue extension	Smooth controlled posture & movements
HYPERFLEXIONS	Trunk, upper limbs, lower limbs, arm high guard, frantic diffuse activity	Self-regulation- hand/foot clasp, hand to mouth, grasping, sucking
3. State		
DURING SLEEP	Twitches, whimpers, jerky movements, irregular resp. rate, fussy, grimaces	Clearly defined sleep states, self-quieting, robust crying
WHEN AWAKE	Glassy eyed, staring, gaze aversion, worried, dull, hyperalert, weak cry, irritable, abrupt state changes	Focussed alertness, animated expression, "ooh" face, cooing, smiling, smooth transition
4. Attention/Interaction		
AUTONOMIC	Irregular resp. rate, colour changes, coughs, yawns, tremors, etc.	Response to auditory and visual stimuli is clear and prolonged
MOTOR	Fluctuating tone, frantic diffuse activity	Actively seeks out auditory stimulus, shifts attention smoothly b/n stimuli
STATE	Becomes stressed if more than one type of stimulus given simultaneously	Bright eyed purposeful interest varying between arousal and relaxation

5. Self-regulation is an infant's efforts to achieve maintain or regain balance and self-organisation in each subsystem as needed. These behaviours are frequently protective mechanisms- baby may "shut-down" or avoid interaction. Examples of self-regulation include motor strategies (e.g., leg and foot bracing, hand clasping, hand to mouth, sucking, and postural changes); state strategies (e.g., lowers state of arousal or releases energy with rhythmic, robust crying) and attention and orientation strategies such as visual locking. The success of various strategies may vary among infants. (Als, Lester, Tronick, and Brazelton, 1982).

Sleep

Sleep disruption may interfere with growth and development by altering neuronal maturation and growth hormone secretion as the highest peaks of growth hormone in infants occur during REM. Sleep is when most brain growth and development occurs..

Modified Cares to Maintain Infant Stability

Some infants may feel quite vulnerable when being undressed, handled and being transferred into the bath or onto the scales.

Wrapping the upper and lower extremities in flexion with hands positioned near the mouth provides the following benefits to the infant:

- Proprioceptive input
- Kinaesthetic (tactile) stimulation

- Encourages hand to mouth manoeuvres
- Facilitates motor organisation
- Calms irritable infants
- Reduces stress behaviours and increases self-regulatory behaviours
- Enhances neuromuscular development in infants who are neurologically intact (Short et al 1996)
- Assists with managing pain (Gormally et.al 2001)

Support during cares and procedures (Modified from Warren & Bond, 2010)

The following suggestions may assist with providing support to the infant during cares and procedures to prevent over stimulation and assist with maintaining stability of the infant. Medical outcomes are improved for preterm infants when individualised developmental care is provided (Als et al, 2003). Stimuli are tolerated in varying degrees according to the gestation, wellness and maturity of the individual baby (Gardner & Goldson, 2011). Performing nappy changes, vital signs, collection of bloods, procedures and feeds etc. at a set, uninterrupted period is known as “clustering cares” and may cause heightened cortisol levels, unstable blood pressure and vital signs, (Holsti et.al, 2007).

Preparation:

- assess infant prior to intervention to determine type, timing and frequency of cares/procedure
- co-ordinate cares with the parent’s or care giver’s visits (Ballweg 2004)
- have everything at hand prior to beginning the cares
- use nests and swaddling to provide containment

During:

- if possible keep the lower half or upper half of the infant wrapped
- move slowly and pace intervention if stress cues are present
- use containment holds to provide support and when pacing
- assist with regulation by giving the infant a finger to grasp or pacifier
- use infants individual preferences
- encourage parents to identify what the baby likes/dislikes
- administer EBM/ sucrose during painful procedures (Shah et al. 2012)
- minimise direct light to the infants face
- observe cues throughout

Completion:

- Use containment holds, swaddling & nests to assist with settling
- Continue to observe cues as stress response may be delayed

Wrapped weighing and bathing (Modified from Warren & Bond, 2010)

Bathing is a valuable opportunity for parent’s to interact with the baby and perform a key parental responsibility. When preparing for the infant’s first bath it is important for the nurse to liaise with the parents about timing of the bath and take into consideration other demands on the infant on that day. The parents should be given the opportunity to perform the bath and the nurse should support the parents. Wrapped weighing and bathing can assist with maintaining infant stability through reduction of physiological stress, increased motor organisation and reduced arousal level (Hall, 2008). Wrapped weighing and bathing

may be useful for infants that have difficulty maintaining physiological stability and for those that are easily overstimulated during handling.

Step 1: Weigh clean muslin wrap and minus the weight of the wrap from baby's wrapped weight.

Step 2: Have bath run and prepared prior to transferring baby onto weighing machine.

Step 3: Place clean muslin wrap on bench. Ensure baby is settled and contained prior to transferring them from the cot. Once on clean wrap remove her clothes and nappy and wrap them firmly containing their arms and legs.

Step 4: Weigh baby keeping her wrapped

Step 5: Transfer baby into the bath lowering them into the water slowly

Step 6: Slowly unwrap baby and wash them as tolerated. Use their cues to determine what they can manage.

Step 7: Contain limbs and lift infant directly onto a dry towel on the parent's chest prior to placing the wrapped infant on the bench or contain limbs and directly transfer onto dry towel on bench then wrap infant in towel.

Step 8: Keep infant as contained as possible while drying them.

Step 9: Dress and transfer baby back into their cot and firmly wrap them.

Step 10: Continue to monitor baby's cues to determine how they managed the bathing experience.

The above strategies are suggested as a guide to developmental care only and should be considered in the context of each individual infant's presentation at a given time.

Knowledge of developmental care principles and the practical application are the responsibility of all disciplines working within NICU. From this evolves interactions with the family to enable parental empowerment to share in decision making for timing of feeds, cares and bathing (Ballweg 2004)

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AUTHOR: Rachael Fallon Paediatric Occupational Therapist, JHCH

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