

DEVELOPMENTALLY SUPPORTIVE CARE FOR NEWBORN INFANTS PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- Individualised, family-centred, developmentally supportive care is a framework for providing care that enhances the neurodevelopment of the infant through interventions that support both the infant and family.
- Developmental care is designed to minimize the stress of the critical care setting and to support the development of parent infant relationships.
- All infants admitted to critical care areas are acknowledged as individuals in various stages of their development.
- This document has been developed for neonates cared for in critical care settings across the Sydney Children's Hospital Network including the Children's Intensive Care Unit (CICU - SCH), Edgar Stephens Ward (ESW-CHW), Grace Centre for Newborn Intensive Care (GCNIC – CHW) and Paediatric Intensive Care Unit (PICU – CHW). However neonates cared for throughout the hospital would benefit from this approach to underpin their care.

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 November 2022	Review Period: 3 years
Team Leader:	CNC	Area/Dept: GCNC CHW

CHANGE SUMMARY

- New and revised content for the document following revision include:
 - Addition of information for NDC in Edgar Stephens Ward and developmental care beyond the ICU.
 - Updated references.
 - Changed the layout of information.
 - Added breakout links for cycled lighting.

READ ACKNOWLEDGEMENT

- To be read and acknowledged by all Nursing, Allied Health and Medical staff caring for neonates in critical care settings.

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.

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Neurodevelopmentally Supportive Care

The goal of Neurodevelopmental care (NDC) also known as developmental care is to provide an environment, which supports, encourages and guides the development and organisation of premature and critically ill infants¹. Caregiving is stressful for the newborn, and resulting in physiological and behavioural changes, including interrupted sleep. The development of the brain is influenced to a large extent by sensory input; these experiences can affect the structure and function of the brain, with impacts on long-term development and consequently future health².

NDC interventions demonstrate some specific benefits for preterm and fragile infants in the critical care setting including improved short term growth and feeding outcomes, decreased respiratory support, decreased length and cost of stay, and improved neurodevelopmental outcomes to 24 months corrected gestational age³.

Core Recommendations for Neurodevelopmental Care

By using standardised core recommendations caregivers ensure they are providing consistent care based on the infant's cues and ability to respond to the environment and interventions.

Core recommendation	
1	A flexible and individualised approach is taken toward all [hands-on care giving] interactions, with continual responsiveness to each infant's competencies, vulnerabilities, and thresholds.
2	Parent-infant relationships are supported from birth and during admissions to critical care settings.
3	All caregivers practice collaboratively.
4	A developmentally appropriate environment is provided for every infant and family.

Strategies to support recommendations

- Observe the infant closely during any intervention or handling to determine their tolerance of the activity⁴.
- Provide rest periods (quiet times) where avoidable disruptions to rest (except for emergency situations) are minimal. [Quiet time in GCNIC 12noon – 3pm]
- Encourage and support periods of rest and sleep by decreasing light, noise and activity at the bedside.

- Support opportunities for infant self-regulation/co-regulation by assisting with hand grasping, non-nutritive sucking, foot-bracing (by providing boundaries), swaddling or facilitated tucking as the infant's condition allows⁴.
- Swaddle the infant using a light wrap to maintain flexion of the upper and lower limbs. Ensure hands are near face to allow for better eye-hand-mouth control facilitating self-quieting activities⁴.
- Cue based cares and interventions are initiated based upon the infants state and focussed on preserving sleep states

Newborn Individualised Developmental Care Assessment Program (NIDCAP)

The Newborn Individualised Developmental Care and Assessment Program (NIDCAP) is an interventional model developed with the aim of providing sensorial stimulation to premature and vulnerable infants at a level that is adapted to the degree of neurological maturity of the infant⁵.

NIDCAP is facilitated by The Australasian NIDCAP Training Centre in GCNIC. For additional information on NIDCAP refer to the [NIDCAP Outline Information](#).

Family Collaboration in Providing Care

The relationship between an infant and their family is of critical importance, as it forms the basis for the infant's future social, emotional and cognitive development⁶. A basic tenet of infant and family-centred care is the role of the family by encouraging maximum involvement of parents with their infants care through unrestricted contact. Parents should be given the opportunity to participate in their infant's care, decision-making and be provided opportunities to learn more about their infant from admission⁷.

Family Collaboration and Support

To support the provision and collaboration of family centred care for neonates we promote the following:

- Parents are not considered visitors in the critical care setting. Parents and siblings have unrestricted access to their infant.
- Visiting hours for visitors and other family members are clearly displayed and communicated to family members.
- To minimise the effects of noise and activity for the infant two family members are welcome at a time at GCNIC/PICU and three visitors at SCH CICU.
- Parents are encouraged and welcomed to be present at any time especially during ward rounds and nursing shift change⁷.
- Parents are supported by staff through demonstration and education to be involved in daily cares, cuddles, skin-to-skin contact, non-nutritive sucking, feeding or bathing.

- Parents are encouraged to support their infant during procedures or resuscitative interventions¹, parents also have the choice of waiting in the parent's room.
- Parents are notified of the availability of resources and support during their stay².
- Support parents in their preparation for the transition to home, by encouraging rooming in, review of the parent 'going home' discharge resource and checklist, and providing parent-craft education.

Patient Safety Considerations

- Ensure parents receive a handout and an explanation about the [Sudden Unexplained Death in Infancy \(SUDI\) recommendations](#) prior to discharge.

Developmental Rounds

Developmental rounds (DR) have been identified as a strategy for the early identification of high risk infants and to support the application of NDC in the critical care setting⁸. DR's are a way to provide guidance, facilitate a coordinated efficient approach to interdisciplinary care, promote family engagement and as a model that enables developmental training for clinical staff⁹⁻¹³. Across SCHN local Developmental Rounds have been established to meet unit specific needs.

For information on the focus, process for referral and structure of DR's refer [here](#).

Developmental Care Plans

- Developmental care plans are recommended to ensure consistency for specific interventions deemed appropriate for the infant and their family⁸.
- The plan is individualised according to the infant's current developmental stage and the needs of the family¹⁴.
- Plans are developed in consultation between members of the developmental team, bedside clinical staff and families. The formation and updating of the plan often occurs during the developmental round or by members of the DR team.
- The plans can come in a number of forms and are unit specific they are modified to suit the needs of the infant, and are reviewed regularly.
- It is recommended staff observe and continually assess the infant's reactions to handling and care to ensure appropriate adjustments are made to the plan¹⁴.
- The care plan may assist parents to develop appropriate care giving skills and techniques especially when the infant is nearing discharge⁸.

Developmental Care Plans

Developmental care plans are utilised in a range of formats across the SCHN as a way to communicate the infant's developmental recommendations and to promote consistency in care giving. They are usually completed by members of the developmental care team during DR's, they act as a visual prompt displayed at the bedside that contain developmentally supportive information and goals specific to the infant. They are developed in consultation with both parents and staff.

Feeding Plans

Infants in the critical care environment are at high risk of developing feeding difficulties, a well-documented and implemented feeding plan can support the infant in developing feeding skills and reduce the likelihood of the infant developing an oral/feeding aversion¹⁵. The use of feeding plans is based upon the unit resources and the infant's individual needs for specific information on feeding plans access the feeding plan information sheet [here](#).

When feeding plans are not available the following is considered best practice recommendations:

- Implement strategies designed to support feeding including early feeding strategies i.e. non-nutritive sucking, skin to skin, holding during NGT feeds, and immune supportive oral care (mouth care with breast milk).
- Infant driven feeding is supported (i.e. demand feeding/feeding based on infant cues)
- Parents should be encouraged to feed the infant as much as they are able, enabling the parent and infant to develop their own feeding routine.
- Staff recognise and respond appropriately to the infant's cues during a feed, this creates a foundation for positive feeding experiences.
- Where possible facilitating opportunities for breast feeding are encouraged this may include sucking at an empty breast to encourage lactation.

Elevated Side-lying feeding

Elevated side-lying (ESL) feeding is a supportive position that is recommended for vulnerable and preterm infants when they are commencing suck feeding via a bottle¹⁶. Vulnerable infants include infants who tire easily during a feed, have evidence of poor swallowing or spilling of milk.

When fed in the ESL position, infants may be allowed to feed at a slower pace, which may provide additional time to control the bolus for safe and efficient swallowing.

For premature infants fed in the ESL position had less variation in HR and less severe and fewer decreases in HR, shorter and more regular intervals between breaths, and briefer feeding related apnoeic events¹⁶. ESL feeding position allows for increased control and transit of fluid from the oral cavity to the pharynx during swallowing. Speech pathologists can provide advice on how to achieve this position with individual infants.



ESL position

Image: ESL Park et al 2014

Touch

Touch is one of the first senses to develop and for infants in hospital it frequently consists of invasive and painful interventions. Positive Touch promotes various types of infant touch including handling, holding and Kangaroo care¹⁷. It is a way of counterbalancing the many and often inevitable, unpleasant experiences, which are a result of highly technical neonatal care¹⁷.

The goal of Positive touch is:

- To guide parents in the development of confidence and competence in the care of their infant¹⁸.
- To facilitate parental attunement to the behaviour of their infant¹⁹.
- To enhance the immature and vulnerable infant's experience avoiding prolonged stress, tactile aversion/avoidance and acute distress that can have long-term health and behavioural benefits²⁰.

Positive Touch interactions can be applied to a number of different types of touch, the Five Step Dialogue is a way to frame touch and can be applied regardless of the type of touch. For information on Positive Touch and Five Step Dialogue information Sheet [here](#).

Components of Positive Touch and the Five Step Dialogue

The components and process of positive touch are described within a Five Step Dialogue outlined in the Positive Touch and Five Step Dialogue information Sheet; the sequence and offering of support is always individualised to the infant. Support that is pre-planned and adjusted to the individual infant can help the infant regulate their physiologic, motor, behavioural and state systems, all of which can aid the clinician as well as the infant¹⁷.

Examples of support include:

- Talking to the infant prior to initiating physical contact
- Containing the infant's extremities in a flexed position.
- Offering opportunities for grasping onto a finger, a cloth or bedding.
- Giving rest periods (pacing) during the stressful procedure.
- Offering dummy or other sucking opportunities.

Maintaining support after an intervention can re-stabilise the infant assisting in their recovery.

Recognising infant physiological stressors

Infants demonstrate signs or cues that indicate their level of stability or stress it is essential that healthcare professionals and carers can recognise and respond to signs of both²¹.

The following strategies can assist in the reduction of and management of physical stress prior to, during and after any interventions:

- Pain and stress levels are monitored and charted regularly each shift.

- Expressed breast milk or alternately sucrose is administered during potentially painful procedure as a non-pharmacological intervention for pain relief²². Avoid procedures and activity during quiet time and when infants are asleep⁸.
- Utilise non-pharmacological strategies to support neonates swaddling, supportive holding, scent, maternal/paternal voice/singing, facilitated tucking, NNS, skin to skin⁸.

Self-regulation

Self-regulation is a way to describe an infant's attempts to process and respond to information from the environment (i.e. noise, pain, light). Self-regulation attempts can include the infant attempting to calm itself by bracing against a nest. The process of learning self-regulation in the newborn period is dependent on support from caregivers (co-regulation) and embedded in the context of relationships²³. Caregivers and parents become the infant's "co-regulators" and support infants by accurately reading and interpreting the infant's behavioural signals²³.

The ability for the neonate to self-regulate can be demonstrated by²³;

- Habituation to repeated stimuli to protect their sleep (protective mechanism).
- Tolerance of basic care as well as painful or stressful stimuli.
- Responding to caregivers' social interactions at a minimum of physiologic cost.

Behavioural Signs of stability and Stress

Recognising behavioural cues or signs that indicate stress or self-regulation attempts is an important skill for health care professionals caring for infants²¹. For information on approach and avoidance cues infants refer to the Behavioural Signs of stability and Stress information sheet. It is important to note that for preterm and critically unwell neonates behavioural cues may be subtle and difficult to discern.

State system regulation


States are clusters of behaviours that tend to occur together and represent the infants level of arousal⁵. For information on the expected infant state ranges refer to the Behavioural Signs of stability and Stress information sheet [here](#).

An understanding of the infant behavioural responses and state regulation systems can be used to support interventions by:

- Infants may respond differently to support, stress and stimulation. Modify activities according to infant's current state to support them individually⁸.
- Gently waking an infant before commencing cares/procedure¹⁷.
- Pace cares or other stimuli when infant is showing signs of stress and support their self-regulation attempts⁸.
- Time of care giving and procedures to protect sleep⁸.

- Support parents to undertake caregiving activities⁸.

A useful tool to determine when to approach caregiving based on infant state is provided on the following page:



	<p style="background-color: red; color: white; padding: 5px;">Don't disturb the baby unless it is really necessary. If it is necessary take time to gently wake the baby before beginning care.</p>			<p style="background-color: green; color: white; padding: 5px;">If the baby is aroused take time to calm him/her before you begin. If the baby falls back to sleep, wait a little. If s/he remains asleep, reorganise your care plan. When s/he stirs, take time to reassure and settle the baby before you continue.</p>		
	1	2	3	4	5	6
Behaviour	Deep sleep	Light sleep	Drowsy	Awake	Agitated	Crying
Breathing	Regular	Regular and irregular	Regular and irregular	Regular and irregular	Regular and irregular	Irregular
Face	Relaxed, eyes closed, no eye movements.	Eyes closed, or open with glazed look. Small frown; isolated mouth movements.	Eyes closed or open with unfocused look; grimaces, mouth movements.	Eyes open.	Eyes open or closed. May grimace.	Eyes open or closed. Grimacing and crying.
Movement tone	No motor activity apart from isolated tremors or startles.	Little motor activity.	Variable motor activity. Strategies for self-regulation.	Little motor activity. Strategies for self-regulation.	Moderate motor activity. Fussy.	Considerable motor activity.

Image: FINE Handbook (2015)

Neuroprotective and developmentally supportive strategies

Incorporating components outlined in the following table in clinical practice is recommended to optimise neuroprotection and support neurodevelopmental outcomes^{8, 17, 22}.

Sensory environment recommendations
<p>Touch^{17,24}</p> <ul style="list-style-type: none"> • Firm rather than light touch is recommended when caring for premature and fragile infants • Facilitate early, frequent and prolonged skin to skin contact • Provide a neutral thermal environment • Provide hand hugs (containment) and support in flexion during painful procedures
<p>Vestibular system^{25,26}</p> <ul style="list-style-type: none"> • Ensure the infant is flexed and supported during movement • Consider lifting/transferring in lateral/side-lying position to prevent eliciting a Moro reflex • Avoid fast movements through space • Provide supportive boundaries during positioning
<p>Smell and taste²⁷⁻³⁰</p> <ul style="list-style-type: none"> • Provide maternal scent (scent pads) to support feeding, assist in calming and maintenance of sleep states • Facilitate early, frequent and prolonged skin to skin contact • Avoid infant exposure to strong scents, fragrances and smoke • Open alcohol wipes away from the infant (outside incubators) and ensure hands are completely dry before approaching the infant when using alcohol hand wash • Provide non-nutritive sucking with EHM milk (where possible) during tube feedings • Position the infant with their hands near their face/mouth • Utilise breast milk for mouth care

- Provide positive oral feeding experiences (promote breast feeding and nuzzling)
- Promote positive oral experiences by encouraging parents to stroke and kiss around the mouth
- Minimize adhesives around the mouth and nose where possible

Noise³¹

- Ambient noise should be kept to a minimum and not exceed 45 to 65 decibels
- Silence and respond to alarms as quickly as possible
- Educate parents and visitors about noise levels which can cause agitation and complications from stressful stimulation
- Ear coverings can be beneficial but should only be used for short periods of time. Long-term use can cause pressure areas and influence development of speech recognition for the infant
- Use a calm, quiet voice prior to interactions with infants
- Interventions should focus on reducing ambient noise of equipment and general NICU activity

Light³²⁻³⁴

- Lighting needs to be balanced between dimmed ambient light, natural light and brighter task light
- Lighting should be introduced for infants >28 weeks gestation and cycled for all infants >32 weeks gestation
- Infants <32 weeks gestation have thin eyelids and little pupillary constriction these infants require protection in the form of an incubator cover
- Incubator covers should not completely cover the incubator, you should be able to visualise the baby at all times with some light present in the incubator
- For additional instructions on incubator cover use [click here](#)
- Avoid purposeful visual stimulation i.e. mobiles/toys etc. prior to 38 weeks gestation
- Cover infants eyes during exams and procedures

Parent/infant interaction recommendations³⁵⁻³⁷

- Facilitate 24 h per day parent/carer access to their infant(s)
- Support parents in their skills to observe and interpret their infant's behaviour
- Provide families with education and support to improve parent/caregiver–child interactions through play, reading and positive interactions

Pain and stress recommendations^{28, 38-39}

- Neonatal procedural pain/stress exposure should be minimised where possible
- Regular pain assessment is considered part of standard care
- Non-pharmacological pain interventions such as breastfeeding, breast milk, and sucrose, as well as positioning, swaddling, non-nutritive sucking and odour should be used for potentially painful interventions modified to the infant's medical condition
- Pharmacological interventions such (morphine/fentanyl) are titrated according to the infant's pain scores following developmental care interventions and a risk to benefit assessment
- Parents are provided information and education about their baby's pain so they can take an active role in their infant's pain care
- Sucrose and breast milk are more effective when combined with the maternal-infant (i.e. maternal presence) than used alone

Skin to skin recommendations⁴⁰

- Discuss the importance of SSC where possible for a minimum of an hour
- Offer SSC during painful procedures where practical to help minimise stress and behavioural responses
- SSC can be offered in infants irrespective of gestational age, staff are encouraged to offer SSC as part of routine care
- Standing or seated transfer options are available

Caregiving recommendations⁴¹

- Age-appropriate individualised care giving should be implemented
- Timing of caregiving should be optimised to support sleep and paced to minimise stress and promote stability
- Involving parents in their infants care enables their competence and confidence as caregivers in the hospital and beyond

Protecting Sleep

Sleep is essential for brain development and maturation in infants. With extensive sleep required for the development of neurosensory systems, the structural development of the brain and to optimise physical growth⁴². Sleep also permits an escape from noxious environmental stimulation that may be present⁴³.

Differences in sleep in premature infants

In addition to a higher portion of time spent in sleep, the sleep stages of a preterm infant are less well organised than in the term infant⁴³. Overall, preterm infants' sleep is often identified by lack of sleep cycling, shortened sleep periods, undifferentiated sleep states, and short episodes of quiet sleep compared with full-term infants⁴³.

Challenges for sleep in the hospital setting ^{42,44}	Recommendations to protect sleep include ⁴²⁻⁴⁴
<p>Whilst these components cannot generally be avoided:</p> <ul style="list-style-type: none"> • Consider if the timing of non-urgent procedures could be adjusted to avoid interrupting sleep • Bedspace location, noise and light can potentially disrupt sleep. • Sedatives and narcotic exposure can obscure normal sleep patterns⁴², whilst stimulants such as caffeine may interfere with sleep. 	<ul style="list-style-type: none"> • Containment and support with hands to help infants when transitioning to sleep • Positioning aids (i.e. nest) • Parental touch • Skin to skin contact or use of maternal scent • Allowing the infant to transition to an awake state before providing non-urgent care • Undertake cares based on the infants cues

For additional information on sleep states refer to the Sleep state information sheet [here](#).

Reading and exposure to language

Exposure to language and reading during infancy is linked to literacy, language, early reading skills and social communication abilities in childhood⁴⁵. In the ICU setting high sound levels and low levels of language exposure can impact on neurodevelopmental outcomes⁴⁶. Adult word count exposure in the NICU is positively associated with language and cognitive scores at 7 and 18 months of age⁴⁷. Whilst the optimal level of language exposure is unknown⁴⁶, a number of strategies can support exposure to language in the ICU setting:

- Encourage parents and health care professionals to speak to infants prior to and during caregiving interactions.
- Encourage parents and caregivers to alternate the pitch and tone of their voice in response to the infant's responses.
- Reading is identified as an intervention that parents can undertake regardless of their child's level of illness. As little as ten minutes per day can be beneficial.
- An information sheet for parents: Reading to your baby is available [here](#)

Positioning

Developmentally supportive positioning is important to promote comfort, respiratory function and to facilitate the infants' movements and maintenance of alert states⁴⁸. Purposeful positioning has been shown to preserve musculoskeletal integrity and facilitate developmental progression⁴⁹. Each body position that an infant experiences whilst in the ICU affects alignment and shaping of the musculoskeletal system⁴⁹. Musculoskeletal consequences include abnormal spinal curvatures, excessive abduction and external rotation of hips, externally rotated and abducted shoulders and skull deformities^{48, 49}.

Positioning in a midline, flexed and contained position with the use of nests and swaddling decreases the surface area of the infant exposed to environmental air, thus reducing radiant and convective heat loss⁵⁰. The flexed and contained position offers additional temperature stability by minimising extraneous movement and energy expenditure⁵⁰.

Patient Safety Considerations

- Positioning aids need to be easily removed in emergency situations.
- Do not apply tight boundaries as they may restrict spontaneous movements.
- Avoid rolls in front of the infant's face as these represent a SID's risk.
- Correct alignment of the head, trunk and limbs in any position will assist in preventing acquired postural deformity.
- A number of positioning aids require assessment by an Occupational Therapist/Physiotherapist and education before implementation.
- Provide explanations to parents and carers outlining why certain hospital used supports are not to be used in the home environment due to the risk of SIDs.

- Infants with a specific medical problem may be positioned sideways, prone or with head of the bed elevated they must be monitored and a sign placed on the cot.
- Infants at CHW must undergo a hip ultrasound if admitted the NICU or hospital for more than 30 days.

Clinical Considerations⁴⁸

Respiratory Support	<ul style="list-style-type: none"> • Preterm infants with increased respiratory demands may be more stable in a prone position. • Prone positioning improves respiration, chest wall synchrony and gas exchange. • Positioning that facilitates comfort may result in a more stable respiratory status.
Posture	<ul style="list-style-type: none"> • Preterm infants <28 weeks have generalised hypotonia. • Muscle imbalance/hypotonia make it difficult for preterm or infants with low tone to bring themselves into the midline position. • Low tone can cause retraction and hyperextension of the trunk and neck resulting in abducted legs, which can impact future gross motor development. • All positions should reduce the impact of gravity and support the infant with hands to the midline and legs flexed. Side lying with nesting is the position that best facilitates this. • Ensure swaddling is not too tight at hips in either a flexed or extended position
Energy Consumption and heat loss	<ul style="list-style-type: none"> • The position the infant settles best in, evidenced by decreased movements or fussing will reduce overall energy consumption. • Prone positioning in the preterm infant has been observed to increase sleep time and decrease energy expenditure compared to supine positioning. • For an infant the exposed surface area is greatest in the supine position with subsequent increased heat losses. • The use of nests can help reduce heat loss.
Other considerations	<ul style="list-style-type: none"> • When infants are nursed on their side, support with swaddling or use a nest to promote midline hands-together or hands-to face movements. • Infants should be repositioned based on their skin risk assessment score (i.e. NSRAS) or when demonstrating discomfort, their position should be alternated from side to side and midline.

	<ul style="list-style-type: none">• Unstable infants have preferred sides and do tolerate repositioning well, in this instance use two staff to turn the infant slowly whilst containing their extremities.
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Positional deformations of the head

The pliability of a newborn's head can cause changes in head shape, particularly in premature infants⁴⁷. For infants lying in their bed for extended periods skull softness combined with rapid growth of the brain increases the risk of deformational head shaping⁴⁷. Additional information on the classifications of head shape can be found [here](#).

Peanut Pillows

It may be necessary to use a small specialised peanut pillow to help the infant maintain their head in the midline when supine (provided by the Occupational Therapist). Peanut pillows are only for use in the NICU/ ICU whilst infants are monitored as they pose a SUDI risk if used at home.

Strategies to assist in the prevention of positional deformities include:

1. Changing the crib position to encourage carers and parents to approach from alternate sides of the bed
2. Alternating the infants position between supine (midline) and left or right side lying
3. Intentionally providing cares from both sides of the bed
4. Providing alert infants (>40 weeks and without sternal surgery) with daily supervised tummy time.

If there are concerns regarding the infants head shape, a referral is made to the unit physiotherapist/occupational therapist. Medical causes of abnormal head shape should also be excluded.

Tummy time

Tummy time is a developmental and play based intervention to promote engagement and strengthening of neck and shoulder muscles.

- Modified tummy time can be offered to infants prior to term age corrected.
- Following a sternotomy neonates are not nursed prone or to engage in tummy time for at least 6 weeks or with medical clearance. Modified tummy time with medical clearance is an alternative.
- Ensure infants are not unattended during their session.
- Short frequent periods of tummy time are better tolerated than prolonged periods where the infant becomes upset.
- Further information can be obtained from the Physiotherapist or Occupational Therapist.



Image demonstrating modified tummy time

Positioning Aids

The availability of equipment may be unit or site dependant, please refer to your local developmental team if you are seeking specific resources.

Nests⁴⁹

Boundaries offered in the form of nests need to be high enough to contain the legs and close enough that the infant can brace their feet on it. The use of high boundaries in nesting provides the baby with containment and facilitates midline movements of hands to face. Nesting is individualised based on the infant's needs.

Removing nests:

- For infants >37 weeks where nesting has been in place for greater than 7 days evaluate with the clinical team if the nest is still required (NP team, developmental round team). Transition to an 'L shaped' support then a foot roll, removing support approximately every 24 hours or as tolerated.
- For infants nested for <7 days within 5-7 days of discharge transition out of a nest (can be initiated by bedside clinician). Consider use of L shaped support and/or foot roll if needed.

Strategies to support the removal of supports include:

- Trialling their removal when the infant is in a calm well-regulated state
- Utilising foot rolls as a transitional support when removing nests
- Wrapping the infant with their hands near their face to support their self-regulation attempts
- Utilising sleeping bags if possible to facilitate ongoing support

For resources on how to make a nest refer to:

<http://www.schn.health.nsw.gov.au/professionals/learn/nidcap/resources-newsletters>

Supportive Seating/Chairs

Seating options are offered on an individual basis to infants once they are post-term corrected age and showing longer periods of active wakefulness.

- The most common seating used for infants is the bean bag chair, which supports them in a semi-upright position where they can visually explore the environment.
- Other chairs that may be used for older infants include Fraser chairs or Tumbleform chairs. These are provided by the Occupational Therapist/Physiotherapist who will provide written information and education to families on their use.



Bean bag Chair



Fraser Chair

Safety considerations for infants in a chair/seating device:

- Infants require high sides on their cot if a chair/seating device is in use
- They require monitoring (direct observation) at all times when positioned in a chair
- Infants should not be left to sleep in chairs it can lead to less effective respirations and is a SUDI risk
- Infants should be in a chair for a maximum of two hours to minimise the risk of pressure areas

Weighted supports (Zaky hands)

Weighted supports can be beneficial for some preterm infants (<36 weeks) who need more assistance to self-regulate and settle to sleep. Please see the Occupational Therapist or member of the Developmental Care team if you think an infant would require this equipment.

- The infant needs to be >800gm in order for a weighted device to be provided.
- Maternal scent on weighted devices has been shown to reduce the incidences of bradycardia and apnoea for preterm infants.
- They can be positioned around or across an infant, avoiding the head/face.
- The device should be positioned diagonally (across or along the length of the body) on alternate joints i.e. shoulder and hip, instead of the same joint i.e. hip to hip to prevent restriction of movement.

DO NOT place across hips or abdomen.

Zaky hands **DO NOT** take the place of supportive holding and settling techniques.

Gel or heart-shaped pillows

A specialised baby headrest can be obtained in Grace at CHW from an occupational therapist to help an infant who must remain in a supine position and is at risk of developing a 'flat-spot' on the occipital region. These aids are useful for infants who are unable to re-position themselves. Ensure that when using gel pillows the infants head is regularly checked for signs of circulatory compromise and skin breakdown due to positioning and movement restrictions.

Developmental care beyond the ICU setting

For areas outside of the ICU the principles of developmental care are applied following the same approach of individualised infant and family centred neuro-supportive strategies.

To ensure infant safety – Nesting is not recommended outside of the NICU/PICU/CICU as the infant is not under the direction supervision of a bedside clinician, the nest represents a SUDI hazard.

The focus of developmental care beyond the ICU should include:

<p>Infant development</p>	<ul style="list-style-type: none"> • Staff education and understanding of expected infant development in first 12 months of life https://kidshealth.schn.health.nsw.gov.au/sites/default/files/kih1567-your-baby-calendar-2015final.pdf • Activities targeted to infants current developmental age • Collaboration with occupational therapy, speech therapy, physiotherapy, play therapy and music therapists
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	<ul style="list-style-type: none"> • Development of individualised daily plans to promote sleep/wake routines • Promotion of reading, singing and infant directed talking
Protecting sleep and settling infants	<ul style="list-style-type: none"> • Recognition of infant sleep states • Consider if the timing of non-urgent procedures could be adjusted to avoid interrupting sleep • Modify the environment to protect sleep • Assist infant's to sleep using responsive setting principles https://www.tresillian.org.au/media/1316/responsivesettling0-12months_tresillian_tipsheet.pdf • Use of a swaddle/sleeping bag to support sleep
Procedural support	<ul style="list-style-type: none"> • Promotion of non-pharmacological pain management strategies including breastfeeding, breast milk, and sucrose, as well as positioning, swaddling, non-nutritive sucking and odour • Supporting parents to take an active role in their infants pain care
Education	<ul style="list-style-type: none"> • Behavioural state education for staff and parents • Education for parents on age appropriate interactions and play • Staff and parent education on safe sleeping environments and SUDI

Developmental Follow-up Clinic

Preterm birth and admission to an ICU during infancy is associated with an increased risk of developmental problems and disorders. These include developmental challenges, physical, sensory, cognitive and learning disorders, and emotional and behavioural problems. They may extend into adolescence and, in some cases, be lifelong⁵⁰. Developmental surveillance is recommended for identifying major problems and disorders.

Cavet to guideline

Each infant, parent and family member are individuals and as such have their own needs and requirements. Please consider these as you implement this guideline across SCHN.

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