

Fragile Infant Forums for Implementation of IFCDC Standards: Supporting Regulation of Infant Sleep and Arousal States in the NICU: The Role of Non-Separation in the Revised Infant-Family Centered Developmental Care (IFCDC) Standard

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Overview:

Physiological and behavioral state regulation and support for the development of sleep and arousal patterns among preterm and sick infants, as well as how this practice can be implemented in the newborn ICU, is described in this article. A decade of studies on infant sleep consistently demonstrates positive relationships between age-appropriate patterns of sleep and arousal, brain development, and developmental outcomes (1–5), leading to sleep being widely accepted as an essential human occupation throughout the lifespan.

Human brain function relies upon age-related sleep patterns and arousal patterns for optimal brain development, including learning, cognition, executive, behavioral, and social/emotional functions. Sleep architecture and states of arousal are known to be affected by individual biological and environmental contexts (6); thus, infants with complex medical conditions who are cared for in the NICU environment, including preterm infants, are at particular risk of negative impacts on sleep and arousal patterns that could ultimately impede their overall development (7). The current evidence, addressed in the Infant-Family-Centered Developmental Care (IFCDC) Standards and Competencies (<https://nicudesign.nd.edu/nicu-care-standards/ifcdc--recommendations-for-best-practice-to-support-sleep-and-arousal/>) supports opportunities for close parent-infant contact, including skin-to-skin contact, as early and as often as possible, and addresses state development and

regulation.

Evidence-Based Standards for Practice:

Infant-Family-Centered Developmental Care (IFCDC) is a neuroprotective model for the care of high-risk infants and families that seeks to ensure optimal conditions for development during the NICU stay and the transition home. The IFCDC standards and competencies (8) emerged from a model of care that has, at its core, the infant(s)/parent(s)/family member(s) as essential caregiving partners with medical professionals in an individualized approach to care where all participants in care recognize infants as competent interactors in their care. The 2024 revisions to these standards and competencies (in the process) now align with the European Standards of Care for Newborn Health (9) and the current recommendations from the World Health Organization (WHO) (10) for the care of preterm and low birthweight newborns by emphasizing non-separation of infant(s)/parent(s)/family as an essential, core component of IFCDC. These core components require a secure foundational context for implementation that includes: a) an organizational mission that utilizes systems thinking as a basis for evaluation and implementation of change, b) a commitment at all levels of the organization to principles and practices that demonstrate respect for diversity, equity, inclusion, and justice for all, and c) a shared mental model for individualized care that provides infant mental health, neuroprotection, and environmental supports.

Non-Separation to Enhance Baby's State Regulation:

Following the current IFCDC revisions, the sub-section of the standards that focuses on support for infant sleep and arousal now emphasizes non-separation, including skin-to-skin contact as early and for as long as possible, whenever the medical and social conditions of mother and baby permit. "Non-separation" in this context also refers to removing institutional barriers to parent-infant contact and close proximity from the earliest moments after birth. This addition to the standards goes beyond addressing the connection between sleep and arousal states and sensory aspects of the NICU environment (11). The call for non-separation recognizes the potential positive impact of an uninterrupted physical/emotional connection between the infant(s) and parent(s) on pain and stress (12) and physiologic and behavioral regulation, including states of sleep and arousal (13, 14). Immediate placement of the newborn to be in contact with the mother's skin while ensuring continuing medical stability of both mother and baby has been increasingly demonstrated to be not only possible (15) but potentially optimal for perinatal stabilization of the term dyad (16–18). Early, sustained physical proximity between baby and mother provides for mutual olfactory, tactile/kinesthetic, and auditory sensations, which contribute to physiologic and hormonal changes that, in turn, reinforce the emotional connection of the dyad (2, 19–22). From a practical standpoint, non-separation provides thermal regulation for the baby, which is particularly necessary in low-resource settings but has been demonstrated to

be beneficial even among very preterm babies in high-resource settings (23). A standard of immediate, continuous, skin-to-skin contact (15) is now strongly endorsed worldwide (10, 17) for the term, preterm, and low birthweight infants whenever possible. Earliest initiation of STS contact for preterm and low birthweight infants is now accepted to be consistent with recommended perinatal care practices such as delayed cord-clamping, breast-crawl, and earliest provision of mother's own breastmilk, each of which have long been demonstrated to have positive relationships to physiologic and immunologic functioning, regulation of sleep and quiet alert states (24), breastfeeding success (25, 26), as well as short term and long-term social-emotional and developmental outcomes (27). Widstrom et al. (28) have provided detailed clinical recommendations for positioning healthy infants skin-to-skin on the mother's abdomen immediately after birth and for progressing mother and infant through nine stages of newborn behavior during this first skin-to-skin experience that includes a progression of increasing state regulation as the infant moves through wake and sleep states: 1. Birth cry, 2. Relaxation, 3. Awakening, 4. Active, 5. Resting, 6. Crawling, 7. Familiarization, 8. Suckling, 9. Sleeping. This practice is now recommended for preterm infants whenever medically possible to obtain some of the same benefits (10, 26). Immediate skin-to-skin contact offers parent(s) an opportunity to provide warmth, touch, and comfort to their newborn; these conditions facilitate their newborn's capacity to self-regulate their arousal and sleep states. Parental closeness, and skin-to-skin contact, in particular, affords the newborn the optimal environment to be soothed and obtain a quiet alert state, to gaze at faces, to actively move toward and engage the breast and/or suck on their fist, and to pull down to a sleep state. When it can be practiced immediately after birth, non-separation can be a profound shared experience with the potential for lasting physiologic and emotional benefits for babies and their parents.

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Non-separation may be an aspirational goal for families with complicated circumstances that prevent their prolonged presence at the bedside, such as the need to work or to care for other family

members, as well as economic, cultural, and social-emotional factors. In the rare cases when close physical contact is not attainable immediately after birth or cannot be provided for sustained periods due to medical or family circumstances, non-separation can be practiced by the parent(s)/family as physical and social-emotional closeness through their active participation in individualized care, to the extent possible, which has known benefits to infant and family (29). Professional staff should use education and encouragement to empower parents in ways that maximize their participation, such as using technology (video conference software and hardware) for participation on rounds and education when physical distance cannot be avoided.

Essential to the implementation of non-separation as a core component of the IFCDC Standards is a shared mental model for individualized care between the obstetrical and neonatal teams. In this model, staff and parent(s)/family are educated in the known benefits of skin-to-skin contact, as well as safe transfer techniques and positioning to optimize airway maintenance for the baby and comfort for the mother/parent (30). Obstetrical and neonatal staff work in tandem to provide a safe, supportive environment for mother and baby to remain in skin-to-skin contact immediately after birth, performing only necessary observations and interventions. In contrast, the baby progresses through the initial stages described above, ultimately reaching a sleep state. For this shared mental model to be successfully implemented, staff and parent education must also include observation and recognition of infant sleep and arousal states.

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Application to Clinical Care:

Infant sleep and arousal states and other vital signs represent the infant's unique bio-behavioral communication of their responses to, and tolerance for, the conditions of care (19, 21, 31, 32). Optimally, ongoing assessment and documentation of sleep and arousal states, physiology, and behavior during the NICU stay are recorded in the electronic medical record (EMR) before, during,

and aftercare and should include the timing and context of care (i.e., infant location, if being held and by whom and for how long), infant position and positioning aids, and aspects of the environment (light, sound, furnishings). When this type of documentation is accessible to all team members via the EMR, it can be compared with concurrent vital signs and pain assessments within the caregiving context to inform team members of the infant's sensitivities, tolerances, and preferences for particular aspects of care. Recording these data in the EMR enables discussion by the team of such aspects of care as positioning and holding, feeding, participation in social interactions and scheduling of tests/interventions based on observed data. Trends in the infant's behavior can also be charted in the EMR and analyzed by the team. For example, documentation that an infant who was previously feeding eagerly but is now consistently lethargic and /or under-aroused for feedings may generate a team discussion on rounds where the parent(s)/family observations of their infant's behavior can be discussed. Modifications to the care schedule, the feeding plan, the environmental conditions, and the need for tests to assess for a medical source of the infant's lethargy may be considered, implemented, and followed up on. Consistent documentation of infant sleep and arousal during care and routine discussion of these observations on rounds demonstrates respect for contributions by all caregivers, particularly parent/family members, and brings the infant's voice to every team decision.

“When parent(s)/family members have participated actively in their infant's care throughout the NICU stay and have learned to recognize their infant's unique style of behavioral communication, they are more confident in their ability to support a healthy balance of sleep and arousal, which is the foundation for optimal feeding, interaction, and development (42).”

Hwang et al. (38) emphasize that physical presence is not sufficient for families to learn to support the development of healthy sleep patterns. Parents/families require education specific to this development area (IFCDC Sleep and Arousal Standard 5) (8). This, in turn, prepares them for a more successful transition home. Sleep, feeding, and behavioral regulation share a complex interaction, and difficulties with any or all of these components of development can be challenging to identify and resolve. However, they cannot be ignored since they are consistently among the primary concerns endorsed by families during the infant's transition home (39–41). Non-separation contributes to parents' understanding of their baby's arousal, sleep, feeding, and behavioral regulation. Healthcare workers' concerns about infant safety or the time required to support physical closeness between parent(s) and their baby have also been identified as barriers to implementation (33). Breaking down such barriers through staff and parent/family education and providing increased opportunities for family participation whenever possible should be a primary goal of the NICU (34, 35). Suppose parent(s)/family members face in-

surmountable barriers to non-separation. In that case, it is even more critical that they receive the necessary education to assess the behavioral communication of their infant(s) (36) and practice these skills in the NICU setting to facilitate competence and confidence in providing the individualized care their baby requires (37). When parent(s)/family members have participated actively in their infant's care throughout the NICU stay and have learned to recognize their infant's unique style of behavioral communication, they are more confident in their ability to support a healthy balance of sleep and arousal, which is the foundation for optimal feeding, interaction, and development (42).

Summary:

The emergence and regulation of sleep and arousal are foundational to later development and are impacted by early care by parents and intensive care staff. The IFCDC standards address the evidence that underpins essential aspects of care that support state and arousal development both in intensive care and as the baby transitions home. The parent's ability to understand and provide for the baby's state regulation is essential to laying that foundation, done best by not being separated from birth through the hospital stay. Non-separation, practiced early and often in the NICU, provides the best opportunity for families to be prepared to respond and adapt to the ongoing changes that are part of infant development once their baby is at home. Moreover, consistent participation as essential, valued members of the NICU care team prepares parent(s)/family members to partner with their baby's primary care providers following discharge to utilize necessary resources and to advocate for their baby's needs, ensure continuity of individualized care through the transition home.

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