

## Neuroprotective Practice Standards in the NICU and what that means for Pediatric Practice

Jenene W. Craig PhD, MBA, OTR/L, CNT  
Kristen W. Lark OTR/L

---

---

---

---

---

---

---

---

### Disclosures

- Connected to multiple groups but no financial benefit to the content of this presentation.
  - Department Chair- Brenau University – School of Occupational Therapy
  - Director of Education – National Association of Neonatal Therapists (NANT)
  - Board of Directors, Executive Committee-National Perinatal Association (NPA)
  - Current Practice- Level III NICU & Outpatient Pediatrics
- There will be no discussion of off-label or investigational uses of commercial products.

2

---

---

---

---

---

---

---

---

### Objectives

- Participant will understand and be able to articulate the concepts and tenets of interdisciplinary neuroprotective care in the NICU.
- Participants will be able to articulate how interdisciplinary neuroprotective care benefits both infant and parents in their attachment and mental health, both in the NICU and post-NICU.
- Participants will begin to consider quality improvement practice measures.

3

---

---

---

---

---

---

---

---

Overview

# What is Neuroprotective Care

4

---

---

---

---

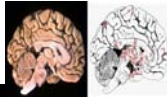
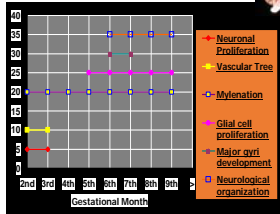
---

---

---

---

## Neurological/Brain Development



5

---

---

---

---

---

---

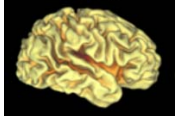
---

---

25 week



Term



6

---

---

---

---

---

---

---

---

### Neurodevelopment

- >50% of hemorrhages occur within the first 24 hours
- The brain grows more rapidly while in our NICU than at any other time!
- Preterm white matter is particularly prone to ischemia
- ( ↓ BP = ↓ blood flow = ↓ Ischemia)
  - immature blood vessels
  - pressure passive circulation
- ...

7

---

---

---

---

---

---

---

---

### Neurodevelopmental Outcomes

8

---

---

---

---

---

---

---

---

### Sequence of Development

- No evidence that premature birth accelerates the sequence of development
- Important to understand the natural order of system development
- Important to understand the impact the NICU has the sequence of systems

9

---

---

---

---

---

---

---

---

## Sensory System Development

- First to Develop:
  - Somatesthetic modalities
  - Vestibular modalities
  - Chemosensory modalities (taste/smell)
- Last to Develop
  - Auditory
  - Visual

10

---

---

---

---

---

---

---

---

## Subsystems of Functioning

Subsystem	Description
Autonomic/Physiological Stability	Basic physiologic functioning of our body necessary for survival. Heart rate, respiratory rate, skin color, tremors/startles.
Motor Organization	Infant's motor tone, movement, activity and posture.
State Organization	Level of central nervous system arousal – sleepy/drowsy, awake/alert, fussing/crying.
Attention/Interaction	The availability of the infant for interacting, alertness and the robustness of the interaction.
Self-Regulation	The presence and success of the infant's efforts to achieve and maintain a balance in the other four subsystems.

11

---

---

---

---

---

---

---

---

### Sensory system development

## Intrauterine vs. Extrauterine Sensory Environments

System	Intrauterine	Extrauterine
Tactile	<ul style="list-style-type: none"> <li>• Constant proprioceptive input: smooth, wet, usually safe and comfortable</li> </ul>	<ul style="list-style-type: none"> <li>• Often painful and invasive; dry, cool air; predominance of medical vs. social touch</li> </ul>
Vestibular	<ul style="list-style-type: none"> <li>• Maternal movements, diurnal cycles, amniotic fluid creates gently oscillating environment, flexed posture</li> </ul>	<ul style="list-style-type: none"> <li>• Horizontal, flat postures; influence of gravity, and equip.</li> </ul>
Auditory	<ul style="list-style-type: none"> <li>• Maternal biologic sounds, muffled environmental sounds</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely loud, harsh, mechanical, and constant noise</li> </ul>
Visual	<ul style="list-style-type: none"> <li>• Dark; may occasionally have very dim red spectrum light</li> </ul>	<ul style="list-style-type: none"> <li>• Bright fluorescent lights. Often no diurnal rhythm</li> </ul>
Thermal	<ul style="list-style-type: none"> <li>• Constant warmth, consistent temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental temperature variations, high risk of neonatal heat loss.</li> </ul>

12

---

---

---

---

---

---

---

---

Neurobehavioral Development

### Developmental Protection

- Stress occurs because of the mismatch of sensory stimulation on the developing infant
- Transformational Models
  - Developmental Care → Neonatal Integrative Developmental Care Model / Trauma Informed Care

13

---

---

---

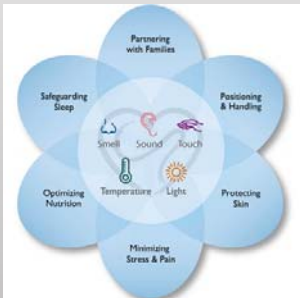
---

---

---

---

---



EVIDENCE  
REQUIRES  
APPLICATION

L. Altmier, R.M. Phillips /  
Newborn & Infant Nursing  
Reviews 13 (2013) 9–22

14

---

---

---

---

---

---

---

---

neuroprotective care and OT in  
support of parental mental health?

Multidisciplinary roles

15

---

---

---

---


---

---

---

---

"A NICU is akin to a trauma center for all participants.  
Fragile babies struggle to survive and grow.  
Parents and families worry constantly while trying to maintain optimism and hope.  
Staff attempt to avoid burnout while both encouraging distraught parents and acknowledging the times of poor prognosis.  
Distress is the companion of everyone."  
- Introduction, *J Perinatology*



The NICU environment is traumatic and presents unique risks for those who inhabit it.

16

---

---

---

---

---

---

---

---

### Mental Health Issues in the NICU

- Trauma occurs daily; stress is constant
- Not only the parents feeling traumatized-siblings and extended families members are also impacted
- NICU staff deal with the trauma of caring for infants and their families that may result in pain and poor outcomes

17

---

---

---

---

---

---

---

---

### Neuroprotection in Action

- We have to pay attention to everything that we do in the NICU. From delivery through admission, until discharge and beyond (post-NICU)
- Our goal is to protect the brain with the understanding that repetitive small incidences can be as damaging as one major event. (e.g. frequent desats...)
- ....putting this into action

18

---

---

---

---

---

---

---

---

# Interdisciplinary Recommendations for Psychosocial Support of NICU Parents

Findings of Workgroup Convened by the National Perinatal Association



---

---

---

---

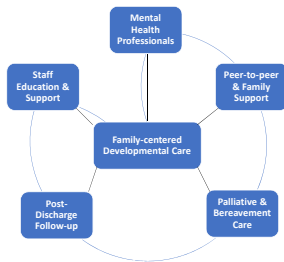
---

---

---

---

## Components of Comprehensive Family Support in the NICU



---

---

---

---

---

---

---

---

## Family-Centered Developmental Care

- The most important role of FCDC is to enhance the bonds of attachment between parents and their baby, which directly influences their child's ultimate outcome.
- While babies can survive without their families, optimal physical, cognitive and emotional development occurs only within the context of loving, positive interactions with their parents or emotionally-involved primary caregivers.

---

---

---

---

---

---

---

---

## Role of Peer-to-Peer and Family Support

- Each parent with an infant in NICU should receive peer-to-peer support.
- Support is offered by trained veteran parents who have had a similar experience.
- Types of peer-to-peer support:
  - In-person or telephone support
  - Parent support groups
  - Internet support

22

---

---

---

---

---

---

---

---

## The Role of Mental Health Professionals

23

---

---

---

---

---

---

---

---

## Palliative and Bereavement Care: A Family-Centered Integrative Approach

24

---

---

---

---

---

---

---

---



## Staff Education and Support

NICU staff need both education and support to be able to successfully carry out their roles with parents.

25

---

---

---

---

---

---

---

---

## Post-Discharge Follow-up and Beyond

26

---

---

---

---

---

---

---

---

## ....Pediatric Implications

- Sensory System Development
- Mental Health
  - Child outcomes
  - Parent outcomes
  - Parent-Child Attachment
- Treatment Planning

27

---

---

---

---

---

---

---

---

Sensory system development

### Intrauterine vs. Extrauterine Sensory Environments

System	Intrauterine	Extrauterine
Tactile	<ul style="list-style-type: none"> <li>Constant proprioceptive input: smooth, wet, usually safe and comfortable</li> </ul>	<ul style="list-style-type: none"> <li>Often painful and invasive; dry, cool air; predominance of medical vs. social touch</li> </ul>
Vestibular	<ul style="list-style-type: none"> <li>Maternal movements, diurnal cycles, amniotic fluid creates gently oscillating environment, flexed posture</li> </ul>	<ul style="list-style-type: none"> <li>Horizontal, flat postures; influence of gravity, and equip.</li> </ul>
Auditory	<ul style="list-style-type: none"> <li>Maternal biologic sounds, muffled environmental sounds</li> </ul>	<ul style="list-style-type: none"> <li>Extremely loud, harsh, mechanical, and constant noise</li> </ul>
Visual	<ul style="list-style-type: none"> <li>Dark; may occasionally have very dim red spectrum light</li> </ul>	<ul style="list-style-type: none"> <li>Bright fluorescent lights. Often no diurnal rhythm</li> </ul>
Thermal	<ul style="list-style-type: none"> <li>Constant warmth, consistent temperature</li> </ul>	<ul style="list-style-type: none"> <li>Environmental temperature variations, high risk of neonatal heat loss.</li> </ul>

28

---

---

---

---

---

---

---

---

---

---

### Post NICU Implications – Sensory System

29

---

---

---

---

---

---

---

---

---

---

### What we do know

- Parents of premature infants often lack understanding of how to parent their infants while in the NICU; leading to frequent misperceptions of their infants (Melnyk et al., 2006).
- the separation of parent from infant in the NICU, combined with frequent occurrences of parent depression, anxiety, and stress-related incidences, affects the psychosocial development of the preterm infant (Ishizaki, 2013).
- This may lead to an increased sense of detachment once the more acute phase of the NICU stay has passed and when greater opportunities are presented for the parent/caregiver to hold or communicate with their infant (Fegran, Fagermoen, & Helseth, 2008).
- These negative parent-infant interactions can often lead to parent depression, anxiety, and stressful parenting patterns (Miles, Holditch-Davis, Schwartz, & Scher, 2007).

---

---

---

---

---

---

---

---

---

---

Strategies for Pediatric Practice  
and  
Helping families

- Developmental History
- Understanding the Parent-Infant dyad. Help parent:
  - Understand non-verbal language or cues-even teenagers have them.
  - Understand how their child sees, hears, feels, tastes and smells
- Using the OT lens...What's your theory??
- Intervention and Strategies

---

---

---

---

---

---

---

---

Summary

- The work that we do collectively in the NICU and pediatric practice is about Brain care ...i.e. stress management and bringing babies and families through their experience in the safest and healthiest manner.
- Parents of babies in NICUs may experience great distress and require psychosocial support.
  - All NICUs should do their best to provide parents with comprehensive family support.
  - NICU staff should be both educated in providing psychosocial support to parents, and
  - Pediatric practitioners should be educated in appreciating the NICU impact on both the child and family long-term.
  - Parents should be supported in their caregiver roles.
- The end result will be creation of stronger, healthier families.

32

---

---

---

---

---

---

---

---