Expanding your OT Toolkit

Evidence-based strategies for working with neonates

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Learning Objectives

- Describe the role and benefits of Occupational Therapists working with the neonatal population.
- Identify therapeutic interventions from an OT perspective as they correlate with the Neonatal Integrative Developmental Care Model.

Neonatal Therapy

- Holistic direct patient care and consultative services to premature and medically complex infants in a neonatal intensive care unit (NICU)
- Integrates typical development into the environment of the NICU
- Interventions support optimal long-term development, prevent adverse conditions and nurture the infant-family relationship

Occupational Therapy & SCN/NICU

- The important role of the occupational therapist is to assist each family to foster optimal infant development, including the the encouragement of developmentally appropriate occupations, sensorimotor processes and neurobehavioral organization.

Therapy in the NICU & Special Care Nurseries

- Neonatal Therapy Requires:
  - Specialized orientation
  - Specialized training
  - Advanced continuing education
  - Mentoring
- Therapist must have knowledge of medical interventions and be skilled in appropriate timing & intensity of treatment interventions in a specialized medical environment.

OT's role in the NICU:

- Facilitates appropriate long term development achievement
- Facilitates infant-parent bonding

Thru assessment & interventions supporting the following areas:

- Neurobehavioral
- Neuromotor
- Neuroendocrine
- Musculoskeletal
- Sensory
- Family/Infant Psychosocial relationship

Knowledge Areas Specific to the NICU

- **Environment:**
  - How does it affect the infant?
  - Is it developmentally appropriate?
- **Neurodevelopment:**
  - Assessments and interventions that match each infants specific sensory and motor needs based on age/ development
- **Neurobehavioral:**
  - Assess/Facilitate infants ability/development in regards to:
    - Autonomic Regulation
    - Motor Regulation
    - State Transition/Regulation
    - Attention/Interaction
    - Self-Regulation

Knowledge Areas Specific to the NICU

- **Neuromotor:**
  - Assess/Facilitate infants ability/development in regards to:
    - Neurodevelopmental positioning & handling
    - Normal movement patterns
    - Normal tone & reflex development
- **Musculoskeletal:**
  - Assess/Facilitate infants development in regards to:
    - Normal posture & alignment
    - Development of antigravity movements and symmetric strength
    - Physiologic activity tolerance
    - Management of orthopedic deformities & prevent iatrogenic deformities

Knowledge Areas Specific to the NICU

- **Sensory**
  - Facilitate/Protect normal sensory development & integration of the following systems
    - Tactile
    - Proprioception
    - Vestibular
    - Gustatory
    - Olfactory
    - Auditory
    - Visual

Knowledge Areas Specific to the NICU

- **Pain**
  - Non-Pharmacological interventions
- **Family Support:**
  - Educate parents & facilitate participation with early parenting skills in preparation for transition to home
  - Parent Bonding and attachment
  - Psychological Support

Knowledge Areas Specific to the NICU

- ADL's
  - Feeding
    - Oral/Motor/Sensory integration
    - Pre-feeding readiness
    - Transition to safe oral feeding
  - Sleep
    - Transition to sleep
    - Safe sleep practices
  - Bathing
    - State & Self Regulation
    - Neuromotor stability
  - Play
    - Facilitate age appropriate developmental skills

Levels of Care

Level II Special Care Nursery

- Intermediate level care for moderately preterm infants born > or equal to 32 weeks GA with birth weight >1500 g
- Management of full-term infants requiring careful postnatal monitoring, IV antibiotics or short-term respiratory support

Level III & IV Nurseries

- Full range of subspecialty staffing with advanced diagnostic imaging and respiratory support equipment adequate to provide the highest level intensive care services for critically ill infants of all viable GA
- IV: Surgical subspecialties for surgical repair of complex conditions as well as full range of respiratory supports

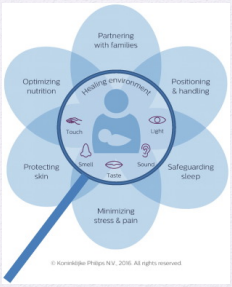
Level II: Special Care Nursery

- Provides high-quality developmental care
- Problems/Diagnoses appropriate for neonatal therapy:
  - NAS – neonatal abstinence syndrome
  - Birth injuries or structural anomalies
  - Neuro or orthopedic diagnoses
  - Genetic disorders
  - Difficulty with oral feeding

Neonatal Integrative Developmental Care Model:

- 7 distinct core measures
- Clinical guidance for delivering neuroprotective family-centered developmental care in pre-term infants
- Neuroprotective interventions support the developing brain
  - The earlier the gestation, the more at risk for atypical brain development

Neonatal Integrative Developmental Care Model:

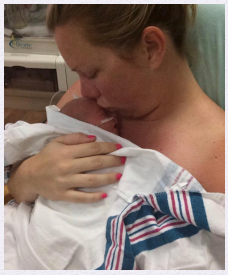


Neonatal Integrative Developmental Care Model:

- Foundation is Skin-to-Skin (Kangaroo Care)
  - Optimal healing environment for infant
  - Supports parents involvement with infant care
  - Facilitates positioning & handling
  - Aides sleeping patterns by providing maternal scent
  - Supports autonomic and physiologic stability, reduces stress and pain
  - Assist with temperature regulation
  - Enhances mother's milk supply for optimal nutrition

Kangaroo Care

- Facilitates optimal brain development
- Supports healing & growth
- Encourages family-infant bonding
- Decreases length of hospital stay



Core Measure 1: Healing Environment

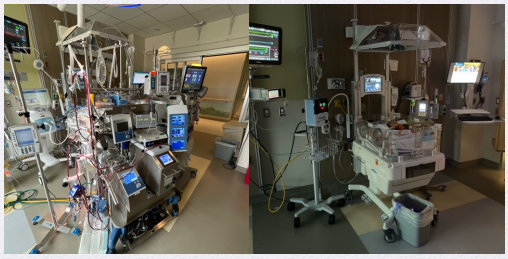
Physical Environment:

- Space, privacy & safety
  - Interactions with people inside the nursery or NICU
- Sensory Environment:
  - Infant interactions via touch, proprioception, smell, taste, sound & light
- Positive sensory experiences drive brain development

Core Measure 1: Healing Environment

Start of Medical Treatments:

11 Days Later:



Healing Environment: Sound

- American Academy of Pediatrics recommend sounds in the nursery do not exceed 45 dB
  - That is equivalent to a whisper
- Pineda et al. (2019) & the SENSE program
  - 28 weeks PMA: 20 minutes of reading/speaking/ singing, reciprocal language
  - 32 weeks PMA: recorded sound can begin; infants are more mature and can tolerate stimuli

Healing Environment: Light

- An infants visual system is not fully developed at birth
- Lighting influences development after birth into childhood
- High lighting levels can contribute to:
  - Decreased weight gain
  - Sleep & behavioral disturbances
  - Rapid changes in light has correlated with decreased oxygenation levels

Healing Environment: Light

- Lighting Recommendations:
  - Avoid direct light exposures especially to the eyes
  - Incorporate natural light with cribs no more than 60 cm from windows
  - Examine/work with infant within a range of general illumination 10-600 lux
  - Have a progressive lighting system based on the infants needs
  - Use cyclic lighting:
    - Daylight: 100-200 lux with natural light
    - Night: light < 50 lux

Healing Environment: Scent

- Avoid scents/fragrance
- Limit exposure to noxious odors
  - Hand sanitizer or soap prior to handling infant
- Use supportive baby wash, lotion and oils
- Encourage maternal scent
  - Cloth, nursing pad, swaddle

Core Measure 2: Partnering with Families

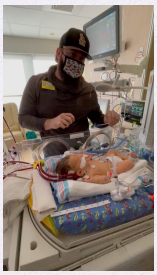
Family-Centered Care:

- Premature infants have "premature" parents – they are most often not prepared for a nursery or NICU stay
- Encourage parent involvement to facilitate infant-family bonding as well as positive nursery/ NICU experience

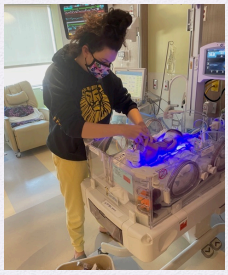
How OT's can help:

- Provide "hands-on" opportunities for parents to participate in cares during treatment session
- Educate parents on the "why" during sessions
- Facilitate use of items from home to ease with transition at discharge
  - Baby wearing positioning & practice

Core Measure 2: Partnering with Families



Core Measure 2: Partnering with Families



Core Measure 2: Partnering with Families

From a parents perspective:

- How did occupational therapy help during your nursery stay?
  - "Occupational therapy helped me better learn what I am supposed to do for my 32 week twins. Being a parent of twins born early is very different than anything I had ever experienced so having support of how to best serve my children through occupational therapy was very helpful." –M.M.

Core Measure 2: Partnering with Families

From a parents perspective:

- What piece of advice would you share after experience in the SCN?
  - "For parents that don't have experience in the NICU, learning to be patient is the hardest part. Because any parent wants her kid to come out the very next day, but it could take a week or two weeks or three weeks. Being patient and taking advantage of the services that the hospitals offer your children. Also being there as much as you can for rounds so you can talk to the whole crew all at once." –M.M.
  - For staff members:
    - "Remember that parents see all that goes on around them. Be compassionate and kind, and explain everything. Don't assume that they know anything." –M.M.

Core Measure 3: Positioning & Handling

Facilitate In-utero positioning:

- Womb is an enclosed space with 360° of well defined boundaries
- Developmentally supportive positioning is essential for musculoskeletal development

Core Measure 3: Positioning & Handling

- In the Research:
  - Konishi, Kuriyama, Mikawa & Suzuki (1987)
    - Excessive supine positioning can lead to developmental problems to include:
      - Preferential head position
      - Extensor hypertonia
      - Asymmetrical postures
      - Atypical gait patterns

Core Measure 3: Positioning & Handling

- In the Research:
  - Monfort & Case-Smith (1997)
    - Use of a prone positioning device significantly increased scapular upward rotation in preterm NICU infants
  - Georgieff & Bernbaum (1986)
    - Improper positioning with downward scapula rotation and winging of the scapula interfere infant's ability to bring their arms/hands to midline for exploration

Core Measure 3: Positioning & Handling

- In the Research:
  - Hunter (2005)
    - A premature infant is unopposed in their active extension motor pattern
    - Infant does not have control or CNS maturity to return to a flexed, midline position on its own
  - Why is midline flexion important?
    - Encourages hand to face & hand to mouth activity
    - Promotes self-regulation & calm state
    - Promotes flexor tone development
    - Prevent positional deformities

Core Measure 3: Positioning & Handling

- In the Research:
  - Aucott, Donohue, Atkins & Allen (2002)
    - Physiological flexion (flexion of the shoulders, hips and knees, scapular protraction and posterior pelvic tilt)
      - Promotes proper joint alignment & symmetry, neuromuscular development and self-soothing/ behavioral organization
  - Hill, Engle, Jorgensen, Kralik & Whitman (2005)
    - Extension positioning can impact developmental milestones, hinder self-regulation, as well as success with oral feeding skills

Core Measure 3: Positioning & Handling

- Premature and critically ill infants generally do not have the "strength" of full-term well infants
- When placed on their backs they tend to lie in an extended position causing atypical motor patterns

Therapeutic Positioning:

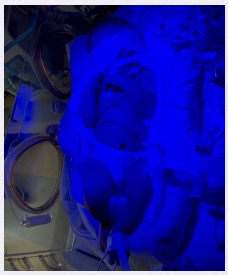
- Promotes midline flexion & infant muscle tone
- Facilitates containment positioning
- Promotes hand to mouth movement patterns
- Uses developmentally supportive positioning aids

Core Measure 3: Positioning & Handling

- Infant positioning without supports presents as:
  - Flat
  - Extended
  - Asymmetrical with head preference
  - Abducted & externally rotated extremities
  - Without boundaries, decreased spontaneous movement patterns to midline flexion noted

Core Measure 3: Positioning & Handling

Core Measure 3: Positioning & Handling



Core Measure 3: Positioning & Handling

Core Measure 4: Safeguarding Sleep

Sleep Preservation

- 28 weeks: REM and NREM sleep patterns emerge
  - Important for neurosensory development and brain plasticity
- Sleep promotes healing and growth
- Be aware/mindful of sleep cycles and cares or "touch" times to not have excessive stimuli (positive or noxious)

Safeguarding Sleep & Occupational Therapy

Newborn Therapeutic Positioning

- During hospitalization, the infant may be placed in positions other than recommended by the American Academy of Pediatrics Safe Sleep Practices . Sleep positions may including :
  - Stomach or prone
  - Side-lying with positioners/ blanket rolls
  - Elevated head of bed
- **Therapeutic positioning is NOT Recommended for your baby at home, and may be unsafe!**
- **Your baby will be introduced to Safe Sleep Practices when it is medically appropriate.**

Safeguarding Sleep & Occupational Therapy

Safeguarding Sleep & Occupational Therapy

Safe to Sleep Practices

- The American Academy of Pediatrics Safe Sleep Practices include :
  - Back to sleep
  - Use a firm, flat mattress in a crib or bassinet
  - No loose bedding, blankets, or soft objects in crib
  - No bumpers, pillows, or stuffed toys in crib
  - Do not over dress, or over heat infant
  - Infant should never sleep in a bed, sofa, recliner with another person
  - Infant should never sleep in a car seat, swing, or other positioning device.

***For more information see the American Academy of Pediatrics** Safe Sleep Guidelines

Safeguarding Sleep & Occupational Therapy

Core Measure 5: Minimizing Stress & Pain

Sensory Stress Response:

- Aside from medical procedures/cares, routine cares can be disrupting to premature/sick infants
  - Bathing
  - Weight checks
  - Diaper Changes
- Repeated pain/stress responses have been linked to poorer cognitive and motor scores

Pain/Stress Cues:

- Altered sleep/wake cycles
- Facial expressions: Brow Bulge, Yawning
- Elevated Heart Rate
- Decreased O2 level
- Body movement patterns:
  - Finger splay
  - Extensor patterns
  - Hand to face

Core Measure 5: Minimizing Stress & Pain

Core Measure 5: Minimizing Stress & Pain

- Non-Pharmacologic interventions include:
  - Maternal presence
  - Breastfeeding/BM
  - Skin to skin contact
  - Non-nutritive sucking
  - Facilitated tucking
  - Swaddling
  - Developmentally supportive positioning

Core Measure 5: Minimizing Stress & Pain

- 2 Person, 4 handed cares
- Involve & educate parents on process
- Method allows for containment holds and increased security for infant

Core Measure 6: Protecting Skin

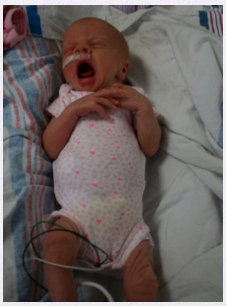
Functions of the Skin:

- Premature infants have underdeveloped skin barriers, linking high risk for:
  - Water loss
  - Electrolyte imbalance
  - Thermal instability
  - Increased permeability
  - Skin damage

How OT's can help:

- Kangaroo Care Positioning
- Introduce Swaddle or immersion bathing
- Be aware of line/IV placement
- Educate on alternative alcohol based hand sanitizer
- Natural oil use for infant massage

Occupational Therapy & Protecting the Skin



- Be mindful of placement of lines/IV/ nasal cannula/feeding tubes as well as adhesives
- Use gel cushions to prevent pressure point breakdown
- Teach parents infant massage for relaxation & bonding

Core Measure 7: Optimizing Nutrition

The Feeding game:

- Research shows breast milk as golden standard for premature infants
  - Most well-tolerated substrate for enteral feedings
  - Decreased risks of necrotizing enterocolitis (NEC), sepsis & ROP
- Donor Milk as alternative
- Transition from gavage feeding to oral (PO) feeding

Occupational Therapy & Optimizing Nutrition

- Facilitate Cue-based feeding vs. volume-based feeding
  - Educate staff and parents on reading the infants cues for readiness with oral feeding
- Advanced training needed for recommendations with positioning, nipple flow rate and bottle system
- Cue-Based Feeding Benefits:
  - Earlier transition to full oral feeds
  - Decreased length of hospital stay
  - Decreased adverse events
  - Improved behavior maturity

Occupational Therapy & Optimizing Nutrition

- Readiness Cues:
  - GA range 28-32 weeks
  - Strong NNS
  - Medically stable
    - Oxygen support <40%
    - RR <60-70 bpm
  - Controlled suck, swallow, breathe
  - Maintain body temperature
  - Rooting/sucking reflexes present
  - Maintain quiet alert state

Occupational Therapy & Optimizing Nutrition

Occupational Therapy & Optimizing Nutrition

- Signs of Disengagement/ Stress during Feeding
  - No active rooting or sucking
  - Decreased alertness
  - Change in body position: arching, extension, pushing away
  - Change in cardiorespiratory status
  - Uncoordinated SSB

OT as part of the Team

- Participates in multi-disciplinary rounds as advocate on how infant/family may benefit from a consult or services
- Provides education to staff and parents
- Often the "bridge" between family and medical team
- Advocate & coordinate for post-SCN/NICU services

OT as part of the Team: Multidisciplinary Rounds

NICU ROUNDING

DATE: _____

Patient: _____ Bed: _____

- ☐ Birth weight < 1500 grams
- ☐ Gestational age <32 weeks or IUGR
- ☐ Suspected CNS/neuromuscular abnormalities (IVH grade ¾, low Apgar scores, recurrent seizures, abnormal muscle tone)
- ☐ Newborn drug withdrawal
- ☐ Congenital abnormalities/deformities (cleft palate, mandibular hypoplasia)
- ☐ Cardio-respiratory issues (BPD, RDS, prolonged ventilator dependence, CHD)
- ☐ Cough/choke, bradys, desats, bolus loss w/ nipple feeds
- ☐ Behavior stress cues w/ nipple feeds (hiccups, arching, crying, falling asleep, pushing out nipple w/ tongue, gagging, falling asleep)
- ☐ Nipple feeds: Y / N Nipple: slow flow / standard / breast / other:_____ NG feeds: Y / N
- ☐ Formula: Y / N Breastmilk: Y / N Fortification: 22 / 24 / 26 / 28
- ☐ RD following: Y / N / recommended

Comments:

_____

_____

OT as part of the Team: Treating NAS

- Handout is included with parent packets given to families with infant admitted with NAS
- Collaborated with nursing and medical team to include OT as a resource for this specific diagnosis

Neonatal Abstinence Syndrome & Occupational Therapy

Occupational Therapists can serve as an important member of your infant's care team to help improve your infant's sleep patterns, alertness, feeding and overall development.

SYMPTOMS OF NEONATAL ABSTINENCE SYNDROME (NAS) INCLUDE:

- Hyperirritability
- Excessive and high-pitched cry
- Increased muscle tone
- Reduced quality and duration of sleep
- Inability to self-soothe
- Tremors
- Seizures

HOW CAN OCCUPATIONAL THERAPY HELP YOUR INFANT WITH NEONATAL ABSTINENCE SYNDROME IN THE NICU?

Positioning: used to help assess the 'ideal position'

Swaddling: reduces the time spent crying, decreases startle response and improve length of sleep

Handling: cradling rather than patting when burping infant to decrease overstimulation

Sensory Recommendations: rocking and massage touch for soothing crying baby, minimal environmental stimulation with decreased noise and dimmed lights

Parent Infant Relationship: parent education, skin-to-skin contact via kangaroo care

If you have any questions regarding occupational therapy services for your infant, please ask your care team about a referral.

SUMMERVILLE MEDICAL CENTER

OT as part of the Team: Treating Torticollis

- Torticollis is the tilting/ turning of the infants head to one side
  - Sternocleidomastoid muscle is shortened
  - Congenital
  - Result of injury
  - Positional influence
- New diagnoses can be intimidating to parents

HEP2GO Home Exercise Program
Created by Schayla Axson Jan 18th, 2022

Right Torticollis- Supine Cervical Rotation Stretch

Place your hand on your baby's LEFT shoulder to stabilize. Place your opposite hand on your baby's LEFT cheek and gently turn their head to the RIGHT.

TORTICOLLIS: Supine Cervical Side Bending Stretch RIGHT

Use your RIGHT hand to stablize your child's LEFT shoulder. Place your LEFT hand on top of or behind your child's head. Slowly bend your child's neck, bringing the RIGHT ear toward the RIGHT shoulder.

TORTICOLLIS: Carry Hold Stretch RIGHT

Have child straddle your LEFT arm and reach across to the child's RIGHT shoulder. Gently hold the shoulder in place. Use your RIGHT hand to stretch their neck, creating space between shoulder and ear. Hold the stretch.

OT as part of the Team: Treating Torticollis

- OT's can give parents tools and hands on training to take care of their infants while hospitalized and after discharge
  - Boosts parent confidence
  - Increases parent-infant bonding

TORTICOLLIS: Tummy time faciliation of rotation - RIGHT

When your child is awake, it is very important they participate in tummy time play. This develops head control. When your child is on tummy on the floor, place toys so they have to turn RIGHT.

TORTICOLLIS: Midline Positioning in Car Seat

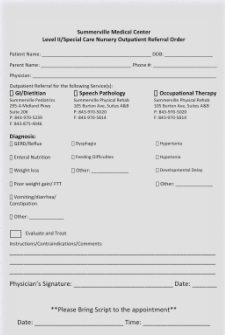
When placing your child in their car seat or other positioning device, ensure their head is positioned midline without tilt or rotation. If your child is unable to maintain this position without help, have your therapist demonstrate ways to support this position.

Torticollis- Positional changes

Encourage your baby to look over both shoulders by switching your carry positions during feeding

OT as part of the Team: Discharge Planning

- Help parents with developmental milestone expectations once at home
  - Prematurity is accounted for up to 1 year of age
  - Discuss developmental milestones as a progression of skills not specific time frame that they should attain a skill
- Provide recommendations for services at discharge
  - BabyNet
  - Outpatient SCN/NICU follow-up clinic or visits



Summerville Medical Center
Level II/Special Care Nursery Outpatient Referral Order

Patient Name: _____ DOB: _____
Parent Name: _____ Phone # _____
Physician: _____

Outpatient Referral for the following Service(s) :

☐ GI/Dietitian	☐ Speech Pathology	☐ Occupational Therapy
Summerville Pediatrics 295-A Midland Pkwy Suite 206 P: 843-970-5230 F: 843-875-4046	Summerville Physical Rehab 105 Burton Ave, Suites A&B P: 843-970-5020 F: 843-970-5014	Summerville Physical Rehab 105 Burton Ave, Suites A&B P: 843-970-5020 F: 843-970-5014

Diagnosis:

☐ GERD/Reflux	☐ Dysphagia	☐ Hypertonia
☐ Enteral Nutrition	☐ Feeding Difficulties	☐ Hypotonia
☐ Weight loss	☐ Other: _____	☐ Developmental Delay
☐ Poor weight gain/ FTT		☐ Other: _____
☐ Vomiting/diarrhea/ Constipation		
☐ Other: _____		

☐ Evaluate and Treat

Instructions/Contraindications/Comments:
_____
_____
_____

Physician's Signature: _____ Date: _____

Please Bring Script to the appointment

Date: _____ Time: _____

What You Do Matters. . .

- Carretto et al. (2000) surveyed 100 NICU OT's & their role with parent education:
  - 100% positioning
  - 97% developmental milestones
  - 92% infant state & cues
  - 89% early intervention services
  - 86% feeding
  - 86% play

What You Do Matters. . .

- White et al. (2000) surveyed parents and OT's in the NICU
  - 88% of OT's felt confident or very confident about parents understanding of education & techniques with feeding
  - 75% of parents reported feeling very confident in their understanding & support they received from the OT prior to discharge

Thank you

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