Neonatology Special Interest Group
Resource Guide for Physical Therapy Practice in the NICU

The Neonatology Special Interest Group, Academy of Pediatrics, American Physical Therapy Association: http://www.pediatricapta.org/special-interest-groups/neonatology/index.cfm has developed a resource guide for individuals interested in learning about physical therapy practice with neonates.

This resource list is a starting point before working with a mentor in the specialized area of neonatal physical therapy practice. The resources alone are not sufficient to prepare a therapist for practice in the Neonatal Intensive Care Unit. Additional experience and mentorships are recommended before working in the neonatal intensive care unit.

PHYSICAL THERAPY NEONATOLOGY FELLOWSHIP PROGRAMS

Nationwide Children's Hospital Neonatology Fellowship
RF-PTCAS Participant: Program Profile
700 Children's Drive
C4973
Columbus, OH 43205
Contact: Maria Damore PT, DPT
Phone: 614/722-6642
Email: maria.damore@nationwidechildrens.org

Rocky Mountain University of Health Professions & Seattle Children's Hospital
Neonatology Fellowship
122 East 1700 South
Provo, UT 84606
Contact: Jane Sweeney PT, PhD
Phone: 253/861-9764
Email: jsweeney@rmuohp.edu

The Children's Hospital of Philadelphia Neonatology Fellowship
RF-PTCAS Participant: Program Profile
34th & Civic Center Blvd.
Philadelphia, PA 19104
Contact: Diane Versaw-Barnes PT, DPT
Phone: 267/426-5002
Fax: 215/590-6162
Email: versaw@email.chop.edu

APTA Online Directory of Fellowship Programs
http://www.abptrfe.org/FellowshipPrograms/ProgramsDirectory/

Raquel Keithley, Kara Boynewicz, Sue Campbell Delapp, Isabel Pineda

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CONFERENCES, ASSOCIATIONS, AND WEB RESOURCES

- **Annual Gravens Conference on the Physical and Developmental Environment of the High Risk Infant**
  - The Gravens Conference is a 4-day medical education conference designed to bring the latest evidence-based information to a multidisciplinary audience of clinicians. The conference design is a day of science, a day for themed tracks, a day of abstracts and workshops, and a final 1/2 day for exploring spirituality in the NICU, and a continuation of the Family Support theme.
  - https://preemieworld.com/event/gravens-conference-environment-care-high-risk-newborns/
- **APTA/ Academy of Pediatric Physical Therapy Annual Conference (APPTAC)**
  - APPTAC features the more than 50 educational tracks in 8 pediatric specialty areas focused on pediatric physical therapy. In addition to fabulous programming, APPTAC features an Exhibit Hall, a Practice Fair, Poster Presentations, exercise initiatives, leadership events, and social events. APPTAC is a great chance to network with colleagues across the country and around the world and may be a helpful part of PCS prep.
  - http://apptac.org/events/annual-conference/2018/
- **APTA/Combined Sections Meeting**
  - CSM is the largest physical therapy conference in the country with programming designed by all 18 of APTA's specialty sections. The Academy of Pediatric Physical Therapy hosts various meetings during this event including one by the NICU SIG.
  - www.apta.org/CSM/
- **Caring Essential Collaborative**
  - Caring Essentials informs to transform the neonatal patient experience of care - bringing the latest evidence-based research to your clinical practice in the NICU.
  - https://www.caringessentials.net
- **Creative Therapy Consultants**
  - Online education, hands-on training, advanced level certification, workshops, lectures, and DVDs designed for all staff in the NICU or Special Care Nursery.
  - https://www.creativetherapyconsultants.com/our-company/
- **Dandle Lion Medical**
  - Dandle·LION Medical webinars are recorded and can be viewed live, with an opportunity to ask questions, or as a recording. Both ways offer free CEUs.
  - www.dandlelion-webinars.com
- **Education Resources**
  - Provides NICU education via face to face seminars by a variety of instructors.
  - www.educationresourcesinc.comvis
- **Infant Driven Feeding**
  - Infant-Driven Feeding® (IDF) provides education related to oral feeding practice for neonatal caregivers worldwide.
  - http://www.infantdrivenfeeding.com
- **Infant Health Foundation**
  - The purpose of the Infant Health Foundation is to improve the care of babies and infants by developing and publishing evidence-based protocols, best practices and standards. Over time the Foundation intends to develop into a collecting point for information and education about the care of babies and infants from many sources.
  - https://babosys.wordpress.com

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- **March of Dimes**
  - Provides information on risk factors for a premature birth, common conditions treated in the NICU, terminology and equipment, prematurity, genetic disorders birth defects, and resources for families.
  - http://www.marchofdimes.com
- **National Association of Neonatal Nurses (NANN)**
  - The **Developmental Care *Specialist*** designation (intended for all neonatal healthcare professionals, including, but not limited to, nurses and therapists) offers clinicians with developmental care experience an opportunity to apply and assess their knowledge through the completion of a 100-item test. The test includes both cognitive assessment questions and scenario-based cases.
  - http://apps.nann.org/store/product-details?productId=361
- **National Association of Neonatal Therapists**
  - An organization of neonatal therapists composed of OT's PT's and SLP's. The organization hosts an annual conference. The objective of the conference is to present evidence-based practices in the NICU. Training opportunities are provided through online webinars ans through the purchase of training materials.
  - http://neonataltherapists.com
- **Neonatal Developmental Care**
  - Six Developmental Care Trainings in DVDs or CD format designed for the bedside health-care staff, and includes evidence and research supporting developmental care practices, photo and video demonstrations.
  - www.neonataldevelopmentalcare.com
- **Pediatric Continuing Education Summer Institute**
  - Rocky Mountain University of Health Professions continuing education programs annual interdisciplinary training in NICU Science & Practice. Content includes neonatal examination, neonatal therapy intervention procedures, feeding overview for medically compromised infants, and transition to home. Periodically certification is provided in neonatal and infant outcome measures in addition to specific training opportunities in taping, splinting, and feeding of high-risk infants.
  - https://rmuohp.edu/academics/continuing-education
- **Quantum Caring**
  - A blog about the neonatal intensive care unit, its patients, their families, and the clinicians who serve them.
  - https://quantumcaring.blogspot.com/?view=classic
  - Annual Conferences brings together leading international scientists, researchers, clinicians and educators to translate advances in evidence-based practice in trauma-informed, neuroprotective care of the critically ill newborn, infant, and family across all healthcare settings.
  - https://www.caringessentials.net/the-conference/

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Essential Readings: Critical for the Physical Therapist Providing Care in the NICU

- Sweeney JK, Heriza CB, Blanchard Y. Neonatal physical therapy. Part I: Clinical competencies and neonatal intensive care unit clinical training models. *Pediatr Phys Ther*. 2009;21(4):296-307.
    - http://www.perinat56.org/images/JR2016/Blanchard%202009%20Neonatal_Physical_Therapy__Part_I__Clinical.21.pdf
- Sweeney JK, Heriza CB, Blanchard Y, Dusing SC. Neonatal physical therapy. Part II: Practice frameworks and evidence-based practice guidelines. *Pediatr Phys Ther*. 2010;22(1):2-16.
    - http://mobile.journals.lww.com/pedpt/Fulltext/2010/02210/Neonatal_Physical_Therapy_Part_II__Practice.2.aspx
- McManus BM, Chambliss JH, Rapport MJ. Application of the NICU practice guidelines to treat an infant in a level III NICU. *Pediatr Phys Ther*. 2013;25(2):204–213.
    - http://mobile.journals.lww.com/pedpt/Fulltext/2013/25020/Application_of_the_NICU_Practice_Guidelines_
- Byrne E, Campbell SK. Physical therapy observation and assessment in the neonatal intensive care unit. *Phys Occupat Ther Pediatr*. 2013;33(1):39-74.
    - https://doi.org/10.3109/01942638.2012.754827
- The neonatal intensive care unit. In: Palisano RJ, Orlin M, Schreiber J. *Campbell's physical therapy for children expert consult 5th edition*. Philadelphia, PA. Elsevier Health Sciences; 2016.
    - https://evolve.elsevier.com/cs/product/9780323390187

Theoretical Principles that Guide Physical Therapy Practice in the NICU

Family-Centered Care

- Maree C, Downes F. Trends in Family-Centered Care in Neonatal Intensive Care. *J Perinat Neonat Nurs*. 2016;30(3):265–269.
    - https://www.ncbi.nlm.nih.gov/pubmed/27465463
- Goldstein LA. Family support and education. *Phys Occupat Ther Pediatr*. 2013;33(1):139-61. doi: 10.3109/01942638.2012.754393. Review. PMID: 23311525
    - https://www.ncbi.nlm.nih.gov/pubmed/23311525
- Gooding JS, Cooper LG, Blaine BA, et. al. Family support and family-centered care in the neonatal intensive care unit: origins, advances, impact. Seminars in Perinatology. 2011;35(1)20-28.
    - https://www.ncbi.nlm.nih.gov/pubmed/21255703
- Patient's Bill of Rights:
    - For example see: www.chop.edu/about/our-philosophy-of-care/patients-bill-of-rights.htm
- Hall S, Hynan M, Phillips R, et al. The neonatal intensive parenting unit: an introduction. *J Perinatol.* 2017;37:1259-1264.
    - http://www.nature.com/jp/journal/vaop/ncurrent/full/jp2017108a.html?WT.feed_name=subjects_medical-research&foxtrotcallback=true

- Hall S, Phillips R, Hynan M. Transforming NICU care to provide comprehensive family support. *Newborn & Infant Nursing Reviews*.2016;16:69-73.
    - https://www.sciencedirect.com/science/article/pii/S1527336916000350

Synactive Theory of Development

- Blanchard Y, Øberg GK. Physical therapy with newborns and infants: applying concepts of phenomenology and synactive theory to guide interventions. *Physiother Theor Pr*. 2015; 31:6,377-381. DOI: 10.3109/09593985.2015.1010243
    - http://www.tandfonline.com/doi/full/10.3109/09593985.2015.1010243
- Als H. A synactive model of neonatal behavioral organization: Framework for the assessment of neurobehavioral development in the premature infant and for support of infants and parents in the neonatal intensive care environment. *Phys Occupat Ther Pediatr*. 1986;6:3-53.
    - https://www.tandfonline.com/doi/abs/10.1080/J006v06n03_02?src=recsys

Dynamic Systems Theory and Theory of Neuronal Group Selection

- Hadders-Algra, M. (2000), The Neuronal Group Selection Theory: a framework to explain variation in normal motor development. Developmental Medicine & Child Neurology, 42: 566–572. doi:10.1111/j.1469-8749.2000.tb 00714.x

Neuroplasticity

- Ismail F, Fatemi A, Johnston M. Cerebral Plasticity: Windows of opportunity in the developing brain. *Eur J Paediatr Neuro.* 2017;21(1):23-48.
    - https://doi.org/10.1016/j.ejpn.2016.07.007

International Classification of Functioning, Disability and Health (ICF)

- Evidence-based decision making in pediatric physical therapy. In: Palisano RJ, Orlin M. Schreiber J, *Campbell's physical therapy for children expert consult. 5th ed.* Philadelphia, PA. Elsevier Health Sciences;2016.
    - https://evolve.elsevier.com/cs/product/9780323390187

Trauma Informed Care

- Marcellus L, Cross S. Trauma-informed care in the NICU: Implications for early childhood development. *Neonatal Netw*. 2016;35(6):359-366.
    - http://dx.doi.org/10.1891/0730-0832.35.6.359
- Coughlin M. Trauma-Informed Care in the NICU: Evidenced-Based Practice Guidelines for Neonatal Clinicians. 1st ed. New York, NY: Springer Publishing Company; 2016.
    - http://www.springerpub.com/trauma-informed-care-in-the-nicu.html
- Coughlin M. Transformative Nursing in the NICU: Trauma-Informed Age-Appropriate Care. 1st ed. New York, NY: Springer Publishing Company; 2016.
    - http://www.springerpub.com/transformative-nursing-in-the-nicu.html

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Developmental Care

- Milette I, Marie-Josée Martel MJ, Margarida Ribeiro da Silva M, McNeil MC. Guidelines for the Institutional Implementation of Developmental Neuroprotective Care in the Neonatal Intensive Care Unit. Part A. *Canadian Journal of Nursing Research* .2017;49(2):46-62.
    - https://doi.org/10.1177/0844562117706882
- Milette I, Marie-Josée Martel MJ, Margarida Ribeiro da Silva M, McNeil MC. Guidelines for the Institutional Implementation of Developmental Neuroprotective Care in the Neonatal Intensive Care Unit. Part B. *Canadian Journal of Nursing Research* .2017;49(2):63-74.
    - https://doi.org/10.1177/0844562117708126
- NANN, Kenner C, McGrath JM. *Developmental Care of Newborns and Infants: A Guide for Professionals*. 1st ed. Maryland Heights, MO. Mosby Publishing; 2015.
    - https://www.amazon.com/Developmental-Care-Newborns-Infants-Professionals/dp/0323024432
- On-Line Training Modules: NANN Developmental Care Modules.
    - http://apps.nann.org/store/product-details?productId=390

Typical Development

Central Nervous System and Musculoskeletal System

- The neonatal intensive care unit. In: Palisano RJ, Orlin M, Schreiber J. *Campbell's physical therapy for children expert consult 5th edition*. Philadelphia, PA. Elsevier Health Sciences; 2016.
    - https://evolve.elsevier.com/cs/product/9780323390187
- Musculoskeletal. In: Palisano RJ, Orlin M, Schreiber J. *Campbell's physical therapy for children expert consult 5th edition.* Philadelphia, PA. Elsevier Health Sciences; 2016.
    - https://evolve.elsevier.com/cs/product/9780323390187
- Lissauer T, Avroy A, Fanaroff LM, Fanaroff J. *Neonatology at a Glance. 3rd ed*. Hoboken NJ: Wiley Blackwell; 2015.
    - http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP003344.html

Sensory Development

- Clark-Gambelunghe MB, Clark DA. Sensory Development. *Pediatr Clin N Am*. 2015;62(2):367-384.
    - https://doi.org/10.1016/j.pcl.2014.11.003
- Pineda R, Guth R, Herring A, Reynolds L, Oberle S, Smith J. Enhancing sensory experiences for very preterm infants in the NICU: An integrative review. *J Perinat*. 2017;16:1-10.
    - https://reference.medscape.com/medline/abstract/27763631

Behavioral State Regulation and Behavioral Stress Cues

- http://www.pediatrics.emory.edu/divisions/neonatology/dpc/nicubeh.html
- http://specialstart.ucsf.edu/sstp/download/getting_to_know.pdf
- Foreman SW, Thomas KA, Blackburn ST. Preterm infant state development: Individual and gender differences matter. *J Obstet Gynecol Neonat Nus.* 2008;37(6):657-665.
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2765199/
- Grenier I, Bigsby R, Vergara E, Lester B. Comparison of motor self-regulatory and stress behaviors of preterm infants across body positions. *Am J Occup Ther*. 2003;57(3):289-97.

- https://ajot.aota.org/pdfaccess.ashx?url=/data/journals/ajot/...

Motor and Sensory Motor Skills

- Motor development and control. In: Palisano RJ, Orlin M. Schreiber J, *Campbell's physical therapy for children expert consult. 5th ed.* Philadelphia, PA. Elsevier Health Sciences;2016.
  - https://evolve.elsevier.com/cs/product/9780323390187
- Motor learning. In: Palisano RJ, Orlin M. Schreiber J, *Campbell's physical therapy for children expert consult. 5th ed.* Philadelphia, PA. Elsevier Health Sciences;2016.
  - https://evolve.elsevier.com/cs/product/9780323390187
- Pathways Awareness Foundation. Educational videos with topics included: sensory, motor and communication development of infants; typical and atypical infant development at 2 and 6 months; and videos of infants in therapy sessions.
  - http://www.pathways.org

Social Development and Infant/Parent Interaction

- www.zerotothree.org
- Infant/parent interaction: Hope empowerment model
  - http://www.copeforhope.com/nicu.php
  - http://www.copeforhope.com/pdf/Nationwide-Childrens-Hospital-Study.pdf
- Melnyk BM, Feinstein NF, Alpert-Gillis L, et al Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) Neonatal Intensive Care Unit Program: A randomized controlled trial. *Pediatrics*. 2006;118:e414-e1437.
  - http://pediatrics.aappublications.org/content/118/5/e1414.long?sso=1&sso_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token
- Sweeney S, Rothstein R, Visintainer P, Rothstein R, Singh R. Impact of kangaroo care on parental anxiety level and parenting skills for preterm infants in the neonatal intensive care unit. *J Neonat Nurs.*2016;23(3):151-158.
- Shaw R, St John N, Lilo E, et al. Prevention of traumatic stress in mothers with preterm infants: A randomized controlled trial. *Pediatrics.* 2013;132:886-894.
- Athanasopoulou E, Fox JR. Effects of kangaroo mother care on maternal mood and interaction patterns between parents and their preterm, low birth weight infants: a systematic review. *Infant Ment Health J.*2014;35(3):245-262.2014.

Early Cognitive Development and Learning Opportunities in Infancy

- Oudgenoeg-Paz O, Mulder H, Jongmans MJ, Van Der Ham IJ, Van Der Stigchel, S. The link between motor and cognitive development in children born preterm and/or with low birth weight: A review of current evidence. *Neurosci Biobehav R*. 2017;80:382-393.
  - https://doi.org/10.1016/j.neubiorev.2017.06.009
- www.zerotothree.org

Outcomes of Neonates at Risk/Atypical Development

Infants Born Preterm (Social/Developmental)

- Hornman J de Winter AF, Kerstjens JM, Bos AF, Reijneveld SA. Emotional and behavioral problems of preterm and full-term children at school entry. *Pediatrics*. 2016;137(5):1-9.

  - e20152255.PDF:http://pediatrics.aappublications.org/content/pediatrics/early/2016/04/19/peds.2015-2255.full.pdf
- Joseph RM, O'Shea TM, Allred EN, et al. Prevalence and associated features of autism spectrum disorder in extremely low gestational age newborns at age 10 years. *Autism Res*. 2017;(2):224-232.
  - http://onlinelibrary.wiley.com/doi/10.1002/aur.1644/pdf
- Cheong JL, Doyle LW, Burnett AC. et al. Association between moderate and late preterm birth and neurodevelopment and social-emotional development at age 2 years. *JAMA Pediatr.* 2017;171(4):e164805. doi:10.1001/jamapediatrics.2016.4805
- Pierrat V, Marchand-Martin L, Arnaud C, et al. Neurodevelopmental outcome at 2 years for preterm children born at 22 to 34 weeks' gestation in France in 2011: EPIPAGE-2 cohort study. *Brit Med J.* 2017; 358 :j 3448
  - https://www.bmj.com/content/bmj/358/bmj.j3448.full.pdf
- Einspieler C, Bos AF, Libertus ME, Marschik PB. The General Movement Assessment helps us to identify preterm infants at risk for cognitive dysfunction. *Front Psychol*. 2016;7:406. doi:10.3389/fpsyg.2016.00406.
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4801883/
- Crozier S, Goodson J, Mackay M. et al. Sensory processing patterns in children born very preterm. *Am J Occup Ther*. 2016;70(1):1-7.
- Philpott-Robinson K, Lane SJ, Korostenski L, Lane AE. The impact of the Neonatal Intensive Care Unit on sensory and developmental outcomes in infants born preterm: A scoping review. *Brit J Occup Ther*. 2017;80(8):459-469. 10.1177/0308022617709761
  - http://journals.sagepub.com/doi/pdf/10.1177/0308022617709761

Infants with Neonatal Abstinence Syndrome & infants with exposure to morphine for pain control

- Ko JY, Patrick SW, Tong VT, Patel R, Lind JN, Barfield WD. Incidence of neonatal abstinence syndrome--28 states, 1999-2013. *Morb Mortal Wkly Rep*. 2016;65:799-802.
- Krans EE, Patrick SW. Opioid use disorder in pregnancy: Health policy and practice in the midst of an epidemic. *Obstet Gynecol*. 2016 Jul;128(1):4-10.
- Patrick SW, Schumacher RE, Horbar JD, et al. Improving care for neonatal abstinence syndrome. *Pediatrics.* 2016;137(5): pii: e20153835. doi: 10.1542/peds.2015-3835. Epub 2016 Apr 15.
- Howard, MB, Schiff, DM, Penwill, N, et al. Impact of parental presence at infant's' bedside on neonatal abstinence syndrome. *Hosp Pediatr*. 2017;7(2):63-69.
- Bagwell GA, Thomas A, Ryshen G. Improving skin integrity in babies diagnosed with neonatal abstinence syndrome. *Neonatal Network*. 2016;35(5):1-7.
- Zwicker JG, Miller SP, Grunau RE, et al. Smaller cerebellar growth and poorer neurodevelopmental outcomes in very preterm infants exposed to neonatal morphine. *J Pediatr*. 2016;172:81-87.
  - https://doi.org/10.1016/j.jpeds.2015.12.024

Infants with Genetic Conditions

  - https://www.genome.gov/10001204/specific-genetic-disorders/

Infants with Cardiovascular and Pulmonary Conditions

- Children requiring long term mechanical ventilation. In: Palisano RJ, Orlin M. Schreiber J, Campbell's physical therapy for children expert consult. 5th ed. Philadelphia, PA. Elsevier Health Sciences;2016.
  - https://evolve.elsevier.com/cs/product/9780323390187

- Congenital heart conditions. In: Palisano RJ, Orlin M. Schreiber J, Campbell's physical therapy for children expert consult. 5th ed. Philadelphia, PA. Elsevier Health Sciences;2016.
    - https://evolve.elsevier.com/cs/product/9780323390187
- Cheatham SL, Carey H, Chisolm JL, Heathcock JC, Steward D. Early results of neurodevelopment following hybrid stage I for hypoplastic left heart syndrome. *Pediatr Cardiol*. 2015;36:684-691.
- Mebius MJ, Kooi EM, Bilardo CM, Bos AF. Brain injury and neurodevelopmental outcome in congenital heart disease: A systematic review*. Pediatrics.* 2017;140(1). pii: e20164055. doi: 10.1542/peds.2016-4055.

Infants with Neonatal Brain Injury

- Rogers EE, Hintz SR. Early neurodevelopmental outcomes of extremely preterm infants. *Sem Perinatol* 2016;40:497-509.
- Cole L, Dewey D, Letourneau N, et al. Clinical characteristics, risk factors, and outcomes associated with neonatal hemorrhagic stroke: A population-based case-control study. *JAMA Pediatr.* 2017;171(3):230-238. doi:10.1001/jamapediatrics.2016.4151
- Hielkema T, Hadders-Algra M. et al. (2016). Motor and cognitive outcome after specific early lesions of the brain – A systematic review. *Dev Med Child Neurol*. 2016;58(4):46-52. DOI: 10.1111/dmcn.13047

Infants with Neuromuscular Injury

- Chang KW, Yang LJ, Driver L, Nelson V. High prevalence of early language delay exists among toddlers with neonatal brachial plexus palsy. *Pediatr Neurol*. 2014;51:384-389.
- Congenital muscular torticolllis. In: Palisano RJ, Orlin M, Schreiber J. Campbell's physical therapy for children expert consult 5th edition. Philadelphia, PA. Elsevier Health Sciences; 2016. https://evolve.elsevier.com/cs/product/9780323390187
- The neonatal intensive care unit. In: Palisano RJ, Orlin M, Schreiber J. Campbell's physical therapy for children expert consult 5th edition. Philadelphia, PA. Elsevier Health Sciences; 2016. https://evolve.elsevier.com/cs/product/9780323390187
- Brachial plexus injury. In: Palisano RJ, Orlin M, Schreiber J. Campbell's physical therapy for children expert consult 5th edition. Philadelphia, PA. Elsevier Health Sciences; 2016.
    - https://evolve.elsevier.com/cs/product/9780323390187

Infants Born Late Preterm

- Spittle AJ, Walsh JM, Potters C. Neurobehavior at term-equivalent age and neurodevelopmental outcomes at 2 years in infants born moderate-to-late preterm. *Dev Med Child Neurol*. 2017;59(2):207-215.
    - https://doi.org/10.1111/dmcn.13297
- Hadders-Algra M. Neurobehavior at term in infants born moderately and late preterm is associated with cognition at 2 years. *Dev Med Child Neurol*. 2017;59(2):122-123.
    - https://doi.org/10.1111/dmcn.13301

Infants Born Preterm

- Breeman L, Jaekel J, Baumann N, Bartman P, Wolke D. Neonatal predictors of cognitive ability in adults born very preterm: A prospective study. *Dev Med Child Neurol*. 2017;59(5):477-483.
    - http://dx.doi.org/10.1111/dmcn.13380
- Serenius F, Ewald U, Farooqi A, et al. Neurodevelopmental outcomes among extremely preterm infants 6.5 years after active perinatal care in Sweden. *JAMA Pediatr* 2016;170(10):954-963.
    - https://dx.doi:10.1001/jamapediatrics.2016.1210

- Crozier SP, Goodson JZ, Mackay ML, et al. Sensory processing patterns in children born very preterm. *Am J Occup Ther*. 2016; 70(1):1-7.
- Subedi D, DeBoer MD, Scharf. Developmental trajectories in children with prolonged NICU stays. *Arch Dis Child*. 2017;102(1):29-34.
- Segal I, Peylan T, Sucre L, Levi L, Bassan H. Relationship between central hypotonia and motor development in infants attending a high-risk neonatal neurology clinic. *Pediatr Phys Ther*. 2016;28(3):332-336.

Examination and Evaluation

Examination procedures for neonates: Determining physiologic and behavioral readiness for neonatal physical therapy examination. Monitoring autonomic, behavioral state, and motor stability throughout an examination. Conducting observational examination techniques. Administering minimal contact examination techniques. Determining when standardized assessment is safe to perform and clinically warranted. Providing standardized assessments developed for neonates born preterm or at term gestation.

- Peyton C, Yang E, Msall ME, et al. White matter injury and general movements in high-risk preterm infants. *Am J Neurorad*. 2017;38(1):162-169. DOI: 10.3174/ajnr.A4955
    - http://www.ajnr.org/content/38/1/162
- Einspieler C, Peharz R, Marschik PB. Fidgety movements - tiny in appearance, but huge in impact. *Jornal de Pediatria.* 2016;92(3 suppl 1):64-70. DOI 10.1016/j.jped.2015.12.003
    - http://ac.els-cdn.com/S0021755716000516/1-s2.0-S0021755716000516-main.pdf?_tid=0f28061e-9729-11e7-be49-00000aab0f26&acdnat=1505159006_039a27f61f660223f938fba2f378063c
- Craciunoiu O. Holsti L. A systematic review of the predictive validity of neurobehavioral assessments during the preterm period. *Phys Occupat Ther Pediatr.* 2017;37(3):292-307.
    - https://doi.org/10.1080/01942638.2016.1185501
- Novak I, Morgan C, Adde L, et al. Early, accurate diagnosis and early intervention in cerebral palsy. *JAMA Pediatr.* 2017;171(9):897-907. doi:10.1001/jamapediatrics.2017.1689
- Sweeney JK, Blackburn ST. Neonatal physiological and behavioral stress during neurological assessment. *J Perinat Neonat Nur*. 2013;27(3):242-252.
- Dunsim S, Smyser C, Liao S, Inder T. Defining the nature and implications of head turn preference in the preterm infant. *Early Hum Dev*. 2016;96:53-60.
    - https://doi.org/10.1016/j.earlhumdev.2016.02.002

Neonatal Test and Measures

Hammersmith Infant Neurological Examination (HINE) (Impairment Measure)

Purpose: Prognostic information regarding motor outcome, identify infants who may benefit from therapy. Optimality score for the neurologic examination of the infant at 12 and 18 months of age.

Age Range: 2-24 months

Areas Tested: 26 items assessing cranial nerve function, posture, quality, and quantity of movements, muscle tone, and reflexes and reactions.

Training required: Nationwide Children's Hospital

Score sheet available: http://dx.doi.org/10.1016/j.pediatrneurol.2016.09.010

- Maitre NL, Chomo O, Romeo DM, Guzzetta A. Implementation of the Hammersmith Infant Neurological Examination in a High-Risk Infant Follow-Up Program. *Pediatr Neurol*. 2016;65:31-38.
    - http://www.sciencedirect.com/science/article/pii/S0887899416305653

Neonatal Individualized Developmental Care and Assessment Program (NIDCAP) (Impairment Measure/Activity Measure)
(www.nidcap.org)
Provides training and information on developmentally appropriate care for the preterm and term infants. Information on NIDCAP certification and certification in NONB.

- http://nidcap.org/en/about-us/faq/

Purpose: Used to determine the infant's physiological and behavioral responses to the environment to assist parents and caregivers.
Age Range: Neonates to 4-weeks post-term
Areas Tested: Criterion-referenced assessment of physiological and behavioral responses in the areas of autonomic, motor and attention.
Training required: 1-2 years.

The Newborn Behavioral Observation (NBO) (Participation Measure)
Purpose: not an assessment tool per se but a relationship-building tool designed to help clinicians sensitize parents to their child's competencies, uniqueness, and support the development of positive parent-infant and clinician-parent relationships. It consists of a structured set of 18 neurobehavioral items observed with the parents as partners. Professionals guide the observation, discuss the baby's abilities and behaviors with parents, encourage parent insights and questions, and suggest specific ways to support the child's development. (Appropriate use of the NBO tool in clinical practice requires training through the NBO training program.)
Age Range: Birth to 3 months
Areas Tested: Structured set of 18 observations for infants from birth to approximately 3 months.
Training required: Two days

- http://www.childrenshospital.org/Research/Centers-Departmental-Programs/brazelton-institute

- Nugent JK, Keefer CH, Minear S, Johnson LC, Blanchard Y. Understanding Newborn Behavioral and Early Relationships. The Newborn Behavioral Observations (NBO) System Handbook. 1st ed. Baltimore, MD;2007.
    - https://products.brookespublishing.com/Understanding-Newborn-Behavior-and-Early-Relationships-P211.aspx

NICU Neonatal Network Scale (NNNS) (Impairment Measure)
Purpose: examines the neurobehavioral organization, neurological reflexes, motor development - active and passive tone, and signs of stress and withdrawal of the at-risk and drug-exposed infant. Designed to provide a comprehensive assessment of both neurological integrity and behavioral function.
Age Range: 34 weeks-45 weeks
Areas Tested: The examination includes 3 parts:
1) neurologic items that assess active and passive tone and primitive reflexes as well as items that reflect CNS integrity
2) behavioral items including state and sensory and interactive responses
3) stress/abstinence items particularly appropriate for high-risk infants.

Training required: Training seminars are structured to meet the specific needs of those being trained. Training is intensive, didactic and hands-on. The preferred approach is to arrange two training sessions several weeks apart to allow for a period of time between sessions during which the trainee(s) can practice administering and scoring the exam. However, with adequate preparation, most examiners can complete the training within a single 5-day training session. * Some examiners with extensive infant experience and pre-visit preparation, can achieve certification in less than 5 days.
Cost: cost associated per trainee (+ travel expenses for the trainee or trainer). Cost is associated per trainee for NNNS kit, which includes 1 NNS manual, 2 head supports, 1 flashlight, 1 bell, 1 ball, 1 rattle.

- https://www.brown.edu/research/projects/children-at-risk/about/nnns-training-and-certification-program-0
- https://www.brown.edu/research/projects/children-at-risk/sites/brown.edu.research.projects.children-at-risk/files/uploads/NNNS%20Training%20Program%20FAQ_0.pdf

Test of Infant Motor Performance (TIMP) (Activity Measure)
Purpose: To identify infants with deficits in postural control and to document the effects of developmental therapy to improve postural control needed for functional movement in early infancy.
Age Range: 34-weeks gestational age through 4-months post-term (or full term to 4-months)
Areas Tested: 13 observed behaviors and 25 elicited behaviors assessing the ability to orient and stabilize the head in space and in response to auditory and visual stimulation in supine, prone, side lying, upright, and during transitions from one position to another, distal selective control of the fingers and ankles, antigravity control of arm and leg movement.
Training required: approximately 14 hours of study plus a minimum of 10 hours practice testing infants.
Cost: includes self-instructional DVD, User's Manual and TIMP test forms or e-Learning course with User's Manual, TIMP test forms, and age calculator.
Authors: Campbell SK, Girolami GL, Kolobe TH, Osten E, and Lenke M.
Publisher: Infant Motor Performance Scales, LLC, 1301 W. Madison St. #526, Chicago, IL. 60607-1953

- http://thetimp.com

General Movement Assessment (GMA) (Impairment Measure)
Purpose: A quick, non-invasive, non-intrusive with high reliability and high validity for the early detection of neurological anomalies.
Age Range: Birth to 20 weeks post term.
Areas Tested: Spontaneous general movements elicited by infant.
Training required: Basic course; an introduction Prechtl's Method on the Qualitative Assessment of General Movements in young infants. Advanced course; covers details of the assessment, proper terminology and technique as well as with the application of individual developmental trajectories.

- http://general-movements-trust.info/51/papers
- http://general-movements-trust.info/5/home

- Prechtl's Method on the Qualitative Assessment of General Movements in Preterm, Term and Young Infants. Einspieler C, Prechtl HR, Bos AF, Ferrari F, Cioni G. Cambridge University Press, West Nyack, NY; 2004. ISBN 1 898683 40 9 2004.

Finnegan Neonatal Abstinence Scoring Tool (FNAST) (Impairment Measure)
Purpose: 21 items scored on a 1-5 point scoring system to quantify severity of neonatal exposure of term infants to toxic substances.

Areas Tested: Central nervous system, gastrointestinal, metabolic, vasomotor, and respiratory disturbances.
Cost: Available online
Publisher: Current therapy in neonatal-perinatal medicine. 2ed. Ontario: BC Decker: 1990. Available through Western Australia Centre for Evidence Based Nursing and Midwifery, January 2007.

- http://www.lkpz.nl/docs/lkpz_pdf_1310485469.pdf
- https://www.neoadvances.com/authors.html

Pain Scales of Neonates and Infants

Neonatal Pain, Agitation and Sedation Scale (N-PASS)
Purpose: a clinically useable, consistent, age appropriate assessment and documentation methodology for ongoing infant pain and also sedation in the neonatal intensive care unit (NICU).
Age Range: 23 to 40 weeks gestation
Areas Tested: Crying, behavioral sate, facial expressions, extremity tone and vital signs.
Cost: Available on line.
Author: Hummel P, Pulchalski M. Loyala University Health Systems. Loyola University Chicago, 2001.

- www.anestesiarianimazione.com/DWLDocuments/npass.doc ·
- http://www.anestesiarianimazione.com/2004/06c.asp

CRIES
Purpose: The CRIES scale is used for infants > than or = 38 weeks of gestation. A maximal score of 10 is possible. If the CRIES score is > 4, further pain assessment should be undertaken, and analgesic administration is indicated for a score of 6 or higher.
Age Range: less than or equal to 38 weeks gestation.
Areas Tested: Characteristics of crying, oxygen requirement, changes in vital signs, facial expression, and sleep state are scored.
Cost: Available on line.
Author: Krechel SW, Bildner J.

- Krechel SW, Bildner J. CRIES: a new neonatal postoperative pain measurement score. Initial testing of validity and reliability. *Paediatr Anaesth.*1995;5(1):53-61.

Neonatal Infant Pain Scales (NIPS)
Purpose: To measure pain in preterm and full term infants
Age Range: Birth to 1-year
Areas Tested: Scored on 6 parameters: facial expression, cry, breathing patterns, arms, legs, and state of arousal.
Cost: Available online.
Author: J. Lawrence, D. Alcock, P. McGrath, J. Kay, S.B. MacMurray, C. Dulberg Publisher: Neonatal Network.
Lawrence J, Alcock D, McGrath P, Kay J, MacMurray SB, Dulberg C. The development of a tool to assess neonatal pain. *Neonatal Netw*. 1993;12(6):59–66.

- https://www.ncbi.nlm.nih.gov/pubmed/8413140

The Premature Infant Pain Profile (PIPP)

Purpose: A behavioral measure of pain for premature infants.
Age Range: < 28 weeks to >= 36 weeks gestation
Areas Tested: Behavioral observation as an indication of pain.
Cost: Available on line
Author: Stevens B, Johnson C, Petryshen P, Taddio A. Premature infant pain profile: development and initial validation. *Clin J Pain*. 1996;12:13-22.

- https://reference.medscape.com/medline/abstract/8722730

Face, Legs, Activity, Cry, and Consolibility Behavioral Pain Scale (FLACC)
Purpose: To quantify pain behaviors in children who are not able to verbalize pain
Age Range: Birth to 18-years
Areas Tested: Observation of facial expression, leg movement, activity, cry and consolability.
Cost: Available online.
Authors: Merkel SL, Voepel-Lewis T, Shayevitz JR, Malviya S. *Pediatr Nurs*. 1997;23(3):293-7.

- http://wps.prenhall.com/wps/media/objects/3103/3178396/tools/flacc.pdf

Prevention and Management of Procedural Pain in the Neonate: An Update
Committee on Fetus and Newborn and Section on Anesthesiology and Pain Medicine. *Pediatrics* Jan 2016, peds.2015-4271; DOI: 10.1542/peds.2015-4271

- http://pediatrics.aappublications.org/content/early/2016/01/22/peds.2015-4271

Safe and Effective Interventions

Please refer to essential reading before going further

Global

- Ross K, Heiny E, Conner S, Spener P, Pineda R. Occupational therapy, physical therapy and speech-language pathology in the neonatal intensive care unit: Patterns of therapy usage in a level IV NICU. *Res Dev Disabil.* 2017 May;64:108-117. doi: 10.1016/j.ridd.2017.03.009.
  - https://www.ncbi.nlm.nih.gov/pubmed/28384484
- Age-appropriate care of the premature and critically ill hospitalized infant. Guideline for practice.
  - http://nann.org/uploads/Education/Age-Appropriate_Care-FINAL.pdf
- Hughes AJ, Redsell SA, Glazebrook C. Motor Development Interventions for Preterm Infants: A Systematic Review and Meta-analysis. Pediatrics. 2016;138(4):e20160147
- Spittle A, Treyvaud K. The role of early developmental intervention to influence neurobehavioral outcomes of children born preterm. *Sem Perinat*.2016;40(8):542-548.
- Dusing S, Brown L, Thacker L, Tripathi T, Henricks-Munoz K. Supporting mother-infant interaction in the NICU may enhance oral motor skills, weight gain, and feeding volume: A pilot study. Dev *Med Child Neurol*. 2016;58:13-14.
- Dusing S, Brown L, Thacker L, Tripathi T, Henricks-Munoz K. Initial efficacy of SPEEDI: A developmental intervention provided for 15 weeks in the NICU and community improves motor abilities in infants born very preterm or with brain injury. *Dev Med Child Neurol*. 2016;58(S5):14-15.

Positioning to Support Alignment and Movement

- King C, Norton D. Does therapeutic positioning of preterm infants impact upon optimal health outcomes? *J Neonat Nurs.* 2017;23(5):218-222. https://doi.org/10.1016/j.jnn.2017.03.004

- Madlinger-Lewis L, Reynolds L, Zarem C, Crapnell T, Inder T, Pineda R. The effects of alternative positioning on preterm infants in the neonatal intensive care unit: A randomized clinical trial. *Res Dev Disabil*. 2014;35(2):490-497. doi:10.1016/j.ridd.2013.11.019.
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3938096/
- McCarty D, Peat JR, Malcolm WF, Smith PB, Fisher K, Goldstein RF. Dolichocephaly in preterm infants: Prevalence, risk factors, and early motor outcomes. *Am J Perinat*. 2017372-378. doi: 10.1097/ANC.0b013e318256b7c1.
    - https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0036-1592128
- Malusky S, Donze A. Neutral head positioning in premature infants for intraventricular hemorrhage prevention: An evidence-based review. *Neonatal Netw*. 2011 Nov-Dec;30(6):381-96.
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- Sweeney J, Gutierrez T. Musculoskeletal implications of preterm infant positioning in the NICU. *J Perinat Neonat Nurs.* 2002; Jun;16(1):58-70.
- AAP TASK FORCE ON SUDDEN INFANT DEATH SYNDROME. SIDS and Other Sleep-Related Infant Deaths: Updated 2016 Recommendations for a Safe Infant Sleeping Environment. *Pediatrics*. 2016;138(5):e20162938; DOI: 10.1542/peds.2016-2938
- Elser HE. Positioning after feedings: what is the evidence to reduce feeding intolerances? *Adv Neonatal Care.* 2012 Jun;12(3):172-5. doi: 10.1097/ANC.0b013e318256b7c1.

Handling

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    - https://doi.org/10.3109/09593985.2015.1010243
- Ludington-Hoe S. Evidence based review of physiological effects of kangaroo care. *Women's Health Reviews*. 2011;7(3):243-253.
- Charpak N, Ruiz JG, Zupan J, Cattaneo A, Figueroa Z, Tessier R, et al. Kangaroo mother care: 25 Years after. *Acta Paediatr*. 2005;94:514-522 (DOI: 10.1080/08035250510027381)
- Hilderman CG, Harris SR. Early intervention post-hospital discharge for infants born preterm. *Phys Ther.* 2014;94:1211-1219.
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- Valizadeh L, Sanaeefar M, Hosseini MB, Jafarabadi MA, Shamili A. Effect of early physical activity programs on motor performance and neuromuscular development in infants born preterm: A randomized clinical trial. *J Caring Sci.* 2017;6:69-81.
- Fucile S, Gisel EG. Sensorimotor interventions improve growth and motor function in preterm infants. *Neonatal Netw*. 2010;29(6):359-366.
- Ustad T, Evensen KA, Campbell SK, Girolami GL, Helbostad J, Jorgensen L, et al. Early parent-administered physical therapy for preterm infants: A randomized controlled trial. *Pediatrics.* 2016;138(2). DOI:10.1542/peds.2016-0271.
- Stalnaker KA, Poskey GA. Osteopenia of prematurity: Does physical activity improve bone mineralization in preterm infants? *Neonatal Netw*. 2016;35(2):95-104.

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Massage

- Diego MA, Field T, Hernandez-Reif M. Preterm Infant Weight Gain is Increased by Massage Therapy and Exercise Via Different Underlying Mechanisms. *Early Hum Dev*. 2014;90(3):137-140. doi:10.1016/j.earlhumdev.2014.01.009.
- Niemi A-K. Review of Randomized Controlled Trials of Massage in Preterm Infants. McClafferty H, ed. *Children*. 2017;4(4):21. doi:10.3390/children4040021.
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5406680/

Environmental Modifications

- Filippa M, Panza C, Ferrari F, et al. Systematic review of maternal voice interventions demonstrates increased stability in preterm infants. *Acta Paediatr*. 2017;106:1220–1229.
- Pineda RG, Stransky KE, Rogers C, et al. The single patient room in the NICU: Maternal and family effects. *J Perinatol.*2012;32(7):545-551. doi:10.1038/jp.2011.144.
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3790962/
- Lester BM, Hawes K, Abar B, et al. Single-family room care and neurobehavioral and medical outcomes in preterm infants. *Pediatrics.* 2014;134(4)754-760.
    - http://pediatrics.aappublications.org/content/134/4/754.long
- Pineda R, Durant P, Mathur A, Inder T, Wallendorf M, Schlaggar BL. Auditory exposure in the neonatal intensive care unit: Room type and other predictors. *J Pediatr.* 2017;183:56-66.
    - http://www.sciencedirect.com/science/article/pii/S0022347616315670?showall%3Dtrue%26via%3Dihub
- Browne JV, White R, Talmi A. Special issues on NICU design and infant mental health in the intensive care unit and beyond. *Newborn and Infant Nursing Reviews*. 2016;16(4):A1-A8, 173-348
    - https://www.sciencedirect.com/journal/newborn-and-infant-nursing-reviews/vol/16/issue/4?sdc=1
- Vohr B, McGowan E, McKinley L, Tucker R, et al. Differential effects of the single-family room neonatal intensive care unit on 18- to 24-month Bayley scores of preterm infants**.** *J Pediatr.* 2017;185(24):42-48.
    - https://www.jpeds.com/article/S0022-3476(17)30166-X/pdf

Developmental Care

- NANN Developmental Care Modules
  Access to 27 modules, with 38.0 CNE contact hours. Included in this set is a PDF overview for each module as well as a post-test and evaluation the learner will complete to receive the designated contact hours. The modules are an aid and do not include an in-depth description of the subject matter. Instead, they are study guides that augment and build on what learners are reading and studying or upon their professional experiences in developmental care as a means to promote understanding and retention.
    - http://apps.nann.org/store/product-details?productId=390

Splinting

- Tanta KJ, Gunsolus K, Harley N, Grosvenor K, Garcia J, Jirikowic T. Protocol Development for Infants with Orthopedic Complications in the Neonatal Intensive Care Unit: Brachial Plexus Injuries and Clubfoot. *Journal of Occupational Therapy, Schools, & Early Intervention*. 2012; Vol. 5:275-292.

Raquel Keithley, Kara Boynewicz, Sue Campbell Delapp, Isabel Pineda

- https://doi.org/10.1080/19411243.2012.750544

Wound Care

- Blume-Peytavi U, Hauser M, Stamatas GN, et al. Skin care practices for newborns and infants: Review of the clinical evidence for best practices. *Pediatr Dermatol*. 2012;28(3):241-54.
- Lund CH, Osborne JW, Kuller J, et al. Neonatal skin care: clinical outcomes of the AWHONN/NANN evidence-based clinical practice guideline.
  Association of Women's Health, Obstetric and Neonatal Nurses and the National Association of Neonatal Nurses. *J Obstet Gynecol Neonatal Nurs*. 2001;30:41-51.
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  - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3985526/pdf/wound.2013.0477.p
- Fox, MD. Wound care in the neonatal intensive care unit. *Neonatal Netw.* 2011;30(5):291-303.
  - http://www.academyofneonatalnursing.org/private/JournalFiles/SepOct11CEArticles.pdf

Determining the Need for and Completing Oral Motor for Feeding Readiness Assessments and Providing Oral Motor Intervention in Preparation for Oral Feeding

- Arvedson J, Clark H, Lazarus C, Schooling T, Frymark T. Evidence-based systematic review: Effects of oral motor interventions on feeding and swallowing in preterm infants. *Am J Speech Lang Pathol*. 2010;19(4)321-340.
- Crowe L, Chang A, Wallace K. Instruments for assessing readiness to commence suck feeds in preterm infants: effects on time to establish full oral feeding and duration of hospitalisation. *Cochrane DB Syst Rev.* 2012, Issue 4:1-15.
- Fucile S, Gisel EG, McFarland DH and Lau C. Oral and non-oral sensorimotor interventions enhance oral feeding performance in preterm infants. *Dev Med Child Neurol*. 2011;53: 829-835.
- Fucile S, McFarland DH, Gisel EG**,** Lau C. Oral and non oral sensorimotor interventions facilitate suck-swallow-respiration functions and their coordination in preterm infants. *Early Hum Dev.* 2012;88(6):345-350.
- Garber, J. Oral–Motor Function and Feeding Intervention. *Phys Occupat Ther Pediatr*. 2013;33(1):111-138.
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- Lau C, Smith EO. A novel approach to assess oral feeding skills of preterm infants. *Neonatol* 2011;100:64-70.
- Philibin MK, Ross ES. The SOFFI Reference Guides: Text, algorithms, and appendices: A manualized method for quality bottle feedings. *J Perinat Neonatal Nurs*. 2011; 25(4):360-380.
- Ross ES, Philibin MK. SOFFI: AN evidence-based method for quality bottle-feeding of preterm, ill, and fragile infants. *J Perinat Neonatal Nurs*. 2011;25(4):349-359.
- Shaker CS. Infant-guided, co-regulated feeding in the neonatal intensive care unit. Part I: Theoretical underpinnings for neuroprotection and safety.2017. *Semin Speech Lang*. 2017;38(02):096-105. Thieme Medical Publishers.
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- Shaker CS. Cue-based feeding in the NICU: Using the infant's communication as a guide. *Neonatal Netw*.2013;32(6):404-408.
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- Shaker CS. Improving feeding outcomes in the NICU: Moving from volume-driven to infant-driven feeding.
    - https://shaker4swallowingandfeeding.files.wordpress.com/2013/02/shaker-infant-driven-feeding1.pdf
    - http://journals.asha.org/perspectivfes/terms.dtl
- Thoyre SM, Shaker CS, and Pridham KF. The early feeding skills assessment for preterm infants. *Neonatal Netw*. 2005;24(3):7–16.

Feeding Books

- Glass R, Wolf L. *Feeding and Swallowing Disorders in Infancy: Assessment and Management*. Publisher: Therapy Skill Builders a Division of Psychological Corporation, 555 Academic Court, San Antonio, Texas 78204-2498.
  Purpose: This text provides a comprehensive description of infant feeding, evaluation and intervention from a medical perspective. This book provides detailed descriptions of individual infant case presentations and treatment strategies to address feeding impairments. Evidenced based references are provided at the end of each chapter. Topics include: specific diagnostic categories, comprehensive approach to feeding evaluations, diagnostic tests and procedures, treatment strategies for feeding dysfunction. anatomy, embryology, physiology, pediatric and neurodevelopmental evaluation, nutrition, feeding assessment, tone and positioning.

Feeding /Assessments

Neonatal Oral-Motor Assessment Scale (NOMAS)

- Author: Braun MA and Palmer MM.
  Purpose: To screen for oral motor dysfunction in the neonate, distinguish infants with normal sucking from those with disorganization, identify infants with poor feeding abilities, and distinguish inefficient from efficient feeders.
  Age Range: Neonate to 3-months of age
  Areas Tested: 26-items divided into 2 categories: jaw movements and tongue movements: rate, rhythmicity, consistency of degree of jaw excursion, direction, range of motion, timing of tongue movement, tongue configuration
  Three day comprehensive training for certification. Contact NOMAS
  International, 1528 Merrill Road, San Juan Bautista, Ca. 95045 for course dates.
    - http://www.nomasinternational.org/index.php

NOMAS on line training:

The 11 talks in this online course focus on feeding difficulties in term and preterm infants, evaluation and treatment of sensory and motor-based feeding problems after discharge from NICU or special care nursery, videofluoroscopic studies of infants and children showing examples,

procedure and diagnosis, and weaning from tube to oral feeding using a sensory-based protocol. Each talk runs about one hour. Certification not available. Introductory, intermediate and advanced material.
($850 if taken individually)

- Series 2: The 12 talks in this online course focus on the etiology, diagnosis, and treatment of feeding difficulties in the term and preterm infant. Evaluation and treatment strategies for the "difficult to feed" infant both in the NICU or special care nursery are discussed as well as those feeding issues that persist after discharge.
- Series 3: The full course is made up of all 12 talks. Each talk runs about 1 hour. Introductory, intermediate and advanced material
    - http://www.nomasinternational.org/about_training.php

Early Feeding Skills Assessment (EFS)

Author: Shaker CS, Thoyre S, Pridham K.
Publisher: *Neonatal Netw*. 2005;24(3):7-16.
Purpose: a checklist for assessing infant readiness for and tolerance of feeding and for profiling the infant's developmental stage regarding specific feeding skills: the abilities to remain engaged in feeding, organize oral-motor functioning, coordinate swallowing with breathing, and maintain physiologic stability.
Age Range: Infants
2 day training workshop on how to use the tool. Contact Catherine Shaker: pediatricseminars@gmail.com;

- http://shaker4swallowingandfeeding.com

Products Developed for the NICU

- http://www.usa.philips.com/healthcare/solutions/mother-and-child-care/infant-positioning
    - Positioning Products including gel positioning aids, snuggle up, Frederick T Frog, Prone plus, Bendy bumper
- www.dandlelionmedical.com
    - Positioning products including DandleRoo, DandleRoo Lite, Dandle Wrap, Dandle Pal
- www.resqwedge.com
    - Wedge positioner and sling for reflux.
- www.sundancesolutions.com/neonatal/
    - Positioning products including fluidized products
- http://www.nurturedbydesign.com/en/thezaky/
    - Positioning tool that can use mother's scent and be used for boundaries and containment
- http://tortlemedical.com
    - The positioning system includes the tortle air and tortle midliner for head positioning.
- http://www.halosleep.com/in-hospital-sleepsack-program/
    - supplier of sleep sacks and hospital sleep sack program
- https://www.catapult-products.com/
    - Swaddle bathing product TurtleTub

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Communication and Collaboration

Developing and Implementing Parent/ Caregiver Education Programs for Adult Learners with Diverse Backgrounds/ Providing Family Education in a Culturally Sensitive Manner

- Dusing SC, Murray T, Stern M. Parent preferences for motor development education in the neonatal intensive care unit. *Pediatr Phys Ther*. 2008;20:363-368.
- Goldstein LA, Campbell SK. Effectiveness of the Test of Infant Motor Performance as an educational tool for mothers. *Pediatr Phys Ther*. 2008;20:152-159.
- Aydon, L., Hauck, Y., Murdoch, J., Siu, D. and Sharp, M. Transition from hospital to home: Parents perception of their preparation and readiness for discharge with their preterm infant. *J Clin Nurs*. 2017;27(1-2):269-277.
- Boykova M. Transition from hospital to home in preterm infants and their families. *J Perinat Neonat Nur.* 2016;30(3):270-272.
- Martin AE, D'Agostino JA, Passarella M, et al. Racial differences in parental satisfaction with neonatal intensive care unit nursing care. *J Perinatol*. 2016;36(11):1001-1007.
- Skeens K, Logsdon MC, Stikes R. et al. Health literacy and preferences for sources of child health information of mothers with infants in the neonatal intensive care unit. *Adv Neonat Care*. 2016;16(4):308-314.
- Adama EA, Bayes S, Sundin D, et al. Parents' experiences of caring for preterm infants after discharge from neonatal intensive care unit: A meta-synthesis of the literature. *J Neonat Nur.* 2016; 22(1), 27-51.
- National Association of Neonatal Nursing (NANN) offers several resources for neonatal families. As part of the Advances in Neonatal Care: Family Teaching Toolbox.
    - http://nann.org/education/educational-products/family-patient-education-products
- Transitioning Newborns from NICU to HOME: A Resource Toolkit, Agency for Healthcare Research and Quality
    - https://www.ahrq.gov/professionals/systems/hospital/nicu_toolkit/index.html

Consulting with Other Professionals. Collaborating as Part of an Interdisciplinary Developmental Team/Communicating with Physicians, Occupational Therapists, Speech Language Pathologists, Respiratory Therapists, Child Life, Social Workers, and Other Professionals

- Barbosa V. Teamwork in the Neonatal Intensive Care Unit. *Phys Occupat Ther in Pediatr*. 2013;33(1):5–26.
    - https://www.tandfonline.com/doi/full/10.3109/01942638.2012.729556
- Rapport MJ, Sweeney JK, Dannemiller L, Heriza CB. Student experiences in the neonatal intensive care unit: addendum to neonatal physical therapy competencies and clinical training models. *Pediatr Phys Ther*. 2010;22(4):439-440.

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Planning for Discharge, Including Community Resources, Car Seats, and Other Equipment or Therapy Needs

- Bull MJ, Engle WA. Safe transportation of preterm and low birth weight infants at hospital discharge. *Pediatrics*. 2009;123(5):1424-1429. DOI: 10.1542/peds.2009-0559
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- Spittle A, Orton J, Anderson PJ, et al. Early developmental intervention programmes provided post hospital discharge to prevent motor and cognitive impairment in preterm infants. *Cochrane Db Syst Rev.* 2015; Nov 24;(11):1-107. Art. No.: CD005495. DOI: 10.1002/14651858.CD005495.pub4.
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Regional Referrals for Early Intervention Services IDEA legislation

- Early intervention services to eligible children and families are federally mandated through the Individuals with Disabilities Education Act. The Part C program mandates a statewide, comprehensive, multidisciplinary service system to address the needs of infants and toddlers who are experiencing developmental delays or a diagnosed physical or mental condition with a high probability of an associated developmental disability in one or more of the following areas: cognitive development, physical development, language and speech development, psychosocial development, and self-help skills. Commonly cited factors that may put an infant or toddler at risk of developmental delay include prenatal exposure to toxins through maternal substance abuse, respiratory distress as a newborn, low birth weight, brain hemorrhage, and infection.
- National Dissemination Center for Children with Disabilities State Resources at
    - http://www.nichy.org/state-organizations-search-by-state
      Pick a state and this site will take you to your local EI provider

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