SPECIALIZED KNOWLEDGE AND SKILLS FOR OCCUPATIONAL THERAPY PRACTICE IN THE NEONATAL INTENSIVE CARE UNIT

Purpose

The purpose of this paper is to provide a reference for occupational therapists on the advanced knowledge and skills necessary to practice in a neonatal intensive care unit (NICU). Occupational therapy practice with infants in the NICU and their families is high risk and specialized, only appropriate for occupational therapists with advanced knowledge and skills in neonatal care.

Introduction

Occupational therapy philosophy and education provide the foundation for this profession to make a valuable contribution to neonatal practice (American Occupational Therapy Association [AOTA], 2004b). Specialized knowledge of neonatal medical conditions and developmental variability and abnormality in infants cared for in the NICU is essential to safe, effective practice. The therapist must recognize the complex medical needs and vulnerabilities of acutely ill or premature infants. These infants frequently are physiologically fragile and easily compromised by environmental conditions. Interactions and therapeutic interventions that may appear innocuous can trigger physiologic instability in an infant and can be life threatening. In fact, protecting the fragile neonate from excessive or inappropriate sensory aspects of the environment is often a more urgent priority than direct interventions or interactions with the infant. Occupational therapy approaches, such as sensory integration and neurodevelopmental intervention, are applicable within the NICU setting. However, these approaches may need to be modified according to the infant's medical status, physiological homeostasis, and developmental and family needs.

The special needs of families whose infants are in the NICU also must be recognized. The infant's medical status and uncertain outcome, the highly technical environment of the NICU, separation from parents, and potential maternal complications after labor and delivery may contribute to family stress or crisis. These situations often alter the parent–infant attachment process, which is essential to optimal infant developmental outcomes. Families are best served by an occupational therapist who is not only knowledgeable about infant needs, but also sensitive to family circumstances, priorities, concerns, and cultural beliefs. The occupational therapist must seek ways to establish supportive, collaborative, and therapeutic relationships with family members in order to foster the infant's optimal development.

The social and physical aspects of the environment can be stressful to both the infant and the family. All persons who interact with the infant constitute the social environment. The physical environment is composed of inanimate elements and properties (e.g., lighting, sound, bedding, equipment). The occupational therapist must understand the interplay of the social and physical features of the NICU and the way in which this interplay influences the infant, family, and staff members. This knowledge is used as a basis for the occupational therapy evaluation and contributes to effective intervention strategies.

Working within the social and physical bounds of the NICU environment, an important role of the occupational therapist is to assist each family to foster optimal infant development, including

the encouragement of developmentally appropriate occupations, sensorimotor processes, and neurobehavioral organization. This must occur while considering the often fragile medical and physiological status of the infant. Through direct observation, intervention, consultation, education, and research, the occupational therapist collaborates with others to provide the infant with the most effective and appropriate social and physical environment.

The occupational therapist working in the NICU must have a basic knowledge of occupational therapy, pediatric experience, and specialized knowledge and skills related to the complex needs of high-risk infants, their families, and the NICU environment. Basic occupational therapy education includes knowledge of biological sciences, disease processes, mental health, and typical and atypical child and adult family development. Occupational therapy's domain of concern, encompassing the interaction among the biological, developmental, and social-emotional aspects of human function as expressed in daily activities and occupations, makes it particularly suited to address the needs of the developing infant and family (AOTA, 2002). The occupational therapy method of activity analysis and adaptation to achieve a functional outcome is valuable in promoting "goodness of fit" (i.e., the match between the infant's capabilities and the physical and social environment), as there is often a mismatch between the NICU environment, parental expectations, and the infant's capabilities.

Experience in pediatric occupational therapy is essential for practice in the NICU. This experience provides a perspective on the continuum of typical and atypical child development and on the significance of the family in the child's life. Experience in pediatric occupational therapy affords the practitioner opportunities for development of the critical thinking skills necessary for evaluation and intervention to promote competent occupational performance and emotional well-being of children and their families. Therefore, the therapist interested in practicing in the NICU should have experience in the following areas: pediatric occupational therapy with infants and young children, longitudinal follow-up of infants treated in the NICU, and collaboration with families.

In addition to basic occupational therapy education and pediatric experience, the occupational therapist working in the NICU requires advanced knowledge and skills to provide complex interventions to critically ill neonates and their families. These interventions require continuous evaluation and a dynamic approach to intervention planning. They also require knowledge of grief reactions, social structures, attachment, medical procedures and other issues relating to the health and well-being of the family unit. Intervention in the NICU context is not a recommended area of practice for occupational therapy assistants because such knowledge and skills are beyond the scope of their practice. Since practice in the NICU requires advanced level expertise and clinical reasoning, this area of practice also is not recommended for entry-level occupational therapists or occupational therapists who do not have the pediatric experience described above. Extensive continuing education; mentoring by an occupational therapist experienced in neonatal care; and graded, closely supervised, mentored practice are recommended to any occupational therapist entering neonatal practice. Supervision often is required until the therapist demonstrates competency working with infants and their families in the NICU environment (AOTA, 2004a).

The specialized knowledge required for practice in the NICU includes familiarity with relevant medical conditions, procedures, and equipment; an understanding of the individualized developmental abilities and vulnerabilities of infants; an understanding of theories of neonatal neurobehavioral organization; working knowledge of family systems, early social–emotional

development, infant mental health, and NICU ecology; and an understanding of multidisciplinary team collaboration. Most importantly, the NICU therapist must have a clear understanding of the manner in which these factors interact to influence behavior. The occupational therapist develops the necessary skills through continuing education and supervised mentored clinical experience in evaluation and intervention specific to the NICU. Neonatal practice requires advanced clinical reasoning skills. These skills include flexibility to recognize and respond to unfamiliar situations and nuances of behavior, the ability to anticipate future directions of intervention, and the ability to perceive the clinical condition as a whole. The occupational therapist in the NICU applies these competencies with regard to the infant, the infant's family and caregivers, and the NICU environment, including staff. Specifically, the occupational therapist in the NICU designs an individualized intervention plan in collaboration with the family and others that incorporates the family's priorities and NICU contexts along with the individualized needs of the infant. This requires understanding the occupations and activities valued by families and the NICU culture; defining what factors limit each infant's participation or engagement in those occupations and activities; identifying factors that would constitute readiness for engagement in occupations and activities; and finally, delineating what physical and/or social environmental supports will maximize participation for both the infant and the family in the short term and in the long term.

Maintenance of clinical competency and an evidence-based approach to practice are both vitally important in the rapidly changing field of neonatology. Clinical competence can be sustained through regular supervision or a mentoring relationship, participation in peer study groups, reflective process, and formal and informal continuing education. An evidence-based approach to practice necessitates ongoing critical review of the relevant research, literature, and clinical tools available in this rapidly changing field of practice. An occupational therapy practitioner is knowledgeable about evidence-based research and applies it ethically and appropriately to the occupational therapy process (AOTA, 2005).

Knowledge and Skills: The Infant, Family, and NICU Environment

The following information identifies the knowledge and skills needed to function as an occupational therapist in the NICU. This information is organized under the three main areas of occupational therapy concern described previously: the infant, the family, and the NICU environment.

The Infant

To be competent, the occupational therapist has to have an in-depth understanding of approaches to evaluation and intervention, including use of a developmentally supportive consultative model of service delivery. These approaches are presented in the literature specific to occupational therapy, neonatology, psychology, and infant and family studies. In addition, the therapist has to have a thorough understanding of medical factors and the potential risks they pose to normal fetal and infant growth and development. The therapist must understand and critically analyze this information within the context of occupational therapy practice and the specific philosophy of the NICU in which the occupational therapist works. The therapist develops an evaluation plan that includes use of appropriate standardized tools, parent or caregiver interviews, and observations of infant adaptation to the social and physical environments. The occupational therapist, in conjunction with the family and medical caregivers, then develops appropriate intervention strategies, individually suited to each infant and family.

For clarity in this paper, infant behavior is discussed separately from family and environmental concerns. However, in program implementation, the infant is assessed and treated within the context of the family and the NICU environment.

The following is a comprehensive outline of the essential knowledge base that an occupational therapist must possess for working with NICU infants.

I. Medical knowledge base as the foundation for understanding infant behavior
   A. General information
      1. Medical terminology and abbreviations used in the NICU
      2. Basic principles, uses, and potential complications of the medical equipment and procedures, including precautions and implications for the therapist and infant
      3. Medical complications frequently encountered, including pathophysiology, risks, precautions, and prognoses associated with specific conditions
   B. Specific knowledge
      1. NICU equipment
      2. Diagnostic procedures
      3. Medical procedures
      4. Nursing procedures and routines
      5. Respiratory support
      6. Thermoregulatory support
      7. Nutritional support
      8. Medication effects
      9. Infection control
      10. Institution-specific policies and procedures

II. Factors that may influence infant and child development
   A. Prenatal
      1. Maternal and fetal complications during pregnancy
      2. Genetic disorders, congenital anomalies, syndromes, isolated defects
      3. Teratogens (e.g., licit and illicit drug exposure, radiation, environmental contaminates)
      4. Infectious diseases (e.g., rubella, cytomegalovirus, herpes, toxoplasmosis, HIV)
      5. Social risk factors (e.g., poverty, inadequate support, stress, environmental toxins)
   B. Perinatal
      1. Maternal complications during delivery
      2. Neonatal complications during delivery
      3. Gestational age and birth weight
   C. Postnatal conditions and complications
      1. Respiratory
      2. Cardiovascular
      3. Neurologic
      4. Sensory
      5. Orthopedic
      6. Gastrointestinal
      7. Metabolic
      8. Hemolytic
      9. Dermatologic

10. Infectious disease
11. Iatrogenic complications

III. Knowledge of the developmental course, abilities, and vulnerabilities of infants in the NICU
   A. Differences in body structure and body functions, developmental progression, variations, deviations, and abnormalities in infants in relation to preterm, term, or postterm birth and/or prenatal, perinatal, or postnatal factors
      1. Infant neurobehavioral organization
         a. physiologic (e.g., cardiorespiratory)
         b. states of arousal
         c. regulatory abilities
            sleep and waking states
            circadian rhythms
            typical and atypical patterns
            self-regulation
            external regulation
            medication effects/side effects
         d. neurosocial (e.g., attention, interaction)
      2. Sensory development and processing of sensory information
         a. sequential developmental progression in utero and adaptations to the extra-uterine environment
         b. thresholds for stimulation within the sensory systems: tactile, vestibular, proprioceptive, visual, auditory, olfactory, gustatory
         c. responses: arousal, attention, modulation, transition, range, decompensation
         d. sensory acuity
      3. Motor function
         a. neuromotor development, including, but not limited to, muscle tone, posture, quality of movement, reflexes and reactions, and motor control
         b. biomechanical factors, including, but not limited to, active and passive range of motion, strength, and orthopedic status
      4. Social–emotional development
         a. early communicative cues
         b. self-regulation of interaction
         c. initial formation of attachment relationships
         d. temperament
   B. Emerging competencies in infant occupation
      1. General factors that influence participation in daily life activities
         a. postconceptional age and weight
         b. physical and developmental maturation
         c. physiological status and medical conditions
         d. neurobehavioral organization
         e. sensory processing
         f. biomechanical and neuromotor function
         g. social interaction
         h. physical environment
         i. social environment
      2. Specific activities
         a. ability to cope with and participate in caregiving

(1) feeding process
(a) modes (e.g., breast, bottle, tube)
(b) function (e.g., ability to meet nutritional needs, physiologic cost, endurance)
(c) oral-motor mechanism (e.g., structure, function, quality)
(d) maturation of mechanical and neural control of sucking, swallowing, and breathing
(e) relationship among nutritive and non-nutritive sucking, respiration, and oxygenation
(f) positioning and handling
(g) feeding readiness cues
(h) physiologic issues, such as metabolic and neurologic
(i) competency of the infant as a partner
(j) relationship with primary caregivers
(k) tolerance of oral-facial and intraoral sensations
(2) bathing
(3) dressing and diapering
(4) medical routines and procedures
b. engaging in nurturing interactions
(1) skin-to-skin holding (kangaroo care)
(2) physical and social dialogue
(3) feeding
c. interrelationship between medical and developmental domains
(1) present conditions
(2) future implications

IV. Knowledge of evolving developmental approaches in the NICU
A. Historical and current perspectives
1. Supplemental stimulation
2. Reduced stimulation
3. Environmental neonatology
4. Individualized developmental care
5. Family-centered care
6. Relationship-based approach
B. Modification and integration of current pediatric occupational therapy frames of reference (e.g., sensory integration, neurodevelopmental therapy, coping, dynamic systems)

V. Specific skills related to occupational therapy with infants in the NICU, including the ability to
A. Instruct, consult, and communicate with caregivers
B. Use NICU equipment appropriately and safely, including understanding of the purpose, basic operation, settings, and precautions of all relevant equipment
C. Conduct appropriate assessments
1. Determine appropriate timing of infant assessments on the basis of the infant's medical and physiological status, postconceptional age, and NICU and family routines

2. Select and administer formal and informal assessment procedures that are appropriate for postconceptional age and medical condition and that identify developmental abilities, vulnerabilities, and limitations in daily life activities and occupations as they are influenced by medical status and
   a. neurobehavioral organization
   b. sensory development and processing
   c. motor function
   d. pain
   e. daily activity (e.g., feeding)
   f. social–emotional development
3. Assess the effects of physical environment, caregiving practices, positioning, and nurturance on the infant's neurobehavioral organization, sensory, motor, and medical status

D. Formulate an individualized therapeutic intervention plan that supports the infant's current level of function and facilitates optimal social–emotional, physical, cognitive, and sensory development of the infant within the context of the family and the NICU
   1. Determine appropriate timing of infant interventions on the basis of the infant's medical and physiological status, postconceptional age, and NICU and family bedside routines
   2. Modify sensory aspects of physical environment according to infant sensory threshold
   3. Participate with the infant and caregivers in occupational therapy interventions that reinforce the role of the family as the constant in the life of the infant and support the individual infant's medical and physiological status in order to
      a. enhance infant neurobehavioral organization
      b. facilitate social participation
      c. promote optimal infant neuromotor functioning and engagement in daily life activities
      d. promote developmentally appropriate motor function and engagement in daily life activities through the use of biomechanical techniques, when appropriate
      e. facilitate well-organized infant behavior through adaptation of infant daily life activities

E. Continuously observe and critically analyze subtle infant responses to the intervention program and modify as needed

F. Collaborate with family, NICU staff, and other persons who potentially may have an impact on infant well-being to
   1. Create and maintain individualized developmental care plans
   2. Incorporate the occupational therapy program into NICU routines
   3. Modify intervention and discharge plans considering anticipated infant outcome

G. Provide documentation that is objective, interpretive, thorough, and concise

H. Formulate discharge and follow-up plans in coordination with the interdisciplinary team and community resources to meet the developmental needs of the infant and family

The Family

Parents and other family members are acknowledged to be the most important and consistent influence in the infant's life. Their occupational roles as primary caregivers and nurturers constantly need to be recognized and reaffirmed. Typically, parents are mediators of the infant's

affective, sensory, and motor experiences. When an infant is hospitalized in the NICU immediately after birth, parents are not always able to play this mediation role. The bi-directional attachment process, which begins at delivery and in which both infant and parent play a part, can be disrupted. Since attachment provides a foundation for the infant's future development and independent function, its promotion is an important consideration for the occupational therapist. Therefore, the occupational therapist collaborates with family members, on-site and off-site, to facilitate the infant's optimal development, promote the parents' occupational roles, support parent-infant attachment, and ensure a successful transition from hospital to home and community.

The following outline summarizes the knowledge base that would enable an occupational therapist to provide services in the NICU from a family-centered perspective.

I. Knowledge of the family as a basis for collaboration
   A. Family systems
      1. Family structure, occupational roles, cultural identification, beliefs, values, and practices
      2. Family resources: Sources and allocation (e.g., time, money, energy, social–emotional support)
      3. Family adaptation: Adjustment to adding a new family member, adjustment to stressful situations
      4. Needs, culture, and roles of family members, including siblings
   B. Adult learning styles
      1. Individual differences in learning
      2. Relationship between emotional state and learning capacities
      3. Changes in parental focus during NICU course
   C. Parent–infant interactions: Progression and individual differences
      1. Parents' role in the infant's early social–emotional development
      2. Attachment as an ongoing two-way process between parents and infant, including the importance of attachment to later developmental function, and the influence of hospitalization on parents and infants on the attachment process
      3. Development of synchronous interactions
      4. Importance of parents' learning to accurately observe, interpret, and respond to their infant's unique cues
   D. The transition of the infant from hospital to home and community
      1. Possible stresses and difficulties inherent in the transition process for the infant and each family member
      2. Knowledge of community resources and local, state, and federal guidelines and services

II. Specific skills related to occupational therapy with families of infants in the NICU. The occupational therapist
   A. Identifies family hopes, dreams, expectations, attitudes, knowledge, strengths, priorities, preferred communication styles, and skills regarding daily care, play, and other interactions with the infant
   B. Identifies family members' learning styles
   C. Assists parents in feeling comfortable with their infant and as parents to a new family member

D. Guides family members in observing and interpreting their infant's behavior and in adapting their own behaviors in response to the infant's cues to elicit appropriate sensory, motor, and social responses
   1. During daily life activities
   2. During interactions involving exploration, attention, and orientation
   3. While engaged in nurturing interactions
E. Recognizes and acknowledges the infant's contribution and strengths in others' lives
F. Fosters successful parent–infant interactions via mutual problem solving, anticipatory guidance, modeling of behaviors, didactic and experiential education, and modification of the infant's environment
G. Integrates family observations and priorities in formulating occupational therapy intervention recommendations
H. Interprets and discusses occupational therapy evaluation findings in collaboration with the family
I. Adapts intervention approaches according to family culture, changing emotions, needs, and resources that may be influenced by the infant's changing medical status or other circumstances
J. Formulates and implements a discharge and follow-up plan with the family and other team members to ensure a smooth transition to the community, integrating occupational therapy goals into the overall goals and priorities of the family

The NICU Environment

The neonate who is born prematurely or acutely ill is not well-adapted to the stressful and technologically complex environment of the NICU. This mismatch between the infant and the environment may have a deleterious effect on the infant's medical and developmental outcomes. Therefore, a primary intervention goal in the NICU is to provide the best match or fit between the infant and the NICU environment. Adapting or structuring the environment to enhance function is a well-accepted occupational therapy approach. However, this first requires knowledge of the various components of the environment as well as their interplay. The occupational therapist assesses the environment and collaborates with others to shape the infant's physical and social environment to provide a milieu of developmentally supportive care. The following competencies are essential:

I. Knowledge of the unique sensory properties of the NICU and their relationship to each infant's neurobehavioral organization
   A. Tactile: Timing, intensity, texture, handling for medical and nursing procedures, parent interaction
   B. Proprioceptive-vestibular: Timing, intensity, handling for medical and nursing procedures, parent interaction
   C. Olfactory and gustatory experiences specific to the NICU (timing, quality, intensity)
   D. Auditory: Intensity, duration, timing, animate versus inanimate
   E. Visual: Timing, ambient and focal light intensity, contents of visual field

II. Knowledge of the social environment and its relationship to each infant's neurobehavioral organization, including interactions and relationships among
   A. Parents and infant
   B. Extended family members and infant
   C. Staff members and infant

D. Parents and staff members
E. Occupational therapist, parents, staff, and infant

III. Knowledge of the physical environment and its relationship to each infant's maturation and behavioral organization
A. Medical equipment and procedures as described under the medical knowledge base section
B. Frequency, timing, duration, quality, and intensity of sensory input from medical equipment and procedures
C. Sensory input from equipment, procedures, and staff activities that is disruptive to the infant's neurobehavioral organization

IV. Knowledge of the NICU culture
A. The NICU's specific philosophy of care, including its particular orientation toward acute and chronic care of infants
B. The team members' roles, functions, attitudes, and positions in the organizational structure of the individual NICU
C. The influence of NICU stressors (e.g., census changes and subsequent staffing patterns)
D. Communication patterns and structure, both formal and informal, among staff members and between family and staff members
E. Spoken and unspoken rules of behavior
F. The effect of the physical and social environments on staff performance and morale
G. Hospital administrative policies (e.g., confidentiality)

V. Specific skills related to occupational therapy in assessing and adapting the environment. The occupational therapist
A. Assesses the sensory aspects of the NICU physical and social environments and its effect on infant well-being
B. Develops intervention strategies in collaboration with the family, NICU staff, and other team members to adapt the environment in order to foster optimal infant development and family interactions
1. Communicates with all levels of staff to establish rapport and develop team commitment to developmental and family goals
2. Integrates occupational therapy goals into the infant's medical priorities and the NICU setting
C. Develops and implements strategies to influence philosophy and practice of developmental and family-centered care within the NICU
D. Assesses the effect of intervention strategies and revises the plan accordingly

VI. Knowledge of structures that support occupational therapy practice in the NICU.
The occupational therapist position exists within the NICU structure. The following knowledge and skills are needed to ensure integration of occupational therapy services into the NICU setting for optimal infant-family outcomes:
A. Ability to articulate the role and function of occupational therapists in the NICU to demonstrate their value and effectiveness
B. Ability to use relevant research literature to support occupational therapy practice in the NICU

C. Knowledge of the hospital's structure, mission, strategic plan, and fiscal priorities as they relate to both NICU and occupational therapy programs
D. Ability to identify and access sources of administrative and fiscal support to maintain occupational therapy services in the NICU
E. Knowledge of the larger local, state, and national health and social service systems as they influence policy and fiscal support for occupational therapy services in the NICU and early intervention services
F. Ability to identify sources of administrative and fiscal support for the practice of occupational therapy within the NICU from the community and the health care system at large
G. Knowledge of confidentiality guidelines (e.g., HIPAA)

Professional and Personal Characteristics Necessary for Occupational Therapists Practicing in the NICU

The NICU, as a critical care area, necessitates certain professional and personal characteristics. These characteristics include the following:

1. Ability to synthesize information from multiple sources, including research findings, and judiciously apply it to the NICU
2. Ability to observe the infant and environment for prolonged periods, without intervening, and to identify and understand subtle nuances of behavior and physiology
3. Interest in, and ability to bring about changes in the infant's social, and physical environments through direct intervention with the infant and family, consultation and collaboration with other team members, and implementation of policies and procedures at the organizational level
4. Understanding of one's interpersonal communication skills and style and the ability to modify them in response to family and staff behavior, learning styles, and needs
5. Commitment to seek ongoing knowledge, education, and peer consultation in this field
6. Ability to provide formal and informal educational programs for the hospital and the community
7. Insight into one's professional knowledge and skills
8. Ability to value, communicate, and collaborate with other NICU team members, community-based early intervention programs, and other resources
9. Understanding of and ability to articulate one's values and attitudes about
   a. the rights and responsibilities of families
   b. relationships between cultural or religious beliefs and medical management decisions
   c. working with infants who ultimately may not survive
   d. working with infants who may have severe and permanent disabilities
   e. working with families whose values, attitudes, behaviors, and life circumstances differ from one's own
   f. allocating limited fiscal, personnel, and technological resources to sustain life
10. Understanding of the AOTA Code of Ethics (2005) as it applies to the NICU

Definitions

***Activity*—**"[T]he performance of a task or action by an individual" (World Health Organization [WHO], 2001, p. 10).

Activity Limitations—"[D]ifficulties an individual may have in executing activities" (WHO, 2001, p. 10).

***Attachment*—**"A bond between an infant and a caregiver, usually its mother. Attachment is generally formed within the context of a family, providing the child with the necessary feelings of safety and nurturing at a time when the infant is growing and developing. This relationship between the infant and his caregiver serves as a model for all future relationships" (Gale, 2005).

Body Functions—"[T]he physiological or psychological functions of body systems" (including psychological functions; WHO, 2001, p. 10).

Body Structures—"[A]natomical parts of the body, such as organs, limbs, and their components" (WHO, 2001, p. 10).

Bonding—See *Attachment*.

***Clinical Reasoning Skills in Occupational Therapy*—**The process by which occupational therapists individualize and modify treatment. It includes not only the application of theory to practice, but also the treatment of the meaning of illness as experienced by the individual and family (Mattingly, 1991).

Environmental Factors—"[T]he physical, social, and attitudinal environment in which people live and conduct their lives" (WHO, 2001, p. 10).

***Environmental Neonatology*—**The study of environment of newborn special care facilities and its impact on the medical and developmental status of at-risk infants (Gottfried & Gaiter, 1985).

Family—A unit composed of individuals who are linked by shared kinship, function, and/or responsibilities and who identify themselves in a common relationship (Crockenberg, Lyons-Ruth, & Dickson, 1993).

Family-Centered Care—A constellation of philosophies, attitudes, and approaches to the care of children with special health and developmental needs that recognizes that the family is the constant in the child's life and that parent–professional partnerships are essential to effective and high-quality service delivery (Dunst, Trivette, & Deal, 1988; Institute for Family-Centered Care, 1990).

Goodness-of-Fit—"When the properties of the environment and its expectations and demands are in accord with the organism's own capacities, characteristics, and style of behaving" (Chess & Thomas, 1999, p. 3).

Impairments—"[P]roblems in body function or structure such as a significant deviation or loss" (WHO, 2001, p. 10).

Infant Mental Health—"Infant" refers to children under 3 years of age. "Mental" includes social–emotional and cognitive domains. "Health" refers to the well-being of young children and families (Fraiberg, 1980). A multidisciplinary intervention approach for the "early identification of risk and treatment to reduce the likelihood of serious developmental failure and relationship disturbance" (Weatherston, 2002, p. 1).

Medical Caregivers—House staff involved in the care of infants in the NICU. Although personnel may vary between institutions, medical caregivers typically include nurses, physicians (e.g., neonatologists, attending physicians, residents, interns), therapists, pharmacists, nutritionists, and other personnel (adapted from U. S. National Library of Medicine, 2005).

Neurobehavioral Organization—An interrelationship among infant central nervous system integrity and maturation, behaviors, and the caregiving environment. The interrelationship is expressed in terms of self-regulation and mutual regulation of autonomic, motoric, state, and interactional functions (Als, 1982).

Neurosocial—The ability to interact as the nervous system matures in preterm infants. There are three developmental stages of neurosocial development: turning in, coming out, and reciprocity (Gorski, Davidson, & Brazelton, 1979).

NICU—Neonatal intensive care unit. Newborn Nurseries are designated as Basic (Level I), Specialty (Level II), or Subspecialty (Level III) on the basis of their responsibilities and the availability of special service. Basic Neonatal Care Nurseries (*Level I*) provide postnatal care to healthy newborn infants and are equipped to provide resuscitation and to stabilize ill newborn infants until they can be transferred to a neonatal intensive care facility. Specialty Care Nurseries (*Level II*) "provide care to infants who are moderately ill with problems that are expected to resolve rapidly or who are recovering from serious illness" after receiving subspecialty care. Subspecialty Nurseries (*Level III*) provide care to infants who are extremely premature, are critically ill or require surgical management (American Academy of Pediatrics & American College of Obstetricians and Gynecologists, 2004, p. 134).

Participation—"[I]nvolvement in a life situation" (WHO, 2001, p. 10).

Participation Restrictions—"[P]roblems an individual may experience in involvement in life situations" (WHO, 2001, p. 10).

Physiologic Instability—Refers to a lack of balance or equilibrium within the autonomic nervous system. Signs of physiologic instability may include changes in cardiorespiratory status (heart rate, respiratory rate, decreased oxygen saturation), color changes (pale, dusky, mottled, flushed), or visceral cues (yawning, sneezing, gagging, spitting up, hiccupping, having bowel movement). Conversely, an infant with physiologic stability will be calm with stable color and vital signs (Als, 1986).

Regulatory Abilities—The infant's capacity to modulate or modify his or her own state of arousal and neurobehavioral organization (Als, 1982).

Relationship-Based Approach—An approach that is "guided by a neurodevelopmental framework for understanding preterm infants and depends on the capacities of professionals to collaborate with one another and with families in support of the infants medical, developmental, and emotional well being" (Als & Gilkerson, 1997, p. 178).

References

Als, H. (1982). Toward a synactive theory of development: Promise for the assessment of infant individuality. *Infant Mental Health Journal, 3,* 229–243.

Als, H. (1986). A synactive model of neonatal behavioral organization: Framework for the assessment of neurobehavioral development in the premature infant and for the support of infants and parents in the neonatal intensive care environment. *Physical and Occupational Therapy in Pediatrics, 6*(3/4), 3–53.

Als, H., & Gilkerson, L. (1997). The role of relationship-based developmentally supportive newborn intensive care in strengthening outcome of preterm infants. *Seminars in Perinatology, 21,* 178–189.

American Academy of Pediatrics & American College of Obstetricians and Gynecologists. (2004). *Guidelines for perinatal care* (5th ed.). Elk Grove Village, IL: Author

American Occupational Therapy Association. (2002). Occupational therapy practice framework: Domain and process. *American Journal of Occupational Therapy, 56,* 609–639.

American Occupational Therapy Association. (2004a). Guidelines for supervision, roles, and responsibilities during the delivery of occupational therapy services. *American Journal of Occupational Therapy, 58,* 663-667.

American Occupational Therapy Association. (2004b). Scope of practice. *American Journal of Occupational Therapy, 58,* 673-667.

American Occupational Therapy Association. (2005). Standards of practice for occupational therapy. *American Journal of Occupational Therapy, 59,* 663-665.

Chess, F., & Thomas, A. (1999). *Goodness of fit: Clinical applications from infancy through adult life*. Philadelphia: Brunner/Mazel.

Crockenberg, S., Lyons-Ruth, K., & Dickson, S. (1993). The family context of infant mental health: II. Infant development in multiple family relationships. In C. H. Zeanah (Ed.), *Handbook of infant mental health* (pp. 38–55). New York: Guilford.

Dunst, C. J., Trivette, C. M., & Deal, A. G. (1988). *Enabling and empowering families: Principles and guidelines for practice.* Cambridge, MA: Brookline Books.

Fraiberg, S. (1980). *Clinical studies in infant mental health.* New York: Basic Books.

Gale, T. (2005). *The Gale encyclopedia of Children's health: Infancy through adolescence.* Farmington Hills, MI**:** Thomson Gale.

Gorski, P., Davidson, M. E., & Brazelton, T. B. (1979). Stages of behavioral organization in the high-risk neonate: Theoretical–clinical considerations. *Seminars in Perinatology, 3,* 61–73.

Gottfried, A. W., & Gaiter, J. L. (1985). *Infant stress under intensive care.* Baltimore: University Park Press.

Institute for Family-Centered Care. (1990). *Association for the care of children's health.* Washington, DC: Author.

Mattingly, C. (1991). What is clinical reasoning? *American Journal of Occupational Therapy, 45,* 979–996.

U.S. National Library of Medicine. (2005, December 13). Medline plus medical encyclopedia. Retrieved January 11, 2006, from http://www.nlm.nih.gov/medlineplus/ency/article/007241.htm

Weatherston, D. J. (2002). Introduction to the infant mental health program. In J. J. Shirilla & D. J. Weatherston (Eds.), *Case studies in infant mental health: Risk, resiliency, and relationships* (pp. 1-13). Washington, DC: Zero to Three.

World Health Organization. (2001). *International classification of functioning, disability, and health (ICF).* Geneva, Switzerland: Author.

Related Readings

Als, H., Duffy, F. H., McAnulty, G. B., Rivkin, M. J., Vajapeyam, S., Mulkern, R. V., et al. (2004). Early experience alters brain function and structure. *Pediatrics, 113,* 846–857.

Als, H., Gilkerson, L., Duffy, F. H., McAnulty, G. B., Buehler, D. M., VanderBerg, K**.** et al. (2003). A three-center randomized controlled trial of individualized developmental care for very low birth weight infants: Medical, neurodevelomental, parenting, and caregiving effects. *Journal of Developmental and Behavioral Pediatrics, 24,* 399-408.

Anzalone, M. E. (1994). Occupational therapy in neonatology: What is our ethical responsibility? *American Journal of Occupational Therapy, 48,* 563–566.

Browne, J. V. (2003). New perspectives on premature infants and their parents. *Zero to Three, 24*(2), 4–12.

Buehler, D., Als, H., Duffy, F., McAnulty, G., & Liederman, J. (1995). Effectiveness of individualized developmental care for low-risk preterm infants: Behavioral and electrophysiologic evidence. *Pediatric, 96,* 923–932.

Carter, B. S. (2003). Collaborative decision making in the NICU: When life is uncertain, satisfice. *Zero to Three*, *24*(2), 21–25.

Holloway, E. (1998). Relationship-based occupational therapy in the neonatal intensive care unit. In J. Case-Smith (Ed.), *Pediatric occupational therapy and intervention* (pp. 111–126). Boston: Butterworth-Heinemann.

Holloway, E. (in press). Fostering early parent-infant playfulness in the neonatal intensive care unit. In L. D. Parham & L. S. Fazio (Eds.), *Play in occupational therapy for children* (2nd ed.). St. Louis, MO: Mosby.

Hunter, J. G. (2005). Neonatal intensive care unit. In J. Case-Smith, (Ed.), *Occupational therapy with children* (5th ed., pp. 688-770) St. Louis, MO: Elsevier Mosby**.**

Johnson, B. H., Abraham, M. R.,& Parrish, R. N. (2004). Designing the neonatal intensive care until for optimal family involvement. *Clinics in Perinatology, 31,* 353–383.

McGrath, J. M., & Conliffe-Torres, S. (1996). Integrating family-centered developmental assessment and intervention into routine care in the neonatal intensive care unit. *Nursing Clinics of North America, 31,* 367–368.

Meyer, E. C., Lester, B. M., Boukydis, C. F. Z., & Bigsby, R. (1998). Family-based intervention with high-risk infants and their families. *Journal of Clinical Psychology in Medical Settings, 5,* 49–69.

Talmi, A., & Harmon, R. J. (2003). Relationships between preterm infants and their parents: Disruption and development. *Zero to Three*, *24*(2), 13–20.

Vergara, E., & Bigsby, R. (2004). *Developmental and therapeutic interventions in the NICU*. Baltimore: Paul H. Brookes.

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