Nourishing and Nurturing the Family and Infant During Feedings

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Objectives

- Describe the feeding outcomes of infants discharging from the NICU.
- Describe the influence of having a child with a feeding problem on the family.
- Discuss evidence-based strategies used by the caregiver to support infant skill, efficiency and endurance during feedings.
Definition of Neonates with Special Health Care Needs

- An infant diagnosed at birth with a medical condition that requires supplemental technology or medication for survival past one month of age, hospitalization for more than three weeks after birth, and/or who has early regulation, feeding, state or motor concerns that require supportive and/or therapeutic intervention.

Browne & Deloian, 2007
NICU Goal

• Assure physical health of infant
• Support development of infant
  • Motor organization
  • Behavioral state organization
  • Developmentally expected activities (e.g. feeding)
• Create a foundation for later physical and developmental health
Laying a Foundation

- Infant brain development, as well as later developmental trajectories, are influenced by:
  - the quality of care given during the NICU
  - parent empowerment
- Interventions to support infant regulation and parent involvement, empowerment, and knowledge have been shown to improve infant functioning in both the short- and long-term.

Achenbach, et al., 1993
Als, et al., 2003; 2004
Peters, et al., 2009
Preparing parents in the NICU for possible feeding challenges following discharge
Prior to Discharge Home

- On-going assessment of parent-infant interactions, i.e. feeding, handling, and social interactions.
- Identify and educate families of fragile newborns in how to respond to their infant’s cues and behaviors.
- Provide anticipatory guidance to enhance parental role.
So, how are we doing?

Prevalence of feeding problems in the NICU population
Short-term skills

- Kirkby et al (2007)
  - 0.8% of their large cohort of infants (n=4932) born between 32 and 36 weeks GA discharged with the need of a supplemental tube

  - 79% discharged to home fully nipple feeding
  - 16.6% discharged home on oral plus gavage feeds
  - 8.6% on gastrostomy-tube feedings
Late Pre-term Infant-At risk population

- Feeding during hospitalization may be transiently successful but not sustained after discharge.

- Early readmission during first month for late-preterm infant
  - Leading diagnoses
    - Jaundice
    - Rule out sepsis
    - Feeding difficulties

Leaving the NICU

- Crisis that began in the NICU often continues after discharge.
  - Discharge is often viewed as the successful end to a hospitalization. Families of premature and sick infants view it differently.
  - Discharge is often the beginning of a long process that can involve on-going medical and therapy services.

Maroney, 1995
They’re home!

- Discharge criteria focus on weight gain – not on feeding skill.
- Frequently feedings are arduous for both infant and family in the first weeks after discharge.
- Feeding behaviors often develop that interfere with both the child’s eating as well as the family functioning.
- Developmentally, feeding in the NICU is a foundation for later transitions.
Delayed Attainment

  - Preterm infants lagged behind in expected skill acquisition at every one of the four time periods evaluated from 1 month to 12 months corrected age, even after correcting for prematurity

  - Total feeding scores on a standardized feeding assessment were significantly lower compared to normative data

  - Trend towards delays in feeding development in preterm infants evaluated at 11-17 months of age
Prevalence of Feeding Problems

  - 51% of parents use food rewards
  - 69% use coaxing during mealtimes
  - 78% of parents identified as the most important issue the quality of the foods eaten by the toddler
  - Preterm infants have more eating problems at 18 months
- DeMauro et al (2011)
  - Feeding problems were prevalent in both the early born (25 to 33.6 weeks GA) and later born (34 to 36.6 weeks GA) groups evaluated at 3, 6 and 12 months
  - Diminished for both groups over time
Quality of Feeding Skills

- N=20 (BW<1000 grams; mean GA 27 weeks)
- 17 RDS, 4 BPD, 3 birth asphyxia, 6 PVL, 13 IVH (1 Grade 3, 1 Grade 4)
- Feedings are prolonged and messy
- Much of food drops out of mouth
- Pace of feeding is rapid
- Increased sensitivity to texture, temperature and tastes
- Both infant and feeder become impatient
- Feeding problems in preterm infants create a risk for early interaction and communication

Torola, et al., 2012
The NICU builds the foundation

- Feedings should focus on the infant-parent interaction;
- Success should be defined in terms of quality, rather than in terms of speed or volume;
- Quality should focus on infant skill, parental competence and confidence, and physiologic, motor and state stability.
Feeding and the Family
“…Infant feeding is a matter of infant-mother relationship, a putting into practice of a love relationship between two human beings.”

Winnicott, 1987
“The feeding relationship is important because it supports the infant’s development... (and) because parents frequently evaluate their premature infant’s health and their competency as parents by the infant’s feeding success and weight gain before and after discharge.”

Deloian, 1998
“A baby’s ability to eat and a mother’s ability to feed her baby are at the heart of who she is as a mother. A majority of the time together in the first year is spent feeding. It is a powerful social and emotional learning experience and, if positive, they develop synchrony.”

Thomas, 1995
Parental experience of having a child with feeding problems

- All encompassing fear
- Concerns that are often not heard
- Guilt and a feeling that they are blamed for their children’s growth failure
- Isolation and helplessness
- Validation when included as members of team
- Pride in their expertise and capability in providing care
- Adaptation and Perseverance in pursuit of answers
- Value for those professionals who trust and respect the role of the family

Thomlinson, E. 2002
“Confidence comes from having the information necessary to assess the infant during feeding and to intervene to minimize problems.”

Shaker, 1999
The NICU interferes with confidence

- 50 Mothers-PreTerm ; 25 Mothers-FullTerm
- M-PT group had significantly more mothers with clinical symptom of anxiety;
- M-PT reported more uncertainties and worries about breastfeeding, and reports were positively correlated with neonatal risk status;
- Lower BW, higher neonatal clinical risk, and longer length of stay in NICU were associated with more mothers' worries and seeing obstacles for breastfeeding

Padovani, et al., 2011
Influence of congenital heart defects on feeding and family

- After survival, feeding issues are the number one stressor for parents as they try to assist their infant in gaining adequate weight.

- Concerns include
  - Adequate weight gain
  - NG tube placement (after infant pulls it out)
  - Managing schedule
  - Managing tube feedings
  - Poor recognition of/signaling of hunger, fullness

Hartman & Medoff-Cooper, 2012
Building a strong foundation

• Success should be defined in terms of quality, rather than in terms of age of acquisition or volume.
  • Discuss what should feeding support look like including:
    • Review of feeding plan
    • Information regarding feeding progression
• Quality should focus on infant skill, parental competence and confidence, and physiologic, motor and state stability.
• How do we focus on the right things, to build a strong foundation?
Roles of maturation and experience on acquisition of feeding skills
Developmental Nature of Feeding

- Early infant eating behavior of the infant is thought to be neurologically based and developmental in nature.
- Studies on the sequence of eating (suck rhythm stability, aggregation of sucks and swallows into runs, length of suck run, and suck-suck interval) suggest that assessment of early eating competence and coordination could predict longer-term neurodevelopmental outcomes.
- The coordination of breathing and eating could reflect an “intrinsic calendar of neurodevelopment rather than experiential or learned behavior.”

Browne & Ross, 2011
Maturation, medical comorbidities, and experience of feedings (especially negative) build the foundation
Synactive Organization of Behavioral Development

• Behavioral organization process
  • subsystem interaction
  • interdependence (synaction) of subsystems

• Behavioral organization supports the neonate to respond to the challenges presented by the extrauterine environment

• Caregivers observe and respond to the infant’s behavior, which reflect the current functioning of the infant

(Als, 1982)
Physiologic stability is the core system
Motor, behavioral state, and interaction are surrounding systems
Organization (or disorganization) of one system similarly influences the other systems through synaction
Through organization, the infant is able to reach homeostasis
Homeostasis supports infant’s striving for the next challenge (e.g., feeding)

Als, 1982
Theory of Neuronal Group Selection (TNGS)

- The brain is a selective system
- The brain is strongly influenced by signals, provided by the infant’s body and the infant’s interactions with the environment
- The brain is continually changing, in response to these signals

(Edelman, 1987)
Experiential Selection

- After birth, infant interacts with environment (distal and proximal)
- Environment provides experiences that drive changes in development
- Synaptic connections are either strengthened through repetitive activation, or weakened through “disuse”

(Edelman, 1987)
Reentrant Mapping

- Neural maps are selected through past and present experiences, and link to form integrated connections.
- **Global mappings** are created that involve motor and sensory systems.
- Experiences do not happen in isolation – every experience matters!
- Negative experiences also create neural maps (but for NOT wanting to eat!)

(Edelman, 1987)
What we know

- Infant feeding is a function of both maturation and experience
- Primitive mechanisms (CPG) support early feedings, but are integrated and feeding is solely a learned skill beginning at 4 mos.
- Immaturity and medical instability increase likelihood of aversive feeding experiences
- Experience directly builds brain pathways
- Children learn to NOT EAT if the experience of eating is repeatedly aversive

Delaney & Arvedson, 2008
"Practice is everything. This is often misquoted as Practice makes perfect."

Periander
665-580 BC
To support positive experiences with feeding

- Support SKILL (coordination) first!
  - Look for stability signs to determine readiness for and influence of feeding
  - Infant’s behavior keeps us “honest”
    - can tell us if we are on the right track or going too fast
- Implement feeding supports to facilitate skill development.
- Focus on experience – volume is a natural outcome of experiences that improve skill, efficiency and endurance.
Without skill

- Repeated experiences of feeding with POOR skill may lead to avoidance behaviors, and...

- Repeated experiences build neural pathways that support development of POOR skills
  - Gagging
  - Gasping
  - Desaturating
Skill → Efficiency → Endurance
Organize the infant from birth

- Developmentally supportive care organizes the infant:
  - Physiologic stability
  - Motor stability
  - Behavioral State stability
  - Attention/Interaction stability

- The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) focuses on improving overall health and development of infant
  - Outcomes show improvements in oral feeding and decreased length of stay compared to controls.

  Als, et al., 2003
Physiologic Stability

- Assess and correct physiologic issues as thoroughly as possible:
  - Respiratory
  - Oxygenation
  - Gastro-Intestinal
- Consider maturation AND morbidity
- Important to pay attention to precursors (what happened before the feeding)
- Implement strategies to protect physiologic stability during feeding (SKILL)
- At a minimum, do NOT create instability
Kangaroo Mother-Care

- Enhances bonding and attachment
- Reduces maternal postpartum depression symptoms
- Enhances infant physiologic stability and reduces pain
- Increases parental sensitivity to infant cues
- Contributes to the establishment and longer duration of breastfeeding
- Has positive effects on infant development and infant/parent interaction

Nyqvist, et al., 2010
Non-nutritive sucking opportunities

- Largest body of evidence to support benefits
- No evidence of detrimental effects
- Decreases significantly the length of hospital stay in preterm infants
- Supports transition from tube to bottle feeds
- Supports better bottle feeding performance

Harding, 2009; Pinelli & Symington, 2005
BROSS Approach
Baby Regulated Organization of Subsystems and Sucking

- Uses the Synactive theory as a paradigm
- Builds upon the organization of each subsystem
- Uses a holistic approach towards the development of feeding skills in the preterm infant
- Recognizes feeding as a neurobehavioral process

Browne & Ross, 2011
Evidence-based strategies for nutritive sucking
Intervention strategies

- Implement intervention strategies to improve skill, efficiency, endurance

**SKILL**
  - Regulation
  - Pacing
  - Positioning

**EFFICIENCY**
  - Slow Flow nipples

**ENDURANCE**
  - Behavioral state support

**SUPPORT BREASTFEEDING**

**SUPPORT PARENTS AS CAREGIVERS**
Skill

- Skill is defined as coordination of sucking, swallowing and breathing
- Regulation/Pacing of the infant feeding and decreased flow rate support suck/swallow and breathe coordination
- Positioning supports organization of suck/swallow breathe coordination and physiologic stability
Supporting respiratory organization

REGULATION

- Facilitates infant’s burst/pause rhythm, to ensure at least one breath every 3-5 sucks
- Designed to **proactively** provide immature S/S/B pattern to infants who have bursts of sucking of >5 without breathing
Effectiveness of Regulation

• Non-randomized consecutive study
• 36 infants – 18 in control, 18 in paced group
• Paced infants demonstrated significant decreases in bradycardic incidences
• Gains in development of more efficient sucking patterns at discharge
• No change in discharge or average weekly weight gain

Law-Morstatt, et al., 2003
Supporting respiratory organization

PACING

• Provided in response to infant’s fatigue/stress
• Brief (1-2 minute) pauses to allow infant to reorganize
• Very effective with medically compromised infants, especially those with respiratory compromise

Gewolb, et al., 2003; 2006
Supporting respiratory organization

Avoid fluid collecting in the back of the throat

Sidelying    Upright
Position

- Should be supportive of midline positioning of arms, legs, neck, head
- Should prevent fluid from collecting in pharynx
- Should encourage close contact with parent
  - Elevated Side-lying appears to be beneficial and does not increase length of stay
  - Elevated side-lying appears to improve oxygenation during feedings
  - Elevated head-tilt position decreases apnea and bradycardia during feeding
- Should encourage interaction

Jones, 2008; Clark, 2007; Jenni, 2007
Efficiency

- Infants who exhibit suction with pacifier and with inappropriate flow rate from bottle will revert to compression-only sucking (dropping suction component) in an attempt to slow flow to compensate when flow rate is too fast.
- As infants drop suction, they become less efficient and have greater respiratory effort.
- Slowing the flow rate helps to establish skill.

Eishima, 1991
Ross & Philbin, 2011
Clinical Example: Preterm

- Infants fed with both single-hole and cross cut nipples. Crossover design. When fed with single-hole nipple units:
  - **Higher intake** (57.5 ml vs. 51.6 ml, p=0.011)
  - **Decreased duration feeding time** per meal (11.5 min vs. 20.9 min, p<0.001)
  - **Higher efficiency** (5.8 ml/min vs. 2.7 ml/min, p<0.001)

- With single-hole nipple units
  - **Lower RR** (40.8 bpm vs. 44.4 bpm, p=0.002)

Chang, et al., 2007
Clinical Example: BPD

- Infants with severe bronchopulmonary dysplasia (n=13) compared to non-BPD (n=7) demonstrated:
  - Lowest sucking pressure
  - Lowest sucking frequency
  - Shortest sucking burst duration
  - Lowest feeding efficiency
  - Lowest frequency of swallows during the run
  - Longest deglutition apnea
  - Highest respiratory rate
  - Largest decrease in oxygen saturation

Mizuno, et al., 2007
Support Breastfeeding

- Colostrum is loaded with pre and probiotics and supports growth of gut flora (Lennon, 2011).
- Breastmilk is best (gut flora, decreased obesity rates, decreased allergy/immune issues).
- Breastfeeding is best (provides all of these caregiver contributions; reinforces parental involvement).
- Infants can often transition from kangaroo mother care to breast exploration earlier than they are ready for bottle feeding.
- May need to pump prior to breastfeeding to slow flow until skill is developed.
- Breastfeeding does not require more energy (Berger, 2009).
Supports for Families
“Our biggest challenge was feeding her, and unfortunately I was the only person who could consistently get her to take the bottle. The pressure and responsibility I felt over her feedings literally made me sick with worry that she would wither away into nothing. Most days we would spend anywhere from 6 to 9 hours engaged in some type of feeding battle. Of course, I rarely won the fight. I was physically exhausted and emotionally drained pretty much all of the time. Finally after four straight months of her losing weight, my husband and I made the heartbreaking decision to have g-tube surgically placed….thankfully, it was probably the best decision we have ever made.”

Mother of a child with special healthcare needs
Parents often focus on the volume, not the experience

- Videotapes of 10 mother-infant dyads, across the time periods of discharge, 1 and 4 months corrected age
- Mother’s on average talked to their infants only 10% of the feeding time across all 3 time periods
- Infants generally had eyes closed for entire first feeding (discharge), but fed with eyes open for 59% of the feeding at 4 months corrected age.

Reyna, et al., 2012
Changing the Focus

- Randomized, repeated measures intervention
- n=34, <1500 grams
- Video tape of feeding before and after intervention
- Intervention focused on increasing parental knowledge and confidence with feeding their preterm infant

Decrease in:
- Infant grimacing (P < .001)
- Infant gagging (P < .05)
- Maternal interruptions during feeding (P < .001)
- Maternal bottle stimulation (P < .01)

Increase in:
- Maternal smiling (P < .001)
- Maternal vocalization (P < .01)
- Sensitivity to infant behavior (P < .001)
- Quality of physical contact (P < .001)
- More positive affect (P < .01)

Meyer, et al., 1994
Parents need support

• Study of mother’s with children with chronic feeding and swallowing disorders
• Mothers' experiences can be understood as two continuing journeys that are not mutually exclusive
  • "Deconstruction: A journey of loss and disempowerment,"
  • "Reconstruction: Getting through the brokenness"

Deconstruction

- Losing the mother dream
- Everything changes: living life on the margins
- Disempowered: from mother to onlooker

Reconstruction

- Letting go of the dream and valuing the real
- Self-empowered: becoming the enabler
- Facilitating the journey
- The continuing journey: negotiating balance.

Helping families cope

• 35 caregivers of children with chronic feeding problems.
• The mothers/caregivers in this study were most likely to cope with their child’s feeding problems by making active attempts to understand the problems.
• It is beneficial for these families to acquire a thorough understanding of their child’s medical situation.
• It is important to provide a variety of resources, including access to support and information groups.

Support Parents as Caregivers

- Parent support, education and advocacy tools are available through Feeding Matters.

- Infant and Child Feeding Questionnaire is available through Feeding Matters to provide parents with information and a way to talk about the feeding struggles they are having, with their pediatrician or primary caregiver.
Parent support &
Parent Education

Education Tab: POPSICLE Infant and Child Feeding Questionnaire
We can help families enjoy the feeding experience
Supporting Relationships During Feeding

- Consider the experience from the infant’s perspective.
- Present feeding as a joint process created by the caregiver and infant together.
- Balance and consider multiple goals in decision making.
- Be flexible and less rule-bound in plans and decisions about feeding.
- Allow the infant to guide feeding process.

Thoyre, 2000
We make a difference!

- To the infant:
  - By understanding development so that we adjust our expectations
  - By supporting organization of physiologic, motor, behavioral states, so that infants can interact and attend to experiences
  - By ensuring all experiences are as pleasurable as possible

- To the family:
  - By supporting them to be able to nurture their infant
Every moment is an experience

Jake Roberts
References


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