MANAGING COMPLEX FEEDING DISORDERS IN THE ICN

Lindsey Ethridge, MOT, OTR/L, SWC
Occupational Therapist III UCSF

Objectives

• Review the anatomy and physiology of swallowing
• Identify the current evidence based research on infant driven feeding readiness
• Identify optimal feeding interventions
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<th>NICU Feeding Team</th>
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<td>• Multidisciplinary approach</td>
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<td>• Nurse Practitioners</td>
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<td>• Nurses</td>
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<td>• Lactation Nurses</td>
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<td>• Occupational Therapists</td>
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<td>• Speech and Language Pathologists</td>
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<td>• Respiratory Therapist</td>
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<td>• Dietitians</td>
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<th>Feeding Goals</th>
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<td>• Support oral development</td>
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<td>• Support a positive oral feeding experience</td>
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<td>• Educate families in helping their babies develop feeding skills</td>
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<td>• Support breast feeding</td>
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<td>• Support early development</td>
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<td>• Optimize growth and development</td>
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<td>• Provide family centered care</td>
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<td>• Prepare for successful discharge home</td>
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<td>• Creating lifelong feeders</td>
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Goal “Pleasurable Feeding” from Neonate to Toddler to Early Childhood

Goal: Pleasurable Feeding
Feeding is a Complex Task

- Multiple systems involved
  - Respiratory
  - Neurological
  - Sensory
  - Gastro intestinal

Neurological System

- 50 pairs of muscles involved in swallowing
- CN involvement (5, 7, 9, 10, 11, 12)
ANATOMY AND PHYSIOLOGY OF INFANT FEEDING AND SWALLOWING

Newborn Anatomy
THE MOUTH AND PHARYNX OF THE NEWBORN (sagittal section)

- Tongue fills the oral cavity
Newborn Anatomy

THE MOUTH AND PHARYNX OF THE NEWBORN
(sagittal section)

- Fat /sucking pads

- Velum and epiglottis approximate
- Larynx rides high in neck, so against the epiglottis
- Mandible is small
Newborn Anatomy

THE MOUTH AND PHARYNX OF THE NEWBORN

- Eustachian tubes lie horizontally in infant
- Assume a more vertical angle in the older child/adult.

Anatomical Differences of Newborn and Older Child

- At birth, positional stability is provided by the close proximity of various structures and the subcutaneous fat ("chubby cheeks")

- As infant matures, greater postural stability

- As structures move apart, they are supported by increased connective tissue, cartilage, and increased specialized muscle control.
Infant vs. Toddler Lateral View

- Changes in the anatomical relationships of the pharyngeal and laryngeal structures

Physiology of Swallowing

Deglutition

- Plays a role in regulation of amniotic fluid balance
- Amniotic fluid coats the lungs and GI tract
- Occurs approximately 16 to 17 weeks of gestation
- Swallowing amniotic fluid
- Motor learning happens at 17 weeks
Physiology of Swallow Cont.

• Initially fetus swallows 2 to 7 milliliters of amniotic fluid/day
• Increasing to 13-16 milliliters at 20 weeks of gestational age
• Term +450 milliliters/day out of approximately 850 milliliters of amniotic fluid

• Polyhydramnios, a condition occurring during pregnancy characterized by too much amniotic fluid, can be observed when there are anatomical defects that affect swallowing (e.g. esophageal atresia, brainstem lesions)

Primitive Oral Reflexes

• Fall into two categories:
  • Protective
  • Adaptive

• Primitive oral reflexes is speculated to provide synergy of movement for feeding.
• These synergies of movement can be impacted by any breakdown in the primitive oral reflexes (POR).
**Gag Reflex: Protective**

- Gag (36 weeks to throughout life)
  - In neonates, stimulus to the anterior 1/3rd of the tongue should elicit a gag
  - As they mature, stimulus moves to the posterior 1/4th of the tongue
  - In the infant and toddler, the gag plays an important role in protecting the pharyngeal airway from too large of a bolus.
  - The gag does NOT protect the laryngeal airway with aspiration. The COUGH plays the critical role in protecting the laryngeal airway in aspiration.

**Cough Reflex: Protective**

- Cough
  - Two mechanisms trigger reflexive cough
    1. Foreign material entering the upper airway stimulates the laryngeal receptors.
    2. Stimulation of the bronchial receptors by excessive secretions triggers a cough.
Cough Reflex : Protective

• A protective laryngeal cough is a prerequisite for safe infant feeding.
• Excessive coughing suggests that some dysfunction in the suck/swallow/breathe triad is allowing for aspiration to occur.
• Coughing on occasion is normal during infant feeding. Important to observe the infant’s physiological response to the cough…how quickly they recover, how frequently the coughing occurs

Postnatal maturation of the cough by stimulating the vocal folds with saline demonstrated:
• < 4 days old 20% cough, 80% no cough
• 30 days old 80% coughed with glottal stimulus

• High risk of silent aspiration, particularly less than 1 month old
Rooting Reflex: Adaptive

- **Rooting** (32 weeks, peaks at 40 weeks, disappears by 3 months)
  - Different responses in preemie versus term infant
  - Preemies do not demonstrate a brisk mature rooting response
  - Tactile stimulation to any quadrant around the mouth produces head turning, jaw extending, latching with the tongue for a suckle
  - Responses vary based on state and satiation
  - Rooting is important for an effective latch-on with breast-feeding

Phasic Bite Reflex: Adaptive

- **Phasic Bite** (28 weeks)
  - Stimulate away from midline; vertical jaw excursions that are rhythmical
  - In mature infant jaw excursions continue until stimulus is removed
  - If jaw clenching occurs, this is a TONIC bite response, and is considered abnormal
Transverse Tongue Reflex: Adaptive

- Transverse Tongue (28 weeks to throughout life)
  - Stimulus to the side of the tongue leads to lateral deviation of the tongue in the direction of the stimulus (horizontally).
  - Prerequisite for later chewing skills

Sucking Reflex: Adaptive

- Sucking (24 weeks)
  - Elicited by tactile input to the tongue and/or roof of mouth

- Mechanics of Sucking
  - Suck Reflex
  - Sucking Pressure/strength
  - Sucking Rhythm
  - Sucking Rate
Mechanics of Sucking

- Regulated in the brainstem
- The tongue helps to seal the oral cavity
- Compressing of the nipple, produces positive pressure which expresses fluid
- During sucking the posterior tongue also lowers, increasing the volume of the oral cavity
- With the oral cavity sealed, negative intra-oral pressure, or suction is created to pull fluid into the mouth.

Sucking Pressure

- During infant feeding, fluid moves primarily because of changes in pressure

1. Positive Pressure/Compression:
2. Negative Pressure/Suction:

   - Tongue compresses the nipple, positive pressure is created, which expels the liquid.
   - With the oral cavity sealed, the jaw and tongue drops, which pulls fluid into the mouth.
   - To produce suction, the oral cavity must be fully sealed, or tongue and jaw movement will be ineffective in creating suction.
Positive Pressure/Negative Pressure

- State (awake, sleepy, drowsy)
- Hunger
- Type of fluid (thicken vs. breast milk)
- Flow of fluid (nipple or breast)
- Maturity of infant (preemies use compression before suction)
  - 37-38 weeks

Sucking Pressure
**Sucking Rhythm**

- Both nutritive and non-nutritive sucking occur in regular patterns of bursts and pauses.
- Burst-pause rhythm

<table>
<thead>
<tr>
<th>Non-Nutritive</th>
<th>Nutritive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absence of nutrient flow</strong></td>
<td><strong>Nutrient flow</strong></td>
</tr>
<tr>
<td>2 sucks/sec</td>
<td>1 suck/sec</td>
</tr>
<tr>
<td>Infrequent swallowing</td>
<td>Slower to accommodate swallow</td>
</tr>
<tr>
<td>7:1 or more suck/swallow ratio</td>
<td>Frequent swallowing</td>
</tr>
<tr>
<td>May be used to satisfy an infant's basic sucking urge or to regulate the infant's state</td>
<td>1:1 ratio suck/swallow</td>
</tr>
<tr>
<td>Up/down movement jaw movements</td>
<td>2:1 or 3 older baby</td>
</tr>
<tr>
<td></td>
<td>Anterior posterior movement</td>
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</tbody>
</table>
**Sucking**

- Expression develops before suction
- Lack of rhythm precedes rhythmicity
- **Rhythm**: coordinated suction and expression appear at **36-42 weeks**
- NNS more stable than NS before full maturity

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**Sucking Rate**

- Sucking rate represents the length of time it takes the infant to complete one suck
- It is NOT the number of sucks occurring in a given time period
- The length of each suck is the same at the beginning and the end of the feeding
- The non-nutritive sucking rate is FAST, averaging about 2 sucks/second
- The nutritive sucking rate is SLOWER, at 1 suck/second, to allow for the swallow to occur
Swallow

Oral phase > Pharyngeal phase > Esophageal phase

OP: Bolus preparation and manipulation sucking or chewing

PP: Airway protection

EP: Bolus transportation

Independent phases have own sequence of muscle activity; however interdependent

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Swallowing

- Oral Phase: Functions
  - Bolus preparation
  - Can be voluntary event
  - Interaction between voluntary and reflexive components
  - Basic underlying rhythm and movements are controlled by central pattern generators in the brainstem
Pharyngeal Phase Swallowing

- Airway protection
- Create bolus propulsion based on of pressure
  - Closure of oral and nasal cavity
- Base of tongue retraction, hyolaryngeal elevation, epiglottis closure = aspiration prevention
- Upper esophageal sphincter opens

Esophageal Phase Swallowing

- Final phase of bolus from mouth to stomach
- Involves relaxation of UES and LES
- Peristalsis: to propel bolus
Swallowing

- http://www.nature.com/gimo/contents/pt1/images/gimo17-V1.mp4

Sucking-Swallowing-Breathing (SSB)

- Sucking and swallowing are not in isolation of breathing
- Sucking swallowing and breathing are a coordinated triad, with the cessation of breathing during the swallow
Respiration

- **Function**
  - Maintain balance between O2 and CO2
  - Meet the infant's changing metabolic needs
  - Active during feeding, play and sleep

- **Work of Breathing**
  - Feeding = aerobic exercise
  - Assess before, during and after feeding
  - Increase work of breathing has cost for the infant

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Respiration

- **Signs of increased WOB**
  - Nasal flaring
  - Suprasternal retractions
  - Intercostal retractions
  - Head bobbing
Respiration

- Airway Protection
  - Pharynx has a dual role
  - Air to lungs
  - Food to stomach
- Airway protective responses
  - Apnea
  - Laryngeal adduction
  - Swallowing
  - Coughing
  - Mucus secretion
  - Bronchoconstriction

Breathing and Feeding Challenges

- Audible airway noises
  - Stridor
  - Wheezing
- Sound varies depending on location of airway restriction
  - Inspiratory stridor: above glottis
  - Expiratory stridor: lower trachea
- Poor endurance
- Difficulty coordination of suck/swallow/breath
- Alterations in sucking pattern
Neonatal Posture/Position

- Head position
- Flexion: more prone to collapse
- Extension: more resistant to collapse
- Respiratory compromised babies adopt an extended head position
- Need postural stability as a base for feeding
Sucking-Swallowing-Breathing (SSB)

Babies who have difficulty breathing change their sucking pattern:
- Slower sucking rate
- Shorter sucking bursts
- Less rhythmic sucking pattern

Coordination of Sucking, Swallowing + Breathing

- Respiration is suppressed during swallow
- Timing of swallow with breathing:
  - Variability in 1st few weeks
- Always have exhalation after the swallow
Swallowing
(suppression vs. paralysis)

• The muscular contractions involved in swallowing can be suppressed
  • failure to acquire the normal reflex response secondary to cerebral damage
  • immaturity

• Disuse observed in infants who cannot feed for prolonged periods, can suppress the swallowing reflex

Swallowing Problems

Aspiration before the swallow
  Poor bolus formation and retention
  Delayed initiation of swallow reflex

Aspiration during the swallow
  Insufficient laryngeal elevation and closure
  Fatigue: swallow integrity changes

Aspiration after the swallow
  Residue remains in pharynx: decreased pharyngeal peristalsis, decreased pressure, dysfunction of cricopharyngeus muscle, weakness
Swallowing problems

- Aspiration can occur in any of the 3 phases
  - Poor timing of swallow response
  - Decreased bolus clearance

Aspiration may be silent
- No external signs
- No coughing
- No desaturations

Modified Barium Swallow Study

- Normal Swallow
  [http://www.nature.com/gimo/contents/pt1/images/gimo17-V1.mp4](http://www.nature.com/gimo/contents/pt1/images/gimo17-V1.mp4)

Severe pharyngeal dysphagia
- [http://www.nature.com/gimo/contents/pt1/images/gimo17-V2.mp4](http://www.nature.com/gimo/contents/pt1/images/gimo17-V2.mp4)

- Delayed Aspiration
PREMATURE INFANT FEEDING

A SUCCESSFUL FEEDER IS MORE IMPORTANT THAN A SUCCESSFUL FEEDING

40% preemies attend feeding clinics
(Burklow et al, 98)
Synactive Framework for Successful Feeding

• Every experience matters

• Infants vulnerable to sensory overload

• Demonstrate overload via physiologic, motor, state and attentional behaviors/cues

• Caregiver helps infant maintain self regulation through modifying environment and caregiving/feeding

Feeding Readiness

• Continuous Assessment of
• State control and behavior
• Stress cues

• Motor Stress Signs
  • Flaccidity
  • Hyperextensions
  • Finger splaying
  • Leg extensions
Feeding Readiness

• Physiological Stress
  • Respiratory changes
  • Color changes
  • Gagging
  • Straining
  • Hiccups

• State Stress Cues
  • Irritability
  • Tuning out
  • Frenzy
  • Lack of alert state

Als, 1986
Developmentally Supportive Feeding

• Signs of Stability During Feeding
  • Smooth regular respirations
  • Hands midline to the body, good postural control
  • Organized, calm and pink
  • Focused clear alertness
  • Good coordination of suck-swallow-breath

Stability during feeding
Developmentally Supportive Feeding

- Signs of Stress during feeding
  - Change in state of alertness
  - Change in color
  - Change in breathing
  - Change in postural control
  - Change in swallowing

Infant Stressed
Feeding Readiness

- Regulation of feeding is a learned skill
  - Developmental variation
    - Development of sucking pressure
    - Arrhythmic compression/no suction: 32-34 wk
    - Rhythmic compression/no suction: 34-36 wk
    - Coordinated + rhythmic compression
      +suction: 34-40 wk

  *Lau et al, Dysphagia 2001*

Feeding Readiness

- Coordination of suck/swallow/breath
  - Follows a predictable sequence
  - Related to post conceptual age and not experience
  - Swallowing rhythm stabilizes 1st at expense of breathing
  - Often not mature at birth
  - Increasing adjusted age corresponds to more rhythmical sucking rate + suck/swallow rhythm

  *Gewolb, 2001*
Motor Control

- Feeding position can impact feeding skill
- Observe motor response that may indicate stress
- Tongue position/movement
  - Central groove
  - Rhythmic movement
  - Small excursion
  - Compression and suction

Feeding Readiness

- Based on progression of skill development
- Skills versus gestational age
- Individualized developmentally-supportive feeding practice
  - Increased weight gain
  - Full nipple feedings sooner
  - Decreased days on respiratory support
  - Less severe IVH and CLD

Als, 1986
Feeding Readiness

- **Pre-oral feeding**
  - Promote culture of breastfeeding
  - Focus on NNS while tube feeding: breast + pacifier
  - Weight gain is by tube feeding
  - Skin to skin
  - Sensory oral motor stimulation:
    - peri oral and intra oral accelerates transition to oral feeding

_Lau, 2011_
Feeding Readiness

- Series for development of feeding skills
- Pre-oral Feeding: sensory oral motor stimulation
- Kangaroo care
- Introduction of oral feeding (breast/bottle)
- Skill building
- Infant led
- Quality versus quantity of feedings

Feeding Readiness

- Introduction of oral feeding
  - Typically begins at 32-34 weeks
  - Quality is key
    - May see a standard protocol to advance feeds
      - i.e. successful at one full feed, advance to 2 feeds etc.
  - Factors that may delay progression
    - Oral motor skills
      - State Control
      - Physiologic
Feeding Readiness

- Look for early feeding cues: root, suck, body squirm
- Used NNS as sign of readiness
- Late feeding cues: crying
- Readiness can be determined during routine care giving

McCain, 2003

Feeding Readiness

- **Skill building**
  - Optimize baby’s ability for full oral feeding
  - Attention to feeding schedule
  - Quality feeding versus quantity
  - Balance advancement of oral feeding with reducing TF
Flow Rates

- Nipple type
  - Ultra Preemie nipple (33-34)
  - Preemie nipple (34-38)
  - Level 1 Dr. Brown or Slow flow (38….)
  - Level 2 Dr. Brown or standard flow
  - Vented bottles

Bottles and Nipples

Dr. Brown’s bottle: premie and level 1 flow nipple

- Use Dr. Brown’s bottle with the vented system helps to minimize air
  intake and reflux.

Preemie Nipple

- Generally use the preemie nipple with premature babies who are
  learning to feed (weeks 35-38)

Level 1 Nipple

- Use level 1 nipple when baby is at least 37-38 weeks and who needs a
  “suff” slow flow rate similar to a 0-3 month flow nipple however who is
  not strong enough to draw milk from the Gerber Slow Flow Nipple.

*Occupational therapy also has a small stock of ultra-preemie nipples
  and level 1 and 3 nipples. If the above nipples do not meet the baby’s
  sucking skills contact OT to try a different level.
Flow Rate Consistency
Cleft Palate Bottles

Cleft Palate nipples and bottles

- Haberman
  - 3 different flow rates

- Pigeon
  - 2 sizes
  - 1 flow rate

- Dr. Brown
  - 1 size nipple
  - 5 flow rates

Bottles/Nipple type

- Choose a nipple based on baby's ability
- Dr. Brown Preemie…
- Slow flow…
- Vented bottle (reduces reflux)
- Specialized cleft palate bottles
Strategies to Promote Feeding Success

- Reduce negative oral experiences
- Maintain a commitment to breastfeeding
- Use non nutritive oral sucking as early as possible with tube feeding
- Use infant driven feeding readiness cues
- Optimize flow rate during feeding
- Develop a culture that values quality v quantity

Preparing for discharge

- Planning for discharge
  - Breastfeeding: maintain milk supply
  - Integrate breast + bottle: # times per day
  - Monitor intake and need for supplementation
  - Use of fortifiers
  - Community support: Lactation Consultant
  - Occupational Therapy/Feeding Therapy
FEEDING CHALLENGES

Feeding Challenges

- Neurologically impairments
- Complex medical /high respiratory support
  - ECMO: Risk for Right True Vocal Cord injury due to injection into the carotid
  - Cardiac Surgeries: risk of recurrent laryngeal nerve involvement
- Premature Infants: ELBW
- Nutritional and Gastrointestinal issues
- Prenatal Drug Exposure
- Congenial Anomalies or syndromes
Neurological Impairment Statistics

35-48% of infants with varied etiologies of brain injury increase likelihood of early sucking and swallowing difficulties

Slattery et al, 2012

Neurologically based dysphagia
94% silent aspirators


Respiratory Considerations

- Respiratory Distress Syndrome
- Increased respiration rate
- High energy expenditure for breathing
- High aspiration risk
- Reduced aerobic capacity
- Increased caloric needs
- Reduced caloric reserve
- Slower to reach full oral feeds
Tongue Issues

- Tongue tip elevation
  - Compensatory strategy to maintain oral stability
  - Difficult to place nipple/breast

Bunched tongue
- Poor central grooving
- Ineffective tongue movement
- Ineffective latch, tongue chomping

Tongue Issues

- Short Frenulum:
  - Tongue lacks forward and upward movement

  - Latch to breast difficult
Tongue Issues

- Retracted Tongue
  - Poor control between tongue and nipple
  - Decrease central grooving
  - Airway obstruction

Tongue Protrusion
- Difficult to create suction
- Compression greater than suction

Signs and Symptoms of Aspiration

- Desaturations during feeding
- Apneas
- Bradycardic events
- Pulling away from nipple
- Wet vocal quality
- Coughing
- Choking
- Facial color changes
- Poor feeding progression
**Instrumental Swallow Study**

MBSS is performed if there is a suspicion of aspiration and to help guide feeding treatment and feeding progression

- **Signs of aspiration**
  - Wet vocal quality
  - Wet upper airway sounds (nasal penetration)
  - Desaturations during feeding
  - Bradycardic events during feed
  - Color changes (skin, nose, lips)

**Feeding Intervention**

- Support pre oral feeding practice
- Oral sensory motor development
- Train caregivers
- Progress to transitional feeding
- Progress to safe nutritive feeding
Non Nutritive Sucking and Tube Feeding

• Benefits of non-nutritive sucking
  • Tube feeding for shorter time
  • Initiate bottle feeding earlier
  • Decreased intestinal transit time
  • More rapid weight gain
  • Reduce energy expenditure in restless activity
  • Decrease behavioral distress
  • Optimizes link between sucking and feeding

  • Mason et al, 2005

Develop a Sensory Oral Motor Development Program

• Supports weight gain
• Reduce/minimize distress
• Promotes behavioral organization and transition to nipple feeding
• Promote GI Motility

  Fucile et al, 02,
  Rocha et al, 07
Sensory Oral Motor Program

- Pacifier with tube attached

Early Feeding Approaches

- Role of neuro-maturation in the transition to oral feeding
- Lack of oral feeding in infancy may lead to deficits in cortical development because sensory and motor pathways between the oropharynx and cortex are not well established
- Monitor for signs/symptoms of aspiration
- Introduction to gustatory and transitional feeding

- Mason et al, 2005
Feeding Intervention

• Positioning
  • Support Head/shoulders in midline,
  • Flexion of upper extremities and lower extremities

• Environment
  • Low stimulation
  • Calming techniques

• Feeding Time
  • Duration of feeding
  • Frequency of feeding

CASE STUDIES
Baby John

• Birth: born at 30 weeks via C/S due to maternal HELLP, poor prenatal care, with daily heroin use

• Diagnosis: prematurity, RDS>intubation, in utero exposure>on morphine

• Respiratory: intubation (1-2 days)>CPAP (8 days)>2L HFNC>O2

• OT consulted at 32 weeks, intact oral reflexes, with strong stress cues, difficult to engage>transitional feeds with tube feeds for 1-2 days

• 2-3 weeks later: showing nice feeding state control, interest in feeding, strong NNS and NS; however RR 100-115 before, during, and after feed.

• MBS (1 month old)>nasal penetration, laryngeal penetrations (slow flow) and aspiration (fast flow).

• Liberalized to consume 10mls for practice.

• RR improved over the next month but not consistent>referred for Pulmonology consult

• Results of lung biopsy> Pulmonary Interstitial Glycogenosis> trialed steroids

• MBS (2 months old, 1 month follow) had improved RR but still 80s+
  • Showed improved s/s/b coordination but continued to have aspiration>RR

• D/C- 10mls q3 practice, Gtube, OP feeding therapy
Baby Joe

• Born: Term via SVD, discharged 2 days later, admitted from ED for coughing, choking, and turning blue at home during feeds.

• OT consulted at admission, 5 DOL, made NPO, feeding assessment desat to 80 and turned blue with 2mls.

• Referred for esophagram and MBS to r/o TEF and assess aspiration

• TEF-
  • Aspiration+

• MBS showed nasal penetration, poor bolus management, large and frequent aspiration, and poor timing of swallow, residue, swallow weakness>likely neurological

• Referred for repeat Neurological consult>MRI>

• MRI: “Multiple brain parenchymal abnormalities to include small craniofacial ratio, globally diminished white matter volume with thinning of corpus callosum, diminutive midbrain, and medulla, ex vacuo prominence of lateral ventricles, small and dysmorphic appearing cerebellum, and delayed myelination for age”.
INFANT DRIVEN

What Is Cue Based Feeding?

• An evidenced-based approach to feeding
• A feeding practice that better supports the infant
• Focuses on the infant’s feeding cues in the moment, rather than choosing to feed based only on age and arbitrary decision making
• Allows the infant to drive feeding practice
• Focuses on the infant’s developmental readiness to orally feed, physiologic stability, and behavioral cues
• Strong emphasis on including the family in the feeding regimen
The Infant Driven Feeding (IDF) Model

- Copy written feeding model developed by Sue Ludwig and Kara Anne Waitzman to support cue based feeding for preterm infants
  - Sue Ludwig OTR/L CNT University of Cincinnati
  - Kara Waitzman OTR/L CNT, NTMTC Dayton Children’s
- Widely used in NICU’s across the country including BCHO
- UCSF BCH has permission to use the model and scoring system from the developers
- Supports infant in his/her development and learning oral feeding skills
- “Transitioning to oral feeding should be a safe, pleasurable and nurturing experience for each infant and family” Ludwig and Waitzman

The IDF Model

- Three Components
  - Feeding Readiness Scale
  - Feeding Quality Scale
  - Caregiver Techniques
## Feeding Readiness Scale

### Appendix A: Feeding Readiness Scale

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alert or fussy prior to care. Rooting and or hands to mouth behavior. Good tone.</td>
</tr>
<tr>
<td>2</td>
<td>Alert once handled. Some rooting or takes pacifier. Adequate tone.</td>
</tr>
<tr>
<td>3</td>
<td>Briefly alert with care. No hunger behaviors (i.e. rooting, sucking). Adequate tone.</td>
</tr>
<tr>
<td>4</td>
<td>Sleeping throughout care. No hunger cues, No change in tone.</td>
</tr>
<tr>
<td>5</td>
<td>Significant HR, RR, O2 or WOB outside of baseline.</td>
</tr>
</tbody>
</table>

***Baby needs to score a 1 or a 2 to attempt oral feeding***

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Score 1: **Alert or fussy prior to care, rooting or hands to mouth behavior, good tone**
Score 2: Alert once handled, some rooting, or takes pacifier, adequate tone

Score 3: Briefly alert with care, no hunger behaviors (rooting, sucking) adequate tone
Score 4: *Sleeping throughout care, no hunger cues, no change in tone*

Score 5: *Significant HR, RR, O2 or WOB outside baseline*
# Quality Of Nippling Scale

Appendix B: Feeding Success Scale

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Nipples with a strong coordinated suck throughout feed.</td>
</tr>
<tr>
<td>2</td>
<td>Nipples with a strong coordinated suck initially but then fatigues.</td>
</tr>
<tr>
<td>3</td>
<td>Nipples with consistent suck but has difficulty coordinating swallow, some loss of liquid or difficulty pacing.</td>
</tr>
<tr>
<td>4</td>
<td>Nipples with a weak/inconsistent suck, little to no rhythm, may require some rest breaks.</td>
</tr>
<tr>
<td>5</td>
<td>Unable to coordinate suck-swallow-breathe pattern despite pacing, may result in frequent A/B's or large amount of liquid loss or increased HR.</td>
</tr>
</tbody>
</table>

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# Infant-Driven Feeding Scales© (IDFS) – Caregiver Techniques Score Description

<table>
<thead>
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<th>Score</th>
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<td>Modified Sidelying: Position infant in inclined sidelying position with head in midline to assist with bolus management</td>
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<td>B</td>
<td>External Pacing: Tip bottle downward/break seal at breast to remove or decrease the flow of liquid to facilitate SSB pattern</td>
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<td>Specialty Nipple: Use nipple other than standard for specific purpose ie. nipple shield, slow-flow, Haberman</td>
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<td>Chin Support: Provide gentle forward pressure on mandible to ensure effective latch/tongue stripping if small chin or wide jaw excursion</td>
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Modified Side Lying Position

- Modified side lying position helps infants manage flow
- Baby's head is higher than hips with head and body aligned
- Full support offered at baby's head and back
- Helps to conserve energy (decreased WOB)
- Reduces reflux
- Slows the flow rate of the bottle
- Mimics the position for breastfeeding
- Allows the bolus to fall to the side of the mouth instead of the back of the pharynx
Side lying Position

External Pacing

- Tip the bottle downward/break the seal at the breast to remove or decrease flow of liquid to facilitate SSB pattern
- Tipping the bottle will allow infant to swallow liquid to then take a breath.

Infant cues that indicate need for pacing:
- Eyebrow raising/ big eyes
- Pulling back
- Milk leaking
- Choking
- Nasal flaring
- Apnea
- Desaturations
Specialty Nipple

- Indication: infants having difficulty managing flow, small chin, poor lip seal, or cleft lip/palate

Infant signs that this may be needed:
- Poor latch
- Big eyes/eyebrow raising
- Milk leaking
- Sucking but not getting anything out
- Apnea/ desaturations
- Choking

Nipple shield: facilitates sucking pattern by increasing oral sensory input
Slow flow nipple: reduces rate allowing for safer feeding
Haberman: cleft lip/palate (only use for premature babies who has a cleft lip/palate)

Chin Support

- Provide gentle forward pressure on mandible to ensure effective latch/tongue stripping, if small chin, or wide jaw excursion
- Signs this may be needed:
  - Smacking noise (break in the intra oral seal)
  - Increased air intake
  - Inefficient eating (sucking a lot but not producing much)

Caution: if not indicated for infant, chin support can make the feeding inefficient and a negative experience. This can lead to oral aversion.
Cheek Support

- Provide gentle unilateral support to improve intra oral pressure
- Indication: infants with poor lip seal
- Signs this may be necessary:
  - Milk leaking

Frequent Burping

- Indication: infants who have slowed down eating or for whom the nipple was removed from mouth due to choking or other reason
- Signs it may be needed:
  - Infant not sucking and without signs of stress
  - Squirming or baby changes his position
How Does The IDF Model Work?

- RN will automatically begin Infant Feeding Readiness Scoring at 32 weeks
  - Per nursing infant driven feeding guideline
  - Scores will be documented in Apex and reviewed daily during rounds
  - Infant can be non-nutritively breast feeding during this time
- **Once an infant scores 1-2 for readiness 50% of the time in a 24 hour period they may begin oral feeds**
- **Provider will order oral feeds (bottle or breast) in the infant feeding panel order set**
- RN will assign a readiness score at each subsequent feeding and infant will be offered an oral feed anytime they score 1 or 2

How Does The IDF Model Work-Cont’d

- RN or parent will monitor the infant’s cues throughout each feeding. Feed may last as long as baby is:
  - Actively engaged in feeding
  - Physiologically stable
  - Shows no signs of disengagement or distress
- **Gavage remainder of feed if infant shows signs of disengagement or distress**
- Daily review on rounds of the following components:
  - Readiness Score
  - Quality Score
  - Techniques utilized
Breast Or Bottle Feed?

- Support breast feeding as long as mom is engaged and available
- Exclusive breast feeding for at least 3 days before initiating any bottle feedings
- When mother is available and baby showing feeding readiness breast feed
- When mother not available and baby showing feeding readiness bottle feed (after first three days of protected breast feeding)

Breast Feeding Algorithm

- 1-5 quality score. 0-5 minutes. Gavage all
- 1-3 quality score. 5-10 minutes. Gavage 2/3
- 1-3 quality score. 10-15 minutes. Gavage 1/3
- 1-3 quality score. > 15 minutes. No Gavage
- *Per RN discretion i.e. EBM production is adequate (per review of pumping volumes - meets or exceeds infant’s feeding volume goal) & audible swallows
- **Protected breastfeeding time of 3 days for engaged and available mother
How To Progress To Ad Lib Feeding

• Process for advancing to ad lib feeds will be similar to what we do now
• When baby is taking >80% of volume by mouth AND has good quality scores the NG tube will be removed
• We will move to ad lib on demand q2-4 hour feeds
• Shift minimums will not be used
• Most babies that have reached this point will do well if allowed to self regulate over 2 to 3 days with ad lib on demand

What is Our Score? Should We Feed?
Rate Feeding Performance

References


References


