Feeding Outcomes, Developmental Care and Culture Change in the Neonatal Intensive Care Unit

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Disclosures

- Financial Disclosures
  - Full time, salaried speech pathologist for Prisma Health
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  - None to report

Disclosures

- Emotional

Objectives

- Describe evidence based pre-feeding and feeding therapy interventions for preterm infants in the NICU.
- Define core measures of neuroprotective developmental care.
- Identify at least three strategies for influencing culture change within clinical practice.

- 26 beds, Level III NICU
- First private room unit in the state
- Four neonatologists
- One speech pathologist
- One occupational therapist


SCRUB BRUSHES
SCRUB BRUSHES
SOAP

https://www.youtube.com/watch?v=J2duS19-LjA&list=PLN0BCjq-YUqZZ4Xkp7zFvbvhl-Q0zlFQh#action=share

Preterm Birth in the United States

- Premature birth and its complications are the number one cause of death in babies in the United States
- 500,000 babies are born prematurely in the U.S. each year
- The preterm birth rate nationally is 9.8%, about 1 in 10 babies
- U.S. preterm birth rate is among the worst of high resource nations

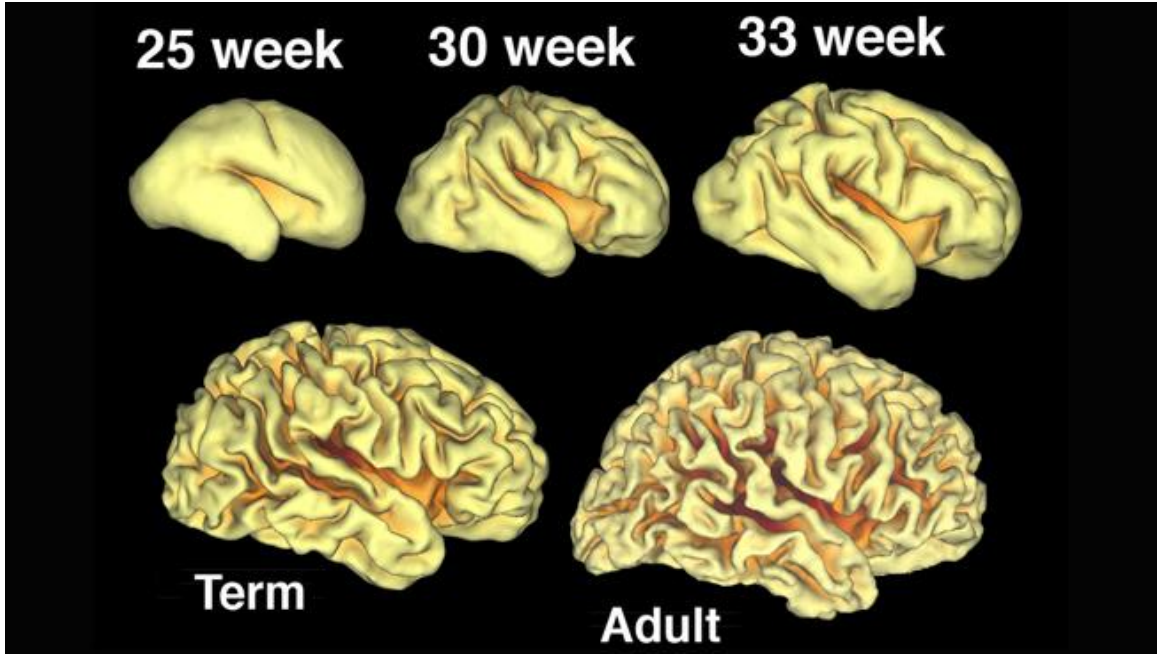
(March of Dimes)

Preterm Birth in South Carolina

- Prematurity grade of D-
- Preterm birth rate of 11.3%
- Of preterm births in SC, ~15% are to African American mothers
  - 56% higher than the rate among other women
- Richland County: grade F, 12.4% preterm birth rate

(March of Dimes)

What we do and how we do it matters!



In Utero Sucking and Swallowing Development

- Ultrasound studies have revealed suckling and swallowing in most fetuses by 15 weeks gestation
- Fetal swallowing is important for the regulation of amniotic fluid volume and composition, recirculation of solutes from the fetal environment, and maturation of the fetal gastrointestinal tract
- Consistent swallowing seen at 22-24 weeks gestation
- Stable NNS at 34 weeks gestation, emergence of suck-swallow-breathe coordination at 34 weeks gestation
- Stable/mature suck-swallow-breathe at 36-37 weeks OR BEYOND
- The near term fetus swallows amniotic fluid at a volume of about 500–1,000 ml/day

(Delaney and Arvedson, 2008)

- 25 weeks of swallowing practice in utero
- Requires no invasive oral interventions such as feeding tubes or endotracheal tubes
- Can immediately begin feedings by mouth at birth

- Only 9 weeks of swallowing practice in utero
- Immediately required invasive oral intervention of intubation and mechanical ventilation
- Not mature enough to have developed NNS
- Multiple co-morbidities increase infants risk for poor feeding outcomes
- Must now endure the overwhelming ex-utero environment while developing oral motor skills

Early Intervention in the NICU

Benefits of Pre-Feeding Therapy

- Systematic review of 19 studies suggest that oral stimulation interventions can shorten transition to oral feedings, reduce length of hospital stay, and decrease time spent on gavage feeding (Greene et al., 2016)

- Non-nutritive sucking significantly reduces the number of days to reach total oral feedings (Arvedson et al., 2010)

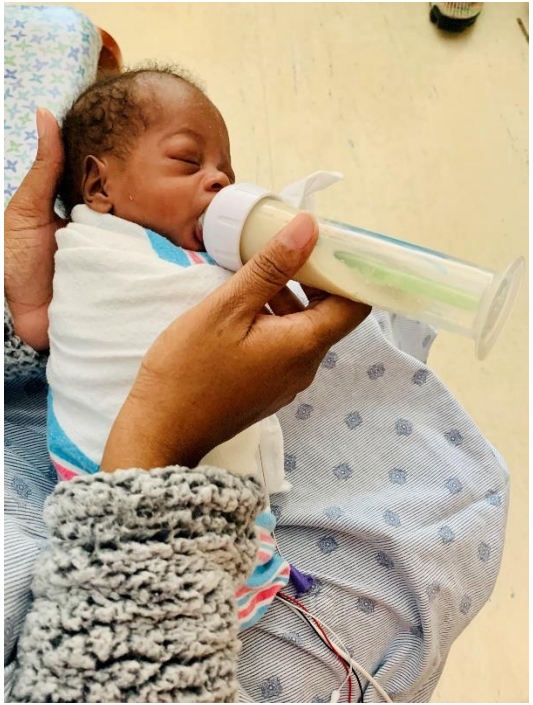
- VLBW infants who received 15 minutes 2x per day of oral stimulation attained independent oral feedings more rapidly, greater suction and expression amplitude and decreased episodes of deglutition apnea (Fucile et al., 2012)

Pre-Feeding Therapy Progression & Goals

- Tolerate tactile input/handling without distress cues
- Tolerate peri-oral stimulation
  - Support hands to mouth--focus on function!
  - Develop strong rooting reflex—support the motor map!
- NNS
  - Own hands, gloved finger, pacifier—only when infant showing rooting, acceptance, & readiness!
- Small tastes/droplets of BM or formula to facilitate purposeful swallows
- Consider No Flow nipple when demonstrating more consistent NNS

Feeding Interventions

- Nipple flow rate
- Swaddling
- Elevated sidelying position
- Pacing/Co-regulation



Benefits of Slow Flow Nipples

- Slower flowing nipples allow infants to breathe more frequently, maintain better oxygenation, & endure oral feeding longer
- In controlled studies, with a slower flow rate, infants have been shown to have increased intake, shorter feeding times, and more efficient sucking
- Research suggests that feedings focused on quality and positive experiences including physiologic stability & motor organization may improve outcomes post-discharge
- Increases opportunities for positive feeding experiences with better long-term outcomes

(Al-Sayed et al., 1994, Matthew 1991, Chang et al., 2007, Thorye et al., 2014, Horner et al., 2014)

Consequences of Faster Flowing Nipples

- As milk flow increases, swallowing frequency also unnecessarily increases which interrupts normal ventilation and affects physiological stability of the infant
- In medically fragile infants, such as premature infants, who are less able to self-regulate, a faster flow rate requires swallowing that is too rapid and increases the risk for aspiration, diverts milk out of the oral cavity anteriorly, and/or forces infant to stop feeding altogether
- Infants change their sucking negatively to slow the flow when it is to fast to protect their airway to include decreased tongue cupping, decreased elevation of tongue, & loosing fluid anteriorly from oral cavity
- Increased opportunity for negative feeding experiences and poorer long-term outcomes

(Al-Sayed et al., 1994, Matthew 1991, Schrank et al., 1998)

Knowing the Flow

TABLE 3. Results of Cluster Analysis

Flow Category	Nipple Brand and Type	Mean Flow Rate (Range)
Extra Slow	Philips Avent Natural First Flow	0.86 (0.15-1.19)
	Philips Avent Natural 0mos+	2.25 (1.49-2.74)
	nfant Labs Extra Slow	3.30 (2.6-3.77)
	Dr. Brown's UltraPreemie	4.92 (4.09-5.73)
Slow	nfant Labs Slow	5.99 (5.10-6.62)
	Dr. Brown's Preemie	7.22 (4.35-8.37)
	Playtex Ventaire Full Sized	7.35 (5.65-10.29)
	Playtex Ventaire Breastlike	7.37 (6.10-9.86)
	Similac single-use Slow Flow	8.04 (6.59-13.28)
	Playtex Baby Naturalatch 0-3m	9.47 (7.66-12.88)
	Comotomo Slow Flow (0-3 mos)	9.76 (6.05-12.49)
	nfant Labs Standard	10.32 (9.12-11.79)
Medium	Enfamil single-use Slow Flow	13.24 (9.93-17.39)
	Gerber First Essentials	13.26 (9.85-20.17)
	Dr. Brown's Level 1	13.31 (11.51-14.59)
	Evenflo Classic Slow Flow 0m+	13.63 (10.66-20.64)
	MAM Anti-colic 0mos+	13.83 (13.04-15.68)
	Tommee Tippee Closer to Nature 0m+	15.90 (14.05-17.08)
	Tommee Tippee Anti-colic 0m+	16.23 (11.28-20.30)
Fast	Philips Avent Anti-colic 0mos+	17.44 (16.31-18.5)
	Similac single-use Standard Flow	18.49 (10.55-26.61)
	Enfamil single-use Standard Flow	19.14 (14.09-21.78)
	Similac single-use Premature	19.17 (13.53-26.82)
	Medela Wide-Base Slow Flow	22.03 (17.97-25.61)
Very Fast	Medela Calma	37.61 (35.54-39.96)

Pados et al., 2018


Dr Brown's


Dr Brown's
Natural Flow

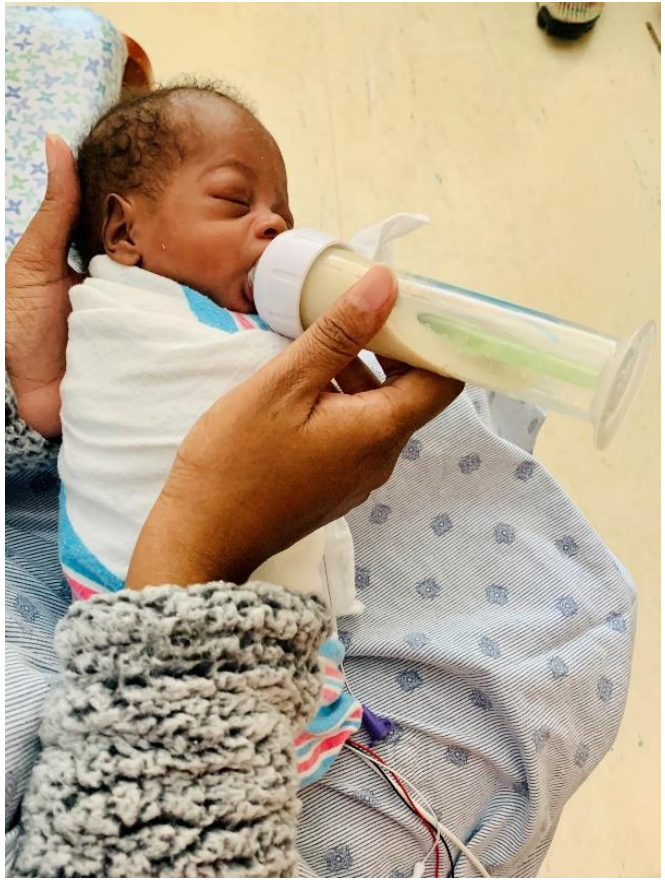
Swaddling

- Support developmentally appropriate, midline positioning
- Reduce energy expenditure
- Elongate body to maximize tidal volume and breath support


back is best

Elevated Sidelying Position

- Clark, 2007
  - Elevated sidelying is common position for infant feeding naturally at the breast. Shown to provide better coordination of breathing with swallowing and less disruption in breathing.
- Litman et al, 2005
  - Elevated sidelying reduces work of breathing by requiring less antigravity movement during breathing and promoting better patency of the upper airway
- Park, 2014
  - Very preterm infants fed in the elevated sidelying position demonstrated significantly less severe and fewer decreases in heart rate, respiratory rate that was closer to the pre-feeding state, shorter and more regular intervals between breaths and briefer feeding-related apneic events. No significant difference for O2 sats.



Pacing/Co-Regulation

- Paced, infants demonstrated significant decreases in bradycardic incidences and gains in development of more efficient sucking patterns in discharge (Law-Morstatt, et al., 2003)

- Showed pacing is very effective with medically compromised infants, especially those with respiratory compromise as it supports respiratory organization (Gewolb, et al., 2006)

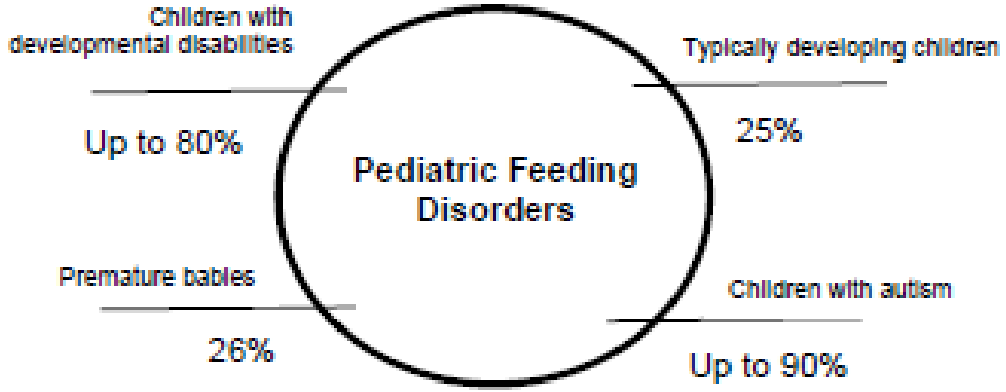
- https://www.youtube.com/watch?v=6E66ErDjt_o

- https://www.youtube.com/watch?v=qFKIP67IWDM&t=327s

Long Term Impact of Early Feeding Experiences

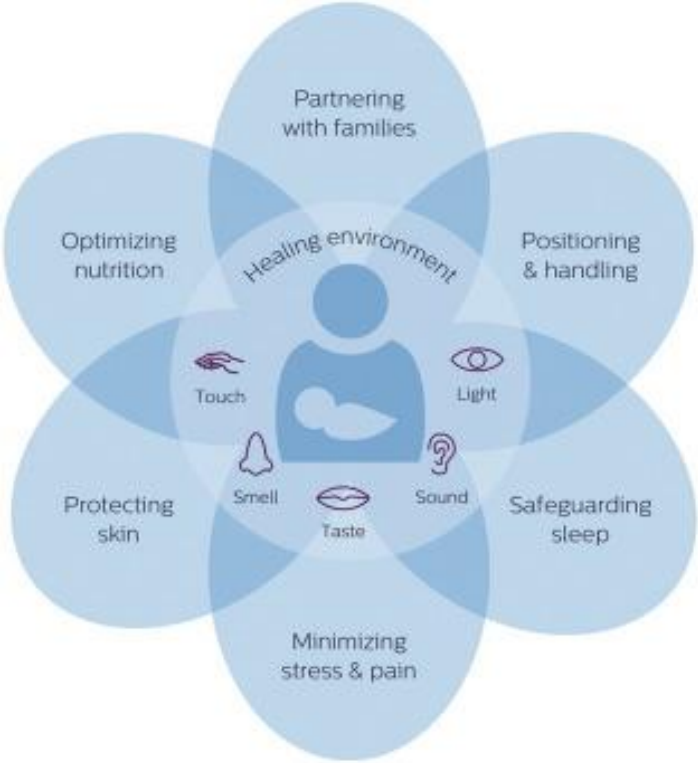
Believe it or not...

Incidence of pediatric feeding disorders beyond the acute care stay



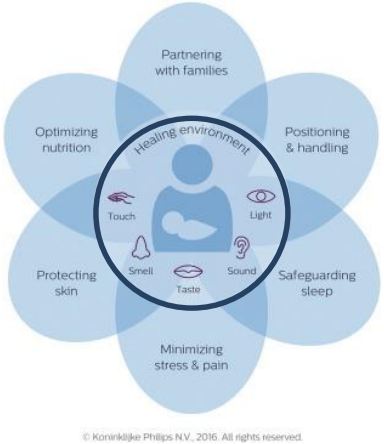
(Manikam & Perman, 2000; Patel & Piazza 2001; Field et al., 2003; Sullivan et al., 2000; Martin et al., 2005; Schreck, 2004; Willaiams et al., 2000.)

Neonatal Integrative Developmental Care Model



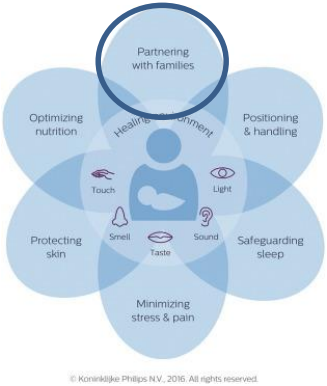
Healing Environment

- Sensory Input
- Skin to Skin Care



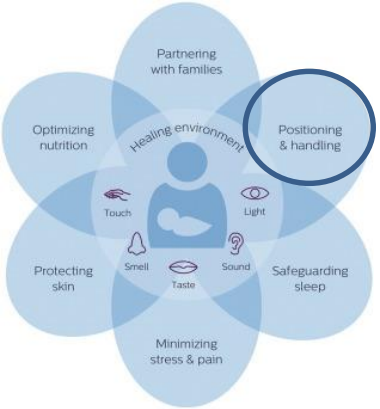
Partnering with Families

- Dignity and respect for all families
- Collaboration, communication & information
- Thoroughness of parental education



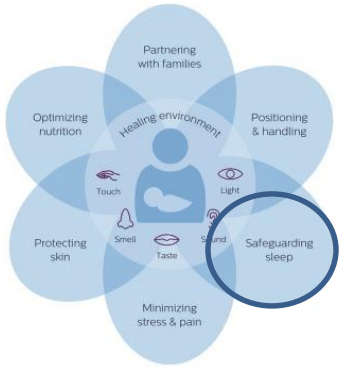
Positioning and Handling

- Swaddling
- Developmentally appropriate positioning in the isolette or bassinette
- Minimizing distress



Safeguarding Sleep

- Proceed with pre-feeding treatment around RN assessments and gavage feeds
- Educate parents on importance of sleep for growth and maturation

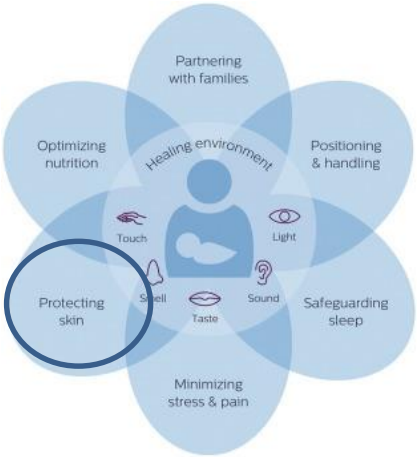


Minimizing Stress and Pain

- Two person care (i.e. replacing NGT, heel stick, etc.)

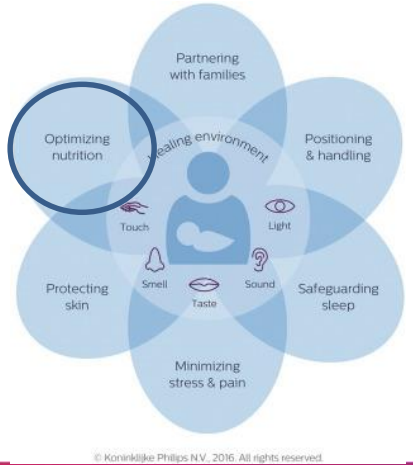
Protecting Skin

- Seek information and education from nursing staff before removing or applying any adhesive
- Diaper rash care



Optimizing Nutrition

- Feeding readiness cues and cue-based feeding
- Supporting breastfeeding (pumping and at mother's breast)



Culture Change in the NICU

“When frustration wins, babies lose.”

-Sue Ludwig, NANT

Volume Driven Culture

TABLE 1 ■ Volume-Driven Strategies[31]

- Removing blanket and feeding unswaddled
- Increasing flow rate
- Prodding
- Chin/cheek support
- Putting infant's head/neck back
- Continuing to feed despite signs of
  - Mild physiologic instability
  - Swallow-breathe incoordination
  - Disengagement

Shaker, 2013

Disengagement

TABLE 2 ■ Signs of Infant Disengagement During Feeding

• No active rooting, no active sucking
• Inability to realert, passivity
• Pulling off the nipple, pushing the nipple out
• Purposeful use of a weak or "compression-only" suck to signal a preference for return to only pacifier sucking instead of nutritive sucking

Shaker, 2013

Distress Cues

TABLE 3 ■ Signs of Stress During Feeding[17]

- Change in state of alertness
- Change in postural control or tone and movement patterns
- Change in cardiorespiratory behavior:
  - Color change from baseline (pallor, cyanosis)
  - Respiratory fatigue
  - Tachypnea
  - Nasal flaring and/or blanching
  - Chin tugging
  - Shallow short breaths instead of a series of deep breaths
  - Unstable saturations
  - Bradycardia, apnea
- Uncoupling of swallowing and breathing reflected in:
  - Loss of bolus control orally ("drooling")
  - Gulping
  - Gurgling sounds in the pharynx
  - Multiple swallows to clear bolus
  - Coughing and/or choking

Shaker, 2013

Cue-Based/Infant Driven Feeding Culture

TABLE 4 ■ Supportive Infant-Guided Interventions

• Providing a more controllable flow rate to protect the immature preterm infant[35–40]
• Providing an elevated side-lying position[31,41,42]
• Providing supportive swaddling to optimize postural stability and control[17,43]
• Providing co-regulated pacing and resting infant during feeding to avoid uncoupling of swallowing and breathing[17,32,34,44,45]
• Providing support for state regulation through re-alerting or calming[17,21]
• Using a developmentally supportive framework for feeding with preterms and their families[14,17]
• Avoiding prodding[20,46]

Shaker, 2013

How Do You Get There?

- Find a physician champion & stay in touch with your neonatologists!
- Develop guidelines for SLP consultation—modify as needs change
- Take pride in small victories!
- Make changes one professional relationship at a time—mutual respect and friendship will take you anywhere.

Tips and Tricks for Changing Nursing Feeding Culture

- Get to know your nurses!
- In-service both shifts—make sure you have a connection with your night shift RNs
- Stay involved in education
- Invite your nurses to be involved in the assessment and recommendations of the infants
- Value their opinion!


Survey
SAYS

When a full time speech pathologist started on my unit, my impression was...

I was completely opposed to speech pathology in the NICU. Why did we need to change the way we feed?	0%
Not exactly in agreement with an SLP in the NICU but open to learning more.	23.5%
Agreed that some pre-term infants would benefit from SLP services but did not think all babies should be evaluated.	52.9%
Accepting of the SLP & interested to learn more about the speech pathologist's role in the NICU.	17.6%
No opinion	5.9%

My first impression of the speech pathologist on my unit was...

She has no idea what she is talking about, & I do not agree with her opinions about infant feeding.	6%
She seems knowledgeable but I am not sure I agree with her recommendations.	47%
She is collaborative, knowledgeable and helping our babies feed better.	47%
No opinion.	0%

When the SLP first started in the NICU, my belief about bottle nipples was...

Most babies should feed with a standard nipple &/or I hate slower flow nipples/Dr. Brown's bottles.	12.5%
Some babies need a slower flow nipple.	81.3%
All babies would benefit from a slower flow nipple.	0%
I am excited to have Dr. Brown's bottle in our NICU.	6.3%
No opinion	0%

When the SLP first arrived, how did you feel about monitoring feeding cues?

What are feeding cues?	0%
Who cares about feeding cues? I can feed a rock!	5.9%
I need strict physician's orders telling me when I can feed the baby.	0%
I want to be more mindful of the baby's cues but our orders/feeding culture don't allow it.	76.5%
I want to learn more about cue-based feeding and how to change our culture.	17.7%

Since having the SLP in my NICU for >3 years, my current impression of the SLP is...

I still do not agree with having a speech pathologist on the unit--our feeding practices were fine.	0%
I enjoy having the speech pathologist on the unit but sometimes still question her recommendations.	23.5%
I am happy that the speech pathologist evaluates most of our babies and helps progress their feeding.	76.5%
Still have no opinion.	0%

Since having the SLP in my NICU for >3 years, my beliefs about bottle nipples are...

Bring back standard nipples! Slow flow nipples don't work!	0%
I wish we would get rid of Dr. Brown's bottles.	0%
I like Dr. Brown's bottles for certain infants but think we overuse them.	56%
Dr. Brown's bottles and nipples have helped our babies feed more safely & progress more quickly.	44%
Still have no opinion.	0%

Since having the SLP on my unit for >3 years, my beliefs about monitoring feeding cues are....

I still don't think we need to watch for feeding cues. I prefer to following strict orders and schedules.	0%
I still don't feel comfortable identifying feeding cues and like to stick to a PO feeding schedule.	6%
I am comfortable identifying feeding cues & feel this is helping our babies be more successful.	82%
I am excited for cue-based feeding to come to my NICU!	12%
Why are we talking about feeding readiness cues?	0%

- The SLP has been very friendly and informative . She has been very patient with our babies, families and nurses. She has shown us that she cares about what is best for our babies in all situations. She listens to our concerns as nurses also and helps make the best decisions for our tiny patients.

- She was good at and knowledgeable about what she does. She was also consistent in her care and recommendations, contrary to nurse's beliefs. Upon talking to and getting to know her I realized she truly has the baby's best interest at heart and does not own stock in Dr. Brown's. LOL! She is eager to teach us when we are open to learning and this has helped tremendously.

- It is really helpful to have SLP come and make recommendations about PO feedings. I do not believe every baby needs a Dr. Brown’s bottle. They have been beneficial to many of our premature babies with feeding difficulties but it becomes cumbersome to wash and keep clean the bottles (when sometimes even our full term babies without feeding difficulties have them). I think we need a better protocol for cleaning the bottles. I would also be interested in seeing maybe some other brand bottles on the unit as there may be other shapes/sized nipples that Dr Browns does not make.

- Explaining the why behind the recommendations she makes and teaching what we should look for or how to improve the bottle feeds of each baby

Volume Driven Outcomes

Volume Driven Culture, PO progression model, PO initiation at 32 weeks GA, feeding on up to 4L HFNC

- N = 52
- Average GA: 29.9w
- Average PMA at PO initiation: 32.9w
- Number of days to full PO feeds: 21.8
- Average LOS: 45.5 days

Volume Driven Culture, PO progression model, PO initiation at 34 weeks GA, feeding on 2L HFNC or less

- N = 43
- Average GA: 30.8w
- Average PMA at PO initiation: 34.5w
- Number of days to full PO feeds: 17.8
- Average LOS: 43.8 days

When Culture Starts to Change

- Baby M
  - Born 31w3d GA at 1200g
  - Started PO feeds at 34w1d PMA
  - 17 days to full PO feeds

When Culture Starts to Change

- Baby G
  - Born 31w6d GA at 1760g
  - Started PO feeds at 34w3d PMA
  - 12 days to full PO feeds

When Culture Starts to Change

- Baby H
  - Born 31w1d GA at 1170g
  - Started PO feeds at 35w6d PMA
  - 3 days to full PO feeds

Nurse T

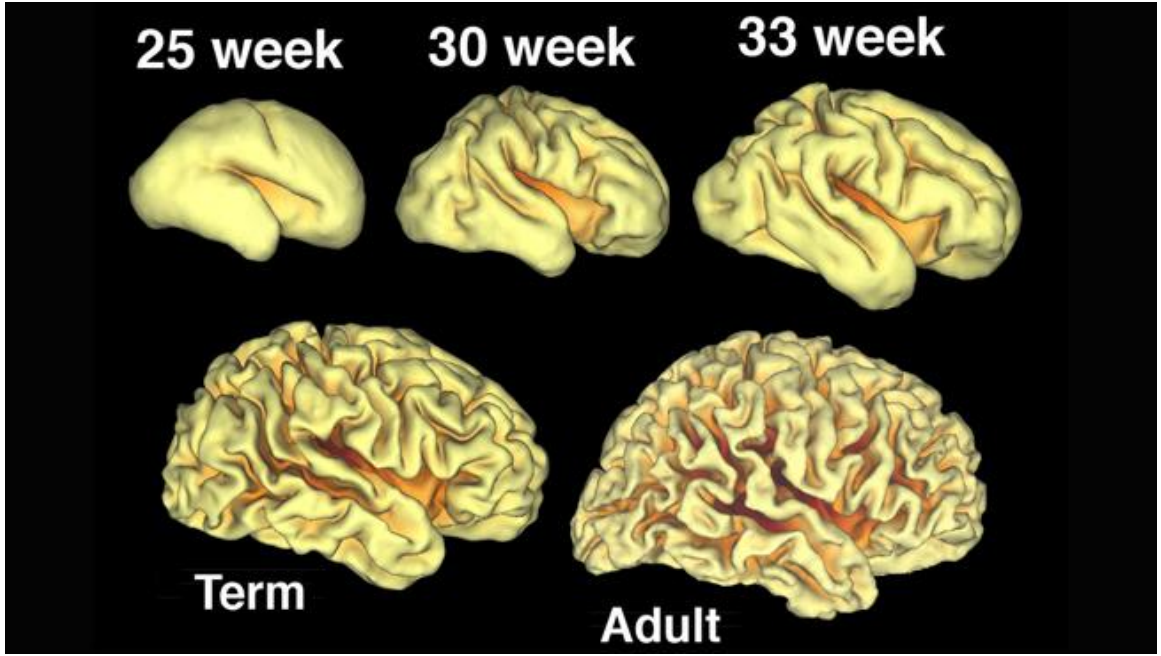
Dr. S

Where are we now?

- SLP has standing orders to consult on all premature infants and any term infants with high risk feeding (typical caseload of 10-20)

- Cue-Based Feeding coming April 2020!

What we do and how we do it matters!



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QUESTIONS?