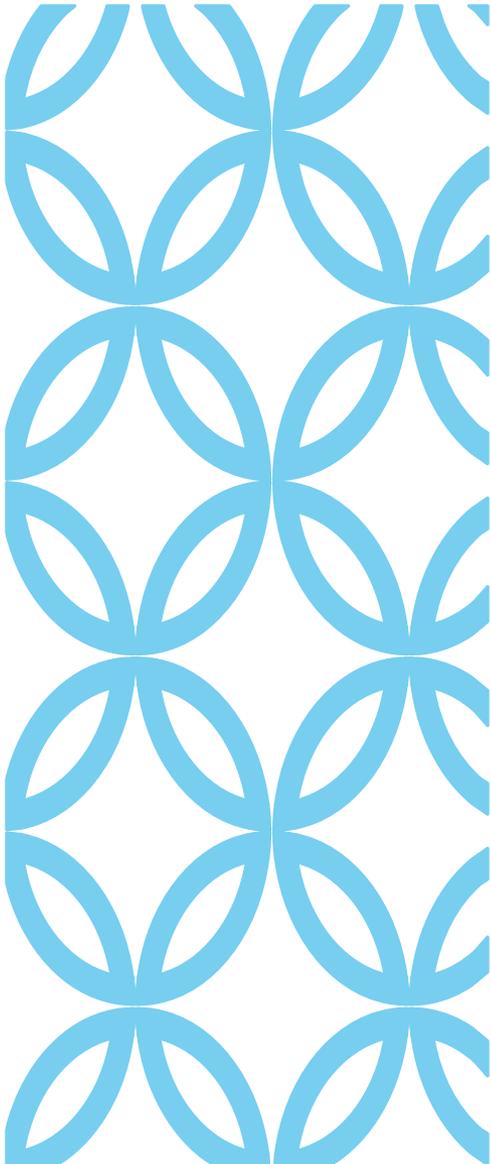


FEEDING 101

Amanda Lovercheck,
MS, CCC-SLP
NICU Feeding Specialist



Holding baby skin to skin, especially during gavage feedings

Offering the pacifier when the baby is awake

Providing colostrum or breast milk for oral cares and milk drops

Placing a scent cloth near baby's face when they are unable to be held

PRE-FEEDING

ORAL CARES AND MILK DROPS

Oral Cares/Oral Immune Therapy: provides baby with colostrum and breastmilk to improve overall immunity

Milk drops: provides baby with drops of milk to their lips to allow for a natural progression to feeding. Allows for positive feeding related experiences to occur from the beginning.



INFANT DRIVEN FEEDINGS

Feeding Safety
Assessment

Assessing cues

Quality score

FEEDING SAFETY ASSESSMENT (FSA)

- Completed when corrected to 32 weeks
- Or when corrected to 34 weeks if exclusively bottle feeding
- Pay attention to RR with handling

NICU - Feeding Safety Assessment

NICU - Feeding Assessment

NICU First Feeding Criteria

Corrected age of \geq 32 Weeks
 \leq 1.0 L High Flow Nasal Cannula

Medical Stable Indicators [Check all that apply](#)

	Yes	No
Gag/cough reflex present		
Audible cry		
Absence of stridor or if stridor, has normal ENT exam	X	
Swallows saliva/secretions		
Maintains O2 sats \geq 90% when sucking on a pacifier	X	
Maintains O2 sats \geq 90% with holding, position change or handling	X	
Respiratory rate \leq 65 with handling	X	

If not met, infant is NOT ready to be assessed for medically stable indicators or to oral feed at this time.

"Yes" Responses to all the above Medically Stable Indicators?

Yes No

If No:
- Will be tasked to reassess in 24 hours
- Continue current feeding orders

If Yes, complete tasks Below

Feeding Safety Assessment order DC'd

ASSESSING CUES

NICU - Feeding Cues

Reference

NICU - Feeding Cues

CarePlan information
 Chart guide
 Nurse preparation
 Patient education
 Policy and procedure

NICU Oral Feeding Cues Assessment

Infants are to be scored before each feeding time. An infant must have a score of 1 or 2 (all cues present) at least 5 times within a 24 hour period before oral feedings will be initiated. Once orally feeding, the score before each feeding is to be used to determine whether the infant may orally feed or is to be gavage.

Feeding Cues Description	Score/Action
<ul style="list-style-type: none"> Alert or fussy prior to cares. Good tone. Rooting and /or brings hands to mouth. 	> ALL CUES MUST BE PRESENT 1 Cues May Oral Feed
<ul style="list-style-type: none"> Alert once handled. Adequate tone. Some rooting or takes pacifier. 	> ALL CUES MUST BE PRESENT 2 Cues May Oral Feed
<ul style="list-style-type: none"> Briefly alert with cares. No change in tone. No hunger behaviors (i.e. rooting or sucking). 	3 No Cues Gavage
<ul style="list-style-type: none"> Sleeps through cares. No change in tone. No hunger behaviors (i.e. rooting or sucking). 	4 No Cues Gavage
<ul style="list-style-type: none"> Significant autonomic changes outside safe parameters: <ul style="list-style-type: none"> Needs increased oxygen to maintain saturations > 90% with cares Desaturations, apnea and/or bradycardia with cares or during holding. Increased heart rate or respiratory rate (20% over baseline) and/or increased work of breathing during cares. 	5 Gavage

Note: Feeding Cues Assessment was adapted from the Infant Feeding Driven®- Readiness Scale with permission

Tone

Alertness

Cues

Infant must have all 3!

QUALITY VS. QUANTITY

Feeding quality

arePlan information

Chart guide

Nurse preparation

Patient education

Policy and procedure

Feeding Quality Score

Score	Description
1	Nipples with a strong coordinated Suck/Swallow/Breathe (SSB) throughout feeding
2	Nipples with a strong coordinated suck coordinated SSB but fatigues with progression
3	Difficulty coordinating SSB despite consistent suck (gulping, liquid loss, requires pacing)
4	Nipples with weak/inconsistent SSB. Little to no rhythm (more mouthing than sucking, takes small amounts)
5	Unable to coordinate SSB pattern. Significant change in HR, RR O2 , work of breathing outside of safe parameters or clinically unsafe swallow during feeding

Infant Driven Feeding Scale© (IDFS)- Quality used with permission

THE ANATOMY OF THE SWALLOW



FEEDING MECHANICS

- ❖ Infants must create suction and compression in order to transfer milk via breast or bottle.
- ❖ Suction is created when a baby closes off their oropharynx. This is done when the soft palate rises up to contact the pharyngeal walls and seal the oral cavity posteriorly.

FEEDING MECHANICS

- ❖ As the tongue and jaw drop during sucking, the oral cavity increases in size, and negative pressure is generated (suction), drawing milk from the breast or bottle.
- ❖ Suction and wave-like movement of the tongue help milk transfer during breastfeeding and bottle feeding.

FEEDING MECHANICS



<https://youtu.be/erDmDWMXEH8>

0:50-1:30

PROTECTING FEEDING EXPERIENCES

Feeding difficulty in the NICU can lead to long-term feeding problems

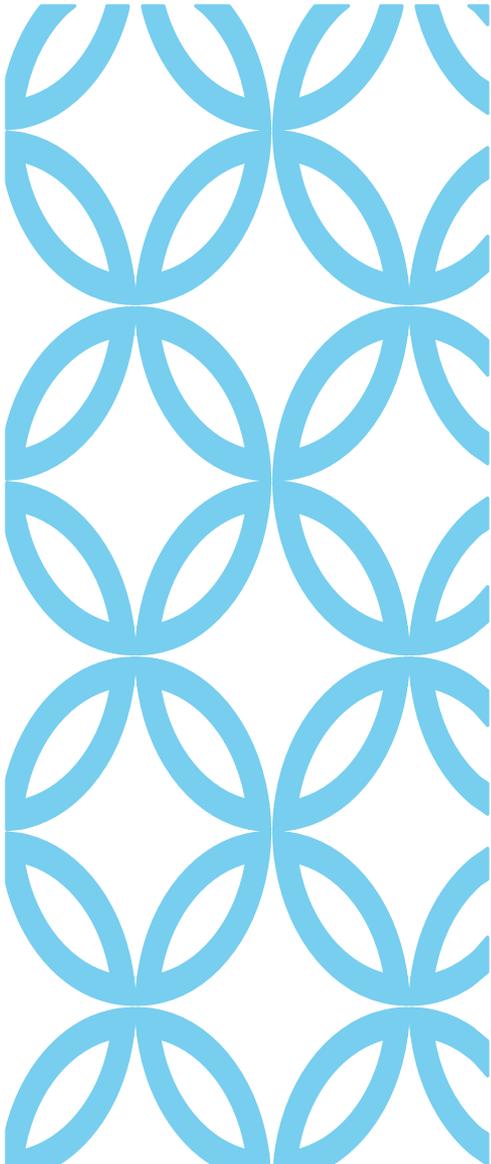
Feeding difficulty can lead to poor infant – parent bonding

Cue based feeding resulted in earlier achievement of full feedings

Consistency and continuity of feeding practices lead to improved feeding performance

Volume driven practices can lead to force feeding infants

Feeding difficulties prolong time hospitalized



Experience matters, especially every feeding experience in the NICU.

All too often, infant feeding is a time when infants experience stress

Desaturations, bradycardia, choking

Infants use more energy when they have to respond to stress, which results in fatigue.

**FROM THE INFANT'S
PERSPECTIVE...**

RESPONDING TO INFANT STRESS

- ❖ Significant results can be caused from missed stress cues.
- ❖ Inconsistent caregivers may not be sensitive to subtle signs of stress for individual babies.
- ❖ Concerns may include specific ways individual infants show stress, supportive interventions, and individualized feeding interventions.

HOW DO WE KNOW WHEN THEY ARE READY?

- ❖ Is the baby able to hold its body in a flexed position with arms and hands toward midline?
- ❖ Is the baby in an awake state? Was the baby awake prior to the feeding and did they cry/fuss prior to the feeding before or during cares?
- ❖ Does the baby show energy to feed? Maintaining muscle tone and body flexion during cares or do they lose flexion and fall into extension with arms and legs?
- ❖ Is attention directed towards feeding? Does the infant search for the nipple or open lips promptly (tongue also descends) to receive the nipple?

MAINTAINING ENGAGEMENT DURING THE FEEDING

Engagement is an important factor in infant participation during a feeding. Engagement requires energy and attention.



Infants who spend more of their oral feeding in an awake state are more successful at achieving their prescribed volume and maintaining higher oxygenation throughout the feeding.



Fatigue may impair an infant's ability to coordinate sucking, swallowing, and breathing; their ability to avoid aspiration; and change the stability of the respiratory system. Fatigue may inhibit infant cues of distress.

MORE ENGAGEMENT CONCERNS

With fatigue and decreased arousal, the infant is not only vulnerable to respiratory instability, but **their ability to cue distress is diminished.**

Loss of flexion, especially observed by the arm falling away from midline orientation, can indicate a loss of engagement in feeding. **Teaching parents this feeding cue can help them decide when the feeding needs to end.**

MATURATION OF SUCTION

	32 wk	33 wk	34 wk	35 wk	36 wk
Sucking pressure (mm Hg)	-16.7	-31.2	-51.5	-70.1	-87.3
Sucking frequency (min)	20.1	33.6	51.3	63.6	73.3
Sucking duration (s)	0.32	0.43	0.57	0.69	0.71
Sucking efficiency (mL/min)	1.1	2.4	4.3	7.3 ± 0.4	10.4 ± 0.3

Suction efficiency really does not start to improve substantially until 35-36 weeks because of brain development. As suction improves, so does milk transfer as evidenced by increased sucking efficiency over time.

COORDINATION OF SWALLOWING

- ❖ The coordination of swallowing with sucking and breathing is directly related to the infant's overall skill at managing liquid and adequately clearing the airway to breathe.
- ❖ **As infants mature, they begin to swallow efficiently, suck for a length of time that matches their ability to swallow efficiently, and time breaths with the swallow that allows for a full swallow cycle to occur to adequately protect the airway.**
- ❖ **Quiet swallowing** indicates that the vocal cords remain closed until the swallow is completed. This is part of airway protection.

COORDINATION OF SWALLOWING

- ❖ When inhalation occurs **just after** the completion of the swallow, air passing between partially closed vocal cords creates a crowing or “yelping” sound.
- ❖ Breathing is changed by the baby to accommodate swallowing and is affected by the size of the bolus, the speed at which the bolus is flowing, the number of swallows needed to clear the bolus, and the post-conceptual age of the infant.
- ❖ If the bolus of fluid exceeds the infant’s ability to efficiently swallow it, **they will loosen their seal on the nipple and allow fluid to spill out resulting in loss.**

COORDINATION OF SWALLOWING

- ❖ Balancing sucking burst length with an adequate number and quality of breaths is problematic for preterm infants. Desire to feed exceeds capability.
- ❖ The higher the infant's baseline respiratory rate, the more breaths the infant will require to maintain physiologic stability. Infants will need careful pacing if they are not breathing adequately during feeding. **They need to do more than stop sucking. They need to take adequate DEEP breaths to maintain stability and overall homeostasis.**
- ❖ The feeder should constantly monitor for feeding stress cues including **pulling away from the nipple, eyebrow raising/wrinkling forehead, eye flutter, rhythmic blinking, arching back, swiping at the bottle with arm/hand, flailing arm movements, finger splaying, bradycardia, oxygen desaturations, gagging, and heart rate more than 15 points above baseline.**

SLEEPING TO QUIET ALERT STATE



DROWSY STATE



FEEDING CUES



SIDELYING? (0-0:27)



GOOD COORDINATION



DOES THIS BABY WANT TO FEED?



FINGER SPLAYING



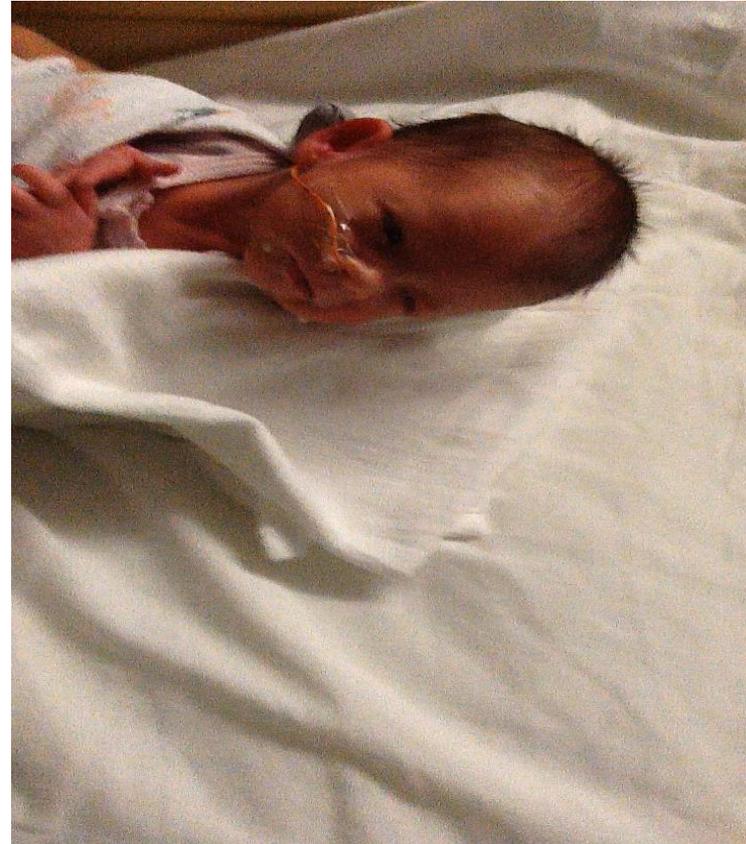
LIQUID LOSS



LONG OR REPETITIVE EYE BLINKS (0:19-0:30)



PACING (0:20-1:00)



FATIGUE WITH FEEDING



GAGGING



POOR SUCTION MAINTENANCE



CATCH UP BREATHING (1:05-1:55)



CONSISTENCY
is key!

**Safe
swallowing is
the priority**
when feeding in
the NICU

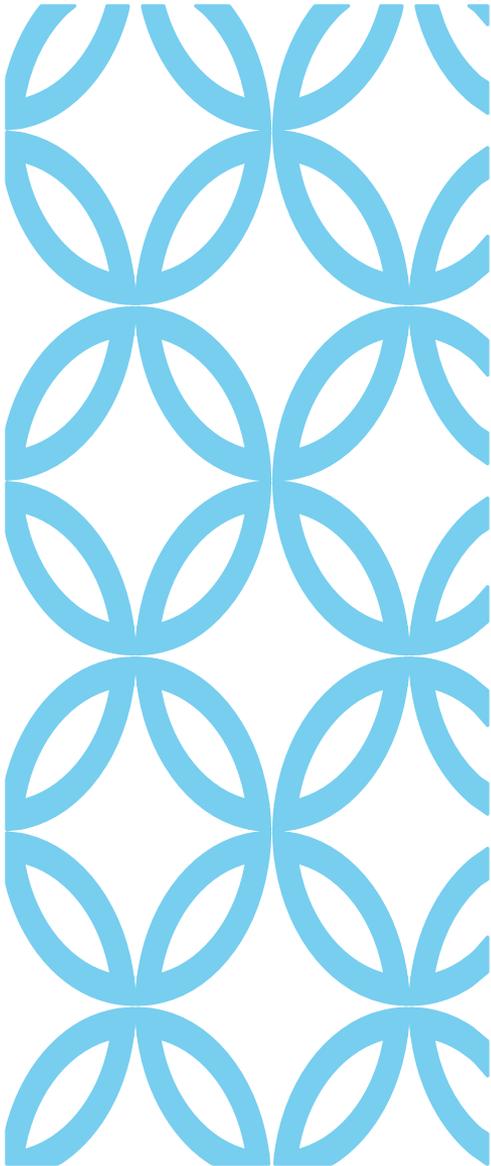
With QUALITY
comes
QUANTITY

**Every baby is
an individual**
(even multiples)
and has their
own NICU
feeding journey

COMMUNICATION
WITH PARENTS

HOW DOES A CLEFT IMPACT SUCTION?

- ❖ Infants with clefts have a difficult time feeding successfully due to a “hole” in the system (think of a straw with a hole in it). No suction is created.
- ❖ Only able to compress via vertical jaw excursion
- ❖ How does this impact feeding????



Poor or absent intraoral pressure (suction) and compensatory muscle movements affect all stages of the swallow- oral, pharyngeal and esophageal

These babes expend a significant amount of energy during the act of feeding

They average 109.26 sucks per minute compared to infants without clefts who average 75.07 sucks per minute

These infants swallow more air- it is important to release this air with frequent burping

CONSIDER THE FOLLOWING:

CONSIDER THE FOLLOWING:

- ❖ These infants under-use their geniohyoid and mylohyoid muscles during the oral phase, and thus have an extended pharyngeal phase.
- ❖ Might notice audible swallows, mild pharyngeal wetness and throat clearing as compensatory patterns
- ❖ Look for stress including furrowed brow, wide eyes, tension in extremities, finger splays, facial grimacing...etc.

FEEDING CONSIDERATIONS

- ❖ Feed in an enface or upright position
- ❖ Use gravity to help with moving the bolus of milk through the oral cavity and down the pharynx into the esophagus
- ❖ Direct nipple toward the side of the mouth that does not have the cleft to allow for better compression
- ❖ The infant may experience nasal regurgitation due to milk moving up into the nasal cavity from the opening in the palate
- ❖ Frequent burping

FEEDER-LEAD VS INFANT- LEAD FEEDING SYSTEMS

Infant-lead:

- ❖ Infant moves jaw in vertical motion to compress nipple
- ❖ One-way valve converts bottle into a compression only system
- ❖ Infant only gets milk when they are actively attempting to suck
- ❖ Allows infant to control flow of milk with normal rhythm of sucking

FEEDER-LEAD VS INFANT- LEAD SYSTEMS

Feeder-lead:

- ❖ Feeder squeezes milk into the infant's mouth while infant is attempting to suck
- ❖ Feeder is the provider of milk transfer, infant is the passive recipient
- ❖ Can be difficult to coordinate the squeezing of the nipple with the infant's sucking

BOTTLE TYPES

- ❖ Mead Johnson Cleft Palate Nurser
- ❖ Pigeon
- ❖ Haberman
- ❖ Dr. Brown's Specialty Bottle

MEAD JOHNSON CLEFT PALATE NURSER

- ❖ Feeder-lead system
- ❖ Soft sided bottle that is squeezed by the feeder to allow the infant to transfer milk
- ❖ Squeezed in conjunction with the infant's sucking efforts
- ❖ Crosscut nipple allows for faster flow
- ❖ Squeeze and release
- ❖ Cheap



PIGEON BOTTLE



Specialty bottle that uses a one-way valve in the nipple to create a compression only system

Infant-lead system

Vertical slit in nipple that opens when the infant compresses

Two nipple sizes- one for smaller mouths/clefts, one for larger mouths/clefts

Pricey

HABERMAN BOTTLE

Feeder lead system/Infant-lead system

Large squeezable nipple for feeder to transfer milk into the infant's mouth with each suck

Markings around the nipple indicate the flow rate of the milk

Infant's effort to compress the soft nipple can be sufficient enough to transfer milk from nipple(infant lead)

Assisted by squeezing the nipple to increase milk transfer volume(feeder lead)

Two sizes of nipples- regular and mini

Pricey



DR. BROWN'S SPECIALTY FEEDER

- ❖ Infant-lead system
- ❖ One way valve inside the nipple to allow the infant to compress the nipple and transfer milk during the natural rhythm and compression of their sucks
- ❖ The only system that allows you to change the nipple to accommodate any flow rate
- ❖ Cheaply-moderately priced



BREASTFEEDING

The ability to generate suction is necessary for:

- ❖ Attachment to the breast
- ❖ Maintenance of stable feeding position
- ❖ And together, with the let down reflex of mother's breast, milk extraction

Normal Breastfeeding:

- ❖ Lips flange and seal the oral cavity anteriorly
- ❖ Soft palate raises toward pharyngeal wall and seal oral cavity posteriorly
- ❖ As tongue and jaw drop during sucking- negative pressure is created, drawing milk from the nipple

BREASTFEEDING WITH CLEFT LIP ONLY

- ❖ Infants with cleft lip only can typically breastfeed successfully, as the breast tissue can aid in filling the holes created by the cleft
- ❖ Thus, they can create the suction and negative pressure to extract milk
- ❖ Positioning for breastfeeding (unilateral): infant should be held so that the cleft lip is oriented toward the top of the breast
- ❖ Positioning for breastfeeding (bilateral): infant should be held in a “face on” straddle position
- ❖ Strategies: Parent may occlude the cleft lip with a finger or thumb to improve overall seal



BREASTFEEDING WITH CLEFT PALATE OR CLEFT LIP AND PALATE

- ❖ Manually expressing breast milk into the infant's mouth (like a feeder-lead bottle system) may help compensate for absent suction
- ❖ However, babies with cleft palates will NOT be able to successfully breastfeed as their main source of nutrition and hydration.
- ❖ Parents should be educated about the protective benefits of breast milk and encouraged to provide their baby breastmilk via bottle
- ❖ Positioning: semi-upright/fully upright positioning

RESOURCES

- ❖ Boyce, Jessica, et al. “ABM Clinical Protocol #17: Guidelines for Breastfeeding Infants with Cleft Lip, Cleft Palate, or Cleft Lip and Palate-Revised 2019.” *Breastfeeding Medicine*. Volume 17, Number 7, 2019.
- ❖ Goodwyn-Craine, Allyson. “Insights on Feeding and Swallowing Differences for Infants with Cleft Palate/Cleft Lip and Palate.” *ASHA Leader*. AHSA. 23, December 2019.
<https://blog.asha.org/2019/12/23/insights-on-feeding-and-swallowing-differences-for-infants-with-cleft-palate-cleft-lip-and-palate>. 7, February 2020.
- ❖ Feeding: Cleft Lip & Palate Association of Ireland. (n.d.). Retrieved from http://www.cleft.ie/?page_id=33
- ❖ Matsuo, K. and Palmer, J. (2020). *Anatomy and Physiology of Feeding and Swallowing: Normal and Abnormal*.

RESOURCES

- ❖ Thoyre SM. Feeding outcomes of extremely premature infants after neonatal care. *J Obstet Gynecol Neonatal Nurs* 2007; 36 (4): 366-375
- ❖ McGrath JM, Cone S, Samra HA. Neuroprotection in the preterm infant: further understanding for the short and long-term implications for brain development. *Newborn Infant Nursing Review* 2011;11(3): 109-112
- ❖ Shaker, CS. Infant-guided, co-regulated feeding in the neonatal intensive care unit (NICU). Part 1: theoretical underpinnings for neuroprotection and safety. *Semin Speech Lang* 2017;38(2): 96-105
- ❖ Shaker, CS. Infant guided, co-regulated feeding in the neonatal intensive care unit. Part 2: interventions to promote neuroprotection and safety. *Semin Speech Lang* 2017;38 (2): 106-115

