Aspiration in Pediatrics

WHAT'S AN SLP TO DO?

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Learner Outcomes

1. Define motor learning theory.
2. Describe pros and cons of three types of thickeners.
3. Explain the systematic weaning protocol to decrease thickener for a child with pharyngeal dysphagia.

Introduction

Hi, I'm Bri!

- SLP & CLC
- Greenville, SC
- Married with 3 fur babies
- Co-host of The Feeding Pod
- President & Co-founder of Pediatric Feeding Disorders Foundation
- Enjoy mentorship networking, and nerding out on all things PFD.

Disclosures

Financial: Bri is the founder and CEO of Pediatric Feeding Therapy, LLC. Bri contracts as a speech-language pathologist with Earthshine Speech and Language.
Non-financial: Bri is the founder and president of the Pediatric Feeding Disorder Foundation. She is the VP of Professional and Clinical Affairs for SCSHA. She is also a volunteer ambassador and CE consultant for Feeding Matters. Bri manages the Instagram page @pediatricfeedingSLP and co-hosts the podcast The Feeding Pod.

Aspiration vs. Silent Aspiration

Silent does not always mean without any signs/symptoms
Must be diagnosed with an instrumental - cannot be done bedside

When liquid or bolus surpasses true VFs into airway with presence of cough

Example: During MBSS child coughs when liquid passes VF, but is unable to successfully clear airway

When liquid or bolus surpasses true VFs into airway without presence of cough

Example: During FEES, liquid drops below VF and no cough is initiated. However, eyes got red/watery and O2 sats dropped

(Calvo, Conway, Henriques, & Walshe, 2017).
(Velayutham, Irace, Kawai, Dodrill, Perez, Londahl, Mundy, Dombrowski, & Rahbar, 2018)

Signs/Symptoms

- Coughing
- Wheezing
- Increased congestion
- Wet/gurgly vocal quality
- Red/watery eyes
- Tachypnea
- Decreased O2 sats (>2%)
- Frequent, long-lasting or recurrent lower respiratory infections
- Increase in secretions during/after feed
- Fevers without other apparent cause
- Decline in activity or alertness
- Failure to thrive
- Cyanotic episodes

(Arvedson, Brodsky, & Lefton-Grief, 2020)

Risk Factors of Silent Aspiration

- Neurological disorders (e.g. Cerebral palsy, seizures/epilepsy, hypotonia, micro/macrocephaly, brain trauma, developmental delay)
- Prematurity (<34 weeks)
- Airway disorder (e.g. laryngeal cleft, laryngomalacia, uninlateral VF paralysis)
- Syndromes (e.g. Down syndrome)
- Congenital heart disease
- Age <1 year

(Velayutham, Irace, Kawai, Dodrill, Perez, Londahl, Mundy, Dombrowski, & Rahbar, 2018)

Instrumentals

"the ability of a clinical feeding evaluation to rule in or rule out oropharyngeal aspiration cannot be reliably applied to every clinical situation (Calvo et al., YEAR)"

FEES

Special Considerations

- Child tolerance
- Tend to work better for breastfeeding

VFSS/MBSS

Special Considerations

- Child tolerance
- May consider practicing /role playing if possible

What information will the swallow study provide that is essential to your POC?

(Arvedson, Brodsky, & Lefton-Grief, 2020)

BUT FIRST... Oral care

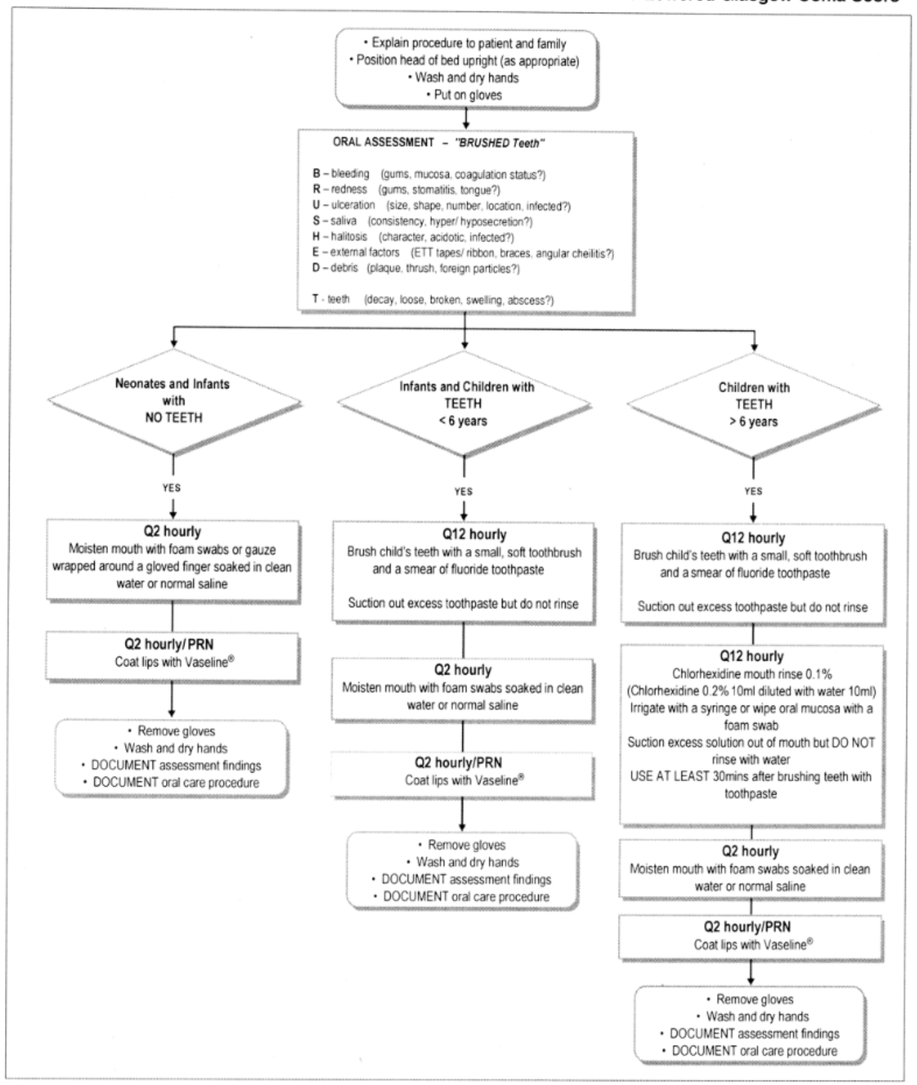
- Should be completed at least twice per day, as well as before and after oral trials
- Toothpaste should be approved by ADA and contain flouride
- Soft, small toothbrushes are preferred over sponges
- Suction should be used for patients unable to spit out excess toothpaste (do not rinse)
- Moisten mouth throughout the day to reduce dryness
- Coat lips with vaseline to reduce dryness
- Mouth rinse for children >3 years or under with physician approval
- Consult physician and/or dentist for additional support

(Johnstone, Spence, & Koziol-McClain, 2010).
(Norwood and Slayton, 2013)

Oral Care Flow Chart

Figure 2. (continued)
Oral Hygiene in the PICU Guideline

Flowchart 1:
Oral Hygiene in the PICU Guideline for Intubated Children or Those with a Lowered Glasgow Coma Score



Note: "BRUSHED Teeth" adopted with permission from Hayes & Jones, 1995.

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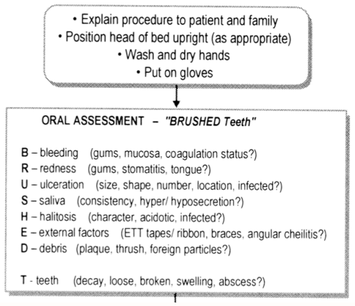

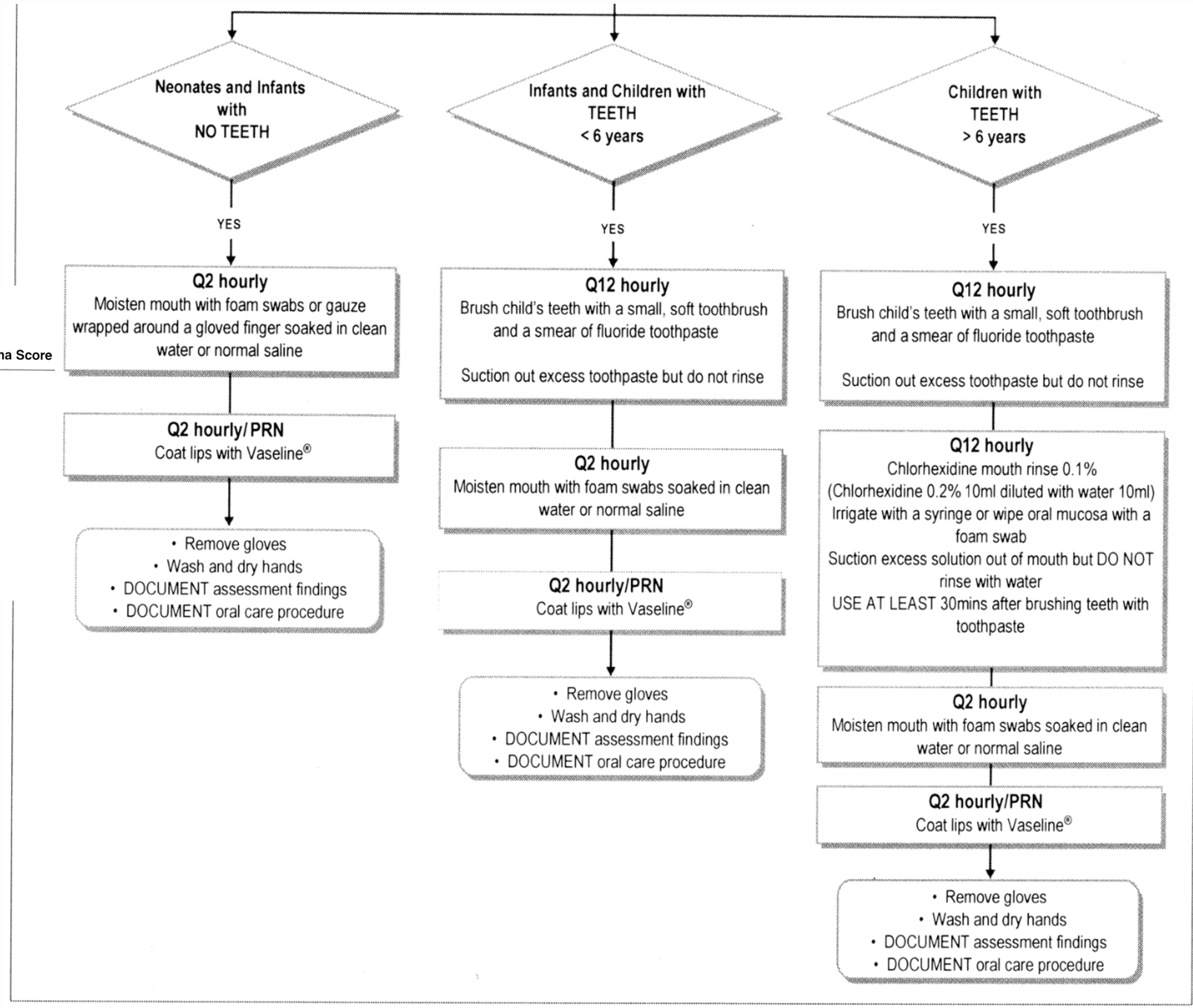

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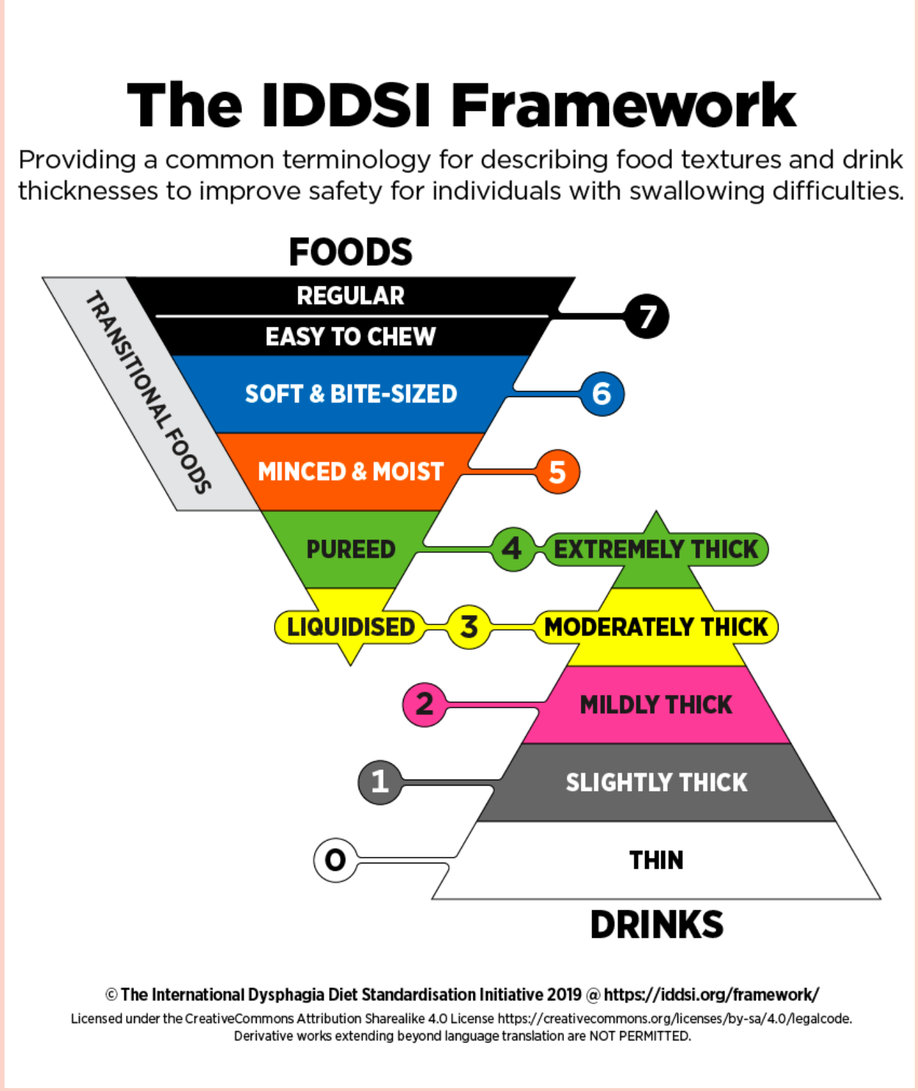

But, do you IDDSI?

Standardized testing for foods and liquids.

How is it relevant here?

- Important to ensure consistency of liquids to reduce risk of aspiration
- Necessary for motor planning and support with weaning thickener – more to come
- Learn More

(Steele, Namasivayam-MacDonald, Guida, Cichero, Duivestein, Hanson, Lam, & Riquelme, 2018)

NPO?

NP - NO?

- Study by Noel et al. (2009) provided children with silent aspiration with absence of pulmonary pathology with oral feeds with appropriate monitoring and therapy. Follow up non-contrast chest CT scan showed that **78% of children with silent aspiration continued oral feeds without pulmonary pathology**.
- Remaining 22% required more regulated oral feeds, despite absence of lung disease clinical indicators.
- 28% of children has resolution of aspiration, with marked improvement in swallowing mechanism and airway protection
- Risk to benefit analysis
  - NPO does not allow for progression of swallowing skills - baseball analogy
  - Must consider other risk factors & their association with aspiration pneumonia
  - Special consideration for children with baseline of lung compromise

(Langmore, Terpenning, Schork, Chen, Murray, Lopatin, & Loesche, 1998)
(Noel, Delaney, Beecher, Arvedson, & Rudolph, 2006)
(Noel, Delaney, Arvedson, & Rudolph, 2009)

Interventions

Signed permission from parent to share

01 Modifications of Oral Intake

02 Management of Reflux

03 Management of Oral Secretions

04 Systematic Weaning Protocol

05 Modified Frazier Free Water Protocol

06 NMES?

01

Modifications of Oral Intake

- Positioning changes/support
- Drinking device changes (e.g. flow rate, cup type)
- Modified diet - thickened liquids
- NG or g-tube placement
    - depending on severity

(Arvedson, Brodsky, & Lefton-Grief, 2020)

Nipple Flow Rates

01

Infant Bottle Feeding Nipple Flow Rates

Flow Category	Nipple Brand & Type	Mean Flow Rate (mL/min)
Extra Slow	Philips Avent Natural First Flow	0.86
	Philips Avent Natural 0mos+	2.25
	nfant Labs Extra Slow	3.30*
	Dr. Brown's UltraPreemie	4.92*
Slow	nfant Labs Slow	5.99*
	Dr. Brown's Preemie	7.22*
	Playtex Ventaire Full Sized	7.35
	Playtex Ventaire Breastlike	7.37
	Similac single-use Slow Flow	8.04
	Enfamil single-use Extra Slow	8.96
	Playtex Baby Naturalatch 0-3m	9.47
	Comotomo Slow Flow (0-3 mos)	9.76
	Dr. Brown's Newborn	9.88*
	nfant Labs Standard	10.32*
Medium	Enfamil single-use Slow Flow	13.24
	Gerber First Essentials	13.26
	Dr. Brown's Level 1	13.31*
	Evenflo Classic Slow Flow 0m+	13.63
	MAM Anti-colic 0mos+	13.83*
	Tommee Tippee Closer to Nature 0m+	15.90*
	Tommee Tippee Anti-colic 0m+	16.23
Fast	Philips Avent Anti-colic 0mos+	17.44*
	Similac single-use Standard Flow	18.49
	Enfamil single-use Standard Flow	19.14*
	Similac single-use Premature	19.17
	Medela Wide-Base Slow Flow	22.03*
Very Fast	Medela Calma	37.61*

* Indicates that the flow rate is consistent from one nipple to another, which is good.

These data were published in:

Pados, B.F., Park, J. & Dodrill, P. (2019). Know the flow: Milk flow rates from bottle nipples used in the hospital and after discharge. *Advances in Neonatal Care, 19*(1), 32-41. doi: 10.1097/ANC.0000000000000538

Note that the Enfamil Extra-Slow and the Dr. Brown's Newborn nipples were not included in the published paper, but were tested later.

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Modified Diet

01

Rice or Oat Cereal

Any age
Easily accessible & affordable
Cannot be used with breastmilk, water, or juice

SimplyThick® & Easy Mix™

>12 years unless healthcare provider approved
Can thicken hot or cold liquids
Can use with breastmilk
Not for use with h/o NEC or prematurity

Gelmix®

>42 weeks CA & >6 lbs.
Can use with breastmilk
Must warm liquids to 100°F before mixing

Thick-It®

>12 years or >2 years with healthcare provider approval
Can thick hot and cold liquids
Thickness changes over time

Purathick™

>12 months
Can thicken hot or cold liquids
Can use with breastmilk
Limited research as it is a newer product

Purees

Some may be a viable option up to mildly thick
Better taste

(Nativ-Zeltzer et al., 2018)
(Parapharma Tech, n.d.)
(Thick-It, n.d.)
(Woods, Oliver, Lewis, & Yang, 2012)
(Brooks, Liao, Harmon, and Breedveld, 2021)
(Duncan, Larson, & Rosen, 2019)
(Gosa and Corkins, 2015)
(Gosh, Schooling, & Coleman, 2011)

02 &
03

Management of Reflux & Oral Secretions

Reflux and oral secretion in isolation are not likely to cause aspiration pneumonia, but in combination of pharyngeal dysphagia may increase risk of infection

Reflux

Positioning changes
Reducing feeding volume
Medications
Surgery - more severe cases

Oral Secretions

Oral sensorimotor intervention
Pharmaceutical agents/Medications
Botox

(Arvedson, Brodsky, & Lefton-Grief, 2020)
(Boesch, Daines, Willging, Kaul, Cohen, Wood, & Amin, 2006)
(Rosen et al., 2018)

04

Systematic Weaning Protocol

Considering principles of motor learning theory and experience-dependent neuroplasticity

- Uses a step-down method to progress between standardized viscosities
- In the study by Wolter at al. (2018), small, 10% reductions in thickener were completed every 2 weeks while monitoring for overt s/s of aspiration
- 78% of patients were successfully weaned to thin diet & those who did not had underlying etiologies including syndromes, cardiopulmonary, anatomical & neuromuscular diagnoses
- Tips
  - Use food scale to weigh thickener for reductions
  - Use IDDSI testing to begin and for monitoring
  - Individualize per patient - this is NOT a one size fits all!

(Klein and Jones, 2008)
(Wolter et al., 2019)
(Zimmerman, Carnby, Lazarus, & Malandraki, 2020)

05

Modified Frazier Free Water Protocol

FFWP – established to reduce risking pulmonary status in order to quench thirst in stroke patients with dysphagia

- First of all, what is the FFWP?
- Limited research to support or deny implementing protocol with pediatrics
- In study by Bernard et al. (2016), no change in risk of developing pneumonia was found between intervention and control group (adults with dysphagia and pulmonary compromise after critical illness)
- Gillman et al. (2016) completed a systematic review that showed low level evidence of increasing total fluid intake and no increased risk of lung compromise
- What does this mean for pediatrics?
  - Risk to benefit analysis
  - Consult medical team
  - Adhere to strict oral care routine and protocol to reduce risk of infection
  - Caregiver education and training

(Bernard, S., Loeslie, & Rabatin, 2016)
(Department of Speech Pathology, Lady Cilento Children's Hospital, 2017)
(Gillman, Winkler, & Taylor, 2016;2017)

06

Neuromuscular Electrical Stimulation

What does the research say?

- Research from adults cannot be adequately transferred to pediatrics due to significant anatomical and maturation differences
- Neonates & Infants - no empirical data showing it is safe or effective
  - Additionally, in high risk infants, absence of a response does not indicate absence of pain
  - Unknown impact on neuromuscular development
  - "The painful pairing of NMES with the experience of feeding may not just interrupt optimal neuromuscular development and motor planning but may also create operant conditioning implications from the pairing of a painful stimulus with swallowing behavior" (Bustamante et al., 2021)
- Pediatrics - no empirical data to support use
  - NMES has been shown to be **no more effective** than usual care of treatment for dysphagia in children

(Bustamante, Plumb, Bailey, & Sandage, 2021)
(Christiaanse, Mabe, Russell, Simeone, Fortunato, & Rubin, 2011)
(Epperson and Sandage, 2019)

Case Study Time!

-Get out paper, phone, laptop, etc.
-Take notes on what you might implement into your plan of care.

*Name & information changed, but based on real case

Let's talk about Holland

Case History

- Born: 32 weeks due to preeclampsia
- NICU stay for 183 days due to bronchopulmonary dysplasia (BPD) and feeding difficulties
- Discharged on oxygen, but has been weaned off since 4 months CA.
- NG tube first 8 weeks of life, then gtube placed due to pharyngeal dysphagia
- FEES at 40 weeks GA (2 months CA) showed laryngeal cleft and PAS score of 8 on thin and mildly thick liquids. Recommendation for moderately thick from bottle.

Current Status

- Age: 1 year 8 months
- Most recent FEES at 18 months showed laryngeal cleft still present and PAS score of 7 with thin and mildly thick liquids
    - ENT does not want to do surgery at this time
- Difficulty transitioning from purees, often gags, sometimes leads to vomiting
- Gtube dependent for 50% of nutritional needs
- Will drink moderately thick liquid from Y-cut Dr. Brown's bottle, but still occasionally coughs
- Mealtimes last 45+ minutes
- Receives OT, PT and EI interventions.
- Followed by pulmonology, ENT, and GI.
    - Pulmonology happy with current lung status

Plan of Care for Holland

Pharyngeal Dysphagia

Oral Care Routine
Caregiver education and training
Systematic weaning
Bottle - Straw and/or open cup
Positioning support
Collaborate with medical team, PT, & OT

Other

Goals for advancing solids
Improved self-feeding
Tube weaning
Decreased mealtime length/improved schedule

Questions?

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The Feeding Pod

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