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PRACTICE PATTERNS FOR THE EVALUATION AND TREATMENT OF FEEDING AND
SWALLOWING DISORDERS FOR NEONATES IN THE NICU

A Thesis Presented to the Faculty of the Department
of Communication Sciences and Disorders
University of Houston

In Partial Fulfillment of the
Requirements for the
Degree of Master of Arts

By
Jessica Rose Shool
May, 2014

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ABSTRACT

Research in pediatric dysphagia is limited, thus expert opinion forms the foundation for the majority of clinical practice. This study surveyed expert speech-language pathologists (SLPs) in pediatric dysphagia and practicing SLPs working in the neonatal intensive care unit (NICU) to identify practice patterns for the evaluation and treatment of infant dysphagia. A 35-item internet survey which included questions concerning two case scenarios was available to members of Division 13, Swallowing and Swallowing Disorders as well as to SLPs through direct email request. Thirty-three individuals completed the survey (4 experts, 29 practicing SLPs). The results revealed varied practice patterns within and between groups in the clinical swallowing evaluation, referral for instrumental swallowing evaluations, and treatment approaches for feeding and swallowing disorders. The findings from this study suggest the necessity for evidence-based practice and standard guidelines in the evaluation and treatment for infants with feeding and swallowing disorders in the NICU.

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INTRODUCTION

The overall health and neurodevelopmental well-being of infants can be determined by their feeding and swallowing capabilities. Feeding is defined as the placement of food in the mouth (Logemann, 1998) and includes sucking from the bottle or breast. Swallowing begins with manipulation and transfer of food, liquid, saliva, also known as a bolus, in the oral cavity and ends with the bolus entering the stomach. In pediatrics, the act of feeding, sucking, and swallowing are highly integrated and are evaluated together. This is particularly true for neonatal infants for whom ingestion involves only liquids. In contrast, adult deglutition feeding and swallowing are considered distinct processes and are generally evaluated separately. Infants who are prematurely, i.e., born before 37 weeks gestation (Tucker & McGuire, 2004), commonly have feeding and swallowing problems (Arvedson & Brodsky, 2002). To understand feeding and swallowing problems, dysphagia, in premature infants, it is important to first have knowledge of normal fetal development and swallowing.

Development of Fetal Swallowing

Sucking and swallowing development begins early in utero and continues to develop throughout the pregnancy. Before detailing fetal and infant swallowing development, various terms which are used to classify age, particularly infants born prematurely will be presented. Gestational age (GA) is calculated from the date of the last menstrual cycle to the time of delivery (American Academy of Pediatrics, 2004). Postconceptual age (PCA) is calculated from the estimated date of fertilization to the time of delivery and is typically 14 days shorter than GA. While both terms are used in the literature, GA is preferred term of the American Academy of

Pediatrics. Last, postmenstrual age (PMA) refers to the combination of the infant's GA plus chronological age (CA), which begins at birth.

Infants born prior to full term, after 37 weeks GA, are classified based on their age and birth weight in order to chart development (Tucker & McGuire, 2004). Preterm infants are defined as neonates born between 32-37 weeks GA, very preterm infants are born between 28-32 week GA, and extreme preterm infants are those born prior to 28 weeks GA. Low birth weight infants are defined as neonates with a birth weight of less than 2500g, very low birth weight infants weigh less than 1500g at birth, and extreme low birth weight infants are born weighing less than 1000g.

Sucking has been documented as early as 11 weeks GA with pharyngeal wall contraction evident as early as 15 weeks GA (Miller, Sonies, & Macedonia, 2003). Tongue movement including tongue thrusts can be noted at 15 weeks GA. Mouth movements and other tongue movements such as cupping, a tongue movement seen in postnatal infants during feeding, are evident as early as 16 weeks GA. Anterior to posterior protrusive movements of the tongue may be inconsistently identified at 18 weeks GA with more consistent movements at 28 weeks GA. Consistent swallowing movements are seen at 22-24 weeks GA; however, consistent glottal closure and sequential pharyngeal swallowing are not evident at this time. Consistent suckling, a backward and forward movement of the tongue (Arvedson & Brodsky, 2002) and swallowing patterns are not seen until at least 28 weeks, indicating it takes the majority of the pregnancy for a mature swallow to develop.

The development of swallowing is critical to fetal and infant growth as it initially functions to maintain homeostatic regulation of amniotic fluid and later becomes the method of

nutritional intake post birth (Miller et al., 2003). A full-term fetus swallows approximately 450 ml of amniotic fluid per day, which is more than the daily oral intake of a postnatal infant (Bosma, 1986). The ingestion of high quantities of amniotic fluid prepares the postnatal infant for achieving full oral feeds.

Normal Swallowing

The majority of research concerning normal swallowing has been conducted in healthy adults. Although there are considerable similarities between adult and infant swallowing biomechanics in regard to ingestion of liquids, there are also important differences. These differences are secondary to the anatomical differences in infants which are discussed later.

Deglutition, for both adults and infants, is a highly integrated neuromuscular act that requires coordination between two complex systems: respiration and swallowing (Storey, 1976 as cited in Logemann, 1998). While swallowing is an integrated process, it can be described in three stages: oral, pharyngeal, and esophageal (Logemann, 1998). The first stage of swallowing, the oral stage, includes the oral preparation and oral transfer. Prior to oral preparation, the sensory system recognizes food approaching and entering the mouth. For individuals who are unable to self-feed, such as infants, the caregiver is required for feeding. Oral preparation involves mastication of solids and semi-solids and mixing the bolus with saliva to create a texture that can be easily swallowed. Once this optimum texture is achieved the tongue pulls the food into a semi-cohesive bolus. The bolus is then held in the oral cavity between the tongue and the hard palate. The duration of oral preparation varies and is dependent on the texture of the food. The oral preparation for an infant consists of latching onto the nipple (Arvedson & Brodsky, 2002), whereas oral preparation is not required for thin liquids in adult deglutition

(Logemann, 1998). Oral transfer begins with the posterior movement of the bolus toward the pharynx and ends with initiation of the pharyngeal swallow. The tongue makes contact with the hard palate, anteriorly to posteriorly, in order to squeeze the bolus toward the posterior oral cavity and propel the bolus into the pharynx. Regardless of bolus consistency, the duration of the oral transfer typically lasts less than one second. The oral stage requires adequate control of labial, lingual buccal, and palatal musculature to successfully prepare and transfer a bolus. Throughout the oral stage, the velum is generally depressed to maintain an open nasal passage for respiration.

The oral stage for an infant is different than that of an adult. The infant creates negative oral pressure in the oral cavity by sealing lips around a nipple, closing the nasopharynx with the velum, and producing a rhythmic suckling movement (Arvedson & Brodsky, 2002). The infant sucks which requires coordination of the intraoral musculature, the liquid through a nipple and collects the liquid at the valleculae (Bosma, 1986), two shallow grooves seen at the base of the tongue (Zemlin, 1998). When an adequate amount of liquid has collected, the pharyngeal swallow is initiated.

For adults, the onset of the pharyngeal swallow, the transition from the oral stage to the pharyngeal stage, generally occurs when the leading edge of bolus reaches the mandibular angle (Logemann, 1998). The pharyngeal swallow can vary in location depending on the material ingested: masticated bolus and liquid, and the type of swallowing: single swallow and sequential swallowing (Daniels & Foundas, 2001; Daniels et al., 2004). For infants, the onset of the pharyngeal swallow is at the valleculae, which is different than the onset for an adult (Bosma, 1986). During the pharyngeal stage of swallowing, numerous events occur (Logemann, 1998).

The nasopharynx is closed off by the elevation and retraction of the velum separating the nasal cavity from the pharynx to prevent material from entering the nasal cavity and to build up pressure in the pharynx. The epiglottis inverts, the true vocal folds adduct, and the anterior and superior movement of the hyoid and larynx closes the respiratory tract to prevent entry of material. The base of the tongue retracts to the posterior pharyngeal wall to drive the bolus through the pharynx. Likewise, the pharyngeal constrictor muscles contract to move the bolus through the pharynx. Relaxation of the cricopharyngeus muscle and anterior movement of the hyoid and larynx result in opening of the upper esophageal sphincter allowing for material to pass into the esophagus. The pharyngeal stage of swallowing for infants and adults lasts approximately one second.

The final phase of a swallow is the esophageal stage. This stage lasts approximately 8 to 20 second in adults (Mandelstam & Lieber, 1970 as cited in Logemann, 1998) and 6 to 10 seconds in children (Arvedson & Lefton-Grief, 1998 as cited in Arvedson & Brodsky, 2002). This stage consists of a peristaltic movement through the esophagus carrying the bolus into the stomach (Logemann, 1998). The differences in adult and infant swallowing can be attributed in large part to the anatomical differences and the method of nutritional consumption, sucking versus mastication. Provided all three swallowing phases are coordinated and initiated appropriately, a safe and efficient swallow is ensured; however, impairment in any phase can result in disordered swallowing.

Anatomic Differences between Infants and Adults

Infants' bodies undergo developmental changes that enable them to consume foods varying in size and consistency allowing them to meet nutritional needs. Infants less than six

months of age have oral and pharyngeal structural differences from those of adults which aid them in sucking and swallowing since deglutition in infants differs from adults. Structural differences include: sizes and ratios, a smaller oral cavity, and different structural locations (Bosma, 1986). First, the tongue, soft palate, and laryngeal structures are proportionally larger than the surrounding structures in infants when compared to adults. Second, the tongue is completely contained in the infant's oral cavity and the sucking pads (fatty tissue) of the lateral walls contribute to a smaller intra-oral space in the oral cavity. The infant utilizes the tongue and the sucking pads to compress the nipple creating a rhythmic sucking pattern (Kramer, 1989). The location of the soft palate also differs from that of an adult as it is in close approximation with the elongated epiglottis. The approximation of the soft palate and the epiglottis prevents the liquid bolus from penetrating the larynx before the onset of the pharyngeal swallow and keeps the nasal route open for respiration (Arvedson & Brodsky, 2002). Similar to the oral cavity, an infant's pharyngeal cavity is structurally smaller than an adult's. As compared to adults, the larynx and the hyoid are more superior at rest in infants and are generally immediately inferior to the base of the tongue. Another difference relating to an infant's hyoid is that it is not a bone as it is in adults. Instead, an infant's hyoid has not ossified but is formed by hyaline cartilage (Arvedson & Brodsky, 2002).

Two major anatomic changes occur as an infant develops more into an adult anatomy: the angle of the nasopharynx moves to 90 degrees, and the pharynx elongates to create the oropharynx (Laitman & Reidenberg, 1993). These anatomic changes are important for the future swallowing needs and the development of human speech in an infant. However, the initial structure of an infant's anatomy is essential for safe positioning and sucking during feeding.

Suck-Swallow-Breath Patterns

Infant feedings should accomplish two goals: minimize energy expenditure for growth and avoid aspiration (Lau, Sheena, Shulman, & Schanler, 1997). Both goals can be achieved if the infant can accurately coordinate suck, swallow, and breath rhythm. This alternating rhythm allows the infant to feed efficiently and minimize airflow interruption. Sucking is considered reflexive and automatic (Stevenson & Allaire, 1991) and has notable maturation ages and rates (Palmer, 1993).

Infants have a specific sucking, swallowing, and breathing pattern can be used as an indicator to assess the maturation of their neurological organization. Three patterns of nutritive sucking (NS): immature, transitional, and mature are identified and are used to assess oral feeding (Palmer, 1993). An immature sucking pattern is characterized by 3-5 sucks per burst with simultaneous respiration and swallows following the sucking bursts. A transitional sucking pattern is characterized by 5-10 suck per burst with erratic breathing. Mature sucking pattern is characterized by 10-30 sucks per bursts with continuous breathing. The suck-swallow-breath ratio seen in fetuses 33 weeks GA is approximately 1:1:1. Organization of sucking and breathing is not expected to mature until 34 weeks PCA; although, proper feeding can be seen as early at 32 weeks PCA (Mizuno & Ueda, 2003). Infants younger than 32 weeks PMA have patterns that are characteristic of rapid, low amplitude, uncoordinated, non-rhythmic sucking motions (Bu'Lock et al. 1990, as cited in Gewolb, Vice, Schweitzer-Kenney, Taciak, & Bosma, 2001). Premature infants make sucking motions approximately 2-3 times per second. Sucking patterns become more consistent after 34 weeks PMA with the amount of sucking motions decreasing to one time per second which is considered a mature sucking pattern. A concern for infant meeting

nutritional needs arises as a mature sucking pattern is unlikely when an infant is born prematurely.

Prematurity and Feeding and Swallowing Difficulties

Approximately 5-7% of all live births result in preterm infants, born before 37 weeks gestation (Tucker & McGuire, 2004). The United States has a higher incidence in which 12% of live births result in preterm infants with 1-2% born prior to 32 weeks gestation. Preterm births cause concern due to many infants experiencing an immediate decrease in weight after birth (Sauer, 2007). This can be attributed to the maturation out of the uterus providing a less suitable environment for development than the intrauterine environment. Along with other symptoms, a full term pregnancy is significant to the development of feeding and swallowing as this complex system is dependent on physical and emotional maturity (Arvedson & Brodsky, 2002). Infants who are born premature commonly experience problems with feeding and swallowing.

The Neonatal Intensive Care Unit (NICU) environment with its lack of normal infant-parent interaction, yet excessive stimulation in terms of light, sound, and the continual tactile presence of invasive tubes and monitors may negatively affect physiologic and neurobehavioral development (Blackburn, 1998). Disordered feeding and swallowing can be particularly challenging for infants in the NICU. In the NICU, babies are frequently critically ill and may require supported ventilation due to immature lung development. Since deglutition requires the coordination of respiration and swallowing, immature lung development increases feeding complications. Disorders in feeding and swallowing in infants can lead to malnutrition, pneumonia and result in life-long consequences (Rogers & Arvedson, 2005). In addition, an infant's feeding skills are correlated their neurodevelopment at 18 months (Mizuno & Ueda,

2005). Unresolved feeding and swallowing disorders may continue into childhood presenting delays in speech and language development.

Generally, feeding and swallowing in an infant is evaluated in terms of efficiency and safety. For infants, efficiency refers to succinct and rhythmic expression of milk from the bottle or breast and timely transfer of the entire liquid bolus through the oral cavity, pharynx, and esophagus (Arvedson & Brodsky, 2002). Inefficient swallowing can be described in terms of non-mature sucking patterns as previously described and/or residue, that is, material remaining in the oral or pharyngeal cavities after the swallow. Safety refers to prevention of material from entering the airway. Aspiration is defined as entry of material below the level of the true vocal folds (Logemann, 1998). Coordinating the suck-swallow-breath pattern is essential for the infant to have an efficient feeding experience and to prevent aspiration. Reduced efficiency and safety are signs of swallowing disorders. It is critical to determine the underlying cause of an infant's dysphagia such as immature development, anatomical abnormality, and/or specific physiologic oral, pharyngeal, or esophageal dysfunction.

Since deglutition is critical to an infant's development, it is essential that an effective protocol is in place for the evaluation and treatment of feeding and swallowing disorders in premature infants. A standardized approach for this process, however, has not been established. The current practice patterns for evaluation and treatment of feeding and swallowing disorders is unclear. Given the significance of feeding and swallowing problems in preterm infants and the importance of establishing early oral intake, it is essential that protocols be developed and implemented to effectively evaluate and treatment dysphagia in this population.

Criteria for Feeding and Swallowing Evaluation

Many premature infants are not ready to feed orally and need to supplement nutrients by using enteral feedings, which often requires them to be admitted into the NICU (American Academy of Pediatrics, 2005). Transitioning from tube feedings to oral feedings is a requirement for infants to be discharged from the NICU; however, there is no standardized protocol to identify feeding and swallowing disorders and prepare premature infants to feed orally. Experts in the field have discussed common criteria for the referral of feeding and swallowing evaluation for premature infants such as the observation during a typical feeding from a regular caregiver, diagnoses that are associated with dysphagia such as cleft lip and/or cleft palate, and delays in developmental milestones (Arvedson & Brodsky, 2002). Likewise, infants observed to have sucking and swallowing incoordination, weak sucking, show irritability, apnea or lethargy during feedings, and/or the duration of feedings exceed 21 minutes should be referred for a feeding and swallowing evaluation. These behaviors may be identified by caregivers or medical staff. Additionally, infants with craniofacial anomalies, history of recurrent pneumonia, and other diagnoses associated with dysphagia or poor nutrition should also be referred for a swallowing evaluation. Finally, infants that demonstrate significant weight loss, food refusal, or have a sudden onset of feeding difficulty should be evaluated for a feeding disorder.

Clinical Assessment of Feeding and Swallowing

Typically, a nonstandard comprehensive clinical feeding and swallowing evaluation is used to assess the feeding and swallowing capabilities of an infant and may include a thorough review of family, medical, and developmental and feeding history (Arvedson & Brodsky, 2002). Once the infant's history has been reviewed, a physical examination is conducted in which the

clinician observes the infant at rest and gathers information about posture, position and behavior state. The clinician also assesses structural integrity, sensitivity to stimuli, and vital signs. This information about behavioral states can be used in determining the infant's oral feeding readiness. The clinical evaluation may also include an observation of a typical feeding which can provide valuable information regarding signs of aspiration. Clinical markers such as coughing, wheezing, throat clearing, gagging, desaturations, stridor, wet voice, temperature spikes, and wet or labored breathing may be used to indicate occurrence of aspiration in adults (Logemann, 1998) and may be beneficial when assessing aspiration in infants. Clinical indicator for aspiration in the pediatric between the ages 2 weeks to 24 months was cough followed by wet breathing, gagging, choking, and wet voice/cry (Weir, McMahon, Barry, Masters, & Chang, 2009).

Several standardized and nonstandardized clinical assessment tools are available to aid in the assessment of feeding and swallowing disorders. These clinical assessment tools are based on systematic observation of infant feeding; however, due to a lack of reliability and consistency in results, no tool has been nationally recognized as a standard protocol. During nonnutritive sucking (NNS), the Neonatal Oral-Motor Assessment Scale (NOMAS) aims to quantify normal and abnormal sensorimotor patterns in orally-fed infants by observing tongue and jaw responses (Braun & Palmer, 1986). However, varying levels of agreement within and between raters was evident and yielded inconsistent diagnoses of feeding and swallowing disorders, even when a consistent NOMAS score was obtained (Da Costa & VanDer Schans, 2008). Similar to the NOMAS, the Early Feeding Skills Assessment is a 36 item check list in which the clinician judges the behavioral states, energy, oxygen stats, coordination, etc. of the premature infant (Thyoyr, Shaker, & Pridham, 2005). This tool is used to assess the infant's oral

feeding readiness, oral feeding skill, and oral feeding recovery; however, no reliability and validity data is available for this tool. The Oral Feeding Skills assessment was created to assess oral intake of preterm infants (Lau et al., 1997; Lau & Smith, 2011). Numerous other tools are available to assess breast or bottle-feeding; however, the empiric research regarding them is limited.

Instrumental Swallowing Assessment

Researchers continue to strive to identify clinical markers that can accurately indicate an underlying swallowing impairment. The swallowing mechanism is an internal structure that requires direct observation to identify specific physiologic dysfunction. Each instrument used to objectively assess swallowing has advantages and disadvantages and is typically used when impairment is evident. Suggested criteria for administering an instrumental swallowing examination include an observation of uncoordinated suck-swallow-breathe rhythms during feeding, history of aspiration pneumonia, a need for assessing swallowing phase boundaries, and determining the underlying physiologic impairment (Rogers & Arvedson, 2005). Children should be referred for an instrumental examination if any of the following symptoms are observed: coughing, choking during oral feeds, concern for aspiration, oral feedings exceeding 40 minutes, gagging during oral feeds, and/or food refusal (Arvedson, Rogers, Buck, Smart, & Msall, 1994). The rationale to refer patients for an instrumental evaluation and the goals for identifying the underlying impairment with the use of an instrumental evaluation is consistent for all individuals with dysphagia, regardless of age (Lefton-Greif, 2008).

The videofluoroscopic swallowing study (VFSS) is the most common instrumental examination for swallowing and allows for assessment of all three stages of swallowing

(Arvesdon et al., 1994). The VFSS provides a lateral view of the swallowing structure and displayed the patient's swallow in real time. This allows the clinician to observe the duration of the oral and pharyngeal phases, oropharyngeal biomechanics as well as signs of dysphagia such as pooling in the pharynx prior to onset of the pharyngeal swallow, oral and pharyngeal residue after the swallow. During the VFSS, the clinician can attempt compensatory strategies safely and determine if strategies are effective, meanwhile identifying any underlying swallowing impairment. Advantages of using VFSS include the ability to assess all four swallowing phases, easy visualization of structural motility and coordination, visualization of upper esophageal sphincter, the ability to measure the duration of oral and pharyngeal phases, and extensive literature supporting the use of VFSS as an evaluation instrument. Disadvantages of using VFSS include: exposure to radiation which require studies to be short, atypical feeding positioning of infants, and the requirement of barium which can alter the texture and taste of liquid and food. These disadvantages make it challenging to complete a VFSS in all patients with suspected dysphagia, particularly infants. Hence, clinicians should complete a thorough clinical examination prior to referring an infant for VFSS.

Feeding and Swallowing Disorders Management

Compensation. Compensatory strategies are used to assist the infant in feeding and swallowing until appropriate oral intake skills have developed. The feeder can compensate for immature sucking skills by adjusting the flow rate of the bottle or nipple and imposing a feeding pace by removing the nipple at intervals that mimic the suck-swallow-breathe patterns (Palmer, 1993). Nipples vary in size, shape, flow, and stiffness. Choosing an appropriate flow on a nipple can affect the overall feeding experience for the infant. In a recent premature feeding study,

premature infants fed through a single hole nipple consumed more milk, had shorter feeding durations, and better sucking efficiency than infants fed through a cross-cut nipple (Chang, Lin, Lin, & Lin, 2007).

Pacing is another approach to facilitate infant feeding and swallowing where the feeder stops the flow of liquid to allow the infant time to breathe (Palmer, 1993). It is suggested that the feeder imposes an alternating rhythm of 3-5 sucks followed by a respiratory break (Ross, 2008). Self-paced flow bottle and vacuum-free bottles enhance the infant's feeding performance by producing significantly shorter feeding duration times, increased occurrence of successful feeding, and feeding efficiency, (Lau & Schanler, 2000).

Another compensation strategy used to assist the infant in achieving safe swallows is proper positioning of the infant while feeding. The infant should be positioned in a way that will facilitate good eye contact with the feeder and close physical contact while semireclined with neutral head posture and flexion at the hip and knees (Arvedson & Brodsky, 2002). Positioning is a common compensatory strategy with varying levels of empirical evidence for adults with dysphagia (Logemann, 1998). Positioning to facilitate feeding and swallowing is recommended for infants (American Speech-Language-Hearing Association, 2014; Clark, Kennedy, Pring, Hird, 2007); however, inconsistent finding regarding positioning as a method for feeding compensation lead to questionable efficacy as recent research found no difference between the experimental group and the control group (Lau, 2013).

Additional anecdotal strategies have been used to help the infant compensate for swallowing disorders during feeding; however, they are not based on empiric evidence. One such compensation is diet modification such as thickening the infant's formula (American Speech-

Language-Hearing Association, 2014). This strategy has been adopted from adult dysphagia treatment. Not only has the efficacy of this strategy not been studied in infants, professionals have been cautioned against using gum-based thickeners in the infant population as it has caused life threatening intestinal damage (U.S. Food and Drug Administration, 2011).

Habilitation. There is not one intervention reflected in the literature that has shown to be efficacious in habilitating a safe and efficient suck-swallow-breath pattern for premature infants. However, several treatment approaches are used in clinical practice, and some interventions have been shown to decrease the duration in attaining full oral feeds. One common treatment is (NNS), which is sucking for reasons other than nutrition (Arvedson & Brodsky, 2002). Infants who engaged in NNS have shown increased intraoral suction pressure, more organized patterns of sucking with more sucking per burst, fewer sporadic sucks, and had a shorter transition time between intravenous feeding and total oral feeding (Bernbaum, Pereira, Watkins, Peckman, 1983).

Other interventions that improve oral motor feeding are oral sensorimotor stimulation and tactile/kinesthetic stimulation. Oral sensorimotor stimulation involves sensory input to the feeding and swallowing structures such as the lips, cheeks, tongue, and gums (Dieter & Emory, 1996). This stimulation may include the use of NNS. Tactile stimulation involves gentle touching and caressing of the infant which includes the neck, back chest, and limbs (Rausch, 1981). This form of stimulation mimics interactions between the mother and infant. Similar to tactile stimulation, kinesthetic stimulation is a form of touch which involves massages and passive movements of the infant's limbs. A recent study evaluated the effects of these two interventions individually along with combined oral and tactile/kinesthetic sensorimotor

stimulation in facilitating independent oral feeding in preterm infants (Fucile, Gisell, McFarland, & Lau, 2011). Results revealed that all three treatment approaches resulted in faster attainment of independent oral feeding as compared to a control group receiving no intervention. Additionally, the combined stimulation group demonstrated greater feeding proficiency than the other two treatment groups.

NNS and oral stimulation have been combined in a training device as an intervention approach for infants that are not ready to begin oral feeding (Barlow, Finan, Lee, & Chu, 2008). The NTrainer is a pulsating nipple that resembles the correct timing pattern of an accurate NNS burst. Barlow et al. studied the use of this device in premature infants during their intravenous feedings for 3 minutes each session for 3-4 times per day for 10 days. Infants that received the NTrainer treatment achieved significantly greater success in advancing to oral feedings faster than the control group.

There is little literature on the use of direct swallowing therapy in premature infants. Lau and Smith (2012) describe a swallowing exercise designed to elicit a pharyngeal swallow by placing a tolerable bolus size at the junction of the hard and soft palate of the infant. The exercise bolus was provided to infants every 21 seconds for 15 minutes or as tolerated. In this study, preterm infant ranging in age from 24-34 weeks GA were randomly assigned to a NNS exercise group, a swallowing exercise group, and a control group which received no treatment. The infants in the swallowing exercise group achieved independent oral feedings faster than the control group; there was no difference between the NNS and control groups.

In summary, feeding and swallowing disorders in infants are difficult to assess as each case is multifaceted and unique. No empirical based protocol has been established that can reliably evaluate or effectively treat such disorders in infants.

Purpose and Research Questions

Given the medical and developmental problems resulting from feeding and swallowing disorders in infants, it is critical to identify feeding and swallowing problems early to initiate treatment. This identification typically begins in the NICU for premature infants. Unlike adults with dysphagia, for whom research has revealed best practices in the evaluation and treatment of such disorders, research is limited for the pediatric population. There are no evidence-based practice patterns for evaluating and treating feeding and swallowing problems for infants, including those in the NICU. Most practice is based on anecdotal evidence and expert opinion (Rogers & Arvedson, 2005). Current practice patterns for evaluating and treating premature infants in the NICU are unknown. The purpose of this research study was to identify practice patterns of speech-language pathologists (SLPs) in evaluating and treating feeding and swallowing disorders for infants in the NICU. The following research questions were addressed:

- 1) What are the practice patterns in the evaluation and treatment of feeding and swallowing disorders for infants in the NICU?
- 2) Do practice patterns differ from pediatric dysphagia experts to clinicians working in the NICU?

METHODS

Participants

Participants included expert clinicians in pediatric dysphagia and practicing clinicians who work with this population. Experts were identified as SLPs who had at least one first authored, peer-reviewed journal publication in pediatric swallowing/dysphagia (excluding invited or review articles, book chapters, professional newsletters). Practicing clinicians were SLPs who provided services in the NICU to infants with dysphagia at the time of the survey.

Experts in pediatric dysphagia were solicited via personal email request that contains the URL link for a survey which was designed for this study and is discussed below (Appendix A). Review of the literature identified seven SLP pediatric dysphagia experts. Additional individuals had the opportunity to be identified as experts based on their response to the publication question (Question 2) in the survey which asked if the individual is the first author of at least one peer-reviewed publication in pediatric dysphagia. A second request was emailed to all seven solicited expert SLPs after 21 days of the initial email. (Appendix B). We anticipated 4 of 7 experts would complete the survey.

To recruit SLPs who work with pediatric dysphagia in the NICU, a message soliciting participation and containing the URL link for the same survey was posted to the American Speech-Language-Hearing Association (ASHA) Special Interest Group (SIG) 13, Swallowing and Swallowing Disorders professional email list. The same email message was used to recruit experts was used to solicit clinicians in SIG 13. Clinicians self-identified their qualification (i.e. work in the NICU) to complete the survey which was based on their response to Question 2 of the survey “I currently work in the neonatal intensive care unit.” If they did not select this option

and they were not an expert in pediatric dysphagia, they were directed out of the survey. A second request to respond was sent through the listserv after 21 days of initial email. In addition, the email request was sent directly to clinicians who practice in NICU known by the thesis committee members.

SIG 13 had approximately 8700 members with 14% (1218) working in pediatric dysphagia at the time of the survey. Of this number working with pediatric dysphagia, approximately 12% (150) of SIG 13 members worked in the NICU. Since research suggests that web-based surveys yield a 25% response rate (Cook, Heath, & Thompson, 2000), we anticipated recruiting a minimum number of 38 practicing clinicians.

Survey

Experts in pediatric dysphagia and clinicians working in the NICU completed the same survey facilitated through Survey Monkey (Appendix C). The consent form was the first question on the survey. Prior to the initiation of the survey, subjects agreed to participate by selecting either: YES, I agree to the conditions or NO, I do not agree to the conditions. If they selected the box that indicated NO, they did not agree to participate, the survey ended. If they selected YES, the survey took the respondent to the first demographic question. The study was approved by the Committee for the Protection of Human Subjects at the University of Houston.

Respondents answered 15 questions concerning non-identifying demographic information and followed by approximately 10 questions each for two case scenarios relating to infant dysphagia. Demographic questions covered three topics: education, work setting, and NICU dysphagia experience. All demographic questions used a multiple choice format.

Two hypothetical case scenarios were developed in conjunction with practicing clinicians working in the NICU. These included considerations of evaluation and treatment of feeding and swallowing disorders in infants in the NICU. The scenarios were intentionally constructed to be vague and lack specific detail in order for the participants to report all potentially appropriate evaluation and treatment options. Each scenario was followed by multiple choice questions concerning feeding/swallowing evaluation and treatment decisions. Each question was then followed by an open-ended question querying respondents about specific factors that influenced their decision.

Analyses

Descriptive statistics (percentages of like answers in multiple choice questions) for the group in general and between experts and practicing clinicians were completed. Additionally, qualitative analysis of open-ended responses was completed. Participants had the opportunity to add additional published protocols or treatment approaches not listed in multiple choice questions. Themes were extracted to identify trends in practice patterns.

RESULTS

A total of 42 individuals initially responded to the survey; however, nine (21%) were immediately excluded and did not complete the survey as they did not meet inclusion criteria of qualifying as an expert or practicing clinician who worked in the NICU. Thus, 33 individuals completed the survey, four experts and 29 practicing clinicians, which represented a response rate of 0.4% of the SIG 13 membership and a 22% response rate for the estimated number of SIG members who work in the NICU. The survey response summaries for the two groups can be seen in Appendices D and E.

Expert Demographics

Three of the four experts (75%) had a doctorate degree. The fourth expert did not indicate the degree held but stated “I have 25 years of experience in the NICU.” It can be assumed that he/she has a minimum of a master’s degree as that is the entry level degree for an SLP. Three of four experts (75%) reported to have six or more years of experience, and one expert (25%) reported having 1-2 years of experience working in the NICU with infants with dysphagia. All but one of the experts (75%) reported to be a board recognized specialist in swallowing and swallowing disorders (BRS-S) with a focus on pediatrics. All experts completed continuing education (CE) focused on pediatric dysphagia over the past two years: two completed 20 or more hours, one completed 6-10 hours, and one completed 1-5 hours. Three of four experts (75%) were currently working in the NICU. Of the three experts who currently worked in the NICU, two completed approximately 1-2 evaluations and treatment sessions per week, and one completed 6-9 evaluations and therapy sessions per week. Three of four (75%) experts rated their

level of proficiency in evaluating and treating infants with feeding/swallowing disorders as “expert;” the remaining expert rated his/her level of proficiency as “proficient.”

Practicing Clinician Demographics

Twenty-eight of practicing clinicians (96%) reported completion of a master’s degree, and one (3%) reported having a doctorate degree. Varying experience working in the NICU was reported: 41% with 6-10 years of experience, 31% with 3-5 years of experience, 10% with 1-2 years of experience, and 17% with less than 1 year experience. Of the practicing clinicians, 17% reported to have BRS-S certification with a focus on pediatrics. CE focused on pediatric swallowing and swallowing disorders over the past two years was notable with almost half of the respondents (48%) reporting over 20 hours, 24% reporting 11-20 hours, 10% reporting 6-10 hours, and 17% reporting 5 or less hours. Caseloads were generally larger for practicing clinicians as compared to the experts with 68% reporting evaluation and 82% reporting treatment sessions of 3 or more per week. While 56% of practicing clinicians averaged 3-5 swallowing evaluations per week, 57% reported 10 or more swallowing/feeding treatment sessions per week. Twenty of the 29 (69%) practicing clinicians rated their level of proficiency in evaluating and treating infants with feeding/swallowing disorders as proficient or higher.

Case Scenario One

The first case scenario was a complex case involving a 42 week PMA infant with significant medical history (Appendix C). The infant received oxygen via a nasal cannula, all nutrition via a nasogastric tube, and demonstrated a weak cry.

When asked to select an appropriate protocol tool to assess feeding/swallowing of described infant, two of four (50%) experts selected one of standardized evaluation tools, one

(25%) identified use a non-standardized hospital/clinician protocol, and one expert (25%) recommended a consult from an otolaryngologist with no assessment protocol identified. Conversely, 15 of 25 (60%) practicing clinicians who answered the question identified use of a non-standardized hospital/clinician protocol and eight (32%) practicing clinicians used published protocols. Similar to the experts, three (12%) practicing clinicians recommended a consult to otolaryngology; however, these respondents indicated use of a non-published protocol in addition to the consult.

Experts and clinicians agreed that coughing (experts 100%, practicing clinicians 96%), color changes (experts and practicing clinicians 100%), and respiratory distress (experts 75%, practicing clinicians 100%) were overt signs and symptoms (S/S) of aspiration in this infant; however, other S/S were not consistently agreed upon between or within groups. While anterior leakage of the bolus was identified by 75% of experts, it was only identified by 9 of 25 (36%) of practicing clinicians. Two of four (50%) experts identified gagging and reduced suck-swallow-breath coordination as additional S/S of aspiration. Likewise, practicing clinicians frequently identified gagging (56%) and suck-swallow-breath coordination (88%) as important S/S of aspiration. Further S/S such as eye tearing, refusal, extension, and head-neck flexion were identified as relevant by only one expert, albeit, a different expert for each. The practicing clinicians, however, identified the remaining listed signs and symptoms with greater frequency ranging from 76% for refusal to 36% for head-neck flexion (Table 1).

Table 1. Percentage of clinical marker reported to assess aspiration between experts and practicing clinicians.

Sign/Symptom	Experts	Practicing Clinicians
Coughing	100%	96%
Color changes	100%	100%
Respiratory distress	75%	100%
Suck-swallow-breath	50%	88%
Refusal	25%	76%
Gagging	50%	56%
Extension	25%	48%
Eye tearing	25%	48%
Anterior leakage	75%	36%
Head-neck flexion	25%	36%

Survey questions sought to identify the next step in evaluation if a decline in respiratory status was observed. Two of four (50%) experts recommended a VFSS; the remaining two experts indicated not enough information was provided to answer the question. Of the practicing clinicians, only 5 of 24 (21%) indicated that they would obtain a VFSS at this point in the assessment process. The most consistent next-step plan expressed among practicing clinicians

was to assess compensation strategies such as pacing, giving the infant a break from feeding, and a combination of positioning, pacing, and allowing breaks as a total of 14 of 24 (58%) practicing clinicians indicated such. More specifically, 3 of 24 (13%) clinicians indicated that their next step would be to implement only pacing, 6 of 24 (25%) indicated giving the infants a break only, and 5 of 24 (21%) indicated a combination of pacing, breaks, and positioning. When asked to indicate the factors that influenced their decision, 5 of 18 (28%) respondents named a specific sign/symptom (S/S), 5 of 18 (28%) explained when they would refer for a VFSS, 3 of 18 (17%) reported it is based on their experience, 3 of 18 (17%) gave an explanation, and the remaining 1 of 18 (10%) reported it was based on the infant and the infant's medical history.

In the area of treatment for scenario one, no single treatment approach was consistently identified among the experts, practicing clinicians, or between the two groups. The most common treatment approach was NS using elevated side-lying positioning with two of four (50%) experts and 22 of 25 (88%) practicing clinicians reporting it as one of their treatment strategies. Another common treatment approach was NNS on pacifier or gloved finger with 75% of experts and 13 of 25 (52%) of practicing clinicians reporting it as one of their treatment strategies. It should be noted that each expert selected a different combination of treatment approaches. Additional treatment approaches mentioned by multiple practicing clinicians included pacing and taste trials (Figure 1).

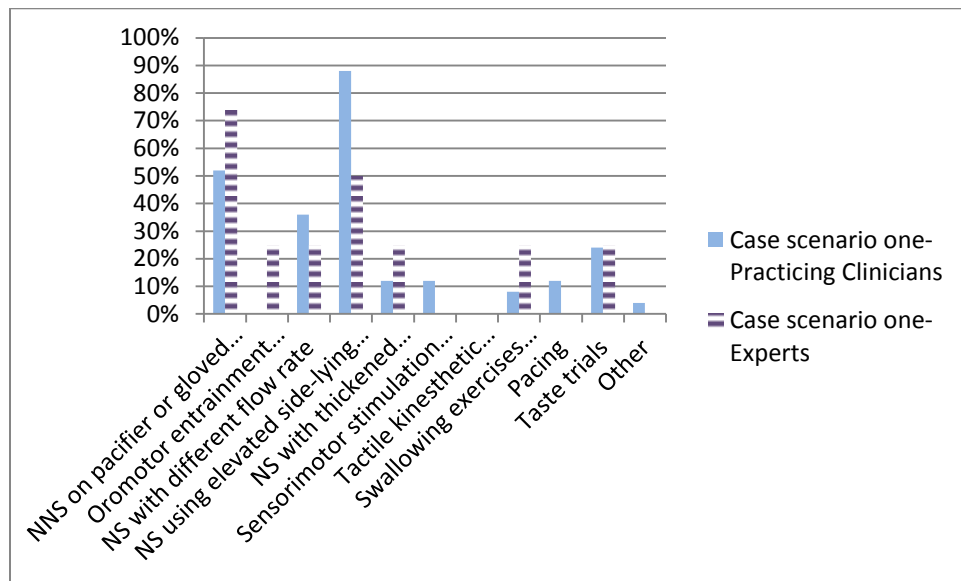


Figure 1. Percentage of treatment recommendations between experts and practicing clinicians.

Case Scenario Two

The second case scenario was a less complex case involving a 38 week PMA infant with Trisomy 21, mild hypotonia, and a heart murmur (Appendix C). The family wished to provide breast milk for the infant as attempts at breastfeeding have been unsuccessful. The infant was receiving hydration and nutrition primarily via a nasogastric tube.

Similar to first case scenario, the majority of the experts (75%) selected to use a published protocol to assess feeding and swallowing, and one (25%) expert indicated a non-published or hospital protocol would be used to assess this case. Conversely, only 8 of 24 (33%) practicing clinicians would use a published protocol, and 15 of 24 (65%) practicing clinicians indicated use of a non-published or hospital protocol.

Experts and clinicians agreed that expressed breast milk as a thin liquid (100% experts, 96% practicing clinicians) would be the consistency they would first try using a slow flow nipple

(75% experts, 96% practicing clinicians). One expert specified prior to the use of a slow flow nipple he/she would dip the pacifier in the breast milk and then attempt a slow flow nipple. Similarly, one clinician indicated dipping the pacifier would also be the first attempt with this infant. However, he/she did not specify which nipple flow would be used after taste trial.

In response to the infant's desaturation and fatigue, the experts and the clinicians lacked cohesive responses to intervention. No two experts selected a similar intervention. For example, one expert reported "allow time for recovery", and another expert did not select a treatment from the ones provided and instead reported "could be a combination of position change, pacing and time" No expert selected that he/she would add O2 or thicken the liquid. The practicing clinicians indicated external pacing (9 of 24; 38%) and change in positioning (8 of 24; 33%) as the two primary interventions for this case.

Another area of inconsistency was in response to the results of the VFSS in which the infant demonstrated minimal aspiration with general clearing of thin liquid using the slow flow nipple, no aspiration of nectar thick liquids, and functional expression with both consistencies. Again, each expert recommended a different consistency and/or intervention. For example, one expert explained "If used an elevated side-lying position with low hydrostatic pressure during VFSS and infant offered a productive cough in response to aspiration, continue therapeutic trials. If silent (aspiration), suggest Enfamil AR mixed from powder." Another expert recommended breast milk (thin liquid) following the VFSS. Similarly, no majority approach was evident with the practicing clinicians as 7 of 24 (29%) recommended breast milk thickened to nectar consistency. 7 of 24 (29%) recommended breast milk as a thin liquid, and 10 of 24 (33%) had

varying recommendation including, but not limited to, repeat VFSS, formula thickened to nectar, allowing the family to decide, and changing nipple.

Similar to case scenario one, no single treatment approach was consistently identified; however, the most common treatment approach was NS using elevated side-lying positioning with three of four (75%) of experts and 18 of 23 (78%) practicing clinicians reporting it as one of their treatment strategies. Another common treatment approach was NS with a different flow rate with 50% of the experts and 6 of 23 (26%) practicing clinicians reporting it as one of their treatment strategies. Again, each expert and clinician selected a different combination of treatment approaches. One of four experts (25%) selected a novel and empirically-based treatment approach whereas only 2 of 23 (9%) practicing clinicians included that treatment. Other treatment approaches mentioned by practicing clinicians included maturation and pacing (Figures 2).

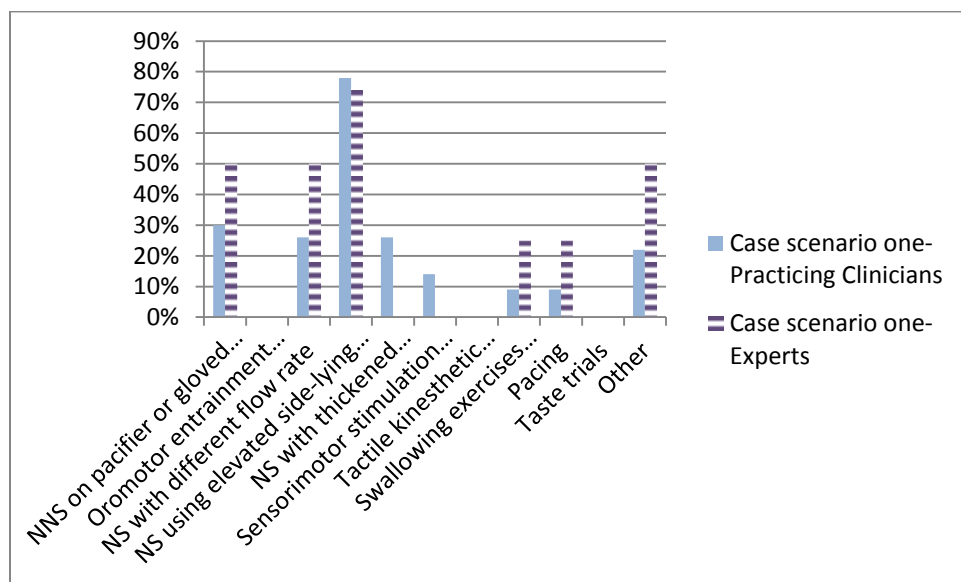


Figure 2. Percentage of treatment recommendations between experts and practicing clinicians.

DISCUSSION

This study aimed to identify the practice patterns of experts and practicing clinicians in evaluating and treating swallowing disorders in infants in the NICU. Evidence-based dysphagia practice is limited in pediatric population, particularly the NICU (Arvedson & Brodsky, 2002); therefore, expert opinion frequently informs practice patterns (American Speech-Language-Hearing Association, 2014). Realizing this, we sought to gain insight into current practice patterns of pediatric dysphagia experts and practicing NICU clinicians through the use of a clinical scenario survey. Findings revealed inconsistencies between experts and clinicians in conduction of the CSE; although, some similarities in the S/S were identified. Moreover, similarities between groups were evident for treatment recommendations, even though treatments were not consistently supported by empiric evidence.

The results reflect the opinion of four experts in the pediatric dysphagia and 29 practicing clinicians who work in the NICU. Although this sample size is small, it appears representative of the demographics that can be found in the field. While not every expert in pediatric dysphagia participated in the survey, due to the limited number of peer-reviewed publications by SLPs in this area, the response rate of four experts is good and ideally reflects the potential to know about general thinking of leaders in the field.

As anticipated, there were differences between the two groups in terms of education, specialty certification, and average weekly caseload. In regard to education, 75% of experts surveyed confirmed having a doctorate degree, whereas, only 1 (3%) of practicing clinicians held a doctorate degree. Maintaining continuing education in pediatric dysphagia appears important in both groups with 50% of experts and 48% of practicing clinicians obtaining over 20 CE hours.

This shows that clinicians are obtaining CE hours and seeking knowledge in their area of practice. The quality of the CE hours, however, cannot be ensured as ASHA guidelines only suggest, but do not require, that the content of CEs include evidence-based practice (American Speech-Language-Hearing Association, 2014).

Not surprising, more experts (75%) had obtained BRS-S specialty certification with a focus on pediatrics as compared to 17% of practicing clinicians. Specialty certification involves more than clinical experience. A candidate must demonstrate related professional skills such as presentation at state association meetings, mentoring new clinicians, provided education/training to professionals or community-based groups. Thus, it is logical to assume that many more experts would have qualifications and seek BRS-S recognition compared to practicing clinicians. However, it is important to acknowledge that five practicing clinicians did have this designation which suggests advanced skills. This is particularly important given that overall number of BRS-S recognized clinicians in 2013 was only 210 with approximately 30 focused on pediatrics (K. Schneider, personal communication, August 23, 2013).

Practicing clinicians often had twice the caseload compared to the experts. This can be expected as experts, particularly those with a doctorate degree, frequently work in academic settings and their workload typically does not involve patient care but rather focuses on teaching and research. However, it should be noted that 75% of responding experts who contribute to the breadth of knowledge in this area of research also participate in clinical care, therefore, their expert opinions remains grounded in clinical practice in addition to research.

Concerning the surveys, responses revealed a lack of consensus between experts and practicing clinicians on the CSE in terms of methods. The majority of experts report that they

would have used a published protocol in a situation similar to case scenario one and two (50% in scenario one, 75% in scenario two); whereas, the majority of practicing clinicians selected a non-published protocol (60% scenario one, 65% in scenario two). The research supporting clinical assessments of feeding and swallowing is unclear as nonstandard comprehensive evaluations are recommended (Arvedson & Brodsky, 2002), yet published clinical assessments are available but not widely used (Rogers & Arvedson, 2005). While the experts typically recommended the use of a published CSE, they did not agree on which specific assessment to use. Since CSEs are the method of choice for assessing feeding and swallowing in the NICU (Arvedson & Brodsky, 2002), a standard approach appears important to adopt. Numerous standard protocols for the pediatric population are evident (Braun & Palmer, 1986; Thyoyr, Shaker, & Pridham, 2005; Lau et al., 1997), but to our knowledge, none have been validated. Although instrumental evaluations are more prevalent in adults compared with the pediatric population, the CSE is the first level of evaluation across diagnoses (Logemann, 1998). In the adult population, protocols for the CSE are suggested (Logemann, 1998; Daniels & Huckabee, 2013) but no standard protocol is recommended. The Mann Assessment of Swallowing Ability is a standard CSE that has been validated to identify dysphagia and aspiration in individuals with acute stroke (Mann, 2002); however, it has not been widely adopted (Daniels & Huckabee, 2013).

As part of a CSE, there are numerous S/S associated with dysphagia and aspiration. In this study, participants were instructed to select all the provided S/S that applied to the cases as well as enter additional S/S not listed. Numerous S/S were identified including coughing, head-neck flexion, anterior leakage, gagging, extension, color changes, suck-swallow-breath coordination, refusal, eye tearing, and respiratory distress. Of these, three were consistently

identified within and between groups: coughing, color changes, and respiratory distress. All participants identified color changes, and approximately 97% identified coughing and respiratory distress as observable S/S of aspiration. In pediatric dysphagia for which expert opinion forms much of the practice patterns (American Speech-Language Hearing Association, 2014), one highly regarded research expert suggests that any behavior suggesting changes in cardiac or respiratory status can be attributed to aspiration (Arvedson & Brodsky, 2002). Another highly regarded research expert lists common respiratory presentations (apnea/bradycardia, apparent life threatening episode, coughing or choking during/after oral feeding, cyanosis during oral feeding, and wheezing or stridor) in conditions associated dysphagia in children 0-6 months of age (Lefton-Greif & McGrath-Morrow, 2007). Our study found strong agreement between experts and practicing clinicians in identifying coughing, color changes, and respiratory distress as S/S predictors of aspiration. Coughing, however, is the only one of these three S/S of aspiration that has been validated in the pediatric population (Weir, et al., 2009) and the adult population (Martino, Pron, & Diamant, 2000). Contradictory findings are evident concerning the association between respiratory changes such as oxygen desaturation and aspiration in the adult population (Collins, Bakheit, 1997; Colodny, 2000). Further research is warranted to validate additional S/S in the pediatric population in order to facilitate clinicians in the accurate identification of risk of dysphagia and aspiration.

There appears to be limited agreement on the need to complete an instrumental swallowing examination for neonates with suspected dysphagia and aspiration. Fifty percent of experts and 21% of practicing clinicians recommended referral for a VFSS. Research recommends that if S/S of aspiration are observed an instrumental examination is warranted

regardless of age (Arvedson et al., 1994; Lefton-Greif, 2008; Weir et al., 2011). The remaining two experts reported that not enough information was provided in the case scenario to choose from the options provided. Therefore, expert SLP practice patterns for VFSS referral cannot be determined.

Thirty-four percent of practicing clinicians implemented compensatory strategies for the infant without completing an instrumental examination to fully assess the pharyngeal stage of swallowing. This may be attributed to the hesitation to expose an infant to radiation. However, it has been shown that infants with suspected dysphagia have abnormalities in the pharyngeal phase seen on instrumental examinations which may present without any overt signs (Newman, Keckley, Petersen, & Hammer, 2001; Weir et al., 2011). In order to determine the specific swallowing impairment and appropriate treatment for feeding and swallowing disorders, guidelines for recommending instrumental evaluations in the pediatric population, particularly the NICU, must be established.

Commonalities in treatment recommendations between groups were identified. The most common treatment method selected for both cases by all participants was NS using elevated side-lying positioning. This treatment approach is recommended by ASHA when treating infants with feeding and swallowing disorders (American Speech-Language Hearing Association, 2014). Furthermore, research suggests elevated side-lying improves physiologic stability; however no control group was included (Clark et al., 2007). Conversely, more recent research found elevated side-lying to be an ineffective treatment for achieving independent feedings (Lau, 2013). The use of NS with elevated side-lying positioning as a treatment approach is common in clinical practice

and supported by expert opinion but has contradictory research findings. Therefore, more research is necessary to determine efficacy of this treatment.

Another congruent practice pattern across groups was the consistent use of breast milk (27 of 28, 96% total respondents) with the use of a slow flow nipple (26 of 28, 93%) as the initial attempted consistency during a feeding and swallowing evaluation. The experts and practicing clinicians commonly reported that the use of breast milk was expressly in response to the family's desire to use breast milk as well as its nutritional value. A slow flow nipple was recommended in conjunction to the use of breast milk as coughing and anterior loss was noted with a fast flow nipple. It was recommended by 56% of total respondents.

In our list of treatment strategies, we included two recently published evidence-based rehabilitative treatment approaches: direct swallowing exercises (Lau & Smith, 2012), and oromotor entrainment therapy (Barlow et al., 2008). For case one, only one expert and two practicing clinicians recommended direct swallowing exercises and another expert recommended entrainment therapy. For case two, the same expert and clinicians again recommended direct swallowing exercise. Entrainment therapy was not recommended for case two. The selection of these new evidence-based by only one expert was surprising. Moreover, few, if any, clinicians selected them. It is unclear if the other experts as well as the majority of practicing clinicians had any knowledge of these treatment approaches or did not find them appropriate for the two cases. Translation of the latest evidence into clinical practice appears lacking given the high number of CE hours by expert and practicing clinicians and the fact that entrainment therapy was initially published in 2008 and direct swallowing therapy in 2012. It is critical that individuals working with pediatric dysphagia maintain up-to-date knowledge in the latest evidence and have the skills

to critically review the literature. Likewise, experts in the field who are providing CE conferences for practicing clinicians must provide the latest evidence.

Limitations

It is important to note the limitations of this study. First, the sample size of pediatric dysphagia experts and practicing NICU clinician was small. The community of speech-language pathology does not have an established or recognized definition of what constitutes an expert SLP. The definition of expert was determined by the primary investigator and the committee chair and it was confirmed by committee members. An expert qualified by being an SLP who was first author of a peer reviewed article in pediatric dysphagia; experts were not specifically focused on the NICU, nor were they limited to individuals holding a doctorate degree. This broad definition was used to increase possible expert participants; however, it may have contributed to the inconsistent responses among the experts. Additionally, some of the research conducted in NICU and pediatric dysphagia is not by SLPs; however, we felt it important to limit experts to published SLPs as they have typically provided most of the education in terms of publications and CE lectures for practicing clinicians.

In addition to the small sample size, some participants did not respond to questions as they reported insufficient information was provided in the case scenarios. One expert and two practicing clinicians reported not enough information was provided. The diagnostic process is dynamic; it may be difficult for a clinician to hypothetically evaluate and treat an infant without observing the internal evidence firsthand. One of four experts declined to answer five questions in the survey and indicated that more information was warranted before the question could be answered. This reduced information from which to compare to the practicing clinicians. The

ability to determine cohesive expert practice patterns was somewhat limited due to this lack of response. The remaining three experts answered all the multiple choice and open-ended questions relating to the case scenarios. Only one of 29 practicing clinicians declined to answer one question due to insufficient information in the case scenario. On average, five practicing clinicians did not answer multiple choice questions and 10-20 practicing clinicians failed to answer the open-ended questions. This also reduced the ability to understand why clinicians practice as they do.

Only two case scenarios were included in the survey. The construction of the case scenarios aimed to include typical patients seen in the NICU. The case scenarios were divergent in order to represent the range of patients seen by practicing clinicians. While these two case scenarios covered typical cases seen in the NICU, they cannot represent all caseloads and may have limited the number of evaluation protocols and treatment approaches that are actually used in the field. The decision to include only two cases was secondary to the length of the overall study. In the event additional case scenarios were added to the survey, it could be expected that less participants would have responded. Since the sample size was already expected to be small, the survey was balanced in such a way that maximal information was obtained while optimizing the length of the survey.

Last, only one of the two case scenarios included a question concerning referral for VFSS and thus, it may under-represent the number of times practicing clinicians refer patients in the NICU for an instrumental examinations. In addition, two of four (50%) experts declined to answer the question concerning VFSS referral. One expert reported insufficient information provided in the case scenario and the other expert declined to select only one action reporting

“one answer is too simplistic.” As such, findings from this survey concerning recommendations for an instrumental examination must be interpreted cautiously.

Future Research

Continued research is warranted to establish consistent evidence-based evaluation and treatment practices to ensure quality care for neonates with dysphagia. This study revealed inconsistencies between expert clinicians and practicing clinicians in evaluation protocols in assessing clinical markers for aspiration and appropriate referrals for VFSS. Inconsistencies were also found in the treatment protocol as some consistently identified practice patterns such as NS with elevated side-lying were supported by experts and practicing clinicians but found to have contradictory empirical evidence (Clark, et al, 2007; Lau, 2013). Future research should aim to establish the reliability and validity of clinical evaluations such as the NOMAS to ensure accuracy of diagnosis. Guidelines are also required to determine when referral for instrumental evaluations is appropriate. Finally, research confirming the efficacy of various treatment approaches is essential. Translation of current evidence-based research into clinical practice is critical to patient care.

APPENDIX A: Listserv and Email Request for Participation

My name is Jessica Rose Shool; I am a graduate student in the Department of Communication Sciences and Disorders at the University of Houston. I am requesting your participation in a research study as a part of my Master's thesis under the direction of Stephanie Daniels, PhD, CCC. The purpose of the study is to determine the practice patterns of speech-language pathologists in the Neonatal Intensive Care Unit (NICU). This project has been reviewed by the University of Houston Committee for the Protection of Human Subjects (713) 743-9204.

If you have already completed the survey, please disregard this email as the survey can only be taken once. Thank you for your participation.

If you choose to participate, you will complete an online survey. The survey consists of questions related to your education and work experience as well as questions concerning two (2) case scenarios. Completion of the survey should not exceed 20 minutes.

Survey Link <https://www.surveymonkey.com/s/NICUpracticepatterns>

Your participation in the survey is completely voluntary, and all of your responses are completely anonymous as no identifying information is collected. You may decline to answer any question or stop the survey at any time before completion. There is no direct benefit to you for your participation aside from your contribution to the literature in the area of pediatric dysphagia.

Thank you for considering participation. If you have questions, please contact me at jrshool@uh.edu.

APPENDIX B: Follow-up Listserv and Email Request for Participation

My name is Jessica Rose Shool; I am a graduate student in the Department of Communication Sciences and Disorders at the University of Houston. I am requesting your participation in a research study as a part of my Master's thesis under the direction of Stephanie Daniels, PhD, CCC. The purpose of the study is to determine the practice patterns of speech-language pathologists in the Neonatal Intensive Care Unit (NICU). This project has been reviewed by the University of Houston Committee for the Protection of Human Subjects (713) 743-9204.

If you have not already responded to this request, please select the survey link below.

If you choose to participate, you will complete an online survey. The survey consists of questions related to your education and work experience as well as questions concerning two (2) case scenarios. Completion of the survey should not exceed 20 minutes.

Survey Link <https://www.surveymonkey.com/s/NICUpracticepatterns>

Your participation in the survey is completely voluntary, and all of your responses are completely anonymous as no identifying information is collected. You may decline to answer any question or stop the survey at any time before completion. There is no direct benefit to you for your participation aside from your contribution to the literature in the area of pediatric dysphagia.

Thank you for considering participation. If you have questions, please contact me at jrshool@uh.edu.

Evaluation and Treatment of Feeding and Swallowing Disorders for

Consent

***1. UNIVERSITY OF HOUSTON CONSENT TO PARTICIPATE IN RESEARCH**

PROJECT TITLE: Evaluation and Treatment of Feeding and Swallowing Disorders for Neonates in the NICU: Current Practice Patterns

You are being invited to participate in a research project conducted by Jessica Rose Shool in the Communication Sciences & Disorders at the University of Houston. This project is a part of a master's thesis and is under the supervision of Stephanie Daniels, PhD, CCC.

NON-PARTICIPATION STATEMENT

Your participation is voluntary, and you may refuse to participate or withdraw at any time without penalty or loss of benefits to which you are otherwise entitled. You may also refuse to answer any question.

PURPOSE OF THE STUDY

The purpose of this study is to identify practice patterns of speech-language pathologists in evaluating and treating feeding and swallowing disorders in infants in the Neonatal Intensive Care Unit (NICU).

PROCEDURES

You will be one of approximately 175 individuals to be asked to participate in this project. You will complete an online survey. The survey consists of questions related to your education and work experience as well as questions concerning two (2) case scenarios. The amount of time required to complete the survey should not exceed 20 minutes.

CONFIDENTIALITY

Your participation in this project is anonymous. No identifying information will be obtained.

RISKS/DISCOMFORTS

There are no foreseeable risks to participating in this study.

Evaluation and Treatment of Feeding and Swallowing Disorders for

BENEFITS

While you will not directly benefit from participation, your participation may help investigators better understand the practice patterns for care of infants with dysphagia in the NICU.

ALTERNATIVES

Participation in this project is voluntary, and the only alternative to this project is non-participation.

PUBLICATION STATEMENT

The results of this study may be published in professional and/or scientific journals. It may also be used for educational purposes or for professional presentations. However, no individual participant will be identified.

If you have any questions, you may contact Dr. Stephanie Daniels (713) 743-2570.

ANY QUESTIONS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (713-743-9204).

☐ YES, I agree to the conditions.

☐ NO, I do not agree to the conditions.

2. Which of the following statements best describes you? Select all that apply.

- ☐ I am first-author of a peer-reviewed journal publication in pediatric swallowing/dysphagia (excluding invited or review articles, book chapters, professional newsletters).
- ☐ I currently work in the Neonatal Intensive Care Unit (NICU) with infants with dysphagia.
- ☐ Neither statement describes me.

Demographic Information

3. How many years of experience do you have working in the NICU with infants with dysphagia?

☐ <1

☐ 1-2

☐ 3-5

☐ 6-10

4. What is the level of your professional training in the area of Speech-Language Pathology?

☐ Masters of Science/Masters of Arts

☐ Doctor of Philosophy/Education

☐ Other (please specify)

5. How many college level lecture hours of pediatric dysphagia have you received?

☐ >1

☐ 1-2

☐ 3-5

☐ 6-9

☐ >10

6. How many continuing education hours in pediatric dysphagia have you completed in last 2 years?

☐ <1

☐ 1-5

☐ 6-10

☐ 11-20

☐ >20

Evaluation and Treatment of Feeding and Swallowing Disorders for

7. Are you a board recognized specialists in swallowing and swallowing disorders with a focus in pediatrics?

☐ Yes

☐ No

8. Have you previously been involved in pediatric dysphagia research?

☐ Yes

☐ No

9. How would you rate your level of proficiency in evaluating and treating infants with feeding/swallowing disorders in the NICU?

☐ Novice

☐ Intermediate

☐ Proficient

☐ Advanced

☐ Expert

10. Which professional performs the feeding/swallowing evaluations in the NICU at your facility? Select all that apply.

☐ Speech-Language Pathologist

☐ Occupational Therapist

☐ Nurse

☐ Nutritionist

☐ Family Member/ Caregiver

☐ Other (please specify)

Evaluation and Treatment of Feeding and Swallowing Disorders for

11. Which professional performs the feeding/swallowing therapy sessions in the NICU at your facility? Select all that apply.

☐ Speech-Language Pathologist

☐ Occupational Therapist

☐ Nurse

☐ Nutritionist

☐ Family Member/ Caregiver

☐ Other (please specify)

12. What type of feeding/swallowing evaluations do you complete in the NICU at your facility? Select all that apply.

☐ Clinical swallowing evaluation

☐ Modified barium swallow (MBS)

☐ Fiberoptic endoscopic evaluation of swallowing (FEES)

☐ Other (please specify)

Demographic Information Continued

13. What is the average number feeding/swallowing evaluations you complete per week in the NICU?

☐ 1-2

☐ 3-5

☐ 6-9

☐ >10

14. Of the total in number 13, what is the average number of clinical feeding/swallowing evaluations you complete per week in the NICU?

☐ 1-2

☐ 3-5

☐ 6-9

☐ >10

15. Of the total in number 13, what is the average number of instrumental (MBS/FEES) feeding/swallowing evaluations you complete per week in the NICU?

☐ 1-2

☐ 3-5

☐ 6-9

☐ >10

16. What is the average number of feeding/swallowing therapy sessions you complete per week in the NICU?

☐ 1-2

☐ 3-5

☐ 6-9

☐ >10

Evaluation and Treatment of Feeding and Swallowing Disorders for

Case Scenario 1

Infant XX was born at 28 weeks gestation weighing (2 grams). XX's current postmenstrual age (PMA) is 42 weeks. Medical history is significant for congenital heart disease (status-post patent ductus arteriosis ligation 1 week ago) and chronic lung disease. XX is on O2 via nasal cannula (1/8 liter). He is currently receiving all nutrition via nasogastric (NG) tube and tolerating bolus feeds well. XX has never been fed by mouth. You receive a feeding/swallowing consult. In the NICU you find XX swaddled and taking a pacifier with good nonnutritive sucking (NNS). Upon removal of pacifier, you hear a weak cry.

17. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

- ☐ Neonatal Oral-Motor Assessment Scale (NOMAS)
- ☐ Early Feeding Skills Assessment
- ☐ Oral Feeding Skills (OFS)
- ☐ Systematic Assessment of the Infant at the Breast (SAIB)
- ☐ Nationwide Children's Cue Based Feeding Scales
- ☐ Non-standardized hospital/clinician protocol
- ☐ Other (please specify)

18. What factors influenced your decision?

Evaluation and Treatment of Feeding and Swallowing Disorders for

19. You provide thin liquids via slow flow nipple. What clinical signs/symptoms would you be observing to assess for aspiration? Select all that apply.

- ☐ Coughing
- ☐ Head-neck flexion
- ☐ Anterior leakage
- ☐ Gagging
- ☐ Extension
- ☐ Color changes
- ☐ Suck-swallow-breath coordination
- ☐ Refusal
- ☐ Eye tearing
- ☐ Respiratory distress
- ☐ Other (please specify)

20. During the assessment, XX desaturates and becomes cyanotic. Your next step would be to:

- ☐ Thicken the liquid to a nectar consistency use slow flow nipple to help with coordination
- ☐ Increase O2 during feeding
- ☐ Stop all feeding and allow the infant time to mature
- ☐ Give the infant a break, allow for recovery, and then continue feeding
- ☐ Refer for modified barium swallow
- ☐ Adjust positioning and provide jaw support to promote improved suck-swallow-breathe
- ☐ Other (please specify)

21. What factors influenced your decision?

	5
	6

Evaluation and Treatment of Feeding and Swallowing Disorders for

22. Given XX's cardiac history and limited experience with PO, what treatment strategies would you attempt to improve oral feeding? Select all that apply.

- ☐ Non-nutritive sucking on pacifier or gloved finger
- ☐ Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)
- ☐ Nutritive sucking with different flow rate
- ☐ Nutritive sucking using elevated side-lying positioning for the infant
- ☐ Nutritive sucking with thickened consistencies
- ☐ Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)
- ☐ Tactile kinesthetic stimulation (stroking the body/passive range of motion)
- ☐ Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)
- ☐ Other (please specify)

23. What factors influenced your decision?

	5
	6

Evaluation and Treatment of Feeding and Swallowing Disorders for

Case Scenario 2

BB was born at 30 weeks gestation, now 38 weeks PMA, with history of Trisomy 21, mild hypotonia, and heart murmur. BB is working on feeding progression. She is currently receiving all nutrition via NG-tube. Feeding history includes unsuccessful breast feeding attempts by her mother. During breast feeding attempts, her mother reported reduced latch and reduced tongue cupping with minimal expression. After multiple unsuccessful attempts, the family decided not to breast-feed but would like to provide breast milk. The family and nursing staff tried expressed breast milk via bottle using a fast flow nipple but stopped due to coughing/choking and anterior loss from the oral cavity. You are consulted for clinical feeding/swallowing evaluation.

24. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

- ☐ Neonatal Oral-Motor Assessment Scale (NOMAS)
- ☐ Early Feeding Skills Assessment
- ☐ Oral Feeding Skills (OFS)
- ☐ Systematic Assessment of the Infant at the Breast (SAIB)
- ☐ Nationwide Children's Cue Based Feeding Scales
- ☐ Non-standardized hospital/clinician protocol
- ☐ Other (please specify)

25. What factors influenced your decision?

26. What consistency would you first try:

- ☐ Expressed breast milk (thin liquid)
- ☐ Formula (thin liquid)
- ☐ Formula thickened to nectar
- ☐ Formula thickened to honey
- ☐ Other (please specify)

27. What factors influenced your decision?

Evaluation and Treatment of Feeding and Swallowing Disorders for

28. What flow rate would you attempt when providing your selection above?

- ☐ Slow flow
- ☐ Medium flow
- ☐ Fast flow
- ☐ Cross cut nipple
- ☐ Other (please specify)

29. What factors influenced your decision?

	5
	6

30. You attempt oral intake in an upright position based on the decisions you made above. BB demonstrates adequate sucking and appears to be coordinating suck-swallow-breathe. However, you note fatigue and desaturation toward the end of your clinical assessment. What intervention would you attempt next?

- ☐ External pacing
- ☐ Change positioning
- ☐ Thicken to nectar
- ☐ Nipple change
- ☐ Allow time for recovery
- ☐ Add O2 during feeding
- ☐ Other (please specify)

31. What factors influenced your decision?

	5
	6

Evaluation and Treatment of Feeding and Swallowing Disorders for

32. During a modified barium swallow study, BB demonstrates minimal aspiration of thin liquid on slow flow nipple with most of the contrast clearing the airway spontaneously upon completion of the swallow (penetration-aspiration scale score 6-8) . There is no aspiration of nectar. Expression is functional with both consistencies. Her mother would prefer to provide breast milk given the nutritional benefits. What is your recommendation?

- ☐ Provide formula thickened to nectar
- ☐ Provide breast milk thickened to nectar
- ☐ Provide formula (thin liquid)
- ☐ Provide breast milk (thin liquid)
- ☐ Provide breast milk via NG-tube
- ☐ Other (please specify)

33. What factors influenced your decision?

34. What treatment strategies would you attempt to improve oral feeding? Select all that apply.

- ☐ Non-nutritive sucking on pacifier or gloved finger
- ☐ Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)
- ☐ Nutritive sucking with different flow rate
- ☐ Nutritive sucking using elevated side-lying positioning for the infant
- ☐ Nutritive sucking with thickened consistencies
- ☐ Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)
- ☐ Tactile kinesthetic stimulation (stroking the body/passive range of motion)
- ☐ Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)
- ☐ Other (please specify)

35. What factors influenced your decision?

APPENDIX D: Expert Response Summary

Evaluation and Treatment of Feeding and Swallowing Disorders for Neonates in the NICU: Current Practice Patterns

1. UNIVERSITY OF HOUSTON CONSENT TO PARTICIPATE IN RESEARCH PROJECT TITLE: Evaluation and Treatment of Feeding and Swallowing Disorders for Neonates in the NICU: Current Practice Patterns You are being invited to participate in a research project conducted by Jessica Rose Shool in the Communication Sciences & Disorders at the University of Houston. This project is a part of a master's thesis and is under the supervision of Stephanie Daniels, PhD, CCC. **NON-PARTICIPATION STATEMENT** Your participation is voluntary, and you may refuse to participate or withdraw at any time without penalty or loss of benefits to which you are otherwise entitled. You may also refuse to answer any question. **PURPOSE OF THE STUDY** The purpose of this study is to identify practice patterns of speech-language pathologists in evaluating and treating feeding and swallowing disorders in infants in the Neonatal Intensive Care Unit (NICU). **PROCEDURES** You will be one of approximately 175 individuals to be asked to participate in this project. You will complete an online survey. The survey consists of questions related to your education and work experience as well as questions concerning two (2) case scenarios. The amount of time required to complete the survey should not exceed 20 minutes. **CONFIDENTIALITY** Your participation in this project is anonymous. No identifying information will be obtained. **RISKS/DISCOMFORTS** There are no foreseeable risks to participating in this study. **BENEFITS** While you will not directly benefit from participation, your participation may help investigators better understand the practice patterns for care of infants with dysphagia in the NICU. **ALTERNATIVES** Participation in this project is voluntary, and the only alternative to this project is non-participation. **PUBLICATION STATEMENT** The results of this study may be published in professional and/or scientific journals. It may also be used for educational purposes or for professional presentations. However, no individual participant will be identified. If you have any questions, you may contact Dr. Stephanie Daniels (713) 743-2570. **ANY QUESTIONS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (713-743-9204).**

	Response Percent	Response Count
YES, I agree to the conditions.	100.0%	4

NO, I do not agree to the conditions.	0.0%	0
answered question		4
skipped question		0




2. Which of the following statements best describes you? Select all that apply.

	Response Percent	Response Count
I am first-author of a peer-reviewed journal publication in pediatric swallowing/dysphagia (excluding invited or review articles, book chapters, professional newsletters).	100.0%	4
I currently work in the Neonatal Intensive Care Unit (NICU) with infants with dysphagia.	50.0%	2
Neither statement describes me.	0.0%	0
answered question		4
skipped question		0





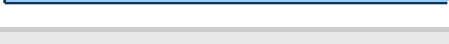
3. How many years of experience do you have working in the NICU with infants with dysphagia?

	Response Percent	Response Count
<1	0.0%	0
1-2	33.3%	1
3-5	0.0%	0
6-10	66.7%	2
answered question		3
skipped question		1


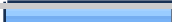
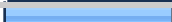

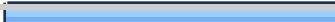
4. What is the level of your professional training in the area of Speech-Language Pathology?

		Response Percent	Response Count
Masters of Science/Masters of Arts		0.0%	0
Doctor of Philosophy/Education		75.0%	3
Other (please specify)		25.0%	1
answered question			4
skipped question			0



5. How many college level lecture hours of pediatric dysphagia have you received?

		Response Percent	Response Count
>1		33.3%	1
1-2		0.0%	0
3-5		0.0%	0
6-9		0.0%	0
>10		66.7%	2
answered question			3
skipped question			1

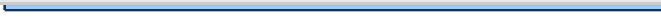

6. How many continuing education hours in pediatric dysphagia have you completed in last 2 years?






		Response Percent	Response Count
<1		0.0%	0
1-5		25.0%	1
6-10		25.0%	1
11-20		0.0%	0
>20		50.0%	2
answered question			4
skipped question			0







7. Are you a board recognized specialists in swallowing and swallowing disorders with a focus in pediatrics?

		Response Percent	Response Count
Yes		75.0%	3
No		25.0%	1
answered question			4
skipped question			0

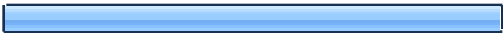



8. Have you previously been involved in pediatric dysphagia research?

		Response Percent	Response Count
Yes		100.0%	4
No		0.0%	0
answered question			4





skipped question		0
9. How would you rate your level of proficiency in evaluating and treating infants with feeding/swallowing disorders in the NICU?		
		Response Percent Response Count
Novice		0.0% 0
Intermediate		0.0% 0
Proficient		25.0% 1
Advanced		0.0% 0
Expert		75.0% 3
answered question		4
skipped question		0

10. Which professional performs the feeding/swallowing evaluations in the NICU at your facility? Select all that apply.		
		Response Percent Response Count
Speech-Language Pathologist		75.0% 3
Occupational Therapist		50.0% 2
Nurse		25.0% 1
Nutritionist		0.0% 0
Family Member/ Caregiver		0.0% 0
Other (please specify)		25.0% 1
answered question		4
skipped question		0



11. Which professional performs the feeding/swallowing therapy sessions in the NICU at your facility? Select all that apply.

		Response Percent	Response Count
Speech-Language Pathologist		75.0%	3
Occupational Therapist		50.0%	2
Nurse		25.0%	1
Nutritionist		0.0%	0
Family Member/ Caregiver		0.0%	0
Other (please specify)		25.0%	1
answered question			4
skipped question			0



12. What type of feeding/swallowing evaluations do you complete in the NICU at your facility? Select all that apply.

		Response Percent	Response Count
Clinical swallowing evaluation		75.0%	3
Modified barium swallow (MBS)		75.0%	3
Fiberoptic endoscopic evaluation of swallowing (FEES)		50.0%	2
Other (please specify)		25.0%	1
answered question			4
skipped question			0


13. What is the average number feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		66.7%	2
3-5		0.0%	0
6-9		33.3%	1
>10		0.0%	0
answered question			3
skipped question			1



14. Of the total in number 13, what is the average number of clinical feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		66.7%	2
3-5		0.0%	0
6-9		33.3%	1
>10		0.0%	0
answered question			3
skipped question			1


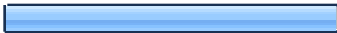




15. Of the total in number 13, what is the average number of instrumental (MBS/FEES) feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		100.0%	3
3-5		0.0%	0
6-9		0.0%	0
>10		0.0%	0
answered question			3
skipped question			1

16. What is the average number of feeding/swallowing therapy sessions you complete per week in the NICU?

		Response Percent	Response Count
1-2		66.7%	2
3-5		0.0%	0
6-9		0.0%	0
>10		33.3%	1
answered question			3
skipped question			1












17. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

		Response Percent	Response Count
Neonatal Oral-Motor Assessment Scale (NOMAS)		25.0%	1
Early Feeding Skills Assessment		50.0%	2
Oral Feeding Skills (OFS)		50.0%	2
Systematic Assessment of the Infant at the Breast (SAIB)		25.0%	1
Nationwide Children's Cue Based Feeding Scales		0.0%	0
Non-standardized hospital/clinician protocol		25.0%	1
Other (please specify)		25.0%	1
		answered question	4
		skipped question	0

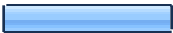
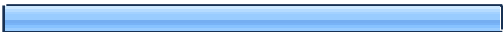
18. What factors influenced your decision?

	Response Count
	4
answered question	4
skipped question	0

19. You provide thin liquids via slow flow nipple. What clinical signs/symptoms would you be observing to assess for aspiration? Select all that apply.

		Response Percent	Response Count
Coughing		100.0%	4
Head-neck flexion		25.0%	1
Anterior leakage		75.0%	3
Gagging		50.0%	2
Extension		25.0%	1
Color changes		100.0%	4
Suck-swallow-breath coordination		50.0%	2
Refusal		25.0%	1
Eye tearing		25.0%	1
Respiratory distress		75.0%	3
Other (please specify)		50.0%	2
answered question			4
skipped question			0








20. During the assessment, XX desaturates and becomes cyanotic. Your next step would be to:

		Response Percent	Response Count
Thicken the liquid to a nectar consistency use slow flow nipple to help with coordination		0.0%	0
Increase O2 during feeding		0.0%	0
Stop all feeding and allow the infant time to mature		0.0%	0
Give the infant a break, allow for recovery, and then continue feeding		0.0%	0
Refer for modified barium swallow		25.0%	1
Adjust positioning and provide jaw support to promote improved suck-swallow-breathe		0.0%	0
Other (please specify)		75.0%	3
answered question			4
skipped question			0

21. What factors influenced your decision?

	Response Count
	4
answered question	4
skipped question	0

22. Given XX's cardiac history and limited experience with PO, what treatment strategies would you attempt to improve oral feeding? Select all that apply.

		Response Percent	Response Count
Non-nutritive sucking on pacifier or gloved finger		75.0%	3
Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)		25.0%	1
Nutritive sucking with different flow rate		25.0%	1
Nutritive sucking using elevated side-lying positioning for the infant		50.0%	2
Nutritive sucking with thickened consistencies		25.0%	1
Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)		0.0%	0
Tactile kinesthetic stimulation (stroking the body/passive range of motion)		0.0%	0
Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)		25.0%	1
Other (please specify)		75.0%	3
answered question			4
skipped question			0

23. What factors influenced your decision?

Response
Count

3

answered question 3

skipped question 1

24. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

Response
Percent Response
Count

Neonatal Oral-Motor Assessment Scale (NOMAS)  25.0% 1

Early Feeding Skills Assessment  25.0% 1

Oral Feeding Skills (OFS)  25.0% 1

Systematic Assessment of the Infant at the Breast (SAIB) 0.0% 0

Nationwide Children's Cue Based Feeding Scales 0.0% 0

Non-standardized hospital/clinician protocol  25.0% 1

Other (please specify)  25.0% 1

answered question 4

skipped question 0

25. What factors influenced your decision?

Response
Count

3

answered question 3

skipped question 1

26. What consistency would you first try:

Response
Percent Response
Count

Expressed breast milk (thin
liquid)



100.0%

4

Formula (thin liquid)

0.0%

0

Formula thickened to nectar

0.0%

0

Formula thickened to honey

0.0%

0

Other (please specify)

0.0%

0

answered question

4

skipped question

0

27. What factors influenced your decision?


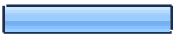
Response
Count

4

answered question 4

skipped question 0








28. What flow rate would you attempt when providing your selection above?

		Response Percent	Response Count
Slow flow		75.0%	3
Medium flow		0.0%	0
Fast flow		0.0%	0
Cross cut nipple		0.0%	0
Other (please specify)		25.0%	1
answered question			4
skipped question			0

29. What factors influenced your decision?

		Response Count
		4
answered question	4	
skipped question		0

30. You attempt oral intake in an upright position based on the decisions you made above. BB demonstrates adequate sucking and appears to be coordinating suck-swallow-breathe. However, you note fatigue and desaturation toward the end of your clinical assessment. What intervention would you attempt next?

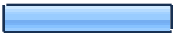


		Response Percent	Response Count
External pacing		0.0%	0
Change positioning		0.0%	0
Thicken to nectar		0.0%	0
Nipple change		0.0%	0
Allow time for recovery		25.0%	1
Add O2 during feeding		0.0%	0
Other (please specify)		75.0%	3
answered question			4
skipped question			0

31. What factors influenced your decision?

	Response Count

4

32. During a modified barium swallow study, BB demonstrates minimal aspiration of thin liquid on slow flow nipple with most of the contrast clearing the airway spontaneously upon completion of the swallow (penetration-aspiration scale score 6-8) . There is no aspiration of nectar. Expression is functional with both consistencies. Her mother would prefer to provide breast milk given the nutritional benefits. What is your recommendation?






		Response Percent	Response Count
Provide formula thickened to nectar		25.0%	1
Provide breast milk thickened to nectar		0.0%	0
Provide formula (thin liquid)		0.0%	0
Provide breast milk (thin liquid)		25.0%	1
Provide breast milk via NG-tube		0.0%	0
Other (please specify)		50.0%	2
answered question			4
skipped question			0

33. What factors influenced your decision?

Response Count

4

34. What treatment strategies would you attempt to improve oral feeding? Select all that apply.

		Response Percent	Response Count
Non-nutritive sucking on pacifier or gloved finger		50.0%	2
Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)		0.0%	0
Nutritive sucking with different flow rate		50.0%	2
Nutritive sucking using elevated side-lying positioning for the infant		75.0%	3
Nutritive sucking with thickened consistencies		0.0%	0
Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)		0.0%	0
Tactile kinesthetic stimulation (stroking the body/passive range of motion)		0.0%	0
Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)		25.0%	1
Other (please specify)		75.0%	3
answered question			4
skipped question			0

35. What factors influenced your decision?

**Response
Count**

3

answered question

3

skipped question

1

Page 3, Q4. What is the level of your professional training in the area of Speech-Language Pathology?

1	I have 25 years experience in NICU	Dec 27, 2013 10:40 AM
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Page 3, Q10. Which professional performs the feeding/swallowing evaluations in the NICU at your facility? Select all that apply.

1	not currently employed in the NICU	Dec 6, 2013 9:27 PM
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Page 3, Q11. Which professional performs the feeding/swallowing therapy sessions in the NICU at your facility? Select all that apply.

1	not currently employed in the NICU	Dec 6, 2013 9:27 PM
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Page 3, Q12. What type of feeding/swallowing evaluations do you complete in the NICU at your facility? Select all that apply.

1	not currently employed in the NICU	Dec 6, 2013 9:27 PM
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Page 5, Q17. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

1	Question is not clear. I would ask for consult with Oto.	Dec 8, 2013 10:19 AM
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Page 5, Q18. What factors influenced your decision?

1	Best practice for physiologic observable actions	Dec 27, 2013 10:43 AM
2	Medical comorbid illness, oxygen requirments, NNS skills	Dec 16, 2013 10:09 AM
3	Problem with this question - grams? Likely you meant kilograms.	Dec 8, 2013 10:19 AM
4	standardization of the test instrument	Dec 6, 2013 9:33 PM

Page 5, Q19. You provide thin liquids via slow flow nipple. What clinical signs/symptoms would you be observing to assess for aspiration? Select all that apply.

1	One has to be careful - slow flow does not always translate into slow flow	Dec 27, 2013 10:43 AM
2	desaturation, tachypnea, discoordination in the SSB triad	Dec 16, 2013 10:09 AM

Page 5, Q20. During the assessment, XX desaturates and becomes cyanotic. Your next step would be to:

1	just one answer is too simplistic altho clearly some are not appropriate	Dec 27, 2013 10:43 AM
2	stop feeding and reassess in 6 to 12 hours depending on approach/avoidance cues from infant. If infant were to present with same physiologic decline during second feeding, MBS	Dec 16, 2013 10:09 AM
3	Insufficient information to address this question. When during the assessment? How much feeding took place.	Dec 8, 2013 10:19 AM

Page 5, Q21. What factors influenced your decision?

1	The "gestalt" and history of the infant	Dec 27, 2013 10:43 AM
2	Desaturation and cyanosis are indicators of interrupted ventilation. Aspiration interrupts ventilation. Therefore, I would want more information if pattern continues.	Dec 16, 2013 10:09 AM
3	See above.	Dec 8, 2013 10:19 AM
4	need to determine reason for the signs of respiratory distress	Dec 6, 2013 9:33 PM

Page 5, Q22. Given XX's cardiac history and limited experience with PO, what treatment strategies would you attempt to improve oral feeding? Select all that apply.

1	Again - some of these options are too simplistic	Dec 27, 2013 10:43 AM
2	Concern for poor endurance with this type of infant. Small oral trials (1ml) at at time with close monitory of behavioral cues	Dec 16, 2013 10:09 AM
3	See below	Dec 8, 2013 10:19 AM

Page 5, Q23. What factors influenced your decision?

1	Multiple medical co morbid illness and physiological decline with previous feeding attempts.	Dec 16, 2013 10:09 AM
2	Don't know how to answer this question - according to the case history - infant has never been fed. This question suggests that oral feeding needs to be improved. Does not make sense to me.	Dec 8, 2013 10:19 AM
3	need to compensate for difficulties, avoid distress and provide practice with increased frequency of swallowing	Dec 6, 2013 9:33 PM

Page 6, Q24. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

1	Comprehensive evaluation based on history, current state, & oral skills as part	Dec 27, 2013 10:53 AM
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Page 6, Q25. What factors influenced your decision?

1	OFS is an objective measure and EFS provides a method of subjectively measuring "readiness"	Dec 16, 2013 10:21 AM
2	I would use portions of each of the exams procedures above, as well as my experience to determine the next steps.	Dec 8, 2013 10:27 AM
3	need to objectify observation with a standardized test	Dec 6, 2013 9:44 PM

Page 6, Q27. What factors influenced your decision?

1	This is what is most desired for nutrition and hydration	Dec 27, 2013 10:53 AM
2	BM is best for infants and does not thicken readily. In addition, preterm infant gut does not process thickening agents well. The gut matures after 40 weeks gestation in terms of motility. Therefore, any thickening may cause additional complications.	Dec 16, 2013 10:21 AM
3	Unless breast milk was unavailable. - Would want to start with what the parents were interested in using.	Dec 8, 2013 10:27 AM
4	Parent's wishes	Dec 6, 2013 9:44 PM

Page 6, Q28. What flow rate would you attempt when providing your selection above?

1	first dips on pacifier and then slow flow.	Dec 8, 2013 10:27 AM
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Page 6, Q28. What flow rate would you attempt when providing your selection above?

Page 6, Q29. What factors influenced your decision?

1	Most important that infant is not working hard to slow the flow	Dec 27, 2013 10:53 AM
2	Fast flow nipple resulted in anterior spillage and coughing. [Previous trial]	Dec 16, 2013 10:21 AM
3	Want to establish a baseline of success.	Dec 8, 2013 10:27 AM
4	trial easier task than provided with fast flow nipple [Previous trial]	Dec 6, 2013 9:44 PM

Page 6, Q30. You attempt oral intake in an upright position based on the decisions you made above. BB demonstrates adequate sucking and appears to be coordinating suck-swallow-breathe. However, you note fatigue and desaturation toward the end of your clinical assessment. What intervention would you attempt ne...

1	could be combination of position change, pacing and time - not add O2 or thicken	Dec 27, 2013 10:53 AM
2	Reduce the hydrostatic pressure in the bottle.	Dec 16, 2013 10:21 AM
3	See below	Dec 8, 2013 10:27 AM

Page 6, Q31. What factors influenced your decision?

1	Nutrition, hydration, function in safest way possible	Dec 27, 2013 10:53 AM
2	Desaturation suggests interrupted ventilation with fatigue as a concern. Adding pacing and lowering hydrostatic pressure may compensate for these variables	Dec 16, 2013 10:21 AM
3	Assuming "assessment" means just the time feeding, I would limit feeds to the volume or time of success of feeding. Also, don't know this infants prior feeding hx - or whether patterns I was observing were consistent with prior experiences. No info about NG feeding schedule - may influence decision.	Dec 8, 2013 10:27 AM
4	symptoms of fatigue aspiration compensated by periodic rests	Dec 6, 2013 9:44 PM

Page 6, Q32. During a modified barium swallow study, BB demonstrates minimal aspiration of thin liquid on slow flow nipple with most of the contrast clearing the airway spontaneously upon completion of the swallow (penetration-aspiration scale score 6-8) . There is no aspiration of nectar. Expression is funct...

1	If I used an elevated sidelying position with low hydro static pressure during MBS and infant offered a protective cough in response to aspiration, continue therapeutic trials. If silent, I would suggest enfamil AR mixed from powder	Dec 16, 2013 10:21 AM
2	No information provided about other co-morbidities associated with Trisomy 21 that might influence decision making.	Dec 8, 2013 10:27 AM

Page 6, Q33. What factors influenced your decision?

1	Figure out how to adjust position, flow rate, etc to keep her getting the breast milk - thickening breast milk does not usually work well (do NOT want a commercial thickener)	Dec 27, 2013 10:53 AM
2	BM is best if at all possible. I would want to offer every opportunity to continue with BM. However, if aspiration is silent, crib-side management is more difficulty.	Dec 16, 2013 10:21 AM
3	I have concerns about thickening in this population. More details would be needed for me to answer this question	Dec 8, 2013 10:27 AM
4	conservative decision to minimize aspiration risk, especially when fatigued	Dec 6, 2013 9:44 PM

Page 6, Q34. What treatment strategies would you attempt to improve oral feeding? Select all that apply.

1	Treatment has to focus on function and safely - train directly to task	Dec 27, 2013 10:53 AM
2	Perhaps pacing - again insufficient details for me to address this question.	Dec 8, 2013 10:27 AM
3	distributing calories across more frequent shorter feedings	Dec 6, 2013 9:44 PM


Page 6, Q35. What factors influenced your decision?

1	Aspiration appears to clear and I would want to continue with breast milk if at all possible.	Dec 16, 2013 10:21 AM
2	See above.	Dec 8, 2013 10:27 AM
3	increasing frequency of saliva swallows along with ongoing oral feeding should continue to improve oral feeding	Dec 6, 2013 9:44 PM

APPENDIX E: Practicing Clinician Response Summary

Evaluation and Treatment of Feeding and Swallowing Disorders for Neonates in the NICU: Current Practice Patterns

1. UNIVERSITY OF HOUSTON CONSENT TO PARTICIPATE IN RESEARCH PROJECT TITLE: Evaluation and Treatment of Feeding and Swallowing Disorders for Neonates in the NICU: Current Practice Patterns You are being invited to participate in a research project conducted by Jessica Rose Shool in the Communication Sciences & Disorders at the University of Houston. This project is a part of a master's thesis and is under the supervision of Stephanie Daniels, PhD, CCC. **NON-PARTICIPATION STATEMENT** Your participation is voluntary, and you may refuse to participate or withdraw at any time without penalty or loss of benefits to which you are otherwise entitled. You may also refuse to answer any question. **PURPOSE OF THE STUDY** The purpose of this study is to identify practice patterns of speech-language pathologists in evaluating and treating feeding and swallowing disorders in infants in the Neonatal Intensive Care Unit (NICU). **PROCEDURES** You will be one of approximately 175 individuals to be asked to participate in this project. You will complete an online survey. The survey consists of questions related to your education and work experience as well as questions concerning two (2) case scenarios. The amount of time required to complete the survey should not exceed 20 minutes. **CONFIDENTIALITY** Your participation in this project is anonymous. No identifying information will be obtained. **RISKS/DISCOMFORTS** There are no foreseeable risks to participating in this study. **BENEFITS** While you will not directly benefit from participation, your participation may help investigators better understand the practice patterns for care of infants with dysphagia in the NICU. **ALTERNATIVES** Participation in this project is voluntary, and the only alternative to this project is non-participation. **PUBLICATION STATEMENT** The results of this study may be published in professional and/or scientific journals. It may also be used for educational purposes or for professional presentations. However, no individual participant will be identified. If you have any questions, you may contact Dr. Stephanie Daniels (713) 743-2570. **ANY QUESTIONS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UNIVERSITY OF HOUSTON COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (713-743-9204).**

		Response Percent	Response Count
YES, I agree to the conditions.		100.0%	29
NO, I do not agree to the conditions.		0.0%	0

answered question 29

skipped question 0



2. Which of the following statements best describes you? Select all that apply.

	Response Percent	Response Count
I am first-author of a peer-reviewed journal publication in pediatric swallowing/dysphagia (excluding invited or review articles, book chapters, professional newsletters).	0.0%	0
I currently work in the Neonatal Intensive Care Unit (NICU) with infants with dysphagia.	100.0%	29
Neither statement describes me.	0.0%	0
answered question		29
skipped question		0






3. How many years of experience do you have working in the NICU with infants with dysphagia?

	Response Percent	Response Count
<1	17.2%	5
1-2	10.3%	3
3-5	31.0%	9
6-10	41.4%	12
answered question		29
skipped question		0






4. What is the level of your professional training in the area of Speech-Language Pathology?

		Response Percent	Response Count
Masters of Science/Masters of Arts		96.6%	28
Doctor of Philosophy/Education		3.4%	1
Other (please specify)		0.0%	0
answered question			29
skipped question			0



5. How many college level lecture hours of pediatric dysphagia have you received?

		Response Percent	Response Count
>1		17.2%	5
1-2		31.0%	9
3-5		31.0%	9
6-9		10.3%	3
>10		10.3%	3
answered question			29
skipped question			0



6. How many continuing education hours in pediatric dysphagia have you completed in last 2 years?





		Response Percent	Response Count
<1		3.4%	1
1-5		13.8%	4
6-10		10.3%	3
11-20		24.1%	7
>20		48.3%	14
answered question			29
skipped question			0






7. Are you a board recognized specialists in swallowing and swallowing disorders with a focus in pediatrics?

		Response Percent	Response Count
Yes		17.2%	5
No		82.8%	24
answered question			29
skipped question			0

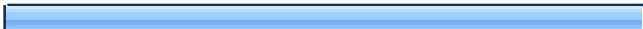




8. Have you previously been involved in pediatric dysphagia research?

		Response Percent	Response Count
Yes		32.1%	9
No		67.9%	19
answered question			28




skipped question		1
9. How would you rate your level of proficiency in evaluating and treating infants with feeding/swallowing disorders in the NICU?		
		Response Percent Response Count
Novice		13.8% 4
Intermediate		17.2% 5
Proficient		13.8% 4
Advanced		34.5% 10
Expert		20.7% 6
answered question		29
skipped question		0

10. Which professional performs the feeding/swallowing evaluations in the NICU at your facility? Select all that apply.		
		Response Percent Response Count
Speech-Language Pathologist		100.0% 29
Occupational Therapist		6.9% 2
Nurse		10.3% 3
Nutritionist		3.4% 1
Family Member/ Caregiver		3.4% 1
Other (please specify)		3.4% 1
answered question		29
skipped question		0

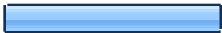



11. Which professional performs the feeding/swallowing therapy sessions in the NICU at your facility? Select all that apply.

		Response Percent	Response Count
Speech-Language Pathologist		96.6%	28
Occupational Therapist		13.8%	4
Nurse		6.9%	2
Nutritionist		0.0%	0
Family Member/ Caregiver		10.3%	3
Other (please specify)		6.9%	2
answered question			29
skipped question			0





12. What type of feeding/swallowing evaluations do you complete in the NICU at your facility? Select all that apply.

		Response Percent	Response Count
Clinical swallowing evaluation		96.6%	28
Modified barium swallow (MBS)		93.1%	27
Fiberoptic endoscopic evaluation of swallowing (FEES)		10.3%	3
Other (please specify)		0.0%	0
answered question			29
skipped question			0

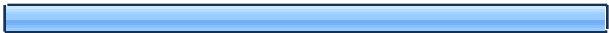

13. What is the average number feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		32.1%	9
3-5		50.0%	14
6-9		14.3%	4
>10		3.6%	1
answered question			28
skipped question			1





14. Of the total in number 13, what is the average number of clinical feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		33.3%	9
3-5		55.6%	15
6-9		7.4%	2
>10		3.7%	1
answered question			27
skipped question			2





15. Of the total in number 13, what is the average number of instrumental (MBS/FEES) feeding/swallowing evaluations you complete per week in the NICU?

		Response Percent	Response Count
1-2		90.9%	20
3-5		9.1%	2
6-9		0.0%	0
>10		0.0%	0
answered question			22
skipped question			7

16. What is the average number of feeding/swallowing therapy sessions you complete per week in the NICU?

		Response Percent	Response Count
1-2		17.9%	5
3-5		14.3%	4
6-9		10.7%	3
>10		57.1%	16
answered question			28
skipped question			1

17. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

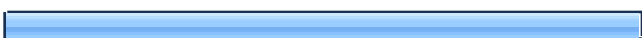










		Response Percent	Response Count
Neonatal Oral-Motor Assessment Scale (NOMAS)		12.0%	3
Early Feeding Skills Assessment		24.0%	6
Oral Feeding Skills (OFS)		0.0%	0
Systematic Assessment of the Infant at the Breast (SAIB)		0.0%	0
Nationwide Children's Cue Based Feeding Scales		0.0%	0
Non-standardized hospital/clinician protocol		84.0%	21
Other (please specify)		20.0%	5
answered question			25
skipped question			4

18. What factors influenced your decision?






	Response Count
answered question	17
skipped question	12

17

19. You provide thin liquids via slow flow nipple. What clinical signs/symptoms would you be observing to assess for aspiration? Select all that apply.

		Response Percent	Response Count
Coughing		96.0%	24
Head-neck flexion		36.0%	9
Anterior leakage		36.0%	9
Gagging		56.0%	14
Extension		48.0%	12
Color changes		100.0%	25
Suck-swallow-breath coordination		88.0%	22
Refusal		76.0%	19
Eye tearing		48.0%	12
Respiratory distress		100.0%	25
Other (please specify)		44.0%	11
answered question			25
skipped question			4








20. During the assessment, XX desaturates and becomes cyanotic. Your next step would be to:

		Response Percent	Response Count
Thicken the liquid to a nectar consistency use slow flow nipple to help with coordination		0.0%	0
Increase O2 during feeding		0.0%	0
Stop all feeding and allow the infant time to mature		8.3%	2
Give the infant a break, allow for recovery, and then continue feeding		25.0%	6
Refer for modified barium swallow		12.5%	3
Adjust positioning and provide jaw support to promote improved suck-swallow-breathe		8.3%	2
Other (please specify)		45.8%	11
answered question			24
skipped question			5

21. What factors influenced your decision?

	Response Count
	18
answered question	18
skipped question	11

22. Given XX's cardiac history and limited experience with PO, what treatment strategies would you attempt to improve oral feeding? Select all that apply.

		Response Percent	Response Count
Non-nutritive sucking on pacifier or gloved finger		52.0%	13
Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)		0.0%	0
Nutritive sucking with different flow rate		36.0%	9
Nutritive sucking using elevated side-lying positioning for the infant		88.0%	22
Nutritive sucking with thickened consistencies		12.0%	3
Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)		12.0%	3
Tactile kinesthetic stimulation (stroking the body/passive range of motion)		0.0%	0
Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)		8.0%	2
Other (please specify)		44.0%	11
answered question			25
skipped question			4

23. What factors influenced your decision?

Response
Count

16

answered question 16

skipped question 13

24. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

Response
Percent Response
Count

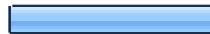
Neonatal Oral-Motor Assessment
Scale (NOMAS)



8.7%

2

Early Feeding Skills Assessment



30.4%

7

Oral Feeding Skills (OFS)

0.0%

0

Systematic Assessment of the
Infant at the Breast (SAIB)

0.0%

0

Nationwide Children's Cue Based
Feeding Scales

0.0%

0

**Non-standardized
hospital/clinician protocol**



87.0%

20

Other (please specify)

0.0%

0

answered question

23

skipped question

6

25. What factors influenced your decision?

Response
Count

15

answered question 15

skipped question 14

26. What consistency would you first try:

Response
Percent Response
Count

Expressed breast milk (thin liquid)



95.8%

23

Formula (thin liquid)



4.2%

1

Formula thickened to nectar

0.0%

0

Formula thickened to honey

0.0%

0

Other (please specify)

0.0%

0

answered question

24

skipped question

5

27. What factors influenced your decision?

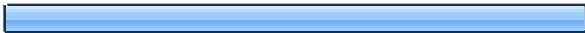


Response
Count

18

answered question 18

skipped question 11






28. What flow rate would you attempt when providing your selection above?

		Response Percent	Response Count
Slow flow		87.5%	21
Medium flow		4.2%	1
Fast flow		0.0%	0
Cross cut nipple		0.0%	0
Other (please specify)		8.3%	2
answered question			24
skipped question			5

29. What factors influenced your decision?

	Response Count
answered question	19
skipped question	10

30. You attempt oral intake in an upright position based on the decisions you made above. BB demonstrates adequate sucking and appears to be coordinating suck-swallow-breathe. However, you note fatigue and desaturation toward the end of your clinical assessment. What intervention would you attempt next?






		Response Percent	Response Count
External pacing		37.5%	9
Change positioning		33.3%	8
Thicken to nectar		0.0%	0
Nipple change		0.0%	0
Allow time for recovery		12.5%	3
Add O2 during feeding		4.2%	1
Other (please specify)		12.5%	3
answered question			24
skipped question			5

31. What factors influenced your decision?

Response Count

18








32. During a modified barium swallow study, BB demonstrates minimal aspiration of thin liquid on slow flow nipple with most of the contrast clearing the airway spontaneously upon completion of the swallow (penetration-aspiration scale score 6-8) . There is no aspiration of nectar. Expression is functional with both consistencies. Her mother would prefer to provide breast milk given the nutritional benefits. What is your recommendation?

		Response Percent	Response Count
Provide formula thickened to nectar		4.2%	1
Provide breast milk thickened to nectar		29.2%	7
Provide formula (thin liquid)		0.0%	0
Provide breast milk (thin liquid)		29.2%	7
Provide breast milk via NG-tube		4.2%	1
Other (please specify)		33.3%	8
answered question			24
skipped question			5

33. What factors influenced your decision?

Response Count

34. What treatment strategies would you attempt to improve oral feeding? Select all that apply.

		Response Percent	Response Count
Non-nutritive sucking on pacifier or gloved finger		30.4%	7
Non-nutritive sucking on pulsating pacifier (oromotor entrainment therapy)		0.0%	0
Nutritive sucking with different flow rate		26.1%	6
Nutritive sucking using elevated side-lying positioning for the infant		78.3%	18
Nutritive sucking with thickened consistencies		26.1%	6
Sensorimotor stimulation (rubbing of cheeks, lips, gums, and tongue)		17.4%	4
Tactile kinesthetic stimulation (stroking the body/passive range of motion)		0.0%	0
Swallowing exercises (placing milk bolus via syringe directly on the medial-posterior tongue and gradually increasing volume)		8.7%	2
Other (please specify)		30.4%	7
answered question			23
skipped question			6

35. What factors influenced your decision?

Response
Count

9

answered question

9

skipped question

20

Page 3, Q10. Which professional performs the feeding/swallowing evaluations in the NICU at your facility? Select all that apply.

1	lactation consultant	Jan 7, 2014 2:15 PM
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Page 3, Q11. Which professional performs the feeding/swallowing therapy sessions in the NICU at your facility? Select all that apply.

1	lactation consultant	Jan 7, 2014 2:15 PM
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2	Physical Therapist	Dec 6, 2013 8:45 AM
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Page 5, Q17. Which clinical protocol would you use during clinical feeding/swallowing evaluation?

1	SOFFI (Supporting Oral Feeding in Fragile Infants)	Jan 20, 2014 12:05 PM
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2	Consider ENT consult for concern for VC dysfunction due to PDA ligation	Jan 16, 2014 5:12 PM
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3	Cue Based Feeding Protocol	Jan 7, 2014 1:11 PM
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4	Your question is somewhat ridiculous. An infant would never have not been fed until 42 weeks. Also, perhaps it's a typo, but 2grams is not a birthweight.	Jan 7, 2014 9:47 AM
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5	slow approach with small amount as tolerated and consideration for ENT consult to eval vocal cords ASAP	Dec 12, 2013 2:34 PM
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Page 5, Q18. What factors influenced your decision?

1	Do not find most of those protocols to be very helpful or all inclusive. Early Feeding Skills is the most comprehensive but our facility has not attended that course	Jan 29, 2014 5:10 PM
2	Assesses nipple readiness and systematically assesses readiness to continue nipple attempt given clinical stress cues observed.	Jan 20, 2014 12:05 PM
3	See above...PDA ligation, likely vocal cord issue	Jan 16, 2014 5:12 PM
4	Gestational Age, respiratory status, oral structure, reflexes and oral-motor skill [non-nutritive sucking ability]	Jan 10, 2014 6:43 PM
5	This tool is thorough and evaluates all pertinent aspects of feeding skills	Jan 8, 2014 9:40 PM
6	Age of infant, medical history, previous training	Jan 7, 2014 11:13 PM
7	Experience/training	Jan 7, 2014 10:25 PM
8	this is what I use in the NICU	Jan 7, 2014 2:35 PM
9	we do not have other assessments in the hospital	Jan 7, 2014 12:09 PM
10	We use aspects of several different scales. Our diagnosis most closely resembles NOMAS; however, we will not let an infant continue to suck for a full two minutes if stress cues or physiological difficulties with feeding are noted. We would implement feeding strategies/modifications (i.e.: sidelying, external pacing, change in nipple, etc.).	Jan 7, 2014 11:30 AM
11	Not trained in standardized assessments	Jan 7, 2014 10:21 AM
12	Pt appropriate for a clinical feeding assessment. He is showing cues and should be PO fed to assess efficiency, of sucking, coordination of sucking, swallowing and breathing and estimated timing of swallowing. With his clinical presentation of a weak cry, I would likely feed him in RIGHT sidelying and request an ENT consult. It is protocol in our NICU that ALL infants s/p PDA ligation undergo nasopharyngoscopy to assess vocal fold function.	Jan 7, 2014 9:47 AM
13	history/vocal quality	Dec 12, 2013 2:34 PM
14	Training/experience - I feel the EFSA is a solid/ comprehensive tool.	Dec 9, 2013 12:55 AM
15	Standard practice at our hospital.	Dec 8, 2013 5:05 PM
16	training received in these protocol;	Dec 6, 2013 8:51 AM
17	Other protocols have not been implemented at my facility.	Dec 5, 2013 11:22 PM

Page 5, Q19. You provide thin liquids via slow flow nipple. What clinical signs/symptoms would you be observing to assess for aspiration? Select all that apply.

1	Could be any number of behavioral s/s stress or respiratory s/s stress (i.e., breath holding) or swallowing stress (i.e., double swallows, gulping)	Jan 29, 2014 5:10 PM
2	bradycardiac episodes, tachypnea, "shut down"	Jan 20, 2014 12:05 PM
3	Facial grimacing, no longer showing interest in eating, change in alertness	Jan 7, 2014 11:13 PM
4	blinking	Jan 7, 2014 2:20 PM
5	audible swallows, multiple swallows	Jan 7, 2014 11:30 AM
6	Change in tone	Jan 7, 2014 10:21 AM
7	monitor changes in physiological state	Jan 7, 2014 10:05 AM
8	any changes in vocal quality post swallowing.	Jan 7, 2014 9:47 AM
9	changes in vitals	Dec 12, 2013 2:34 PM
10	physiologic instability (bradycardia, desats), change in breath sounds, stridor, wet vocalizations, state shutdown	Dec 9, 2013 12:55 AM
11	apnea, bradycardia	Dec 6, 2013 8:51 AM

Page 5, Q20. During the assessment, XX desaturates and becomes cyanotic. Your next step would be to:

1	attempt Assess breathing effort and O2 sats, increasing oxygen may be appropriate to trial and observe, possible MBS if adverse overt events persist [MBS]	Jan 20, 2014 12:05 PM
2	Next step would be based upon my evaluation of why infant became cyanotic, not enough information to answer your question. [Not Enough Info]	Jan 10, 2014 6:43 PM
3	Increase pacing and assess for change with these changes but only once infant has fully stabilized [Pacing]	Jan 8, 2014 9:40 PM
4	Adjust positioning, provide pacing [Pacing]	Jan 7, 2014 11:13 PM
5	attempt pacing/imposed breathing breaks [Pacing]	Jan 7, 2014 10:25 PM
6	May adjust positioning and then provide external pacing with the bottle tipped downwards during imposed breaks [Pacing]	Jan 7, 2014 1:11 PM
7	give infant a break, allow for recovery. If showing feeding readiness cues continue feeding with modifications (i.e.: position change, change in flow rate of nipple, external pacing, etc.). If difficulties continue to be noted stop feeding and reassess in 2-3 days. [Pacing]	Jan 7, 2014 11:30 AM
8	change to side lying and pace infant. see if it makes a diff. [Pacing]	Jan 7, 2014 10:05 AM
9	remove nipple, allow for recovery, move into sidelying position, provide external pacing and reassess. Would refer for MBSS regardless given medical history and weak cry (high risk for vocal fold paresis/paralysis) [MBS]	Dec 9, 2013 12:55 AM
10	Attempt pacing and other techniques and ask for ENT consult before further po trials. [Pacing]	Dec 8, 2013 5:05 PM
11	Provide more frequent external pacing by removing the nipple from the oral cavity or tipping the nipple towards the palate to cease flow of liquid; if this does not prove beneficial, then would stop oral feeding and provide oral stim (e.g., pacifier dips) while allowing the infant to mature- would see the patient every day for ongoing assessment and intervention [Pacing]	Dec 6, 2013 9:26 AM

Page 5, Q21. What factors influenced your decision?

1	Depends on interpreted cause for episode. Typically this would be a time for problem-solving: does infant need a different position, or a lower flow rate, slower pacing, nipple held less full, etc? If cause is interpreted to be too dangerous to continue or if infant does not recover well, then feeding would be stopped.	Jan 29, 2014 5:10 PM
2	One time clinical assessment not always enough to determine if MBS is warranted. Clinical trials at bedside across 2-3 feedings offers additional information that is very appropriate and helps to know what to trial during MBS	Jan 20, 2014 12:05 PM
3	R/O aspiration prior to continuing	Jan 16, 2014 5:12 PM
4	Limited trials given and option for therapeutic intervention that remained	Jan 8, 2014 9:40 PM
5	Previous experience, training	Jan 7, 2014 11:13 PM
6	severity of desaturation and weak cry mentioned above	Jan 7, 2014 2:35 PM
7	Try to get Mum to offer breast feed- usually much easier for baby to pace and coordinate. First attempt at bottle feed, would wait to see if that is consistent response across multiple feeds before considering MBSS. Also need to put in context with neurodevelopmental maturity. Also was this kid really 2grams at birth? Wowza	Jan 7, 2014 2:20 PM
8	desaturation is a physiological sign of distress indicating the feed is not a pleasurable experience	Jan 7, 2014 12:09 PM
9	There may be multiple reasons why infant desaturated and became cyanotic. The strategies implemented would be based on WHY the infant desaturated and what the infant's comorbidities are. For example, a low tone neurologically involved infant would be at risk for residue with thickened liquids, so I would not attempt that at the bedside without a MBS. If the infant is very young (i.e.: 32 weeks), then it may be reasonable to allow time for maturation. We would rarely due a MBS if an infant is not yet term. Adjusting positioning would be a an initial step, but jaw support would not promote improved SSB (it would be reasonable for a dysfunctional feeding pattern with wide jaw excursions).	Jan 7, 2014 11:30 AM
10	After one desat I would allow infant to recover and then reinstate feeding as child has limited po experience. If another desat occurred and/or Brady I would stop and refer for MBS.	Jan 7, 2014 10:21 AM
11	experience	Jan 7, 2014 10:05 AM
12	As you stated the infant has NEVER orally fed, It is likely he will need practice and experience with PO feeding. I would give a break, then assess other strategies.	Jan 7, 2014 9:47 AM
13	Infant has never had experience with oral feeding previously. Need to provide adequate postural and feeding support for infant to "learn" what to do with the fluid in a controlled manner.	Jan 7, 2014 9:43 AM
14	experience; but I would also consider O2 increase and my decision may change based on the severity of the desat	Dec 12, 2013 2:34 PM

Page 5, Q21. What factors influenced your decision?

15	Medical history and clinical presentation.	Dec 9, 2013 12:55 AM
16	Possible vocal cord paralysis secondary to PDA ligation and weak cry	Dec 8, 2013 5:05 PM
17	PDA ligation with high risk of vocal fold paralysis; best to r/o aspiration	Dec 6, 2013 8:51 AM
18	Would try positioning first, but with the symptom of hoarse vocal quality would quickly refer for MBSS.	Dec 5, 2013 11:22 PM

Page 5, Q22. Given XX's cardiac history and limited experience with PO, what treatment strategies would you attempt to improve oral feeding? Select all that apply.

1	begin with non-nutritive experience using pacifier and if tolerated would trial pacifier dipped in milk for trace swallow trials. If positive clinical response would offer single sucks via slow flow nipple. VERY slow progression to observ where breakdown occurs [Taste trials]	Jan 20, 2014 12:05 PM
2	External pacing [Pacing]	Jan 10, 2014 6:43 PM
3	Pacing [Pacing]	Jan 8, 2014 9:40 PM
4	Pacing [Pacing]	Jan 8, 2014 2:20 PM
5	dipped pacifier trials, 1-3mL trials via nipple [Taste trials]	Jan 7, 2014 10:25 PM
6	pacifier/nipple dips/taste trials [Taste trials]	Jan 7, 2014 12:09 PM
7	would attempt non-nutritive sucking first to see if infant is able to maintain vitals and tolerate with minimal stress cues. if able to do these, would attempt oral feedings. given cardiac history, infant is at risk for fatiguing sooner, so limiting length of feeding may be beneficial. not pushing po feedings would also be beneficial (encouraging po/ng) depending on severity of cardiac history. For example, an infant with an ASD/VSD that is not yet repaired will often have worsening po feedings as infant approaches heart failure prior to repair. The goal would be to keep orally feeding as long as possible to maintain skills in anticipation of repair.	Jan 7, 2014 11:30 AM
8	taste stimulation with NNS and therapeutic feeds with SLP until pt improves [Taste trials]	Jan 7, 2014 10:05 AM
9	Pacifier dipped in feeding. [Taste trials]	Jan 7, 2014 9:43 AM
10	depending on ENT findings and performance on clinical eval; also may try taste stimulation [Taste trials]	Dec 12, 2013 2:34 PM
11	dependent on physiologic stability and MBSS results - PO trials may not be appropriate	Dec 9, 2013 12:55 AM

Page 5, Q23. What factors influenced your decision?

1	This would depend on more information about the source of the problem (not just the symptom given). Any one of these techniques selected may/may not be beneficial or appropriate. I do not find the pulsating pacifier to ever be appropriate or helpful.	Jan 29, 2014 5:10 PM
2	Stress cues observed and medical status	Jan 20, 2014 12:05 PM
3	Respiratory work of feeding and neurologic immaturity	Jan 10, 2014 6:43 PM
4	Deficits appear related to introduction of liquid boluses	Jan 8, 2014 9:40 PM
5	Training, continuing education	Jan 7, 2014 11:13 PM
6	experience/training	Jan 7, 2014 10:25 PM
7	would try a variety of things. this is an older baby at this point and we need to see if he can progress or not.	Jan 7, 2014 2:35 PM
8	Breast feeding- if not tolerating let-down, then try at "empty" breast where milk has been expressed off	Jan 7, 2014 2:20 PM
9	The baby has good NNS and taste trials provide practice for minimal amount of sucking with bolus; sidelying provides the baby with more support and best position to control bolus flow	Jan 7, 2014 12:09 PM
10	See above.	Jan 7, 2014 11:30 AM
11	Pt needs positive practice and likely position changes given an assumed left vocal fold immobility.	Jan 7, 2014 9:47 AM
12	patient's history and clinical observations	Jan 7, 2014 9:43 AM
13	decisions would be based on clinical and instrumental swallow evaluation results	Dec 9, 2013 12:55 AM
14	Same as above pending ENT assessment.	Dec 8, 2013 5:05 PM
15	Need to reduce aspiration risk and limit work of breathing	Dec 6, 2013 10:10 AM
16	None of the other interventions are evidence based.	Dec 5, 2013 11:22 PM

Page 6, Q25. What factors influenced your decision?

1	Same as in previous answer	Jan 29, 2014 5:16 PM
2	Looks at various components throughout feeding including disorganization and tone	Jan 20, 2014 12:12 PM
3	Thorough assessment tool	Jan 8, 2014 9:45 PM
4	Training	Jan 7, 2014 11:19 PM
5	experience/training	Jan 7, 2014 10:30 PM
6	this is what I use in our NICU	Jan 7, 2014 2:38 PM
7	Try a nipple shield to see if it would help breast feeding	Jan 7, 2014 2:23 PM
8	we do not have other assessments	Jan 7, 2014 12:23 PM
9	Allows for greater flexibility during evaluation to customize a treatment plan specifically for infant.	Jan 7, 2014 11:38 AM
10	Our standard assessment includes components of the EFS, but is our own cue based feeding guideline	Jan 7, 2014 9:58 AM
11	current practice	Dec 12, 2013 2:38 PM
12	experience with EFSA and belief that it is a comprehensive assessment tool for feeding readiness/performance for NICU infants	Dec 9, 2013 1:02 AM
13	NOMAS not appropriate for congenital anomalies	Dec 6, 2013 10:18 AM
14	training in protocols;	Dec 6, 2013 8:59 AM
15	None of the other protocols have been implemented in my facility.	Dec 5, 2013 11:28 PM

Page 6, Q27. What factors influenced your decision?

1	No reason to use formula if parents prefer breastmilk. No need to thicken at this time	Jan 29, 2014 5:16 PM
2	Parent wants to use breast milk which is nutritionally good	Jan 20, 2014 12:12 PM
3	EBM is preferred nutrition for infants	Jan 10, 2014 6:51 PM
4	Family preference, no reason I thicken at this point given this is first evaluation.	Jan 8, 2014 9:45 PM
5	I typically always start with thin formula using a slower flow nipple.	Jan 8, 2014 2:20 PM
6	Least restrictive diet	Jan 7, 2014 11:19 PM
7	Family desire	Jan 7, 2014 10:30 PM
8	this is what the familiy is hoping for	Jan 7, 2014 2:38 PM
9	stick with breast milk always	Jan 7, 2014 2:23 PM
10	this is what the family has been trying and I would like to see what was going onfirst hand	Jan 7, 2014 12:23 PM
11	Family wishes to provide expressed breastmilk, and it is a more nutritionally sound source of nutrition and hydration for an infant	Jan 7, 2014 11:38 AM
12	preterm infants should never be given thickened fluids as they influence gut motility and have higher incidence of necrotizing entercolitis.	Jan 7, 2014 9:58 AM
13	family's wishes to feed expressed breast milk	Jan 7, 2014 9:46 AM
14	mom's desires	Dec 12, 2013 2:38 PM
15	family's preference is to provide expressed breast milk	Dec 9, 2013 1:02 AM
16	Prefer to keep babies on breast milk as long as possible; want to assess baby with consistency she has been receiving	Dec 6, 2013 9:35 AM
17	Breast milk is superior nutrition for infant; thickened feeds add risk of NEC and I would only offer if demonstrated via MBS that 1) there was aspiration with thin liquids and 2) there was not aspiration with thickened liquids	Dec 6, 2013 8:59 AM
18	Least restrictive, family's choice to give infant breastmilk rather than formula	Dec 5, 2013 11:28 PM

Page 6, Q28. What flow rate would you attempt when providing your selection above?

1	Orthodontic shape nipple [slow flow] to address diminished strength of lingual seal	Jan 10, 2014 6:51 PM
2	start with just 0.1 ml breast milk on pacifier and work up from there	Dec 6, 2013 8:59 AM

Page 6, Q29. What factors influenced your decision?

1	Infant is choking with fast flow. Infants with lower tone typically need slower flow. [Previous trial]	Jan 29, 2014 5:16 PM
2	Offers increased control over bolus for better coordination	Jan 20, 2014 12:12 PM
3	Infant's oral skills Parental desire to provide EBM	Jan 10, 2014 6:51 PM
4	Developmentally supportive, better bolus control	Jan 8, 2014 9:45 PM
5	Infant was noted to be coughing with a faster flow nipple. [Previous trial]	Jan 8, 2014 2:20 PM
6	Previous trouble with faster flow nipple with this patient [Previous trial]	Jan 7, 2014 11:19 PM
7	One step down from fast flow nipple. Most standard for this age. [Previous trial]	Jan 7, 2014 10:30 PM
8	coughing with standard nipple [Previous trial]	Jan 7, 2014 2:38 PM
9	fast flow resulted in s/sx of distress and slow flow nipple offers the best changes of bolus control [Previous trial]	Jan 7, 2014 12:23 PM
10	Infant demonstrated coughing/choking with anterior spillage coupled by reduced tongue cup and low tone. It is likely that the infant is having difficulty controlling the flow of the milk. [Previous trial]	Jan 7, 2014 11:38 AM
11	Child is obviously having difficulty with fast flow nipple. If child can tolerate slow flow I would then transition to medium flow and reassess. [Previous trial]	Jan 7, 2014 10:24 AM
12	ALL infants in our NICU use slow-flow nipples. Slow flow nipples are what newborns use.	Jan 7, 2014 9:58 AM
13	slower the flow, the more control the infant has. Positioning is also vital.	Jan 7, 2014 9:46 AM
14	Infant exhibited physiologic and motor stress cues (per report) during trial with fast flow nipple [Previous trial]	Dec 9, 2013 1:02 AM
15	Baby won't need to fight the flow.	Dec 8, 2013 5:08 PM
16	reduce likelihood of aspiration	Dec 6, 2013 10:18 AM
17	Do not want to overwhelm the baby; coughing/choking may be impacted by use of a fast flow nipple. By reducing the flow rate, may be able to improve oral control, and will also reduce the amount of liquid that passively spills into the oral cavity when the baby is not actively engaged in sucking. [Previous trial]	Dec 6, 2013 9:35 AM
18	poor tolerance of both breast and bottle feeding w/fast flow nipple [Previous trial]	Dec 6, 2013 8:59 AM
19	Slow flow is developmentally appropriate, and with history as given would obviously make the most sense.	Dec 5, 2013 11:28 PM

Page 6, Q30. You attempt oral intake in an upright position based on the decisions you made above. BB demonstrates adequate sucking and appears to be coordinating suck-swallow-breathe. However, you note fatigue and desaturation toward the end of your clinical assessment. What intervention would you attempt ne...

1	matureation, low tone easier to fatigue, time to gain skills	Jan 7, 2014 10:08 AM
2	changing positioning, and allow time to recover.	Jan 7, 2014 9:46 AM
3	Might place in elevated side-lying, as this promotes physiologic stability. If the baby continues to demonstrate difficulty (i.e., desats, fatigue), would then discontinue oral trials, as she has NGT in place. She can continue to rely on NGT while receiving limited volumes PO for practice	Dec 6, 2013 9:35 AM

Page 6, Q31. What factors influenced your decision?

1	Easiest thing to change, easiest thing for parents to replicate	Jan 29, 2014 5:16 PM
2	May start with with positioning but if no change then would trial increased imposed breaks to facilitate coordination of breathing with swallowing. May trial Oxygen if desats persist	Jan 20, 2014 12:12 PM
3	Cardiorespiratory status	Jan 10, 2014 6:51 PM
4	Use of co-regulated pacing throughout feeding may help with endurance	Jan 8, 2014 9:45 PM
5	Least restrictive change to make	Jan 7, 2014 11:19 PM
6	experience/training	Jan 7, 2014 10:30 PM
7	this may decrease fatigue	Jan 7, 2014 2:38 PM
8	if she fatigues and desats, teach caregivers the signs of fatigue and then they stop feed when those are witnessed	Jan 7, 2014 2:23 PM
9	external pacing can help increase endurance by providing rest breaks	Jan 7, 2014 12:23 PM
10	To determine if placing in sidelying improves endurance. If not, I would shorten the length of the feeding.	Jan 7, 2014 11:38 AM
11	Pacing is not indicated as child is coordinating SSB. Position change would be less restrictive than thickening liquids.	Jan 7, 2014 10:24 AM
12	I hold infants in a cradled position for PO feeding. This is a natural position and promotes physiologic flexion and stability. Holding an infant upright for feeding can lead to muscle fatigue.	Jan 7, 2014 9:58 AM
13	observations of behavior	Jan 7, 2014 9:46 AM
14	cardiac hx/also might ask for cardiac f/up	Dec 12, 2013 2:38 PM
15	1) positioning and flow rate changes have already been made 2) clinical presentation	Dec 9, 2013 1:02 AM
16	good coordination of SSB but poor endurance is probably a cardiac issue	Dec 6, 2013 10:18 AM
17	likely respiratory fatigue is contributing to desaturations and respiratory fatigue; infant with heart murmur most likely will need both O2 during feeding and external pacing	Dec 6, 2013 8:59 AM
18	Positioning is the easiest to teach parents and will usually do the trick.	Dec 5, 2013 11:28 PM

Page 6, Q32. During a modified barium swallow study, BB demonstrates minimal aspiration of thin liquid on slow flow nipple with most of the contrast clearing the airway spontaneously upon completion of the swallow (penetration-aspiration scale score 6-8) . There is no aspiration of nectar. Expression is funct...

1	I would ensure no techniques with thin eliminated aspiration before thickening [Other]	Jan 8, 2014 9:45 PM
2	formula thickened to nectar and decision to gavage EBM or offer small bottle of EBM daily if cleared by pulmonary [Formula thicken]	Jan 7, 2014 10:30 PM
3	Use of different bottle- Dr. Brown's preemie nipple [Other]	Jan 7, 2014 1:13 PM
4	we allow the parent to choose unless gross aspiration. MD family discussion to choose for breast milk. we do not thicken breast milk [Other]	Jan 7, 2014 10:08 AM
5	have a meeting/discussion with MD, mother/parents and SLP regarding risks/benefits of providing breast milk so that mother/parents can make informed decision/give informed consent [Other]	Dec 9, 2013 1:02 AM
6	Provide formula thickened to a nectar-thick consistency for PO trials (as there are no methods of thickening breast milk that she can receive at her age) and gavage expressed breast milk via NGT [Formula thicken]	Dec 6, 2013 9:35 AM
7	provide limited feeding attempts (maybe 1-2 x day) of breastfeeding and monitor pulmonary status carefully for advancement with repeat MBS in 2-4 weeks [Other]	Dec 6, 2013 8:59 AM
8	Would offer PO breastmilk on a limited basis and repeat MBSS in a week to 10 days. Would also play with positioning during MBSS. [Other]	Dec 5, 2013 11:28 PM

Page 6, Q33. What factors influenced your decision?

1	Parents do not want formula, and it is an inferior nutrition source. Need more data from multiple feedings as to tolerance for positioning and pacing changes to reduce risk of aspiration and guage tolerance for feedings.	Jan 29, 2014 5:16 PM
2	Safety of swallow comes first. And breast milk typically does not thicken due to make-up. Would recommend freezing EBM and repeat video later as indicated.	Jan 20, 2014 12:12 PM
3	Safety and the consequences of chronic aspiration given infant cardiac history. MBSS is only a snapshot. With infant fatigue, penetration/aspiration may increase.	Jan 10, 2014 6:51 PM
4	Family preference, controversy with thickeners	Jan 8, 2014 9:45 PM
5	Mother wants to continue with breast milk and negative consequences of the aspiration are minimal.	Jan 8, 2014 2:20 PM
6	Aspiration risk in account with medical diagnosis	Jan 7, 2014 11:19 PM
7	this is safe per MBS and the mother's preference	Jan 7, 2014 2:38 PM
8	if child shows no respiratory concerns, keep on breast milk thin	Jan 7, 2014 2:23 PM
9	breastmilk does not thicken well and I would monitor lung status	Jan 7, 2014 12:23 PM
10	Mother's desire to provide breastmilk; no aspiration on nectar.	Jan 7, 2014 11:38 AM
11	I likely would not have performed a videofluoroscopic swallow study with this infant. Be aware that the penetration aspiration scale is NOT normed on children or infants and has no use in your reporting. Thickened liquids should not be used with preterm infants and breast milk is best for infants.	Jan 7, 2014 9:58 AM
12	mother's desire to use breast milk. Reassess in 1-2 weeks	Jan 7, 2014 9:46 AM
13	hospital protocol	Dec 12, 2013 2:38 PM
14	Mother's/parents preference/goals.	Dec 9, 2013 1:02 AM
15	Family's desire to only feed infant breastmilk and typical improvements with maturity that occur. Infant is only 38 weeks.	Dec 5, 2013 11:28 PM

Page 6, Q34. What treatment strategies would you attempt to improve oral feeding? Select all that apply.

1	would depend given cues of infant during session. no standard protocol	Jan 20, 2014 12:12 PM
2	Physical tx to strengthen head/neck musculature	Jan 10, 2014 6:51 PM
3	maturation	Jan 7, 2014 2:38 PM
4	external pacing [pacing]	Jan 7, 2014 12:23 PM
5	repeat mbs after a few weeks	Dec 12, 2013 2:38 PM
6	external pacing, cue based feeding attempts [pacing]	Dec 9, 2013 1:02 AM
7	swaddling infant for oral feedings to support low muscle tone	Dec 6, 2013 8:59 AM

Page 6, Q35. What factors influenced your decision?

1	This is likely all that is needed, in addition to tight swaddling to facilitate flexion (likely decreased tone given medical diagnoses).	Jan 29, 2014 5:16 PM
2	each infant warrants individualized treatment approach	Jan 20, 2014 12:12 PM
3	Continuing education	Jan 7, 2014 11:19 PM
4	side lying will give the baby a better chance to manage bolus and suck-swallow-breathe and pacing can help increase endurance	Jan 7, 2014 12:23 PM
5	Improved tolerance noted on MBS with nectar thick liquids.	Jan 7, 2014 11:38 AM
6	You've stated that SSB is normal. You haven't stated if Pt taking full feeds or the quality of those feeds (i.e., duration of feeds, stress cues observed). I'd follow the infants cues and allow her to eat PO and gavage remainder volume.	Jan 7, 2014 9:58 AM
7	clinical presentation, knowledge of respiratory/swallow physiology	Dec 9, 2013 1:02 AM
8	Would first attempt elevated side lying during MBS to determine whether this prevents aspiration; if so, would continue to offer thin by mouth. If not, would practice with nectar by mouth and continually assess for readiness to transition to thin	Dec 6, 2013 9:35 AM
9	Most functional choices	Dec 5, 2013 11:28 PM

APPENDIX G: List of Abbreviations

ASHA	American Speech-Language-Hearing Association
BRS-S	board recognized specialist in swallowing and swallowing disorders
CA	chronological age
CE	continuing education
CSE	clinical swallowing evaluation
GA	gestational age
NICU	neonatal intensive care unit
NOMAS	Neonatal Oral-Motor Assessment Scale
NS	nutritive sucking
NNS	nonnutritive sucking
PCA	postconceptual age
PMA	postmenstrual age
S/S	signs and symptoms
SIG	special interest group
SLP	speech-language pathologist
VFSS	videofluoroscopic swallowing study

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