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PEDIATRIC DYSPHAGIA MANAGEMENT IN THE SCHOOLS

by

Emily Lueken

Bachelor of Science, Western Kentucky University, 2008

A Research Paper

Submitted in Partial Fulfillment of the Requirements for the
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PEDIATRIC DYSPHAGIA MANAGEMENT IN THE SCHOOLS

By

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A Research Paper Submitted in Partial

Fulfillment of the Requirements

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Introduction

Speech language pathology is a field made of different dynamics. In practicing speech pathology, one has the option to choose the medical route or the school system. In the past, disorders related to language, phonology, articulation, fluency, and cognition were predominately associated with the school system and dysphagia was more accurately linked to the medical field. Today, times have changed and a shift has begun for the inclusion of dysphagia treatment within the school system. With the passing of the Public Law 94-142, which is now known as IDEA (i.e. Individuals with Disabilities Education Act), children with complex medical conditions are integrated into the school system. Many of these students had previously been served in other settings (Power-deFur, 2000).

Speech-language pathologists (SLPs) are viewed as the experts in dysphagia and feeding difficulty within the school system (Homer, 2008) and have been required to accept these children on their caseload, regardless of their training, knowledge, and/or skills. The question remains if these school-based speech-language pathologists possess the skills and knowledge necessary to treat this population of children who present with dysphagia and/or feeding difficulties.

It is important to study children with dysphagia to determine what treatment techniques are effective in reducing the prevalence of dysphagia in the school system. School-based SLPs need to be informed about these effective treatment techniques and the background of pediatric dysphagia to accurately diagnosis and treat this special population. Gaining the necessary knowledge improves the treated child's quality of life and nutritional status, as well as improves the skills of the SLP. The continuing shift to

include children with complex medical needs, such as dysphagia, in schools stresses the importance of school-based SLPs' knowledge to enhance effective dysphagia treatment to ensure the safety of these children.

Rationale for Increase

As mentioned before, the mandates of including FAPE (i.e. Free Appropriate Public Education) and LRE (i.e. Least Restrictive Environment) have given children who in previous years were not able to attend school due to their complex medical needs, an opportunity to participate in a least restrictive educational setting with peers. Students who have complex medical needs and/or dysphagia are commonly attending regular schools as a result of these mandates (Lefton-Greif & Arvedson, 2008). These mandates place emphasis on the support of related services needed for children with disabilities to benefit from a positive school experience and have access to a free and appropriate education (O'Donoghue & Dean-Claytor, 2008).

In addition to changes in legal statutes, the sudden influx of medically complex students within the school system can be attributed to recent advances in medical technology and changes in health care coverage for inpatient services (O'Donoghue & Dean-Claytor, 2008). A significant decrease in premature mortality rates has resulted in premature infants with low birth weights surviving until school age and beyond (O'Donoghue & Dean-Claytor, 2008). The continuing shift from an inpatient to outpatient delivery model has increased the percentage of medically complex children receiving services in the public school setting as well (O'Donoghue & Dean-Claytor, 2008). It is routine for children with feeding tubes, tracheostomy care (e.g. suctioning), oral medication administration, ventilators, and other health care needs associated with

dysphagia to attend schools within their home communities (Angell, Bailey, & Stoner, 2008; O'Brien & Huffman, 1998). As Ryan (2006) stated, "the school population is becoming more diverse, needy, and exceptional than at any other part in history (p. 15)." This statement stresses the opportunity for knowledgeable SLPs take part in treatment of children who present with dysphagia.

The Swallowing Process and Dysphagia

Successful completion of swallowing depends on the coordination of both body posture and breathing (Sheppard, 2008). An interruption in the swallowing process can be labeled as dysphagia. As explained by Miller and Willging (2003), pediatric dysphagia encompasses a wide range of feeding and/or swallowing dysfunction in infants and children and is noted as more than a specific diagnosis.

Feeding is a complicated task that relies on the organization of neuromuscular coordination and integration of motor and sensory pathways (Clawson, Kuchinski, & Bach, 2007). As Sheppard (2008) outlines, the sensory components of swallowing are complex and the motor components involved in the total task of swallowing are essential. Within the four phases of swallowing (i.e. oral preparation, oral initiation, pharyngeal phase, and esophageal phase), motor components include the structures and muscles of the nose, mouth, throat, chest, abdomen, and aerodigestive tract. With the sensory components, the child receives relevant sensory information from contact receptors for touch, pressure, and taste and information from distant receptors for smell, vision, and hearing. Proprioceptors send information for position and movement of the necessary joints and muscles involved with swallowing. Organ systems transmit information for respiration, body position in space, alignment, hunger, thirst, and condition of the gut

(Sheppard, 2008). Swallowing and feeding both rely on sensory and motor components to complete the total task.

Pediatric dysphagia has been linked to health compromise with a decrease in nutrition, growth restrictions, and respiratory compromise (Angell et al., 2008). Within the literature, five main etiological categories for pediatric dysphagia have been identified and include: (a) neurological conditions, (b) prematurity, (c) congenital/anatomical malformation, (d) reflux, and (e) genetic conditions (Arvedson & Brodsky, 2002; Gisel, Lange, & Niman, 1984; Lefton-Greif, 2008; Prasse & Kikano, 2009). Other causes that may trigger the onset of dysphagia can be attributed to cardiorespiratory issues, metabolic dysfunction, oral sensory, and behavioral issues (Miller & Willging, 2003). Children who were dependent upon feeding tubes for a long period of time are another population that should be considered in the treatment of pediatric dysphagia as their oral skills have not fully developed due to lack of oral experiences (Tarbell & Allaire, 2002).

Neurological conditions

Neurological conditions are the most common among the etiologies for pediatric dysphagia. Conditions may include central nervous system conditions (e.g. cerebral palsy, brain stem tumor, traumatic brain injury, cerebral vascular accident), neuromuscular junction disease (e.g. myasthenia gravis), and/or muscle disease (e.g. spinal muscular dystrophy, muscular dystrophy, Guillian-Barre´ syndrome) (Lefton-Greif, 2008). Burklow and colleagues (1998) reported that neurological involvement may contribute to impairments in swallowing that persist beyond infancy. When cranial nerve involvement exists, children experience oral sensorimotor deficits as well as pharyngeal deficits that place the child at risk for aspiration (Arvedson & Brodsky, 2001).

Cerebral palsy (CP) presents as the most common neurological condition associated with dysphagia (Lefton-Greif, 2008). Children with CP tend to demonstrate an in-coordination between respiration and swallowing (Rempel & Moussavi, 2005). Children with CP may develop sensitivity to touch and foods, abnormal muscle tone resulting from excessive tone (i.e. hypertonicity) or extremely low tone (i.e. hypotonicity), and demonstrate a prolongation of reflexes, such as rooting and suckle (Helfrich-Miller, Rector, & Straka, 1986). Oral motor dysfunction and/or delays are also known to be common in ninety percent of children with CP (Reilly, Skuse, & Poblete, 1996).

Of children with CP, an estimated 85-90% will have swallowing difficulties at some point within their lifetime (Reilly, Skuse, & Poblete, 1996). Feeding difficulties in children with neurological impairments, especially those with CP, were shown to manifest in infancy and continue throughout the child's lifetime (Gisel, Alphonse, & Ramsay, 2000). Of interesting finding, a study completed by Rogers and cohorts (1994) unveiled a prominence of silent aspiration in the population of children with cerebral palsy. Because silent aspiration will not be determined without the use of a videofluoroscopic study, school-based speech-language pathologists should use caution in ruling out aspiration based on behavioral indicators. Thus, collaboration with medical personnel is imperative for the success of identification and treatment of dysphagia for those kids who present with cerebral palsy.

A study completed by Morgan and colleagues (2003), revealed children with traumatic brain injury and the corresponding incidence of dysphagia is low, ranging from 3.8-5.3%. The occurrence of dysphagia depends on the severity of the injury (Morgan,

2010). Those children with severe traumatic brain injuries showed a higher incidence of developing dysphagia, ranging from 68-76% (Morgan, 2010). Two corresponding risks identified in developing dysphagia for children with traumatic brain injury were Glasgow rating scale of eight or less and a ventilation period of more than 1.5 days (Morgan et al, 2003).

Children who are older and have experienced head trauma mimic the same physiologic characteristics with feeding and swallowing complications as adults with head injury (Ylvisaker & Weinstein, 1989). These physiologic characteristics may involve reduced tongue control, poor bolus manipulation in the oral cavity, delayed production of the pharyngeal phase of the swallow, and inefficient transport of food from the mouth and pharynx (Arvedson & Brodsky, 2001). Children with dysphagia as a result of traumatic brain injury may also demonstrate alterations in behavior related to feeding, such as impulsivity with food (Morgan, Ward, & Murdoch, 2004). Children were also noted to develop severe tonal and postural deficits, oromotor deficiencies, respiratory and laryngeal impairments, and oral sensitivity which all impacted swallowing competence and the safety to manage food orally (Morgan et al, 2004).

Prematurity

Prematurity places children at an increased risk for impairments in swallowing and disruptions in feeding possibly because infants were reported to experience a period of non-oral feedings (e.g. nasogastric tube feeding), at least one aspiration event, and the need for alternative feeding methods (e.g. gastrointestinal feeding tube) (Burklow et al., 2002). Chronic lung disease is the most common adverse outcome of prematurity and is associated with an atypical pattern of respiration and swallowing (Timms et al., 1993).

Stability with respiration, alertness, and a coordinated suck-swallow-breathe pattern are all prerequisites for safe oral feeding (Arvedson & Brodsky, 2001). Conditions that may affect the suck-swallow-breathing pattern include cardiac disease, laryngomalacia, bronchopulmonary dysplasia (BPD), and respiratory syncytial virus (Lefton-Greif, 2008).

It was noted by Homer (2008) that children who begin their lives in the neonatal intensive care unit exhibit a high prevalence of dysphagia. These children are deprived of early feeding experiences and as a result develop dysphagia (Clawson et al., 2007). Approximately 37-40% of children with feeding and swallowing difficulties were identified as born prematurely (Burklow et al., 1998).

Congenital and Anatomical Abnormalities

Anatomical and congenital abnormalities may include cleft lip/palate, vocal fold paralysis or paresis, laryngeal cleft, tracheoesophageal fistula, laryngomalacia, tracheomalacia, and/or tracheostomy (Lefton-Greif, 2008). The dysfunction and discomfort associated with these anatomical/congenital abnormalities may lead to feeding aversion or result in food refusal (Prasse & Kikano, 2009). A cleft palate may inhibit pressure for sucking and may cause nasal regurgitation. A submucousal cleft may also result in nasal regurgitation. Cleft lip restricts the functionality of the labial seal and further creates swallowing problems involving inadequate lip closure (Biavati & Bassichis, 2008). Lip closure is needed for keeping food in the mouth and assists with the tongue action used to propel the bolus posterior (Arvedson & Brodsky, 2001)

Children with tracheotomies also fall under the etiological category of anatomical abnormalities. These children are vulnerable to behavioral feeding difficulties especially food refusal as a result of caregivers trying to force feed the child orally in order to meet

caloric needs and avoid use of feeding tube (Arvedson & Brodsky, 2001). Long term tracheotomy has also been known to affect a child's swallowing physiology (Abraham & Wolf, 2000).

Gastroesophageal reflux and Genetic conditions

Gastroesophageal reflux is another common contributor to dysphagia.

Gastroesophageal reflux can lead to coughing, apnea, pneumonia, and/or failure to thrive (Nelson et al., 1999). Behavioral challenges like food aversions have been common in children experiencing reflux (Nelson et al., 1999).

Some of the genetic conditions associated with dysphagia include Down syndrome, velocardiofacial syndrome, Rett syndrome, and Treacher-Collins syndrome (Arvedson & Brodsky, 2001; Lefton-Greif, 2008). Eighty percent of children with Down syndrome develop oral motor dysfunction or delays (Field, Garland, & Williams, 2003). Immature eating skills were identified in children with a diagnosed intellectual disability (Kurjan, 2000).

Rett syndrome is a genetic disorder that primarily affects females and may not progress until later in life. With Rett syndrome, the child's feeding skills regress (Arvedson & Brodsky, 2001). Management of the child's feeding skills and how to cope is warranted for the caregiver and those involved. Neurological etiologies are also associated with regression of feeding skills and include progressive neuromuscular conditions, brain tumors, acquired neurologic disorders, or static conditions such as cerebral palsy (Arvedson & Brodsky, 2001).

Children with autism do not primarily show problems with swallowing, but often demonstrate significant feeding problems (Arvedson & Brodsky, 2001). Children with a

diagnosis of autism spectrum disorder are more likely to exhibit selectivity of type and texture of food than to demonstrate oropharyngeal dysphagia (Field et al., 2003).

As outlined, eating is a complex and dynamic process that can be disrupted by neurological, environmental, social, and developmental issues (Stevenson & Allaire, 1991). Knowing the contributors and causes as mentioned above can help the speech language pathologist in identifying probable cases of dysphagia. Becoming familiar with the signs and symptoms associated with dysphagia is another area of importance for the speech language pathologist.

Signs and Symptoms

Common signs and symptoms associated with dysphagia can range from the overt such as, emesis, coughing, and/or choking to more subtle including silent aspiration (Prasse & Kikano, 2009). Silent aspiration is the absence of any sign (e.g. coughing) to indicate an individual is having difficulty with swallowing. A child with little interest in eating, straining or extension of muscles during eating, extensive time requirement to finish a meal, spillage of food or liquid from the mouth, gagging while eating, respiratory distress, and a change in quality of life may be signaling a problem such as dysphagia (Prasse & Kikano, 2009).

Other symptoms or signs to look for include reflux, nasal regurgitation, tongue thrusting during swallowing, and chronic lung infections (Dahan & Lelong, 2003; Friedman & Bolders, 2000; Prasse & Kikano, 2009). Chronic lung infections may suggest aspiration and aspiration may be a result of refluxed material which in part leads to chronic lung infections. Lung infections may be the only indication that aspiration occurs (Newman et al., 2001).

Treatment and Intervention Techniques

Common oral-motor and swallowing therapy techniques may include modifications in the texture and tastes of foods, oral sensorimotor awareness and oral exercises, use of adaptive equipment, positioning/posture, tactile stimulation, behavior modifications, and activities that focus on improving swallowing musculature and the integration of developmentally appropriate movement patterns (Arvedson & Brodsky, 2001; Lefton-Greif, 2008; Prasse & Kikano, 2009). The primary goals of dysphagia interventions are to treat causes of dysphagia and to minimize the effects of the dysfunctional swallow (Lefton-Greif, 2008). The following are suggestions of possible interventions for the practicing SLP, but every SLP must be mindful that each child is unique and treatment is to be tailored to each individual's goals.

Modifications in texture and tastes of foods can be done by altering the temperature, volume, and consistency of the bolus (Prasse & Kikano, 2009). Thickening the bolus is a way to alter the consistency and can be done through use of wheat germ, rice cereal, dehydrated potatoes, or foods with bland tastes (Arvedson & Brodsky, 2001). Thickened liquids are useful in the treatment of reflux as well as helping to restore or improve a child's oral sensorimotor functioning (Arvedson & Brodsky, 2001). Use of these diet modifications reduces the risk of children choking (Arvedson, 2001; Sheppard, 2001).

Oral Exercises

Swallowing is a dynamic process that requires coordination of the lips, tongue, palate, pharynx, larynx, and esophagus and its coordinating muscles (Prasse & Kikano, 2009). When these muscles are weakened, a regimen of sensory awareness and oral

exercises are warranted to arouse and stimulate the muscles for proper functioning. Children with oral sensorimotor dysfunction may demonstrate tongue thrust, hypersensitivity to oral stimulation, and drooling (Casas et al., 1995). Children who are developmentally delayed often present with decreased oral motor skills (Arvedson, 2001) and the implementation of oral exercises to improve these oral skills is necessitated. Speech-language therapy includes many treatment techniques that facilitate improved oral and motor skills, targeting the jaw, lips, tongue, sensory components, and positioning (Marshalla, 2008).

The purpose of oral exercises is to stimulate structures for function and encourage mouth exploration (Arvedson & Brodsky, 2001). Oral exercises can be integrated into the child's activities of daily living such as play, brushing teeth, and mealtime (Arvedson & Brodsky, 2001). The drawbacks to use of oral exercises include the incidence of increased salivary production if the child does not need to produce more saliva and the invasiveness of the exercises may be problematic for some children (Arvedson & Brodsky, 2001).

Children with TBI may demonstrate reduced tongue movement (Morgan et al., 2004). Reduced tongue strength and in-coordination impact the oral phase of swallowing and possibly the pharyngeal phase of swallowing (Arvedson & Brodsky, 2001). With reduced tongue control, the bolus is susceptible to fall prematurely into the pharynx and obstruct the swallow (Morgan, 2010). Coordinated tongue action is needed for a functional swallow. Oral exercises to target tongue strength may include vibration and/or stimulation. Stimulation may include the use of varied textures and temperatures to

stimulate tongue action which has been observed to increase tongue movement (Arvedson & Brodsky, 2001).

Deficits of tone impact muscles related to swallowing and often impact children with CP (Marshalla, 2008). To increase tongue range of motion caused by hypotonicity, the child practices opening their mouth as wide as possible, holding it, and then releasing. The child can also elevate the tongue as far as possible, hold it, and release (Marshalla, 2008). These exercises should be repeated in sequence. Children demonstrating with hypotonicity benefit from drill-like exercises to increase tone (Marshalla, 2008). Children with hypertonicity may benefit from relaxation techniques to reduce tone (Marshalla, 2008) such as stretching the tongue to each side of the mouth, extending the tongue out of the mouth, and pulling the tongue as far back into the mouth as possible (Logemann, 1983). Each position should be held and then released.

Mandibular stability is fundamental in swallowing and bolus formation (Arvedson & Brodsky, 2001). Jaw thrust, the sudden forced jaw opening or exaggerated up and down movements, is also associated with hypertonicity and causes instability of the jaw (Arvedson & Brodsky, 2001). Children with TBI may also present with jaw thrust (Morgan et al., 2004) and exercises to improve jaw stability are warranted. Jaw thrust can be brought on by poor posture, an over-stimulating environment, or hypersensitivity (Swigert, 1998). Mouth play with fingers or soft toys, as well as stroking and tapping the face, aid in reducing jaw thrust and promote jaw stability (Arvedson & Brodsky, 2001).

Adequate tone in the cheeks assists with lip closure and formation of the bolus. Lip closure is needed to keep food from falling into the lateral sulci (Arvedson & Brodsky, 2001). Oral exercises to improve lip coordination and strength include

puckering the lips, spreading the lips to form a smile, and rounding the lips in a wide open position (Logemann, 1983). Each of these exercises should be done with holding the posture, relaxing, and repeating the exercise.

Most children are receptive to some form of stimulation that is done either in conjunction with feeding or without (Lefton-Greif & Arvedson, 2008). Techniques to stimulate the facial muscles and lip musculature include use of broad smiling, tight frowning, alternating lip movements between pursing and retracting, and use of resistive sucking through a pinched straw (Asher, 1984). The use of an intraoral massage can increase oral awareness within the oral cavity and improve the child's response to the sensation (Bahr, 2001). The use of facial molding helps to reduce muscle tone and provides tactile stimulation to the face with use of general massage to the face and gently molding the facial structure toward a closed mouth or lip position (Morris & Klein, 2000). Use of gum massagers and other utensils may stimulate an increase with salivary secretions (Lefton-Greif & Arvedson, 2008). It was noted that children with CP benefited from stimulation that involved stretching, brushing, vibrating, icing, or stroking the orofacial musculature (Sobsey & Orelove, 1984).

An oral exercise used to enhance chewing skills consists of wrapping a small amount of food in a gauze pad and tying it to a string known as the "food ball". It is then moved between the teeth to stimulate the act of chewing (Morris & Klein, 1987, 2000). A technique used to improve rate and rhythm involved with chewing allow children to engage in rhythmic activities by stomping their feet or kicking in rhythm with chewing (Bauman-Waengler, 2004). Employment of these oral exercises used to enhance chewing skills reduces the risk of choking (Arvedson, 2001; Sheppard, 2001).

A study completed by Clawson, Kuchinski, and Bach (2007) implemented the use of Beckman oral motor exercises 20-30 minutes before each feeding. This feeding protocol was administered to 8 children varying in age from 18 months to 4.7 years and who presented with a diagnosis of spastic diplegic cerebral palsy with an underlying condition of prematurity, failure to thrive, or oral dysphagia. The children participated in this intense feeding program for an average of 29 days and the feeding protocol was conducted four times a day. The results indicated that integration of oral exercises along with other treatment modalities such as positioning and positive feedback yield promising results. Children improved their management of food within their mouth, tolerated longer meal sessions, and consumed larger amounts of food which increased caloric consumption for appropriate weight gain (Clawson et al., 2007).

Positioning

Adaptive equipment and correct posture alignment will primarily be monitored by the occupational therapist on the dysphagia team as these interventions are related to their field of study. It is important, however, to stress the significance of good body positioning and its affect on the swallowing mechanism. Body stability is needed to support oral-motor mobility with the cheeks, lips, jaw, and hyoid during chewing, drinking and swallowing; changes in posture have been attributed to changes in the oral and pharyngeal phases of swallowing, which demonstrates the strong causal relationship between body stability and oral-motor control (Morgan, 2010). Consideration should be given to tone and movement patterns before changes with the oral sensorimotor system can be made (Morris & Klein, 2000). The positioning and seating of a child provides better support for feeding and improves head and trunk control (Arvedson & Brodsky,

2001). When a child is fed in an inappropriate position, such as the reclined state, children are more susceptible to nasopharyngeal reflux (Arvedson & Brodsky, 2001).

Environmental Changes

Children with sensory deficits demonstrate with dysphagia that is behavioral in nature. These children may be transitioning from tube to oral feedings, have low volume intake or poor weight gain, limited variety of tastes and textures, difficulty transitioning from one texture to the next, or food refusal (Arvedson & Brodsky, 2001). As mentioned prior, children with autism and children with reflux may demonstrate food aversion or refusal (Field et al., 2003; Nelson et al., 1999). Even after underlying conditions have been treated, some children may require behaviorally based interventions to treat feeding refusal and aversion (DiScipio & Kaslon, 1982). It was cited that problematic mealtime behaviors commonly co-occur with pediatric dysphagia (Arvedson, 1997).

Changes in the environment, use of positive feedback, preferred toys, differential attention, and prolonged presentation of food were reported effective in behaviorally based intervention programs (Arvedson & Brodsky, 2001; Clawson et al., 2007). Changes in the environment may consist of reduction of distractions, improving the child's ability to focus, and limited interactions (Arvedson & Brodsky, 2001). Results from a survey conducted by Angell, Bailey, and Stoner (2008) indicated all but one participant reported an over-stimulating environment impeded their child's treatment and progress. Participants consisted of seven caregivers of children age 3-11 years old and who presented with pediatric dysphagia with a diagnosis of cerebral palsy, scoliosis, FG syndrome, CHARGE syndrome, microcephaly, or hypotonia. Families reported behavior management techniques utilized within the home environment including (a) moving to an

isolated area with dimmed lights, (b) playing soft music of low volume television, (c) and using verbal and tactile cues to gain the child's attention during feeding (Angell et al., 2008). Making simple environment adjustments such as the ones mentioned above via parent survey (Angell et al., 2008) have been cited within the literature (Lowman & Murphy, 1999; Morris & Klein, 1987).

A behavior intervention program carried out by Clawson and colleagues (2007) demonstrated a reduction in negative feeding responses such as refusing, vomiting, gagging, expelling or holding food in the mouth. Preferred toys were used to reward appropriate behaviors such as accepting food, chewing, or swallowing (Clawson et al., 2007) and children did not to receive any form of reinforcement for negative behaviors displayed such as refusal, expelling food, or not swallowing within 30 seconds (Clawson et al., 2007). This study was completed with an inclusion of an intensive day program, six hours a day five days a week for 29 days. Eight children participated ranging from 18 months to 4.7 years. The participants presented with a diagnosis of spastic diplegic cerebral palsy and whose underlying condition was compromised by either prematurity, failure to thrive, or oral dysphagia.

Arvedson and Brodsky (2001) discuss six stages to use with behavior intervention. These six stages are tolerating, interacting, smelling, touching, tasting, and eating (Arvedson & Brodsky, 2001). With the stage of tolerating, the child advances from accepting food being in the same room to looking at the food when placed in front of the child. The stage of interacting consists of the child using utensils to stir or mix food, but not placing the food in the mouth. Smelling, the third stage, introduces the child to odor of food and the child has to tolerate food in the room and then picks food up

and smells it. The fourth stage, touching, consists of the child accepting food on face, fingers, hands, and upper body. The fifth stage, tasting, requires the child to lick lips or tongue, bite food, bite and spit out, bite and hold in mouth before expelling, chewing and partially swallowing, chewing and swallowing with drink, and finally independently demonstrating chewing and swallowing. The final stage, eating, consists of the child functionally carrying out the task of eating (Arvedson & Brodsky, 2001).

Sheppard (2001) utilized elements of the six stages in a treatment protocol with a child exhibiting behavioral feeding deficits. The stage of tolerating was demonstrated when the child moved from sitting in a chair at the table with family and classmates to keeping his plate and utensils in front of him to keeping food and drink on the table (Sheppard, 2001). Ned was trained to hold pieces of apple and crackers in his hands and lick them (Sheppard, 2001); this represents a crossover between the stages of touching and tasting. The child was taught to bring a cup to his mouth which had a sample of yogurt smeared on the rim that provided the child with a small taste and attempted to elicit a swallow (Sheppard, 2001); this stage is representative of the stage, tasting, as outlined by Angell et al. (2008). The final stage, eating, was demonstrated when Ned learned to feed himself yogurt with a spoon after several weeks of practice (Sheppard, 2001).

It has been said that swallowing is the best exercise for swallowing (Perlman et al., 1989). To depict activities that focus on improving swallowing musculature and the integration of developmentally appropriate movement patterns is to provide a child with an opportunity to practice functional swallowing therapy. The best outcomes for learning and retention are to practice within natural routines and natural environments (Sheppard,

2008). These natural environments may include the home, lunchroom, classroom, restaurant, etc. Experiences that yield faster learning and retention of a skill are those that are closely approximated to the movement and coordination of the task, as well as the environment in which it takes place (Schmidt & Wrisberg, 2004). In fact, research has shown that learners perform skills more effectively when skills are learned from experiences that are related to the target task (Sheppard, 2008). The more opportunities that are provided for practice, the better the child's performance and better retention of the task (Schmidt & Lee, 1999).

It has been suggested within the literature that functional activities should immediately follow the direction of oral exercises (Arvedson & Brodsky, 2001). A case study that summarizes purposeful treatment details the SLP giving a small amount of food and water to facilitate purposeful swallowing in hopes to adversely affect the amount of secretions made (Lefton-Greif & Arvedson, 2008). It was suggested that activities of daily living should include safe and functional skills for oral feeding (Lefton-Greif, 2008).

School-Based Dysphagia Team

Historically, dysphagia treatment has occurred predominately in the medical setting (Silliman, 2000) and debate continues as to whether or not dysphagia treatment needs to be addressed within the school system (Wagner, 2001). Lack of understanding or limited experience in pediatric dysphagia may contribute to negative feelings toward dysphagia treatment in the schools (Bailey et al., 2008). Current research has given support for a school-based dysphagia team and identified skills required by an SLP as a member of the dysphagia team.

Five items were outlined in an article by Homer (2008) to establish a school-based dysphagia team. Forming a team, summary of statements, suggested number of children with dysphagia, outlining an estimated budget, and designing and implementing a plan to treat dysphagia are all elements in designing an effective dysphagia team.

No single profession can adequately serve the needs of these complex children (Arvedson, 2000); thus, the development of a school-based dysphagia team is warranted. A school-based dysphagia team should be comprised of professionals who can provide additional supports for treatment of the child with dysphagia. These professionals may include but are not limited to: speech-language pathologists, occupational therapists, social workers, physical therapists, dieticians, nurses or other medical personnel, special educators, teachers and paraprofessionals, behavior specialists, administrators, and parents/guardians (Bailey & Angell, 2008; Bailey et al., 2008; Homer et al., 2000; Power-deFur, 2000; Prasse & Kikano, 2009).

It is crucial to include parents on the dysphagia team as they can provide information relative to their child's characteristics, medical complexities, and educational needs (Angell et al., 2008). Including family members is considered a valuable component to a dysphagia team and is declared by IDEA Amendments 1997 that families be included in team decision-making (Bailey et al., 2008). Listening to family members and their opinions and perspectives on dysphagia management can reinforce strategies and promote generalization across settings outside of school (Stoner et al., 2006).

Members of the dysphagia team need to have up-to-date knowledge on pediatric dysphagia concerning evaluation and management (Angell et al., 2008). Children rely on

their parents and therapist to be alert to the signs and symptoms of their swallowing problem (Prasse & Kikano, 2009). Members need to know the associated signs/symptoms and implications for dysphagia management. Child's communicative signals should also be well understood by team members, such as arching, excessive muscle strain, averting gaze, and roving the eyes (Arvedson & Brodsky, 2001). Ability to interpret these signals and signs will aid in re-establishing more effective treatment for the child (Arvedson & Brodsky, 2001).

Within the school system, SLPs are generally the only professionals who have had education and training on the topic (Homer, 2003) and may serve as the case manager for the team (Homer, 2008). It is important for the success of the team approach that SLPs are proficient in skills related to assessment and treatment of pediatric dysphagia (Power-deFur, 2000). Such skills can be acquired through observation of a skilled and knowledgeable SLP (Power-deFur, 2000). The SLP must also demonstrate knowledge of pediatric dysphagia including common etiologies, identification and interpretation of associated signs and symptoms, and display knowledge of the anatomy and physiology of the swallowing mechanism (Lefton-Greif & Arvedson, 2008; Power-deFur, 2000). With some university programs, variable knowledge is provided on the treatment of dysphagia (Power deFur, 2000) and some programs only focus on the treatment of adult dysphagia (Homer, 2008). It is imperative that the SLP who does not have the extensive knowledge/skills seek out educational opportunities that provide the SLP with a dynamic and hands-on experience (Power-deFur, 2000; Silliman, 2000).

It is reported that 35% of SLPs participating in schools serve students with dysphagia (Owre, 2006). Some of these SLPs have accepted responsibilities that are out

of their realm of practice due to their lack of understanding with pediatric dysphagia. Not having the adequate knowledge and skills to serve people with dysphagia is a violation with ASHA's Code of Ethics (2003). Power-deFur (2000) notes that a clinician's lack of preparation in management of dysphagia constitutes negative outcomes for the child such as, choking, pneumonia, or even death if not handled correctly. Survey results indicated that SLPS with more continuing education and training reported a lower self-confidence rating; whereas, those with no continuing education reported a high self-confidence rating for treating dysphagia (O'Donoghue & Dean-Claytor, 2008). This disparity represents the ignorance some SLPs have about pediatric dysphagia and their capabilities of treating children regardless of training.

Families overwhelmingly reported via an investigation conducted by Angell et al. (2008) that positive therapist disposition skills such as, a caring attitude, willingness to learn, and open-mindedness to try new ideas attributed to the improvement in their child. Dispositions are defined as "reflecting the values and attitudes of professionals in terms of their commitment, sense of responsibility and ethical behavior on behalf of a child with disabilities and their families" (Fiedler, 2000, pg. 12). Research within the fields of psychology and special education have also indicated the importance of team member disposition and demonstration of a positive attitude as underlying components for successful communication with caregiver and motivation for students (Friend & Cook, 2002). Within the literature, Lowman & Murphy (1999) have also outlined the importance of using disposition skills when working with families. The dispositional skill of a caring and kind attitude was perceived by the caregiver that the professional was the "best" therapist for their child (Angell et al., 2008). As stated, the professional

carrying out skills related to ethical issues, optimistic attitude, commitment and sense of responsibility are reflected as commendable therapists.

It is important to note that several models for team approach have been used in serving children with dysphagia (Bailey & Angell, 2003; Homer, 2008). Sometimes the school system may not have all the professionals available due to caseload constraints and time (Bailey et al., 2008). Organization of a school-district team would adequately serve its purpose for treatment of children with dysphagia (Bailey & Angell, 2003; Homer, 2008) and alleviate complications accrued by a school-based team.

The next step is to design and implement an effective treatment plan for children with pediatric dysphagia (Homer, 2008). As described by the American Speech Language Hearing Association (ASHA), interventions should be comprised of guidelines that include: providing information and guidance to students, families and caregivers about the nature of dysphagia; consulting and collaborating with medical providers throughout planning and intervention; training caregivers and educational staff on safe eating and swallowing techniques; instructing families, caregivers, and educators about the social-emotional relationship between dysphagia and educational success (ASHA, 2002, p. 281). Goals that were developed by the Louisiana school dysphagia team were stated as; evaluate the child; provide information to support the need for an instrumental evaluation (VFSS) and observe procedure when applicable; design and implement a treatment plan; develop compensatory strategies to facilitate safe swallowing (Homer, 2008).

Dysphagia management within the schools is still a new topic within the field of speech-language pathology and there is still some hesitance among members to adopt this

protocol. Further investigation should be paid to effects of intervention techniques specifically on the pediatric population as well as, additional research towards effectiveness of dysphagia management, its specific intervention techniques, and the outcomes of affected children within the schools. It has been stated by Cass et al. (2005) that little is known about the impact of pediatric dysphagia and the effectiveness of intervention techniques with this population as most of the literature has come from experience with working with adults who have dysphagia. It is essential for further research to be conducted on the effectiveness of intervention strategies specifically performed on the pediatric population.

Conclusion

A proposed model and outline for a school-based dysphagia team has been outlined. It is the school-based speech language pathologist's obligation to know their limits regarding their education and experience with dysphagia and to seek out additional resources. Treatment and intervention techniques have been provided and detailed to be used with specific areas of treatment in children with dysphagia. Knowing the etiologies and the signs/symptoms associated with dysphagia are of utmost value for the practicing school-based therapist. Collaboration with medical personnel, possessing dispositional skills, communication with family, and seeking out additional education or experiences are stated as successful components to a school-based team and should be given consideration. Management of pediatric dysphagia within the school systems is a growing trend among states and it is imperative that SLPs acknowledge this new trend and come to accept the responsibility of treatment with this population.

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