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AN OVERVIEW OF ASSESSMENT AND MANAGEMENT OF DYSPHAGIA WITHIN THE PEDIATRIC POPULATION

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AN OVERVIEW OF ASSESSMENT AND MANAGEMENT OF DYSPHAGIA WITHIN THE
PEDIATRIC POPULATION

by

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B.S., Southern Illinois University, 2010

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
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Department of Communication Disorders and Sciences
in the Graduate School
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RESEARCH PAPER APPROVAL

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It is estimated that adults swallow up to 2,400 times per day, while children are estimated to swallow between 600 and 1,000 times a day (Arvedson & Brodsky, 2002). During the span of a lifetime, swallowing difficulties may arise as a result of numerous etiologies. Dysphagia may result from neurological, genetic, or structural etiologies (e.g., apraxia, cerebral palsy, Down syndrome, cleft palate, autism spectrum disorder) (Sheppard, 2008). Thus, when these challenges occur, limitations, pain, and frustration may be some of the common feelings that affected individuals and their family experience.

Speech-language pathologists (SLPs) work as part of an interdisciplinary team that assess, diagnose, and treat individuals with dysphagia. Health care professionals who serve on a swallowing team may include an otolaryngologist, gastroenterologist, radiologist, neurologist, dentist, nurse, dietician, occupational therapist, and the pulmonologist or respiratory therapist (Dikeman & Kazandjian, 2003). Therapy techniques for swallowing disorders includes compensatory procedures and direct therapy strategies (Crary & Groher, 2003).

The ability to swallow requires functional anatomy and physiology. Swallowing encompasses a combination of voluntary and involuntary actions involving several different muscles and brain areas (White, O'Rourke, Ong, Cordato, & Chan, 2008). There are four stages of swallowing: oral preparatory, oral, pharyngeal, and esophageal. During these four phases, structures and muscles of the nose, mouth, throat, chest, abdomen, and digestive tract are involved (Sheppard, 2008). During the oral preparatory phase, food or liquid is masticated to form a bolus. The oral phase is initiated when the bolus is propelled posteriorly in the oral cavity, the tongue is elevated toward the soft palate, and the bolus leaves the oral cavity. The pharyngeal phase begins with the initiation of the pharyngeal swallow and ends with the bolus entering the upper esophageal sphincter. Lastly, the esophageal phase moves the bolus through the esophagus

and into the stomach via peristalsis (Arvedson & Brodsky, 2002). Successful completion of swallowing depends on coordination of all movements involved (Sheppard, 2008).

Dysphagia may occur in any stage of swallowing and with individuals of all ages, from birth to the elderly. According to Arvedson, Clark, Lazarus, Schooling, and Frymark (2010), "the estimated prevalence of feeding disorders in the United States ranges from 25% to 45% in typically developing children and from 33% to 80% in children with developmental delays" (p. 322). Medical complications are a common cause of dysphagia in this population (Arvedson, 2000).

Dysphagia in Children

During infancy, stages of typical feeding development take place. Suckling and sucking are two distinct phases of the suck that take place during infant development (Arvedson & Brodsky, 2002). Suckling is a guided reflex that marks the beginning of the swallowing process. Suckling occurs from birth to nine months and is characterized by a pattern of in-out tongue action (Arvedson & Brodsky, 2002). During this phase, liquid is drawn into the oral cavity through a rhythmic licking action of the tongue with lips loosely approximated (Arvedson & Brodsky, 2002). In conjunction with suckling, sucking begins around six to nine months and is characterized by a pattern of increasing vertical tongue action with lips more firmly approximated (Arvedson & Brodsky, 2002). Suckling and sucking mark the beginning of development of feeding skills that are maintained throughout a life span (Arvedson & Brodsky, 2002).

Nourishment is priority in newborns (Vergara & Bigsby, 2003). Highly nutritional and efficient feedings provide the infant with the building blocks to advance development within deficient and immature systems (Dunn, Kleeck, & Rossetti, 1993). Whenever difficulty with

feeding is observed, supplemental assessment and treatment should be provided as needed. Providing intervention for a child with a swallowing disorder may improve ability to swallow and overall quality of life.

The objective of this research paper is to review the literature of swallowing disorders within the pediatric population. Aspects of assessment and management of dysphagia will also be reviewed.

Clinical Assessment of Feeding and Swallowing

Early indications of dysphagia include poor oral bolus control, delayed or slowed pharyngeal response, and compromised airway protection, resulting in coughing or choking (Swigert, 1998). Cognitive deficits and reduction in the sensory ability to monitor the bolus may reduce the adequacy of bolus preparation (Garcia, Chambers IV, Molander, 2005). Children with dysphagia may not recognize that they have a problem swallowing or they may not be able to voice concerns of swallowing difficulty (Arvedson, 2000). It is important that parents or caregivers are knowledgeable of signs that may indicate the presence of dysphagia. Many of these signs may not be detected without use of specific diagnostic assessment (Arvedson & Brodsky, 2002). Nevertheless, often the child with dysphagia will present many signs of swallowing difficulty while eating. Some of the signs of dysphagia in infants and young children include sucking and swallowing incoordination, gagging, vomiting, nasal regurgitation, and increased drooling (Swigert, 1998). Additional signs may include difficulty chewing, poor labial seal resulting in food falling from the mouth, frequent coughing or choking, oral residue, watery eyes, and a wet voice (Homer, 2008).

Evaluation of feeding and swallowing is applied in order to gather information regarding past and current factors affecting the feeding and swallowing process such as evaluation of

sensory, motor, and structural components, observation of feeding and swallowing skills, and recommendations for an instrumental assessment if needed (Cherney, 1994).

Clinical assessment of swallowing assists professionals in determining the presence and severity of dysphagia, possible etiologies, and recommended treatment strategies to improve swallowing. Swallowing and feeding skills are assessed through a combination of tools including a comprehensive medical and developmental history, examination of the anatomy and physiology of the structures and systems involved in swallowing, and determination of the level and adequacy of development for these skills and the affective behaviors associated with these tasks (Sheppard, 2008). Solid food and liquid bolus trials should be part of the general evaluation. Clinical assessment of swallowing assists professionals in determining the presence and severity of dysphagia, possible etiologies, and recommended treatment strategies to improve swallowing.

Background history

A case background history should be obtained in order to gain knowledge of family, medical, and birth history. Such valuable information may be acquired through a parent and caregiver questionnaire (Cherney, 1994). Background history may also include information about the child's feeding and sleep patterns, the child's state, physiologic function, and additional concerns that the parents or caregivers may have (Swigert, 1998). Further information that may be obtained relates to preferences of taste, temperature, and texture (Cherney, 1994).

Bedside assessment

The SLP may choose to apply a standardized bedside assessment if the child is mature enough. Cognitive state, posture, ability to produce a voluntary cough, vocal quality, and oral motor control are examined during a standardized bedside assessment (White et al., 2008).

Furthermore, the bedside assessment should provide information on general health and social and cognitive ability (Logemann, 1998).

A bedside assessment may gather advantageous information to assist the professional in determining the presence of dysphagia, which in turn, will support cause for further evaluation and possible diagnosis of a swallowing disorder. However, not all cases are explicit and descriptive information with regard to medical and birth history may not be obtainable. Such history allows the professional to apply this distinctive information to determine the next step in evaluation and diagnosis. The clinical assessment is rarely the final step in the dysphagia evaluation process (Dikeman & Kazandjian, 2003). Only if the clinician is completely confident of a patient's ability to manage oral intake will a recommendation for oral feeding be made based only on the bedside assessment (Dikeman & Kazanjian, 2003).

Additionally, an oral mechanism examination will assess the client's oral musculature, strength, and facial symmetry. Structural deformities may also be noted at this time. During the oral mechanism examination, the patient's jaw, lips, tongue, cheeks, palate, and gums should be inspected (Swigert, 1998). Information gathered during the oral mechanism examination will directly impact aspects of the oral preparatory and oral phases of swallowing (Dikeman & Kazanjian, 2003).

Cervical Auscultation

Cervical auscultation is a technique used to detect sounds of a swallow by placing a stethoscope on the larynx (Dikeman & Kazandjian, 2003). In addition to detecting the presence or absence of a pharyngeal swallow, the clinician can determine the possibility of a compromised airway via respiratory sounds (Dikeman & Kazandjian, 2003). This technique can provide additional information to be used during the clinical evaluation.

Diagnostic Instruments

Instrumental assessment is applied to view the anatomical structures and physiologic function of the swallowing mechanism. The Videofluoroscopic Swallowing Study (VFSS) and Fiberoptic Endoscopic Evaluation of Swallowing (FEES) are common diagnostic procedures used in the evaluation of swallowing disorders (Cherney, 1994).

VFSS.

VFSS is the most frequently used procedure for evaluation of swallowing in both adults and children due to ease of interpretation and ability to view all stages of the swallow (White et al., 2008). It is a comprehensive radiographic evaluation of the swallowing process, defining transit and motility problems (Logemann, 1998). VFSS also provides a view of anatomical structures, physiologic function of swallowing; additionally, VFSS provides a qualitative estimate of aspiration (Cherney, 1994). During the VFSS procedure, patients are positioned with special seating devices to facilitate the use of postural changes and allow imaging of lateral and anterior-posterior views (Dikeman & Kazandjian, 2003). Professionals are cautioned to limit the amount of time the patient is exposed to radiation and generally does not exceed 5 minutes (Logemann, 1998).

Information gathered during a VFSS with regard to swallow physiology includes duration of bolus transit, reduction or presence of tongue movement during oral transit, duration of delay in triggering of the swallow response, degree of airway closure and cricopharyngeal opening, and range of movement of pharyngeal structures, such as laryngeal elevation, tongue base retraction, and pharyngeal wall contraction to propel the bolus through the pharynx (Langmore & Logemann, 1991). Results found in a VFSS aid in determining appropriate therapy procedures to improve the child's disordered swallow (Cherney, 1994).

FEES.

FEES is an additional procedure used to evaluate dysphagia. The upper aerodigestive tract is viewed via passage of an endoscope through the nose and down to the level of the soft palate (White et al., 2008). Information concerning events occurring immediately before, during, and immediately after the pharyngeal swallow is provided through use of the endoscopic method (Arvedson & Brodsky, 2002). Sensory testing can also be performed using FEES by using air pressure to trigger a swallow response (White et al., 2008). The whiteout period, or loss of view as structures come into contact during swallowing, does not allow assessment during the actual act of swallowing. In order to complete the full assessment, FEES may need to be modified according to the tolerance of the patient due to the patient's inability to tolerate the passage of the scope for lengthy periods of time (Dikeman & Kazandjian, 2003). FEES is a useful and informative instrument used in the diagnosis and treatment of swallowing in patients of all ages.

Although diagnostic instruments provide valuable information regarding the patient's swallow, these assessment tools are not appropriate for use with all individuals (Swigert, 1998). For example, obese people may not be suitable candidates for participation in a VFSS. Machines used to obtain a VFSS image may have weight and size limits. Additionally, individuals with behavior problems may be poor candidates for swallowing assessment (Arvedson & Brodsky, 2002). SLPs should consider all factors when planning management. Seeking advice from fellow colleagues and professionals involved in the case would assist SLPs in determining a fitting plan of action.

Therapy Procedures

Following swallowing assessment, SLPs should create a treatment plan in conjunction with the interdisciplinary team treating the individual with dysphagia. It is important to note that

the individual under treatment must be medically stable prior to the onset of any therapy services (Dunn et al., 1993).

Evidence-Based Practice

Swigert (1998) emphasized the importance of evidence-based practice (EBP) in the assessment and management of feeding and swallowing problems. EBP is a type of clinical perspective that integrates professional expertise with the best available current evidence from research, along with client preferences and values, in making clinical decisions about the management of clients (Lass & Pannbacker, 2008).

Integration of client preferences and values in treatment is a component of EBP that requires SLPs to identify and apply the most efficacious interventions as determined by the individual's preferences, environment, culture, and values (Swigert, 1998). Current best evidence is an additional component of EBP that utilizes current best evidence from systematic research (ASHA, 2006). New research-based evidence for diagnosis and treatment is emerging on a regular basis and so; professionals continually need to change to serve the profession, the patients, and the institutions where speech-language pathology is practiced (Johnson & Jacobson, 2007). In addition, few studies people can disagree about the quality of evidence from a particular study, making it important for every professional to think independently about the validity, importance, and precision of results from empirical studies prior to applying them to clinical care (Dollaghan, 2004). Clinical expertise, the last component of EBP, states that the clinician's task is to use their experience and best judgment to make clinical decisions guided by evidence (Reilly, Douglas, & Oates, 2004). EBP guides the professional by providing a framework to systematically become a better clinician, colleague, advocate, and investigator by

considering clinical expertise and client preferences against a background of the highest quality of scientific evidence that can be found (Dollaghan, 2004).

The standard service delivery of professionals treating children with dysphagia should be ethical. These standards include avoiding misrepresentation of services, performing only those activities for which one is qualified, adhering to preferred practice patterns, and providing service in the best interest of the patient, among others (Johnson & Jacobson, 2007).

Treatment strategies used in management of feeding and swallowing disorders with the pediatric population can be divided into compensatory procedures and direct therapy strategies (Logemann, 2000). Concurrent use of both types of procedures is commonly practiced to attain the best results. Swallow intervention programs are designed to establish or return the child to safe and efficient oral intake on a normal diet without the need to use any treatment strategies (Logemann, 2000). Although not all children may be able to return to a normal diet, it is substantial that an effort is made as an attempt to improve the child's quality of life.

Compensatory Treatment Strategies

Compensatory treatment strategies include postural changes, sensory enhancement procedures, and changes in the feeding process (Logemann, 2000). Young children benefit from use of compensatory treatment strategies because generally the caregiver has control and the child is not required to follow directions (Logemann, 2000). Compensatory treatment strategies consist in temporary methods for swallowing difficulties, and should be least restrictive to patients (Logemann, 1998).

Postural changes.

Posture and positioning during mealtime is an essential part of the treatment program (Cherney, 1994) because it may facilitate the child's ability to eat and drink normally (Swigert, 1998). The

SLP must first diagnose the physiologic or anatomic disorder in the patient's deglutition and then identify the posture that will facilitate swallowing (Logemann, 1998). Careful identification of the problem will allow the professional to provide the most efficient therapy available (Cherney, 1994).

Swigert (1998) listed numerous appropriate postural alignments for infants with dysphagia: "hold the infant with one arm, support the infant's neck and head with your arm and hand, place the infant on your lap facing you, seat the child next to you and maintain the child's position by placing your arm around the child, or use a side lying or prone position to feed the infant" (p.132-133). The most beneficial postural alignment is chosen based on the child's swallowing needs and deficits to promote a more safe and efficient swallow.

Postural adjustments generally modify the direction of food flow and the size of the pharynx (Logemann, 2000). Children using postural changes must be monitored at all times to ensure compliance with the selected posture. It is noted that postural changes may only benefit a small part of the pediatric population due to reduced levels of cognition and limited communication skill. However, these postural alignments may be utilized with assistance from a caregiver. Postural techniques are more reliable with individuals of school age or older.

Postural changes include the chin down posture, chin-up posture, head rotation to the damaged side, tilting the head to the stronger side, and lying down. The chin-down posture promotes tongue base to pharyngeal wall contact, narrows the airway entrance, and places the epiglottis closer to the posterior pharyngeal wall, thus improving airway protection. The chin-down posture is appropriate for children with a delay in triggering of the pharyngeal swallow, reduced laryngeal closure, or reduced tongue base to pharyngeal wall contact (Logemann, 2000). The chin-up posture utilizes gravity to drain the bolus from the oral cavity in children who

experience difficulty with the oral phase of swallowing (Logemann, 2000). The chin-up posture can be combined with a breath-hold procedure if the child has the cognitive ability to follow directions and is experiencing reduced laryngeal lifting or airway closure (Logemann, 2000). The breath-hold helps to protect the airway voluntarily before and during the swallow. In this procedure, the child is asked to hold his or her breath and swallow at the same time (Logemann, 2000).

Head rotation to the damaged side of the pharynx or larynx is a posture used in children with unilateral laryngeal damage or unilateral damage of the pharyngeal wall (Logemann, 2000). This posture directs food down the stronger side and improves laryngeal closure. Tilting the head to the stronger side is helpful to children with both oral and pharyngeal asymmetries of the same side (Logemann, 2000). This postural change helps directing food down the stronger side by gravity in both the mouth and the pharynx, which may be helpful if the child has experienced trauma or had surgery in one side of the head and neck (Logemann, 2000). Additionally, Logemann (2000) discussed a less commonly used postural technique lying the child down on the stronger side or back, promoting clearance of pharyngeal residue. If the child aspirates after the swallow because of residual food left in the pharynx as a consequence of reduced pharyngeal contraction or reduced laryngeal elevation, lying down may eliminate the aspiration. The child does not need to be in a fully horizontal posture, but may be elevated to 15 or 20 degrees, depending on the severity of the problem (Logemann, 2000).

Use of postural techniques may improve swallowing performance in the pediatric population. The postural change should be explained fully to the feeder and to the child prior to implementation. During feeding, it is important that both the child and the caregiver be comfortable (Cherney, 1994).

Sensory enhancement procedures.

Sensory enhancement procedures may include modification of food consistency, texture, temperature, and taste. The specific sensory properties of a food may facilitate more normal oral movements during feeding (Cherney, 1994). Changes in food consistency, texture, temperature, and taste may be recommended to improve the child's ability to bite, chew, and propel a bolus through the oropharynx (Cherney, 1994). Careful consideration of such modifications should be taken in order to provide the best possible feeding experience and to maximize safety for the child.

Heightening sensory awareness follows postures and is designed to improve increase oral transit speed and triggering of the swallow (Johnson & Jacobson, 2007). Logemann (2008) suggested sensory enhancement procedures including (1) increasing downward pressure of the spoon against the tongue when presenting food in the mouth; (2) presenting a sour bolus; (3) presenting a cold bolus; (4) presenting a bolus requiring chewing; (5) presenting a larger volume bolus of 3 ml or more; and (6) thermal-tactile stimulation. These techniques enhance sensory input, such as bolus taste, temperature, volume, and viscosity, may also result in reduced pharyngeal delay times in some patients (Logemann, 2008). The SLP will have tested the patient's oral reaction to the mentioned techniques above prior to presenting them during intervention (Logemann, 2008).

Dietary modifications.

Aspiration increases the risk of pneumonia. Foreign material such as food or liquid is inhaled into the lungs, generating bacteria growth, leading to infection (Garcia et al., 2005). Aspirated materials may be cleared with a strong cough or throat-clearing. However, not all patients have the physical capacity to expel aspirated material (Swigert, 1998). Modified diets

can make it easier for patients with dysphagia to swallow without aspirating, and can be adjusted according to the swallowing ability of the patient (White et al., 2008). A modified diet may be determined by results of a bedside evaluation, VFSS, FEES, and additional diagnostic procedures.

Children with dysphagia vary in their ability to swallow thin or thick liquids (Palmer, Drennan, & Baba, 2000). If a child aspirates on thin liquids, diet modifications would continue to allow proper hydration with reduced risk of aspiration. The use of thickened liquids is considered when oral control is diminished, pharyngeal response is slow or delayed, airway protection is compromised during swallowing, or there is reduced sensory or cognitive awareness that interferes with bolus preparation (Garcia et al., 2005). Additional consistencies such as solid foods can be modified to support the underlying swallowing deficits presented. These modifications can range anywhere from a pureed consistency to a mechanical soft consistency. A pureed consistency is “pudding-like,” reduces the need for chewing, and is easy to swallow (Logemann, 1998). A mechanical soft consistency is soft, tender, easy to chew, and forms a cohesive bolus when swallowed (Logemann, 1998).

A bolus’ volume can also be modified to help the patient gain control and safely transit the bolus through the swallowing mechanism with minimal postswallow residue (Crary & Groher, 2003). Some patients require a smaller bolus volume while others may benefit from a larger bolus, such as for increased sensory input (Crary & Groher, 2003).

In addition to preventing aspiration, other complications of dysphagia that a modified diet can prevent are dehydration, undernutrition, and choking due to a reduction in necessary foods and liquids required to maintain a healthy lifestyle (Homer, 2008). Dietary modifications should only be used as a last resort in treatment of dysphagia because restricting a person’s diet takes

away their pleasure to eat, may affect nutrition, motivation, and quality of life (Logemann, 1998).

Modify the feeding activity.

Modification of the mealtime activity may be necessary to accommodate the needs of individual patients and may include changing the meal schedule, oropharyngeal cleansing or hydration, or the use of feeding aids (Crary & Groher, 2003). Cognitive status, level of independence, medications, and environment are variables that contribute to warrant modification of the mealtime activity (Palmer, Drennan, & Baba, 2000).

Equipment adaptations.

Equipment adaptations are used with children who have diminished oral-motor functioning. Adaptive feeding equipment should be carefully selected to assist with bolus formation and to reduce the speed of flow of the bolus (Cherney, 1994). There are several different types and sizes of utensils that may be used to improve feeding. Different aspects of the utensil may be altered to fit the child's needs. For example, a spoon with a flat bowl made of a hard, rounded plastic may assist a child who has oral-motor control issues (Arvedson & Brodsky, 2002). Other examples of adaptive equipment include spoons with built up and curved handles, heavy utensils, slow-flow nipples, and latex-covered utensils.

Cups may also come in different shapes and sizes to facilitate a desired response (Cherney, 1994). For example, a cut-out cup may promote improved tongue positioning for some children and is most beneficial for those children who require slight head and neck flexion. A cup with a sipper seal may improve independent lip-cheek function (Cherney, 1994). Compensatory strategies including postural changes, sensory enhancement procedures, dietary modifications, and equipment adaptations are therapy procedures that are applied for

improvement of swallowing in children with dysphagia. Considerations regarding temporary effects of compensatory strategies should be part of the dysphagia management plan.

Direct Therapy Strategies

Direct therapy strategies are designed to change swallow physiology in a permanent manner through active exercise. Exercises included in this category include range-of-motion (ROM) exercises for the lips, tongue, and jaw as well as laryngeal elevation, tongue base retraction and the false vocal folds and arytenoids, resistance exercises to the lips and tongue, and swallowing maneuvers (Logemann, 2000).

Range-of-Motion exercises.

Range-of-motion (ROM) exercises have been found to improve swallowing difficulty. ROM exercises are performed by stretching and moving structure as far as possible (Logemann, 2000). These exercises contribute to strengthen the musculature, which as a result, may reduce the amount or occurrence of swallowing difficulty. In addition, bolus control and chewing exercises may be used to improve fine motor control of the tongue.

Several exercises are available to improve ROM and oral control. In the oral phase of swallowing, a patient may have difficulty with tongue control. Examples of difficulty may include: coordination of the tongue during chewing, elevation of the tongue to the hard palate, cupping of the tongue around the bolus to hold it in a cohesive manner with the sides of the tongue sealed to the lateral alveolar ridge, and anterior-posterior movement of the midline of the tongue in the initiation of the voluntary or oral phase of the swallow (Logemann, 2000).

Exercises directed toward improving tongue ROM should improve oral transit. ROM exercises have been found to improve swallowing and speech intelligibility in oral cancer patients (Logemann et al., 1998). Resistance exercises can also be used to improve ROM and

strength. Pushing the tongue against a tongue depressor or the clinician's finger has been seen to improve ROM and strength (Cherney, 1994). The SLP will work with the interdisciplinary team and the client to develop a personalized exercise regimen to promote oral-pharyngeal improvement (Homer, 2008).

Swallowing maneuvers.

Swallowing maneuvers are another form of direct therapy exercise that applies modified positioning to the head or body in a particular way to eliminate aspiration (Penner, McClement, & Sawatzky, 2007). Swallow maneuvers voluntarily change oropharyngeal positioning during the swallow (Logemann, 2000). Logemann (2000) suggested four swallow maneuvers for improvement of swallowing difficulty: (1) the supraglottic swallow, which closes the airway to prevent aspiration before and during the swallow; (2) the super-supraglottic swallow, which also closes the entrance to the airway before and during the swallow; (3) the effortful swallow, which promotes posterior tongue base movement to clear the bolus from the valleculae; and (4) the Mendohlson maneuver, which improves the laryngeal elevation to support cricopharyngeal opening (Logemann et al., 1993).

These maneuvers require the ability to follow instructions carefully and are not practical for use with patients with cognitive deficits (Palmer, Drennan, & Baba, 2000). Significant muscular effort is required to perform these maneuvers as well. Patients who fatigue easily are not good candidates for this form of therapy (White et al., 2008).

Swallow maneuvers can be a useful tool in improvement of swallowing deficits when practiced under clinician monitoring (Robbins et al., 2008). The clinician should provide step-by-step instructions and provide feedback as needed. Also, a schedule of treatment should be

designed to incorporate this repetitive swallowing therapy effectively (Arvedson & Brodsky, 2002).

A combination of compensatory and direct therapy strategies, detailed instruction, supervision, and feedback all used with a sufficient candidate will encourage proper healing of existing swallowing difficulty (Langmore & Logemann, 1991). Compensatory and direct therapy strategies should be designed individually for pediatric dysphagia (Arvedson & Brodsky, 2002).

Conclusion

Swallowing disorders occur in individuals of all ages for a variety of reasons. In order to adequately evaluate, diagnose, and treat swallowing disorders, professionals must use appropriate tools to determine the presence of dysphagia (Logemann, 1998). Parents or caregivers typically provide valuable information about the child's medical and birth history, preferences, and overall state, assisting the SLP and the child's interdisciplinary team in treating the disorder (Swigert, 1998). A collaborative assessment should be performed to determine the presence of dysphagia. When a child is diagnosed with swallowing difficulty, a personalized treatment plan should be created to improve swallowing in the most safe and efficient way possible (Cherney, 1994). Therapy procedures may include compensatory treatment strategies that provide a temporary relief of the problem (Crary & Groher, 2003). They may also include direct treatment strategies, which work to permanently improve the child's oral-pharyngeal musculature (Crary & Groher, 2003). Proper execution and maintenance of the child's intervention plan increases the probability of improvement and a reduction in the occurrence or amount of swallowing difficulty experienced (Cherney, 1994).

The treating professional can ensure they are providing the most fitting services by recognizing the fact that the field of speech-language pathology is ever changing (Reilly et al.,

2004). SLPs should continue to adapt and grow during their career by maintaining clinical expertise and currency (Johnson & Jacobson, 2007). Attending continuing education classes and specializing in areas of interest will assist the SLP in maintaining high standards of practice (Lass & Pannbacker, 2008). Building relationships with other professionals and familiarizing yourself with their role in the patient's medical care will also ease service delivery (Arvedson et al., 2010). Lastly, another way to ensure quality of service delivery is through ongoing involvement in speech-language-hearing associations and related professional organizations (Dollaghan, 2004). Professional involvement provides an opportunity to network with others, to exchange information and ideas, and an ongoing source of new resources.

Future Investigation

Researchers have provided sufficient evidence and literature on evaluation and treatment of swallowing disorders within the pediatric population. Future investigations in this area would help to determine the efficacy of therapy procedures currently used. Future investigations of the rate of recurrence of dysphagia in children who received therapy may help to determine treatment effectiveness. Once rate of recurrence is determined, further investigation of individualized treatment plans and programs may be investigated in order to compare and contrast treatment strategies. By investigating rate of recurrence, causes associated with returning dysphagia in previously treated individuals could be examined.

It is possible that health problems could interfere with treatment (Arvedson & Brodsky, 2002). This could be a determining factor as to why therapy is less successful than projected to be. Future investigation of interfering health problems would enable researchers to create additional or alternative forms of treatment as assigned to a specific health problem.

Pediatric dysphagia occurs in school-age children as well as with infants (Sheppard, 2008). Future investigation of school-based programs designed to treat pediatric dysphagia should be considered in order to create a universal program for all professionals to follow. This would ensure a reliable measure and could include a program to educate caregivers, administration, and staff on proper techniques to promote adequate treatment. Investigation of school-based programs would help to determine a need for a more constructive school-based dysphagia program.

Assessment, treatment, and management of pediatric dysphagia should be tolerable and enjoyable for all individuals involved (Logemann, 2000). It is important to include the client's perspective in the creation of the treatment plan (Homer, 2008). The probability of success is going to be higher if the patient is agreeable to therapy and has a desire to improve (Langmore & Logemann, 1991). Future investigation of individual's enjoyment of their experience in being assessed and treated for dysphagia previously as a child may help to determine if current practices are agreeable or if change should be made. It is mentioned previously that a goal of SLPs is to provide safe and effective swallowing treatment. However, providing a tolerable and potentially pleasant experience should also be a major factor in forming appropriate care.

One consideration for a future investigation in this area is to investigate how swallowing treatment changed the lives of the individuals who participated in dysphagia treatment as children. Researching the success rate of swallowing treatment in patients who received intervention earlier in life would assist professionals in determining whether or not their current practices are suitable. Additional points may include patients' reaction to treatment and their level of enjoyment. It is possible that treatment could have caused negative feelings or that these children simply did not benefit from treatment. If this is the case, the SLP should alter their

current form of treatment to satisfy the patient's needs. Future investigation of how treatment affected these children would provide supplementary evaluation of current treatment and may enable the exploration of alternate treatment strategies.

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