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Life Care Planning Issues for Pediatric Swallowing Disorders

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Editor's Note: *This is the first of a two-part series on life care planning issues for individuals with swallowing disorders. This first article addresses pediatric swallowing disorders, with adult swallowing disorders to be addressed in a later issue of the Journal.*

Abstract. *Swallowing disorders can occur in children as a result of congenital and acquired disorders. Life care planners who work with children with swallowing disorders should have a basic understanding not only about the complexity of swallowing problems and the potential impact of oral and pharyngeal dysphagia (swallowing disorders) on future care planning, but also on swallowing anatomy and physiology, assessment, and treatment. This first article of a two-part series will discuss pediatric oral and pharyngeal swallowing disorders; how to locate a speech-language pathologist qualified to evaluate, treat, and participate in your life care plan; as well as the components of the plan that relate to swallowing disorders. The article also addresses therapeutic interventions and implications for the life care plan.*

Introduction

Feeding is central within the living experience of the young infant and it continues to be a major element of experience in the older infant and child (Groher, 1992). Although swallowing impairments can potentially affect both children and adults, swallowing problems in children can be especially life threatening. Children can experience growth and maturation changes contingent on swallowing functions, and a properly functioning feeding and swallowing mechanism is necessary for appropriate development and well being of infants and children. Individuals who do life care planning and/or case management for children with swallowing problems should understand how a normal swallow develops, the phases of a normal swallow, the steps of a swallowing assessment, and how to identify a speech-language pathologist (SLP) qualified to evaluate oral and pharyngeal swallowing problems to give accurate recommendations for future care needs.

Role of the Speech-Language Pathologist in Life Care Planning

The role of the life care planner in preparing a life care plan for infants and children with swallowing disorders or the potential for swallowing disorders is to assure the plans include services and items necessary to promote the highest quality of life possible for these individuals. The etiology and treatment of swallowing disorders can be complex and confusing and

often go unidentified. Successful management of this disorder in a life care plan requires that the life care planner have a working knowledge of the disorder and the ability to identify when it is appropriate to bring in a SLP. The expectation for the SLP is to have a thorough knowledge and understanding of the anatomy and physiology, normal development, possible etiologies, proper assessment, and methods of treatment and management for swallowing disorders in infants and children. The life care planner and the SLP can recommend services that will benefit children with swallowing disorders and their families potentially throughout their lifetime.

Qualified SLPs diagnose and treat pediatric oral and pharyngeal dysphagia (ASHA, 2001); therefore, it is vitally important for life care planners to identify SLPs who understand and are competent in a variety of skills necessary to serve infants and children with swallowing difficulties. Groher (1992) states that first, the SLP must be capable of identifying infants at risk for dysphagia. According to Groher (1992), a second important skill is the ability to conduct and interpret oral-pharyngeal, respiratory, and feeding assessments. Third, the SLP should be able to conduct an instrument-based assessment of swallowing and provide therapeutic intervention strategies to address the swallowing disorder. Lastly, the SLP must provide education, counseling, and training to the individual and family members.

According to Groher (1992), the specific role of the SLP includes:

1. Taking a careful history of the child's medical history, development, and symptoms,
2. Looking at the strength and movement of the muscles involved in swallowing,
3. Observing feeding to see if the child's posture, behavior, and oral movements during eating and drinking are affecting swallowing,
4. Performing special tests to evaluate swallowing,
5. Prescribing exercises for strength, sensation, and coordination of muscles involved in feeding and swallowing and,
6. Recommending special foods, equipment, or techniques to improve feeding and swallowing.

Embryological and Fetal Development of Feeding and Swallowing

For the reader who may need a refresher in the anatomy and physiology of normal swallowing, several paragraphs detailing embryo and fetal development, anatomy and physiology, and normal swallowing development are provided is this article. Swallowing disorders, referred to in the professional clinical and research literature as oral and pharyngeal dysphagia, can occur at different stages in the swallowing process. The stages of normal swallowing are:

1. Oral stage
2. Pharyngeal stage
3. Esophageal stage

The oral stage is the sucking, chewing, and moving of food or liquid into the throat. The

pharyngeal stage triggers the swallow reflex, squeezing food down the throat, and closing off the airway to prevent food or liquid from entering the airway (aspiration) or to prevent choking. During the esophageal stage, relaxing and tightening the openings at the top and bottom of the feeding tube in the throat (esophagus) and squeezing food through the esophagus into the stomach occurs.

According to Hall (2001), Logemann (1998), and Groher (1992), the structures and functioning of the feeding and swallowing mechanism begin forming during the embryonic and fetal development stages. The respiratory system is continuously developing alongside these other functions. The following table summarizes the feeding and swallowing prenatal stages of development according to these recognized authorities in the area of dysphagia.

Table 1. Feeding and Swallowing Stages of Prenatal Development

Week 3 to week 8 following fertilization	Embryo, consisting of three germ layers, develops all major systems with all body structures and tissue formed. The six bronchial arches that give rise to muscles, nerves, and bones later used for speech and swallowing develop. Laryngotracheal tube develops and separates to form the larynx, trachea, lungs, and esophagus.
Week 5	Arytenoids and epiglottis begin to develop.
Week 6	Fusion of maxillary and medial nasal processes begins, which form the primary palate separating the oral and nasal cavities.
Week 7 and 8	Tongue begins to develop.
Week 12	Hard and soft palate are fused at midline. If malformation occurs during this critical period, the child could have defects of the head and/or neck, resulting in speech and swallowing deficits.
Week 13 to week 16	Pharyngeal swallow begins.
Week 17 to week 20	Pharyngeal swallow strengthens, fetus begins to swallow, and digest up to about 50% of the amniotic fluid, and sucking begins.
Week 18 to week 24	A true suckling response begins.
Week 26 to week 29	Lungs become capable of breathing air and central nervous system begins to improve rhythmic breathing.

Table 1 Cont'd

Week 30 to week 33	Fetus is still unable to coordinate the suck, swallow, and breathing pattern.
Week 34	Coordination of suck, swallow, and breathing pattern should be adequate for oral feeding.

Anatomy of Swallowing Mechanism

Frequently, oral and pharyngeal swallowing disorders go undiagnosed because of lack of understanding about the etiology of the disorder or potential underlying risk factors. This could have great implications for the life care planner working with a child with swallowing problems. For this reason, the author believes that understanding the anatomy and physiology of the swallowing mechanism is extremely important to assure that correct assessment and treatment can be implemented (Higdon, 2004). The following discussion will help all readers review the necessary anatomy and the physiology process necessary of a normal swallow.

The nasal cavity, oral cavity, pharynx, larynx, and esophagus form the upper aerodigestive tract and the lower airways are comprised of the trachea, bronchi, and pulmonary parenchyma. The primary functions of the nose are to warm, filter, and humidify air as it enters the nasal airway. The oral cavity includes the lips, tongue, mandible, maxilla, cheeks, hard palate, and soft palate. Older infants and children also have teeth for mastication (i.e., chewing). Structures of the oral cavity are used for bolus preparation and the cheeks are important for sucking. Defects to any of these structures could lead to difficulties in sucking and swallowing (Arvedson & Brodsky, 2002).

The pharynx contains the nasopharynx, oropharynx, and the hypopharynx. The nasopharynx and hypopharynx of infants blend together forming one structure and there is no true oropharynx such as is found in older children and adults. As the infant grows and develops, two anatomical changes occur. The angle of the nasopharynx at the skull base becomes more acute and approaches 90 degrees. Also, the pharynx elongates so that an oropharynx is created. The vertical extension of the space in this area allows for development of human speech. The elongation does, on the other hand, propose a challenge for simultaneous breathing and swallowing since these processes share the same passageways. Three pair of muscles in the walls of the pharynx include the superior, medial, and inferior constrictors. These muscles are involved in the process of swallowing (Arvedson & Brodsky, 2002).

The larynx consists of cartilages, muscles, and ligaments. It is a complex structure. The primary functions of the larynx are protection, respiration, and phonation. The cartilages of the larynx are the epiglottis, thyroid, cricoid, arytenoid, cuneiform, and corniculate. The false and true vocal folds in the larynx are intrinsic muscles. The epiglottis, arytenoids, and vocal folds help to protect against aspiration (Arvedson & Brodsky, 2002).

The esophagus is a mucous-lined muscular tube that forces food down from the hypopharynx to the stomach. The primary muscle of the Upper Esophageal Sphincter (UES) is the cricopharyngeus. It is the junction separating the hypopharynx and the esophagus (Arvedson & Brodsky, 2002).

Development of Normal Feeding and Swallowing

When an infant is born with appropriate and intact anatomy and neurological function, he or she will usually become an efficient feeder. The oral and pharyngeal cavities of the newborn infant are smaller with fat pads in the cheeks. The tongue fills most of the space in the oral cavity creating a specific design to hold a nipple in place for feeding. Due to the elevation of the larynx and pharynx in the neck, it is difficult but not impossible for aspiration to occur. As the child ages, the structures for swallowing shift back and downward (Hall, 2001).

Infants use a process during feeding known as the suck, swallow, and breathe pattern. All three of these processes are complex within themselves; however, in order to have a successful feeding experience, the infant must coordinate these functions to work smoothly and effectively together (Glass & Wolf, 1992).

Fluid expression from the nipple is also accomplished through the creation of negative pressure in the oral cavity. Here, the lip seal around the nipple completely closes the oral cavity. When the tongue and mandible drop, this increases the size of the oral cavity and, subsequently, creates a pressure deferential between the positive pressure in the bottle and the negative pressure to the oral cavity. The liquid is sucked from the nipple into the mouth.

Hall (2001) also explains that nipple feeding of the infant progresses from suckling to sucking, which can be characterized by tongue movement and the amount of lip closure around the nipple. The compression and nipple changes draw liquid from the nipple. By six months of age, the infant has more stable head, neck, and trunk control which can increase intra oral space and tongue mobility. During this time, the progression from suckling to sucking should be observed due to the expansion of intra oral space and increased tongue movement. True sucking patterns usually begin between six and nine months of age. Both nutritive (sucking to bring in nutrition) and nonnutritive sucking/suckling (sucking a pacifier or empty nipple) are important for oral motor experience and for oral sensorimotor development. Nonnutritive sucking (NNS) occurs at a more rapid pace than nutritive sucking (NS). Nonnutritive sucking is two (2) sucks per second and nutritive sucking is one (1) suck per second. The coordination of respiration after each NS is the cause of the slower rate. There is a rhythmic pattern in NS and NNS called "bursts." The infant sucks 6 to 8 times before swallowing in NNS. Breathing is continuous and only interrupted by the swallowing. The NNS bursts increase with age. In the case of NS, there are about 20-30 cycles of suck-swallow-breathe and then a period of about 5 seconds to pause for "catch-up" breathing. The type of nipple and flow rate impact the burst pattern. Most infants begin with a suck-swallow-breathe ratio of 1:1:1. However, as the infant matures, the ratio increases to 2:1:1. The most important issue is that the infant is able to form and maintain a rhythmic sucking pattern.

Physiology of Swallowing (Phases)

According to Logemann (1998), the act of swallowing is divided into four phases, three of which the SLP addresses in the swallowing assessment and therapy: the oral preparatory phase, the oral phase, the pharyngeal phase, and the esophageal phase. During the oral preparatory phase, the bolus (food or liquid) is manipulated in the mouth to form a consistency that is appropriate for swallowing. Once the bolus is placed in the mouth, a labial seal must be formed to prevent spills or leakage from the oral cavity. Nasal breathing is used during this time. The tongue forms a cup to hold the bolus in the oral cavity. If necessary, the tongue may sweep the bolus around in the oral cavity and the teeth may be used to chew the bolus.

Chewing of a bolus is known as mastication.

In the oral phase of swallowing, the tongue pushes the bolus posteriorly, toward the pharyngeal wall. The bolus is moved from the cupped tongue (dipper position), onto the tongue tip (tipper position) to prepare the food to be propelled toward the pharyngeal wall in order to trigger the pharyngeal swallow. During this time, the midline of the tongue squeezes the bolus against the hard palate as it moves it posteriorly. This phase of the swallow takes about 1 to 1.5 seconds to be accomplished (Logemann, 1998).

As the bolus moves toward the pharyngeal wall, receptors in the oropharynx and tongue are stimulated. This sends a message to the cortex and brainstem that this is a swallow stimulus. Then the pharyngeal swallow reflex is initiated. In all individuals, no matter what age, the pharyngeal swallow should be triggered by the time the bolus reaches the point where the mandible crosses the tongue base. Once the pharyngeal swallow is triggered, the velum retracts and elevates to close the velopharyngeal opening and the hyoid bone and larynx move anteriorly and elevate. Also at this time the vocal folds close, the arytenoids tilt anteriorly, and the epiglottis closes to prevent the bolus from entering the larynx. The cricopharyngeal sphincter or upper esophageal sphincter (UES) is the opening at the top of the esophagus. The tension in this sphincter is released. Then, when the larynx moves, an anterior superior motion begins to open the sphincter. The pressure of the bolus widens the opening as it passes through. Then the sphincter returns to a somewhat contracted state (Logemann, 1998).

The next step in the swallowing process is the esophageal phase. In this phase, the bolus is moved through the esophagus by a peristaltic wave. The gastroesophageal juncture or lower esophageal sphincter (LES) is the opening that allows the bolus to move from the esophagus into the stomach (Logemann, 1998).

Conditions Leading to Development of Feeding and Swallowing Problems: Medical Problems and Other Etiologies

There are numerous factors that can cause feeding and/or swallowing dysfunction in infants and children. Often infants will refuse or be unable to withstand oral feedings because of these conditions and the negative outcomes associated with the food intake (ASHA, 2004). The difficulties can range from oral motor impairments to gastrointestinal issues. A short list helpful for the life care planner includes:

- Nervous system disorders such as cerebral palsy, meningitis, and encephalopathy
- Prematurity and low birth weight
- Conditions of the airway
- Cleft lip or palate
- Gastrointestinal conditions
- Heart disease

Nervous system disorders or traumatic brain injuries (TBI) may have swallowing difficulties as a consequence. The specific characteristics vary depending on the location and severity of the injury as well as the stage of recovery. The swallowing problems that accompany this etiology may be due to reduced cognition, orientation, alertness, or muscle tone. Some characteristics of feeding and swallowing problems in this population are oral hypersensitivity, bite reflex, and absent or delayed pharyngeal swallow (Cherney, 1994).

Neuromuscular disease can also have effects on feeding and swallowing abilities of

infants and children. Such diseases as muscular dystrophy, myasthenia gravis, and cerebral palsy all have characteristics of swallowing difficulties. There are a variety of feeding and swallowing characteristics that accompany cerebral palsy such as lack of saliva control (drooling), difficulty with lip closure, difficulty forming a bolus of food, choking, chronic aspiration, and difficulty shifting food from the anterior to the posterior part of the mouth cavity. The type of muscle tone, the presence of primitive reflexes, and movement patterns can affect the swallowing (Cherney, 1994).

Tuchman and Walters (1994) explained that another factor that can lead to feeding and swallowing problems is prematurity. Since sucking does not develop until 30 to 34 weeks gestation, a premature infant may not have acquired these skills if he or she is born before this time. Another possible complication with this population is poor lung development and respiratory distress. Premature infants may also have difficulty coordinating sucking, swallowing, and breathing.

Another example would be infants with upper airway-foodway anomalies. These could include infants with nasal and sinus infections, septal deflections, tumors, hypopharyngeal stenosis, craniofacial syndromes, laryngeal stenosis and webs, or laryngeal paralysis. Also in this category would be infants with cleft lip and/or palate. When an infant has a cleft lip, he or she is unable to form an appropriate labial seal around a nipple. It also allows for spills and leakage of the liquid and also deters adequate air pressure required to produce a successful swallow. A cleft of the palate could allow liquid to pass into the nasal cavity (Tuchman & Walters, 1994).

Congenital defects of the larynx, trachea, or esophagus could also lead to feeding and swallowing problems in infants or children. This could include laryngo-tracheo-esophageal cleft, which is an opening from the trachea or larynx into the esophagus. Esophageal strictures and webs could pose cause difficulties as well (Tuchman & Walters, 1994). Neural control of the esophagus and the esophagogastric is incomplete in the infant and young child, permitting reflux of gastric contents into the esophagus (Groher, 1992). Although pain initiated or exacerbated by swallowing would strongly implicate the esophagus as the site or origin, a clear relationship to eating is often absent. Similarly, the presence of other symptoms implicating the swallowing mechanism would support the possibility that the esophagus is the cause of the chest pain. A cardiology evaluation may be justified (Groher, 1992). And vice versa, if there is a history of cardiac problems, an assessment for dysphagia should be completed. The complicating factors in infants and children is that most of them are not going to be able to indicate either the pain or swallowing difficulties, again, because most of the time this is not connected to an inability to eat.

It is extremely important for the SLP working with the life care planner to know and understand the etiology of swallowing difficulties before appropriate goals and recommendations toward remediation can be made. Signs and symptoms of feeding and swallowing problems in very young children may include arching or stiffening of the body during feeding, irritability or lack of alertness during feeding, failure to accept different textures of food, and prolonged feeding times (more than 30 minutes). General signs may include excessive drooling or leaking food/liquid from the mouth; gurgly, hoarse, or breathy voice quality; coughing or gagging during meals; recurring pneumonia or respiratory infections; difficulty coordinating breathing with eating or drinking; frequent spitting up; and less than normal weight gain or growth. As a result, children may have dehydration or poor nutrition, risk of aspiration pneumonia or repeated upper respiratory infections that can lead to chronic lung disease, and embarrassment or isolation in social situations involving eating. The embarrassment or isola-

tion occur because of excessive drooling or food leaking from the nasal cavity or mouth, as well as from the excessive coughing, gagging and spitting up during meals (ASHA, 2002).

Feeding and Swallowing Assessment

A thorough feeding and swallowing assessment by a qualified SLP is mandatory in order to determine specific issues that need to be addressed for future care consideration, such as treatment and/or preparation for non-oral feedings (Groher, 1992). This is true whether the infant is a preterm feeding-impaired infant or a school-age child with a swallowing disorder. The assessment may also help to identify possible etiologies causing the dysphagia. The SLP should be able to establish a baseline, form a hypothesis about the severity, and introduce possible therapeutic modifications for the child over his/her lifetime. Other important facts that the assessment could provide are feeding options that are safe for the child, whether or not instrumental assessment is warranted, and readiness of the individual to participate.

For life care planners or case managers who may be unfamiliar with a feeding and swallowing assessment, there are specific steps that should be taken by the SLP. The first step is to review the child's chart and other reports that may provide needed information. The life care planner or case manager typically is in the best position to provide copies of relevant records when coordinating the assessment. During this step, the SLP should also obtain a medical and family history from the life care planner and caregiver, determine the concerns or issues, and observe the child. While observing, the SLP should note posture and position, state of alertness, airway status, neurodevelopment, communication, oral sensorimotor status, sensory awareness of body, and cognitive level.

The life care planner or case manager may find the information in Checklist 1 helpful in knowing the types of questions that could be asked by the SLP during the initial intake of information. The information also may be helpful when referring to a SLP for an oral and pharyngeal dysphagia assessment as well as an overall communication disorders assessment. Careful and complete notes should be taken on the answers to each question since each question has direct implications in the triage of the swallowing assessment (Higdon, 2004).

Checklist 1. Questions That Could Be Asked During the Dysphagia History Intake

1. Is the child dependent on others for feeding or is there some independent feeding, if the child is developmentally and cognitively able to self-feed.
2. Is the child a total oral feeder? (Readers should remember that feeding and eating may be and frequently are completely separated from whether a swallowing disorder is present. The purpose of this question is to understand if any nourishment is furnished by alternate feeding tubes.)
3. Does the feeding problem vary by texture, taste, temperature, or type of food?
4. Is the feeding problem worse at the beginning, middle, or end of a meal?
5. Does the child's feeding performance vary by time of day or with different feeders?
6. What is the child's body position during mealtimes? How does it vary?

7. Does the child show any indication of difficulty breathing while eating? Are there any other obvious risks for aspiration?
8. Does the child have emesis (vomiting)? If yes, when and how much?
9. Does the child refuse food? If yes, under what circumstances? (Children with swallowing disorders will refuse certain textures or consistencies of food, such as breads and muffins, because of sensory issues and/or the inability to physically swallow those foods.)
10. Does the child get irritable during feeds? Or sleepy or lethargic?
11. How long does the child take for most meals?
12. How do the child and caregiver interact? Any forced feeding?

Checklist 1 adapted from Higdon, C.W. (2004), p. 239

Continuing the general steps that should be performed by a SLP during a feeding and swallowing assessment, the second step is to determine if the child has normal respiration patterns. If the child has respiratory problems, then a trained professional, such as a physician or respiratory therapist, should complete further airway assessment. If the airway is clear and normal, then the SLP may proceed to the clinical feeding and swallowing assessment.

The assessment should be completed in an environment that is optimal for the infant or child, either in the child's home, preschool, or school if conducive for the assessment. It is suggested that there are a variety of tools on hand during the assessment, including a special feeding spoon, sippy cup, cut-out cup, regular cup, bowls, plates, straws, various nipples, NUK brushes, bottles, a pen light, towels, and bibs. Presentation of food begins with a latex spoon or NUK brush unless the parents report a more familiar utensil. The consistencies of the food needed and the type of tool used depend on the specific conditions and age of the child. For example, using a metal spoon could cause a bite reflex. If there is no evidence of a bite reflex, then the SLP may choose to switch to a plastic or metal spoon (Cherney, 1994).

In an infant assessment, observation of the infant feeding for about 15 to 20 minutes is helpful because there are some infants who can coordinate suck-swallow-breathe for a few minutes but then can not maintain it. The SLP watches for increased cardiac or respiratory rate, gagging, spitting, tongue thrusting, withdrawing, arching of back or neck, and falling asleep as well as observing lip closure, tongue action, cheek posture, and laryngeal movement. If there is suspicion of aspiration, then an instrumental assessment, such as videofluoroscopy (VFS) or flexible endoscopic (FEES) is warranted. However, if there is no suspicion of aspiration, then the third step in the clinical assessment of feeding and swallowing is to develop an oral-sensorimotor plan in the context of the child's global needs. As the assessment plan is carried out, the infant should be monitored and the plan altered as necessary, due to fatigue, fussiness, respiratory problems, etc.

Radiographic Assessment of Dysphasia as Part of Life Care Planning

A radiographic examination provides a motion x-ray of the swallow. There are several titles for this procedure, including VFS, modified barium swallow (MBS), and oral pharyngeal motility study (OPMS). During this assessment, the child is presented with barium of varying consistencies (e.g., thin liquids, thick pudding) and sometimes foods coated with barium such as crackers or cookies, depending on the age of the child. The child swallows the barium while

being x-rayed as the SLP observes the progression of the barium through the oral and pharyngeal cavities and into the esophagus. The test provides valuable diagnostic information by allowing the SLP to determine whether the child is aspirating or penetrating the airway, and, if he or she is, specifically identifying the site of aspiration or penetration, its cause, and strategies that will maximize swallowing safety for the child (e.g., body and head positioning, food texture, and amount and rate of food presentation). Although the examination is administered by a radiologist, the SLP should make explicit requests about positioning, food consistencies, and compensatory strategies (e.g., modify head position, amount of food, etc.) that need to be assessed by the study. The SLP is always present during the radiographic examination to maximize the diagnostic benefits, to determine trial therapy techniques that are applied during the diagnostics, and to determine the future treatment or management techniques that will be needed (ASHA, 2002).

Treatment of Mechanical Swallowing Disorders in Infants and Children

Dikeman and Kazandjian (1995) explain that one other consideration in the area of dysphagia is the assessment of a child with a tracheostomy. Discussion of dysphagia with this population really warrants a completely separate paper; however, some general comments will be made so that the reader may identify the potential difficulties with this population. The presence of a tracheostomy changes the pharyngeal pressures that contribute to a functional swallow. Also, the actual hardware can obscure a child's ability to swallow normally and safely. Due to the complicating factors related to the tracheostomy, it is critical that the child's physician and respiratory therapist be consulted prior to administering the swallowing assessment. It is also helpful to have the respiratory therapist present during portions of the assessment to monitor ventilation status, assist with cuff deflation and inflation (if the child is old enough to have a cuffed tracheostomy tube), and if suction is needed.

When dysphagia is present, swallowed contents do not traverse the normal route of deglutition in a timely fashion. Rather one or more of the following events occur: drooling, nasal re-gurgitation, aspiration, esophageal regurgitation or reflux, or the swallowed contents remain as residual that eventually may follow four alternative routes. These routes include anteriorly past the lips, into the nasal cavity, into the airway, or from the esophagus or stomach into the mouth or pharynx. Dysphagia, therefore, is not a disease, but a sign or symptom of another underlying disease or disorder that may be debilitating or life-threatening (ASHA, 2002). The problems associated with mechanical dysphagia are multi-faceted and allow an array of management possibilities. Consequently, determining the optimal plan can be challenging. Additional concerns with children include positioning of the body and head, feeding devices such as glossectomy feeding spoons, the correct use of feeding syringes when needed, the use of nasogastric feeding tubes, and the correct type and size of tracheostoma tubes to maximize any oral feeding including the types of one-way speech valves that might be used to maximize air pressures.

Answers to the following questions generally are helpful to the SLP in determining potential future care expectations that can be considered for future care planning:

1. Why is the child tracheostomized?
2. How long has the tracheostomy been in place?
3. What kind of tracheostomy tube is present? What size? Is it cuffed? Is it fen-

estrated (a hole in the tube to allow air to pass into the larynx)?

4. What stage, if any, of weaning is the child in?
5. Is future weaning an option? When?
6. What is the child's medical status?
7. Can the child tolerate occlusion of the tracheostomy tube with a finger or a one-way speech valve such as the Passy-Muir valve?

Adapted from Higdon, C.W. (2004), p. 241

Intervention and Management

Management of feeding and swallowing problems for infants and children is based on adequate nutrition and gastrointestinal function, stable pulmonary function, and developmentally appropriate oral sensorimotor and feeding skills (Arvedson & Brodsky, 2002), focused on three universally accepted goals for the treatment of all types of dysphagia. These include (1) identification of the individual who may be at risk for aspiration, (2) prevention of aspiration, and (3) prevention of malnutrition. There are numerous direct and indirect intervention strategies to management of infant and children feeding and swallowing problems that can be incorporated into the life care plan.

Direct Interventions:

- Oral exercises help to stimulate structures for function and encourage mouth exploration. However, this technique could be too invasive and may be aversive to the child which could, in turn, increase the child's secretions.
- Sensorimotor activities through play therapy to introduce different textures to the oral cavity.
- Present controlled quantities of food and/or liquid.
- Instruction of compensatory strategies to be incorporated into mealtime, such as the use of special feeding utensils, straws, and placement of food in oral cavity.
- Placement of speaking valves during play activities and during therapeutic eating.

Indirect Interventions:

- Alterations in the environment to reduce distractions and improve the infant's or child's ability to focus on the feeding. However, this technique may limit his/her social interactions.
- Change in positioning and seating to provide better support for feeding and improve trunk and head control.
- Use of communication signals to include touch and verbal cueing for children who are visually impaired and touch and visual cueing for children who are hearing impaired.
- Altering food textures, taste, and temperature.
- Change in timing intervals for food presentation or varying size of bolus can also improve oral sensorimotor function (Arvedson & Brodsky, 2002).

There are many other possible feeding and swallowing problems and numerous compensatory strategies and facilitative techniques specific to those dilemmas that can be considered for future care planning. If the child is experiencing a suck(le) lag, then he or she may benefit from receiving jaw support or verbal cueing, such as counting during the swallow process.

When the infant has anterior loss of food from the mouth, then jaw tapping and external lip or jaw support could be helpful. If a bite reflex, defined by Groher (1992) as a reflex often in individuals with severe neurological lesions elicited by touching the lips, teeth, or gums with a strong closure of the jaw as the reaction, is present, applying firm pressure to the face, cheeks, and gums or providing sensory stimulation to these areas may reduce the reflex. Thermal stimulation, or stimulation at the anterior facial arches prior to swallowing to improve the total oral transit time (Logemann, 1998), or reducing the flow rate may help if the child is experiencing a delay in triggering the swallowing response. When aspiration is noted during the swallow, the feeding position may need to be altered to more of a chin-down position. However, when aspiration is occurring after the swallow, pacing and allowing time for dry swallows in between may clear away the residue that is later being aspirated. These techniques can be extremely beneficial for infants and children who demonstrate feeding and swallowing deficits (Hall, 2001).

Locating a Qualified SLP to Evaluate and Treat Oral and Pharyngeal Swallowing Disorders

Identification of a qualified speech-language pathologist SLP to assess swallowing disorders begins with locating an individual who holds a master's degree or doctoral degree in speech-language pathology, the Certificate of Clinical Competence (CCC) from the American Speech-Language and Hearing Association (ASHA) and state licensure, in states where licensure is required. At the time of this writing, forty seven (47) states require licensure for SLPs to practice. ASHA has ProSearch, an online directory of more than 5,000 programs that employ SLPs (and audiologists) who hold the CCC from ASHA. The ASHA website is http://www.asha.org. This is a searchable data base for consumers to locate individuals in their specific geographic area. SLPs voluntarily sign up to be listed in this data base so not every qualified SLP may be listed. An additional website that life care planners may find useful is the Dysphagia Resource Center (http://www.dysphagia.com). Beyond the formal qualifications, it is up to the life care planner or case manager to ask questions to further determine if the SLP's experience and training fits the planner or case manager's needs, and ultimately the child's needs. The questions below may be helpful to ask SLPs to determine if the SLP is qualified and correctly matched to the case:

1. An explanation of the SLP's credentials.
2. A discussion of the types and numbers of swallowing disorders the person may have had an opportunity to assess. It is wise to note at this point, that although some SLPs with doctorates may be presumed to have the best training or experience, many times these SLPs have held administrative or academic positions without much clinical experience. The master's level SLP with a special interest in swallowing disorders may have completed many assessments of complex etiologies. So, the experience is essential in identifying the correct SLP.

3. An understanding of behavioral assessment techniques as well as instrumental assessment techniques.
4. An understanding of team assessments, as well as an understanding of life care planning. Again, note that many SLPs do not have knowledge or an understanding of the area of life care planning or case management. However, the person will have an understanding of medical and educational team models and will be willing and able to furnish the needed information.

What to Include in a Life Care Plan for Oral and Pharyngeal Swallowing Disorders

In a pediatric life care plan, the following information should be included for an infant or child with a swallowing disorder or the potential for a swallowing disorder during his or her lifespan. Children with feeding and swallowing problems are at a high risk for health-related complications (Higdon, 2004), and potential complications should also be considered in the life care plan.

1. Referral to a qualified SLP for a complete oral and pharyngeal assessment. Include time for intake information and review of clinical records, face to face assessment of the child as well as meeting with the caregivers, instrumental assessment, interpretation of results, and recommendations for treatment, follow-up, and family and caregiver education as well as discussion with physician and other team members.
2. Referral to a qualified SLP for a complete treatment plan, following swallowing diagnoses, with the appropriate time and resources to complete the treatment plan.
3. Instrumental assessments may include:
    a. Referral to radiologist to participate in specific instrumentation assessment, if needed. (Radiologist is needed if radiographic studies will be completed). Cost of this testing varies according to the geographic region and the type of testing.
    b. Referral to an otolaryngologist to participate in specific instrumentation assessment, if needed. (Otolaryngologist is needed if fiberendoscopic (FEES) assessment is to be completed. In some states, SLPs do the FEES testing, and otolaryngologists interpret the medical results of the FEES.). Cost of this testing varies according to the geographic region and the type of testing.
    c. Referral to appropriate facility for the radiographic study, such as the modified barium swallow study. Facility costs will be separate from physician or technician costs as well as diagnostic study costs.
    d. If there is an existing swallowing disorder, the instrumentation assessment should be repeated on a biannual or annual basis, depending on recommendations of the SLP. That will also include reassessment from the physicians. Typically, if the treatment plan is in effect, SLPs and respiratory therapists will be included under the daily, weekly, etc. treatment/therapy costs. In extreme situations, this author has recommended

repeated instrumentation studies on a quarterly basis; however, this is rare and should not be done on an ongoing basis.

4. Referral to a pulmonologist if there is evidence of respiratory problems.
5. Referral to a respiratory therapist if there is evidence of respiratory problems, tracheostomy, or etiologies with possible respiratory complications.
6. Referral to a gastroenterologist for assessment of gastroesophageal reflux, frequently present in children with swallowing disorders.
7. Include costs of oral feedings versus insertion of tubes and tube feedings, as well as feeding utensils. In these cases, consideration for offsets related to normal food and utensil costs should be given.
8. Typically, when a child has a swallowing disorder, he or she may have a communication disorder, requiring SLP assessment and intervention. This part of the process can be accomplished by the same qualified SLP but should be identified in the plan as a separate item with separate costs and frequencies. A SLP can and does complete a swallowing assessment without administering a communication disorders assessment and vice versa, and the life care planner should develop a separate recommendation for the communicative disorders assessment (speech-language pathology and audiology), if needed.

Summary and Conclusion

In summary, the following is a list of information extracted from this article that should be useful to life care planners who have a need for information on assessment of infant and childhood dysphagia. In preparing a life care plan for a child with a swallowing disorder, the life care planner should collaborate with a qualified SLP who will:

1. Gather information about the child's current status, by consulting with medical and rehabilitation team members, including family members, physicians, nurses, dieticians, and other therapists. This would include identifying the child's neurological and medical status and identifying the child's current feeding and nutritional status.
2. Be aware of dietary limitations such as food allergies, diabetes, etc.
3. Identify the child's cognitive status to determine how alert and able to follow commands the child is. Will the child be able to cooperate in therapy if treatment is indicated?
4. Assess the integrity of the oral mechanism through an oral-facial examination.
5. Determine if there are chewing difficulties or nasal regurgitation and assess velopharyngeal movement.
6. Conduct laryngeal assessment to determine if there is normal range of motion of the larynx, if the laryngeal reflex is slow during swallowing, and if the child can clear food out of the airway if aspiration does occur.
7. Present different textures and consistencies of food (liquid, puree, soft, and

regular) orally. The oral preparatory stage is assessed during this stage of the assessment.

8. Proceed with the radiographic examination (referred to as a videofluoroscopic evaluation, oral pharyngeal motility study/OPMS, or a modified barium swallow/MBS). This provides a motion x-ray of the swallow. During this assessment, the child is presented with barium of varying consistencies (thin, thick, pudding) and sometimes food coated with barium. The child swallows the barium while being x-rayed as the examiner observes the progression of the barium through the oral and pharyngeal cavities and into the esophagus. The test provides valuable diagnostic information by allowing the SLP to determine if the child is aspirating or penetrating the airway, and if he or she is, specifically identifying the site of aspiration or penetration, its cause, and strategies that will maximize swallowing safety for the client. The SLP gathers information on food consistencies, positioning, and compensatory strategies necessary in developing therapy and oral intake protocols.
9. If a tracheostomy is present, the pharyngeal pressures that contribute to a functional swallow will be changed. The actual tracheostomy tube can obscure the child's ability to swallow normally and safely. The respiratory therapist and the physician must be consulted prior to administering the swallowing assessment. Specific questions that the SLP should ask, related to the tracheostomy tube, include
    a. Why is the child tracheostomized?
    b. How long has the tracheostomy been in place?
    c. What type and size of tracheostomy tube is present?
    d. Has weaning been attempted?
    e. What is the child's medical status?
    f. Can the child tolerate occlusion of the tracheostomy tube with a finger or a one-way speech valve such as the Passy Muir valve or the Bivona one way speech valve?

In addition to these questions, the life care planner may want more information on the oral and pharyngeal swallowing of an individual. Additional testing such as fiberendoscopic evaluation (FEES) and/or fiberendoscopic sensory testing (FEEST) will be addressed in part two of this series, adult swallowing disorders.

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