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A Comparison of Neuromuscular Electrical Stimulation and Acupuncture in Reducing
Dysphagia in Individuals Who Suffered A Stroke

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Senior Inquiry – Research Essay; Fall 2016

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I dedicate this project to my Grandma Lue in hopes of improving the quality of life for stroke victims. Thank you for inspiring me in all I do. *9/28/1943-10/21/2016*

Introduction

Dysphagia is described as having difficulty swallowing or an uncomfortable swallow. The swallow is one of the most powerful processes of the human body because it is essential to receive the nutrients for survival. For most, swallowing is autonomic, but for those who have trouble swallowing, or dysphagia, swallowing is an everyday obstacle. Dysphagia is a secondary disorder so it is a symptom of another disease or neurological disorder such as Parkinson's Disease, brain injury, Alzheimer's disease, and more with stroke as the leading cause of dysphagia.

There are many components that contribute to an effective swallow. The larynx, where the swallow takes place, is comprised of the epiglottis, hyoid bone, thyroid cartilage, cricoid cartilage, corniculate cartilage, cuneiform cartilage, and arytenoid cartilages along with the vocal folds, other muscles and attachments that activate and essentially perform the swallow. The epiglottis provides structure to the larynx. The hyoid bone is the only floating bone in the body, meaning it has bony attachments. The thyroid cartilage lies in front of and protects the vocal folds because the vocal folds are made up of layers of membranous tissue. The cricoid cartilages are posterior to the vocal folds and hold the tissue in place and are also responsible for vocal fold movement. The arytenoid cartilages serve as an attachment for the vocal folds. Corniculate and cuneiform cartilages pair as components of the arytenoid cartilages. Lastly, the muscular attachments are responsible for the movement of all these cartilages and bone. Some muscles involved in an effective swallow include: cricothyroid, cricoarytenoid, thyroarytenoid, and infrahyoid muscles. Not only do these provide movement, but they also hold the structures of the larynx in place.

Additionally, the larynx uses all of these muscles and cartilaginous structures to execute an effective swallow, but swallowing is not the only purpose of the larynx. It also provides voice and respiration with the latter being the number one purpose of the larynx. The respiration function of the larynx is important because an effective swallow will separate these two functions (swallowing and respiration) to ensure that food and drink are not aspirated (entering the trachea) or penetrated (entering the laryngeal cavity but not past the vocal folds). During respiration, the trachea is the pathway; the vocal folds are abducted or open, meaning that there is a direct pathway to the lungs. Aspiration is when a substance is intended to enter the esophagus and enters the trachea instead. Aspiration is a sign of a dysfunctional swallow; it is uncomfortable and can lead to pneumonia. During an effective swallow, the epiglottis prevents aspiration by covering the laryngeal area and then the vocal folds adduct, meaning close, the trachea to keep out food meant to travel down the esophagus. Once this has been done to prepare for the swallow, the hyoid muscles pull the larynx anteriorly to help create a larger opening for the bolus, a round mass of chewed food created by the tongue, to be accepted by the opening of the esophagus. Some anatomical abnormalities that may lead to dysphagia include cleft palate, shorted or misshapen epiglottis, and in the case of many neurological disorders including muscle weakness.

In addition, common symptoms that are associated with dysphagia include aspiration and penetration, painful swallow, drooling, unintentional weight loss, gastro esophageal reflux disease (GERD), coughing or choking after meals, hoarse or raspy voice, recurrent pneumonia (due to aspiration and penetration) and/or the feeling of having food, “stuck,” behind the sternum.

With dysphagia secondary to another condition, the most common incident that leads to dysphagia is stroke. Each year, 795,000 Americans suffer from stroke (Internet stroke center, 1997-2016). Stroke often leads to hemiparesis where one side of the body (i.e., the opposite side of the damaged hemisphere) loses control and feeling. With only half of the muscles functioning to produce an effective swallow, there are challenges because only half of the laryngeal muscles play an active role in hemiparesis. In the same way that the brain affects swallowing in individuals who have suffered a stroke, brain damage following a traumatic brain injury can also negatively impact swallowing. In America, 1.7 million people sustain a traumatic brain injury annually (U.S. Department of Human Services, 2002-2006).

Regarding treatments, the most common way to reduce dysphagia in individuals who have suffered a stroke is through traditional dysphagia treatment (TDT). TDT is a proven method and is widely used by speech-language pathologists and medical teams for improving swallowing ability in patients suffering from dysphagia. TDT typically includes directed use of swallowing mechanisms (e.g., lips, tongue, cheek) and strategies such as dry swallow, forced swallow, exercise-based treatments, postural adjustment and more.

Another dysphagia treatment with less popularity in the western world is acupuncture. Acupuncture for swallowing uses acupoints in the tongue, scalp, and body. Acupuncture is an ancient Chinese medicine used primarily to reduce pain and promote self-healing. Insertion of the needle causes blood to rise to the area where the needle is inserted. That oxygenate blood then heals the affected muscle. Despite this treatment being uncommon in the western world, recent studies have shown progress in the research of this method, especially in Asian cultures. Acupoints used in this therapy include sites on the inferior spinous processes on vertebrae C1 (cervical vertebra) to L5 (lumbar vertebra) as well as cranial scalp sites and infralingual sites.

Lastly, neuromuscular electrical stimulation (NMES) has been used to treat dysphagia in individuals who have suffered from a stroke. NMES sends electrical pulses through the areas affected by the hemiparesis following stroke. The electrical pulses then contract the muscles by stimulation. The electrical pulses are administered through electrodes that are placed on the surface level of the skin over chosen muscles.

In dysphagia treatment, though speech-language pathologists (SLPs) are the primary professionals engaging with patients suffering from dysphagia, SLPs collaborate with other medical team members to develop and execute the intervention plans. Healthcare professionals often included on the medical team are physicians, otolaryngologists, physical therapists, occupational therapists, and nursing staff. This multidisciplinary approach is the most beneficial for the progress of the individual because they are receiving cohesive therapy from each professional. It is important that dysphagia therapy is administered with the input of other professionals because there may be other health risks in other areas of expertise that are important to take into consideration when creating dysphagia goals and overall goals for the patient across multiple disciplines.

This paper will evaluate and compare the effectiveness of TDT to acupuncture, and TDT to TDT and NMES as well as examine the speech-language pathologist's role in dysphagia treatment in individuals who have suffered a stroke. The following research questions will be discussed:

1. How does NMES compare to traditional dysphagia therapy in reducing dysphagia in individuals who have suffered a stroke?
2. How effective and safe is acupuncture in reducing dysphagia in individuals who have suffered a stroke?

3. What is the speech-language pathologist's role in providing treatment for dysphagia in individuals who have suffered a stroke?

Summary of Findings

The Effectiveness of NMES

In general, neurological muscular electrical stimulation (NMES) is used to stimulate, contract, and strengthen paralyzed muscles and prevent muscle disuse atrophy. Electrical stimulation strengthens the muscle more than simply performing physical exercise. This is especially helpful in the treatment of dysphagia because strengthening laryngeal muscles using exercise presents several challenges. The laryngeal muscles are very small and overlap which is an obstacle when strengthening them. Another active approach is that of traditional dysphagia therapy (TDT) that works to improve the swallow contrasted to the passive approach where the diet is modified. TDT may include thermal-tactile therapy, effortful swallow, muscle strengthening, direct teaching and more. These tactics have been proven to be a safe and effective way to strengthen laryngeal muscles in post-stroke treatment, however, neurological muscular stimulation (NMES) may further accelerate the healing process.

Neuromuscular electrical stimulation (NMES) is used for the stimulation of various muscles outside the larynx in the result of a variety of events aside from stroke. Specifically to swallowing, as earlier mentioned, dysphagia is not a disorder in itself, but rather a symptom of another disorder and the leading cause of dysphagia is stroke. Hemiparesis, muscle weakness of the opposite side of the body that the stroke occurs, is a common side effect of stroke. Hemiparesis, or muscle weakness, is present in the laryngeal muscles that leads to dysphagia. Only half of the muscles participate fully in the swallow causing insufficient closure of the larynx, specifically, the upper esophageal sphincter. This lack of closure of the larynx leads to dysphagia. For NMES to be administered, electrodes are placed on the surface level of the skin over the paralyzed muscle group. In the majority of cases, NMES is used in conjunction with

traditional dysphagia therapy (TDT) (Poorjavad M., Moghadam, S, T., Ansari, N, N., & Daemi M. 2014; Scutt, P., Lee, H. S., Hamdy, S., & Bath, P. M., 2015; Lee K. W., Kim S. B., Lee J. H., Lee S. L., Ri J. W., & Park J. G., 2016). However, one study evaluated NMES as a treatment for dysphagia separately (Chen Y. W., Chang K. H., Chen H. C., Liang W. M., Wang Y. H., & Lin Y. N., 2016). Based on these studies, there were several important findings relevant to the differences in the placement of the electrodes, strength of electrical stimulation, along with treating acute or sub-acute stroke that will be discussed here.

Electrode Location. During NMES, electrodes are placed on the surface of the skin over the muscle group that is experiencing weakness. Electrode placement can be challenging due to the overlapping of laryngeal muscles and muscle size. Most muscles that aid in swallowing (i.e., sternohyoid, sternothyroid, omohyoid) depress the larynx. Stimulating (or contracting) these paralyzed muscles by placing electrodes on or around the thyroid cartilage will depress the larynx and fight displaced muscles, leading to a more effective swallow. It is important for the stimulation to take place during the swallow rather than while the muscle is at rest (Poorjavad et al., 2014).

On the other hand, this placement for contraction of inferior muscles may be dangerous during a swallow because it could lead to aspiration or penetration (Poorjavad et al., 2014). Studies have compared placements of electrodes and their effectiveness on reducing dysphagia in individuals who suffered a stroke. It was found that the placement of electrodes was not significant when the intensity of stimulation was adjusted (Poorjavad et al., 2014). Furthering this statement, there is no significant difference in placement of electrode stimulation in the progress of the patient.

This study demonstrates that placement of the electrode is not significant in reducing dysphagia but placement can be important for the safety of the patient (Poorjavad et al., 2014). Placement below the thyroid cartilage could lead to aspiration or penetration. Because there is no significance to having the electrodes in this placement, it is best to use superior placement for the safety of the patient.

With there being no significant difference in electrode location, it is best to locate the electrode on the suprahyoid muscles in an effort to be more conservative when addressing safety. Infrahyoid muscles could be potentially dangerous to activate with NMES during a swallow as this could lead to aspiration and penetration (Poorjavad et al., 2014). It is important to reduce the number of risks for the well-being of the individual, therefore, the placement of electrodes in NMES treatment should be on the suprahyoid muscles as that present fewer risks for penetration and aspiration.

Level of Intensity. The threshold for the level of intensity of the electrical stimulation was typically the pain threshold for each individual (Lee et al., 2016). Other levels include increasing stimulation intensity until the muscles of the larynx contract or until the individual feels a tingling sensation (Poorjavad et al., 2016). One study started at 3 mA and then intensified slowly by 1 mA until the threshold was reached (Lee et al., 2016). Other studies did not address significance in that electrical stimulation was administered (Scutt et al., 2015; Chen et al., 2016).

In the study by Lee et al. (2016), 56 participants were recruited who had no prior swallowing disorders prior to the onset of stroke. Individuals had to have had their stroke within 10 days and an ischemic stroke confirmed by magnetic resonance imaging (MRI). Thirty-one participants received both NMES and TDT and 26 participants received TDT only. Both groups received TDT for 60 minutes every day for 15 days. NMES took place for the first 30 minutes of

the TDT in the NMES/TDT group. The TDT/NMES group had two electrodes in the infrahyoid area in an effort to target sternohyoid muscles. Intensity was administered initially at 3mA and then increased 1mA until reaching the pain threshold for that individual. The results of the study were measured using the Functional Oral Intake Scale (FOIS) and videofluoroscopic scale (VFSS). After 12 weeks, the swallowing function of the NMES/TDT group FOIS intake increased from non-oral, limited diet and normal diet. On the VFSS scale, participants in the NMES/TDT group compared to the TDT group demonstrated a significant difference of $p=.049$. Overall, these measures show that early application of NMES was beneficial in reducing dysphagia compared to TDT alone.

Acute vs. Sub-acute. Strokes are classified as acute when they occur between one day and one week, whereas a sub-acute stroke occurs between one week and one month. Progress through dysphagia treatment is more successful in acute cases than sub-acute across several studies (Chen et al., 2016; Lee et al., 2016).

Chen et al. (2016) and Lee et al. (2016) showed that progress occurred for acute and subacute groups, but, in both instances, the acute group demonstrated a significant improvement in progress compared to the subacute group. Chen et al. (2016) found a significant SMD of 1.01 and 2.01 for acute/subacute, yet no significant difference between acute and subacute groups. Lee et al. (2016) found improved FOIS scores with administration of NMES 10 days after stroke whereas previous studies performed NMES three weeks after stroke.

These findings suggest that NMES is effective for both acute and sub-acute stroke, however, the timing of NMES therapy is critical. Those who experience a stroke resulting in dysphagia should receive NMES as soon as possible for the best results. If the treatment is received later, NMES continues to be helpful in reducing dysphagia, but to a lesser degree.

Positive similarities. All four of the studies concluded that NMES in conjunction with traditional dysphagia therapy (TDT) was more effective than TDT alone (Poorjavad et al., 2014; Scutt et al., 2015; Chen et al., 2016; Lee et al., 2016).

Two studies found that although NMES is effective in conjunction with TDT, it is not proven to be more effective than TDT as a separate treatment (Poorjavad et al., 2014; Chen et al., 2016).

Chen et al. (2016) completed a meta-analysis of X articles related to NMES and dysphagia in individuals who suffered a stroke. In the review, articles were tested for quality by using three criteria: a) random allocation, b) blinding procedure, and c) drop-out explanation. Data from each publication was extracted and standard data (age, stroke duration etc.) was recorded. Two groups were compared within the meta-analysis: TDT with NMES and NMES. Three studies compared the effectiveness NMES with TDT and TDT and two studies compared the effectiveness of NMES alone and TDT. Their findings suggested that NMES with TDT was more effective than TDT alone, however, there was not significant data to determine that NMES alone is more effective than TDT.

Summary. In conclusion, this review suggests that NMES in conjunction with TDT, is an effective therapy in reducing dysphagia for individuals who suffered a stroke. Not only is NMES effective in conjunction with TDT, but it was proven to be more effective than TDT alone (Poorjavad et al., 2014; Scutt et al., 2015; Chen et al., 2016; Lee et al., 2016). Future studies should continue to explore the ways to improve NMES therapy for individuals who have suffered a stroke through electrode placement and controlling the level of intensity. Furthermore, it was found that when using NMES, in conjunction with TDT, it is best to do early stimulation when possible. While both individuals who suffered stroke have an acute or sub-acute stroke

demonstrated significant progress, those with acute stroke demonstrated significant improvement compared to the sub-acute group. This is important in reducing dysphagia for individuals who suffered a stroke with NMES/TDT to ensure the best possible progress (Chen et al., 2016; Lee et al., 2016).

The Effectiveness and Safety of Acupuncture

Acupuncture is an alternative form of medicine originating in Asian cultures used to reduce pain and to activate muscles. Chinese Medicine (CM) uses a combination of scalp, body and Jaiji (vertebral) acupoints simultaneously to “wake the brain,” and increase, “qi,” or flow within the body. A stroke is blockage in the brain and acupuncture is thought to restore flow throughout the body. Acupuncture is said to resolve stasis and return (Mao L. Y., Li L. L., Mao Z. N., Han Y. P., Zhang X. L., Yao J. X., & Li M., 2016). In this case, stroke is literally a blockage in the brain and Chinese Medicine explains this as a disruption of “qi”, or life energy. In Chinese medicine, the goal is to regain “qi” using acupuncture. Acupuncture increases blood flow and surfaces oxygen to the muscles to aid in healing. Acupoints are points located on the body where needles are inserted. Different acupoints are used for different purposes with subsequent locations for certain muscles. Acupuncture is not only used as a therapy for dysphagia, but for other conditions such as chronic pain or a sore throat.

In Chinese Medicine (CM), stroke patients are divided into three syndrome patterns: phlegm and blood stasis obstructing collaterals pattern; qi deficiency and blood stasis pattern; and the Gan (Liver)-Sheng (Kidney) yin deficiency pattern. For each separate group, different acupoints are added to complement the different difficulties.

In this case, the use of acupuncture was implemented as a treatment for dysphagia in three out of four studies in conjunction with traditional dysphagia therapy (Mao et al., 2016; Xia

et al., 2016; Zhang et al., 2016). All four studies found that acupuncture, with or without traditional therapy, was effective in reducing dysphagia in individuals who had suffered a stroke compared to the control group (Cai et al., 2015; Mao et al., 2016; Xia et al., 2016; Zhang et al., 2016). The differences in methodologies across studies will be investigated further.

Location of Acupoints. There are over 2,000 acupoints on the human body. Regarding lingual acupoints, two out of four studies provided acupuncture intervention to the tongue (Cai et al., 2015; Zhang et al., 2016). Zhang et al. (2016) also administered acupuncture to the pharyngeal walls after lingual acupuncture. This specific type of acupuncture is called *Tongguan Liqiao*. *Tongguan Liqiao* incorporates the following acupoints; *Neiguan* (PC6), *Penzhong* (DU26), *Sanyinjiao* (SP6), *Fenchi* (GB20), *Wangu* (GB12), and *Yifeng* (SJ17). Needles are left in place for 30 minutes. In this study, participants range from ages 41 to 86 years old. Patients were recruited from the Inpatient Department of the First Teaching Hospital of Tianjin University of Traditional Chinese Medicine of China. Incidence and location of stroke was identified by diagnostic criteria and written informed consent. Participants were divided into three groups; infarctions of a) the medulla oblongata, b) the midbrain and pons, and c) the brainstem combined with basal ganglia and cortex. Participants received acupuncture therapy for 28 days (Zhang et al., 2016). There was no significant difference in scores between the three groups, however, there was a significant difference between the treatment and control groups. In sum, there is no significant difference in the effect of *Tongguan Liqiao* acupuncture of dysphagia in stroke patients depending on the area in that the stroke took place (Zhang et al., 2016). The placement of the stroke is of little significance, but there were significant findings that *Tongguan Liqiao* was a safe and effective therapy to reduce dysphagia in a variety of stroke patients.

Xia et al. (2016) administered acupuncture to the nape, tongue, and scalp. The idea behind the additional nape and scalp areas are to increase blood flow to the tongue and the head for the stroke and cerebral cortex. This study did not incorporate any lingual acupuncture, but rather acupuncture was provided to the scalp, body (various places such as above the large intestine, stomach, etc.) and Jaiji acupoints. Jaiji is applied to the spinous process of each vertebra (C1-T5; Mao et al., 2016). After methods were carried out, it was found that the acupuncture group score significantly lower on the SSA, showing that their dysphagia was significantly more reduced than the control group who was administered TDT alone.

In all studies, needles were sterilized in 70% ethanol alcohol. In all forms of body acupuncture, needles remained in the surface of the skin for 30 minutes and remain in the participant (Mao et al., 2016; Xia et al., 2016). For lingual acupuncture and acupuncture of the pharyngeal wall, a tactic was used where the needle is inserted rapidly, repeatedly with just a small portion of the needle entering the skin also known as, “bird pecking.” This method was continued until the individual’s eyes watered. Needles are then twisted after insertion (Cai et al., 2015; Zhang et al., 2016).

Cai et al., (2015) observed individuals ages 50 to 60 years old. All of that demonstrated stable vital signs and dysphagia *confirme Juanquand* (EX-HN10) and *Haiquan* (EX-HN11). Those in the body acupuncture group received acupuncture on acupoints *Fenchi* (GB20) and *Neiguan* (PC6) by the VFSS. Individuals were divided into two groups; those who received tongue acupuncture and those who received conventional acupuncture to the X (parts of body). It was found that the acupuncture group had a significantly lower NIHSS score than the traditional therapy group. This suggests that this acupuncture was an effective therapy to reduce dysphagia and may be beneficial in the future of stroke rehabilitation.

Differences in measures. Studies using acupuncture as a treatment for dysphagia have implemented numerous outcome measures for assessing swallow function including videofluoroscopic swallow study (VFSS), standard swallow assessment (SSA), the Kubota Water Test and the Royal Brisbane Hospital Outcome Measure for swallowing (RBHOMS; Cai et al., 2015; Mao et al., 2016; Xia et al., 2016; Zhang et al., 2016). A videofluoroscopic swallow study (VFSS) involves the individual swallowing a variety of textures of food that had been injected with barium. The bolus then appears in an x-ray video. If irregularities occur, they can be observed in this form. The standard swallow assessment (SSA) is known as the “gold standard” for dysphagia assessment. Finally, because water is difficult for individuals with dysphagia to swallow due to its viscosity, the Kubota Water test is often used to assess swallowing. Greater thickness or viscosity decreases the risk of penetration and aspiration, hence, easier swallowing. The Kubota Water test involves the individual swallowing a small amount of water and any difficulties are observed during the swallow, such as choking. A greater amount of water is given to them if this task is completed with ease and this swallowing is also observed (Zhang et al., 2016).

The Royal Brisbane Hospital Outcome Measure for swallowing (RBHOMS) originated in Brisbane and is often used as a secondary measure with VFSS or SSA working as the primary measure. The RBHOMS is a 10-point scale that SLPs use to assess changes in swallowing function. All measures are reliable and valid for interpreting and assessing swallow dysfunction.

Safety. While there are no adverse effects of acupuncture for individuals with dysphagia who suffered a stroke, there were some reported side effects of importance. One study reported 7 participants out of 62 that had experienced discomfort, two with hematoma, and one participant

with severe pain that was related to edema. In that study, physicians recorded responses that were unexpected or unintentional along with any missing outcomes or data (Xia et al., 2016).

Summary. In the studies reviewed here, acupuncture was used to reduce dysphagia in individuals who suffered a stroke. Across all studies, the experimental group who were treated with acupuncture with or without simultaneous traditional dysphagia therapy, demonstrated significant improvements compared to the control group on all swallow measures. This information could be value to the future of dysphagia research. Further research should be done to expand on the effectiveness and safety for the western world (Cai et al., 2015; Mao et al., 2016; Xia et al., 2016; Zhang et al., 2016).

The Speech-Language Pathologist's Role in Providing Treatment for Dysphagia

The speech-language pathologist's role in identifying and treating dysphagia has grown over time. A speech-language pathologist who works with swallowing must be familiar with the anatomy and physiology of the swallowing mechanisms and effective treatments for different disorders of dysphagia. She must be knowledgeable of etiologies of dysphagia and how dysphagia is treated differently when it has etiologies due to dysphagia being a secondary, rather than a primary, disorder. She must also know the different ways to assess and screen swallow disorders.

Dysphagia is a complex disorder so it requires a multidisciplinary approach. A multidisciplinary approach involves a variety of specialists; otolaryngologists, physicians, gastroenterologists, neurologists, occupational therapists, and any other professional necessary for the individual with dysphagia. A multidisciplinary approach asks these individuals to work within their professional limits and then collaborate to decide what will best help reduce dysphagia in that particular individual. For example, therapy can work across multiple

disciplines so it is beneficial to incorporate those disciplines in the same therapy if possible. It is also important to collaborate for the safety and well being of the individual. An individual may be able to swallow a certain texture but maybe they do not have the physical ability to get the food from plate to mouth.

Within this group, speech-language pathologists usually work as mediators and coordinators. Aside from working across professionals, speech-language pathologists play an important role in evaluating and treating dysphagia. The speech-language pathologist works down a hierarchy to best resolve the disorder. They begin with respiration then swallowing and lastly speech. This order is important because it focuses on the physiological importance of the body's needs.

Interview. An interview with a speech-language pathologist took place in order to gain a closer understanding of the speech-language pathologist's role in dysphagia therapy and their views on NMES and acupuncture treatment. The aim is to determine, with the help of a speech-language pathologist, the professional's role in treatment of individuals with dysphagia. This interview provided an internal evidence point of view on current dysphagia treatments, NMES, acupuncture, and how these treatments are viewed. This also provided insight on a speech-language pathologist's role and how this role fits in with the multidisciplinary approach.

Mrs. Briggs, a speech-language pathologist at the Augustana College Center for Speech, Language, and Hearing, willingly agreed to participate in an interview over email based on her experience working with individuals with dysphagia. Mrs. Briggs received interview questions in the form of a word document (see interview questions in Appendix) and responded within it and returned in upon completion. She has been speech-language pathologist for 10 years and has

worked in the field of swallowing for eight years. Mrs. Briggs has worked in a private practice, outpatient voice and swallow clinic, acute care hospital, and inpatient rehabilitation.

The first question asks about the current setting she works in and her current roles and responsibilities in a typical day. Mrs. Briggs reported that she works part-time in a long-term acute care hospital. On a typical day she does multiple clinical swallow evaluations as well as assessments for speech and language deficits. She also implements dysphagia, voice, speech, and language treatment to adults and determine the need for additional tests including video swallow studies. Many patients have tracheostomies and she works with them on tolerating a Passy Muir Speaking Valve (PMSV) for voicing and swallowing. When asked what types of treatments do she and her facility provide for dysphagia in individuals who suffered a stroke, Mrs. Briggs responded in saying that they use muscle rehabilitation (strengthening) exercises, postural techniques, swallow strategies, an diet/consistency modification.

The following question addressed whether she had experience with NMES and what her views are on it. She responded saying that she did not have experience with NMES because she was not trained in NMES, but did work in a hospital where some of the speech-language pathologists were trained in it. Mrs. Briggs expressed that she felt there was not enough research to support the efficacy of it. She believes there have been anecdotal reports of treatment success, but more research should be conducted as many of the studies have a small sample size as well. Mrs. Briggs thinks if NMES is to be used, it is most beneficial in conjunction with other swallow therapies. Mrs. Brigg wonders about the long-term effects of the treatment.

When questioned about familiarity with acupuncture (body, scalp, tongue, etc.) as a treatment for dysphagia in individuals who suffered a stroke Mrs. Briggs expressed that she did

not have enough knowledge of acupuncture as a whole and felt it was out of her scope of practice.

Mrs. Briggs was asked based on her personal experience what felt was the most effective treatment for dysphagia in stroke patient. She mentioned that she believes the most effective treatment is based off of the motor learning theory: intensive rehabilitation exercises immediately post-stroke with bursts of exercises, multiple times throughout the day, 7 days a week. She does this paired with functional goals for the patient. This is also the most common form of treatment Mrs. Briggs uses in her current setting.

Another question asked about whether, in her experience, if Mrs. Briggs felt that individuals who suffered a stroke had a preference in their treatment. Mrs. Briggs responded saying that personally, she finds that patients generally trust her expertise and will implement what I recommend but she has had some patients non-compliant with her diet modification recommendations, but they understood the risks of aspiration. When prompted for any further information she would like to add, Mrs. Briggs wrote that sometimes patients do not tolerate the “ideal treatment” for them due to other medical conditions, medical status, and/or compliance. She stressed the importance of looking at each patient as an individual and seeing what dysphagia symptoms they are presenting with. She mentioned that she regularly relies on results of video swallow studies (barium swallow studies) for more specific information on swallow timing, pressure, range of motion, strength, structural movements, bolus flow patterns, bolus clearance, airway protection, and sensation. These are all factors to consider prior to implementing a treatment plan.

Moving forward, it is valuable to have the internal evidence presented by Mrs. Briggs to use in conjunction with the external evidence mentioned earlier in regards to NMES and

acupuncture. While NMES and acupuncture have external evidence that is suggestive of future progressions in the field of dysphagia treatment, one must also take into consideration the real-world implications of these therapies and what is realistic and functional in settings of dysphagia reduction.

In her role as a speech-language pathologist in an acute-care setting, Mrs. Briggs performed her independent role such as performing barium swallow studies as well as occasional speech and language assessments. This is a reality for many speech-language pathologists. It is often that they perform a variety of roles in a variety of different areas within speech-language pathology. Speech-language pathologists often specialize within one area of their field but it is true that they are qualified to provide treatment within all areas.

As used in evidence-based practice, both internal and external evidence should be considered before implementing a treatment. External evidence is the research basis and internal evidence is the expertise based on experience and what is going to be best for the individual. With the combination of these two suggestions, one must proceed studying dysphagia therapy and the speech-language pathologists role but also be sure to proceed with caution when taking the individual's needs into account.

Conclusion

Studies of both neuromuscular electrical stimulation and acupuncture as treatments for reducing dysphagia either in conjunction with TDT or on their own account have shown progress in individuals who suffered a stroke in comparison to traditional therapy approaches. However, these approaches are relatively new and may not be as well accepted in the field of swallowing or in the western culture. Further research should be done to demonstrate the effectiveness of both NMES and acupuncture in larger studies. If more research is done and also finds significant difference in improvement, new therapies could incorporate more NMES and acupuncture into dysphagia treatment in the U.S. While all studies have limitations and both approaches have challenges such as pain, discomfort, etc., if these approaches are truly beneficial as these studies suggest, then these therapies could be revolutionary in dysphagia therapy.

Internal evidence also needs to be taken into account as provided by Mrs. Briggs. It may be challenging to prove these approaches to be effective and implement them with further training. While it is challenging to create studies that can control for all of the factors in stroke and dysphagia, with more careful research, further conclusions can be made about effectiveness and safety of NMES and acupuncture treatments. Some might ask why continue researching dysphagia treatments for individuals who suffered from a stroke when traditional dysphagia therapy has proven to be effective? The purpose is to be persistent in reducing dysphagia in the most effective way possible by minimizing the amount of time that an individual has to suffer. Regardless of the outcome, further research has the potential of essentially improving the quality of life for thousands every year and every step taken is a step in the right direction.

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Appendix

“A comparison of treatments to reduce dysphagia in individuals who suffered a stroke”

Interview Questions for the Speech-Language Pathologist

1. What setting do you currently work in? What roles and responsibilities do you have on a daily basis?
2. How long have you been working as a speech-language pathologist? What settings have you previously worked in?
3. In the field of swallowing, how long have you been providing clinical care to these patients?
4. What types of treatments do you and your facility provide for dysphagia in individuals who suffered a stroke?
5. Do you have any experience with neuromuscular electrical stimulation (NMES)? What are your views on NMES?
6. Are you familiar with acupuncture (body, scalp, tongue, etc.) as a treatment for dysphagia in individuals who suffered a stroke? Have you provided this treatment before? Why or why not?
7. Do you feel that acupuncture is a safe treatment for dysphagia in individuals who suffered a stroke?
8. In your experience, what do you feel is the most effective treatment for dysphagia in stroke patient?
9. What form of treatment is most common for you to provide? Do individuals who suffered a stroke typically have a preference in what treatment is used?
10. Any other comments you wish to make about dysphasia treatments for individuals who suffered a stroke?