CURRENT MEDICAL PRACTICES FOR TREATMENT OF VESTIBULAR DYSFUNCTION

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This paper reports on current medical practices performed by health care professionals, audiologists and Ear, Nose, and Throat (ENT) physicians, for treatment of vestibular dysfunction. The study surveyed each professional on the different treatment options for peripheral inner ear dysfunction in which s/he performs or recommends for vestibular patients. Since surgery is rarely a treatment option and vestibular suppressant medications may delay the compensation process and have negative side effects, there is a growing awareness of the effectiveness of vestibular rehabilitation therapy (VRT). The results analyzed the difference in the number of audiologists versus ENT physicians performing vestibular rehabilitation therapy. Results also indicated electronystagmography as the most common vestibular assessment performed by audiologists. This paper also presents limitations of the study and implications of future research.
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CHAPTER I
Introduction

Vestibular disorders are characterized by a variety of symptoms including vertigo. Vertigo is classified as one of the four subtypes of the general term dizziness, which is suggestive of a vestibular pathology (Sloane, Coeytaux, Beck, & Dallara, 2001). Vertigo is typically defined as the illusion or sensation of an individual’s body and/or the environment spinning in a rotational motion (Hain & Uddin, 2003). Vertigo is often provoked by specific head movements such as bending over or getting in and out of bed (Cohen, 1992). The sensation can be accompanied by nausea, vomiting, and perspiration (Sandhaus, 2002).

Vertigo is a debilitating symptom which can dramatically alter an individual’s quality of life by various degrees such as “…lifestyle changes, loss of confidence, increased risk of falls and reports of physical, functional and emotional handicap” (Murray, Carroll, & Hill, 2001, p. 251). It can be present in individuals of all ages; however it is primarily found in the geriatric population (Eaton, 2003). In a primary care setting, vertigo is the ninth most frequently reported symptom by patients. In addition, the frequency of vertigo is more prevalent in females than in males. Over 90 million Americans, age 17 and older, suffer from vertigo (Sandhaus, 2002). More than twenty-percent of the elderly population that live independently experience vertiginous symptoms (Cohen, 1992).

Vertigo is commonly reported by patients suffering from vestibular diseases (Baloh, 1984). Vestibular disorders are a result of an impairment or pathology of the peripheral vestibular system or central dysfunction (Murray et al., 2001). Approximately 85% of vertiginous patients have a peripheral vestibular disorder while the other 15% suffer from a central nervous system dysfunction (Sandhaus, 2002). It has been estimated that 50% of patients that experience a fall are suffering from a vestibular disorder (Cohen, 1992). Peripheral vertigo is most commonly associated with benign paroxysmal positional vertigo (BPPV), vestibular neuritis, Meniere’s disease, or ototoxicity (Hain & Uddin, 2003).

Within three to six months, the vertiginous symptoms of patients with peripheral inner ear dysfunction can spontaneously improve (Horak, Jones-Rycewicz,
Black, & Shumway-Cook, 1992). However, if the symptoms persist, the vertigo may cause the individual to experience chronic difficulties; ultimately resulting in a long-term disability. Specific head movements can elicit vertigo. Patients will avoid that particular head movement often becoming inactive and reliant on others. Sandhaus (2002) stated that vertigo can be as debilitating to an individual as paralysis or loss of an arm or a leg.

Other than a spontaneous recovery, the treatment options for vertiginous symptoms are limited to surgery, rehabilitation, and pharmacological treatment (Cohen, 1992). Surgical procedures such as a labyrinthectomy and a vestibular nerve section can be used to eliminate vertigo. Surgery, which is seldom an option for individuals, should only be performed when the course of the disease is defined as well as the certainty of the impaired side (Balogh, 1984; Yardley, Burgneay, Anderson, Owen, Nazareth, & Luxons, 1998).

There are several different types of vestibular suppressant medications that are prescribed to vertiginous patients including anticholinergics, antihistamines, and benzodiazepines (Hain & Uddin, 2003). However, Horak and colleagues (1992) indicated that the use of these medications may inhibit the central nervous system’s compensation process for the vestibular impairment as well as have other undesirable side-effects. Due to these specific complications, only a small percentage of patients receive benefits from vestibular suppressant medication (Rubin & Brookler, 1991).

Since surgery is rarely a treatment option and vestibular suppressant medications may delay the compensation process and have negative side effects, there is a growing awareness of the effectiveness of vestibular rehabilitation therapy (VRT) (Cohen, 1992; Yardley et al., 1998). Since the 1940s, VRT has been believed to be an effective form of treatment for vertiginous symptoms, but only in the last 15 years has the technique acquired credibility due to a recent increase in the knowledge about the vestibular system (Murray et al., 2001).

Vestibular rehabilitation therapy consists of various exercises repeatedly performed by patients with vestibular diseases to improve their vertiginous symptoms (Murray et al., 2001). An effective VRT program consists of exercises that are based on vestibular adaptation, substitution, as well as habituation (Herdman, 2001). The concept of adaptation is to teach the brain and central vestibular system to learn to become
accustomed to the responses of the impaired vestibular system (Gans, 1996). Substitution exercises are generally recommended to individuals with a severe bilateral loss of vestibular function in order to enhance other equilibrium sensory mechanisms to replace the loss of the vestibular system. The concept of habituation or desensitization focuses on a reduction of vertigo by producing repeated movements which provoke the vertiginous symptoms (Cohen, 1992). Desensitization exercises train the brain to recognize faulty information that it is received from a damaged vestibular system. Overtime, the sensation of vertigo is reduced or subsided completely.

Particle repositioning maneuvers (PRM) are specific exercises that are performed on individuals with benign paroxysmal positional vertigo. There are several approaches which reposition the loose otoconia in the semicircular canals back to the utricle by certain positioning maneuvers (Gans, 1996). PRM consist of the vertiginous patient maintaining certain positions for a defined period of time (Baloh, 1984). While the exercises will trigger the patient’s vertigo, the movements have the potential to be curative after a single maneuver (Asawavichianginda, 2000). Well-known positional exercises are the Epley Maneuver, the Semont Liberatory Maneuver and the Brandt-Daroff habituation exercises. Studies indicate a high curative rate of these maneuvers for BPPV (Baloh, 2000; Levrat, Van Melle, Monnier, & Maire, 2003; Monobe, Sugasawa, & Murofushi, 2001).

Research on the efficacy of vestibular rehabilitation report that it is a safe and effective form of treatment for vestibular dysfunction (Horak et al., 1992; Murray et al., 2001; Shepard, Smith-Wheelock, Telian, & Raj, 1993; Yardley et al., 1998). Yardley and colleagues (1998) conducted a study investigating the effectiveness and feasibility of a vestibular rehabilitation program for patients with dizziness. Sixteen subjects participated in the vestibular therapy program over a period of 10 weeks in which they were asked to complete several questionnaires regarding their symptoms as well as levels of handicap both pre and post therapy. The results indicated that there was a significant improvement on the post-therapy questionnaires scores indicating that most of the patients had almost entirely recovered after receiving therapy. The results revealed that participants found the therapy program to be beneficial in alleviating their symptoms.
Vertigo is a significant health problem that can drastically affect an individual’s quality of life (Cohen, 1992). With an increase in the knowledge of vestibular rehabilitation therapy by health professionals, patients suffering from debilitating vertiginous symptoms are more likely now than ever before to be able to experience relief. The effective treatment of vertigo enables patients to return to daily routines and pursue their goals. Due to extensive research on the effectiveness of vestibular rehabilitation, this treatment method is a viable management option. Alternative treatment options such as surgical procedures and pharmacological management are often impractical because of the stringent criteria needed to employ surgical methods and the many negative effects of vestibular suppressant medications. According to Yardley and colleagues (1998) VRT is the suggested choice of treatment for patients with vestibular impairments.

Purpose of the Study
The primary purpose of this study is to investigate the use of vestibular rehabilitation exercises by health care professionals, audiologists and Ear, Nose and Throat physicians, as a treatment option for patients with vertigo. The research study will analyze the difference in the number of audiologists versus ENT physicians performing vestibular rehabilitation. In addition, the study will examine the number of audiologists performing vestibular assessments. Additional information will include data on the high prevalent vestibular disorders and the common pharmacological medications that are prescribed.

Hypotheses
It is hypothesized that the surveys will determine that audiologists are more likely to perform vestibular rehabilitation exercises than ENT doctors. Lastly, it is hypothesized that the majority of audiologists do not perform vestibular assessments.
CHAPTER II
Literature Review

Vestibular Disorders

There are many disorders which can affect the peripheral vestibular system including benign paroxysmal positional vertigo (BPPV), Meniere’s disease, vestibular neuritis, autoimmune inner ear disease, and perilymphatic fistulas (Mattox, 2000). Vestibular disorders can be very difficult to diagnose due to all of the overlapping symptoms. These diseases are characterized by various symptoms primarily including vertigo.

Benign paroxysmal positional vertigo is one of the most common vestibular disorders (Herdman & Tusa, 1999). BPPV is accounted for an estimated 20% of all cases of peripheral vertigo (Hain & Udden, 2003). Most individuals diagnosed with BPPV are over the age of 40, affecting a greater number of women than men (Sandhaus, 2002). Most cases of benign paroxysmal positional vertigo occur spontaneously; however, head trauma, ischemia, and labyrinthitis can be of cause of the disease. BPPV is characterized by brief episodes of vertigo which are provoked by quick head movements such as bending over and getting in and out of bed (Asawavichianginda, 2000). The disorder occurs when the otoconia, calcium carbonate crystals, of the macula become displaced within one of the semicircular canals (Sandhaus, 2002).

The second most common cause of peripheral vertigo is endolymphatic hydrops otherwise known as Meniere’s disease (Wackym, 2001). Approximately 2.4 to 4.8 million Americans are diagnosed with Meniere’s disease. Onset of the disease generally occurs in individuals between the ages of 20 to 60 years old (LaRouere, Seidman, & Kartush, 1997).

Meniere’s disease, a disorder of the inner ear, is characterized by a fluctuating hearing loss, roaring tinnitus, vertigo accompanied by nausea and vomiting, and fullness of the ear (Balogh, 1984). The disease usually affects one ear, but 40% of individuals develop symptoms bilaterally (LaRouere et al., 1997). Meniere’s disease can be very difficult to manage, but patients are often advised to keep a low salt diet, avoid caffeine, as well as stop smoking to lessen attacks (Hain & Uddin, 2003).
Vestibular neuritis, a common neurotologic disease, usually occurs in middle-aged individuals; however, patients of all ages have been diagnosed with it (LaRouere et al., 1997). The etiology has not been well defined, but it is thought to be a result of a viral inflammation of the vestibular nerve and vestibular end organs (Baloh, 1998). There have been several different viruses that have been clinically linked to vestibular neuritis including Cytomegalovirus, Rubella, Hepatitis, and Epstein-Barr (Baloh, 1998).

Common symptoms associated with vestibular neuritis are acute sudden onset of vertigo, vomiting, nausea, as well as postural imbalance without auditory or neurological deficits (Baloh, 1984). Typically, the intense vertigo persists for several days then gradually lessens (Hain & Uddin, 2003). Patients with these symptoms have reported to experience an upper respiratory tract illness one to two weeks before the onset of the disease (Baloh, 1984).

A perilymphatic fistula is an abnormal opening of membranes of the oval or round window of the inner ear which results in an irregular transmission between the inner and middle ear (LaRouere et al., 1997). Fistulas are commonly caused by head trauma, barotrauma, chronic otological surgery, stapedectomies as well as spontaneous occurrences (LaRouere et al., 1997). Fetter (2000) indicated that perilymphatic fistulas may account for a considerable amount of undiagnosed patients with vertigo. Symptoms of perilymphatic fistulas are similar to those of Meniere’s disease and as a result, the diagnosis of a fistula may be complicated (LaRouere et al., 1997). While the individual is resting the symptoms will settle; however, simple movements including straining, sneezing, and nose blowing can elicit the intermittent symptoms (Fetter, 2000).

In addition to peripheral vertigo, a dysfunction of the central nervous system such as vascular disorders can result in central vertigo (Hain & Uddin, 2003). Hain and Uddin (2003) reported that in an otolaryngology setting, central vertigo accounts for less than 5% of patients. In comparison, only 20% patients seen in neurology clinics have vertigo due to central nervous system dysfunction. However, peripheral vertigo and central vertigo may be of similar etiologies, but of different locations (Hain & Uddin, 2003).

Screening Tests for Vestibular Disorders

There are several different screening tests that can be performed in a physician’s or audiologist’s office to assist in the diagnosis process of a vestibular disorder.
However, a thorough medical history, physical examination, as well as additional testing is necessary to identify a vestibular pathology. Many of these screening methods are nonspecific, providing sufficient information to suggest a general balance disorder (McFeely & Bojrab, 2001).

According to McFeely and Bojrab (2001), clinical posture and gait testing or sensory-organization tests are based on the three peripheral components of balance: visual, labyrinthine (vestibular), and proprioceptive (somato-sensory) systems. If either one or two of these elements were to be eliminated, the other component(s) would have to be intact in order to maintain balance (McFeely & Bojrab, 2001). Horak and Shupert (2000) provided the example of walking on uneven surfaces such as mud or sand. Due to the unsteady surface conditions, the proprioceptive information may differ from the other balance components. The orientation of the individual’s body may not be aligned with their legs and feet due to the uneven surface (Horak & Shupert, 2000).

A physician can easily determine a patient’s gait by watching the individual walk into the examining room. The doctor is observing the individual’s walk to determine if their gait is characterized by shuffling, requiring assistance from a cane or walker, or broad based (McFeely & Bojrab, 2001). While in the examining room, the physician may ask the patient to walk in a straight line with their eyes closed, removing only their visual balance component. In this case, if the patient tends to sway toward a specific side, the affected side, it may imply a cerebellar pathology (McFeely & Bojrab, 2001).

Sensory-organization tests are assessment screening tools that combine vestibular, visual, and somato-sensory information to distinguish between vestibular and neural pathologies. The classic Romberg, a sensory-organization test, evaluates an individual’s ability to utilize and integrate sensory input to maintain postural control. During the Romberg test, a patient is asked to stand with their feet together and arms crossed or at their side. Then, the patient is asked to close their eyes maintaining their balance, denying their vision (Rubin & Brookler, 1991).

The sharpened tandem Romberg is similar to the original; however, a little more challenging. The patient’s feet are positioned in the tandem position, one foot in front of the other, with their arms crossed (McFeely & Bojrab, 2001). Once again, the patient is allowed visual information and then asked to close their eyes. The physician is watching
Swaying is indicative of a vestibular dysfunction, the visual system is no longer compensating for the vestibular abnormality. McFeely and Bojrab (2001) reported that the tandem Romberg test is a better indicator of vestibular dysfunction than the classic Romberg.

Another sensory-organization test is the Unterberger test, more commonly known as the Fakuda test (McFeely & Bojrab, 2001). To perform the Unterberger, the patient marches 50 steps in place with their arms extended straight out at their shoulders. Similar to the Romberg, the test is conducted with eyes opened then with eyes closed. A normal response is when the patient remains in place while marching. However, there are instances when a patient with no impairments will slightly move; therefore, the normal limits consists of the patient marching forward 50 centimeters or rotates 30 degrees from their starting position (McFeely & Bojrab, 2001). A positive test or an abnormal response is when the patient moves outside of the normal limits which are indicative of a unilateral vestibular weakness.

Sensory conflict posture tests or “poor man’s posturography” is a series of six tests that require the patient to remain balanced under various situations (McFeely & Bojrab, 2001). During tests one through three, the patient is asked to maintain their balance while standing on a hard surface. In contrast, tests four through six requires the patient to stand on a foam surface. The foam mat removes the subject’s proprioception. In addition, to the different surfaces, the patient will be instructed to close their eyes on a few of the tests. Normal adults will have little or no problems sustaining their balance during each of the tests. In contrast, subjects with vestibular impairments will experience difficulties performing these tests.

In addition, there are a few alternative bedside tests used to evaluate the function of the vestibular system such as: past pointing, tandem walking, and the doll’s eye test (Baloh, 1984). To perform the test of past pointing, the patient must be seated directly across from the examiner with their eyes closed. The patient extends their index finger to the examiner’s index finger, raises their hand above their head, and attempts to return their finger upon the examiner’s finger. Baloh (1984) reported that when there is a
consistent deviation to one side, past pointing has occurred. Past pointing can be indicative of an acute peripheral lesion.

Similar to the tandem Romberg, tandem walking is performed with the subject stepping one foot in front of the other with eyes open and closed (McFeely & Bojrab, 2001). When tandem walking is completed with the patient’s eyes opened, this assessment tool primarily acts as a test of cerebellar function (Baloh, 1984). In contrast, tandem walking with the patient’s eyes closed provides information regarding the vestibular system, when the proprioceptive and cerebellar functions are unimpaired (McFeely & Bojrab, 2001).

To conduct the doll’s eye test, the patient is asked to turn their head back and forth in a horizontal plane (Baloh, 1984). This movement of the head is reliant on the vestibular and fixation pursuit systems which provokes compensatory horizontal eye movements. In a normal response when a patient moves their head to the right; their eyes will slowly move then quickly follow to the right side. Contrastingly, an abnormal response is characterized by the patient maintaining eye movement while moving their head (Baloh, 1984).

Screening test can be organized into groups that allow assessment of all three of the peripheral components of balance. By comparing the results of each screening test may make limited predictions with respect to which component is involved. An example of such a combination is the Gans’ sensory organization test (SOT). Gans recommends the combination of the tandem Romberg, tandem walking, stepping fakuda, and using a foam surface to evaluate a patient’s balance system (Nashner, 2001).

Site-of-Lesion Tests

Site-of-lesion vestibular function tests can provide information regarding the localization of a lesion, peripheral or central, as well as approximate the degree of the impairment (Shepard, 2001). The results of vestibular function tests alone do not provide sufficient information to diagnose a patient. The site and extent of a lesion as well as the patient’s symptoms can assist in the confirmation of a diagnosis. In addition, the localization of an impairment can be beneficial in providing further medical recommendations and management. Some of the site-of-lesions tests include electronystagmography (ENG), the Dix-Hallpike maneuver, harmonic acceleration
testing, and posturography (Rubin & Brookler, 1991). These tests evaluate three components of the vestibular system including the vestibular nuclei, end organs, and central vestibular associations.

Electronystagmography is a technique developed by Schott in 1922 (Cesarani & Alpini, 1999). An ENG test is the most frequently used to form for vestibular assessment (Bloom, 2004). ENG testing is a series of several subtests that uses electro-oculography to record eye movements while stimulating the vestibular system (Shepard, 2001). The subtests include: tracking, saccades, optokinetic, positionals, the Dix-Hallpike maneuver, and bithermal caloric testing. The typical electrode montage consists of an electrode positioned at the lateral canthus of each eye, above and below one eye, and one on the forehead serving as the ground.

Although the Dix-Hallpike maneuver is a part of the traditional ENG evaluation, the maneuver is solely intended to identify patients with benign paroxysmal positional vertigo (Sherman & Massoud, 2001). The maneuver is comprised of two quick movements in which the examiner is provoking vertigo and watching for an abnormal nystagmus response (Herdman & Tusa, 1999). The movements are performed using the right and left sides to evaluate the function of both semicircular canals. In order to perform a Dix-Hallpike maneuver to assess vestibular function on the right side, the patient must be seated on the examining table looking towards the right at a 45 degree angle. Keeping the patient’s head turned, the examiner quickly pulls the patient’s body straight back until their head is hanging over the edge of the table. The examiner watches for nystagmus while supporting the individual’s head. The patient maintains that position for approximately 40 seconds. After the 40 seconds, the examiner returns the patient to the original sitting position (Herdman & Tusa, 1999).

Another test of the peripheral vestibular system is the harmonic acceleration rotation test. Harmonic acceleration rotation test evaluates the vestibulo-ocular reflex (VOR), which controls the position of the eyes while the head is in movement (Baloh, 1984; Rubin & Brookler, 1991). For rotating testing, the patient is seated in a computerized rotary chair with their head tilted forward at approximately a 30 degree angle (Baloh, 1984). With the head in the forward position, the chair rotates upon its vertical axis stimulating both of the horizontal semicircular canals. However, Baloh
(1984) stated that there are some disadvantages of conducting a harmonic acceleration rotation test. The test does not discriminate between the semicircular canals; the stimulation affects both canals simultaneously. The simultaneous stimulation limits the localization of a pathology to a specific semicircular canal. Also, the necessary equipment to perform harmonic acceleration rotation chair testing is very costly (Balogh, 1984).

Computerized dynamic posturography (CDP) assesses an individual’s function of balance under various conditions which simulate daily life activities (Nashner, 2001). CDP can assist in determining the degree of the patient’s peripheral vestibular impairment by evaluating their capabilities in correlation to everyday activities. Nashner (2001) reported that computerized dynamic posturography is the most expensive form of balance testing.

Treatment Options

There are few treatment options available for eliminating vertigo. They include surgery, vestibular suppressant medication, and vestibular rehabilitation. Surgical procedures can be an effective treatment method; however, the option is only available if conservative treatment is not successful (LaRouere et al., 1997). Individuals must meet specific criteria to be a candidate for surgical intervention including the identification of the disorder as an impairment of the peripheral vestibular system as well as have the appropriate vestibular and hearing testing. Due to the stringent criterion, surgery is rarely an alternative treatment for peripheral vestibular dysfunction (Wackym, 2001).

The three main vestibular disorders that may require surgery are Meniere’s disease, benign paroxysmal positional vertigo, and perilymphatic fistulas. The two different surgical procedures that can eliminate vertigo are preservation procedures and ablative procedures. Preservation procedures consist of endolymphatic sac surgery, cochleosacculotomy, perilymphatic fistula repair, and microvascular decompression. Whereas a labyrinthectomy, vestibular nerve section, singular neurectomy, and posterior semicircular canal occlusion are all ablative procedures (LaRouere et al., 1997).

Several different types of vestibular suppressants are prescribed to individuals suffering from vertigo. (Appendix A). Some of the classes of vestibular suppressant medications include anticholinergics, antihistamines, benzodiazepines, phenothiazines,
and calcium channel and dopamine receptor antagonists (Hain & Uddin, 2003). Commonly prescribed antivertiginous medications include meclizine, promethazine, diazepam, and dimenhydrinate (Balloh, 1998; Rascol, Hain, Brefel, Benazet, Clanet, & Montastruc, 1995). Hain & Uddin (2003) stated that depending on the type of medication, the drug can alter the intensity of the symptoms or have an effect on the underlying cause.

The use of antivertiginous medicine that has sedative characteristics may delay the compensation process of the central nervous system (Horak et al., 1992) as well as have undesirable side-effects (Yardley et al., 1998). Leigh (2000) stated that due to these long term effects, current research has revealed that these drugs should be prescribed in small dosages and only be used for the initial 24 hours. After the 24 hour time period, the patient is urged to return to their daily life activities and the medication to be used with caution (Leigh, 2000).

In addition, several studies indicated that pharmacological drugs have been proven to be an ineffective treatment method for individuals diagnosed with BPPV (Sherman & Massoud, 2001; Wolf, Hertanu, Novikov, & Kronenberg, 1999; Leigh, 2000). Horak and colleagues (1992) conducted a study investigating three different treatment methods and their improvement in symptoms of dizziness and imbalance. There were 25 participants with chronic peripheral vestibular disorders that were randomly assigned to three treatment groups: vestibular rehabilitation, conditioning exercises, and vestibular suppressant medication. The research data revealed that all three experiment groups reduced symptoms of dizziness; however, vestibular rehabilitation was the only treatment method that improved balance.

In the last fifteen years, vestibular rehabilitation has gained extensive awareness due to recent studies conducted on the effectiveness of these exercises. In the 1940’s, Cawthorne, an otolaryngologist, and Cooksey, a psychotherapist, developed a set of exercises consisting of rapid head movements (Gans, 1996) to facilitate compensation of the central nervous system for vestibular dysfunction (Horak et al., 1992). The Cawthorne-Cooksey exercises, which are still used, are utilized to slowly train an individual’s vision and proprioceptive components to compensate for the impaired vestibular signal (Balloh, 1984). The Cawthorne-Cooksey concept of fast head
movements serve as the foundation of other existing vestibular rehabilitation exercises including the Gans’ self directed program exercises with the addition of modifications (Herdman, 2001). (Appendix B).

However, it was not until the early 1980’s that vestibular rehabilitation regained attention. New techniques were being developed such as the Semont liberatory and Epley maneuvers which are both positional exercises used to treat benign paroxysmal positional vertigo (Gans, 1996). At that time, several researchers including Brandt and Daroff were implementing specific protocols for the exercises and reporting their effectiveness. The Brandt-Daroff exercises are commonly performed by the patient outside of the medical setting without the assistance of a health care professional (Herdman & Tusa, 1999). Since the late 1980’s, several studies have been conducted verifying the efficacy of vestibular rehabilitation for patients suffering from vertigo (Cohen, 1992; Cohen & Kimball, 2002; Horak et al., 1992; Murray et al., 2001; Shepard et al., 1993; Yardley et al., 1998).

Shepard and colleagues (1993) conducted a study on the lasting effects of a vestibular rehabilitation management program over a two year interval. One hundred and fifty-two participants, aged 20 to 89 years old, who experienced vertigo for more than two consecutive months participated in the study. The exercises were designed to reduce positional and/or motion-provoked vertigo as well as eliminate complications related to balance and gait. The results indicated that 85% of the individuals experienced at least some improvement of their symptoms after performing the exercises. The authors concluding that the rehabilitation program was beneficial.

Murray et al. (2001) examined the correlation between a home exercise program and balance performance of individuals suffering from chronic vestibular diseases. Sixteen subjects participated in the exercise program as well as completed a Dizziness Handicap Inventory (DHI) pre and post therapy. The researchers found that there was a significant improvement in the subjects’ balance performance. As the balance of the individuals improved, their sense of handicap per DHI decreased.

Numerous research studies have reported the success of particle repositioning maneuvers including the Semont, Epley, and the Brandt-Daroff exercises for BPPV (Baloh, 2000; Levrat, Van Melle, Monnier, & Maire, 2003; Monobe, Sugasawa, &
Levrat et al. (2003) stated that the Semont liberatory maneuver has a 90.3% curative rate after four maneuvers and an 83.5% recovery rate after two maneuvers. Another study investigating the efficacy of the Epley maneuver, revealed that there was a significantly higher recovery rate among BPPV patients than the untreated control group (Wolf et al., 1999). The article stated that recent studies indicate that the Epley maneuver has a 100% curative rate and the Brandt-Daroff exercises have been reported to reduce symptoms in patients at a success rate of 98% (Herdman & Tusa, 1999).

Vestibular rehabilitation has been recommended to be the treatment of choice for individuals suffering from vertigo (Yardley et al., 1998). There are several studies conducted on the efficacy of vestibular rehabilitation; however, there is limited research on the use of VRT by health care professionals. With an increase in the amount of professionals performing vestibular rehabilitation, more individuals will be able to experience relief from vertigo.
CHAPTER III
Methods and Procedures

Participants

Three hundred and twenty-four professionals were selected to participate in this study. The subjects were audiologists and Ear, Nose, and Throat (ENT) physicians, male and female, from various metropolitan areas of Ohio. Subjects were recruited for participation based on the inclusion criteria that the audiologists and physicians were licensed and currently practicing.

One hundred and twenty-two addresses of ENT doctors were obtained from the American Academy of Otolaryngology – Head and Neck Surgery website. The website supplied information regarding Ohio licensed physicians in which all addresses were used for the study. Two hundred and two addresses of audiologists were selected from the Ohio Board of Speech-Language Pathology and Audiology (OBLSLA) mailing list. The potential subject pool was selected by using every fourth address from the OBLSLA list.

Design and Procedures

Measurement Tool

Each participant was sent a survey consisting of questions pertaining to the different treatment options for vestibular disorders. Two separate surveys were developed with questions based on different vestibular rehabilitation approaches, desensitization exercises and repositioning maneuvers. One questionnaire was designed for the physicians and a separate survey for the audiologists reflecting the similarities and differences in the professionals’ scope of practice. (Appendices C and D). The audiology survey consisted of six questions whereas the ENT physician questionnaire was comprised of eight questions.

Subject participation was voluntary and the decision to return the questionnaire was an indication of their permission to use the information for research purposes. The questionnaire took approximately five minutes to complete. In addition to the surveys, each subject in the study received a letter explaining the purpose of the research project and a guarantee of confidentiality. The letter also notified the professional that s/he may choose to refuse to answer any of the survey questions. (Appendix E). Upon completion
of the survey, the participant returned the questionnaire in the provided stamped and addressed envelope.

Data Computation

All data was collected through the mail and sorted into two groups according to their profession of audiologists and ENT physicians. The surveys contained no information that could uniquely identify the individual who completed the survey; however, a numeric code was used for tracking purposes. The tracking codes were necessary to identify those individuals who had or had not responded. Once the surveys were returned, the tracking code was destroyed. After a period of five weeks, a second set of surveys was sent to those who had not replied. At that point in time, the mailing lists as well as the list of codes were destroyed.

Statistical Analysis

For the study, the data was analyzed using descriptive statistics including frequencies, means, and contingency correlation tables. Pearson’s chi-square and correlations were used to determine significant differences between the number of audiologists and ENT doctors conducting vestibular rehabilitation exercises. Probability levels of 0.05 were used to determine significance.
CHAPTER IV

Results

A total of 324 surveys were sent to professionals regarding different treatment options for vestibular dysfunction. The final number of surveys used for analysis consisted of one hundred and sixty-two questionnaires or a return rate of approximately 50%. The initial mailing resulted in the return of 113 questionnaires, 74 completed by audiologists and 39 from ENT physicians. After a period of five weeks, those who had not replied received a second survey. The second mailing resulted in an additional 49 surveys, 29 from audiologists and 20 from ENT physicians.

Audiologists’ Results

The results of the surveys completed by the audiologists revealed that the participating professionals varied in years of practice as well as work settings (Figure 1). Table 1 illustrates demographic information obtained from the audiologists’ surveys including years of practice and work setting. The responses do not total 100% due to seven incomplete surveys.

The mean number of years of practice from the respondents was 14.5 years (range 1 to 45 years). The audiologists reported seeing an average of 7.4 vestibular patients per week. The data indicated that the majority of audiologists do not perform vestibular assessments or vestibular screenings (Table 2). The audiologists that do conduct vestibular evaluations revealed that electronystagmography was the test most frequently performed. However, there was a wide distribution of types of vestibular screenings conducted by the audiologists.

Association between Audiologists and Vestibular Rehabilitation Exercises

Contingency tables were produced to determine the relations between the audiologists’ number of years of practice and whether s/he performs vestibular rehabilitation exercises (Figure 2). The chi-square analysis suggests that there was no statistical difference between the time of years in practice and performance of these exercises (p=.422). Figure 3 indicates the number of audiologists performing vestibular exercises at each of the different work settings (private practice, ENT office, hospital, and other). The chi-square analysis shows a significant difference between the audiologists’ performance of vestibular exercises and type of work setting (p=.002). The analysis
indicates that there is a relation of the type of work setting and the performance of vestibular rehabilitation therapy by audiologists. The audiologists practicing in an ENT setting were more likely to perform VRT.

**ENT Physicians’ Results**

The data obtained from the physicians focused on their profession as well as the area in which they specialize. The majority of the doctors were otolaryngologists (86.4%). More than half of the physicians reported that seeing vertiginous patients was within their scope of practice with a mean of 10.3 vestibular patients per week. In addition to treating these patients, approximately 84.7% of the doctors perform the Dix-Hallpike maneuver on patients experiencing vertigo.

The responses of the survey indicated that meclizine, was the most commonly prescribed medication administered to vertiginous patients by the participating physicians. Other medications prescribed include diazepam, lorazepam, promethazine, and alprazolam. Of the ENT doctors that treat vertiginous symptoms with medication, 23.7% report that s/he prescribe medication indefinitely. However when prescribing medication, the respondents indicated the most common length for a trial period of medicine is 14 days. Table 3 provides additional information obtained from the surveys completed by the ENT physicians. Due to ten incomplete surveys, some figures in Table 3 do not total 100%.

**Associations between ENT Physicians and Vestibular Rehabilitation Exercises**

The chi-square analysis suggests that there was no significant difference (p=.742) between the specific area of profession (laryngologist, otolaryngologist, other) and performance of vestibular rehabilitation exercises (Figure 4). The findings imply that there is no relation between the type of profession and performance of the exercises.

A contingency table was produced to explore the relationship between the number of physicians prescribing medication for an indefinite period of time that conduct vestibular rehabilitation exercises. The chi-square analysis indicates a statistical difference (p=.000) in the number of respondents that prescribe medication indefinitely and perform vestibular rehabilitation therapy. The significance is driven by the high percentage of physicians that prescribe medication for an indefinite period of time and perform rehabilitation treatment (100%).
Associations between Audiologists and ENT Physicians

The audiologists and Ear, Nose, & Throat physician both indicated that benign paroxysmal positional vertigo is the most frequently seen vestibular disorder among patients. Other vestibular disorders commonly seen by audiologists include unilateral weakness (4.9%), Meniere’s disease (3.9%), and labyrinthitis (2.9%) whereas Meniere’s disease (16.9%), labyrinthitis (15.3%), and neuronitis (10.2%) are disorders often seen by physicians.

The chi-square analyses and contingency tables were produced to analyze the relation of the responses of audiologists and ENT physicians performing vestibular rehabilitation therapy. The chi-square analysis suggests a positive association and statistically significant relationship between the number of professionals conducting or recommending any type of vestibular rehabilitation exercise including desensitization techniques and particle repositioning movements (p=.000). The association is influenced by the high percentage of ENT physicians (88.1%) performing VRT in comparison to audiologists (28.2%).

In addition, the chi-square analysis indicates significant differences between the number of audiologists and ENT physicians and of the performance of either desensitization exercises or particle repositioning maneuvers (p-value=.000). The statistical difference is driven by the high percentage of ENT physicians performing or recommending desensitization exercises (78.0%) and repositioning maneuvers (86.4%) in contrast to the performance of desensitization techniques (23.3%) and particle repositioning movements (27.2%) conducted by audiologists.

Figure 5 and 6 demonstrate the number of audiologists and doctors that are conducting each of the repositioning maneuvers. Figure 5 and 6 show that of all the repositioning exercises, the Epley maneuver is most commonly performed by both audiologists and doctors. In addition, Figure 7 and 8 illustrate the number of respondents in each profession that perform or recommend each desensitization exercise. Figure 7 and 8 demonstrate that the Cawthorne-Cooksey exercises are most frequently recommended or performed of all the desensitization exercises by both groups of professionals.
Table 1

*Percentages of Audiologists Who Answered Demographic Survey Questions*

### Demographical Data

1. **Years of Practice**

<table>
<thead>
<tr>
<th>Years of Practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>21.4%</td>
</tr>
<tr>
<td>6-10</td>
<td>22.3%</td>
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<tr>
<td>11-15</td>
<td>11.7%</td>
</tr>
<tr>
<td>16-20</td>
<td>15.5%</td>
</tr>
<tr>
<td>21-25</td>
<td>7.8%</td>
</tr>
<tr>
<td>26-30</td>
<td>9.7%</td>
</tr>
<tr>
<td>31-35</td>
<td>2.9%</td>
</tr>
<tr>
<td>36-40</td>
<td>1.0%</td>
</tr>
<tr>
<td>41-45</td>
<td>1.9%</td>
</tr>
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</table>

2. **Work Settings**

<table>
<thead>
<tr>
<th>Work Setting</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENT Office</td>
<td>29.1%</td>
</tr>
<tr>
<td>Other</td>
<td>27.2%</td>
</tr>
<tr>
<td>Private Practice</td>
<td>21.4%</td>
</tr>
<tr>
<td>Hospital</td>
<td>18.4%</td>
</tr>
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</table>
Table 2

*Percentages of Audiologists Who Reported Performing Vestibular Screenings and Assessments*

<table>
<thead>
<tr>
<th>Vestibular Screenings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform Vestibular Screenings</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12.6%</td>
</tr>
<tr>
<td>No</td>
<td>87.4%</td>
</tr>
<tr>
<td>2. Vestibular Screenings</td>
<td></td>
</tr>
<tr>
<td>Standing Romberg</td>
<td>9.7%</td>
</tr>
<tr>
<td>Tandem Romberg</td>
<td>6.8%</td>
</tr>
<tr>
<td>Foam Surface Test</td>
<td>5.8%</td>
</tr>
<tr>
<td>Stepping Fakuda</td>
<td>5.8%</td>
</tr>
<tr>
<td>Other</td>
<td>3.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vestibular Assessments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform Vestibular Assessment</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>42.7%</td>
</tr>
<tr>
<td>No</td>
<td>57.3%</td>
</tr>
<tr>
<td>2. Vestibular Assessments</td>
<td></td>
</tr>
<tr>
<td>Electronystagmography</td>
<td>39.8%</td>
</tr>
<tr>
<td>Dynamic Platform Posturography</td>
<td>3.9%</td>
</tr>
<tr>
<td>Harmonic Acceleration Rotation Test</td>
<td>2.9%</td>
</tr>
<tr>
<td>Other</td>
<td>10.7%</td>
</tr>
<tr>
<td>Demographical Data</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td><strong>1. Area of Profession</strong></td>
<td></td>
</tr>
<tr>
<td>Otolaryngologist</td>
<td>86.4%</td>
</tr>
<tr>
<td>Other</td>
<td>8.5%</td>
</tr>
<tr>
<td>Laryngologist</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>2. Treat Vestibular Patients</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>86.4%</td>
</tr>
<tr>
<td>No</td>
<td>11.9%</td>
</tr>
<tr>
<td><strong>3. Perform Dix-Hallpike</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>84.7%</td>
</tr>
<tr>
<td>No</td>
<td>15.3%</td>
</tr>
<tr>
<td><strong>4. Refer for Additional Testing</strong></td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>52.5%</td>
</tr>
<tr>
<td>Always</td>
<td>27.1%</td>
</tr>
<tr>
<td>Never</td>
<td>5.1%</td>
</tr>
<tr>
<td><strong>5. Prescribe Medication</strong></td>
<td></td>
</tr>
<tr>
<td>Meclizine (Antivert, Dramamine II)</td>
<td>44.2%</td>
</tr>
<tr>
<td>Promethazine (Phenergan)</td>
<td>6.7%</td>
</tr>
<tr>
<td>Diazepam (Valium)</td>
<td>39.4%</td>
</tr>
<tr>
<td>Lorazepam (Ativan)</td>
<td>7.7%</td>
</tr>
<tr>
<td>Alprazolam (Xanax)</td>
<td>1.9%</td>
</tr>
</tbody>
</table>
Figure Captions

*Figure 1.* The Number of Audiologists Employed at Each Work Setting.

*Figure 2.* The Number of Years of Practice and Performance of VRT.

*Figure 3.* The Number of Audiologists Performing VRT in each Work Setting.

*Figure 4.* The Number of ENT Physicians Performing VRT in Each Type of Professional Specialty.

*Figure 5.* The Number of Audiologists Performing Repositioning Maneuvers.

*Figure 6.* The Number of ENT Physicians Performing Repositioning Maneuvers.

*Figure 7.* The Number of Audiologists Performing Desensitization Exercises.

*Figure 8.* The Number of ENT Physicians Performing Desensitization Exercises.
Figure 1

![Bar chart showing the number of audiologists in different work settings]

- **Private Practice**: 22
- **ENT Office**: 30
- **Hospital**: 18
- **Other**: 28

**Work Settings**
Figure 2

Number of Audiologists Performing VRT

<table>
<thead>
<tr>
<th>Years of Practice</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>16-20</th>
<th>21-25</th>
<th>26-30</th>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 3

![Bar chart showing the number of audiologists performing VRT in different work settings. The chart indicates a higher number of audiologists performing VRT in ENT offices compared to private practice, hospital, and other settings.]

- Private Practice: 4 audiologists
- ENT Office: 14 audiologists
- Hospital: 6 audiologists
- Other: 2 audiologists
Figure 4

Professions

Number of ENT Physicians Performing VRT

- Laryngologist
- Otolaryngologist
- Other-Neurologist
Figure 5

Repositioning Maneuvers

<table>
<thead>
<tr>
<th>Repositioning Maneuvers</th>
<th>Number of Audiologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epley</td>
<td>30</td>
</tr>
<tr>
<td>Modified Semont</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 6.

Repositioning Maneuvers

Number of ENT Physicians

- Epley
- Modified Semont
- Other
Figure 7

Desensitization Exercises

Number of Audiologists

Cawthorne-Cooksey  Habituation  Gans  Other
Figure 8

Desensitization Exercises

Number of ENT Physicians

Cawthome-Cooksey  Habituation  Gans  Other
CHAPTER V
Discussion

Dysfunction of the vestibular system is a serious ailment that disrupts the lives of millions of individuals on a daily basis (Cohen, 1992). According to American Speech-Language-Hearing Association (ASHA) the scope of practice for a licensed audiologist includes the identification, assessment, consultation, and rehabilitation or treatment of vestibular impairments (American Speech-Language-Hearing Association, 2004). Due to the extensive number of individuals experiencing vertigo, audiologists must be properly trained to administer vestibular assessments and treatments to ensure the greatest quality of care for these patients.

Treatment of peripheral inner ear dysfunction can take the form of surgery, pharmacological management, and rehabilitation therapy. Criteria for surgical procedures are very stringent and vestibular suppressants can result in negative side-effects, leaving vestibular rehabilitation exercises to be a valuable alternative. Emerging research has shown that vestibular rehabilitation therapy has been proven to be an effective form of treatment for peripheral vestibular impairments (Horak et al., 1992; Murray et al., 2001; Shepard, Smith-Wheelock, Telian, & Raj, 1993; Yardley et al., 1998). The purpose of this study was to determine if there was a relation between the number of audiologists and physicians that performed VRT. Additionally, the study investigated the number of audiologists administering vestibular assessments.

The findings from the study revealed several significant associations. The results indicated three primary significant relations between the two groups of professionals and the performance of VRT. ENT physicians were more likely to perform VRT, desensitization exercises and particle repositioning exercises, than the audiologists. In addition, a statistical association was seen between the type of work setting and the number of audiologists performing rehabilitation exercises resulting in audiologists employed in ENT offices to be more likely to conduct VRT. Lastly, the relation between physicians prescribing medication for indefinite periods of time and the performance of the exercises determined a significant association.

The number of audiologists (28.2%) versus ENT physicians (88.1%) that perform vestibular rehabilitation exercises were drastically different. The finding regarding the
low percentage of audiologists is in agreement with previous research. Helfer (1999) conducted a study surveying audiologists on their areas of interests within the scope of practice for continuing education. Of the 268 respondents, only 35% of the audiologists indicated an interest in the topic of vestibular rehabilitation (Helfer, 1999). In addition, the majority of the audiologists in this study reported that s/he do not perform vestibular assessments. The results are consistent with Helfer (1999) in which less than half of the audiologists, approximately 44%, expressed interest in vestibular testing. Also, the findings from this study indicated that electronystagmography was the most frequently performed assessment which is in agreement with previous literature (Bloom, 2004).

Henri (1994) researched the preparedness of recent doctorate audiology graduates. The graduates were rated by clinical supervisors on a scale from poor to excellent (1=poor, 2=fair, 3=good, 4=excellent). The results revealed that the graduates were rated on a weighted scale of 1.91 of preparedness for vestibular assessment. The data implied that recent graduates are not receiving sufficient exposure resulting in poorer knowledge and/or skill within this area of practice. Unpreparedness by the graduates may be consistent with an earlier study regarding the low percentages of interests in the topic of vestibular assessments and vestibular rehabilitation (Helfer, 1999). The findings of this study indicated a small number of the audiologists practicing for 1-5 years did not perform VRT, whereas a greater number of audiologists that have been in practice for 6-30 years were more likely to conduct VRT. The trend of an increase of years in practice and performance of the exercises may be a result due to insufficient training in school. Overtime and with experience, audiologists may acquire the skills to perform the exercises through workshops sponsored by companies or national organizations, and on the job training from colleagues.

Audiologists may not perform the vestibular tests and/or exercises due to a lack of interest in the subject matter of vestibular dysfunction. Bloom (2004) reported that most audiologists do not view vestibular testing and rehabilitation among their scope of practice. However, with an increase in the number of audiologists pursing a professional doctorate, additional time will be allotted to prepare professionals for all areas within the scope of practice (Henri, 1994). The increased training may spark increased interest within the area of vestibular assessment and treatment.
The data reported here revealed that meclizine, promethazine, and diazepam are commonly used vestibular suppressants prescribed by the ENT physicians to individuals with vestibular impairments. The findings are expected given that literature reports parallel conclusions that meclizine, promethazine and diazepam are among the most commonly prescribed antivertiginous medications (Baloh, 1998; Rascol et al., 1995). In addition, the frequently seen balance disorders reported by the audiologists and physicians including Meniere’s disease, vestibular neuronitis, and labyrinthitis correlate with the more common vestibular disorders in literature. Bloom (2004) reported that BPPV, labyrinthitis, Meniere’s disease, vestibular neuritis, and perilymph fistulas are among the more common vestibular disorders.

**Limitations**

Throughout the study, limitations were discovered which mostly derived from the content of the survey for both audiologists and ENT physicians. Several of the questions were not very defined, which may be due to the wording of the question. For example, questions regarding desensitization exercises for both the doctors and the audiologists asked whether each professional performed or recommended the performance of these exercises. The questions tend to be ambiguous and not provide information on whether or not the exercises were actually being performed by the professional. The doctors may refer a patient to an audiologist, physical therapist, or occupational therapist to have the exercises performed. Additionally, the question regarding desensitization exercises does not provide the choice of compensatory strategies. Including the compensatory strategies option may have yielded more diverse results as well as provided more information regarding the use of different types of vestibular rehabilitation exercises.

Additional questions on the survey could have provided more data relating to the professionals’ demographics. Information such as gender and the physicians’ number of years in practice may have been valuable data to have analyzed. Further analyses could have been executed and provide supplementary data about the particular demographics of the participants and the performance of vestibular exercises. Associations between years of practice of both professions and whether they conduct VRT may have possibly yielded significant findings between the two groups. Another limitation to this study relates to the sample of subjects. The study was limited to the professionals practicing within the
state of Ohio. However if the project included a national representation of a subject population, the results would have possible yielded to be more generalized.

The distribution of types of work setting indicated two high response rates for ENT offices and the other category. Those that chose the other category including educational audiologists are not likely to see vestibular patients. With the future requirements a clinical doctorate degree, there may be an increase in the number of audiologists opening private practices, which may extend their services to vestibular testing and treatment.

Future Research

Future research should be conducted to expand the study of professionals and the performance of VRT. A larger sample from a broader region may provide more generalized results regarding audiologists and physicians around the country. Further studies should also include the addition of questions regarding the interest in the assessment and treatment of peripheral inner ear dysfunction on the survey. This information would yield as to a rationale as to why the majority of audiologists do not perform vestibular testing and rehabilitation. Additionally, inquiry of whether or not the audiologists had a class in peripheral vestibular dysfunction within their graduate program would be an interesting factor to analyze. The information would provide whether their vestibular assessment and treatment skills were acquired through their graduate program or additional training.

Implications for Clinical Use

Having a greater knowledge of vestibular rehabilitation therapy by professionals, individuals diagnosed with vestibular disorders will be able to experience relief. The study provided information regarding the number of audiologists and ENT physicians that perform vestibular rehabilitation. The study has found several significant associations between the number of professionals performing the exercises. Typically, the majority of the audiologists were found to most likely not perform vestibular assessments and/or rehabilitation exercises.

With the requirement of a four-year clinical doctorate degree in audiology approaching, students will be required to spend more time in the classroom. Bloom (2004) reported that during the four-year program additional training is offered resulting
in an increase of audiologists specializing in areas including vestibular disorders. The
growing interest of vestibular dysfunction is especially important due to the rapid
increase of care for vestibular patients (Bloom, 2004).

The results from this study provide information that a high percentage of
audiologists are currently not performing vestibular testing and treatment. However, the
addition of the doctorate program will offer professionals a greater understanding of the
vestibular system and supplementary clinical training hoping to increase interest of
vestibular dysfunction among the audiologists. In the future, it is anticipated that a
greater number of audiologists will be willing and properly trained to provide relief to the
increasing number of individuals with vertigo.
References


Appendix A

Commonly Prescribed Medications to Treat Vertigo & Their Effects

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Sedation</th>
<th>Antiemetic</th>
<th>Dryness Mucous Membranes</th>
<th>Extra-Pyramidal Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticholinergic</td>
<td>Scopolamine</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Atropine</td>
<td>-</td>
<td>+</td>
<td>+++</td>
<td>-</td>
</tr>
<tr>
<td>Antihistamine</td>
<td>Meclizine</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Cyclizine</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Dimenhydrinate</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Promethazine</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Phenothiazine</td>
<td>Prochlorperazine</td>
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<td>+++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Chlorpromazine</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Benzodiazepine</td>
<td>Diazepam</td>
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<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Appendix B
Cawthorne-Cooksey Exercises

A. In bed
   1. Eye movements: at first slow, then quick.
      (a) up and down
      (b) side to side
      (c) focusing on finger moving from 3 feet to 1 foot away from face
   2. Head movements at first slow, then quick. Later with vision denied.
      (a) bending forwards and backwards
      (b) turning from side to side

B. Sitting
   1. and 2 as above
   3. Shrugging and circling shoulders
   4. Bending forwards and picking up objects from the ground

C. Standing
   1. as A1 and 2 and B3
   2. Changing from sitting to standing position with eyes open and with vision denied
   3. Throwing ball back and forth from hand to hand (above eye level)
   4. Throwing ball back and forth from hand to hand under knee
   5. Change from sitting to standing and turning round in between

D. Moving About
   1. Circle round center person who will throw a large ball and to whom it will be returned
   2. Walk across room with eyes open and then with vision denied
   3. Walk up and down slope with eyes open then with vision denied
   4. Walk up and down steps with eyes open and then with vision denied
   5. Any game involving stooping and stretching and aiming such as bowling or basketball

Appendix C

Audiology Vestibular Disorder Survey

Years of Practice: __________
Work Setting: Private Practice _____   ENT _____   Hospital _____   Other _____

Please read and complete the following questions.

1. Do you see clients exhibiting vertiginous symptoms for vestibular assessment?
   YES   NO
   Check all types of assessments that apply:
   ENG _____
   Dynamic Platform Posturography _____
   Harmonic Acceleration Rotation Testing _____
   Other _____

Do you see clients exhibiting vertiginous symptoms for vestibular rehabilitation?
   YES   NO

*If this question does not pertain to your scope of practice please indicate on the form and return to sender.

2. Do you conduct vestibular screenings? If answer is YES, check all that applies.
   Standing Romberg           _____
   Tandem Romberg           _____
   Standing of foam surface test     _____
   Stepping Fakuda                  _____
   Other        _____

3. On average, how many clients with vestibular symptoms do you see weekly? ______

4. List the five most common vestibular disorders as to why a client is referred for audiology services.
   1.____________________ (most common)
   2.____________________
   3.____________________
   4.____________________
   5.____________________ (least common)

5. Indicate below the treatment options that you perform for patients with Benign Paroxysmal Positional Vertigo (BPPV)?
   Epley Maneuver _____   Modified Semont Maneuver _____   Other _____
6. In vestibular pathologies other than BPPV, please list the vestibular exercises that you perform or recommend.

<table>
<thead>
<tr>
<th>Exercise</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cawthorne-Cooksey Exercises</td>
<td>______</td>
</tr>
<tr>
<td>Habituation Exercises</td>
<td>______</td>
</tr>
<tr>
<td>Gans’ Self-Directed Home Program</td>
<td>______</td>
</tr>
<tr>
<td>Other</td>
<td>______</td>
</tr>
</tbody>
</table>
Appendix D

Ear Nose & Throat Physician Vestibular Disorder Survey

Profession:  Laryngologist ______  Otolaryngologist ______
           Intern ______  General Practitioner ______
           Other ______

Please read and complete the following questions.

1. Do you see vestibular clients? If answer is NO, please indicate and return survey to sender.
   YES  NO

2. On average, how many clients with vestibular symptoms do you see weekly? ______

3. List the three most common vestibular disorders that you see.
   1.____________________ (most common)
   2.____________________
   3.____________________ (least common)

4. List the three most common vestibular suppressant medications that you prescribe.
   1.____________________
   2.____________________
   3.____________________

5. If vestibular suppressants are effective for a patient’s vertiginous symptoms, do you prescribe the medication for an indefinite period of time?
   YES  NO

6. What is the average length of a medication trial for patients with vestibular problems?______

7. Is the Dix-Hallpike procedure performed for patients who complain of positional vertigo?
   YES  NO

   If YES, please indicate the treatment options that you perform or recommend for patients with Benign Paroxysmal Positional Vertigo (BPPV)?
   Epley Maneuver _____  Modified Semont Maneuver _____  Other _____
8. Indicate the non-pharmacological treatment options you perform or refer for vestibular clients.
   - Cawthorne-Cooksey Exercises _____
   - Habituation Exercises _____
   - Gans’ Self-Directed Home Program _____
   - Other _____

9. How often do you refer vestibular patients for additional testing? (example: ENG testing)
   - Never _____
   - Sometimes _____
   - Always _____
Appendix E

Purpose Letter

Dear Professional,

There is a growing interest in the area of treatment options for vestibular disorders. Therefore I am conducting a research study on the different vestibular treatments used by health professionals. The research is being conducted as part of the degree requirements in the graduate Audiology program at Miami University.

The purpose of this letter is to request your participation in this study. The data is being collected via a questionnaire. Participation is voluntary and your decision to return the questionnaire is an indication of your permission to use the information for research purposes. No information uniquely identified with you or your place of work will be used. In addition, you may choose to refuse to answer any of the survey questions. All responses will be used for research purposes only. The questionnaire will take approximately 5 minutes to complete.

Please contact Allison Resavage, graduate researcher at (513) 664-6271 or Laura Kelly, Ph.D., at (513) 529-2505 with any questions or concerns regarding this study. Any questions about subject’s rights can be directed to the Miami University’s Office for the Advancement of Research and Scholarship (513) 529-3734.

Your participation in this study is greatly appreciated. Should you wish to receive a summary of study findings simply include a separate piece of paper with your name and address. This information will be placed in a file separate from your questionnaire. I will be happy to forward my findings to you when data analysis is complete. Thank you for your assistance.

Sincerely,

Allison Resavage, B.S.          Laura J. Kelly, Ph.D.
Graduate Researcher            Associate Professor