SURVEYING OCCUPATIONAL THERAPISTS TO INVESTIGATE THE USE OF EVIDENCE-BASED PRACTICE IN POSTSTROKE INTERVENTIONS FOR UPPER EXTREMITY HEMIPARESIS

A Thesis submitted to the faculty at Stanbridge University in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy

by

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Certification of Approval

I certify that I have read Surveying Occupational Therapists to Investigate the Use of Evidence-Based Practice in Poststroke Interventions for Upper Extremity Hemiparesis by Cody Bartlett, Destiny Bowlin, Janice Mascarinas and Ricardo Pena, and in my opinion, this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy at Stanbridge University.

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Abstract

The objective of our research was to determine if occupational therapists are using evidence-based practice interventions when treating poststroke upper extremity hemiplegia and if not, to determine why. Through a literature review, we identified electrical stimulation, mirror visual feedback, constraint induced movement therapy, and virtual reality as the rehabilitation techniques with the most supportive evidence for improving upper extremity functioning in individuals with poststroke hemiparesis. An 18 question survey was created to gather information regarding experience level, setting, and use of evidence-based practice interventions for treating poststroke hemiplegia. A total of 15 occupational therapists completed the survey. Our results indicated that the implementation of best evidence interventions across all occupational therapy settings were not being utilized on a regular basis due to a variety of variables: a lack of resources, a lack of knowledge, and a limited amount of time for individual treatment sessions, as well as a limited time to conduct individual research.

Keywords: stroke, hemiplegia, occupational therapy, electrical stimulation, mirror visual feedback, constraint induced movement therapy, virtual reality

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Surveying Occupational Therapists to Investigate the Use of Evidence-Based Practice in Poststroke Interventions for Upper Extremity Hemiparesis

Each year, more than 795,000 people in the United States experience a unilateral stroke, which is damage that occurs to one side of the brain due to an interruption of its blood supply (Centers for Disease Control and Prevention [CDC], 2020). The incidence rate of stroke occurrence increased approximately 19% from 1990 to 2010 and is predicted to continue rising (Murray et al., 2012). This leads to a higher population of individuals living with the consequences of stroke, including upper extremity (UE) hemiparesis, meaning the paralysis of one side of the body (American Stroke Association, 2019). Nearly 40% of clients who have experienced hemiplegia due to stroke have significantly impaired motor function in their affected arm after 3 months, and an additional 40% have mild to moderate impairment which persists over time (Vafadar, Côté, & Archambault, 2015). The impairment caused by a unilateral stroke often results in weakness-related slowness in the affected limb, which affects an individual's ability to generate the force needed to carry out motor activities (Krakauer, 2006). Thus, this decrease in strength and functioning of the upper limb leads to difficulty in carrying out motor tasks necessary to engage in occupational performance. However, occupation-based interventions may be implemented in order to improve a client's performance skills in five categories of the Occupational Therapy Practice Framework including activities of daily living (ADLs), instrumental ADLs, work, play, and leisure (American Occupational Therapy Association [AOTA], 2014).

Our research aimed to determine the treatment effectiveness of occupational therapy (OT) interventions carried out to reduce the secondary conditions that result from

a primary disability, specifically UE hemiparesis due to stroke (AOTA & American Occupational Therapy Foundation [AOTF], 2011). This highlights one of the goals and priorities of the Occupational Therapy Research Agenda: To promote the development and use of evidence-based OT interventions. In our review of the literature, we focused on the key findings of four functional and task-specific OT interventions: electrical stimulation, mirror therapy, constraint-induced movement therapy, and virtual reality. We decided on these four interventions because there is a great deal of literature to support their effectiveness in improving the UE motor functioning of individuals with hemiparesis (Nilsen et al., 2015; Mangold, Schuster, Keller, Zimmermann-Schlatter, & Ettlin, 2008; Page, Levin, Hermann, Dunning & Levine, 2012; Vafadar et al., 2015; Thieme, Mehrholz, Pohl, Behrens & Dohle, 2012). Each of these interventions considers the functional goals of the individual and aims to minimize impairments, maximize function, and prevent stroke recurrence (Duncan et al., 2005).

While the current research has proven these four interventions as effective strategies in rehabilitating hemiparesis, the literature does not explicitly report whether or not these methods are effectively being carried out in clinical practice. In order to ensure that evidence-based practice is taking place in clinical settings, the objective of our research was to survey current occupational therapists in the United States and gather information on what treatment methods are being used to rehabilitate UE hemiparesis in poststroke clients. Understanding how evidence-based research translates into clinical practice allowed us to determine how easily reproducible the researched interventions are in the real world and how effective they are in treating UE hemiparesis as a result of stroke occurrence.

Literature Review

As stroke is one of the leading causes of disability in adults, effective evidence-based interventions are needed to support the rehabilitation of this population (Page, Levine, & Hill, 2015). We have chosen to focus our research on four poststroke rehabilitation techniques that have been proven by current research to be the most consistent and effective interventions in improving UE functioning of individuals with hemiparesis: electrical stimulation, mirror therapy, constraint-induced therapy, and virtual reality.

Electrical Stimulation

Functional electrical stimulation (FES) involves stimulating the nerves of weakened muscles, which results in muscle contractions and functional movement (Vafadar et al., 2015). FES is designed to generate movements which mimic typical voluntary movements, and the repeated stimulation from the currents aims to restore the functions served by those movements (Vafadar et al., 2015). There has been evidence that the use of FES in stroke rehabilitation increases arm motor function and shoulder subluxation (Vafadar et al., 2015), however each of the studies tend to vary in what part of the arm is affected and stimulated, the duration of the therapy session, and whether the stroke is chronic or acute.

FES has been found to improve motor function in many studies (Mehrholz, Pohl, Platz, Kugler & Elsner, 2018; Eraifej, Clark, France, Desando & Moore, 2017; Mangold et al., 2008; Page et al., 2015; Urton, Kohia, Davis, & Neill, 2007). But there is also contrary evidence which suggests that although FES has been shown to help prevent or reduce shoulder subluxation, there are no significant benefits in pain reduction or

improvements in upper arm motor function after FES (Vafadar et al., 2015). Due to the overwhelming evidence in support of FES, the research which does not show significant improvements in upper arm functioning needs to be examined to focus on the amount of time each intervention was, as well as whether the participants were recovering from acute or chronic stroke. The research which does not directly support benefits of FES could be one of the reasons why this method of intervention might not be utilized regularly by occupational therapists.

The majority of the research supports the use of FES when it is implemented soon after stroke onset to yield the best results and improvements in UE function (Mangold et al., 2008; Eraifej et al., 2017; Page, et al., 2015). However, a study by Page et al. (2012), found that when electrical stimulation is used in conjunction with 120 minutes per day of repetitive task-specific practice, participants with chronic stroke consistently showed UE motor improvements even years after their strokes. These findings encourage the use of FES with clients who have experienced their strokes more recently and demonstrate better outcomes from the therapy.

Much of the research indicates a need for more therapy time using the electrical stimulation equipment. This means that for the therapy to be most successful it needs to be implemented at home, outside of therapy hours. One study focused on home-based mental practice-triggered electrical stimulation program for clients poststroke with moderate UE impairment. This approach showed participants experienced a substantial impact not only on upper arm impairment, but also improvements with dexterity and participation in valued activities (Page et al., 2015). Additionally, Hermann et al. (2010) found a combination of telerehabilitation and FES resulted in improvements of the

participant's forearm pronation and supination as well as increased grasping skills and strength. These findings suggest positive results about the efficacy of in-home therapy. The majority of the research has shown that electrical stimulation can be used to improve upper limb outcomes in patients with moderate to severe upper limb dysfunction and is feasible for home-based interventions (Urton et al., 2007; Page et al., 2015; Hermann et al., 2010).

While more research should be done on this method due to limitations regarding the duration of therapy times, sample sizes, and discrepancies between chronic versus acute strokes, the literature suggests that electrical stimulation benefits clients recovering from stroke related UE deficits.

Mirror Visual Feedback

Mirror visual feedback (MVF) has been shown to be an effective intervention in the treatment of hemiparesis following a stroke. MVF was first introduced by Ramachrandan and Rogers-Ramachandran (1996) where they explored the effect of visual input on phantom sensations using a mirror. Ramachrandan and Rogers-Ramachandran (1996) concluded that mirror therapy proved effective for inter-sensory effects in phantom limbs, suggesting therapeutic implications for stroke rehabilitation. Mirror therapy has since been utilized as a treatment tool for UE hemiparesis following stroke (Yavuzer et al., 2008), alongside other pain symptoms such as complex regional pain syndrome (CRPS), and phantom limb pain (Ramachandran & Altschuer, 2009).

During mirror therapy, a mirror is placed directly in front of a patient with the mirror facing and reflecting the non-paretic hand (Ramachandran & Rogers-Ramachandra, 1996). The positioning of the limbs then creates a visual illusion where

any movement of the non-paretic hand is visually perceived as the paretic hand with the use of the mirror. The mechanism behind mirror therapy uses visual feedback that activates the mirror neurons of the contralateral hemisphere of the affected limb, which develops the reorganization and functional recovery in poststroke patients (Carvalho et al., 2013). It is speculated that the visual input of the reflected limb and the absence of feeling or movement in the affected limb both activate mirror neurons in the brain (Kuys, Edwards & Morris, 2012).

A systematic review by Thieme et al. (2012) analyzed 14 studies on mirror therapy, where 567 participants were compared to alternate therapy interventions for the treatment of hemiparesis. In this review, they found that mirror therapy has a significant positive effect on motor function, activities of daily living, and pain. The results of this review indicate positive effectiveness and support implications for motor function of hemiparesis. Similarly, Yavuzer et al. (2008) found that mirror therapy was beneficial when offered as an intervention in addition to conventional rehab in motor recovery of hemiparesis. Additionally, Toh and Fong (2012) found the current evidence for the use of mirror therapy (MT) in improving motor function of hemiplegia to be beneficial with subacute stroke.

Overall, current research has shown the effectiveness of MT on UE functioning following a stroke to be an effective and optimal treatment option (Ramachandran & Altschuer, 2009; Thiem et al., 2012; Rothgangel, Braun, Beurskens, Seitz & Wade, 2011; Toh & Fong, 2012). However, it is important to consider the limitations and shift the focus of future research on to specific clinical protocols and inclusion criteria in order to better benefit individuals receiving this intervention. Although there are strong

implications and supportive evidence for the use of MT for hemiplegia, more research is needed to determine optimal intervention treatment time as well as optimal dose of MT treatment. Such limitations may interfere with the implementation of the intervention technique.

Positive advantages for the use of MT and implications for clinical use are the ease, affordability, and accessibility of the treatment. MT is a simple, relatively cheap, and convenient tool that can be fully accessed and implemented easily.

Constraint Induced Movement Therapy

CIMT is a specialized neuro-rehabilitative approach used to help stroke patients recover from their motor impairments caused by a stroke (Liu, Huai, Gao, Zhang & Yue, 2017). The tasks vary depending on the setting and the occupations that the patients consider meaningful to them. Other components of this approach consist of shaping, intensity, and repetitive task training for 6 hours a day, for 2 weeks (Campbell, 2017). Due to the high intensity and length of time of the treatment, it can lead to low levels of compliance by the patients. To fix the problem, modified constraint inducement movement therapy (mCIMT) was created. This approach reduces the intensity of training, the restraint time of the unaffected limb, or both. Each mCIMT approach can vary depending on the setting or population to decrease issues with compliance (Liu et al., 2017).

Many studies have shown CIMT is more effective in treating hemiparesis in patients with stroke than conventional therapy such as OT. Liu et al. (2017) conducted a meta-analysis to evaluate the efficiency of CIMT in acute and subacute stroke patients. The authors used 16 randomized controlled trials (RCT) that used the same assessment

methods such as the Fugl-Meyer motor assessment of the arm, the action research-arm test or a motor activity log, and compared the results to each other. The procedures were not taken into account, it was only the outcomes that the authors compared. The authors found that CIMT/mCIMT were more effective than conventional therapy in all studies. Singh and Pradhan (2013), conducted an RCT to assess the effectiveness of mCIMT in stroke patients. The authors randomly divided 40 sub-acute patients into 2 groups. The mCIMT group received 2-hour therapy sessions, 5 times per week, for 2 weeks. Using the Fugl-Meyer motor assessment of the arm, the authors concluded that mCIMT is effective in improving the motor function of patients with stroke as there was a significant improvement in UE function after mCIMT.

Imaging studies have shown growth in specific areas of the affected side of the brain associated with movement in patients that have engaged in CIMT/mCIMT (Campbell, 2017). Although this approach has been proven to be beneficial for stroke patients, it has many limitations. Time constraints and treatment compliance are big barriers when implementing this approach. With future research, mCIMT can help provide all the benefits of CIMT by accommodating both therapist and patients to avoid treatment noncompliance.

Virtual Reality

Advances in technology have led to an increased interest in the use of technology-based neurorehabilitation approaches to treat stroke occurrences. Virtual reality (VR) based systems have been shown to have positive benefits in the rehabilitation of UE impairment and functioning in the paretic limb after stroke (Saposnik & Levin, 2011). There are two types of VR systems: one system is immersive where the whole body is

involved, and the other is non-immersive, only involving the use of a single limb. It is also important to note that the immersive systems are relatively cost-effective, making it an affordable means of therapy (McNulty, Mouawad, Doust, & Max, 2011).

One recent study used the Nintendo Wii, a non-immersive VR system, to determine the functional improvements in the paretic UE range of motion and the transferability of improvements into activities of daily living (McNulty et al., 2011). The Wii-based movement therapy included playing Wii Sports games such as baseball, tennis, bowling, boxing, and golf using the affected limb over the course of two weeks. Results found the VR treatment improved the speed of task completion, increased the independent use of the more affected UE, and increased the range of motion of the elbow and shoulder joints. These results provide support for the implementation of VR in treatment for paresis after stroke. The significant improvements in motor functioning also suggests that the benefits from Wii-based therapy can be transferred into activities of daily living.

These benefits from VR based therapies can be explained by the functional reorganization of the brain, known as plasticity, which occurs when participating in challenging and repetitive task-specific activities (Cameirao, Badia, Oller, & Verschure, 2011). Cameirao et al. (2011) developed a VR based technique called the Rehabilitation Gaming System (RGS) to treat motor deficits that result from the occurrence of stroke. The RGS—an immersive, first-person perspective VR environment—tracked the arm and finger movements of each participant while in the virtual environment. The movements of the participant's physical arms were processed by the motion capture system and transferred onto the movement of the two virtual arms. They hypothesized that by

observing the virtual limbs move they would be able to mirror the intended movements to facilitate functional reorganization of the motor systems in the brain. The results supported their hypothesis, and showed how the RGS is an effective method to treat UE hemiparesis through the observation of goal-oriented movement through virtual representation. However, there are gaps in the current literature, as the small sample sizes of these studies makes it difficult to generalize this information to the whole population.

Statement of Purpose, Research Question, and Hypothesis

While we found plenty of research on the efficacy of these interventions for poststroke rehabilitation addressing UE hemiparesis, there was no information regarding how often these interventions are being carried out in clinical settings. The objective of our research is to fill this gap, and to gather data on the types and frequency of evidence-based treatment methods being utilized by occupational therapists in the field. This information was gathered by surveying occupational therapists who work in a variety of practice settings in order to address our identified gap in the literature. Surveying current occupational therapists can provide clinician insight into determining the type, frequency, and reasons for the interventions currently being practiced. This information will help assess how to increase the application and use of best evidence research by therapists in order to ensure that clients are receiving the most effective interventions to aid in their recovery process. Therefore, our research question involved the investigation of evidence-based rehabilitation interventions being utilized by occupational therapists to treat poststroke clients with UE hemiparesis. Specifically, we investigated the use of interventions including electrical stimulation, mirror therapy, constraint-induced therapy, and virtual reality. We hypothesized that we would find common themes from the survey

data that show a limited use of one or more of these intervention techniques due to a lack of knowledge, time, and/or resources.

Theoretical Framework

When approaching poststroke clients, it is necessary for occupational therapists to develop and apply a frame of reference which best pairs with the population, their impairments, and their functional goals. To properly address the needs of poststroke clients with UE hemiparesis, we have determined that the motor control and learning frame of reference (FOR) would be best suited to assist these clients. The motor control and learning FOR focuses on the learning/relearning of motor skills through the use of activities and repetitive initiation and activation of movement that leads to long lasting changes of motor skills (Cole & Tufano, 2008). Therefore, this framework has been chosen as our basis in determining the effectiveness of interventions implemented into client treatment plans by occupational therapists to rehabilitate hemiparesis after the occurrence of stroke. Through our search of the literature, we identified two themes related to the motor control and learning frame of reference: goal-oriented movement and neuroplasticity. All of the literature we found regarding the four best interventions we identified mentioned that the ability to relearn motor skills and regain motor control results in functional restructuring of the neuronal synapses, or connections, within our brains which describes one of the processes within neuroplasticity (Lundy-Ekman, 2018, p. 137). This synaptic change is a recovery process that is followed after an injury to the brain, such as a unilateral stroke, that results in many deficits including hemiplegia of an UE limb. Through the use of task-specific practices, it has been shown that when patients perform movement tasks it can lead to motor learning/re-learning and skill acquisition by

altering patterns of brain activity in the affected area (Boyd, Vidoni, & Wessel, 2010). This tells us that our ability to learn and relearn skills relies heavily on experience through movement practice to receive sensory feedback that can allow us to problem solve and make adjustments when needed, and to potentially strengthen the connections within our central nervous system to acquire motor skills and motor control.

There are two approaches in this framework including the: 1) the neurodevelopmental theory (NDT) and the 2) the task-oriented approach. The NDT has a recovery aspect that focuses on restoring stability through sensory input in order to regain functional voluntary movement by applying different strategies such as handling, placement, and facilitation and inhibition techniques (Cole & Tufano, 2008). This technique inhibits abnormal movement and facilitates normal movement to help retrain specific muscle groups. In congruence with NDT, the motor learning and task-oriented approach also focuses on restoring functional movement after an acquired motor impairment. However, it uses meaningful tasks chosen by the client themselves in order to increase motivation for efforts towards recovery in relearning voluntary movement (Cole & Tufano, 2008). This theory claims that learning occurs through trial and error within the interaction of the client, the task, and the environment. It states that and with repetitive practice, can lead to refined motor skills in specific task performance. The aim of our research study is to ensure that when using treatment methods for poststroke clients, occupational therapists are following this theory, whether that be through the use of one of the four identified best evidence-based interventions or other variations. The approaches mentioned in this theory can be found in the evidence-based research literature and are highly regarded as an effective means of therapy for improving UE

function in individuals with hemiparesis (Besios, Nikolaos, Vassilios, & Giorgos, 2019).

Methodology

Design

A qualitative approach was the most fitting means to address the gap in literature and identify intervention approaches being utilized. We first reviewed the best evidence-based practice interventions for hemiparesis poststroke. Following our research, we disseminated a self-administered questionnaire survey that was developed to gather information from OT practitioners working with stroke clients with UE hemiparesis throughout the United States. Study procedures were approved by the Stanbridge University Institutional Review Board.

Questionnaire

The survey contained a consent form at the beginning explaining the purpose of the study and the participant's privacy rights, which can be viewed in Appendix A. The consent form stated that identifying factors, including the site name and therapist's name, would not be obtained through the survey or be used as data. After reading the consent form, participants were asked to check a box saying that they agreed or disagreed to be in the study. Those who consented to participate could withdraw at any time without any further questions. If consent was granted via the participant consent form, the therapist was prompted to continue on to complete the survey. The survey was estimated to take approximately 10-15 minutes to complete. Both multiple choice and open-ended questions were used to gather information relative to the participants' experience in stroke interventions for hemiparesis, as well as to obtain demographic information. At the end of the survey we asked the participants to forward the survey link to any other

occupational therapists they know working with stroke rehabilitation and who met the inclusion criteria. A copy of the survey questionnaire can be found in Appendix B

Subjects

The participants for this study included OT practitioners that meet the following criteria: they needed to be a certified occupational therapist, to work with clients with hemiparesis in the United States, and to work in inpatient, outpatient, acute or long-term care settings. Participants were also required to be able to read English.

Procedure

Participants were recruited and surveys were accessed and distributed via the AOTA and Occupational Therapy Association of California (OTAC). AOTA is the national professional association which represents the interests and concerns of OT practitioners and students to improve the quality of OT services. The AOTA website has several discussion forums where students and professionals can post, communicate, and collaborate. OTAC is a member-driven professional association to support occupational therapists, and OTAC can send emails to all of their members. We posted a description of the study and a link to the survey AOTA discussion forum as well as distributed the survey link and description through email via OTAC. Due to the nature of the online survey, therapists were able to complete it either at work or at home from their preferred electronic device. Once completed, the data was uploaded to SurveyMonkey and was not analyzed until the deadline of the survey had passed.

Data Analysis

The final survey responses were analyzed using open coding followed by selective coding to reveal common themes from the data. Each question was analyzed to determine emerging common themes. Next, we examined the emerging themes to

determine the perceptions and use of the interventions mentioned in this study. The purpose of analyzing themes was to determine if the participants were using emerging and current evidence-based practice interventions. We hypothesized that some of the common themes we would find regarding a lack of evidence-based practice interventions being used were: lack of time, lack of resources/equipment, and lack of knowledge. Our research is focused on finding out if the interventions we researched are being used and, if not, what are the common themes of the reasons why practitioners are not implementing them.

Ethical Considerations

All the participants were provided with a consent form explaining the procedures and purpose of the study before they were allowed to complete the survey. All participation was voluntary, and participants were given the option to opt out of the research at any point in time. Confidentiality was upheld by making the survey anonymous, thus providing privacy to both therapist and facility.

Results

Demographics

A total of 15 participants responded to the survey, however one participant did not agree to the consent form. The survey achieved a completed response rate of 73%. All respondents represented different regions of the United States (Figure 1). Of the 11 respondents regarding experience, 46% had 16 or more years of working with individuals with stroke, 36% had 11-15 years of experience with stroke patients, 9% had 6-10 years of experience, and 9% had 0-5 years of experience (Figure 2). The Majority of

participants work in outpatient facilities (64%), and the rest at inpatient/hospital settings (27%) or other, which was identified as a pediatric school setting (9%: Figure 3).

Use of Interventions

When asked which of the four evidence-based practice (EBP) interventions presented were used by the practitioners, 63% of therapists reported the use of FES, 54% reported use of CIMT, 54% reported the use of MT, 9% reported the use of VR (see Figure 4). In addition to these interventions, 81% of participants reported use of other interventions; vibration for muscle facilitation, Proprioceptive Neuromuscular Facilitation (PNF), UE robotics, and functional task specific training were identified as the other most prevalent interventions. In the hospital/inpatient setting 67% of participants use FES, 33% use CIMT, 33% use MT, and no therapist reported using VR. In the outpatient setting 71% of participants use FES, 57% use CIMT, 57% use MT, and 14% use VR (see Figure 5). In addition, 50% of participants with 11-14 years of experience with stroke use FES, 50% use CIMT, 50% use MT, and none have used VR. In comparison, 60% of therapists with 16+ years of experience with stroke clients use FES, 60% use CIMT, 60% use MT, and none have used VR (see Figure 6). The only participant that reported using VR had 6-10 years of experience. Although the participants reported some use of the interventions, only 2 respondents reported everyday use of the interventions. Virtual reality was the least used intervention for stroke clients with 90% responding that they rarely or never use the intervention in practice.

Barriers

When asked to explain what prevents them from implementing the interventions identified, 46% of the participants stated that it was due to lack of resources, 18% stated

that it was due to lack of time, 18% stated that it was due to lack of knowledge and 18% chose “other” (Figure 7). Participants who chose “other” stated that the reasons why the interventions were not implemented were: a lack of trained staff, a lack of success with mirror therapy, that protocols hard to manage, and that barriers vary depending on client deficits. Regarding how frequently participants research and stay up to date on the most current evidence-based practices in OT, 18% responded always, 63% often, and 18% sometimes.

Discussion

The findings from this study reflect the current prevalence and practical application of EBP in stroke rehabilitation by occupational therapists. Our findings indicate that the use of EBP in stroke rehabilitation is present across all practice settings. However, the results indicated that the implementation of best evidence interventions across all settings were not being utilized on a daily basis due to a variety of variables, such as a lack of resources, a lack of knowledge, a limited amount of time for individual treatment sessions, and a limited time to conduct individual research. These results possibly reflect and support our hypothesis that best evidence research only accounts for a small fraction of what OT practitioners use to determine their intervention strategies when treating clients who have experienced stroke.

Through thematic analyses, we found that the most frequently reported reasons as to why the four evidence-based practice interventions were not implemented was the lack of resources and knowledge. Of those OT practitioners that did report the use of the best evidence research interventions in their practice, they also report that they currently work in outpatient clinics, which may directly imply that these resources are more readily

available in outpatient settings. VR was the least used intervention and presented as the intervention with the least amount of knowledge and exposure. Given this information, a push for increased awareness and training in order to utilize and implement the emerging technology-based, best evidence research interventions into daily practice is needed. Additionally, intervention approaches were determined by patient response, client-centered care, research and continuing education. These emerging themes suggest that current practitioners working with the stroke population may need to seek additional resources to increase their knowledge on evidence-based interventions and engage in further training on how to utilize and implement these intervention strategies.

Another theme we found present in our survey data was the lack of time to implement certain intervention methods during treatment sessions. Each client is restricted to having a set amount of appointments per week with limited treatment duration in the clinic, therefore it may be difficult for the OT to incorporate interventions like CIMT, which requires high intensity and increased length of treatment time in order to be effective. This finding suggests that given the limited treatment session durations, research must be done to investigate the long-term effects short duration CIMT, along with the other described interventions, may have on improving the function of the hemiparetic UE in poststroke clients. In addition to restricted treatment time, it was also found that many OTs find they are being prevented from researching best evidence research in OT stroke rehabilitation on a regular basis due to not having enough time in their work day. Therefore, providing an allotted time to focus on keeping updated with current research should be pushed throughout OT clinics in all settings to ensure that our

clients are receiving the best treatment to improve the UE functioning of their hemiparetic limb as well as their overall health and well-being.

Limitations

The results of this study are limited due to a small sample size; not all of the therapists that work with stroke clients have access to AOTA and/or OTAC, or if they do they may not check it regularly or on the forums the survey was posted to, therefore responses are limited to the therapists that have access to these platforms. Additionally, the survey was posted twice to the AOTA forum and researchers did not receive a response from OTAC in regards to sending out the survey link. For those who responded to our survey, there may have been a lack of understanding and comprehension of our written questions, which may have skewed the results of our data. Results were influenced by some participants skipping questions, and by not providing a response our data is limited. Additionally, at the end of our survey we asked the participants to forward the survey link to any other occupational therapists they know who work with stroke rehabilitation and meet the inclusion criteria. We acknowledge that this method of convenience/snowball sampling may result in sampling bias as initial participants tend to nominate others that they know well. This leads to a high possibility that the subjects share similar traits and characteristics, so it is possible that the sample the researchers will obtain only represents a small subgroup of the entire population of therapists who work with this client population.

Conclusion

As a science-driven and evidence-based profession, it is important that evidence-based rehabilitative strategies be implemented in OT practice. In our review of the

literature regarding OT rehabilitation techniques for poststroke individuals experiencing UE hemiparesis, we identified four evidence-based practice interventions: electrical stimulation, mirror therapy, constraint-induced movement therapy, and virtual reality. Although implementing evidence-based research in practice is ideal, occupational therapists working with stroke clients have identified perceived barriers to using such methods in stroke rehabilitation addressing hemiparesis. Among surveyed OT practitioners working with the stroke population, very few use the best evidence interventions to guide their treatment; instead, they focus on individual client needs. The results of this study suggest that further research needs to be done to determine how to increase the use of EBP interventions implemented around client-centered care in order to provide the best intervention approaches for poststroke clients. Additional studies should recruit a larger sample population in order to gain further insight on the perceived barriers to the use of EBP in stroke rehabilitation. Additionally, further research is needed to determine the best method to implement these EBP intervention strategies while maintaining client-centered care. Our research may also be further used as a clinical guide to increase the resources needed to implement EBP intervention, extend the time needed to carry out such treatment sessions, and encourage practicing clinicians to maintain their knowledge on current research strategies. This will ensure that poststroke clients who have experienced UE hemiparesis are receiving the best treatment aimed to assist them in the recovery process so that they may engage in meaningful occupations that improve one's overall quality of living.

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Appendix A

Therapist Consent Form

Description: You are invited to participate in a research study on occupational therapy interventions for post-stroke clients with upper extremity hemiparesis. There is plenty of research on effective interventions for post-stroke rehabilitation that improves motor functioning, but there is no data stating how often these interventions are being applied in a clinical setting or if they are even being used at all. Through our research, we are hoping to find whether or not therapists are using the best evidence-based interventions we identified and understand the reasoning behind those choices. You will be asked to read and sign this consent form if you agree to participate, then continue on by completing an online survey.

Your Time Involvement: The time to fill out the survey will take approximately 10-15 minutes.

Risks and Benefits: We aim to maintain the privacy rights of each participant by keeping participant names and site names anonymous, resulting in low risk for the loss of confidentiality. The results of this research will help identify common themes relating to the implementation of evidence-based practice interventions when working with post-stroke clients with upper extremity hemiparesis. These results will enhance further research to assure that the best evidence-based practice interventions are being implemented in clinical settings.

Payment: There will be no payment for participation in this study.

Participant Rights: If you have read and signed this form you are consenting to participate in this study. Participation in this study is voluntary and you have the right to withdraw at any point without penalty. Your alternative is to not participate in this study. You have the right to refuse to answer specific questions. The identity of the facility or therapist(s) will not be disclosed at any time. The survey will be anonymous and data will be analyzed at the end of the survey deadline. Consent forms and data will be destroyed after a year. The results of this study may be disseminated at professional meetings or published in scientific journals.

Contact Information: If you have any questions about this research you may contact the Faculty Advisor:
Alice Cheung; phone number: (562) 472-9715, email: acheung@stanbridge.edu

Independent Contact: If you are in some way dissatisfied with this research and how it is conducted, you may contact the Stanbridge University Vice President of Instruction at VP.instruction@stanbridge.edu.

Do you agree to the above terms? By clicking Yes, you consent that you are willing to answer the questions in this survey.

Appendix B

Survey Questions

Below is a list of 19 questions that will be included in the survey made using Survey Monkey and will be posted using a link on an AOTA discussion forum as well as distributed through OTAC. Prior to the start of the survey will be the consent form we had provided in the section above.

1. Are you a current licensed occupational therapist?
    a. Yes
    b. No

2. How many years have you been an active licensed practitioner?
    a. 0-5 years
    b. 6-10 years
    c. 11-15 years
    d. 16+ years

3. Which state (California, New York, etc.) do you currently practice in?
    - fill in the blank

4. How long have you been working with post-stroke clients?
    a. 0-5 years
    b. 6-10 years
    c. 11-15 years
    d. 16+ years

5. What level of expertise in stroke rehabilitation do you consider yourself?
    a. Novice (limited experience, new to the field)
    b. Advanced Beginner (enough experience that enables one to troubleshoot their problems and work on their own)
    c. Competent (obtained necessary knowledge and experience to have acceptable and satisfactory overall performance)
    d. Proficient (able to successfully carry out tasks independently)
    e. Expert (can provide guidance, troubleshoot and answer questions related to this area of expertise)
6. What setting do you practice in?
    a. Hospital
    b. Community care
    c. Skilled nursing facility
    d. Outpatient
    e. In-home
    f. Other, please specify.

7. Which of the following intervention methods do you practice with stroke rehabilitation? Pick all that apply.
   a. Functional Electrical Stimulation
   b. Constraint-Induced Movement Therapy
   c. Mirror Therapy
   d. Virtual Reality
   e. Other, please specify.

8. Have you obtained any advanced training certifications? Please select all that apply.
   a. NDT (neurodevelopmental therapy)
   b. CIMT (constraint-induced movement therapy)
   c. PNF (proprioceptive neuromuscular facilitation)
   d. CHT (certified hand therapy)
   e. Other, please specify.

9. If you have used functional electrical stimulation before, how often do you use it?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely
   e. Never

10. If you have used constraint-induced movement therapy before, how often do you use it?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely
   e. Never

11. If you have used mirror therapy before, how often do you use it?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely
   e. Never

12. If you have used virtual reality-based therapy before, how often do you use it?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely
   e. Never

13. If Functional Electrical Stimulation, Constraint-Induced Movement Therapy, Mirror Therapy, or Virtual Reality are not being implemented, please explain why. What prevents you from using any of the above interventions?
    a. Lack of time during treatment sessions
    b. Lack of resources in the clinic
    c. Lack of knowledge on the intervention
    d. Other, please specify

14. How do you determine which approach to use?
    a. Method learned in school
    b. Research articles
    c. Learned from a colleague or supervisor
    d. Other, please specify

15. Are there any of the listed interventions (Functional Electrical Stimulation, Constraint-Induced Movement Therapy, Mirror Therapy, Virtual Reality) that you are not familiar with?
    a. If yes, please specify which.

16. How frequently do you research and keep yourself updated on the most current evidence-based practices in occupational therapy stroke rehabilitation?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely
    e. Never

17. What are some aspects that prevent you from researching evidence-based practices in stroke rehabilitation?
    a. Not enough time
    b. Do not have database access
    c. Unsure of how to access the databases
    d. Nothing, I regularly research articles and keep up to date on current techniques
    e. Other

18. Any additional comments regarding the mentioned interventions, other interventions, or information on evidence-based practice?
    - Open-ended question

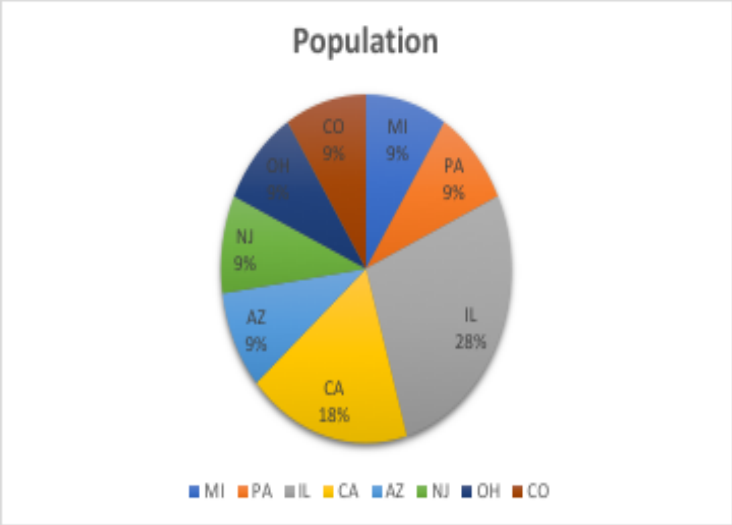
19. If you know another Occupational Therapist that works within the stroke rehabilitation population, please forward them our survey link! Thank you for your participation.

Appendix C

Data Analysis Figures

Figure 1

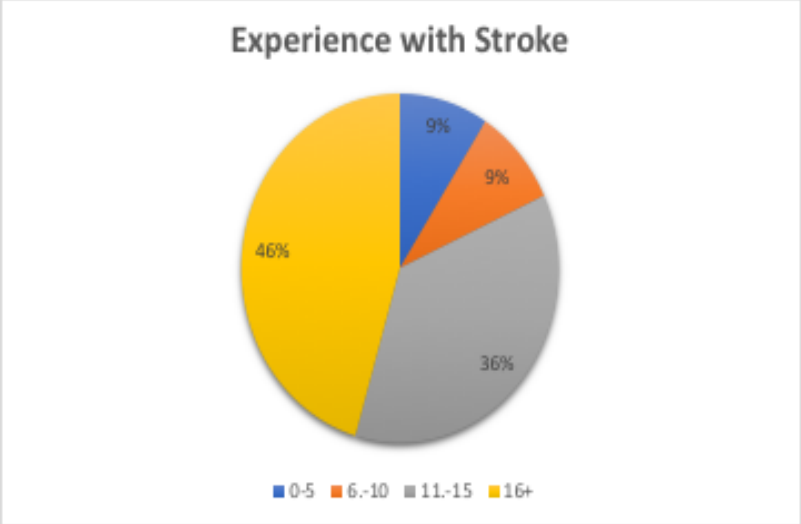
Representation of Different U.S. Regions



Note. Of the survey respondents, 28% practice in Illinois, 18% practice in California, 9% practice in Arizona, 9% practice in New Jersey, 9% percent practice in Michigan, 9% practice in Colorado, 9% practice in Ohio, and 9% practice in Pennsylvania.

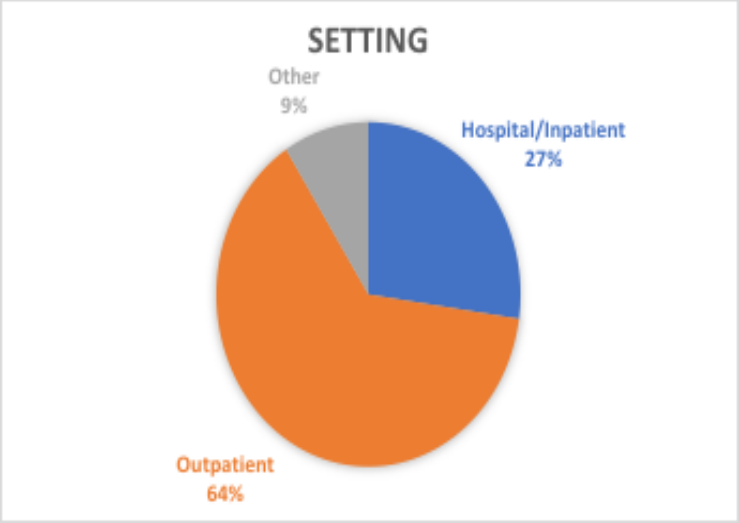
Figure 2

OT Experience Working With Poststroke Clients



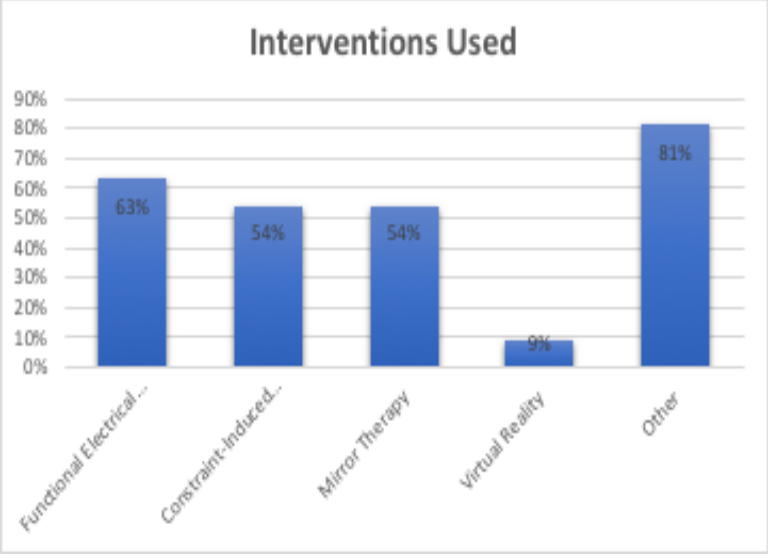
Note. Of the 15 respondents, 46% report to have been working with poststroke clients for 16 or more years, 36% have had 11-15 years of experience, 9% have had 6-10 years, and another 9% have had 0-5 years of experience.

Figure 3
Clinician Practice Settings



Note. Of the survey respondents, 64% practice in outpatient settings, 27% practice in hospital/outpatient settings, and 9% reported to practice in other settings.

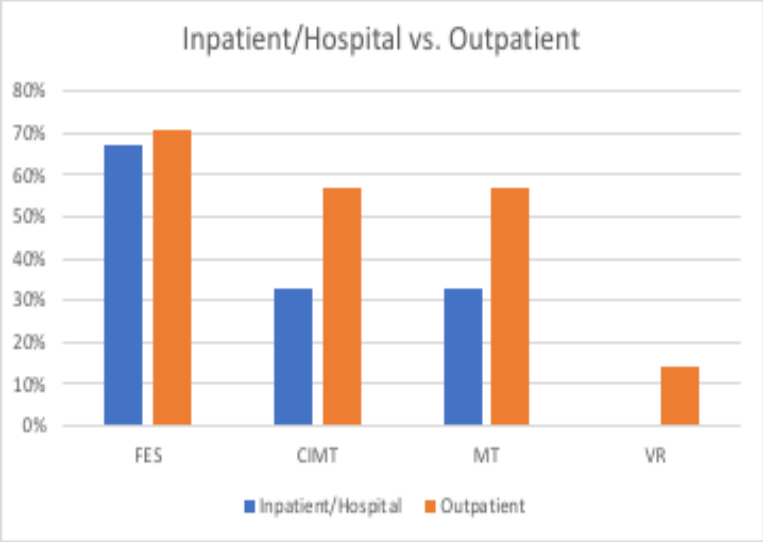
Figure 4
Interventions Used for UE Hemiparesis



Note. Of the survey respondents, 63% report to use Functional Electrical Stimulation, 54% use Constraint-Induced Movement Therapy, 54% use Mirror Therapy, 9% use Virtual Reality, and 81% reported use of other techniques.

Figure 5

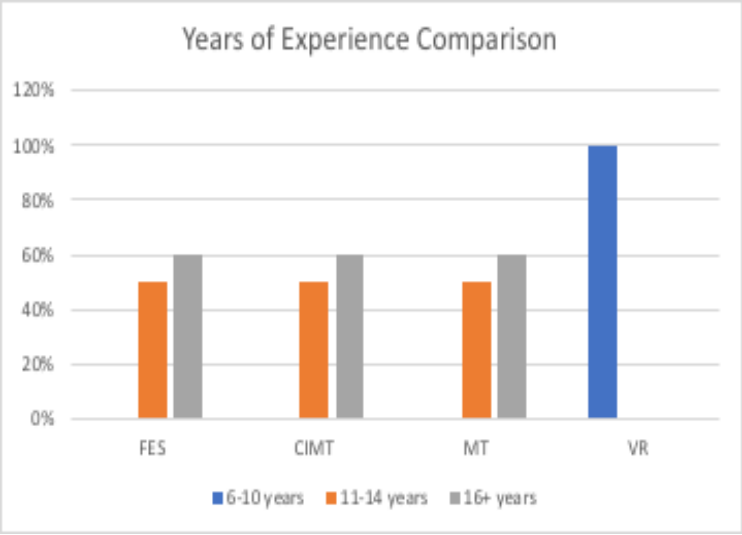
Comparison of Interventions Across Multiple Settings



Note. Based on survey responses, in the hospital/inpatient setting 67% of participants use FES, 33% use CIMT, 33% use MT and no therapist reported using VR. In the outpatient setting 71% of participants use FES, 57% use CIMT, 57% use MT and 14% use VR.

Figure 6

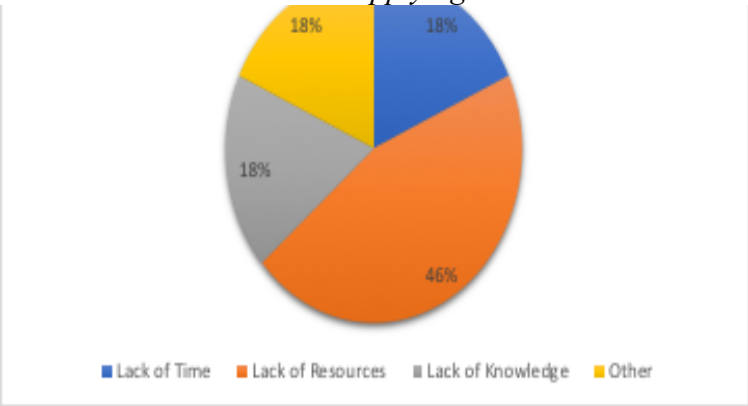
Comparison of Experience Among Participants



Note. Based on the survey responses, 50% of participants with 11-14 years of experience with stroke use FES, 50% use CIMT, 50% use MT and none have used VR. In comparison, 60% of therapists with 16+ years of experience with stroke clients use FES, 60% use CIMT, 60% use MT and none have used VR.

Figure 7

Clinician Reasons For Not Applying Interventions



Note. Of the survey respondents, 46% report lack of resources to implement best evidence research interventions, 18% report lack of knowledge, 18% report lack of time, and another 18% listed other reasons.