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Aquatic Therapy for Occupational Therapy Education and Practice

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AQUATIC THERAPY FOR OCCUPATIONAL THERAPY EDUCATION AND PRACTICE

by

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ABSTRACT

Purpose: With injuries, diseases and various conditions occurring daily among millions of Americans, the need for therapeutic intervention is steadily growing, as indicated by The American Occupational Therapy Association (2017a). Aquatic therapy is a unique practice that may be utilized across multiple healthcare professionals to benefit clients with a variety of conditions. Occupational therapists are qualified to perform aquatic techniques with clients in the pool; however, aquatic therapy is rarely utilized in occupational therapy practice (Franken, Mische Lawson & Santalucia, 2013). The problem may be derived from the lack of knowledge from occupational therapy students and entry-level practitioners regarding aquatic techniques in practice (Franken et al., 2013). Therefore, occupational therapy students and entry-level therapists should be educated on the benefits, drawbacks and intervention strategies involved with aquatic therapy in order to provide a unique, evidence-based experience to clients.

Methodology: A literature review was conducted exploring the concepts of education and aquatic therapy components using PubMed, Google Scholar, Academic Search Premier and Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases. Key terms used in this search included *aquatic therapy, education,* and *occupational therapy.* Techniques for teaching and learning in the educational environment were also reviewed using Academic Search Premier, Google Scholar and CINAHL databases using key terms such as *occupational therapy, education, teaching, learning,* and *students*. Specific educational techniques used for this manual were based

on the theories of Andragogy, also known as adult learning, and Cognitive Constructivism, which involves active learning and forming personalized meaning through experiences (Powell & Kalina, 2009). Additionally, the evaluation and intervention samples were designed based on the Ecology of Human Performance Model (EHP), which involves using a multitude of approaches to address the person, context, task and performance (Dunn, 2017). Aspects of EHP relevant to this manual include the support of interdisciplinary treatment, community-based involvement, and allows for the environment to facilitate client behavioral change (Dunn, 2017).

Outcome: Several outcomes to aquatic therapy were discovered for clients with a variety of conditions. Some benefits of aquatic interventions included increased muscle strength, improved balance and coordination, reduced fear of falling, and enhanced functional mobility (Resende & Rassi, 2008; Salem et al., 2015). Aquatic intervention was also found to improve dual-task performance and overall mood or satisfaction with performance (Shaefer, Louder, Foster & Bressel, 2016). Drawbacks of water-based intervention were found including allergic reactions to chlorine and limited access to the aquatic environment (Lima, Dias, Mazuquin, da Silva, Nogueira, Marques & Cardoso, 2013). Specific materials regarding inclusion of aquatic therapy in occupational therapy education were limited and research of water-based techniques in occupational therapy practice was scarce.

Product: A resource manual was developed to provide educational material for occupational therapy students and entry-level practitioners. The manual begins with a

brief introduction of aquatic therapy and interprofessional utilization of this water-based strategy. It continues with descriptions of how the manual can be used in an educational setting as well as an intervention manual for practitioners. While utilizing occupational therapy evaluation tools as pretest and outcome measures and occupations as a means of therapy, a wide variety of populations are able to benefit from this manual. Sample sessions and case studies are included to support learning and provide a user friendly tool.

CHAPTER I

INTRODUCTION

Introduction to Occupational Therapy

The prevalence of injuries, diseases and other conditions in the United States are abundant. These injuries and diseases are contributing factors for lack of engagement in life tasks. Some of the most common conditions include low back pain, musculoskeletal or head injuries from falling, and chronic upper extremity ailments. With injuries, diseases and various conditions occurring and being diagnosed daily, the need for therapeutic intervention is steadily expanding, according to The American Occupational Therapy Association (2017a).

Occupational therapists are among the plethora of health professionals who play a critical role in the rehabilitation process. Occupational therapy is a unique and valuable allied health profession in which licensed therapists provide evaluation and intervention services for clients through engagement in occupations (AOTA, 2017a). Occupational therapists serve individuals across the lifespan with an emphasis on the physical, cognitive, spiritual, social, and cultural qualities of each client (AOTA, 2017a).

Problem

Occupational therapy education programs are designed to prepare students to enter the workforce as entry-level practitioners to treat people with a wide variety of populations in a multitude of contexts. While this approach is valuable, new graduates often enter the workforce with limited information regarding non-traditional practice

areas. One area of practice that is not commonly explored in occupational therapy curriculum is aquatic therapy. Subsequently, entry-level practitioners are not exposed to this area of practice, and have a lack of knowledge of the benefits of aquatic therapy and how it can be a useful tool in the field of occupational therapy.

Purpose of the Product

The purpose of this product is to provide a dual-purpose manual. First, this manual can be used for occupational therapy students to use as an introductory tool to aquatic therapy. Second, occupational therapy practitioners may use this manual as a field-guide to utilize in practice with the appropriate clientele. This manual was designed to bridge the gap between the knowledge and the opportunities that students and entry-level therapists have in the area of aquatic therapy.

Educational Theories

In order to best facilitate adult learning, Knowles' Andragogy theory was chosen. This theory encourages the use of group sessions and involvement of clients and learners throughout the learning process (Werth & Werth, 2011). Another theory to build the product was Piaget's theory of Cognitive Constructivism. The focus is to allow the student or client to be an active learner and construct his or her own meaning based on personal experience (Powell & Kalina, 2009). Additionally, these models allow for the client to be his or her own agent of change and learn new concepts through practice and repetition.

Occupation-Based Model

To guide the process of forming the product, the Ecology of Human Performance Model (EHP) was chosen. This model allows for interdisciplinary practice by

incorporating terms that are familiar across multiple disciplines (Dunn, 2017). Additionally, the EHP model is focused on using the environment to facilitate client change (Dunn, 2017). As highlighted in the model, the desired outcomes would be to increase the performance range for clients to increase engagement in meaningful occupations, with the ability to adapt the context (Dunn, 2017).

Proposed Interventions & Application

The interventions that are highlighted in this manual include ideas from Andragogy, Cognitive Constructivism and the EHP model. Interventions with the adult population include the concept of Andragogy, to support adult learning through means of allowing the client to guide his or her own learning process. Cognitive Constructivism was utilized in the manual to support the concept of learning by doing various tasks. In the manual, there are case studies that allow learners to increase their knowledge by practicing different aquatic therapy scenarios. Finally, concepts of the EHP model can be found throughout the manual to set a foundation for occupational therapy practice in water-based techniques. Interventions should also incorporate preparatory, purposeful activities, and occupation-based tasks to enhance learning, ensure client-centeredness, and support follow-through.

Key Concepts

- *Andragogy:* "adult learning" consists of four principles based on Malcolm Knowles. These include integrating adult involvement in course instruction, learning through experience, learning information related to current life situations, and utilizing problem-centered topics instead of content-related (Knowles, 1980).

- *Aquatic Therapy:* an intervention technique that involves utilizing activities to promote physical and cognitive rehabilitation (Sanders, Islam, Naruse, Takeshima & Rogers, 2016).
- *Cognitive Constructivism:* ideas constructed from each person's experiences in order to form personal meaning (Powell & Kalina, 2009). The focus is for learners to be highly involved in learning in order to gain a deep and meaningful understanding (Fosnot & Perry, 1996).
- *Ecology of Human Performance Model:* an occupation-based model in which tasks are used to increase the client's performance range, so the client could increase engagement in meaningful occupations (Dunn, 2017).
- *Occupation***:** Everyday life activities including activities of daily living, instrumental activities of daily living, leisure, work, rest and sleep, play, and education (AOTA, 2017a).
- *Occupational Therapy:* an allied health profession in which licensed professionals provide evaluation and intervention services for clients across the lifespan through engagement in the clients' meaningful occupations (AOTA, 2017a).

Conclusion

Chapter II consists of a literature review and summary of findings in relation to aquatic therapy and occupational therapy education and practice. The methodology is described in chapter III, including detailed descriptions of how the product was conceptualized and organized. Chapter IV consists of the product, which is comprised of a dual purpose manual that can be utilized by occupational therapy students and practitioners. Finally, chapter V is comprised of a summary of the scholarly project.

CHAPTER II

REVIEW OF LITERATURE

The prevalence of injuries, diseases and other conditions in the United States are abundant, affecting millions of Americans in the adult population and their ability to engage in life tasks, including such functions as ambulation within their environment. Falling is a common cause for injury. According to the Centers for Disease Control and Prevention (2017), more than 2.8 million older adults are admitted into the emergency room as a result of falling. In addition, 20% of these falls result in a musculoskeletal or head injury (Centers for Disease Control and Prevention, 2017). Injuries that result in falls may cause impairment in performing life tasks, therefore, intervention from allied professionals in needed.

Shoulder injuries are also generally common across the lifespan. Rotator cuff tears are one of the most common shoulder injuries to be seen in outpatient rehabilitation settings (Brady, Redfern, Macdougal, & Williams, 2008). These injuries often result from a traumatic event, such as a fall, or chronic overuse of the shoulder in conjunction with muscle weakness. It can be assumed that since the upper extremities are used to perform several daily tasks, shoulder injuries often result in reduced ability to perform such tasks.

Low back pain (LBP) is another injury that is well known among the adult population. Pires, Cruz and Caeiro (2015) wrote that chronic low back pain is one of the leading causes of functional disability and work absence. Additionally, Johnson, Keyan and Rosario (2016) reported the following:

> LBP is the second-leading cause for medical visits in the United States and the fifth most common reason for hospital admissions. It is estimated that 80% to 90% of people in the United States will be affected by some form of LBP during their lifetime. (p. 22)

With injuries, diseases and various conditions occurring daily among millions of Americans, the need for therapeutic intervention is steadily growing, as indicated by The American Occupational Therapy Association (2017b). Allied health professionals play a vital role in the treatment and rehabilitation of patients with chronic and acute conditions. Occupational therapists are among these professionals who play a critical role in this process.

Occupational therapy is a unique and valuable allied health profession in which licensed professionals provide evaluation and intervention services for clients through engagement in the clients' occupations (AOTA, 2017a). Occupational therapists serve individuals across the lifespan with the goal to facilitate performance in clients' meaningful occupations, individualized to each client's needs. Therapists provide skilled services for each client according to his or her unique physical, cognitive, spiritual, social, and cultural qualities (AOTA, 2017a). According to the American Occupational Therapy Association (2017a), occupational therapy practitioners hold a holistic perspective, focusing on adapting the environment to fit the person, who is an important part of the therapy team (AOTA, 2017a).

In order to properly facilitate performance in occupations, occupational therapists engage in assessment, to evaluate client abilities, and then subsequent interventions aimed to facilitate return to function (AOTA, 2017a). Client populations with whom

occupational therapists work vary greatly and thus academic occupational therapy educational programs are tasked with preparing entry-level practitioners on education regarding services for people across the lifespan who may encounter disruptions in occupational performance due to any disease, illness, injury or condition. Subsequently, new graduates of the occupational therapy program usually enter the workforce as general practitioners. While this approach is valuable, often new graduates enter the workforce with limited information regarding areas of practice that are considered non-traditional or those practice areas that require additional training. One area of practice that is not commonly explored in occupational therapy curriculums is that of aquatic therapy.

Aquatic therapy is an intervention technique that involves utilizing activities to promote physical and cognitive rehabilitation (Sanders, Islam, Naruse, Takeshima & Rogers, 2016). Aquatic intervention typically takes place in pools of various sizes where participants have enough room to stand and perform exercises (Sanders et al., 2016). Aquatic therapy may be administered by a variety of healthcare professionals including occupational therapists, physical therapists, athletic trainers and exercise physiologists (HydroWorx, 2018).

Occupational therapy has a number of specialty areas that encompass focused knowledge that is specific, detailed and beyond what a general practitioner may know. According to the AOTA (2017b), certifications that are considered specialty areas in occupational therapy include *Driving and Community Mobility*, *Environment Modification*, *Feeding, Eating and Swallowing*, *Low Vision*, and *School Systems*. Although there has been little research conducted on aquatic therapy in occupational

therapy, aquatic therapy is not a specialty area and is billed as *Therapeutic Procedures* in Medicare CPT codes as "97113 aquatic therapy with therapeutic exercises," (AOTA, 2017b, p. 1). Therapeutic Procedures are defined as a manner of effecting change by clinical skills of direct patient to therapist contact in attempts to improve function (AOTA, 2017b).

Aquatic therapy is a remedial intervention that has been used by clinical professionals to heal clients with a wide variety of physical and cognitive conditions. Aquatic interventions may be beneficial for clients seeking therapeutic treatment. Franken, Mische, Lawson and Santalucia (2013) stated, "[c]urrent evidence reveals that participating in aquatics leads to increased function, health, wellness, and quality of life across the lifespan" (p. 16). In the field of occupational therapy, aquatic therapy is used to aid clients of a wide variety of abilities and conditions. However, many therapists and students are unaware of the benefits and techniques of aquatic therapy for occupational therapy practice. As highlighted in this literature review, aquatic therapy is a useful treatment that provides several benefits to clients with various conditions and occupational needs. Thus, it is important for aquatic therapy to be included in occupational therapy education to ensure that best practice is provided to students. Additionally, resources should be available for occupational therapy practitioners to learn and apply aquatic therapy techniques with clients.

The purpose of this literature review is threefold. The first purpose is to explore the benefits and drawbacks of aquatic intervention for clients with a wide variety of conditions. The second purpose is to review the educational dynamics in typical occupational therapy curriculum. Finally, the goal of this literature review is to discover a

connection between aquatic intervention and occupational therapy education in order to understand how to implement aquatic therapy into practice.

Occupational Therapy Educational Standards

The authors began by exploring educational standards for occupational therapy programs. Occupational therapy programs are designed to prepare students for entry-level practice in order to aid clients in performing their most valued occupations. Once students are accepted into an accredited occupational therapy assistant (OTA), Master's of Occupational Therapy (MOT), or Occupational Therapy Doctoral programs (OTD), they must complete coursework prior to participating in fieldwork experiences. Throughout the curriculum, level I Fieldwork is integrated in full days for one-half a term, full days in alternating weeks for one term, half days for one term, or one week throughout the undergraduate curriculum (AOTA, 2017b). The American Occupational Therapy Association (2017b) described the goal of level I fieldwork is to introduce students to the experience of fieldwork and gain a basic understanding of the needs of clients. There are a wide variety of settings and populations available for students that must follow certain requirements. The goal of level II Fieldwork is to develop entry-level occupational therapists and occupational therapy assistants that are competent (AOTA, 2013). Prior to graduation, students must complete a capstone by integrating knowledge and skills learned through coursework and fieldworks, ending with professional research poster presentations (Cohn, Coster & Kramer, 2014). As students complete final exams and become graduates with the respective occupational therapy title, graduates are required to pass the National Board Certification of Occupational Therapy (NBCOT) exam before they can begin practicing.

In order to be registered nationally and eligible for state licensure, occupational therapy students must graduate from an accredited professional program thereby completing the requirements set by The Accreditation Council for Occupational Therapy Education (ACOTE). This council is responsible for the development and evaluation of the guidelines and standards for occupational therapy education for Master's and Doctoral occupational therapy degree programs. Standards include the minimum requirements of knowledge and skill that students need by graduation. There are numerous standards that are the same among the OTA, MOT, and OTD programs. An example from the preamble states that a graduate must acquire knowledge of liberal arts, science and diversity, become educated on the settings in which occupational therapy is implemented, complete academic education and fieldwork practicums, understand how to apply occupational therapy assessments and interventions to individuals with a wide variety of abilities and diagnoses across the lifespan (ACOTE, 2011).

Although there are similarities between the three program standards, there are differences as well, both slight and significant. In the MOT accreditation, standard B.5.19. states that the student will be able to "apply the principles of the teaching–learning process using educational methods to design experiences to address the needs of the client, family, significant others, colleagues, other health providers, and the public" (ACOTE, 2011, p. 26). The OTD standard includes "communities" in the description and the OTA standard doesn't include use of educational methods, to demonstrate a few slight differences.

According to ACOTE (2011), the standards that guide OTA programs require students to possess basic skills to provide direct care, education and advocacy for

occupational therapy. The MOT programs require additional student knowledge and skills including consulting, managing and researching in the occupational therapy profession (ACOTE, 2011). Finally, the OTD programs require advanced knowledge and skills regarding direct care, consultation, management, leadership, research, education and advocacy (ACOTE, 2011).

Graduates must then attain a licensure that comprises of different requirements per state. Once these steps are completed, occupational therapists may practice in a wide variety of environments, including the client's home, work, school, or community. Other settings available include long-term care facilities, hospitals, outpatient rehabilitation, nursing homes, hand therapy clinics, pediatrics, mental health, community-based settings, veteran populations and more. Overall, entry-level therapists must be able to problem solve and create interventions that are client-centered, occupation-based and best suited for each individual client's interests and needs.

All accredited Occupational therapy programs must meet specific standards set by ACOTE in order to best prepare students for entry-level practice. The implementation of aquatic therapy into occupational therapy education meets both MOT and OTD curriculum standards. For example, ACOTE (2011) standard A.6.1 states:

> The curriculum must ensure preparation to practice as a generalist with a broad exposure to current practice settings (e.g., school, hospital, community, long-term care) and emerging practice areas (as defined by the program). The curriculum must prepare students to work with a variety of populations including, but not limited to, children, adolescents, adults, and elderly persons in areas of physical and mental health (p.16).

Aquatic therapy fits ACOTE standard A.6.1 because it is a current practice technique in which therapists can serve clients of a variety of populations to improve physical and mental health. Aquatic therapy also fits B.5.16 as practitioners must have the ability to educate clients on specific skills to perform various occupations (ACOTE, 2011). Furthermore, according to standard B.5.16, occupational therapists must have the ability to educate clients on prevention and safety (ACOTE, 2011). For example, occupational therapists may utilize the aquatic environment to educate clients on prevention and safety techniques such as falls prevention and correct safety techniques during transfers.

Educational Theory

In order to gain understanding of how adults learn, the authors began by exploring educational theories. One learning theory that was analyzed was Knowles' Andragogy of adult learning. Knowles believed students should be engaged in self-evaluations to assist in understanding experiences, utilize practical applications from classwork, and engage in group work (Werth & Werth, 2011). The four principles Knowles proposed include adult involvement in course instruction, learning through experience, learning relevant subjects related to current life situations, and problem-centered topics instead of content-related (Knowles, 1980).

Next, Piaget's Theory of Cognitive Development was explored. In this theory, humans must construct their own knowledge instead of being provided with information that is expected to immediately be used and understood (Powell & Kalina, 2009). Piaget developed the process and idea of Cognitive Constructivism, described as ideas constructed from each person's experiences in order to form personal meaning (Powell &

Kalina, 2009). The focus of Cognitive Constructivism was to be an active learner, gain a deep understanding, and do so by reorganizing and transforming personalized versions of cognitive development (Fosnot & Perry, 1996).

Werth and Werth (2011) proposed a need for shifting from an instructor presentation focus to a constructivist, student-centered mentality. Powell and Kalina (2009) stated that collaboration with others improved communication skills that enhanced the learning process. Further, Vygotsky explained that internalization of information was more effective with social interaction (Powell & Kalina, 2009). Other teaching methods that were found to be effective include incorporating collaboration, cooperation, communities of learning and engagement with students (Bassendowski & Petrucka, 2013).

Aquatic Intervention for Occupational Therapy

The aim of occupational therapy education is to prepare students in clinical reasoning habits that will guide fieldwork experiences and integrate evidence into future practice (Cohn, Coster, & Kramer, 2014). However, when researching occupational therapy education on aquatic therapy practices, literature on aquatic intervention for occupational therapy was scarce. Although aquatic therapy is considered a useful intervention, it is not commonly used in mainstream occupational therapy practice. Franken, Mische Lawson and Santalucia (2013) stated:

> The aquatic environment provides a multitude of applications, ranging from treatment of acute and chronic injuries to health maintenance to overall wellness, yet it continues to be an underused treatment modality. The role of an occupational therapist is to use the aquatic environment to ultimately maximize an

> individual's ability to achieve his or her goals, such as land-based activity performance, leisure participation, and/or health and wellness. (p. 16)

Franken et al. (2013) further concluded that aquatic therapy is considered a skilled intervention in occupational therapy practice; however, many therapists are either unaware of the benefits of aquatic intervention, or do not know how to use water-based interventions appropriately with clients in order for the intervention to be considered skilled occupational therapy services. Finally, there is a lack of knowledge of specific occupation-based interventions that can be utilized in the aquatic setting, which may be another reason why aquatic therapy is not commonly utilized by occupational therapists (Franken et al., 2013). In order to fill this gap of knowledge, the authors explored the benefits and drawbacks to utilizing aquatic intervention.

Benefits of Aquatic Therapy

Aquatic therapy has been beneficial in improving various body functions, including musculoskeletal, cognitive and sensory components (Herold et al.,2016). Interestingly, Vivas, Arias, and Cudeiro (2011) suggested the buoyancy and hydrostatic pressure from water aids in body support and can be safer than land-based therapy, due to the reduction of fall velocity. Warm water may also help reduce spasticity in muscles (Vivas et al., 2011). Furthermore, Johnson, Keyan, and Rosario (2016) found therapists who have used aquatic interventions to help individuals with musculoskeletal conditions reduce low back pain and improve physical ability. Johnson et al. (2016) found that through aquatic interventions, participants showed a significant decrease in lower back pain and increased flexibility. Additionally, significant decrease in fear avoidance and

increase in quality of life were found with participants in who completed aquatic interventions (Johnson et al., 2016).

Resende and Rassi (2008) implemented an aquatic therapy program for elderly women and discovered after 12 weeks, participants showed enhanced balance, walking speed and coordination, thus demonstrating musculoskeletal and cardiovascular improvements. Salem, Scott, Karpatkin, Concert, Haller, Kaminsky and Spatz (2011) added to this evidence by creating a community-based aquatic therapy program that included warm-up activities, exercises and cool-down activities. The researchers incorporated exercises that consisted of joint mobility, balance, coordination and strength into the aquatic therapy program (Salem et al., 2011). Interestingly, Salem et al. (2011) noted that subjects who performed aquatic exercises showed significant improvements in balance, walking speed, coordination and grip strength from the beginning to the end of the treatment sessions. These findings were further supported by Sanders, Islam, Naruse, Takeshima and Rogers (2016) as they discovered subjects improved coordination, and upper-extremity strength following aquatic intervention. The subjects also showed improved cardiovascular function with improved walking speed (Sanders et al., 2016). Finally, Brady, Redfern, Macdougal and Williams, (2008) discovered that aquatic interventions might also benefit clients in gaining passive range of motion and flexibility.

Adapted techniques.

The aquatic environment may also provide opportunities to perform basic maneuvers that may be too difficult to perform on land. For example, Cuesta-Vargas, Cano- Herrera, and Heywood (2013) analyzed the neuromuscular responses of subjects performing a sit-to-stand maneuver on land versus in a pool and recognized that while

performing sit-to-stand in the water, there were fewer neuromuscular responses from the lower extremities versus performing the maneuver on land. Cuesta-Vargas et al. (2013) concluded that the aquatic environment was an appropriate alternative to performing exercises on land, especially for clients who have lower extremity weakness.

Castillo-Lozano and Cuesta-Vargas (2015) explored the activity of subjects' muscle groups during various swimming exercises. Castillo-Lozano and Cuesta-Vargas (2015) discovered that subjects utilized different muscles depending on the equipment that was being used. For example, when the swimmers used the snorkel, there was increased activity of the pectoralis, deltoid muscles and infraspinatus, while there was decreased activity of the erector spinae muscles and latissimus dorsi. This was a significant finding because it showed that swimming techniques could be adapted to focus on specific muscle groups with the use of adaptive equipment (Castillo-Lozano & Cuesta-Vargas, 2015). Therefore, aquatic interventions may hold more opportunities for occupational therapeutic exercises and adaptations versus land-based therapy (Castillo-Lozano & Cuesta-Vargas, 2015).

Mental functions.

Not only is aquatic therapy beneficial for physical functions, but mental functions may also be affected positively. According to the The Canadian Mental Health Association (2018), chronic physical conditions are a risk factor for poor mental health and vise versa. Additionally, physical activity may reduce the risk of mental health issues (Canadian Mental Health Association, 2018). Lynch and Sawyer (2016) encouraged the use of aquatic interventions to improve cognitive functioning by stating the following:

> It has been discovered that chest-level immersion alone results in statistically significant increases in cerebral blood flow, which may lead to improvements in cognitive function. When the body is immersed in water, our brains release a steady stream of natural hormones like endorphins, oxytocin and dopamine. Chemicals called neurotrophins are released, facilitating verve regeneration and reconnection (p.59).

Additionally, Schaefer, Louder, Foster and Bressel (2016) explored the cognitive performance through use of aquatic intervention. Participants with mild cognitive impairments and participants with no cognitive impairments took part in the study (Schaefer et al., 2016). Participants performed single-talk and dual-task activities while chest-deep in water (Schaefer et al., 2016). Interestingly, participants made fewer cognitive errors in the aquatic setting versus performing on land (Schaefer et al., 2016). In an extensive literature review, Herold et al. (2016) found that aquatic therapy could be beneficial for individuals to invoke mental relaxation and provide a calming sensory input.

Drawbacks to Aquatic Therapy

Although there are several benefits to aquatic intervention, there are drawbacks to consider. Lima, Dias, Mazuquin, da Silva, Nogueira, Marques and Cardoso (2013) conducted a meta-analysis to explore the effectiveness of aquatic intervention on individuals with fibromyalgia. The researchers noted that in aquatic therapy versus land-based therapy at the three 23-week timelines, pain and depression were measured with no significant differences in the results (Lima et al., 2013). Additionally, Brady et al. (2008) noted that the long-term effectiveness of aquatic therapy on passive range of motion

versus land-based therapy were unknown. In fact, in some studies, adverse side effects of aquatic therapy were reported including worsening of symptoms, muscle pain and hypersensitivity to chlorine (Lima et al., 2013).

In a systematic review by Marinho-Buzelli, Bonnyman, and Verrier (2015), aquatic therapy was shown to have positive effects on patients with neurological conditions; however, the long-term effects were inconclusive. Other drawbacks to aquatic intervention may include allergic reaction to chlorine, limited access to a pool, and difficulty transferring in and out of the pool (Lima et al., 2013). Additionally, some clients may have a fear of water or a fear of drowning, in which, aquatic therapy would not be appropriate (Franken et al., 2013).

Aquatic Therapy Overview

In summary, the benefits of aquatic therapy include multiple musculoskeletal, cognitive, and sensory components. Aquatic therapy has been shown to reduce spasticity, low back pain and fall risk (Johnson et al., 2016; Resende & Rassi, 2008). The interventions also improve balance, speed, coordination, and joint mobility in various populations (Salem et al., 2011; Sanders et al., 2016). Besides the increased strength and range of motion benefits of this intervention, aquatic intervention could also be used to improve cognitive functioning, invoked mental relaxation and provide a calming sensory environment (Herold et al.,2016). Drawbacks to aquatic intervention include limited evidence to support long-term effectiveness, pool availability, and adverse effects to chlorine (Lima et al., 2013).

Aquatic therapy is an upcoming therapeutic technique therapists can utilize to provide treatment to clients to improve occupational performance. It is evident that

aquatic therapy is an appropriate and beneficial treatment; however, many occupational therapy students and entry-level clinicians are unaware of how to use aquatic therapy as a therapeutic tool. This problem stems from lack of exposure to aquatic therapy in occupational therapy education. It would be beneficial for aquatic therapy to be taught in occupational therapy education so students and entry-level practitioners are aware of best practice techniques in occupational therapy.

Aquatic Therapy and the Ecology of Human Performance Model

The Ecology of Human Performance Model (EHP) is a suitable fit for aquatic intervention in occupational therapy. EHP is shaped around use of the environment to facilitate client behavioral change (Dunn, 2017). When using the EHP Model as a foundation for intervention development, the occupational therapist changes the environment and alters available tasks and contexts in order to provide meaningful, occupation-based treatment (Dunn, 2017). Interdisciplinary treatment is necessary for effective aquatic intervention with inclusion of physical therapy and other possible healthcare professionals, which EHP comprises (Dunn, 2017). Another fitting aspect for aquatic intervention is that EHP is an appropriate model to utilize with clients who have chronic conditions (Dunn, 2017). Community engagement is an imperative feature of EHP, which matches the method of group-based aquatic therapy because it provides clients with a sense of community involvement. The last characteristic of EHP that fits with aquatic intervention is the ability for occupational therapists to utilize preparatory methods as intervention due to the task-oriented approach (Dunn, 2017). Through the use of tasks to increase the client's performance range, the client could increase engagement in meaningful occupations, as encompassed in the EHP Model (Dunn, 2017).

Discussion

The purpose of this literature review was to explore the concepts of aquatic therapy and how to incorporate these ideas into occupational therapy education and entry-level practice. Currently, occupational therapy curriculum does not include aspects of aquatic therapy, yet has modified teaching techniques to better facilitate student learning. By implementing aquatic therapy into the curriculum with inclusion of intervention resources, students and practitioners will have the opportunity to learn through hands-on strategies and become informed on a well-researched and useful modality with the ability to aid a wide variety of clientele.

Occupational therapists can use aquatic intervention strategies to improve strength, range of motion, balance and cognition to help clients develop skills needed to perform everyday occupations. The role of occupational therapy in aquatic therapy is to determine areas of deficit per client factor and problem-solve ways to form occupation-based interventions in the pool, as well as provide education on implementing aquatic therapy into occupational therapy curriculum.

As the role of occupational therapy continues to evolve, aquatic therapy is emerging as a beneficial modality for a wide variety of clients. Mannerkorpi, Nyberg, Ahlmen, and Ekdahl (2000) created an education program comprised of six one-hour sessions aimed to provide strategies for pain management, lifestyle modifications, relaxation for stress and physical activity engagement for participants with fibromyalgia. In combination of pool exercises and education sessions, subjects experienced positive outcomes such as decreased pain, increased grip strength and social participation with enhanced lifestyle pronounced (Mannerkorpi et al., 2000). As occupational therapists

often address lifestyle management, reintegration into daily living, and encourage implementing exercise into daily routines, evidence showed that aquatic therapy can act as an appropriate modality for therapeutic interventions.

Summary

Aquatic therapy is an appropriate addition to occupational therapy education, as it meets the curriculum standards set by ACOTE for both MOT and OTD programs. Additionally, aquatic intervention may be utilized based on the EHP Model of occupational therapy practice to provide interventions to clients by using a variety of approaches. Aquatic therapy is an appropriate intervention that may be used by occupational therapists; however, many students and occupational therapy practitioners are unaware of the benefits and drawbacks to aquatic therapy. Furthermore, many clinicians do not know how to implement aquatic intervention into occupational therapy practice.

Occupational therapy covers a wide range of evaluation and intervention techniques that skilled clinicians use to serve a variety of populations across the lifespan. Occupational therapy education is based on ACOTE standards that include in-class requirements and fieldwork experiences to prepare future clinicians for licensure and future practice (AOTA, 2013). Students learn about the field of occupational therapy in a variety of ways; however, students show better performance when engaged in hands-on activities, in-depth discussions and real-life simulations to ensure effective transfer of learning into fieldwork and professional practice (Powell & Kalina, 2009).

Piaget idea of Cognitive Constructivism was explored, as it is described as ideas constructed from each person's experiences in order to form personal meaning (Powell &

Kalina, 2009). Additionally, Cognitive Constructivism emphasizes active learning to gain a deep understanding of what is being learned (Fosnot & Perry, 1996). To improve learning, Powell and Kalina (2009) suggested an emphasis in collaboration. Social interaction also supported learning (Powell & Kalina, 2009). Incorporating collaboration, cooperation, communities of learning were found to enhance the learning process(Bassendowski & Petrucka, 2013).

Aquatic therapy may be used to provide several benefits to clients, if used appropriately. Physical benefits of aquatic interventions include increased muscle strength, improved balance and coordination, reduced fear of falling, and enhanced functional mobility (Resende & Rassi, 2008; Salem et al., 2015). Additionally, the aquatic environment allows for different muscle groups to activate when performing certain exercises (Castillo-Lozano & Cuesta-Vargas, 2015). This means that clients who cannot perform maneuvers on land may be successful in performing these tasks in the water due to having buoyancy in the water. Finally, aquatic intervention may improve functions, such as dual-task performance, increase cerebral blood flow, promote nerve connections and improve overall mood or satisfaction with performance (Herold et al., 2016; Lynch & Sawyer, 2016; Schaefer et al., 2016). Aquatic therapy is not appropriate for everyone and adverse effects of this intervention are possible (Lima et al., 2013). Although the long-term effects of aquatic therapy still need to be explored, the aquatic environment may benefit clients in physical and mental functions (Marinho-Buzelli, et al., 2015). It is important for occupational therapists to understand the possibilities of intervention in the water in order to provide client-centered and occupation-based treatment.

Aquatic therapy is an upcoming and effective intervention technique to help treat clients with a wide variety of abilities. Although aquatic therapy is still in its infancy, it holds great promise as highlighted by recent evidence. Lack of exposure to aquatic therapy in occupational therapy education is problematic as it is essential for best practice to be provided to students via occupational therapy curriculum. As occupational therapy education prepares students for entry-level practice, it is vital for students to be exposed to aquatic therapy as an effective outlet for treatment. Thus, the purpose of this scholarly project is to explore the concepts of aquatic therapy and provide an educational resource that includes aquatic interventions specifically for occupational therapy students and entry-level clinicians to utilize for professional practice.

CHAPTER III

METHODOLOGY

Introduction

Our methodology consisted of choosing a topic following literature reviews regarding the need for aquatic therapy for adults within occupational therapy curriculum and in practice. We based our methodology and product on certain learning theories and an occupational model that fit our topic in order to guide our process. Next, we determined the purpose, which is to provide a dual purpose manual geared towards providing education for occupational therapy students in the water-based setting and as a manual created for entry-level occupational therapists to use as a reference in aquatic therapy. Basing our product on the Ecology of Human Performance (EHP) components, we formed evaluation, intervention, and outcome measures to organize the process. To guide the educational aspect, we made three case studies to integrate use of the therapy process within aquatic therapy, including sample sessions.

Formulation of Ideas

To bring the process of determining a topic, we found a similar interest in physical dysfunction. Next, the population was chosen and narrowed down to adults and older adults. We agreed on aquatic therapy because of the great possibility for occupational therapy involvement. Aquatic therapy was chosen based on mutual interest in the topic and the multiple areas of context in which this intervention could be implemented.

A precursory literature search was conducted and we found information on many aspects of aquatic therapy in relation to children and adults with neurodevelopmental disorders, mostly consisting of physical therapy interventions. The need for aquatic therapy in occupational therapy practice was found to be a need. We met with occupational therapy students at the University of North Dakota, along with fieldwork educators to discuss current knowledge of aquatic intervention in occupational therapy. We discovered that occupational therapy students and practitioners had limited knowledge of aquatic therapy and how to utilize it in occupational therapy practice. Based on this evidence, we found an interest in basing the project on aquatic therapy and formulating meaningful occupations for adult clients while addressing various needs of the adult population.

Upon meeting with our academic advisor, we discussed teaching and learning techniques utilized in occupational therapy education and practice. We discovered that there were a wide variety of educational strategies in relation to occupational therapy academia and practice. We agreed on a plan to review literature in regards to aquatic therapy and occupational therapy education. Thus, the purpose of this product was to create a manual that could be utilized both in the educational setting for occupational therapy students and in the field for practitioners.

Review of Literature

The next step in the process was to determine the strength of literary evidence in the area of aquatic therapy and occupational therapy. Additionally we sought to explore the concepts of aquatic therapy and how to incorporate these ideas into occupational therapy education. We found information on multiple teaching techniques, theories and

strategies used in the past and current educational curriculums. Techniques for teaching and learning in the academic environment were explored using Academic Search Premier, Google Scholar and Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases using key terms such as *occupational therapy, education, teaching, learning, students,* and *academia*. We also gained insight on the various components of aquatic therapy as a technique in occupational therapy. Key terms were used such as *aquatic therapy, education, intervention, techniques* and *occupational therapy* using PubMed, Google Scholar, Academic Search Premier and CINAHL databases. A written literature review was then completed highlighting our findings and providing a foundation from which to build occupational therapy educational sessions for students who wish to learn about aquatic therapy.

Educational Theory

According to Turpin and Iwama (2011), the term *theory* is described as a system of ideas intended to guide action. Theories can also be assumptions about a general principle that help to form rational explanations of phenomenon. In general, theories are used to support evidence related to use of best practice techniques (Turpin & Iwama, 2011). We chose to use theories to assist us in guiding our product regarding educational techniques for future curriculums and for practitioners to use in practice. To guide the educational techniques geared toward graduate students, we chose the adult learning theory and Cognitive Constructivism. For practitioners, we used multiple teaching techniques to utilize with various populations.

One learning theory that was integrated into this project is Knowles' Andragogy of adult learning. Knowles had the idea that students should be engaged in self-

evaluations to assist in understanding experiences, utilize practical applications from classwork, and engage in group work (Werth & Werth, 2011). The way we used this theory in our product provided the option for group treatment and allowing students and practitioners alike to be involved in the curriculum and treatment. This theory helped us to use client-centered practice.

In terms of theory guiding educational practices, according to Piaget's Theory of Cognitive Development, humans must construct their own knowledge instead of being provided with information that is expected to immediately be used and understood (Powell & Kalina, 2009). The focus of Cognitive Constructivism was to be an active learner, gain a deep understanding, by reorganizing and transforming personalized versions of cognitive development (Fosnot & Perry, 1996). This theory was pertinent to the project based on the ability for clients and students to be active learners, completing the therapy process with case examples. Rather providing treatment and information through lecture-base, the use of aquatics provides a novel way to learn and improve.

Teaching Techniques for Aquatic Therapy

Furthermore, Werth and Werth (2011) suggested lecturing no more than 15 minutes prior to opening discussion topics. During aquatic therapy intervention, we will begin with brief explanations of the purpose of the session. This will provide reasoning for why clients will complete certain movements, exercises, and activities, which in turn will prepare the clients for occupational performance when on land. Upon completion of the introduction, clients will engage in aquatics for the majority and remainder of their session.

Other teaching methods that were found to be effective consists of incorporating collaboration, cooperation, communities of learning and engagement with students (Bassendowski & Petrucka, 2013). Werth and Werth (2011) suggested shifting from an instructor presentation focus to a constructivist, student-centered mentality. Considering this type of effective teaching, we included opportunities for group-based sessions to allow for further collaboration. We also utilized facilitation of each clients' desires in order to stay client-centered.

Occupational Therapy Model

For an occupational model to guide our process, we decided to organize the manual based on the concepts of the EHP Model. This model was chosen as it allows for interdisciplinary practice by incorporating terms that are familiar across multiple disciplines. Additionally, the EHP Model is focused on using the environment to facilitate client change (Dunn, 2017). As highlighted in the model, the desired outcomes would be to increase the performance range for clients to increase engagement in meaningful occupations (Dunn, 2017).

Aquatic Therapy Content Development

Prior to beginning the product, we provided an overview of what aquatic therapy entails in order to provide the readers of the manual background information from the literature review. This included the aquatic benefits, drawbacks and descriptions of how occupational therapists can provide skilled service in the pool for adult clients of various populations. We then utilized the educational theories and occupational model to guide the way we proceeded. We created a comparison chart to highlight key differences in the

learning process in the traditional style versus utilizing the Cognitive Constructivism approach.

To further facilitate overall understanding of how to use the manual in an educational and aquatic setting, we formed objectives to help guide educators and practitioners throughout the manual. We based our objectives on the key pieces of information most critical for learners. These objectives were chosen so the learners could have all the basic tools to begin incorporating water-based therapy into practice.

We chose to highlight the roles of interdisciplinary teams in this context because often, a multitude of healthcare professionals are involved in client care. Additionally, we felt it was important to emphasize the differences of these roles and how occupational therapists can bring a unique perspective into this area of practice. The manual also consists of the benefits of aquatic therapy, allowing readers to learn why aquatic therapy could be used with clients of a variety of populations. In contrast, we described precautions when working in the water-based context. We felt it was critical for readers to be able to identify when aquatic therapy would be appropriate and when it would be contraindicated.

We decided to incorporate methods based on cognitive constructivism. To allow active learning, we added assessment tools, intervention approaches and outcome measures to provide examples of how the therapy process would flow in the aquatic context. This was organized based on approaches of the EHP Model and the influence on the person, task, context and performance. The foundational aspects of EHP were woven throughout the manual as a way to tie the content to occupational performance. Finally,

case studies were included at the end to allow learners to synthesize the content of the manual and apply their knowledge.

Product

Basing our product on the theories described in this section, we began by forming the purpose of our product. The purpose is to provide a dual purpose manual geared towards providing education for occupational therapy students in the water-based setting and as a manual created for entry-level occupational therapists to use as a reference in aquatic therapy. In order to fully describe the uses of aquatic therapy in an interdisciplinary setting, we used evidence gained from the literature review to summarize the main points.

Next, we began formulating the educational manual on aquatic therapy that would be implemented in future occupational therapy curriculums and for clinicians in practice. In order to organize the product, we made an outline with objectives for the educators/occupational therapists based on Bloom's Taxonomy. The objectives for educators to follow included understanding populations appropriate for aquatics, benefits, contraindications, interdisciplinary roles, assessment tools, intervention approaches, outcome measures, and utilization of the EHP Model used in the aquatic therapy setting.

To guide the next step, we used EHP components to categorize the evaluation tools, intervention approaches, and outcome measures. First, we described the components of EHP (person, task, context, and performance) by category according to the chosen assessment tools (Dunn, 2017). Tables were made to provide a visually appealing, easy to read guide for what assessments match the EHP component. EHP intervention approaches (create, establish/restore, alter, prevent, adapt) were then utilized

to determine how to organize sessions (Dunn, 2017). By matching the intervention approaches with the corresponding EHP component, we formed a simple guide to effectively organize the sample sessions.

Lastly, we made a table with outcome measures to demonstrate what each assessment tool was measuring, as well as how to score each tool. The descriptions provided a useful guide for understanding appropriateness of the evaluation and tracking progress to determine readiness for discharge. To further engage students and practitioners as active learners in using the manual, we provided three case studies. Directions for completion comprised of choosing assessment tools, forming goals, choosing from given sample sessions appropriate for the client, and determining how to plan for discharge based on outcomes. Once the manual was organized, we began forming aquatic sessions based on the elements of EHP and occupational intervention approaches, including client goal areas.

The sample sessions integrated evidence-based examples based on the literature review and we included activities to facilitate client occupational engagement. In order to give opportunities for active learning, we formulated objectives throughout the product to address each aspect of the therapy process. Finally, case studies were added to the manual to allow learners to go through the process step-by-step in the aquatic context. A key to these case studies was also developed with rationale to enhance learning.

CHAPTER IV

PRODUCT

Introduction to the Manual

Chapter IV consists of an introduction to the product, which is a manual for aquatic techniques in occupational therapy. Next, the purpose of the manual is described and how it could be used both in academia and in professional practice. Theories and frames of reference are introduced, including Andragogy, Cognitive Constructivism, the EHP Model and the biomechanical frame of reference. Finally, an explanation of the integration of each theory and frame of reference into the manual is provided.

This manual can be utilized as an educational guide for occupational therapy students to understand the basic components of aquatic therapy. Additionally, this manual may be used by entry-level occupational therapists to use as a guide for aquatic therapy interventions with clients. This manual provides intervention strategies including varying preparatory tasks, purposeful activities and occupation-based techniques to help clients expand their performance range. Existing literature lacked aquatic intervention for adults with multiple disabilities and diseases, with a majority of research consisting of pediatric practice. Many occupational therapy students and entry-level practitioners are unaware that occupational therapists are qualified to perform aquatic therapy. Additionally, many occupational therapy students and practitioners are unaware of how to put aquatic therapy into use. This may be due to lack of exposure of aquatic intervention in occupational-therapy curriculum.

Purpose of the Manual

The purpose of this product was to provide an educational resource that includes aquatic interventions specifically for occupational therapy students and entry-level clinicians. This manual was constructed to be utilized in academic curriculum and professional practice. This manual was created to provide a simple, concise introduction to water-based therapy with evaluation and intervention examples that may be used in occupational therapy.

The use of aquatic intervention may provide a plethora of benefits including cognitive, musculoskeletal and sensory components. These benefits include reduction of spasticity, pain, increased balance, coordination and joint mobility (Johnson et al., 2016; Resende and Rassi, 2008; Salem et al., 2011). Additionally, providing intervention in a water-based environment may provoke mental relaxation and improve cognitive functioning (Herold et al., 2016). Some precautions to aquatic therapy include Fibromyalgia, Multiple Sclerosis, poor cognition, weakness, and edema (Aquatic Therapist, 2008). In some instances, aquatic therapy would be contraindicated such as if a client has uncontrolled seizures, bowel incontinence, and Hepatitis A (Aquatic Therapist, 2008). Water-based therapy may not be appropriate for clients who feel uncomfortable in the water or have hypersensitivity to chlorine (Lima et al., 2013).

Aquatic therapy is not considered a specialty area in occupational therapy. Therefore, entry-level practitioners who have the basic knowledge of aquatic therapy are qualified to integrate this type of intervention with clients. Another benefit to aquatic intervention is the opportunity for interdisciplinary treatment as occupational therapists may co-treat with physical therapists or recreational therapists in this environment.

Theories and Frames of Reference

A significant theory used to guide this scholarly project is the adult learning theory, also known as Andragogy. Certain principles of the theory match the learning style used in graduate school programs, including occupational therapy. Relating learning to an immediate need or problem is one principle of adult learning, as well as incorporating learning that is self-directed, self-initiated, individualized, and provides the learner with the ability to work in a group, participating actively in the process (Braungart, Braungart & Gramet, 2011). The teacher's role is more of a facilitator and the nature of learning changes frequently. In the aquatic therapy setting, the occupational therapist sets up the environment, forms interventions meaningful to the clients, provides prompt feedback, and collaborates with clients to determine occupational performance issues (Braungart, Braungart & Gramet, 2011).

Another important educational theory is that of John Dewey, the father of constructivism. He proposed that students gain knowledge through real world experience of collaboration and creativity (UCD Dublin, n.d.). Piaget later developed the process and idea of Cognitive Constructivism, described as ideas constructed from each person's experiences in order to form personal meaning (Powell & Kalina, 2009). The focus of Cognitive Constructivism was to be an active learner, gain a deep understanding, and do so by reorganizing and transforming personalized versions of cognitive development (Fosnot & Perry, 1996). Occupational therapists utilize this theory in allowing clients to participate actively in a practical, community-based setting that leads to personalized, constructed knowledge. As seen below, there are key differences between a traditional and constructivist classroom.

Table 1. Traditional and Constructivism Classrooms

Traditional Classroom	Constructivist Classroom
Curriculum is based on learning details first before the big picture.	Curriculum begins big picture ideas and then broken down into details
Strict curriculum guidelines based on specific learning objectives set by the teacher.	Curriculum is flexible, based on learner's interests. Learner is self-directed to accomplish personal learning objectives.
Repetition-based learning	Interactive learning. The learner gains knowledge by doing tasks.
Directive teaching style	Interactive teaching style. Main concepts are introduced and the teacher becomes the facilitator to guide learners as needed.
Outcomes are valued	The process and outcomes are valued.
Assessment done through testing	Assessment done through testing, observations and learner's perceptions.
Individual learning	Learning may be done individually or in a group

This table consists of information retrieved from: Braungart, Braungart & Gramet (2017); Fosnot & Perry (1996); Powell & Kalina (2009); The University of Hong Kong (2018).

The Ecology of Human Performance Model (EHP) is an appropriate fit for aquatic intervention in occupational therapy. According to Dunn (2017), EHP is shaped around use of the environment to facilitate client behavioral change. With EHP as the foundation for aquatic therapy, the occupational therapist may change the environment and alter various tasks and contexts. This may allow the client to engage in meaningful, occupation-based interventions. EHP also supports interdisciplinary treatment, with inclusion of physical therapy and other possible healthcare professionals. Additionally, EHP is a suitable model to support aquatic intervention for clients who have chronic conditions. Finally, EHP is congruent with aquatic intervention as occupational therapists may utilize preparatory methods as intervention due to the task-oriented approach (Dunn,

2017). Through the use of tasks to increase the client's performance range, the client could increase engagement in meaningful occupations and fulfill valued roles.

According to Pawar (2016), there are certain client concerns using the biomechanical frame of reference. These include structural instability, passive range of motion (ROM) deficits, low or high endurance, edema, and weakness when engaging in occupations (Pawar, 2016). Assumptions of the biomechanical frame of reference incorporate use of purposeful activities in the areas of ROM, strength and endurance, in order for client to regain function. Another assumption is that the body must rest for self-healing before the body undergoes physical stress toward improvements (Pawar, 2016). Lastly, clients must have an intact central nervous system in order to benefit from the biomechanical frame of reference (Pawar, 2016). Occupational therapists would benefit from use of this frame of reference in assessment, evaluation within the individual's context, and use of intervention strategies associated with progressing client's physical performance in occupations. The main objectives include prevention, maintenance of movement and restoring if possible, and compensating or adapting for loss of movement within occupational performance (McMillan, 2016). It is appropriate for occupational therapists to utilize the biomechanical frame of reference in conjunction with an occupational therapy model. For the purpose of this product, there are components inspired by the Ecology of Human Performance Model, biomechanical frame of reference, Andragogy, and Cognitive Constructivism.

CHAPTER V

SUMMARY

Chapter V consists of the summary for this scholarly project. First, the major findings from the literature review are described, including discoveries of occupational therapy education and aquatic therapy utilization in professional practice. The summary of the EHP Model is described, along with components of Andragogy and Cognitive Constructivism. There is a brief description of the product, which is a dual purpose manual of aquatic therapy in occupational therapy education and practice, followed by clinical implications, limitations and recommendations for future research and clinical application.

The major findings from the literature review included several benefits to aquatic therapy including reduction of spasticity, low back pain and fall risk (Johnson et al., 2016; Resende & Rassi, 2008). Additionally, water-based interventions also improved balance, speed, coordination, and joint mobility in various populations (Salem et al., 2011; Sanders et al., 2016). Improvement in cognitive functioning, including memory and dual-task performance have also been found as a result of aquatic therapy for the adult population (Herold et al.,2016; Lynch & Sawyer, 2016; Schaefer et al., 2016). Drawbacks of aquatic therapy include allergic reaction to chlorine, limited access to a pool, and difficulty transferring in and out of the pool (Lima et al., 2013). Additionally, the long-term effectiveness of aquatic therapy is inconclusive (Marinho-Buzelli, Bonnyman, & Verrier, 2015).

After exploring components of education, the concepts of Andragogy and Cognitive Constructivism were explored. Andragogy includes principles that allow for clients and practitioners, as the learner, to be self-directed and learn through their own experiences (Knowles, 1980). The theory also provides the opportunity for learners to engage in group sessions and be involved during the learning process (Werth & Werth, 2011). Another theory to assist the process was Piaget's theory of Cognitive Constructivism. The focus is to allow the student or client to be an active learner and construct their own meaning based on personal experience (Powell & Kalina, 2009). Additionally, these models allow for the learner to be his or her own agent of change and learn new concepts through practice and repetition.

This manual was constructed to provide a simple, concise introduction to aquatic therapy with evaluation and intervention examples that may be used in occupational therapy. Components of the EHP model as a foundation for the product. EHP is an appropriate model to use for aquatic therapy, as the occupational therapist may change the environment and alter various tasks and contexts (Dunn, 2017). Additionally, EHP involves the use of tasks to increase the client's performance range, so the client could increase engagement in meaningful occupations and fulfill valued roles. Finally, EHP also supports interdisciplinary treatment, with inclusion of physical therapy and other possible healthcare professionals (Dunn., 2017).

Clinical Implications

The manual may be a useful tool that can be used in an educational setting or in practice and there are many opportunities for clinical implications. First, the manual describes aquatic therapy and occupational therapy, as well as how the two can be used

together following educational theories and an occupational model. By using the EHP model's components and intervention approaches to guide the formation of the manual, it acts as an easy tool for educators to uses. The manual also incorporates utilization of aquatic therapy benefits with occupation-based interventions, and provides activities and sample sessions based on real case scenarios. The session examples allow for flexibility in implementation for occupational therapists to use. Case studies along with an instructor's key is provided to support application of knowledge in the aquatic context.

Limitations & Recommendations

One limitation of the product is that it has not been tested in a clinical or educational setting. It is recommended that future research include the use of occupational therapy in the aquatic setting to add validity and evidence to support the use of water-based techniques in occupational therapy practice. Also, it is recommended that aquatic therapy be introduced as an intervention technique to occupational therapy students in the academic setting. Finally, future materials should include resources for occupational therapists to practice aquatic therapy with clients across the lifespan.

Conclusion

The purpose of this manual was to provide an educational resource that includes water-based interventions for occupational therapy students and entry-level clinicians to utilize for professional practice. It recommended that occupational therapy students and practitioners review this introductory manual to enhance their knowledge of how to use aquatic intervention in occupational therapy practice. This manual may be utilized both in the academic and clinical setting as a practical guide for the occupational therapy process in the aquatic context.

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APPENDICES

DIVE INTO AQUATIC THERAPY

AN EDUCATIONAL TOOL AND PRACTICAL GUIDE

Emily L. LaBlanc
Megan L. Lauck

Introduction

This manual has a dual-purpose for the use of occupational therapy students and entry-level practitioners. First, this manual was developed to provide an educational manual for occupational therapy students to become introduced to the basic concepts of occupational therapy in the water-based setting. Second, this manual was created for entry-level occupational therapists to use as a reference throughout the therapeutic process in the aquatic setting.

Intervention strategies are also provided including preparatory tasks, purposeful activities and occupation-based techniques to help clients expand his or her performance range. Based on the EHP Model, this increase in performance range will allow clients to fulfill his or her desired roles and improve occupational performance (Dunn, 2017). Examples of assessment tools, intervention approaches and outcome measures are included. The manual ends with three case studies and an instructor's key to enhance learning through practice and synthesis of knowledge. Below are the objectives that the learner should be able to meet upon reading through the manual while completing activities throughout.

Objectives
1. *Identify populations in which aquatic therapy would be appropriate.*
2. *Recognize the benefits of aquatic therapy including physical, cognitive and psychosocial components.*
3. *Recall precautions and contraindications to aquatic therapy.*
4. *Describe approaches in accordance with the Ecology of Human Performance Model.*
5. *Apply assessment tools under the person, context, task and performance categories.*
6. *Compare and contrast the roles of occupational, physical and athletic trainers in aquatic therapy.*
7. *Categorize appropriate interventions that match the approaches of the EHP Model.*
8. *Interpret client post-test scores to determine outcomes from treatment.*

Aquatic Therapy

- Definition: Aquatic therapy is an intervention strategy involving activities to promote physical and cognitive rehabilitation (Sanders, Islam, Naruse, Takeshima & Rogers, 2016).
- Additional training is not required to provide aquatic therapy. It is considered entry level and is within the scope of occupational therapy (AOTA, 2017b).
- Included in occupational therapy standards of practice for Master's and Doctoral curriculums (ACOTE, 2011).

Benefits of Aquatic Therapy

- Pain reduction
- Increased balance and coordination
- Improved joint mobility
- Mental relaxation
- Improved cognitive functioning
- Able to co-treat with other healthcare professionals

(Herold et al, 2016; Johnson et al., 2016; Resende & Rassi, 2008; Salem et al., 2011).

Interprofessional Roles in Aquatic Therapy

In the aquatic therapy setting, occupational therapists may work as part of a rehabilitation team alongside physical therapists, and athletic trainers. It is important for each member of the rehabilitation team to utilize his or her professional skills to contribute to the rehabilitative process. Each member of this team approach rehabilitation from a different lens.

- **Athletic trainers** focus on acute rehabilitation, and regaining physical function to return to athletics (HydroWorx, 2018).
- **Physical therapists** have advanced knowledge of physical rehabilitation utilizing biomechanical methods of strengthening and conditioning (American Physical Therapy Association, 2018).
- **Occupational therapists** have the unique role of utilizing occupation as both a means and an end in the therapeutic process. Occupational therapists incorporate occupation-based, purposeful activities, and preparatory methods to promote

- functionality for performance in occupation and fulfillment of desired roles (Franken et al., 2013).

Each of the aforementioned team members is essential to the rehabilitation process, thus, interprofessional collaboration is necessary to ensure clients are able to reach his or her desired goals (HydroWorx, 2018).

LIFESAVER SNIPPETS

SUMMARIZE KEY DIFFERENCES BETWEEN ATHLETIC TRAINING, PHYSICAL THERAPY AND OCCUPATIONAL THERAPY.

Objective Met

Compare and contrast the roles of occupational, physical and athletic trainers in aquatic therapy.

Populations

Based on research from the literature review, populations that would benefit from aquatic therapy include adults with the following:

- Stroke
- Traumatic Brain Injury
- Multiple Sclerosis
- Parkinson's disease
- Fibromyalgia
- Sensory imbalances
- Cognitive deficits
- Balance issues
- Low back pain
- Decreased strength and activity tolerance
- Joint instability

(Foster & Bressel, 2015; HydroWorx, 2018; Johnson et al., 2016; Resende & Rassi, 2008; Shaefer, Louder).

LIFESAVER SNIPPETS

DO AN INTERNET SEARCH TO IDENTIFY ADDITIONAL POPULATIONS IN WHICH AQUATIC THERAPY MAY BE APPROPRIATE.

Objective Met

Identify populations in which aquatic therapy would be appropriate.

Environment

Populations who are suited for aquatic therapy would be integrated into the pool therapy setting. Treatments can include individual or group-based sessions alongside health and fitness classes. A significant aspect of the therapy pool is the temperature of the water. It varies from 88-95 degrees Fahrenheit with the air temperature near 87 degrees Fahrenheit in order to best serve client needs (Aquatic Therapist, 2012).

LIFESAVER SNIPPETS

DESCRIBE THE BENEFITS OF AQUATIC THERAPY AS IF YOU WERE SPEAKING TO A CLIENT.

- Vivas, Arias, and Cudeiro (2011) found that warm water helps to reduce muscle spasticity, in consideration with the buoyancy and hydrostatic pressure of the water, people are at a reduced risk of falling, making the pool safer than land-based therapy.
- The aquatic environment may also reduce pain, increase dual task performance and provoke mental relaxation (Johnson et al., 2016; Herold et al., 2016; Schaefer et al., 2016).
- Performing activities in the aquatic environment may reduce the fear of falling and increase balance and functional mobility (Resende & Rassi, 2008; Salem et al., 2015).

Objective Met

Recognize the benefits of aquatic therapy including physical, cognitive and psychosocial components.

Precautions and Contraindications

Precaution are things to consider for clients who may be at risk for adverse effects. However, precautions are not determined as reasoning for client to be omitted from the activity (Collins English Dictionary, 2018). In contrast, contraindications are reasons to disqualify persons from engaging in the activity as the client's safety would be compromised (Medline Plus, 2018). See Table 1 for a list of precautions and contraindications for aquatic therapy.

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

LIFESAVER SNIPPETS

DO AN INTERNET SEARCH TO FIND ADDITIONAL PRECAUTIONS OR CONTRAINDICATIONS TO AQUATIC THERAPY.

Objective Met

Recall precautions and contraindications to aquatic therapy.

Evaluation/Assessment

In accordance with the EHP Model, chosen evaluations have been organized into categories to address the components of person, task, context and performance. One strength of the EHP Model is the allowance of utilizing assessment tools from other models (Dunn, 2017). This allows therapists to freely choose a wide variety of evaluation

tools to best fit each individual client. The selected assessments will be used as pretest measures and post-test measures throughout the course of treatment and at the end to determine progress. The evaluations are described in subsequent paragraphs in the components of person, task, context, and performance. See Table 2.

Categorization of EHP components.

The first component is the **person**, who can only be seen as part of the context, as the context supports the person (Dunn, 2017). Factors include the person's abilities, experiences and skills, where the skills comprise psychosocial, cognitive, and sensorimotor aspects. The **task** is performed through a person's use of skills and abilities (Dunn, 2017). According to Dunn, (2017), a task defined as objective sets of behaviors needed to reach goals. Tasks can be roles or occupations encompassed by a wide range of performance skills or abilities. While performing these tasks, the person utilizes environmental cues and features, known as the context, to support the performance. Examples of tasks are the role of a student, mother, or those skills involved in cooking, driving, working, etc. These impact the person's performance abilities.

Context is affected by the person, incorporating physical, social, cultural and social aspects (Dunn, 2017). The context is dynamic and supports the person's behavior. It is important to consider that the person draws meaning from the context and when the context is limited, this can pose challenges with performance. The **performance** range of each person is dependent on past experiences and resources; therefore, having limited skills and abilities can decrease the range. Limitations of the person, task or context may decrease performance range (Dunn, 2017).

- **The Modified Interest Checklist** is based on the Model of Human Occupation (Fasoli, 2014). The checklist comprises of a list of occupations in which the client may report his or her level of past, present, and future interests (Fasoli, 2014). This checklist is useful for therapists to gather information regarding the client's interests and goals, while also providing ideas for preparatory, purposeful and occupation-based intervention strategies.

- **The Borg Rate of Perceived Pain** is a simple self-report in which the client may rate his or her pain level on a scale from zero to ten. Additionally, gathering the

occupational profile via informal interviewing allows the client to freely express his or her concerns by answering open-ended questions regarding current health and goals.

- **The Leisure Satisfaction Scale** may be used to measure levels of satisfaction with leisure activities by using questions rated on a scale from 1-10 (Di Bona, 2000). This assessment has shown to be valid when measuring leisure satisfaction (Di Bona, 2000) allowing occupational therapists to determine improvements in overall satisfaction with leisure engagement and exploration after the aquatic therapy program.

- **The Canadian Occupational Performance Measure (COPM)** is a valid and reliable tool to measure a client's performance and satisfaction in various occupations in the categories of productivity, self-care and leisure (Canadian Occupational Performance Measure, 2018). The client determines problems with occupational performance and rates his or her perceived importance of the identified occupations. The therapist measures the client's rating of his or her occupational performance and makes a comparison to the client's perceived satisfaction (Canadian Occupational Performance Measure, 2018).

- **The Functional Reach Test** is a quick assessment of balance while reaching. The therapist may measure the client's ability to reach forward while standing without losing balance or stepping forward (Almhdawi, Mathiowetz, and Bass, 2014). The Functional Reach Test is has high reliability to determine balance during functional reach tasks (Almhdawi et al., 2014).

- **Manual muscle testing (MMT)** and **Goniometry** are reliable strategies to assess a client's muscle strength and joint range of motion (Whelan, 2014). Additionally, client demographics including age, health status, diagnoses, gender, and educational processes are important contextual factors. These factors are often gathered via client interviews and medical chart reviews.

- **The Functional Independence Measure (FIM)** is a valid and reliable measure in which the occupational therapist is able to determine a client's range of abilities

through observation of occupational performance (Fasoli, 2014). The client is rated on a scale from zero to seven for several tasks. These tasks include dressing, grooming, functional transfers, walking, wheelchair use and more (Fasoli, 2014).

- **The Montreal Cognitive Assessment (MoCA)** is a screening tool to measure various aspects of cognition including memory, orientation, and executive function (Cooke & Finkelstein Kline, 2007). The MoCA consists of eleven items, with a possible score of 30 points. A score of 26 or above is considered normal cognitive functioning (Cooke & Finkelstein Kline, 2007).

- **The Cognitive Performance Test (CPT)** is another useful tool to measure cognitive functioning. The CPT consists of multiple subtests in which the client engages in ADLs and familiar tasks including meal preparation, dressing, shopping, using the telephone, washing, travelling and sorting medication (Cooke & Finkelstein Kline, 2007).

- **The Berg Balance Scale** is an evaluation tool that may be used to measure balance and fall risk during functional tasks (Almhdawi, et al., 2014). This tool was specifically designed for older adults to perform tasks including unsupported standing, sit to stand transitions, functional transfers, walking and turning. The Berg Balance Scale is both valid and reliable (Almhdawi et al., 2014).

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

* The COPM fits under both the person and context components of the EHP Model because the person's perceptions of performance and satisfaction are measured and occupations that are of concern are also identified by the client.

LIFESAVER SNIPPETS

CHOOSE AN ASSESSMENT TOOL FROM TABLE 2 AND DESCRIBE HOW IT FITS WITH THE EHP MODEL COMPONENT.

Objective Met

Apply assessment tools under the person, context, task and performance categories.

Interventions

Using the EHP Model as a foundation for the intervention process, it is helpful to categorize the five intervention approaches into EHP components of person, task, context and performance. This allows for ease of understanding with a theoretical foundation for the project. The EHP Model will guide the steps of the therapy process and act as a bridge between the evaluation, intervention, and outcome measure stages. The illustrated concept of the EHP Model can be seen in Figure 1.

Figure 1: EHP Model in the Aquatic Context

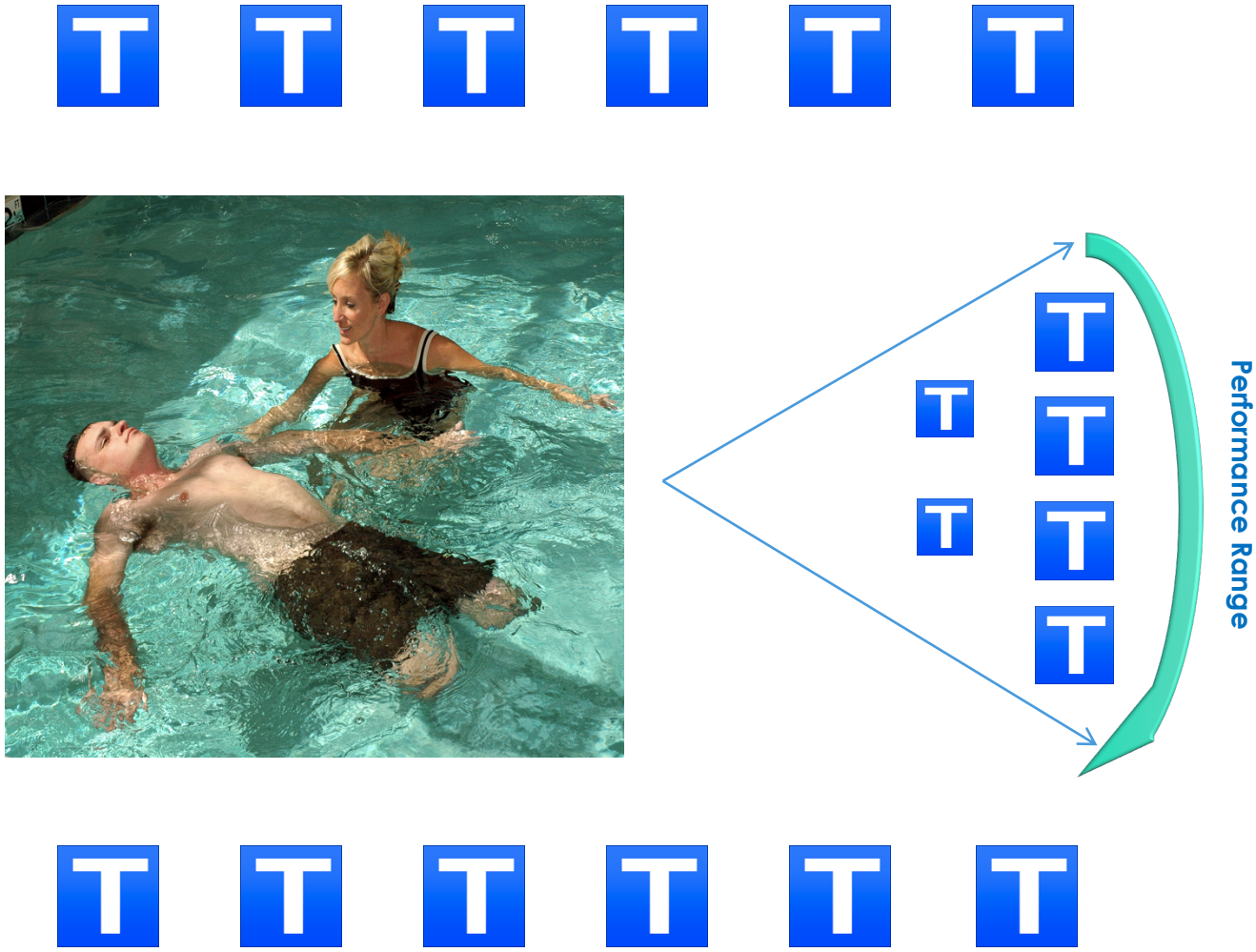

Figure 1: The Ecology of Human Performance Model utilizes various approaches to optimize the range of performance and availability of tasks within the context. In this figure, the context is in the pool and the T's represent tasks available to the person. The wider the performance range, the more tasks are available for the person to perform. Figure was inspired by Dunn (2017).

Approaches

The approaches encompassed in the EHP Model are create, alter, adapt, establish/restore and prevent. According to Turpin and Iwama (2011), the create approach is an intervention approach that does not assume a disability is present and facilitates circumstances that promote contextual occupational performance. The alter approach changes the actual environment or allows for the client and therapist to select a

different environment altogether to perform the task (Turpin & Iwama, 2011). For the next approach, this pertains to establishing or restoring the client's skills and abilities. With adapt, the contextual features or task demands must be revised in order to assist with performance (Turpin & Iwama, 2011). Lastly, the prevent approach involves maintenance or development within occupational performance problems (Turpin & Iwama, 2011).

Using approaches to address EHP components.

A therapist may use the create approach to provide new opportunities for performance. Also, aspects of the person may be targeting to establish new skills or restore former skills. Finally, the person component may also be targeted in order to prevent negative performance (Dunn, 2017). Tasks may be addressed by utilizing the adapt or prevent approaches. By using the adapt approach, the therapist may make changes to the task to meet the client's needs. The therapist may also use the prevent approach by using interventions to target specific tasks and prevent maladaptive performance (Dunn, 2017)

Contextual components may be addressed using all approaches from the EHP Model. A therapist may use the create approach by targeting contextual components and create opportunities to improve performance. By addressing context, the therapist may help the client establish a new skill or restore skills that had previously been lost. The context may be altered in order to support performance or the therapist may make adaptations or modifications in order to help the client perform in his or her given context. Finally, context may be addressed in order to prevent maladaptive performance (Dunn, 2017).

In order to increase performance range, the components of person, task and context may be targeted via multiple intervention approaches (Dunn, 2017). According to Dunn (2017), the create approach focuses on improving performance by utilizing interventions that target the person and context components. Performance may also be addressed via the prevent approach as the therapist may use interventions to prevent maladaptive performance (Dunn, 2017). Table 3 illustrates the integration of intervention approaches to influence to person, task, context and performance components of the EHP Model.

Table 3: Interventions

	Person	Task	Context	Performance*
Create				
Establish/Restore				
Adapt				
Alter				
Prevent				

*Performance is always indirectly affected based on the improvements made in the person, task and context components. Inspired by Dunn (2017).

LIFESAVER SNIPPETS

BRAINSTORM AN AQUATIC THERAPY INTERVENTION USING THE ADAPT APPROACH TO ADDRESS THE TASK COMPONENT IN THE AQUATIC SETTING.

Objective Met

Describe approaches in accordance with the Ecology of Human Performance Model.

The following are examples of approaches being utilized in the aquatic setting.

- **Create:** A therapist could implement a leisure/social group that is open to the public where participants can engage in leisure activities in the aquatic context.
- **Establish/Restore:** In the pool, client and therapist throw/catch beach ball to restore upper extremity strength and ROM.
- **Adapt:** Therapist increases repetitions for push/pull movements with water dumbbell to facilitate upper extremity coordination and activity tolerance in preparation for opening/closing doors.

- **Alter:** Therapist has client move from knee-deep water to chest-deep in order to increase buoyancy and decrease the stress placed on knee joints.
- **Prevent:** In the pool, the therapist and client practice safe transfer techniques as part of a falls prevention program.

LIFESAVER SNIPPETS

USE THE TABLE BELOW TO BRAINSTORE ADDITIONAL TECHNIQUES THAT FALL UNDER EACH APPROACH ACCORDING TO THE EHP MODEL

Table 4: Intervention Approaches

	Techniques
Create	
Establish/Restore	
Adapt	
Alter	
Prevent	

Objective Met

Categorize appropriate interventions that match the approaches of the EHP Model.

Outcomes

Outcome measures are important to use in order to measure progress and the client's readiness for discharge. It is beneficial to utilize tools that can be used as both evaluation and outcome measures. Table 5 shows example outcome measures and how progression can be measured.

Table 5: Outcomes and Measurement of Progression

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	1. Improved performance and satisfaction scores with self-care, productivity and leisure. 2. Decreased perceived pain score 3. Increase score of leisure satisfaction
Task	1. Functional Reach	1. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	1. Goniometry 2. MMT	1. Increased PROM, AAROM and AROM for functional use. 2. Increase MMT scores. Scale 0-5
Performance	1. FIM 2. Berg Balance Test 3. MoCA 4. CPT	1. Increased score = decreased level of assistance. Score 0-7 2. Increased balance score. Score 0-4 3. Increased score= improved cognition. A score of 26 or above is normal 4. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

LIFESAVER SNIPPETS

UPON EVALUATION, A CLIENT SCORED 4 INCHES ON THE FUNCTIONAL REACH TEST AND A 2 ON THE BERG BALANCE SCALE. INDICATE WHAT THE CLIENT WOULD HAVE TO SCORE TO SHOW SIGNIFICANT IMPROVEMENT IN THE OUTCOME MEASURES.

Objective Met

Interpret client post-test scores to determine outcomes from treatment.

Case Studies

In the following section, three case studies are provided in which the learner will be required to synthesize and apply knowledge from the models and content of the therapeutic process in the aquatic context.

Directions for completion of case study examples:

- *Step One*: Indicate any precautions or contraindications with the client. See Table 1.
- *Step Two*: Choose the appropriate assessment tools and justify your reasoning.
    - Refer to Table 2.
- *Step Three*: Form 1-2 additional goals for the client. One example is provided.
- *Step Four*: Based on the goal areas, choose 2-3 sample sessions for your client and describe 1 intervention approach that matches the EHP Model.
    - Refer to Table 3 for explanations of the approaches. Table 6 consists of sample sessions.
- *Step Five*: Based on the assessment tools you chose in Step One, how would you determine if the client met goals and is ready for discharge?
    - Refer to Table 5.

Case Study 1:

Mason is a 26 year old male who received a right rotator cuff repair 8 weeks ago. Mason enjoys playing baseball, but hasn't been able to play for the past three months due to severe pain in his right shoulder. Mason works on the Tech Support team for a local university. His job consists of analyzing and repairing computers and other tech devices. Mason lives in an apartment complex with two roommates. Due to his recent surgery, Mason is currently having difficulty with grocery shopping, cleaning and self-care tasks. After discussing rehabilitation options with Mason, he agrees to participating in aquatic intervention.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications:

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	**Check all that apply**	**Justification**
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain		
Functional Reach		
Modified Interest Checklist		
Leisure Satisfaction Scale		

COPM
Demographics
Medical Chart Review
Goniometry (ROM)
Manual Muscle Test (MMT)
Functional Independence Measure (FIM)
Berg Balance Test
Montreal Cognitive Assessment
Cognitive Performance Test

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

Goal 1**:**	Client will exhibit PROM and AROM within normal limits in his right UE in order to improve ability in reaching tasks, within 4 weeks.
Goal 2:	
Goal 3:	

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create	🌊		🌊	🌊
Establish/Restore	🌊		🌊	🌊
Adapt		🌊	🌊	🌊
Alter			🌊	🌊
Prevent	🌊	🌊	🌊	🌊

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM		
Session B: Balance & Coordination		
Session C: Strength & Endurance		
Session: D: Cognition		
Session E: ADLs & IADLs		

Session F: Falls Prevention

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurement of Progression

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	1. Improved performance and satisfaction scores with self-care, productivity and leisure. 2. Decreased perceived pain score 3. Increase score of leisure satisfaction
Task	4. Functional Reach	4. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	5. Goniometry 6. MMT	5. Increased PROM, AAROM and AROM for functional use. 6. Increase MMT scores. Scale 0-5
Performance	7. FIM 8. Berg Balance Test 9. MoCA 10. CPT	7. Increased score = decreased level of assistance. Score 0-7 8. Increased balance score. Score 0-4 9. Increased score= improved cognition. A score of 26 or above is normal 10. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	Justification for Discharge
•	•
•	•
•	•
•	•
•	•
•	•

Table 6. Sample Sessions

Session A: Leisure & Range of Motion

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Perform a volleyball activity or throwing/catching using a beach ball to facilitate upper extremity AROM
  - Fishing activity by practicing casting and reeling to facilitate upper extremity ROM
  - Baseball/tee ball using foam baseballs and a tee stand.
- During the session, therapist will provide education on the purpose of the activity and how ROM influences occupational performance.

Session B: Balance & Coordination

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - The client will perform Tai Chi. Calming music will be playing and the client will be encouraged to focus on the body movements in the water. Therapist will provide education on body posture.
  - Client will walk around the pool and practice grocery shopping by reaching for different items placed around the pool to promote balance during functional mobility and reaching tasks.
  - Client will practice functional mobility by transporting cooking materials to various areas in the pool.
- During the session, the therapist will provide education on the purpose of the activity and how balance and coordination influence occupational performance.

Session C: Strength and Endurance

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Arm and shoulder dowel exercises using foam noodles, graded by either in the water, on top of the water, or above the water level.
  - Raking or pushing with a dowel or rake to facilitate strength and endurance for yard work.
  - Passing a ball against water resistance to promote trunk control and upper body strength. Can be done in a group session.
  - Step-ups/ water aerobics with pump up music, grading difficulty based on depth of water, pace and duration.
  - Lifting/carrying and pouring watering can for gardening.
- During the session, therapist will provide education on the purpose of the activity and how strength and endurance influences balance, mobility, and occupational performance.

Session D: Cognition

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Tic-Tac-Toe using beach balls and multipurpose floatation device for board in order to facilitate sequencing and memory.
    - Ring toss/ Frisbee golf with client keeping track of scores and recalling the rules of the game.
    - Have client plan weekly meals and create a grocery list in order of his or her typical route in the store. Client may do this while walking, treading water, etc.
- During the session, therapist will provide education on the purpose of the activity and the how improved cognition promotes occupational engagement.

Session E: ADLs/IADLs

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Practice upper and lower body dressing by donning/doffing different types of clothing over swimsuit in waist-deep water.
    - Practice compensatory bathing techniques using adaptive equipment.
    - Practice wiping edges of the pool, sweeping or mopping to practice cleaning.
    - Retrieving and transporting cooking ingredients based on a given recipe or cooking instructions.
- During the session, therapist will provide education on the purpose of the activity and the importance practicing ADLs to promote occupational engagement.

Session F: Falls Prevention

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - From sitting in a pool chair, play musical chairs to promote balance and functional transfers.
    - In knee or just-below waist level water, have client practice bending safely to pick up toys and other items in the water.
    - Practice carrying toolbox, baseball bag, or watering can while walking in the pool to improve upright posture.
- During the session, therapist will educate the client on the purpose of the activity and the importance of safety techniques to use at home to reduce falls.

*Sessions will overlap based on needs of client and goals.

Case Study 2:

Jack is a 48 year old male who experienced a stroke 4 weeks ago affecting his left side and has been discharged from the hospital. He is currently attending outpatient occupational therapy and physical therapy services. He works as a carpenter and would like to get back to woodworking and using his hands. Jack enjoys being outdoors, fishing, golfing, and spending time with his family of five. Jack is having trouble with day to day tasks due to tightness and (6/10) pain in his shoulder, wrist and hand. He also expressed concern with feeling confused at times and having difficulty with his memory. This is causing him to feel incompetent because he usually does the yard work and cooks for his family. Jack has also been having difficulty dressing since his stroke. Through discussion of possible goals and treatment ideas, Jack and his wife agree to participate in aquatic therapy.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications:

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	**Check all that apply**	**Justification**
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain		
Functional Reach		
Modified Interest Checklist		
Leisure Satisfaction Scale		

COPM
Demographics
Medical Chart Review
Goniometry (ROM)
Manual Muscle Test (MMT)
Functional Independence Measure (FIM)
Berg Balance Test
Montreal Cognitive Assessment
Cognitive Performance Test

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

Goal 1**:**	Client will exhibit PROM and AROM within normal limits in his right UE in order to improve ability in reaching tasks, within 4 weeks.
Goal 2:	
Goal 3:	

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create	🌊		🌊	🌊
Establish/Restore	🌊		🌊	🌊
Adapt		🌊	🌊	🌊
Alter			🌊	🌊
Prevent	🌊	🌊	🌊	🌊

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM		
Session B: Balance & Coordination		
Session C: Strength & Endurance		
Session: D: Cognition		
Session E: ADLs & IADLs		

Session F: Falls Prevention

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurement of Progress

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	11. Improved performance and satisfaction scores with self-care, productivity and leisure. 12. Decreased perceived pain score 13. Increase score of leisure satisfaction
Task	4. Functional Reach	14. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	5. Goniometry 6. MMT	15. Increased PROM, AAROM and AROM for functional use. 16. Increase MMT scores. Scale 0-5
Performance	7. FIM 8. Berg Balance Test 9. MoCA 10. CPT	17. Increased score = decreased level of assistance. Score 0-7 18. Increased balance score. Score 0-4 19. Increased score= improved cognition. A score of 26 or above is normal 20. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	Justification for Discharge
•	•
•	•
•	•
•	•
•	•
•	•

Table 6. Sample Sessions

Session A: Leisure & Range of Motion

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Perform a volleyball activity or throwing/catching using a beach ball to facilitate upper extremity AROM
  - Fishing activity by practicing casting and reeling to facilitate upper extremity ROM
  - Baseball/tee ball using foam baseballs and a tee stand.
- During the session, therapist will provide education on the purpose of the activity and how ROM influences occupational performance.

Session B: Balance & Coordination

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - The client will perform Tai Chi. Calming music will be playing and the client will be encouraged to focus on the body movements in the water. Therapist will provide education on body posture.
  - Client will walk around the pool and practice grocery shopping by reaching for different items placed around the pool to promote balance during functional mobility and reaching tasks.
  - Client will practice functional mobility by transporting cooking materials to various areas in the pool.
- During the session, the therapist will provide education on the purpose of the activity and how balance and coordination influence occupational performance.

Session C: Strength and Endurance

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Arm and shoulder dowel exercises using foam noodles, graded by either in the water, on top of the water, or above the water level.
  - Raking or pushing with a dowel or rake to facilitate strength and endurance for yard work.
  - Passing a ball against water resistance to promote trunk control and upper body strength. Can be done in a group session.
  - Step-ups/ water aerobics with pump up music, grading difficulty based on depth of water, pace and duration.
  - Lifting/carrying and pouring watering can for gardening.
- During the session, therapist will provide education on the purpose of the activity and how strength and endurance influences balance, mobility, and occupational performance.

Session D: Cognition

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Tic-Tac-Toe using beach balls and multipurpose floatation device for board in order to facilitate sequencing and memory.
    - Ring toss/ Frisbee golf with client keeping track of scores and recalling the rules of the game.
    - Have client plan weekly meals and create a grocery list in order of his or her typical route in the store. Client may do this while walking, treading water, etc.
- During the session, therapist will provide education on the purpose of the activity and the how improved cognition promotes occupational engagement.

Session E: ADLs/IADLs

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Practice upper and lower body dressing by donning/doffing different types of clothing over swimsuit in waist-deep water.
    - Practice compensatory bathing techniques using adaptive equipment.
    - Practice wiping edges of the pool, sweeping or mopping to practice cleaning.
    - Retrieving and transporting cooking ingredients based on a given recipe or cooking instructions.
- During the session, therapist will provide education on the purpose of the activity and the importance practicing ADLs to promote occupational engagement.

Session F: Falls Prevention

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - From sitting in a pool chair, play musical chairs to promote balance and functional transfers.
    - In knee or just-below waist level water, have client practice bending safely to pick up toys and other items in the water.
    - Practice carrying toolbox, baseball bag, or watering can while walking in the pool to improve upright posture.
- During the session, therapist will educate the client on the purpose of the activity and the importance of safety techniques to use at home to reduce falls.

*Sessions will overlap based on needs of client and goals.

Case Study 3: Ethel 66 year old female with chronic low back pain and generalized weakness. Upon reviewing her medical chart, you discover that Ethel has had 4 falls in the past 3 months. Ethel currently lives with her daughter in a duplex. Ethel enjoys knitting, cooking, and gardening. In the past, Ethel attended water aerobics at the local YMCA; however, due to her increased back pain she has not been to water aerobics in the past month. Ethel's daughter reported that her mother fatigues easily and her endurance "isn't as good as it used to be." Ethel is currently having difficulty with gardening, grooming, dressing, cleaning and cooking tasks due to her lack of endurance and fear of falling. After discussing options for outpatient rehabilitation with Ethel and her daughter, Ethel agrees to participate in aquatic therapy.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications:

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	**Check all that apply**	**Justification**
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain		
Functional Reach		
Modified Interest Checklist		
Leisure Satisfaction Scale		
COPM		

Demographics
Medical Chart Review
Goniometry (ROM)
Manual Muscle Test (MMT)
Functional Independence Measure (FIM)
Berg Balance Test
Montreal Cognitive Assessment
Cognitive Performance Test

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

Goal 1**:**	Client will exhibit PROM and AROM within normal limits in his right UE in order to improve ability in reaching tasks, within 4 weeks.
Goal 2:	
Goal 3:	

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create	🌊		🌊	🌊
Establish/Restore	🌊		🌊	🌊
Adapt		🌊	🌊	🌊
Alter			🌊	🌊
Prevent	🌊	🌊	🌊	🌊

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM		
Session B: Balance & Coordination		
Session C: Strength & Endurance		
Session: D: Cognition		
Session E: ADLs & IADLs		

Session F: Falls Prevention

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurement of Progress

EHP Component	Outcome Measure	Assess
Person	11. COPM 12. Modified Borg Rate of Perceived Pain 13. Leisure Satisfaction Scale	21. Improved performance and satisfaction scores with self-care, productivity and leisure. 22. Decreased perceived pain score 23. Increase score of leisure satisfaction
Task	14. Functional Reach	24. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	15. Goniometry 16. MMT	25. Increased PROM, AAROM and AROM for functional use. 26. Increase MMT scores. Scale 0-5
Performance	17. FIM 18. Berg Balance Test 19. MoCA 20. CPT	27. Increased score = decreased level of assistance. Score 0-7 28. Increased balance score. Score 0-4 29. Increased score= improved cognition. A score of 26 or above is normal 30. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	Justification for Discharge
•	•
•	•
•	•
•	•
•	•
•	•

Table 6. Sample Sessions

Session A: Leisure & Range of Motion

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Perform a volleyball activity or throwing/catching using a beach ball to facilitate upper extremity AROM
  - Fishing activity by practicing casting and reeling to facilitate upper extremity ROM
  - Baseball/tee ball using foam baseballs and a tee stand.
- During the session, therapist will provide education on the purpose of the activity and how ROM influences occupational performance.

Session B: Balance & Coordination

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - The client will perform Tai Chi. Calming music will be playing and the client will be encouraged to focus on the body movements in the water. Therapist will provide education on body posture.
  - Client will walk around the pool and practice grocery shopping by reaching for different items placed around the pool to promote balance during functional mobility and reaching tasks.
  - Client will practice functional mobility by transporting cooking materials to various areas in the pool.
- During the session, the therapist will provide education on the purpose of the activity and how balance and coordination influence occupational performance.

Session C: Strength and Endurance

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
  - Arm and shoulder dowel exercises using foam noodles, graded by either in the water, on top of the water, or above the water level.
  - Raking or pushing with a dowel or rake to facilitate strength and endurance for yard work.
  - Passing a ball against water resistance to promote trunk control and upper body strength. Can be done in a group session.
  - Step-ups/ water aerobics with pump up music, grading difficulty based on depth of water, pace and duration.
  - Lifting/carrying and pouring watering can for gardening.
- During the session, therapist will provide education on the purpose of the activity and how strength and endurance influences balance, mobility, and occupational performance.

Session D: Cognition

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Tic-Tac-Toe using beach balls and multipurpose floatation device for board in order to facilitate sequencing and memory.
    - Ring toss/ Frisbee golf with client keeping track of scores and recalling the rules of the game.
    - Have client plan weekly meals and create a grocery list in order of his or her typical route in the store. Client may do this while walking, treading water, etc.
- During the session, therapist will provide education on the purpose of the activity and the how improved cognition promotes occupational engagement.

Session E: ADLs/IADLs

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - Practice upper and lower body dressing by donning/doffing different types of clothing over swimsuit in waist-deep water.
    - Practice compensatory bathing techniques using adaptive equipment.
    - Practice wiping edges of the pool, sweeping or mopping to practice cleaning.
    - Retrieving and transporting cooking ingredients based on a given recipe or cooking instructions.
- During the session, therapist will provide education on the purpose of the activity and the importance practicing ADLs to promote occupational engagement.

Session F: Falls Prevention

- Begin warm-up including walking, arm-circles, leg swings, etc.
- Examples:
    - From sitting in a pool chair, play musical chairs to promote balance and functional transfers.
    - In knee or just-below waist level water, have client practice bending safely to pick up toys and other items in the water.
    - Practice carrying toolbox, baseball bag, or watering can while walking in the pool to improve upright posture.
- During the session, therapist will educate the client on the purpose of the activity and the importance of safety techniques to use at home to reduce falls.

*Sessions will overlap based on needs of client and goals.

Conclusion

The purpose of this manual was to provide an educational guide and practical tool for occupational therapy students and entry-level practitioners. To facilitate learning, objectives and activities were incorporated into the manual. Components of the EHP Model, Andragogy, and Cognitive Constructivism were woven throughout in order to guide the process of synthesizing information. Finally, case studies were provided to practice application of knowledge in the aquatic context.

Instructor's Key

Case Studies

Directions for completion of case study examples:

- *Step One*: Indicate any precautions or contraindications with the client. See Table 1.
- *Step Two*: Choose the appropriate assessment tools and justify your reasoning.
    - Refer to Table 2.
- *Step Three*: Form 1-2 additional goals for the client. One example is provided.
- *Step Four*: Based on the goal areas, choose 2-3 sample sessions for your client and describe 1 intervention approach that matches the EHP Model.
    - Refer to Table 3 for explanations of the approaches. Table 6 consists of sample sessions.
- *Step Five*: Based on the assessment tools you chose in Step One, how would you determine if the client met goals and is ready for discharge?
    - Refer to Table 5.

Case Study 1:

Mason is a 26 year old male who received a right rotator cuff repair 8 weeks ago. Mason enjoys playing baseball, but hasn't been able to play for the past three months due to severe pain in his right shoulder. Mason works on the Tech Support team for a local university. His job consists of analyzing and repairing computers and other tech devices. Mason lives in an apartment complex with two roommates. Due to his recent surgery, Mason is currently having difficulty with grocery shopping, cleaning and self-care tasks. After discussing rehabilitation options with Mason, he agrees to participating in aquatic intervention.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications: It is important to double check Mason's incisions to ensure there are no open wounds. Also check the surgical protocol precautions from the MD.

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	Check all that apply	Justification
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain	✓	It is important to get subjective data of Mason's pain and track this level of pain over time. It is likely Mason's pain will be high for a few weeks and slowly decrease throughout the rehabilitation process.
Functional Reach		Functional reach is not necessary to complete with Mason, as he does not have issues with balance.
Modified Interest Checklist	✓	This may be completed to gather Mason's interests and preferred occupations.

Leisure Satisfaction Scale	✓	This may be completed to gather Mason's leisure interests and satisfaction with his performance in these areas.
COPM	✓	This is appropriate to gather Mason's performance and satisfaction in occupations in the categories of self-care, productivity and leisure.
Demographics	✓	It is important to know Mason's age, health status, diagnoses, gender, and educational processes.
Medical Chart Review	✓	Chart review may be completed to review MD's notes, precautions, Mason's medical history, etc.
Goniometry (ROM)	✓	PROM of Mason's right UE should be measured. Mason will complete AROM and AAROM at a later date in accordance with his post-op protocol provided by MD.
Manual Muscle Test (MMT)	✓	May be completed on the left (non-affected side) for comparison.
Functional Independence Measure (FIM)	✓	FIM scores may be used to score self-care tasks.
Berg Balance Test		Mason does not have any balance issues at this time.
Montreal Cognitive Assessment		Mason does not have difficulty with cognition.
Cognitive Performance Test		Mason does not have difficulty with cognition.

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

***Example*:**	Client will exhibit PROM and AROM within normal limits in right UE in order to improve ability in reaching tasks, within 4 weeks.

**Goals may address pain, ROM, MMT, baseball, grocery shopping, cleaning and self-care tasks as evidenced by outcome measures.*

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create				
Establish/Restore				
Adapt				
Alter				
Prevent				

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM	Baseball and other leisure activities may be addressed by practicing leisure activities in the pool. Leisure activities may be used as a means to improve ROM of Mason's right shoulder.	Establish/Restore Adapt Alter Prevent
Session B: Balance & Coordination	Mason does not have difficulty with balance and coordination.	Establish/Restore Create Adapt Alter Prevent
Session C: Strength & Endurance	Mason will need to improve strength and endurance of the right UE in order to restore his ability to perform occupations such as leisure, ADLs and work.	Establish/Restore Adapt Alter Prevent

Session: D: Cognition	Mason does not have difficulty with cognition.	Establish/Restore Create Adapt Alter Prevent
Session E: ADLs & IADLs	Mason may practice ADL tasks in the pool. Tasks may include modified techniques for bathing, dressing, cleaning and functional mobility (e.g. transportation of objects).	Establish/Restore Adapt Alter Prevent
Session F: Falls Prevention	Mason does not have balance issues and is not considered at high risk for falls.	Establish/Restore Adapt Alter Prevent

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurement of Progress

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	1. Improved performance and satisfaction scores with self-care, productivity and leisure. 2. Decreased perceived pain score 3. Increase score of leisure satisfaction
Task	4. Functional Reach	4. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	5. Goniometry 6. MMT	5. Increased PROM, AAROM and AROM for functional use. 6. Increase MMT scores. Scale 0-5
Performance	7. FIM 8. Berg Balance Test 9. MoCA 10. CPT	7. Increased score = decreased level of assistance. Score 0-7 8. Increased balance score. Score 0-4 9. Increased score= improved cognition. A score of 26 or above is normal 10. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	Justification for Discharge
I. ***Modified Borg Rate of Perceived Pain*** II. ***Leisure Satisfaction Scale*** III. ***COPM*** IV. ***Goniometry (ROM)*** V. ***Manual Muscle Test (MMT)*** VI. ***Functional Independence Measure (FIM)***	I. Decreased perceived pain score II. Increased rating of leisure satisfaction III. Improved performance and satisfaction ratings with self-care, productivity and leisure IV. Increased PROM, AAROM and AROM for functional use. V. Increased MMT scores. Scale 0-5 VI. Increased score to demonstrate increased independence with self-cares

Case Study 2:

Jack is a 48 year old male who experienced a stroke 4 weeks ago affecting his left side and has been discharged from the hospital. He is currently attending outpatient occupational therapy and physical therapy services. He works as a carpenter and would like to get back to woodworking and using his hands. Jack enjoys being outdoors, fishing, golfing, and spending time with his family of five. Jack is having trouble with day to day tasks due to tightness and (6/10) pain in his shoulder, wrist and hand. He also expressed concern with feeling confused at times and having difficulty with his memory. This is causing him to feel incompetent because he usually does the yard work and cooks for his family. Jack has also been having difficulty dressing since his stroke. Through discussion of possible goals and treatment ideas, Jack and his wife agree to participate in aquatic therapy.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications: It is important to be aware of Jack's left sided weakness and pain. Also, take into consideration the confusion Jack experiences regarding his memory.

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	*Task*	*Context*	*Performance*
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	Check all that apply	Justification
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain	✓	It is important to get subjective data of Jack's pain and track this level of pain over time.
Functional Reach		Functional reach is not necessary to complete with Jack, as he does not have issues with balance.
Modified Interest Checklist	✓	This may be completed to gather Jack's interests and preferred occupations.

Leisure Satisfaction Scale	✓	This may be completed to know Jack's leisure interests and satisfaction with his performance in these areas.
COPM	✓	This is appropriate to gather Jack's performance and satisfaction in occupations in the categories of self-care, productivity and leisure.
Demographics	✓	It is important to know Jack's age, health status, diagnoses, gender, and educational processes.
Medical Chart Review	✓	Chart review may be completed to review MD's notes, precautions, Jack's medical history, etc.
Goniometry (ROM)	✓	It is important to measure Jack's PROM, AAROM and AROM of both UE for functional use.
Manual Muscle Test (MMT)	✓	It is important to measure Jack's MMT, of both UE for functional use.
Functional Independence Measure (FIM)	✓	FIM scores may be used to score self-care tasks.
Berg Balance Test		Jack does not exhibit balance issues at this time.
Montreal Cognitive Assessment	✓	Jack is exhibiting confusion and issues with memory; therefore, it would be useful to measure his cognitive abilities.
Cognitive Performance Test	✓	Jack is exhibiting confusion and issues with memory; therefore, it would be useful to measure his cognitive abilities.

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

***Example*:**	Client will report decreased pain on a 1-10 pain scale (4/10) in his left UE by improving PROM in the pool in order to engage in meal preparation tasks.

**Goals may address pain, woodworking, MMT, ROM, cooking, yard, social participation with family, cognition, and self-care as evidenced by outcome measures.*

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create				
Establish/Restore				
Adapt				
Alter				
Prevent				

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM	Fishing and other leisure activities may be addressed by practicing in the pool. Leisure activities may be used as a means to improve ROM of Jacks affected UE.	Establish/Restore Adapt Alter Prevent
Session B: Balance & Coordination	Jack does not have difficulty with balance or coordination.	Establish/Restore Create Adapt Alter Prevent
Session C: Strength & Endurance	Jack will need to improve strength and endurance of the left UE in order to restore his ability to perform occupations such as leisure, ADLs and woodworking.	Establish/Restore Adapt Alter Prevent
Session: D: Cognition	Cognition may be addressed in the pool to improve Jack's memory and decrease confusion. Cognition may be addressed in	Establish/Restore Create Adapt

	conjunction with strength, coordination, leisure or ROM activities.	Alter Prevent
Session E: ADLs & IADLs	Jack may practice ADL/IADL tasks in the pool. Tasks may include modified techniques for dressing , and functional mobility, (e.g. transportation of objects to assist with cooking tasks).	Establish/Restore Adapt Alter Prevent
Session F: Falls Prevention	Jack does not have balance issues at this time.	Establish/Restore Adapt Alter Prevent

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurement of Progress.

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	1. Improved performance and satisfaction scores with self-care, productivity and leisure. 2. Decreased perceived pain score 3. Increase score of leisure satisfaction
Task	4. Functional Reach	4. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	5. Goniometry 6. MMT	5. Increased PROM, AAROM and AROM for functional use. 6. Increase MMT scores. Scale 0-5
Performance	7. FIM 8. Berg Balance Test 9. MoCA 10. CPT	7. Increased score = decreased level of assistance. Score 0-7 8. Increased balance score. Score 0-4 9. Increased score= improved cognition. A score of 26 or above is normal 10. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	Justification for Discharge
I. ***Modified Borg Rate of Perceived Pain***	I. Decreased perceived pain score
II. ***Leisure Satisfaction Scale***	II. Increased rating of leisure satisfaction
III. ***COPM***	III. Improved performance and satisfaction ratings with self-care, productivity and leisure
IV. ***Goniometry (ROM)***	IV. Increased PROM, AAROM and AROM for functional use.
V. ***Manual Muscle Test (MMT)***	V. Increased MMT scores. Scale 0-5
VI. ***Functional Independence Measure (FIM)***	VI. Increased score to demonstrate increased independence with self-cares
VII. ***Montreal Cognitive Assessment***	VII. Increased score= improved cognition. A score of 26 or above is normal
VIII. ***Cognitive Performance Test***	VIII. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Case Study 3:

Ethel 66 year old female with chronic low back pain and generalized weakness. Upon reviewing her medical chart, you discover that Ethel has had 4 falls in the past 3 months. Ethel currently lives with her daughter in a duplex. Ethel enjoys knitting, cooking, and gardening. In the past, Ethel attended water aerobics at the local YMCA; however, due to her increased back pain she has not been to water aerobics in the past month. Ethel's daughter reported that her mother fatigues easily and her endurance "isn't as good as it used to be." Ethel is currently having difficulty with gardening, grooming, dressing, cleaning and cooking tasks due to her lack of endurance and fear of falling. After discussing options for outpatient rehabilitation with Ethel and her daughter, Ethel agrees to participate in aquatic therapy.

***Step One*: Indicate any precautions or contraindications with the client.**

Table 1: Precautions and Contraindications

Precautions	**Contraindications**
Fibromyalgia	Hypersensitive to chlorine
Multiple Sclerosis	Allergy to chlorine
Autonomic Dysreflexia	Uncontrolled seizures
Hypersensitivity to chlorine	Open wounds
Orthostatic hypotension	Bowel incontinence
Hydrophobia	Hepatitis A
Poor cognition	Fear of drowning
On chemotherapy	Acute joint inflammation
Structural instability	
Passive range of motion deficits	
Low or high endurance	**Information retrieved from**: Aquatic Therapist (2008); HydroWorx, (2018); Lima, Dias, Mazuquin, da Silva, Nogueira, Marquees, & Cardoso, (2013); Pawar, (2016).
Weakness	
Edema	

Precautions/Contraindications: It is important to consider Ethel's back pain and weakness when in the aquatic setting. Also be careful with her getting in and out of the pool with her fall history.

***Step Two*: Choose the appropriate assessment tools and justify your reasoning. See Table 2.**

Table 2: Evaluations

Person	***Task***	***Context***	***Performance***
➢ COPM ◄——►	➢ COPM	➢ Demographics	➢ FIM
➢ Modified Interest Checklist	➢ Functional Reach	➢ Medical chart review	➢ Berg Balance Test
➢ Modified Borg Rate of Perceived Pain		➢ Goniometry	➢ Montreal Cognitive Assessment (MoCA)
➢ Occupational Profile		➢ MMT	➢ Cognitive Performance Test (CPT)
➢ Leisure Satisfaction Scale			

Evaluation Tools	**Check all that apply**	**Justification**
Occupational Profile*	✓	Occupational profile is gathered via multiple evaluation measures.
Modified Borg Rate of Perceived Pain	✓	It is important to get subjective data of Ethel's pain and track this level of pain over time.
Functional Reach	✓	It is appropriate to gather objective data for Ethel's standing balance during reaching.
Modified Interest Checklist	✓	This may be completed to gather Ethel's interests and preferred occupations.

Leisure Satisfaction Scale	✓	This may be completed to know Ethel's leisure interests and satisfaction with his performance in these areas.
COPM	✓	This is appropriate to gather Ethel's performance and satisfaction in occupations in the categories of self-care, productivity and leisure.
Demographics	✓	It is important to know Ethel's age, health status, diagnoses, gender, and educational processes.
Medical Chart Review	✓	Chart review may be completed to review MD's notes, precautions, Ethel's medical history, etc.
Goniometry (ROM)	✓	It is important to measure Ethel's PROM, AAROM and AROM of both UE for functional use.
Manual Muscle Test (MMT)	✓	It is important to measure Ethel's MMT, of both UE for functional use.
Functional Independence Measure (FIM)	✓	FIM scores may be used to score self-care tasks.
Berg Balance Test	✓	This is appropriate to gather objective data of Ethel's balance in regards to functional task performance.
Montreal Cognitive Assessment		Ethel does not have difficulty with cognition.
Cognitive Performance Test		Ethel does not have difficulty with cognition.

Step Three: **Create two goals for the client. These can be long-term or short-term goals. One example is provided below.**

Goals

***Example*:**	Client will increase MMT in each UE by at least 1 point in 3 weeks in order to perform cooking and gardening tasks.

**Goals may address pain, leisure, MMT, ROM, ADLs, as evidenced by outcome measures.*

Step Four: **Indicate which sessions you would use for this client and identify the matching EHP approach. Provide justification for your answers. See Table 3.**

Table 3: Interventions

	Person	Task	Context	Performance*
Create				
Establish/Restore				
Adapt				
Alter				
Prevent				

Sample Sessions	Justification	Matching EHP Approach
Session A: Leisure & ROM	Gardening and other leisure activities may be addressed by practicing in the pool. Leisure activities may be used as a means to improve Ethel's ROM. Leisure activities may also be used in conjunction with other sessions.	Establish/Restore Adapt Alter Prevent
Session B: Balance & Coordination	Ethel must improve her balance and coordination in order to increase her independence with ADLs and leisure occupations.	Establish/Restore Create Adapt Alter Prevent
Session C: Strength & Endurance	Ethel will need to improve strength and endurance in order to restore her ability to perform occupations such as leisure, and ADLs. Strength and endurance activities may be used in conjunction with the falls prevention session.	Establish/Restore Adapt Alter Prevent

Session: D: Cognition	Ethel does not have difficulty with cognition.	Establish/Restore Create Adapt Alter Prevent
Session E: ADLs & IADLs	Ethel may practice ADL/IADLs tasks in the pool. Tasks may include modified techniques for dressing, grooming, cleaning and functional mobility (e.g. transportation of objects for cooking tasks).	Establish/Restore Adapt Alter Prevent
Session F: Falls Prevention	Ethel may practice falls prevention safety techniques in the pool. The aquatic environment is a safe place to practice these techniques, especially if Ethel has a fear of falling.	Establish/Restore Adapt Alter Prevent

***Step Five*: Select outcome measures and justify the client's readiness for discharge. How do you know your client has progressed? See Table 5.**

Table 5: Outcomes and Measurements of Progression

EHP Component	Outcome Measure	Assess
Person	1. COPM 2. Modified Borg Rate of Perceived Pain 3. Leisure Satisfaction Scale	1. Improved performance and satisfaction scores with self-care, productivity and leisure. 2. Decreased perceived pain score 3. Increase score of leisure satisfaction
Task	4. Functional Reach	4. Score of 6 or less= significant risk for falls. Score between 6-10 inches= moderate risk for falls.
Context	5. Goniometry 6. MMT	5. Increased PROM, AAROM and AROM for functional use. 6. Increase MMT scores. Scale 0-5

Performance	7. FIM 8. Berg Balance Test 9. MoCA 10. CPT	7. Increased score = decreased level of assistance. Score 0-7 8. Increased balance score. Score 0-4 9. Increased score= improved cognition. A score of 26 or above is normal 10. Scored according to Allen's levels of cognition. Ranging from 1-6. Increased score= improved cognitive functions.

Outcome Measures	**Justification for Discharge**
I. ***Modified Borg Rate of Perceived Pain***	I. Decreased perceived pain score
II. ***Functional Reach Test***	II. Increased distance of reach before loss of balance.
III. ***Leisure Satisfaction Scale***	III. Increased rating of leisure satisfaction
IV. ***COPM***	IV. Improved performance and satisfaction ratings with self-care, productivity and leisure
V. ***Goniometry (ROM)***	V. Increased PROM, AAROM, and AROM for functional use.
VI. ***MMT***	VI. Increased MMT scores. Scale 0-5
VII. ***Berg Balance Test***	VII. Increased balance score. Score 0-4

Review of Objectives

Objective Met	
Identify populations in which aquatic therapy would be appropriate.	
Recognize the benefits of aquatic therapy including physical, cognitive and psychosocial components.	
Recall precautions and contraindications to aquatic therapy.	
Describe approaches in accordance with the Ecology of Human Performance Model.	
Apply assessment tools under the person, context, task and performance categories.	
Compare and contrast the roles of occupational, physical and athletic trainers in aquatic therapy.	
Categorize appropriate interventions that match the approaches of the EHP Model.	
Interpret client post-test scores to determine outcomes from treatment.	

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