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An Aquatic Occupational Therapy Program for Children with Physical, Developmental, and Psychosocial Disabilities

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AN AQUATIC OCCUPATIONAL THERAPY PROGRAM FOR CHILDREN WITH
PHYSICAL, DEVELOPMENTAL, AND PSYCHOSOCIAL DISABILITIES

by

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This Scholarly Project Paper, submitted by Nicole E. Miller in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Faculty Advisor

Date

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Title: An Aquatic Occupational Therapy Program for Children with Physical, Developmental, and Psychosocial Disabilities

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CHAPTER I

Introduction

Aquatic therapy was defined by the Aquatic Therapy & Rehab Institute, Inc. in 2004 as “the use of water and specifically designed activity by qualified personnel to aid in the restoration, extension, maintenance, and quality of function for persons with acute, transient, or chronic disabilities, syndromes or diseases.” Aquatic therapy is an adjunct to traditional occupational therapy that can be used to help a client achieve his or her goals more quickly and without pain. Many times the interventions are the same in the pool as they would be on dry land, but the therapist is utilizing the properties of water to better support occupational performance. For instance, warm water helps to relax spasticity in a child with high muscle tone, making it easier to perform stretching and other movements; hydrostatic pressure provides support to the trunk and joints, allowing freedom from wearing a brace; and a child may be more motivated to participate in therapy when it takes place in the water versus on dry land. In each of these cases, a therapist would use aquatic therapy to reach functional goals more quickly.

While aquatic therapy is beneficial with many of the populations that occupational therapists serve, there is currently limited literature available to assist occupational therapists in developing aquatic therapy programs. The purpose of this project is to provide a manual that guides occupational therapists who wish to begin an aquatic occupational therapy program.

Chapter II consists of an extensive literature review, which forms the foundation for a manual describing an aquatic occupational therapy program. This literature review discusses the properties of water that make aquatic therapy different from land-based therapy. The four main properties include buoyancy, hydrostatic pressure, viscosity, and temperature. It also outlines the benefits of aquatic therapy, which are grouped into the categories of physical, psychosocial, cognitive, and recreational. Because of the wide range of benefits, aquatic therapy is a prime method of therapy for children with physical, developmental, and psychosocial disabilities.

The Ecology of Human Performance Model was chosen to guide the product because it contains essential components that match the objectives of the proposed aquatic occupational therapy program. It follows a client-centered approach and doesn't focus on a person's disability, but instead looks at what is impeding task performance, and whether changes need to be made to the person, context, or task itself. The Ecology of Human Performance Model also defines five different intervention strategies that are used to address the person, context, task, or a combination of these variables. The goal of each intervention strategy is to fulfill the needs an individual requires to perform a task. This model clearly explains how it can be implemented into a program, and was easily applied to the formation of an aquatic occupational therapy program.

Chapter III describes the methodology that was used to form the product in Chapter IV. Chapter V is the final chapter, summarizing the purpose, limitations, and clinical implications of this project.

CHAPTER II

Introduction

"Aquatic Therapy and Rehabilitation is the use of water and specifically designed activity by qualified personnel to aid in the restoration, extension, maintenance, and quality of function for persons with acute, transient, or chronic disabilities, syndromes or diseases" (Aquatic Therapy & Rehab Institute, Inc., 2004, paragraph 4). This definition was formed by a committee that was made up of representatives from various disciplines across the United States and Canada, including professions such as occupational therapy, physical therapy, kinesiotherapy, and adapted aquatics. It is inferred that aquatic therapy with a licensed professional who has knowledge of movement mechanics, science, and aquatic principles differs from adapted aquatics with a non-licensed aquatic instructor. Examples of the latter include swimming lessons or water aerobics classes for special populations. Aquatic occupational therapy, which is provided by a trained and licensed occupational therapist (OT), uses a client-centered approach in which the OT integrates the client's abilities and personal goals with the OT's goals to form a meaningful treatment plan. Occupational therapists are also skilled in activity analysis and gradation, which allows them to adapt the activity to fit a client's specific needs. It is this client-centered approach that separates occupational therapists from other disciplines when implementing aquatic therapy in their treatment sessions.

The benefits of aquatic therapy can be grouped into four main categories: physical, psychosocial, cognitive, and recreational. Examples may include, respectively,

increased range of motion (ROM), improved self-esteem, better understanding of your body, and the development of a new leisure activity. The benefits of aquatic therapy have long been known, and are the main focus of the literature available on the subject. However there have been very few research studies done on aquatic therapy, and most of that research occurred before 1995. There is also minimal literature available in the occupational therapy field, which may indicate minimal use of aquatic therapy by OT's.

In addition to the benefits of aquatic therapy, this review of literature also discusses the properties of water that make aquatic therapy different from land-based therapy, and the indications and contraindications for the use of aquatic therapy. Similar to any other form of rehabilitation, aquatic therapy should not be used with all clients, and it is just as important to consider what populations should avoid this type of treatment as it is to list who benefits from aquatic therapy. Although there is minimal literature on the use of aquatic therapy by OT's, aquatic occupational therapy will be explored, as well as the essential components needed to form a successful, OT theory-based aquatic therapy program. The purpose is to utilize the literature available on aquatic therapy to develop an aquatic occupational therapy program for children with physical, developmental, and psychosocial disabilities.

Properties of Water

There are four main properties of water that make aquatic therapy beneficial when land-based therapy may not be appropriate. These properties are buoyancy, hydrostatic pressure, viscosity, and temperature. Buoyancy is defined as "the upward force on an object immersed in water" (Jamison, 2000, p. 60). It is what reduces body weight to 10% of what it weighs on land when a person is submerged in water to the level of the neck.

This reduces joint loading and assists limb movement, while also unburdening the compressive features of the spine. Buoyancy allows a therapist to gradually increase weight bearing during treatment by progressively moving to shallow water (Johnson & Garrett, 1994). The ability of a human body to sink or float depends on its specific gravity, which is the comparison of its density to that of water. Because the specific gravity of water is one, a person must have a specific gravity of less than one to float, otherwise that person will sink. Factors that determine a person's density include bone density, muscle mass, the quantity and distribution of fat, and the depth and expansion of the lungs. This means that a person with a high density of bones and muscle mass and little body fat is more likely to sink in water, while a person whose muscles have not developed or have atrophied and may be replaced by fat is more likely to float in water. Individuals with respiratory illnesses, such as cystic fibrosis, asthma, or chronic pulmonary obstructive disorders, may also be more likely to sink in water (Lepore, Gayle, & Stevens, 1998).

Hydrostatic pressure is the pressure exerted by water, which is three-dimensional (Jamison, 2000). Because water has density, this pressure provides support to a person's joints and trunk, allowing for braces weaning and post-surgical rehabilitation. It also provides ambient proprioceptive input by making an individual more aware of the motions he or she is making, helping improve body image for individuals with neurological deficits and organize sensory input for children with sensory integration issues. Hydrostatic pressure reduces edema by increasing tissue pressure, forcing the hemodilution of excess fluid and toxins from the cells into the bloodstream. In this way,

pain and swelling is decreased while circulation is increased, allowing for greater freedom of movement (Johnson & Garrett, 1994).

The internal friction of water molecules causes viscosity, or the resistance to movement (Johnson & Garrett, 1994). There are three factors that determine how much resistance a person experiences in the water: “the volume of the exerciser’s body, its shape, and the speed of the movement performed” (Binkley & Schroyer, 2002, p. 49). Typically, the faster a person moves in the water, the more resistance he or she experiences. Drag, the resistance put forth by a fluid in the opposite direction of movement, is affected by these three factors. Drag and viscosity can be used in two different ways during therapy sessions. First, muscles are being worked every time a movement is made in the water because the person is moving against the pressure of water. As a person increases the speed and length of time that he or she can perform exercises in the water, muscle strength and endurance also begin to increase. Drag and viscosity can also aid in balancing because their properties act to resist movement, which slows a person’s fall and allows time to react to a loss of balance. Also, since falling in water does not cause injury, it can help to reduce the fear of falling.

Water temperature plays an important role in aquatic therapy because warm and cool water each have a different effect on the person’s performance. The average swimming pool typically has a temperature of 80-84°F. A heated therapy pool raises its temperature to a range of 92-96°F (Garrett, 1994), which promotes muscle relaxation, pain relief, increased blood flow to body tissues, and decreased muscle tone. Warm water tends to be comforting to people who may have anxiety about being in a pool, and also allows for easier stretching and mobility. However, it is also important for the air

surrounding a therapeutic pool to be within a few degrees of the water in the pool to maintain these benefits. The best way to achieve this is to keep the therapeutic pool enclosed in a room, separate from the other rooms in the facility.

Cool water temperature, on the other hand, helps to stimulate arousal, increase muscle tone, and prevent overheating, making it a prime medium for cardiovascular workouts (Johnson & Garrett, 1994). It is also beneficial for individuals with multiple sclerosis (MS), who tend to experience sensitivity to heat, overwhelming fatigue, weakness, dizziness, and difficulties walking. Since a heated pool causes relaxation and could exacerbate a person's fatigue or dizziness, cool water is the optimal choice when using aquatic therapy for individuals with MS. The decreased body weight in water also helps reduce the effort needed to lift a leg to walk or perform other exercises, enabling clients to engage in physical exercise. Finally, because individuals with MS often use wheelchairs or sit for a majority of the day to conserve energy, walking or floating in the water helps improve the circulation in their lower bodies (Butler, 2002).

Benefits of Aquatic Therapy

Physical

There are numerous physical benefits that result from engaging in aquatic therapy. One of the main physical benefits is the ability of warm water to decrease spasticity, or high muscle tone, in individuals with central nervous system impairments such as cerebral palsy (CP). Spasticity often makes passive range of motion difficult, impeding the caretaker's ability to provide proper hygiene, dress the individual, or position the person to prevent skin breakdown. However, when submerged in the pool, maximum ROM of each joint is achieved through gentle stretching, helping to maintain current

functioning and prevent increased tightness (Martin, 1983). Certain movements in the water can also benefit individuals who experience spasticity. For example, someone with lower extremity extensor tone may use the frog kick rather than the flutter kick so as to break up instead of facilitate synergistic patterns. On the other hand, a person who needs to strengthen the quadriceps and gluteal muscles should practice the flutter kick (Garrett, 1994).

Water helps to decrease edema and swelling, which allows for decreased pain with movement (Binkley & Schroyer, 2002). When cardiovascular fitness is improved through regular exercise, circulation of lymph fluid is improved along with blood circulation. Water exercise can develop muscular and cardiovascular strength and endurance as effectively as land-based exercise (Jamison, 2000).

Individuals with compromised respiratory systems, such as those diagnosed with asthma, spinal muscular atrophy (SMA), or chronic obstructive pulmonary disorder (COPD), can also strengthen their respiratory muscles through aquatic therapy. When submerged to the neck level, water exerts pressure on the chest wall, causing the person's muscles to work harder to breathe against the resistance of the water. However, it is important to gradually immerse these patients at the beginning of each therapy session so that they may become accustomed to more laborious breathing. Oral motor control may also be improved by having a patient blow bubbles or ping pong balls across the surface of the water, as well as practicing closing the mouth when a person's face comes close to the water. All of these areas will help to improve a person's overall vital capacity (Figuers, 1999).

Another general area that can be addressed through aquatic therapy is motor skills. Individuals with weakened trunk muscles, such as those recovering from a stroke, may practice sitting balance by sitting on the steps of the pool and using the water as a natural support. Creating turbulence in the water by adding jets enables a therapist to challenge a client's balance and righting reactions once static sitting balance has been achieved. Strengthening the spinal and trunk muscles during activities such as these will improve your client's posture and mobility as well. Coordination may also be improved through manipulation of any pool toys or equipment. For example, since playing with pool toys may be motivating to a child, a therapist could have him or her reach for toys while facilitating bilateral use of the upper extremities. This also helps to improve the child's grasp and fine motor control. Finally, a secondary gain that is achieved through aquatic therapy is the tactile and vestibular stimulation that is provided when a person is immersed in the water, which may, for example, help to calm a sensory seeking child (Garrett, 1994).

Psychosocial

Participation in an aquatic program not only improves motor development and health, but also the psychosocial components of a person's mental health. Teenagers with cerebral palsy are often unable to perform activities of daily living independently, which leads to dependence on others and a lowered self-esteem. There are also limited opportunities for adolescents with disabilities to engage in physical activities with their peers. Participation in an aquatics program, however, allows adolescents with disabilities to interact with their peers in a non-threatening environment where the stigma of having a disability is not as apparent. Dorval, Tetreault, and Caron (1996) studied the

participation of 20 adolescents diagnosed with cerebral palsy between the ages of 10 and 17 in one of two different aquatic programs over the course of 12 months. The purpose of the study was to evaluate the immediate and long-standing effect of the aquatic programs on self-esteem and functional independence, verify the universal benefits of aquatic therapy, and discriminate the predictors of self-esteem and functional independence. Results indicated there was a significant increase in both self-esteem and functional independence throughout the duration of the 10-week aquatic program for both groups, although these factors had decreased again 9 months after the end of the program for 6 children, or 30% of the total subjects. This indicates the importance of following through with a community-based or other aquatic program after a client is discharged from an aquatic occupational therapy program in order to maintain the goals that were achieved. The results of this study also provide evidence that self-esteem and independence in daily tasks leads to the development of self, an important aspect in adolescence.

Similarly, Peganoff (1996) documented treatment of a 14-year-old girl with cerebral palsy who had, in association with her many physical limitations, a poor self-image. The subject participated in an aquatic therapy program with an occupational therapist and an aquatics instructor for eight weeks to improve her functional abilities. In this arrangement, the OT assessed the subject, formulated treatment goals, and analyzed planes of movement, body positions, and graded movement patterns in swimming strokes through which the treatment goals could be met. The aquatics instructor had a background in water safety instruction (WSI), and taught the adapted swim strokes as suggested by the OT to the girl. Both professionals were present throughout the

treatment sessions to ensure the best possible swimming strokes were being utilized. The subject showed great improvements in her physical functioning following the eight-week program, and as a result, developed a stronger self-image. This was evidenced by the girl becoming an active participant in the swimming sessions, and feeling less frustrated during daily activities. Peganoff has concluded that a low self-image tends to slow physical and psychological development as the teenager further withdraws from activities and social situations. With the development of a new skill, in this case swimming, the subject was able to interact more with her peers, strengthen her self-esteem, and improve her physical functioning. By choosing a purposeful activity that was meaningful to the client, she was able to reach her treatment goals in a motivating environment.

Swimming is a physical activity that children with disabilities can participate in more easily with their peers than other activities that require advanced coordination and balance. Because there is more peer interaction, children with disabilities are able to learn age-appropriate social skills while experiencing acceptance and the success of forming new friendships. Emotional well-being is also needed to lead a healthy lifestyle. Because of the freedom of independent movement that a person with disabilities experiences in the water, he or she gains self-confidence and a better self-image. The individual is also able to feel the same sensations as any person without a disability. The water becomes a place where the child with disabilities can forget about his or her physical limitations and have fun. Nessel (1995) believes this improved self-image leads to an improved quality of life, which is reflected in the person's attitude.

Finally, being able to engage in exercise and therapy without experiencing pain has positive effects on a person's mood as the decreased pain tends to last beyond the

pool session. Clients are suddenly able to perform certain movements or activities that they have struggled with on land, and again, they gain self-confidence. They also become more relaxed in the water and lose the fear of falling during movement, and as a result, are more motivated to participate in therapy sessions (Thiers, 1994). Clients who are motivated and have less pain in their therapy sessions are going to be invested in their treatment plan and more likely to follow up on the therapist's recommendations.

Cognitive

Aquatic therapy gives children the opportunity to increase their cognitive skills. There are many conditions that influence a child's ability to learn, including the environment, length of pool sessions, the time of day the sessions are held, and whether the progression of activities are suited to meet each individual's needs (Dulcy, 1983). The pool sessions should ideally be held at the time of day when the child has the most energy and capacity to pay attention, and in an environment that is free of unnecessary distractions. The pool sessions should also include short periods of free time or games to keep the children excited about their therapy sessions. When these conditions are taken into consideration, aquatic therapy can be used to enhance a child's cognition.

Swimming is a "closed" skill, which means that it is repetitive and does not require any quick changes in the approach, making it an easy activity to learn (Wanzer, 2000). A therapist can also incorporate concepts such as math, spelling, reading, or counting into their treatment plans through different activities and games. Examples may include reading their treatment plan or swimming safety rules before each session, counting laps or repetitions during strengthening activities, or reaching under the water for plastic letters. Other concepts that can be implemented into the aquatic therapy

treatment plan are problem-solving skills, speaking in full sentences, memory, and sequencing (Lepore, Gayle, & Stevens, 1998). By keeping the child involved in all aspects of the therapy session, a therapist is helping to improve his or her judgment and orientation to surroundings.

For children with neurological deficits, such as traumatic brain injuries, or extremely limited mobility, such as cerebral palsy, it is often difficult to understand how their bodies move. The properties of water, however, provide a stimulating environment that helps these children better understand their bodies and improve their body image. This occurs through movement exploration, which is made possible by decreased spasticity and increased ROM (Dulcy, 1983).

Recreational

Leisure is one of the seven areas of occupation identified in the Occupational Therapy Practice Framework, and is integral in developing a well-rounded person. For children with physical or psychosocial limitations, it is often difficult to develop leisure interests due to problems with accessibility, inclusion, and stigma. Engaging in an aquatic therapy program, however, gives children with disabilities the opportunity to safely participate in a leisure activity with their peers, while reducing the stigma of having a disability. Once swimming is established as a new recreational outlet, the child will experience pleasure and begin exploring other leisure opportunities.

Indications and Contraindications

Similar to other forms of rehabilitation, aquatic therapy should not be used with all clients. It is important to consider which populations should avoid aquatic therapy as

well as who benefits from this type of treatment. The following table lists the indications and contraindications for the use of aquatic therapy as part of a rehabilitation program.

Table 1

When to Use Aquatic Therapy

Indications	Contraindications
High pain level Gait deviations Decreased mobility Weakness Poor coordination Limited weight bearing Poor muscle endurance Decreased cardiovascular endurance Joint contractures Decreased flexibility Poor proprioception Increased muscle tone Decreased range of motion Decreased balance Edema Poor facial control Respiratory problems	Contagious infections Open wounds Fever Chronic ear infections Abnormal blood pressure Excessive fear of water Epilepsy Gastrointestinal disorders Current or recent radiation therapy Severe burns Diseases grossly affecting thermoregulation

Note. Information adapted from “Aquatic Therapy in the Treatment of Upper Extremity Injuries,”

by H. Binkley and T. Schroyer, 2002, *Aquatic Therapy Today*, 7(1), p. 50.

Aquatic Devices and Equipment

According to Crawford (1998), there are six main reasons to use adaptive equipment during aquatic therapy sessions: entrance and exit of the pool, safety, support of the body, propulsion, fitness, and motivation. Using adaptive equipment in any of these areas will provide clients with maximum benefits during their aquatic therapy sessions.

Entrance and Exit of the Pool

While ladders can be used to access a pool, they require advanced strength, balance, coordination, and ROM of the upper and lower extremities and are not easily accessible by individuals with disabilities. The optimal equipment to have in a pool is wide stairs with a handrail that gradually reaches the floor of the pool. This allows a client to practice stair climbing, sitting with varying levels of water support, and motor planning (Martin, 1983). Ramps may also be used for wheelchair users who feel more comfortable being wheeled into the water rather than lifted. There are also a variety of lifts, such as a Hoyer Lift, that help people with severely limited mobility enter and exit a pool. They do so by suspending, pivoting, lowering, and raising the individual (book). It is important when using lifts, however, that the people operating them are adequately trained in performing transfers and operating the lift. Finally, for individuals who have good upper body strength, but weak or paralyzed lower body strength, there is the option of transfer steps. The topmost step is at the seat level of a wheelchair so that people can transfer themselves independently to it, and then lower themselves into the pool step by step. The steps should be nonabrasive and have nonskid treads to avoid injury.

Safety

The usual safety equipment that should be at every poolside includes a shepherd's crook or reaching pole, ring buoy, and first aid kit (Lepore, Gayle, & Stevens, 1998). In addition, for individuals with disabilities, gym mats may be needed to prevent abrasions if a person with lower body paralysis needs to pull himself out of the pool or if a person needs to be lowered onto the floor. Waterproof mats that float on the water's surface may also be needed to aid a person who is having a seizure in the water.

Support of the Body

For individuals who are dependent on others to keep their heads above the water, there is a variety of floatation equipment available. Examples include water dumbbells, mats, belts, noodles, kickboards, water wings, vests or life jackets, and pull buoys. These help to guarantee safety, reduce fear, provide support, and assist individuals in maintaining a level position in the water. A therapist may also use a bolster or wedge to achieve optimal positioning when placing a client on a floatation mat.

Propulsion

Areas that affect forward movement in the water are a person's physical ability, body shape, and efficiency of swim stroke (Anderson, 1988). The more limited a person's functional mobility is, the more awkward and uncoordinated the person's movements become, causing difficulty with forward movement in the water. There are three basic body types that determine how a person floats in the water (L. Marshall, personal communication, August 1, 2004). One type is endomorph, or a pear-shaped body, which causes buoyancy at the hips and thighs. The second body type is ectomorph, or an apple-shaped body, which causes buoyancy at the middle of a person's body. Finally, there is mesomorph, which is a dense, muscular body that causes a person to sink. In order to initiate forward movement in the water, a person's body must be positioned in the most streamlined and balanced position possible, which can be achieved by using floatation devices to compensate for the person's body type. Finally, the efficiency of a person's swim stroke may be affected by such conditions as limited ROM, the inability to keep the fingers together, or a limited capacity to learn how to coordinate kicking and using a swim stroke with the arms at the same time.

Devices that assist propulsion are webbed gloves, fins, and prosthetics designed specifically for use by amputees in the water. These items increase the surface area of the hands or feet to allow for easier movement. A therapist may also fabricate splints, such as an elbow extension splint or a hand paddle with a wrist cock-up, to allow clients to achieve a functional swimming stroke (Johnson & Garrett, 1994). Through creativity and knowledge of how the human body works, adaptive equipment can be used to overcome just about any disability.

Fitness

As previously mentioned, aquatic therapy can be used to increase a person's strength and cardiovascular fitness level. There are some machines that are specifically used under water, such as underwater treadmills and aquacycles. These are often used in the early rehabilitation stage of orthopedic injuries with physical therapists because it is less painful, and the water supports the person's joints.

Therapists who wish to increase resistance during strength training may use devices such as ankle and wrist weights, water dumbbells, paddles, aquashoes, webbed gloves, and water jogging belts. Strengthening, which is considered a preparatory method, may be used by occupational therapists as a step to help their clients reach a goal. For example, a client who wants to participate in a game of pool volleyball, but lacks the upper extremity strength needed to lift her arms above her head to direct the ball, may strengthen her arms by using water dumbbells against the resistance of water. In this way, the occupational therapist is teaching utilizing strengthening methods in order to reach a client-centered goal. In addition to strengthening, ankle weights may

also function to help a person who is not able to maintain an upright position independently to keep his or her feet on the floor.

Therapists may also decide to use turbo jets, which push air out rapidly, to increase the turbulence of the water and challenge a person's balance (Garrett, 1994). This device can also be used to break up scar tissue in post surgical clients, or provide deep muscle massage for individuals experiencing back pain or with a diagnosis of spinal stenosis. Finally, a raised platform or parallel bars may be used to assist clients with balance as they perform functional activities in the pool. The platform also provides a shallow area for sitting, standing, crab walking, and other movements that children may use as they experience movement in the water (Harris & Thompson, 1983).

Motivation

There are a variety of water toys that can be used to help motivate children to participate in aquatic therapy. These toys are generally attractive, brightly colored, and will either sink or float in the water. Some examples of pool toys include foam rafts, noodles, diving rings or sticks, goggles, hoops, and balls, which may be used during water games or to help achieve therapeutic goals. For example, retrieving diving rings under the water may be used to practice reaching or to decrease a child's fear of submerging his or her head under the water. Playing catch with a beach ball could also facilitate bilateral use of the upper extremities, increased motor planning, and improved gross motor coordination. In these examples, the child will typically think he or she is just playing a game, while the occupational therapist is actually using the occupation of play through toys/games to help achieve a specific goal. Using toys during aquatic therapy will maintain a child's attention and interest for longer periods of time.

Aquatic Occupational Therapy

Occupational therapists traditionally use a holistic approach when treating their clients (Garrett, 1995). In other words, OT's look at the individual as a whole human being, which includes assessing areas such as physical, mental, emotional, spiritual, and personal believe systems in order to work with clients to develop and maintain skills that enable them to carry out everyday functions. This differs from the conventional medical model, which views a client's physical ailments as separate and unrelated to the individual's context. By offering a holistic approach, occupational therapists separate themselves from other disciplines in keeping interventions client-centered, and are well positioned to provide aquatic therapy services.

In order to maintain a holistic approach, OT's attempt to use purposeful and occupation-based activities as often as possible in their treatment. Purposeful activities are those that occur within a therapeutically designed context and lead to an occupation, while occupation-based activities occur in their natural context and match the client's goals. Preparatory activities, the third type used by occupational therapists, prepare the client for occupational performance (American Occupational Therapy Association, 2002). While interventions that utilize preparatory and purposeful activities are beneficial and sometimes necessary, the ultimate goal of occupational therapists is to help clients achieve their goals through occupation-based activities in order to match the client's context. It is the use of purposeful and occupation-based activities, both of which have meaning to the client and help him or her to fulfill life roles, that makes occupational therapy client-centered (Garrett, 1994). In a case study conducted by Peganoff (1984), she and an adolescent with cerebral palsy agreed to use swimming as a

means to reach the client's therapeutic goals. At the end of the swimming program, the adolescent showed great improvements in both her physical and her psychosocial functioning. Peganoff concluded that by utilizing aquatic therapy, a purposeful activity that is socially acceptable and appealing to the adolescent population, her client was able to enhance her functional status through active participation in the therapy program.

An occupational therapist who utilizes aquatic therapy is well trained in the principles and properties of water, and knows how to grade and advance activity in water (Garrett, 1995). With skills in activity analysis and activity gradation, an OT can adapt almost any activity in the pool to match a client's needs, allowing that person the opportunity to participate in integrated aquatic programs with his or her peers. When OT's lead aquatic therapy groups, they are able to utilize their training in group process, as well, to manage and facilitate social interactions and group dynamics among group members.

Knowledge of sensory integration principles and techniques is another skill area unique to the profession of occupational therapy that can be utilized in aquatic therapy. With this knowledge, the OT is able to make the necessary changes in the environment to implement treatment sessions in a way that is best suited for that individual (Joe, 1998). The therapist must take into consideration how conditions in the surrounding environment affect the client during treatment. This could include the level of extraneous noise, brightness of the lights, temperature of the water, smell of chlorine, sensation of water in the ears or on the skin, tolerance of being physically touched by the therapist, and the pressure of water surrounding the body. In sum, occupational therapists have

skills that distinguish them from other disciplines and allow them to provide their clients with an aquatic therapy experience unique to each client's occupational needs.

Theory

The Ecological Model of Human Performance, which was formed to underline the fundamental role of context in task performance, contains essential components that match the objectives of this aquatic occupational therapy program. It follows a client-centered approach, and consists of four major constructs: person, context, task, and performance (Dunn, W., Brown, C., & Youngstrom, M. J., 2003). The person is defined as a unique individual with distinctive abilities, cognition, and experiences. The variables that make up a person are constantly changing with every experience that he or she encounters, and influence the tasks that a person engages in and the quality of task performance. Participation in aquatic occupational therapy can be affected by skill development, intellectual abilities, and previous experience in aquatics.

The model further identifies tasks, which are the behaviors necessary to accomplish a goal, as endless in number and narrowed for each individual based on his or her values, experiences, abilities, environment, and the resources available. The tasks that are meaningful to a person help define the various roles he or she may fulfill. For example, a child with physical limitations may find that he is restricted to engaging in activities that do not require a lot of physical effort. This may limit the amount of time the child can spend with friends, and as a result, have a negative impact on the ability to fulfill the role of a friend. However, aquatic occupational therapy provides the child with an opportunity to engage in a physical activity with friends without expending a large amount of effort, and thus helping to maintain that role of a friend.

Context is described as the person's surrounding environment and the conditions that affect task performance. Temporal context consists of conditions that exist within the person, including chronological age, developmental stage, life cycle, and health status. Environmental context includes physical, social, and cultural dimensions, which are external to a person. Context influences a person's behavior and task performance through such things as availability of materials, resources, or other people needed to perform certain activities, as well as the social norms placed on the activity. A person's physical limitations are not as obvious in the water, making aquatic therapy a socially acceptable activity for a child with disabilities to engage in with his or her peers.

Dunn et al (2003) describe performance as the process of the person engaging in a task. The quality of performance is established by the interaction between the person and the context. A person may have all the skills necessary to engage in a particular task; however, the context may encumber that individual's ability to perform the task. Likewise, the context may fully support an individual's ability to engage in a task, but the person is limited by his or her skills and abilities. For instance, a child diagnosed with autism may have all the underlying skills necessary to learn how to swim; however, the aquatic instructor at a community facility may not be trained in teaching children with pervasive developmental disorders and would not know how to effectively handle the ensuing behaviors. On the other hand, a community facility may offer swimming lessons with an adapted aquatics instructor who has experience working with multiple developmental disabilities; however, the child with autism experiences chronic seizures and it is unsafe for her to pursue aquatic therapy.

The Ecological Model of Human Performance also defines five different intervention strategies that are used to address the person, context, task, or a combination of these variables. Dunn et al. (2003) lists the five strategies as establish/restore, alter, adapt/modify, prevent, and create, all of which have been incorporated into the Occupational Therapy Practice Framework (American Occupational Therapy Association, 2002). The goal of each intervention strategy is to fulfill the needs an individual requires to perform a task.

Establish/restore is an approach that involves assessing the person variables and improving his or her skills. The therapist may be establishing skills that have not yet been learned, or restoring skills that have been affected by illness or injury. For example, an aquatic occupational therapist will establish basic swimming skills with a child who has never learned to swim, or restore swimming strokes in a person who has lost functional use of his or her upper extremities due to a traumatic brain injury. Alter is a strategy that concentrates on the context in which the person carries out tasks. Interventions are designed to alter the context in order to fit the person's current skills and abilities. An example would be if the OT holds individual aquatic sessions to limit unnecessary noise and traffic in the pool area for a child who has difficulty modulating external distractions in the environment.

Adapt/modify is the third intervention strategy, and is used when a therapist needs to adapt the environment or task features of a chosen task to support performance. Examples of this strategy could include providing laminated treatment plans to the client as a reminder of the skills being addressed in the pool session, or teaching active assistive exercises to a client with a flaccid upper extremity in the pool. Prevent is another

approach that is used to avert problems with task performance. When using this strategy, the therapist looks to change the person, context, or task variables to prevent illness or injury that might otherwise occur. This could include teaching a client with diabetes to wear aqua shoes in the pool to prevent injury to the feet.

Finally, the fifth intervention strategy proposed by the Ecological Model of Human Performance is create. This method creates situations that support optimal performance for all people and populations by not assuming that a disability exists or is likely to transpire. The fact that this strategy is not limited to people with disabilities or people at risk of developing a disability is the piece that differentiates create from prevent. An example is the use of a lifejacket or other floatation device in any number of aquatic activities.

The Ecological Model of Human Performance was chosen to guide the process of planning an aquatic occupational therapy program because it uses a client-centered approach that can be adapted to each individual's needs. It doesn't focus on a person's disability, but instead looks at what is impeding task performance, and whether changes need to be made to the person, environment, or task itself. The model can also easily be used in community programming, where it supports inclusion of individuals with disabilities. This aspect will aid a therapist who strives to incorporate an integrated aquatic group in his or her aquatic occupational therapy program. The five intervention strategies described above will be used to form samples of specific skills groups within the aquatic occupational therapy program.

Conclusion

The benefits of aquatic therapy include physical, psychosocial, cognitive, and recreational benefits. While land-based therapy may provide some of the same benefits, aquatic therapy has the added properties of water that together act as a natural support to the human body, relax tight or spastic muscles, and help to alleviate pain. Therefore, aquatic therapy should be utilized when goals can be achieved more efficiently or with less pain in the water than on dry land.

While occupational therapists have the knowledge and skills necessary to provide aquatic therapy, it is not very common in the field. Research by OT's on the use of aquatic therapy is limited, and it currently is an infrequent topic in educational programs. As aquatic therapy becomes more popular, occupational therapists must seek to gain more knowledge in its principles and become aware of how their skills can be used to implement aquatic therapy in treatment sessions. Currently, a protocol is needed to help guide aspiring OT's in implementing aquatic therapy into their treatment programs. The ensuing manual will utilize the principles of the Ecological Model of Human Performance, and thus address issues related to the person, environment, and task performance.

Chapter III will discuss the process that was carried out during the production of the aquatic occupational therapy program. It includes the formulation of a topic, the literature review, and analysis of the information found in the literature review.

CHAPTER III

Methodology

Literature was gathered using OT Search, PubMed, CINAHL, and MedLine Plus to determine what has been done in the field of occupational therapy and other health science fields regarding aquatic therapy. Much of the literature addressed the benefits of aquatic therapy and how the properties of water affect the human body, while case studies done by occupational therapists and physical therapists offered real-life examples of how aquatic therapy was used in treatment sessions. Included in the literature were interviews with occupational and physical therapists experienced in aquatic therapy; therapists currently involved in aquatic programs were also consulted for additional information. The literature review was completed and is presented in Chapter II. The need for a manual to assist occupational therapists to develop aquatic occupational therapy programs was identified.

The Ecological Model of Human Performance was chosen to guide the formation of an aquatic occupational therapy program. This model uses a client centered approach that can be adapted to each individual's needs. Well suited for community-based programming as well as clinic-based services, the model promotes the inclusion of children with disabilities with their peers. It also includes a seven-step process for treatment and five intervention strategies recommended for delivery of occupational therapy services, providing structure for application of the model to an aquatic program.

In the development of the manual for an aquatic occupational therapy program, two phases of the program were formed to address the individual and community interaction needs of a developing child. The first phase of the program is the Direct Service Model. When developing assessments for this phase, examples of aquatic assessment forms were researched in Adapted Aquatics Programming: A Professional Guide. By researching assessment forms used by various disciplines, it ensured that every area was considered to form a complete, efficient evaluation process. The resulting assessment forms addressed the individual, context, and task performance, which matches the Ecological Model of Human Performance.

A referral form was also created, which includes a checklist of all the physical, psychosocial, cognitive, and recreational areas found in the literature that can be addressed through aquatic therapy. This provides physicians with an easy referral process while also informing them of everything an occupational therapist can address in the water.

Finally, a client satisfaction survey was formed to be used with the retest portions of the assessments to measure the outcomes of the aquatic occupational therapy program and determine what changes need to be made in order to increase the program's efficacy. Areas that were addressed in the client satisfaction survey include the parent/guardian's understanding of aquatic therapy, their opinions of the therapist's role, and their satisfaction with the aquatic program and the gains the child made.

The second phase of the proposed aquatic occupational therapy program, the Community Integrated Model, involves the therapist forming a contract to act as a consultant to a community program. This model provides children with the opportunity

to engage in an aquatic program with their peers in the community while also maintaining the occupational therapy goals. Dougherty's, Consultation: Practice and Perspectives in School and Community Settings (1995), was used to summarize the steps to be taken when forming a consultation contract. It includes six elements to be considered when forming a contract with a facility, which will be helpful for therapists new to consultation. The occupational therapist's role in this process is identified, as well as specific examples of how to implement the model into the program.

In Chapter IV, the aquatic occupational therapy manual is presented. The program described in this manual describes both direct and indirect services provided by an occupational therapist in an aquatic environment. Community acceptance of children with disabilities is also facilitated in the integrated, community-based aquatic program.

CHAPTER IV

Introduction

Aquatic occupational therapy provides clients with numerous physical, psychosocial, cognitive, and recreational benefits, yet aquatic therapy is not widely used among occupational therapists. With its popularity increasing, the need has arisen for a manual that describes an occupational therapist's role in this field and what is needed in a successful aquatic occupational therapy program. This manual is designed for an occupational therapist to develop an aquatic therapy program for children with disabilities. It includes assessments and guidelines, but it can also be adapted to better suit each therapist's unique style.

The first phase of the program involves direct services provided by an occupational therapist, and relies on physician referrals. The therapist will work one-on-one with the client to achieve specific goals set at the beginning of the program. Because a referral base needs to be established, there is a section dedicated to marketing and reimbursement of an aquatic occupational therapy program. If the occupational therapist is employed through a school district, the aquatic program is considered part of that child's therapy and therefore a physician's referral is not needed.

In the second phase of this program, the occupational therapist assumes the role of a consultant for an aquatic therapy program in the community. After a client has met his or her goals and is discharged from the aquatic occupational therapy program, he or she will be referred to an integrated, community-based program. This manual illustrates the

steps to be taken in order to establish a contract with a facility, such as the YMCA, that will accept occupational therapy referrals. The occupational therapist then adapts elements of that facility's aquatic program to meet the needs of various childhood disorders, and act as a consultant to provide suggestions on how to grade the activities so that children both with and without disabilities can be actively involved in the sessions. Participation in an integrated aquatics program will not only allow children to maintain the goals they have achieved with the occupational therapist, but it will also provide them with the opportunity to interact with their peers in a socially acceptable environment.

This program is guided by the Ecology of Human Performance Model, which follows a client-centered approach. By utilizing the principles of this model, the aquatic occupational therapy program takes into account the person, environment, task, and task performance, ensuring optimal treatment for the client. The model also describes five intervention strategies that address deficits in either the person, environment, task performance, or a combination of these factors. Application to the two aquatics programs is provided.

AQUATIC OCCUPATIONAL THERAPY



**A MANUAL FOR CHILDREN WITH PHYSICAL,
DEVELOPMENTAL, AND PSYCHOSOCIAL DISABILITIES**

BY

NICOLE E. MILLER, MOTS

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Program Objectives

- To provide skilled aquatic therapy services to children with physical and psychosocial disabilities in the community.
- To help children achieve their full potential through the use of aquatic therapy.
- To maintain a client-centered approach when forming treatment goals and implementing interventions.
- To provide a safe and inviting environment that is conducive to each child's individual learning style.
- To provide an aquatic program in the community with expertise on the adaptation and gradation of pool activities for children with disabilities through consultation.

Phase I: Inpatient/Outpatient Occupational Therapy Direct Service Model

Phase I of the aquatic occupational therapy program involves direct treatment by an occupational therapist. The clients may be referred by a physician if the OT is working in a rehabilitation setting, or they may already be established clients if the OT works through the school system. The occupational therapist will assess the child to determine which goals can be achieved through aquatic therapy, and develop a treatment plan that addresses those goals.

Inclusion criteria for the aquatic occupational therapy program will depend on the child's needs and whether or not they can be met through aquatic therapy. They may include physical, cognitive, psychosocial, or recreational needs. The following referral form lists deficits that can be addressed through this program. This form should be filled out by the referral source to identify the reasons for referring the child to aquatic occupational therapy.

Aquatic Occupational Therapy Referral Form

Today's Date: _____

Client's Name: _____ **Date of Birth:** _____

Diagnosis: _____ **Physician's Name:** _____

Medications: _____

Reason for Referral (check all that apply):

Physical

- range of motion
- muscular strength & endurance
- balance (sitting or standing)
- mobility (walking, crawling)
- weight bearing
- pain with movement
- edema
- coordination
- vital capacity & oral motor control
- muscle tone
 - high
 - low
- sensory integration
- joint contractures
- cardiovascular fitness
- gross motor skills
- fine motor skills

Recreational

- leisure participation

Cognitive

- difficulty learning new tasks
- specific school subjects
 - math
 - spelling
 - reading
- speech
- problem-solving skills
- sequencing skills
- memory
- task initiation or termination
- orientation
- body image

Psychosocial

- impulsivity
- low self-esteem/self-image
- age appropriate social skills
- peer interaction
- communication skills
- mood (i.e. depression)
- energy & motivation
- affect/emotional regulation

Additional Comments _____

Physician's Signature

Date

Assessment

The assessments suggested in this aquatic occupational therapy program address the areas of person, environment, and task performance. Information will be solicited from the parent or guardian, the occupational therapist's initial assessment, and the therapist's observation of the child during aquatic activities. Assessment areas include such things as the child's interaction with the environment, range of motion, strength and endurance, self-image, participation in other extracurricular activities, and functional abilities in the pool. The following pages contain reproducible assessment forms addressing areas in the order of person, task performance, and environment.

Aquatic Occupational Therapy Individual Assessment

To be filled out by the parent/guardian.

Name _____ Birthdate _____

Year in School _____ Name of School _____

Address _____

Parent/Guardian Name _____ Phone # _____

Emergency Contact _____ Phone # _____

Physician/Source of Referral _____ Diagnosis _____

Primary Concerns _____

Is the child subject to seizures? ___ Yes ___ No If yes, describe the type of seizure, triggers, and typical symptoms and duration of seizure. _____

Any other health problems that we should be aware of (e.g. asthma, arrhythmia)? _____

Is the child on medication? ___ Yes ___ No If yes, what type? _____

What adaptive equipment does the child use (e.g. glasses, wheelchair, brace)? _____

Has the child participated in an aquatics program before? ___ Yes ___ No

If yes, how long ago? _____ Who conducted the sessions (e.g. OT, PT, adapted aquatics instructor)? _____

Does the child have any sensory sensitivity (e.g. startle at unexpected noises)? _____

Is the child involved in any extracurricular activities? ___ Yes ___ No If yes, how often? _____

Additional Comments _____

Aquatic Occupational Therapy Individual Assessment

To be filled out by the occupational therapist. Indicate any changes in the child's functioning in the retest space.

Name _____ Age _____ Male _____ Female _____

Diagnosis _____

Physician _____ Reason for Referral _____

Cognition:

Can the child express his/her needs verbally or nonverbally? ____ Yes ____ No

Can the child answer simple yes/no questions (either verbally or by nodding the head)? ____ Yes ____ No

Can the child follow simple, 1-step directions? ____ Yes ____ No

Multi-step directions? ____ Yes ____ No

Hand Dominance ____ Right ____ Left ____ None Established

Comments:

Retest Date: _____

Sensory:

Was any sensory sensitivity observed? ____ Yes ____ No

If yes, describe. _____

Comments:

Retest Date: _____

Physical:

Describe the child's mobility (i.e. walks independently, uses crutches or wheelchair, etc.) _____

Presence of contracture? ___ Yes ___ No

If yes, describe. _____

Range of Motion (if not WNL or WFL, indicate measurement).

Motion	Left		Right		Motion	Left		Right	
	Pre	Post	Pre	Post		Pre	Post	Pre	Post
Shoulder abduction					Wrist extension				
Shoulder adduction					Finger flexion				
Shoulder flexion					Finger extension				
Shoulder extension					Hip flexion				
Horizontal abduction					Hip extension				
Horizontal adduction					Hip abduction				
Internal rotation					Hip adduction				
External rotation					Hip internal rotation				
Elbow flexion					Hip external rotation				
Elbow extension					Knee flexion				
Supination					Knee extension				
Pronation					Ankle dorsiflexion				
Wrist flexion					Ankle plantarflexion				

Manual Muscle Testing

Motion	Left		Right		Motion	Left		Right	
	Pre	Post	Pre	Post		Pre	Post	Pre	Post
Shoulder abduction					Wrist extension				
Shoulder adduction					Finger flexion				
Shoulder flexion					Finger extension				
Shoulder extension					Hip flexion				
Horizontal abduction					Hip extension				
Horizontal adduction					Hip abduction				
Internal rotation					Hip adduction				
External rotation					Hip internal rotation				
Elbow flexion					Hip external rotation				
Elbow extension					Knee flexion				
Supination					Knee extension				
Pronation					Ankle dorsiflexion				
Wrist flexion					Ankle plantarflexion				

Describe the child's coordination skills, including ability to coordinate body and manipulate objects. _____

Comments:

Retest Date: _____

Psychosocial:

Describe the child's energy, including attention span and pace during an activity. ____

Describe the child's motivation level, including impulse control and expressed values or interests. _____

Describe the child's interpersonal skills, including affect, regulation of emotions, and communication skills. _____

Describe the child's self-image. _____

Comments:

***Retest Date:* _____**

Therapist's Signature

Date

Aquatic Occupational Therapy Task Assessment

4 = Performs independently 3 = Performs with equipment or technique adaptations 2 = Completes but not in a practical time frame 1 = Attempts but requires assistance of the therapist to complete 0 = Does not attempt activity				
Child Assessment	Date	Initial assessment	Post-assessment	Date
1. Stair or ramp entrance (circle one)				
2. Holds pool gutter				
3. "Spidering" (hand-walking) on pool gutter				
4. Sits for 1 minute on water platform				
5. Holds sitting balance while water is turbulent (1 minute)				
6. Grabs and holds toys just out of reach from sitting				
7. Stands on water platform for 1 minute				
8. Holds standing balance while water is turbulent (1 minute)				
9. Walks on water platform				
10. Grasps floatation device (i.e. kickboard or barbells)				
11. Holds and uses floatation device				
12. Grasps weighted ring (from standing) on pool bottom without submerging				
13. Tolerates water splashing nearby				
14. Tolerates water on face and head				
15. Closes lips when putting face in water				
16. Holds breath when putting face in water				
17. Catches a ball while standing on water platform				
18. Floats on back				
19. Floats on stomach				
20. Kicks feet while holding on to pool gutter				

Adapted from Adapted Aquatics Programming: A Professional Guide by M. Lepore, G. W. Gayle, & S. Stevens, 1998.

Comments:

Therapist's Signature

Date

Aquatic Occupational Therapy Contextual Assessment

Physical Context

Does the child react adversely to bright lights? _____ Yes _____ No
 loud noises? _____ Yes _____ No
 smell of chlorine? _____ Yes _____ No
 water on bare skin? _____ Yes _____ No
 other people in the pool _____ Yes _____ No
Is the child distracted by objects in the area? _____ Yes _____ No

Comments:

Social Context

Does the child have supportive family and/or friends? _____ Yes _____ No
Does the child prefer to spend time alone _____ or with others _____?

Comments:

Personal Context

Does the child display age appropriate behaviors? _____ Yes _____ No
How does the child describe his/her abilities? _____

Comments:

Spiritual Context

What are the child's interests? _____

What motivates the child? _____

Comments:

Temporal Context

What is the best time of day for physical activity? _____

Comments:

Therapist's Signature

Date

Application of the Model

The Ecological Model of Human Performance defines five different intervention strategies that are used to address the person, context, task, or a combination of these variables. Dunn et al. (2003) lists the five strategies as establish/restore, alter, adapt/modify, prevent, and create, all of which have been incorporated into the Occupational Therapy Practice Framework (American Occupational Therapy Association, 2002). The goal of each intervention strategy is to fulfill the needs an individual requires to perform a task. Each of the five intervention strategies is described, followed by examples of applying these strategies to various diagnostic groups.

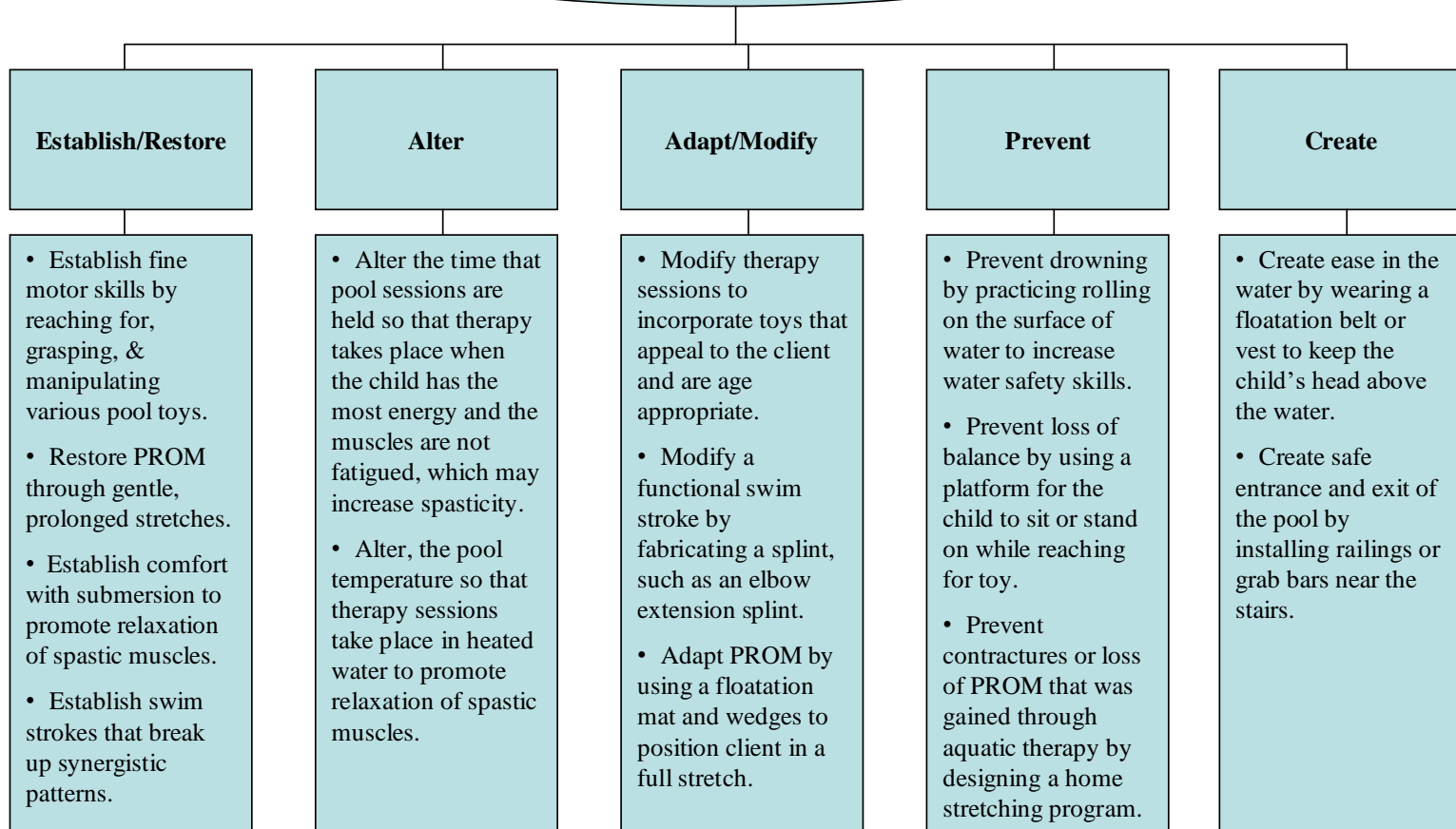
- **Establish/Restore** is a strategy that involves assessing the person variables and improving his or her skills. The therapist may be establishing skills that have not yet been learned, or restoring skills that have been affected by illness or injury.
 - **Example:** establish basic swimming skills with a child who has never learned to swim, or restore swimming strokes in a person who has lost functional use of his or her upper extremities due to a traumatic brain injury.
- **Alter** is a strategy that concentrates on the context in which the person carries out tasks. Interventions are designed to alter the context in order to fit the person's current skills and abilities.
 - **Example:** the OT holds individual aquatic sessions to limit unnecessary noise and traffic in the pool area for a child who has difficulty modulating external distractions in the environment.

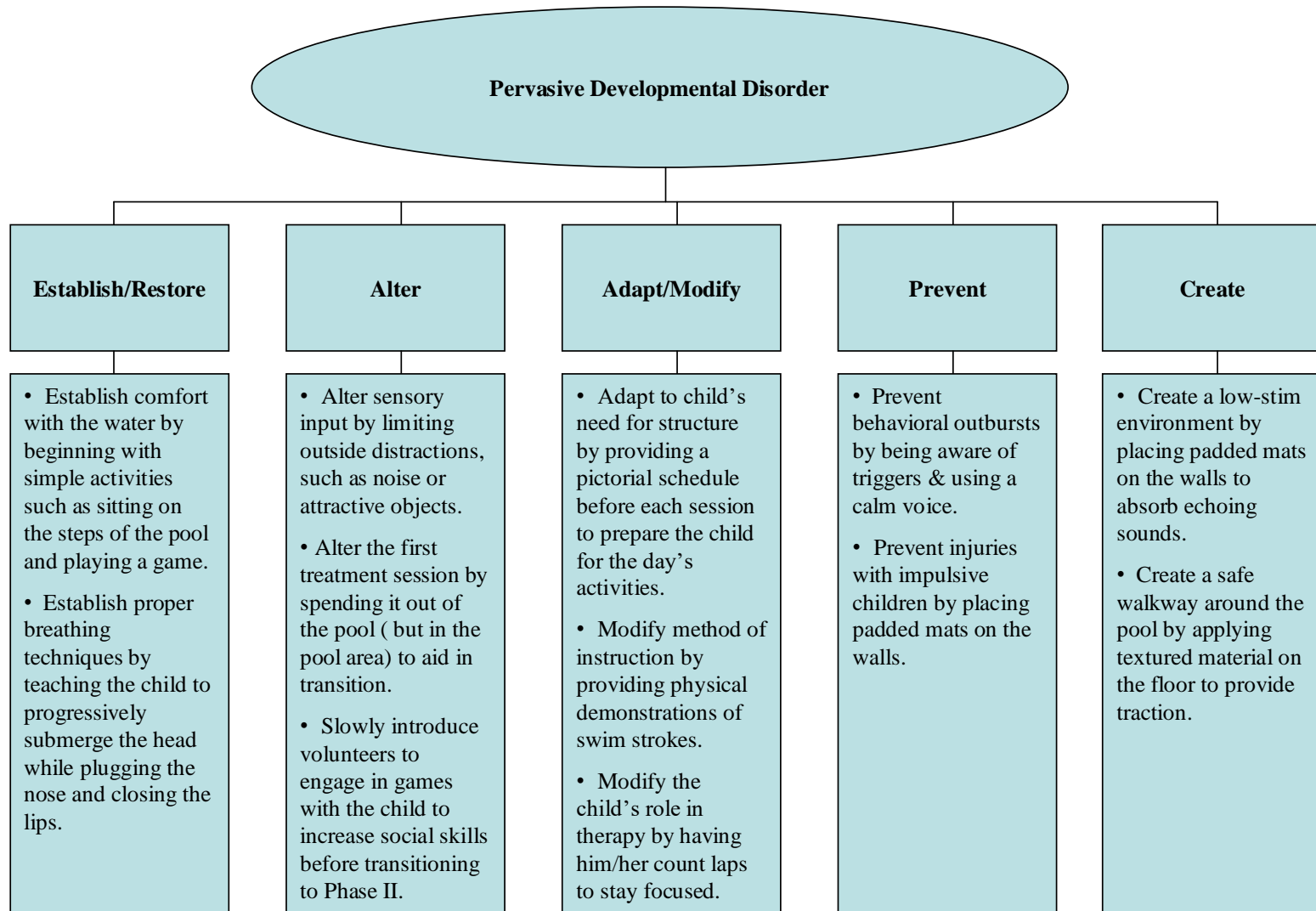
- **Adapt/Modify** is a strategy that is used when a therapist needs to adapt the environment or task features of a chosen task to support performance.
 - **Example:** provide laminated treatment plans to the client as a reminder of the skills being addressed in the pool session, or teach active assistive exercises to a client with a flaccid upper extremity in the pool.
- **Prevent** is a strategy that is used to avert problems with task performance. When using this strategy, the therapist looks to change the person, context, or task variables to prevent illness or injury that might otherwise occur.
 - **Example:** teach a client with diabetes to wear aqua shoes in the pool to prevent injury to the feet.
- **Create** is a strategy that produces situations to support optimal performance for all people and populations by not assuming that a disability exists or is likely to transpire. The fact that this strategy is not limited to people with disabilities or people at risk of developing a disability is the piece that differentiates create from prevent.
 - **Example:** the use of a lifejacket or other floatation device in any number of aquatic activities.

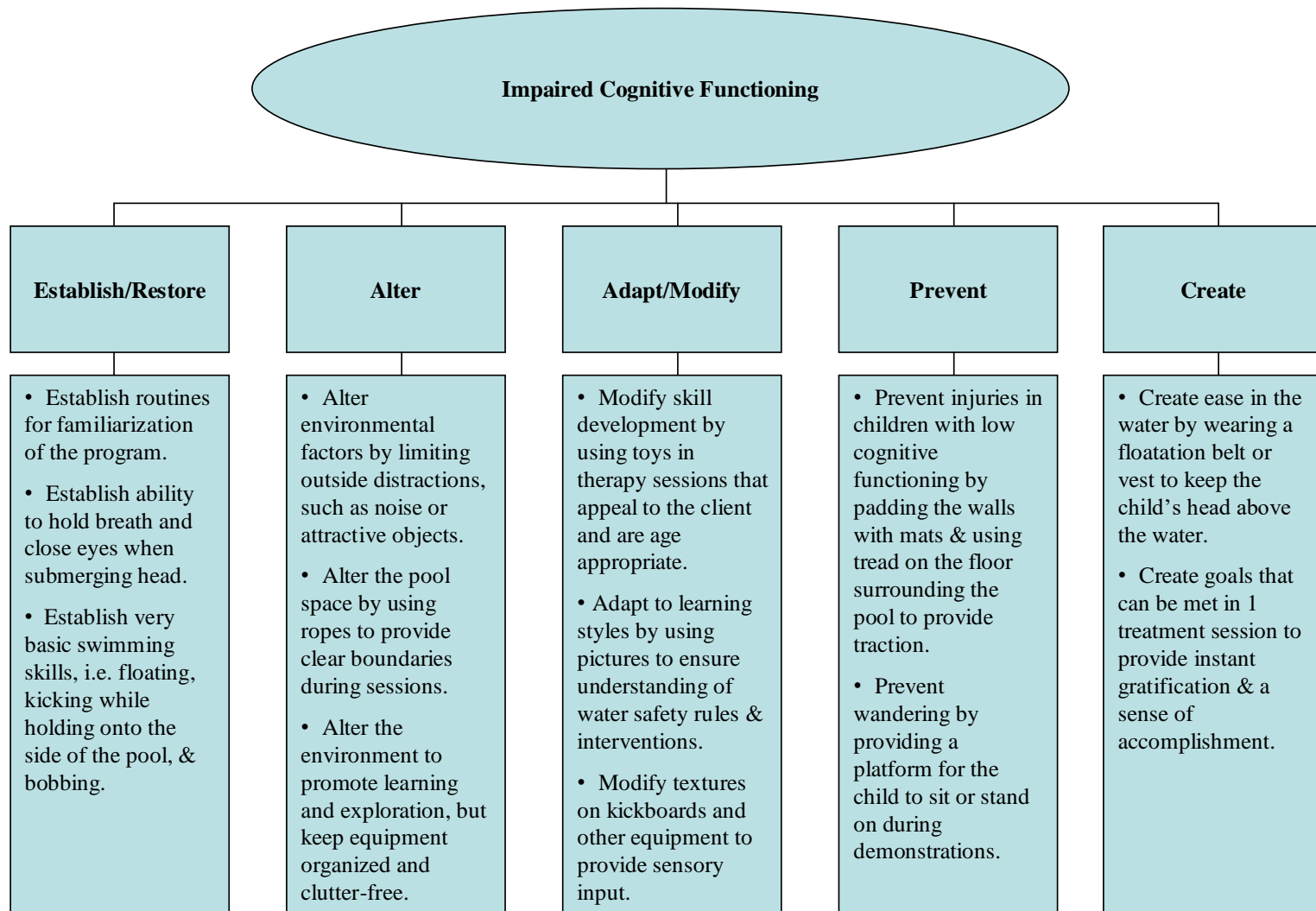
The Ecology of Human Performance Framework was chosen to guide the process of planning an aquatic occupational therapy program because it uses a client-centered approach that can be adapted to each individual's needs. It doesn't focus on a person's disability, but instead looks at what is impeding task performance, and whether changes need to be made to the person, environment, or task itself. The framework can also easily be used in community programming, where it supports inclusion of individuals with

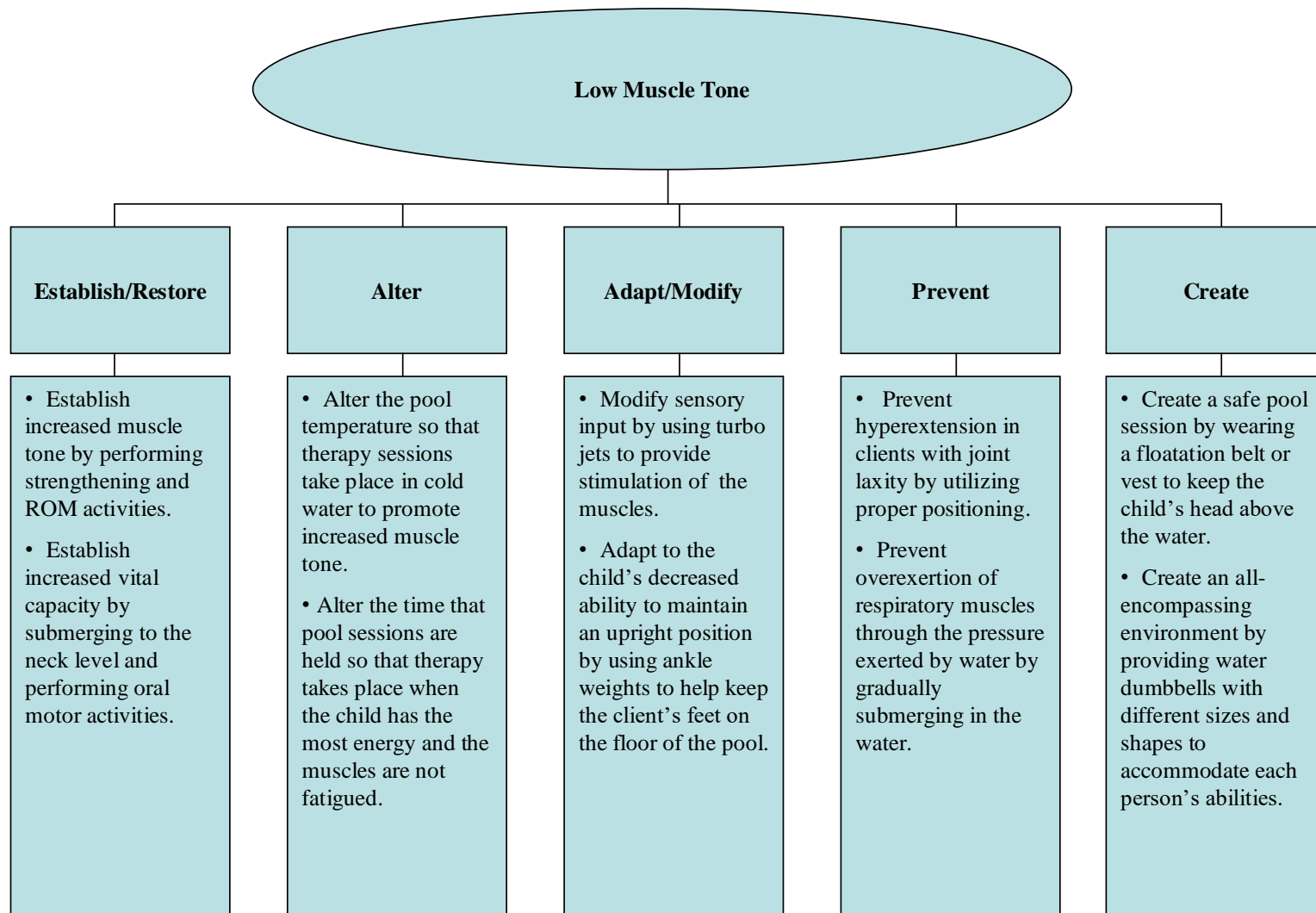
disabilities. This aspect will aid a therapist who strives to incorporate an integrated aquatic group in his or her aquatic occupational therapy program. The five intervention strategies described above are used to form samples of specific skills groups within the aquatic occupational therapy program. A case study will also be included later on in this manual to demonstrate the basic steps that are used in applying the Ecology of Human Performance Framework to the evaluation and intervention process.

High Muscular Tone with Decreased Range of Motion and Fine Motor Skills









Outcome Measures

Specific outcome measures are identified in order to assess the efficacy of this aquatic occupational therapy program. The outcomes include client satisfaction, which gauges both the child and the parent or guardian's satisfaction with the aquatic therapy program, as well as health and wellness, which assesses the improvements that were made in the client's physical, psychosocial, or cognitive functioning. To measure the improvements in the child's functional skills, the therapist will complete the retest portions of the Aquatic Occupational Therapy Task Assessment and the Aquatic Occupational Therapy Individual Assessment provided earlier in this manual. This will provide the occupational therapist with quantifiable data that demonstrates the functional gains the client has achieved through aquatic occupational therapy. The parent or guardian will also complete a client satisfaction survey upon the completion of the aquatic program. This survey will provide valuable feedback to the occupational therapist to ensure that the client's needs are being met. By utilizing these assessments to measure the outcomes, the occupational therapist is increasing the chances for a successful program. The following is an example of the client satisfaction survey.

Client Satisfaction Survey

To be filled out by the parent/guardian.

Aquatic Experience	Yes	No	Unsure	Comments & Suggestions for Improvement
Did the therapist clearly explain the purpose of aquatic occupational therapy?				
Did the therapist provide feedback throughout the aquatic program?				
Was the therapist approachable and helpful throughout the aquatic program?				
Did the therapist address the specific concerns of you and your child?				
Are there any areas of concern that were not addressed by the therapist?				
Are you satisfied with the gains that your child has made in functional ability?				
Did this program meet your expectations? Why or why not?				
Did the therapist provide an easy transition into the community-based aquatic program?				
Will you continue to enroll your child in aquatic therapy programs in the future?				
Would you recommend this aquatic occupational therapy program to others?				
Are you and your child satisfied with the overall aquatic occupational therapy experience?				

Additional Comments:

Child's Name

Parent/Guardian Signature

Date

Phase II: Community Integrated Model

The second phase of the aquatic occupational therapy program places the occupational therapist in the role of a consultant. In this role, the OT will function as an expert on providing therapy to children with disabilities and modifying existing aquatic programs to meet the individual needs of each child. The OT will not provide direct treatment of the clients, but instead will recommend solutions to the consulting facility. The goal of this phase is to promote the inclusion of children with disabilities into a community-based aquatic program, which would allow them to maintain the occupational therapy goals that have been achieved while interacting with their peers in a socially acceptable environment.

To begin the consultation process, the occupational therapist must research other aquatic programs in the community and determine which one best fits the needs of the clients being served. Some things to consider may be the training and experience of the adapted aquatics instructor, availability of pool volunteers, and class size. Once the occupational therapist decides on a facility, he or she must attempt to “sell” the consultation services to help the contracting facility recognize the benefits of OT consultation. If both parties agree on the need for consultation, the next step will be to negotiate the terms of the contract. In order to minimize the possibility of role conflicts between the contracting parties, there are six elements that should be considered when forming a contract. Refer to the table on page 23 for information on forming a contract.

Table 1

Six Elements of a Consultation Contract
1. general goals of consultation
2. tentative time frame
3. consultant's responsibilities: <ul style="list-style-type: none"> a. services to be provided b. methods to be used c. time to be committed to the agency d. evaluation of the degree to which goals are achieved
4. agency's responsibilities; <ul style="list-style-type: none"> a. nature and extent of staff contributions to consultation b. fees to be paid to consultant, including expenses
5. consultant's boundaries; <ul style="list-style-type: none"> a. the contact person to whom the consultant is to be responsible b. people to whom the consultant is to have access (and those who are out of bounds) c. consultant's access to departments, meetings, and documents d. conditions for bringing in other consultants or trainees e. confidentiality rules regarding all information
6. arrangements for periodic review and evaluation of the consultant's work; explication of freedom of either party to terminate the contract if consultation progress is unsatisfactory

Gallessich (1982), as cited by A. M. Dougherty (1995) in *Consultation: Practice and Perspectives in School and Community Settings*. Pacific Grove, CA: Brooks/Cole Publishing Company.

Once a contract has been formed with a facility, the occupational therapist can begin referring clients to the aquatic program. With parental consent, the therapist will share with the aquatic instructor(s) the client's diagnosis, any precautions, an overview of the child's abilities, goals that were achieved through aquatic occupational therapy, and any other information that may be pertinent to the child's transition into community programming. The therapist and aquatic instructor may decide together whether this information should be exchanged over the phone, in writing, or in person. It is expected that the occupational therapist will meet with the aquatic instructor once per month to discuss the progress of the referred clients, as well as observe the instructor in a pool session to ensure proper safety measures are being taken. There should also be an open line of communication between the occupational therapist and aquatic instructor so that any questions or concerns can be immediately addressed. With a good working relationship, the children being referred will ultimately benefit from this two-part aquatic occupational therapy program.

Case Study

Evan is a 14-year-old boy who is diagnosed with spastic cerebral palsy. He attends school in a small, rural community and is currently in the 8th grade. Evan uses a wheelchair for mobility, and can walk short distances of up to 10 feet with moderate assist from a therapist and a front-wheeled walker. Although he can write with an enlarged pencil, Evan's penmanship is hard to read and his hand fatigues easily. He uses a computer with an enlarged keyboard for school assignments and is provided with notes by his teachers. Evan receives half an hour of occupational therapy (OT) outside of the classroom each day for stretching and pressure relief, and remains in regular classes throughout the rest of the day.

Evan lives in a two-story house with his mother, father, and 11-year-old sister. There is a ramp leading into the front door of the house, and the door through the garage has three steps. Evan's bedroom and handicapped accessible bathroom are on the main floor, along with his parents' bedroom, the kitchen, and the family room. His sister's bedroom, the laundry room, and the den are in the basement. There is a stair glide that Evan can use to go down into the basement, however he rarely uses it. His family is very religious, and believes that God has a divine plan for Evan.

Evan is a bright, easygoing teenager with a lot of friends and a positive attitude. He enjoys playing video games on his computer and Playstation, although the smaller controllers for the Playstation are hard for him to manipulate. He is most efficient with a joystick, and his occupational therapist has provided him with a controller that has larger buttons. Evan also enjoys watching sports and attends all of the school football and hockey games to watch his friends play. He often plays basketball with his friends, but

he wishes that he could be more physically active. Evan's occupational therapist has decided to refer Evan to aquatic therapy three times per week to help him meet his goal of increased physical activity. The following seven steps are described in the Ecology of Human Performance Framework, and will guide the aquatic occupational therapist's treatment plan.

1. Prioritize the individual's/population's wants and needs.

Evan's priorities include increasing his ability to participate in physical activities with his friends, such as swimming, and to be able to walk for longer distances. He would also like to improve his fine motor control for easier use of his computer and video game controllers. In addition, Evan would like to be able to transfer himself out of his wheelchair and into the pool, because he prefers not to be lifted out of his chair. Evan's parents have identified their priorities as increased range of motion to make dressing and bathing easier, as well as increased fine motor skills to improve his handwriting.

2. Analyze prioritized tasks.

Skills needed for swimming:

- Remove clothing and don a swimming suit.
- Enter the pool by using stairs, a ladder, a lift, or jumping from the pool deck.
- Keep head above water by floating, sitting or standing on the floor or a platform, or by treading water.
- Close eyes and mouth while holding your breath when submerging head.
- Use arms and/or legs to propel body through the water.
- Adduct fingers and cup your hand for efficient arm strokes.
- Exit the pool by using stairs, a ladder, a lift, or by pulling self up over the edge.

Skills needed for playing video games:

- Open the case and release the latch that holds the disc in place.
- Press the button to open the disc compartment on the Playstation.
- Place the disc accurately in the compartment and push it closed.
- Hold a game controller with two hands.
- Simultaneously press the buttons with accuracy.
- Divided attention span – use the controller while watching the effects on the T.V.
- Hand eye coordination.

3. Evaluate performance.

Swimming

Evan is able to dress himself with minimal assist for buttons, zippers, and snaps, as well with items that require a lot of ROM (such as a coat). He transfers himself from his wheelchair to a lift with stand by assist (SBA) from a therapist, however requires either a seatbelt or someone to hold his shoulders back when the lift is moving to keep from falling out of the seat. Once in the water, Evan's high muscle tone makes it difficult for him to float or keep his head above water. However, he is able to hold a static standing balance with only contact guard assist (CGA) for 10 minutes due to the support provided by water and reduced body weight. Evan can safely submerge his head under water while holding his breath and closing his eyes and mouth; however, someone must be nearby to help him recover if necessary. Evan is able to move his arms through a swim stroke, however is not able to effectively adduct his fingers and cup his hands to scoop the water. He has difficulty kicking his legs under the water due to the resistance of water and the tendency for his legs to scissor. When exiting the pool, Evan needs

moderate assistance to get positioned on the lift and minimal assist to transfer to his wheelchair due to fatigue from the swimming session.

Playing Video Games

Evan is able to open the game case with minimal difficulties and place the disc in the Playstation. He does not have the finger dexterity to accurately press the buttons on a regular controller, and it is extremely difficult for Evan to hold the controller with both hands while using his fingers to press the buttons. Evan is able to place the joystick controller that the OT gave him in his lap and stabilize it with one hand while he uses the joystick and presses the buttons with the other hand. He has good accuracy when pressing the buttons, and can typically play a game for 30 minutes before his hands become fatigued.

4. Evaluate the contexts.

- Physical
 - Lives in a small, rural community.
 - Lives in a two-story house, with his bedroom and bathroom on the main floor.
 - Attends one of two middle schools in the community, with 20-25 children in each of his classes.
 - There is an elevator for the 2-story middle school, and a special desk for each of Evan's classrooms that his wheelchair can fit under.
 - There is a ramp that leads from the locker room to the pool deck, and a Hoyer lift for entrance/exit of the pool.

- Social
 - Has many friends at school.
 - His father works full-time and his mother works part-time so that she can transport Evan to school in their wheelchair accessible van.
 - His sister is supportive, but sometimes feels overshadowed by Evan's disability.
- Personal
 - Intelligent, on the honor roll.
 - Motivated to try new experiences.
- Cultural
 - Grandparents live in the same town and are closely involved.
 - The small community has little diversity.
 - Athletic and leadership skills are valued within the school system.
 - The family practices the Catholic faith.
- Temporal
 - He is 14 years old.
 - Successful in the public school system.
 - Spastic cerebral palsy interferes with his physical development.
- Virtual
 - Utilizes the computer for school assignments, communication with family and friends via the Internet, and playing video games.

5. Evaluate the person/population variables.

Strengths: Evan is hard working and motivated, and has a positive attitude about life. He has supportive family and friends, and a strong faith and values. Evan is able to easily identify his strengths and interests, does well in school, and is interested in developing skills in swimming.

Areas for improvement: Evan has high muscle tone, which limits his range of motion and flexibility. He can reach up to 75% of the normal range with all upper extremity movements, except for the hands where he has noted contractures and impaired fine motor skills. Finger opposition requires slow, deliberate movements. Evan's legs move through approximately 80% of the normal range with all lower extremity movements, with slight scissoring during ambulation. Evan requires minimal assist with sitting balance on dry land, moderate assist with standing balance, and moderate assist from a therapist with the use of a front-wheeled walker when ambulating short distances.

6. Develop goals and choose intervention strategies for identified priorities.

- LTG: Evan will increase his passive range of motion of shoulder flexion, horizontal abduction, and elbow extension by 10° in order to increase his ability to perform swim strokes.
 - STG: Evan will “spider” or hand-walk on the pool gutter around the entire length of the pool in both directions to promote extension and abduction of bilateral upper extremities.
 - STG: Evan will engage in pool volleyball with a light beach ball for at least 10 minutes to promote extension of bilateral upper extremities.

- STG: Evan will retrieve 5 diving rings under water with each hand while keeping his head above water to promote extension of bilateral upper extremities and strengthened hand grasp.
- LTG: Evan will independently hold a dynamic sitting balance for 15 minutes while submerged to the chest level for improved balance and trunk stability.
 - STG: Evan will hold a static sitting balance for 1 minute with water turbulence to increase his balance.
 - STG: Evan will right himself 3 out of 5 times when pushed to each side, the front, and back in a sitting position to increase strength in trunk muscles.

7. Evaluate the person/task/context match and select achievable goals and reasonable intervention strategies.

As Evan progresses through his treatment plan, it is important for the therapist to continually reevaluate the goals and interventions to ensure that they match his functional status. Evan's functional status may change as he continues to grow and experiences puberty, as he becomes more comfortable with the water and gains swimming skills, and if he experiences any increases in ROM. The therapist should form goals that challenge him but are still achievable, which is known as the "just right" challenge.

Marketing and Reimbursement

Utilizing a strong marketing plan will increase awareness in the community of the benefits of aquatic occupational therapy, expand the referral base for potential clients, and ultimately facilitate consistent reimbursement by third party payors. It is important to promote the skilled services that are being provided, as well as the knowledge of occupational therapists in the development of children with physical and psychosocial disabilities. The following methods can be used to market an aquatic occupational therapy program.

- Invite physicians who may be possible referral sources to tour the therapeutic pool and demonstrate the use of adaptive equipment.
- Provide referring physicians with completed outcome measures of their clients so they are aware of the goals that were achieved through aquatic occupational therapy.
- Provide insurance companies with articles to educate them on the benefits of aquatic occupational therapy.
- Advertise aquatic occupational therapy in programs at sporting events to expand the clientele to include sports injuries.
- Produce a television commercial that promotes the benefits of aquatic occupational therapy.
- Submit a promotional article to medical newsletters at nearby hospitals or the local newspaper.
- Create an Internet website that describes your program and the types of injuries/disabilities that can be addressed through aquatic occupational therapy.

Along with marketing the aquatic occupational therapy program, it is also important to complete proper documentation in order to ensure reimbursement of services. First, the occupational therapy assessment must be completed on land to address the functional status of the client. Then the therapist needs to clearly identify how the goals can be met more efficiently in the water versus on dry land. Once the child has started the aquatic program, the therapist should utilize reassessment to identify the progress that is being made and justify the continued use of aquatic therapy. Therapists need to continually demonstrate that the aquatic component is making the client achieve the functional goals as quickly as possible. Aquatic occupational therapy has traditionally been reimbursed by 3rd party payors in the past; however, just as with any other form of therapy, documentation needs to consistently reflect patient progress.

Included is an annotated bibliography that may be useful to a person who wants to learn more about aquatic therapy.

Annotated Bibliography

Aquatic Therapy & Rehab Institute, Inc. (2004). *Aquatic therapy and rehabilitation industry standards.* Retrieved February 4, 2005, from <http://www.atri.org/stflyer.htm>.

A committee was made up of representatives from various disciplines including physical therapy, occupational therapy, kinesiotherapy, recreation therapy, athletic training, exercise physiology, aquatic exercise, massage therapy, physical education, and adapted aquatics to define aquatic therapy and develop professional standards in the field.

Binkley, H., & Schroyer, T. (2002). *Aquatic therapy in the treatment of upper extremity injuries.* *Aquatic Therapy Today*, 7(1), 49-54.

Some benefits of performing upper extremity rehab in the pool are the decreased pain and swelling, increased circulation and freedom of movement, and supported joints. The authors describe five phases of a general aquatic rehabilitation plan for upper extremities, as well as progressive resistance exercise training in the water.

Dunn, W., Brown, C., & Youngstrom, M. J. (2003). *Ecological model of occupation.* In P. Kramer, J. Hinojosa, & C. B. Royeen (Eds), *Perspectives in human occupation: Participation in life* (pp. 222-263). Baltimore, MD: Lippincott Williams & Wilkins.

This chapter describes the Ecological Model of Human Performance in detail, providing definitions of the terminology and core constructs. It includes case studies and examples of the five intervention strategies to assist in learning how to apply the model to a specific client.

Dorval, G., Tetreault, S., Caron, C. (1996). *Impact of aquatic programmes on adolescents with cerebral palsy.* *Occupational Therapy International*, 3(4), 241-261.

Previous studies have shown that the concepts of self-esteem and independence in everyday tasks have been found to be the prerequisites to the development of the self during adolescence. The purpose of this study was to compare the short and long term impact of two specific aquatic programs on self-esteem and functional independence, confirm the widely-acknowledged clinical impression of the global benefit of aquatic activities, and to identify the predictors of self-esteem and functional independence.

Dougherty, M. A. (1995). *Consultation: Practice and perspectives in school and community settings*. Pacific Grove, CA: Brooks/Cole Publishing Company.

This book describes consultation and the steps that need to be taken to form a contract with a facility. Topics include various models of consultation, steps to beginning a consultation practice, and ethical issues.

Figuers, C. C. (1999). Aquatic therapy intervention for a child diagnosed with spinal muscular atrophy. *Physical Therapy Case Reports*, 2(3), 109-112.

A physical therapist describes a case study with a 12-month old boy diagnosed with spinal muscular dystrophy. Treatment is focused on increasing vital capacity and spontaneous active range of motion in the pool.

Framroze, A. (1995). Aquatic rehabilitation. *Rehab Management*, 8(3), 43-45, 51.

Judy Cirullo is a physical therapist who owns a consulting practice, Integrative Aquatic Therapy, in Eugene, Oregon. She was interviewed about her experience with providing aquatic physical therapy. Topics include defining aquatic physical therapy, its benefits, documentation, and reimbursement.

Garrett, G. (1994). A stroke of genius. *Rehab Management*, 7(3), 56-59, 128.

Garrett is an occupational therapist who describes the skills that OT's have which will allow them to expand into the aquatic therapy practice. She lists specific goals that OT's may address through aquatic therapy, as well as specific techniques that may be used to address these goals.

Garrett, G. (1995). Occupational therapy's perspective. *Aquatic Rehabilitation*, 47-49.

An occupational therapist describes some of the physiological affects water has on the human body, as well as the OT's approach to forming treatment goals.

Jamison, L. J. (2000). The healing properties of water. *Rehab Management*, 13(1), 58-60, 62.

Lymphedema is a swelling that may arise when lymph fluid collects abnormally in the tissues because the lymph drainage system is compromised. The author clearly explains how lymphedema can be treated by aquatic therapy, and why it is effective.

Joe, B. E. (1998). Aquatic rehab: The great equalizer. *OT Week*, 12(33), 12-13.

This article describes how aquatic occupational therapy is different from other forms of aquatic therapy, including the use of sensory integration techniques and functional goals.

Johnson, C. & Garrett, G. (1994). Taking the plunge. *Teamrehab Report*, 5(2), 14-17.

Two occupational therapists illustrate the use of purposeful activity when treating clients, and describe the positive effects water has on the human body. Examples of occupational therapy goals are listed, as well as a short case study.

Lepore, M., Gayle, G. W., & Stevens, S (1998). *Adapted aquatics programming: A professional guide*. Champaign, IL: Human Kinetics.

This book provides detailed information on the history of adapted aquatics and the elements of implementing an adapted aquatics program. It contains suggestions on class content and size, specific aquatic needs of various diagnoses, and many examples of assessment forms and pool activities.

McNamara, S. (1994). Marketing aquatic therapy. *Rehab Management*, 7(6), 67-70.

The author explains how a strong marketing strategy can help maximize an aquatic program's use. She has gathered information from a variety of aquatic providers on marketing strategies that have been successful and how to address third-party payor reimbursement.

Peganoff, S. (1984). The use of aquatics with cerebral palsied adolescents. *The American Journal of Occupational Therapy*, 38(7), 469-473.

Body image is negatively affected by an adolescent's physical appearance when a disability is present. However, swimming is a socially acceptable activity that can address a client's goals while increasing self-esteem. An occupational therapist provides a case study of a 14-year-old girl who is diagnosed with cerebral palsy.

Thiers, N. (1994). Aquatic therapy: Taking rehab to the pool. *OT Week*, 8(1), 22-23.

The benefits of aquatic therapy are described, and an occupational therapist provides information on the benefits she has seen with aquatic occupational therapy. She states that aquatic therapy is ideal for treating children, because swimming is a natural activity of daily living.

CHAPTER V

Summary

The use of aquatic therapy can result in many physical, psychosocial, cognitive, and recreational benefits. While land-based therapy may provide some of the same benefits, aquatic therapy has the added properties of water that together act as a natural support to the human body, relax tight or spastic muscles, and help to alleviate pain. Therefore, aquatic therapy should be utilized when goals can be achieved more efficiently or with less pain in the water than on dry land.

In the process of developing the manual for an aquatic occupational therapy program, the question arose of whether to provide individual therapy sessions or group sessions to promote inclusion. It was decided that the children being referred to aquatic occupational therapy will initially need individual therapy to address individual, specific concerns. While inclusion is a fundamental concept in occupational therapy, these children often have impairments that require the full attention of the therapist. It was also considered that with group sessions, there would need to be more volunteers and/or therapists present to supervise the safety of all the children, and reimbursement from the clients' insurance companies may not cover all of the expenses. Therefore, the aquatic occupational therapy program that was developed was divided into two phases.

The first phase of the program is the Direct Service Model. In this phase, the occupational therapist evaluates the child and forms goals to be achieved through aquatic therapy. Once the goals have been met and the therapist considers the child ready to

transition into another program, the therapist will refer the child to a community-based aquatic program. This is the second phase of the proposed aquatic occupational therapy program. The therapist will have formed a contract to act as a consultant to a community program where the children can maintain the goals they has achieved through aquatic occupational therapy in a socially acceptable environment. The overall program described in this manual will not only help children to develop through a different form of therapy, but it will also help the parents/guardians find additional resources in the community that will accept a child with disabilities.

While the information found in this scholarly project is pertinent to the field of occupational therapy, there are some limitations. The literature that was used came from a wide variety of sources; however, minimal research has been done on aquatic therapy in the occupational therapy field, with most of the literature dated prior to 1995. Also, the aquatic occupational therapy program that is presented in the manual is theoretical and has not been tested.

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