

## Aquatic fitness and rehabilitation at individuals with disabilities

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**Abstract.** People with disabilities frequently are unable to exercise on land. Through water exercise they can contribute to their own health and wellness. People with disabilities can develop and maintain a level of physical fitness that can decrease or prevent the risk of appearance of other diseases, in spite of psychological obstacles that still remain in our country today. Depending on availability hydrotherapists should help patients to set goals and objectives and adapt equipments and skills to their needs. Our hydrotherapists must apply the concepts about maintaining health and fitness and make the adaptations to aquatic fitness training for people with disabilities to organize a program that will meet all the needs of patients.

**Key words:** *aquatic fitness, rehabilitation, disabilities.*

### Introduction

Traditionally, society has often perceived disability as unhealthy but when considering the persons health, psychological well-being as physical health must be recognized.

"Wellness is an approach to personal health that emphasizes the individual's responsibility for well-being through the practice of health-promoting life style behaviors" (1). Water treatment programs and for maintenance can provide ways to restore the level of fitness but are also beneficial for people with or without acute or chronic disorders.

It is essential to our country to change limited attitudes of aquatics leadership, staff, and participants without disabilities, and other patrons to accept, include and learn about people with disabilities.

Instructors and hydrotherapists must adapt aquatic exercise techniques, equipment and environmental and social factors to encourage disabled people to make lifestyle changes necessary, therefore ensuring long-term success.

Physical fitness is more than one aspect of wellness. It can act as a catalyst for improving other aspects of wellness, including mental well-being, social, emotional and spiritual. In striving to increase the fitness of participants with disabilities and coverage of issues relating to contraindications related to aquatic recovery, the hydrotherapist can shape a structure for appropriate practices and a platform for further study.

### Health related physical fitness and aquatic exercises

"Physical fitness is generally accepted as the ability to carry out daily tasks with vigor and alertness, without fatigue, and with ample energy to enjoy leisure pursuits and to meet unforeseen emergencies" (2).

The most frequently cited physical fitness measures fall into two groups: health related measures and measures related to sports skills. Skill related physical fitness is important to participate in various individual and team sports. The skill related components are defined as: agility – the ability to change the position of the whole body in space with speed and accuracy, balance – the ability to maintain balance on the spot and in moving, coordination – using senses such as sight and hearing, together with other parts of the body to perform motor tasks smoothly and accurately, power – the rate at which a person may perform physical activities, reaction time – the time elapsed between stimulation and the beginning of the resulting reaction, speed – the ability to perform a movement within a short time (3).

"Health related physical fitness refers to a person's ability to work effectively, enjoy leisure time, resist hypokinetic diseases, and meet emergency situations" (3).

"It includes body composition, cardiorespiratory endurance, flexibility, muscular endurance, and strength" (4).

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These health related components are defined as: body composition – The relative amounts of muscle, fat, bone, and other vital parts of the human body, cardiorespiratory endurance – the ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity, flexibility – the range of motion available at a joint, muscular endurance – the ability of the muscle to continue to performer without fatigue, muscular strength – The ability of the muscle to exert force (3).

”The trend today in the United States is to emphasize the development of health related fitness elements and to push for their prominence in school, work, and community programs” (1). Cardiorespiratory endurance is the main constituent of health related fitness. Thus, swimming programs are the primary activities that work large muscle groups for an extended time and they are the best ways for regular exercise leading to health related physical fitness.

Aquatic programs of swimming exercises have become a popular activity that meets the needs of a culturally diverse society and with various physical or mental needs. The center of practicing in water tends to be on physical fitness, independence and mobility, maintaining or improving the level of physical training. Walking, running (both in deep water and low water) aerobics performed to music, sports specific workouts, step aerobics, tai chi and circuit training are just some examples of aquatic activities used to enhance physical fitness. Depending on the availability of the pool, the programs facilitate participation in activities or in combinations of programs based on interest and physical capacity. Integration of persons with disabilities in an aquatic program requires the presence of aquatic instructor prepared for such conditions, with a good attitude to inclusion, and/or the presence of a person who helps the patient in collaboration with the instructor.

Children, adolescents and adults, people with disabilities, athletes with or without sports injuries, and older people are participating in aquatic exercise. People with chronic medical disorders, as arthritis, coronary heart disease, or multiple sclerosis, use aquatic exercise as a rehabilitation instrument to go back to the former activity. Kinesiotherapists, occupational therapists, physical therapists frequently avail aquatic therapy and conditioning to help injured people to make the strength and endurance that they need for returning at the working world.

Other persons participating in aquatic exercise prescribed include obese people, pregnant women or who have had recent surgery. Although water was used for therapeutic purposes for centuries, only recently is widely used in community rehabilitation. Therefore, the issue of who is qualified to provide these services continues to be a dynamic group. ”Aquatic therapy can be defined as using an aquatic medium to achieve physical therapy goals, and therapeutic exercises are those activities that are prescribed by a doctor, a physical therapist, or an occupational therapist” (5, 6).

Most people practice aquatic exercises because the body can not cope with the impact of intense exercise on land, but they still want to exercise and get fit. As older people become more concerned with quality of life, recognize the importance of daily exercise to maintain health and independence.

In aquatic therapy the number and the combination of the exercises are processed according to age and disease, of development of movement and to the temperature of the water.

### **Participation factors and challenges**

”Obstacles may confront a person with disabilities who is trying to achieve physical fitness. Physiological and psychological obstacles include fear of water, seizures, cardiac dysfunction, open wounds, tracheotomies and intravenous lines” (7). ”Health-promoting behaviors were viewed as essential to the process of rehabilitation and maintaining an acceptable quality of life. Implications are that health promotion efforts need to be encouraged and supported in individuals with chronic disabling conditions” (8). Together with hydrotherapist, the patient must establish goals and objectives and embark on a regimen to improve physical fitness, depending on the specific condition.

*Current fitness status, before the accident or surgery.* A person active and engaged in fitness before injury or surgery, it will want to use water as a means of rehabilitation programs. A person with long-term disability and is currently active, is more likely to seek aquatic fitness. People with a higher level of fitness are often more motivated to perform fitness programs.

*Swimming abilities present before the accident or surgery.* In practicing aquatics the risk is minimal. Participants can feel anxiety if they are unfamiliar with swimming skills, may feel apprehension and fear of starting a fitness program in water.

Fear of water can limit effectiveness aquatic exercise programs and even elevated negative symptoms. Guiding participants to move through water, including the effects of sinking and balanced, the use of flotation devices, to walk, run, and other aquatic exercises may be the only way to initially expose individual to the aquatic environment.

"The most prominent secondary risk of aquatic exercising is overdoing activity due to the waters effect on buoyancy" (9). "A thorough initial orientation and limited initial activity will help a participant swim sooner than later. People who were swimmers before experiencing an accident may not experience fear but may have unrealistic expectations as to what they can now perform" (4). Swimmers, divers, water polo players, performers in water activities, can get frustrated when they realize that they cannot turn back to prior skill levels.

*Sedentary life.* Lack of strength and endurance is the main problem for individual who was at bed rest for a longer period of time. The training in this case must be done very slowly.

Attention must be on people who take medication. „Seizure medications, for example, may cause side effects that interfere with target heart rates. Furthermore, excitement, frustration, strobe lights, hypoglycemia" (10).

*Physical capabilities.* The hydrotherapist must develop a program for the participant. There are several problems like excessive muscle tones, paralysis, postsurgical status, hydrostatic water pressure, behavior problems and balance that may limit aquatic activities the participant can perform to improve fitness. Some typical fitness activities such as swimming unaided, treading water on spot or in movement may not be possible with certain physical disabilities. Flotation devices and stationary objects such as docks and all the seats, however, can assist people with balance problems in the development of other components of skill-related fitness, and agility.

*Understanding fitness.* Fitness is not an easy concept to understand, mainly for individual who have cognitive disabilities. Heating moments are a good time to explain the basic principles of fitness, to involve total person in practice. If the information you need to present is too difficult for people to understand it, benefits such as feeling good pair and look good with images of people who rise through the water practicing.

The therapist has the role to show the practitioner the advantages of practicing swimming and the

other aquatic exercises throughout life. A participant may continue to swim independently while realizing that there are other benefits of attending swimming pools in addition to recreation and entertainment.

Other points to include motivational reason to practice of lifelong fitness is the value that it offers our lives outside the pool: you may want to swim when will learn that can help you gain and maintain strength and endurance, necessary to transfer in and out of the wheelchair and bed for people with physical impairment, or you may see swimming as a social outlet.

*Available equipment.* There are several pieces of equipment that can be used during the aquatic fitness, like jacket, fitness paddles, plastic hand paddles, noodles. Some increase resistance and other are used as flotation devices.

Therapists can work with physical trainers, or with physiologists for plan and improving programs.

### **Enhancing cardio-respiratory resistance**

Success in activities that require supported rhythmic movement depends on a good level of cardiorespiratory resistance. People with disabilities need cardiorespiratory strength to push on long-distance wheelchair, ambulance braces, or walkers, running daily work and household activities. Cardiorespiratory fitness is best achieved through aerobic exercise. The term aerobic means with oxygen. The ability of the heart, vascular system and respiratory system to move oxygenated blood efficiently to the muscles and the ability of the muscles to use oxygen efficiently for a longer time establish the amount of resistance that a participant shows. For cardiorespiratory training to be carried by aquatic exercise, swimming activities must involve large muscle groups of the legs and buttocks and should last 20 minutes while the participant is working on his target heart rates.

General principles of physical training are the same for people with or without disabilities. Thus, the frequency, intensity, time and the type of aquatic activity are set according to what the individual wants to achieve.

### **Enhancing flexibility**

"Flexibility is the ability to move a joint through its complete range of motion" (11). "There are various methods of developing flexibility, including active (static or ballistic), passive, and combined" (12).

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Practice in water improves range of motion at joints.

A reduced range of motion in the articulations: shoulder, neck, elbow, wrist, hip or ankle can hinder improvement of fitness level. Mobility influences the ability of increase strength during active phase of arm in a stroke and during the recovery phase, over the water.

Aquatic exercises are valuable for improving range of motion in people for which the moving area is limited due to illness or disability. Float, warmth and strength are appealing attributes of the exercise mode. People who can not tolerate exercise on land due to gravity can tolerate exercise in the water, while the injured athletes may have significant gains using aquatic exercise.

"Aquatic exercise can aid recovery from surgery, increase functional ability, and decrease pain experienced during exercise" (13). To prevent injuries due to poor mobility, it is recommended starting in deep water up to chest or neck, carefully controlling movements and keeping them under water. The participant can move progressively to lower depth of water as area of moving increases. Moving to shallow water gives more weight and gravity, to continue improving.

There are particular conditions that inhibit area of movement. Among those are: „abnormal stretch reflex in individuals with cerebral palsy; contractures in individuals with muscular dystrophy, cerebral palsy, spinal cord injury, traumatic brain injury, or stroke; surgery; scar tissue; heterotypic ossification (bone formation in soft tissues around joints) in individuals with spina bifida, polio, or multiple sclerosis; injury or joint capsule damage, or both, in individuals with sports injuries or arthritis; unstable environment due to buoyancy." (4).

The mechanical of swimming strokes will require changes when the area of movement is inhibited. To improve area of movement in joint must stretch every articulation every day without going over the limit of discomfort. "To enhance flexibility, move joints through their full ROM so muscles are stretched at least 10 per cent over their resting length and held at the point of tension (not pain) at least 20 to 30 seconds" (14).

A person without possibility of consulting an athletic trainer and physical therapist, will know the limits on active and passive range of motion and practice the necessary exercises without overcome the professional barriers into clinical service if: works with athletic training or physical therapist and teaches a lesson specifics to help the

participant to perform mobility exercises; use gravity and keep the movements underwater; water temperature must be kept at 31 – 33<sup>0</sup> C, for helping flexibility; "get medical clearance and have licensed therapists or certified trainers provide, or outline for you, ROM activities or specific movements that you may safely facilitate when working with individuals with the following conditions: severe spasticity, joint contractures, osteoporosis, heterotypic ossification, hypermobility, subluxations, dislocations, tissue adhesion, joint fusions, surgically implanted bars or pins, and pain that has not been evaluated by the physician" (15).

### **Enhancing muscular strength and endurance**

Muscle strength refers to the external force that a muscle can generate. "Endurance is the ability of a muscle group to execute repeated contractions over a length of time sufficient to cause muscular fatigue or to maintain a specific percentage of the maximum voluntary contraction for a prolonged time" (11). Muscle strength and endurance are essential components that disabled people need to perform daily living activities, including wheelchair pushing on unequal surfaces, walking with crutches or walkers, transferring, performing vocational skills, and use community facilities. Strength and endurance are important for proper posture and for preventing injuries caused by skeletal muscle weakness and instability.

Unfortunately, some people have disabilities that affect muscle directly or have progressive disability that results in muscle atrophy and loss of strength. Such persons may not be able to strength train muscle groups. „Strength training at a low intensity is beneficial if the progression rate is slow, if 70% of residual muscle mass is available, and if the rate of intensity is monitored" (15). People who require medical approval for strength training includes those with muscular dystrophy and other degenerative disabilities, multiple sclerosis, myasthenia gravis or postpolio syndrome. In these cases, strength training may be contraindicated because of extreme fatigue or potential risk for permanent damage to muscle fibers. "These individuals (and all beginners) may benefit most from muscular endurance training at low intensities and low repetitions" (15).

Strength training and muscle strength can be easily modified in the pool. Resistance training can be done with objects such as floating rafts, pull buoys, floating barbells, noodles, beach balls, rings of water to push them down into the water

with hands and arms. In addition, participants can use hand paddles or fins, or both, adding larger areas of strength that is pushed through the water, thus improving the strength and endurance. Strap-on and handheld weights are popular, but they must be used carefully by people with joint problems or acute injuries.

"Have these participants increase the resistance underwater, or increase water resistance by presenting a larger surface area to the water" (16). Webbed gloves increases surface without adding the risk of accidents which may have with paddles. Elbow flexion (biceps curls) performed under water with one hand open and not punch provides greater strength, making movement more difficult without the need to use resistance equipment.

Typically, the muscles that need to be strengthened are those who are antagonistic to the spastic muscle groups, usually extensor muscles of hip and wrist and muscles on the front of the leg. Respiratory muscle strength and endurance are important for people with asthma, spasticity, scoliosis, and muscular dystrophy. The respiratory muscle strength can be developed by performing trunk exercises (e.g. trunk rotation in sitting and trunk curls and extensions), complete with rhythmic breathing and exhaling air bubbles under water.

### **Physical conditions and aquatic recovery**

Body alignment and position contributes significantly to how a person feels. Maintaining a proper body alignment while exercising helps prevent injury and contributes to effective exercise lesson. "Body posture is defined as the position of the body in space, while body alignment refers to the relative positions of the various body segments" (17). It will emphasize a good alignment while exercising so that the muscle groups targeted to receive proper workout. Muscle strength imbalance can compromise body posture. It is therefore especially important to emphasize correct body alignment and posture while exercising, since many adapted aquatic participants have congenital or acquired postural anomalies.

An aquatic instructor in collaboration with the therapist and the doctor may elaborate a program of recovery for a person who has different conditions, to review the participant's medical history and thus, may know the side effects that may affect performance.

Many of the aspects regarding physical conditions

below are from these authors (12, 18, 19).

An elderly person is considered frail if can not do weight-bearing exercises, have certain disabilities of age, or needs assistance to perform activities of daily living or exercise. Aquatic program should provide a physically and emotionally safe environment, to limit spinning and turning to minimize the possibility of dizziness, use slow movements, and possibly use the gutter or pool chair to help balance. Many people who are frail elderly need long, slow warm-ups and must work at their own pace to feel comfortable. When developing a program for the elderly who are frail, must include all aspects of health-related physical fitness as well as fine motor movement. Avoid equipment that has to be kept for a longer time because it avoids problems such as arthritis joints. Webbed gloves may be helpful because they increase resistance.

"Experts consider individuals who are 20% over their recommended body weight to be obese" (20). For this segment of the population, exercise must be carried out under conditions of low impact, low intensity, and long duration. "This population is at a high risk for developing heat related illness due to lack of proper heat dissipation; therefore, water above 30<sup>0</sup> C may be too hot for working out" (19).

In cases of fibromyalgia, an aquatic exercise should increase tolerance at practice and resistance levels of mobility and strengthening exercises. It will be practicing 2-3 times a week for 5 to 10 minutes and increasing by 2 to 3 minutes per week, choosing activities such as walking and running in shallow or deep water.

Aquatic exercise has to maintain fitness levels during pregnancy, without overheating, without exceeding the heart rate over 140 beats per minute, and without excessive stretching (due to increased softness of joints) or exercises to enhance abdominal muscle.

Twisting, jarring and compressing the lumbar spine are the main contraindications for people with lumbar spine pain. Execution of the slow, controlled movements besides strengthening the hip flexors and strengthening the abdominal muscles will prevent or treat lumbar spine pain.

After surgery knee flexion is limited to at least 75<sup>0</sup>. Are contraindicated jumping, to use equipment for heaviness, twisting with feet planted on the bottom of the pool, kicking breaststroke and breaststroke on the back and recommended flotation devices, which enhances exercise in deep water, eliminating the wear weight.

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At chondromalacia it should not exercise high impact activity or excessive knee flexion and extension, and not using buoyant, or resistive equipment on ankles, wearing aqua shoes, and without kicking exercises or swimming breaststroke or backstroke.

In cases of shin splints exercises must be done without weight bearing, in deep water, without jarring and landing on heels, wearing aqua shoes.

In plantar fasciitis is best to avoid jumping, exercise in deep water, with aqua shoes. People with bursitis should avoid using weighted, buoyant, or resistive equipment. In tendonitis the purpose is to strengthen the weak muscle and to stretch the opposing muscles of the affected articulation.

People with a stress fracture of legs must not wear weight-bearing. The best practice is in deep water, with a flotation device.

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