Aquatic Therapy

TOSH Pool Staff
Aquatic Therapy is performed in the water, assisting to rehabilitate patients after injury or those with chronic illness. It uses the resistance of water instead of weights, taking excess pressure off joints for better outcomes.
Theory Behind Aquatic Therapy?

Hurley and Turner (1991) suggested that for many individuals with disabilities the buoyancy as well as the increased resistance and warmth of water creates an environment for exercise which is more conducive to achieving treatment goals than conducted on land.
Why is water sometimes better for therapy?

• Aquatic therapy can make exercise easier and less painful, because the forces on weight-bearing joints are reduced.

• The warmth of the water helps reduce pain by relaxing tight or spasm muscles and increasing blood flow.

• The water resistance and/or jets help patients strengthen muscles and improve cardiovascular fitness.
Fundamentals of Aquatic therapy

These principles are important to understand in order to treat patients and make adaptations to treatment plans:

1. Hydrostatic Pressure
2. Buoyancy
3. Viscosity
4. Temperature
Hydrostatic Pressure
(Pascal’s Law)

• Pressure is directly proportional to both the liquid density and to the immersion depth.
• Pressure exerted on an immersed object is equal on all surfaces of the object.
• Hydrostatic pressure is the force that aids in decreasing edema.
Buoyancy
(Archimedes’ Principle)

“An immersed body will experience an upward buoyant force equal to the weight of fluid the body displaces.”
Buoyancy

• Exercising in different depths of water will determine % of weight bearing.

• Land-Based = 100% WB (50% each limb)

• Depth of water:
  • Waist (ASIS) Deep = 50% WB (25% each limb)
  • Chest (Xiphoid Process) Deep = 25% WB (12.5% each limb)
  • Neck Deep = 10% WB (5% each limb)
Buoyancy

• Buoyancy can assist movement up toward the surface of the water.

• Buoyancy supports movement on the surface of the water.

• Buoyancy resists movement down toward the floor.
Viscosity

• A measure of the fluids resistance to gradual deformation by a shear stress or tensile stress.

• A limb moving is subject to resistance..

• Resistance increases as more force is exerted against the fluid (adding equipment).

• In the water, you can work both opposing muscle groups with the same amount of resistance throughout full movement patterns.
Temperature

• General guidelines might include:
  • 82-88 degrees for more active patients and patients with MS
  • 88-92 degrees for less active patients such as those with arthritis or women
  • 92-96 degrees for less active patients with hypertonicity / spasticity issues
Equipment to Manipulate These Principles

• Wonder board
• Flotation dumbbells
• Noodle
• Flotation Belts
• Paddles
• Webbed Gloves
• Flotation Cuffs and Weights
Benefits of Aquatic Therapy

**Physiological Benefits**
- Relief of pain
- Strengthens muscles
- Improves endurance and cardiovascular fitness
- Increases mobility and production of synovial fluid
- Provides proprioceptive and kinesthetic input
- Challenges equilibrium
- Decreases joint compression
- Improved bone density

**Psychological Benefits**
- Improved body image
- Improved mood
- Improved self concept
- Decreased depression

**General Benefits**
- Can benefit all ages
- Environment to cross-train for sport injury's
- Can help improve sleeping patterns
Does adherence make a difference? Results from a community-based aquatic exercise program.


Baseline to Post Intervention
- Improved
  - Quality of Well-Being
  - Physical Function
  - Arthritis Quality of Life

Tx Adherers vs. Non-Adherers
- Improved
  - Quality of Well-Being
  - Depressed Mood
Effectiveness of aquatic exercise for musculoskeletal conditions: a meta-analysis

Arch Phys Med Rehabil. 2014 Sep;95(9):1776-86

Compared with NO exercise

• Improvements in:
  • Pain
  • Physical Function
  • Quality of Life

Compared to Land-Based exercise

• No difference
Frailty vs. Disability

“In 1990, an American Medical Association white paper concluded that “one of the most important tasks that the medical community faces today is to prepare for the problems in caring for the elderly in the 1990s and the early 21st century”. This report particularly emphasized the growing population of frail, vulnerable older adults, “the group of patients that presents the most complex and challenging problems to the physician and all health care professionals.”


Frailty

- Frailty indicates instability and risk of loss or further loss of function
- Frailty indicators: Gait speed, Rising from a chair, Decrease food intake, Lack of energy, Decrease time or frequency of hobbies like walking, biking, gardening, sports.

Disability

- Disability indicates loss of function
- $$$ Medical Costs $$$
This prospective cohort study included 1122 men and women 71 years of age or older who were living in the community, who reported no disability in the activities of daily living, and who reported that they were able to walk one-half mile (0.8 km) and climb stairs without assistance.

The subjects completed a short battery of physical-performance tests and participated in a follow-up interview four years later. The tests included an assessment of standing balance, a timed 8-ft (2.4-m) walk at a normal pace, and a timed test of five repetitions of rising from a chair and sitting down.

Among the 1,122 subjects who were not disabled at base line and who participated in the four-year follow-up, lower scores on the base-line performance tests were associated with a statistically significant, graduated increase in the frequency of disability in the activities of daily living and mobility-related disability at follow-up.

After adjustment for age, sex, and the presence of chronic disease, those with the lowest scores on the performance tests were 4.2 to 4.9 times as likely to have disability at four years as those with the highest performance scores, and those with intermediate performance scores were 1.6 to 1.8 times as likely to have disability.
Who can benefit from Aquatic Therapy?
(vs. Land-Based Therapy)

• Post-surgical patients
  • Those with limited WB restrictions
  • Those too painful or swollen for land based
  • Patients with high BMI

• Joint pain from sports or daily repetitive activities
  • Decreased joint reaction forces
  • Cross training

• Frail patients
  • Poor balance (Fall risk)
  • Muscular atrophy, poor endurance, OA

And many others:
• Neurological Patients
• Back Patients
• Chronic Pain
• Pediatrics
• Prenatal
Contraindications

• Open wounds, sores, acute surgical incisions
  • “Tegaderm” (bioclusive dressing) on none joint areas for small mostly healed areas
• Infections
• Dermatitis
• Fever / Illness
• Incontinence
• Peripheral vascular disease
Beginner Level

1. Make the movement smaller slower shorter and single plane
2. Proximal to distal
3. Static progressing to dynamic
4. Slow progressing speed
5. Changing amount of resistance with surface area
6. Open chain vs. Close Chain
7. start with lower reps or time
Intermediate Level

1. Quick changes in movement. Example ambulating with stops, turns different obstacles.
2. Decrease amount of buoyancy with exercise
3. Double leg to single leg
Aquatic Therapy for Athletes

- Water allows athletes to use full ROM for all muscle groups, because there is no gravitational pull on the body.
- There is an even amount of tension placed on the muscles throughout full range of motion.
- The resistance dampens the speed of motion and the end point of each movement preventing or diminishing the occurrence of jerky movements.
- Increase use of stabilizing muscles are used especially while suspended in the deep water.
Aqua Jogging Technique

1. Best performed in deep water with a flotation-belt. Your feet should not touch the bottom of the pool.


3. Trunk: Maintain a nice upright posture, avoid a horizontal position. Lead with hips not chest.

4. Legs: Pump legs in running pattern, Bend knee as you drive leg forward. Straighten leg directly under you avoid legs from kicking to far out in front of your body.
Aqua Jogging Training Time

- To get similar results to running on land you need to exercise about 25% longer during aquajogging. Take your expected minutes-per-mile pace for your training run and multiply by the miles you plan to run. Next take your total planned minutes and multiply by 1.25 to get your minutes in the pool.

- Example: 6 mile run at a 8 min per mile = 48 minutes x 1.25= 60 minutes in the pool
Aqua Jogging Training Pace

1. Heart rate is usually 10 beats slower per minute in the pool due to the hydrostatic pressure

2. Work at a similar effort level in the pool as you would during your run. This includes tempo and interval days.
Any Questions?