ORTHOPEDIC HOSPITAL OF OKLAHOMA

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Aquatic cardiovascular programs are extremely popular both in a clinical as well as sport medicine setting. Endurance training in the water is best accomplished by embarking upon a running program. For clinical rehabilitation aquatic running has the highest utility in terms of meeting the standard demands of aerobic conditioning. Aquatic running involves large muscle groups, rhythmic contractions for extended periods of time. For sports training and rehabilitation, running is one of the most universally required skills for major sports. [1] Most clinicians or trainers use aquatic running to unload the body from ground reaction forces typically associated with land based running

Injury prevention should be in the forefront any runner's training program it is one thing to train hard and diligently, it is another to survive the pitfalls of over training. A significant amount of training related injuries can be attributed to poor selection of training volumes and intensities (training errors). In particular these injuries appear more related to runners exceeding their orthopedic limit in terms of number of "foot strikes with the ground. Any increases in training volume beyond that theoretical "orthopedic limit" should be in the form of low or non impact cross training activities [2].

Research on training related injuries [3-5] in runners has show that:

- 66% of all runners will experience a running related injury over any given 12 month period
- running in excess of 50k per week increases your chance of injury by more than 55% .
- a runner will typically hit the ground between 800-2000 times per mile
- ground reaction forces of up to 4 times their body weight.
- all runners have an individual maximum number of "foot strikes" or orthopedic limit they can accommodate before beginning to breakdown.
- repetitive motion injuries associated with distance running is dependent on numerous factors including fitness level, ongoing training workloads, inherent biomechanics, previous history of injury, and genetics.

If you <u>are</u> injury prone it would make sense to gradually build your weekly mileage by no more than 10% per week and set an upper limit of 25-30 miles per week. Furthermore, consider adding a significant amount of non-impact cross training activity into your training mix. Aquarunning permits the runner to increase weekly "mileage" yet eliminates the increased risk associated with repetitive impact during land based running. Many runners now use Aquarunning effectively as a form of "active recovery" between two land based workouts.[5]

<u>The Three R's of Deepwater Running</u>

"Three R's" *Range of Motion, Rhythm* and *Relaxation* may be helpful in improving both land based and water based running.[2] Remember, any changes in your running style should be introduced gradually and continuously over an extended period of time.

Range of Motion Þ	**Rhythm** Þ	**Relaxation** Þ
postural alignment	speed of movement	progressive
joint angles	endurance	holistic state / rhythmic flow
muscle mind focus	efficiency	auto suggestion / visualization

<u>Range Of Motion</u> - Consider the motion that your head, arms, trunk, legs and feet naturally move through with each stride. Motion should be viewed by way of three directions or planes of motion, horizontal (forward and back), vertical (up and down) and lateral (side to side). *The head* looks ahead, shoulders and hips should move in a straight line with little vertical or side-to-side motion *The spine* is essentially in an upright position (or no more than 3 degrees forward of vertical). It is not necessary to lean forward to run fast. Keep the feet and knees moving in a straight line. *Arm action* will effect posture dramatically. As with the shoulders and hips, avoid excessive side-to-side motion (crossover). Allow the elbow then wrist to track downward and back past the hip, all following the same arc. Rest the thumb on top of a lightly clenched fist. The elbow should maintain an angle of about 90 degrees. Arm swing contributes to a runner's balance, coordination and stride length. *Leg* action should be "light" and economical, with no conscious effort to drive

the knees forward and up. The leg and foot should drop directly under your body upon contact with the ground. It is better to slightly under stride than over stride. Over striding usually will cause a breaking action each time your foot hits the ground. This is not an efficient way to run and certainly not good on the knees. Most runners have an optimal stride length (self determined), once attained any increase in running speed is best accomplished by increasing stride frequency (leg speed).

Rhythm - Is the "timing", or coordination of movements. Experienced runners are usually very much in tune with the natural "flow" of running. They tend to key into the rhythm of their footfall and breathing. These cyclical sounds for many runners become their mantra (something to focus on). I recommend modifying your running motion at various speeds (start slowly at first). Practice using a track or other flat surface when running on land. For Aquarunning, practice running at a water depth that allows you to just lightly touch the bottom of the pool. In some cases I use metronome to control rhythm speeds. Try to find a comfortable "flow" in your stride pattern. On land most distance runners run at approximately 85-90 cycles (complete revolutions) per minute.

Relaxation - There is no one single definition for relaxation and this is especially true for sport in general and running in particular. While the physiologists may simplify it to neuromuscular conditioning, in sport, relaxation appears to be more associated with human psychology then physiology. Author and coach Ken Doherty [6] as early as 1969 defined 10 ways to approach relaxation with his athletes:

(1) S*kill learning:* - mastery of skill will lead to increased relaxation
(2) *Differential relaxation:*- muscle isolation, awareness of uninvolved muscle tension
(3) *Holistic relaxation:*- coming to terms with your environment (mind, body and soul)
(4) *Withdrawal and return:*- stop training and return only when refreshed and re-focused
(5) *Progressive relaxation:*- contract/relax each muscle group moving from head to toe.
(6) *Auto suggestion:*- attaining a relaxed state through positive thinking (mind set)
(7) *Emptying the mind:*- mental activity reduced by focusing on one thing (meditation),
(8) *Repression of negatives:*- don't create unnecessary internal or external stressors
(9) *Unload the action:*- reduce neuromuscular tension by slowing down the movements
(10)*Wholeness:*- sense of unity, mutual supportiveness and internal/external tranquility

Water Based Running
Deep water running does not require loading of lower extremity muscles and joints during the "support phase" of the gait cycle. The ankle and metatarsal joints are not subjected to ground reaction forces (impact, support and drive) typically present in land based running. Additionally, hip flexion during land based running is very dependent on the resultant force applied to the ground by the opposing grounded leg.
During deep water running hip flexion is dependent primarily on hip flexor action with little or no help from the opposite leg's drive downward against the weaker resistance of buoyancy. Although this represents significant differences in muscle recruitment patterns between land and water based running these differences are acceptable given we want to rest or protect those "kinetic systems" involved in land based impact. Research has show that despite these differences in "ground reaction specificity" we can still maintain very high levels of both anaerobic and aerobic output with good general specificity of exercise for running while training in deep water. [7-13]. Many runners either bring poor running mechanics to the pool or fail to take the time to "reprogram" their running mechanics for the pool in view of the lack of ground reaction forces. You will maximize the benefits of this low impact highly specific cross training activity only by being mindful of the biomechanical requirements of deep water running [35]. I have found it takes about 2-3 sessions to familiarize a runner to Aquarunning mechanics. Here are a few tips to help you accomplish good form in the pool:

The Trunk
- The spine assumes a position slightly forward of vertical (2-3 degrees.)
- Eyes look out and not down with the head positioned so that the ears are aligned vertically with the shoulders.
- Don't lean too far forward. Keep the shoulder girdle relaxed and stable.

The Arms
- Start the movement of the forward hand at a point 5 cm from the water 15-20 cm away from the chest.
- Elbows are bent at 90 degrees, hands make a light fist with the thumbs on top.
- Leading with the elbow, move the hand back and down so that the elbow, wrist and then thumb all pass the hip close to the body in a pendulum like action. (maintain elbow flexion at 80-90 degrees)

- Avoid any crossover type motion (excessive shoulder or elbow internal/external rotation) with the forearm or hands.
- Each arm moves in perfect opposition to the other remaining relaxed, smooth and streamlined. Continue to focus on coordinating the arms with legs.

The Legs

- Start the leg motion with the thigh moved forward and up (approximately 70-80 degrees hip flexion) with the knee at a right angle (90 degrees).
- The foot remains flat (minor activation of the anterior tibialis) and positioned directly below the knee.
- As the thigh moves downward and backward (hip extension) push the foot down with a "stomp like" action directly below the body.
- Once the leg is fully extended (knee is almost straight) move the thigh behind the body. (slight hip hyper -extension).
- Next, lift the heel toward the buttocks, with the knee flexed the thigh then returns to the forward and up starting position. Avoid over striding (lower leg moving in front of the knee).
- Focus on the up and down motion of the legs while maintaining an erect posture. Ignore forward momentum through the water.
- Leg speed is more important than your horizontal speed.
- Use a tether line attached to the side of the pool. Imagine you are running on a treadmill.
- Use a metronome set a slow speeds (not > 60 cpm) or count your leg turnover rate (see RPE/cpm table) to control your leg speed.

The importance of training both the aerobic and anaerobic systems to improve running performance are well known. When looking at a systematic scientific approach to improving both aerobic and anaerobic systems three important physiological determinates for training a distance runner are; maximum oxygen consumption, lactate threshold and running economy. Water training programs that are used for improving fitness in general and running performance in particular are based on proven land based concepts. These concepts include long intervals, short interval, fartlek, long slow steady state and active recovery running.

Wilder Graded Exercise Test (GXT)

The Wilder GXT is an accurate way of prescribing individualized training intensities for deep water running [1,2,8,10,11,13]. This test is designed for apparently healthy individuals who do not present any contraindications for performing maximal exercise in the pool. While not as reliable for exercise prescription purposes the test can also be modified to a sub maximal test by restricting peak heart rate values of the subject to 85% of water adjusted (10% lower) age predicted max or an RPE of 4.0. The Wilder test should be administered every 6-12 weeks so that adjustments to metronome settings (cadence) for training can be made in accordance with changes in fitness levels. When administrating the Wilder test it is very important to monitor the subjects biomechanics, especially in the later stages of the test. The subject should be tethered to the side of the pool and be able to clearly hear the metronome and your verbal cues for running form. ROM and posture are critical to determining true HR, RPE and CPM relationships. Any excessive shortening of hip or shoulder ROM or not reinforcing the maintenance of cadence will produce erroneous data. Utilize constant visual verbal cueing throughout the test. I recommend at least 2-3 familiarization sessions for the subject before conducting the Wilder test. HR, RPE and CPM data can be individualized based on the three major training components for distance running, Running economy, Lactate threshold and Max VO2, I prefer to use RPE to prescribe exercise and then cross check with HR and CPM data. If your programs are prescribed by metronome settings (cpm) you would use HR and RPE to cross check exercise intensity. You will need a waterproof heart rate monitor, chronograph stopwatch and digital metronome. (see appendix for blank Wilder GXT data collection sheet)

The following sample programs address the major training components previously mentioned. These workouts are a progressive approach to organizing your pool sessions so that they are both safe and productive. Begin each workout with 5minutes of aquajogging at very light to light intensity followed by some general upper and lower extremity stretches. Utilize RPE initially when starting this program (see table 1.) and once you have established baseline cadences and heart rates for each particular RPE level you can use a metronome or heart rate monitor to control training intensity. The Wilder GXT for Aquarunning is a highly effective tool for determining cadence and heart rate values for each of the prescribed RPE levels below. [8]

Table 1. RPE and cadence values for distance runners

RPE		CPM*	Land Equivalent
Very Light	1.0	< 55	Brisk walk
	1.5	55-59	
Light	2.0	60-64	Easy jog
	2.5	65-69	
Somewhat Hard	3.0	70-74	Brisk run
	3.5	75-79	
Hard	4.0	80-84	5k/10 pace
	4.5	85-89	
Very Hard	5.0	> 90	Short track intervals

* measured as the number of times each limb moves through a complete gait cycle per minute

Long Interval
Long intervals improve the runners ability to sustain a faster pace without acquiring excessively high blood lactate levels. A single session each week can familiarize the runner with the muscular as well as cardiovascular demands of both short and long distances (5k through marathon). Long interval training should be at 80-90% of Max, several intervals of greater than 3:00-15:00 minutes duration are usually performed with 1-2 minutes recovery period. Total run time should be 30-60 minutes. This training would simulate intervals of 800m up to 5 km on the track.

Sample workouts:

Workout # 1 [31 minutes]
8:00 @ RPE 3.0 [1:00@ RPE2] , 6:00 @ RPE 3.5 [1:00@ RPE2],, 5:00 @ RPE 3.5 [1:00@ RPE2]
4:00 @ RPE 4.0[1:00@ RPE2], 3:00 @ RPE 4.0 [1:00@RPE 2]

Workout # 2 [36 minutes]
4 x 8:00 @ RPE 3.0-3.5 [1:00 @ RPE 2]

Workout # 3 [40 minutes]
9:00 @ RPE 3.5 [1:00@ RPE2], 8:00 @ RPE 3.5 [1:00@ RPE2],7:00 @ RPE 3.5 [1:00@ RPE2],
6:00 @ RPE 4.0 [1:00 @ RPE 2], 5:00 @ RPE 4.0 [1:00 @ RPE2]

Workout # 4 [44 minutes]
2 x 6:00 @ RPE 3.5 [1:00@ RPE2], 2 x 5:00 @ RPE 4.0 [1:00@ RPE2], 2 x 4:00 @ RPE 4.0 [1:00@ RPE2], 2 x 3:00 @ RPE 4.5 [1:00@ RPE2]

Workout # 5 [48 minutes]
8 x 5:00 @ RPE 4.0[1:00 @ RPE2]

Short Intervals
Short interval training usually involves running at 90-99% of Max at interval of 30 sec. up to 2 minutes. with recovery periods that may range from 30 sec. up to 5:00 minutes depending on the intensity and length of the intervals and if the training objective calls for "incomplete" recovery. This type of training allows the runner to feel comfortable at high leg speeds and helps the muscular and circulatory system "tolerate" very high workloads for short periods of time. Short intervals in the pool simulate 200m-800m track intervals and should be performed 1-2 times every 7-10 days depending on the training objectives at the time.

Sample Workouts
Workout # 1 [30 minutes]
10 x 2:00 @ RPE 4.0-4.5, [1:00 @ RPE2]

Workout # 2 [36 minutes]
4 x 3:00 [1:00@ RPE2], 6 x 2:00 @ RPE 4.0-4.5 [1:00@ RPE2],
8 x 1:00 @ RPE 4.5 [:30 sec. @ RPE2].

Workout # 3 [36 minutes]
4 x 2:00 @ RPE 4.0 [1:00@ RPE2], 4 x 1:30 @ RPE 4.5 [1:00@ RPE2],
4 x 1:00 @ RPE 4.5 [1:00@ RPE2], 4 x :30 @ RPE 4.5-5.0 [1:00@ RPE2]

Workout # 4 [38 minutes]
4 x 2:00 @ RPE 4.0 [1:00 @ RPE2], 6 x 1:00 @ RPE 4.5 [:30 sec. @ RPE2], 5:00 RPE 2.0
8 x :30 @ RPE 4.5-5.0 [1:00 @ RPE3]

Workout # 5 [48 minutes]
10 x 1:00 @ RPE 4.0 [1:00@ RPE2, 5:00 @ RPE 2.0, 10 x 1:00 @ RPE 4.5-5.0 [1:00@ RPE2

Long Slow Continuous (LSC)
This type of running simulates long slow distance run (LSD) type run. One should be able to hold a conversation while performing this workout your RPE level will range from 2.0-3.0. Running economy can be practiced during this "steady state" low intensity workout. Try to focus on the correct running mechanics. If you are doing this workout alone, pack a portable music device with your aquajogger as it can get a little tedious in the pool after and hour. I have listed five (5) sample workouts below.

Workout # 1
40 mins @ RPE 2.0-3.0

Workout # 2
50 mins @ RPE 2.0-3.0

Workout # 3
60 mins @ RPE 2.0-3.0

Workout # 4
70 mins @ RPE 2.0-3.0

Workout # 5
80 mins @ RPE 2.0-3.0

Fartlek
The word fartlek is Swedish for "speed play" and was developed by the Swedes as part of their training regime in the Alpine forest. The Swedes would run in a group, taking turns at leading a surge and picking a finish point as they cruised the forest trails. In the pool one can simulate this type of training by varying the duration and intensity of each surge. These intermittent surges are of 10 sec to 2:00 mins duration at hard to very hard exertion levels with 10 sec - 2:00 minutes recovery at light to very light intensity. The key to fartlek is that the surges are executed at random with very little structure. I suggest timing only the total time of the fartlek session which is usually of 30-60 minutes duration.

Sprint Workouts
Water based training can be used very effectively for sprint training either by track runners or sports that require explosive type running. My work with world class sprinters, Carl Lewis and Leroy Burrel, called for the development of sprint specific RPE/CPM values. (table 2.) Together with their coach Tom Tellez we utilized a three phase approach to sprint training in the pool. [2]

Table 2. RPE and cadence values for sprinters

RPE		CPM	Land Equivalent
Very Light	1.0	< 74	> 800 meters
	1.5	75-79	
Light	2.0	80-84	600-800 meters
	2.5	85-90	
Somewhat Hard	3.0	90-94	400-600 meters
	3.5	95-99	
Hard	4.0	100-104	200-400 meters
	4.5	105-109	
Very Hard	5.0	>110	50m-200 meters

1. Transitional Phase (1-2 weeks) - This phase allows progressive loading of the muscular skeletal system and provides biomechanical familiarization to specific movement patterns required for deepwater running. Even if the athlete is very fit I recommend spending at least 2-3 sessions over the course of a week or two before moving to the next phase.

Sample program:

Warm up	5:00 @ 1.0-1.5 / stretch 5-10 minutes
Intervals	2 x 3:00 @ RPE 2.0 [1:00 @ RPE 1.0]
	2 x 2:00 @RPE 2.5 [1:00 @ RPE 1.0]
	4 x 1:30 @ RPE 3.0 [1:00 @ RPE 1.0]
	6 x 1:00 @ RPE 3.5 [1:00 @ RPE 1.0]
Cool Down	5:00 @ 1.0-1.5 / stretch 5-10 minutes

2. Base Phase (4-6 weeks) - Sprinters can benefit from a base phase early in pre-competition preparation.. These base phase workouts simulate 400m/800m type training ensuring the development of an efficient cardiovascular system and specific muscular endurance. Base workouts also enhances the circulatory system thus possibly aiding an athletes recovery from strenuous longer track intervals often a major component of early season sprint training and a source of potential injury.

Sample program:

Warm up	5:00 @ 1.0-1.5 / stretch 5-10 minutes
Intervals 2 x 2:00 @RPE 3.0 [0:30 @ RPE 1.0]	
	2 x 1:30 @ RPE 3.5 [0:30 @ RPE 1.0]
	4 x 1:00 @ RPE 4.0 [1:00 @ RPE 1.0]
	4 x :45 @ RPE 4.5 [1:00 @ RPE 1.0]
Cool Down	5:00 @ 1.0-1.5 / stretch 5-10 minutes

3. Speed Phase (4-6 weeks) - Specific training to enhance leg turnover, limb range of motion and coordination between the upper and lower extremities while maintaining high speed s. Usually a single session per week emulating land based interval recovery workloads (e.g. 6 x 200m followed by 1-2 minute recovery.)

Sample program:

Warm up	5:00 @ 1.0-1.5 / stretch 5-10 minutes
Intervals 3:00 @ RPE 3.0 [1:00 @ RPE 1.0]	
	2:00 @ RPE 3.5 [1:00 @ RPE 1.0]
	4 x 1:30 @ RPE 4.0 [2:00 @ RPE 1.0]
	6 x :30 @ RPE 5.0 [2:00 @ RPE 1.0]
Cool Down	5:00 @ 1.0-1.5 / stretch 5-10 minutes

Active and Passive Recovery

Some runners may call this type of running "junk mileage" but as far as pool workouts go this type of very low intensity running is extremely under-valued by coaches and athletes alike. While exercising at very light to light intensities (RPE 1-2) in the water the body actual removes more metabolic waste than it produces. This can really be a great way to enhance recovery immediately after a hard land based training session or as a timely recovery session the next day between land based sessions. The duration of an active recovery workout should be about 20-30 minutes. No physical activity at all (passive recovery) includes therapeutic massage, extended sleeping hours, mid-day naps and relaxation time. Combined with active recovery these two forms of "rest" allow time for previously stressed biological systems to "adapt" to training and offer the best protection against over training and staleness often seen in very competitive athletes or hypervigilent exercisers.

Sport Specific Running Programs

Running is clearly the "common denominator" when it comes to major sports in the United States. While each sport has very specific performance bases skills most sports require explosive running skills. The "big four" baseball, basketball, football and soccer usually require high to very high work output for efforts of 5-30 second duration. In order to satisfy the principle of specificity of exercise interval training in the pool should reflect the effort duration specification of the for mentioned sports. The following are examples of pool running workouts I am presently using for major league baseball players. Head Trainer at the Houston Astros head trainer, Dave Labossiare, has his players run one of the following 20 minute pool sessions in the pool with moderate to high laminar flow values (3.0-5.0 on swimometer).

Workout #1 (20 minutes)
3:00 @ RPE 2.0 warm up
20 x :15 secs @ RPE 4.5-5.0 [:30 sec @ RPE 1.0-2.0]
2:00 cool down @ RPE 2.0

Workout # 2 (20 minutes)
20:00 mins @ RPE 3.0

Workout #3 (20 minutes)
3:00 @ RPE 2.0 warm up
10 x :30 sec @ RPE 4.5-5.0 [1:00 recovery @ RPE 2.0]
2:00 cool down @ RPE 2.0

Workout # 4 (20 minutes)
3:00 @ RPE 2.0 warm up
8 x 1:00 @ RPE 4.0 (:30 sec RPE 2.0)
2:00 cool down @ RPE 2.0

It is important to monitor the runners form at all times taking care not to increase leg speed (cadence) of laminar flow values (horizontal resistance) at the expense of smooth and relaxed biomechanics. Take the time to establish individual "baseline cadence values" for each athlete. This can be done by simply counting the number of complete gait cycles performed by the athlete per minute for any given RPE and using the metronome to control for that recorded speed (cpms) cross check with heart rate and RPE. Progressive weight bearing is also a key factor to consider when returning an injured runner to land based training. I suggest starting at 0-10% vertical load in the deep section of the SwimEx. Once the athlete can tolerate 10% weight bearing (neck level) and is asymptomatic progress to the dynamic running pad adding more difficult dynamic proprioceptive challenges.

Rehabilitation and transition to land

If you are transitioning from deep water running to land as part rehabilitation from injury shallow water running is a great supplement to deep water running. When standing in water that is up to your shoulders you only weigh about 10% of your total body weight. This is a great place to start your transition to land based running. In fact when I have access to pool with a graduated depth profile I put my athletes at a depth so that during running they can lightly touch the bottom of the pool with their feet. The athlete now has the benefits of limited weight bearing (<10% total body weight) yet can gain sensory input for the "support phase" of the running gait and perhaps increase Aquarunning biomechanical specificity. After a week or two the runner can move to water that is at chest level (30% body weight). Two to three weeks later progress to water that is hip level where vertical load is about 50%. At this point a runner coming back from an injury can begin to integrate land based running or walking with deep and shallow water running.

Shallow water running programs utilize the same continuous of interval type training programs I previously suggested for deep water. The cadences values in shallow water may however vary slightly as the weight bearing forces are increased with decreasing depth. The resultant increase in orthopedic trauma may limit the duration and frequency of shallow water running. To this end I suggest wearing a pair of running shoes or aquatic shoes during shallow water so as to minimize the chance of orthopedic trauma, protect the feet from abrasion and re-familiarize yourself with wearing shoes. I have outlined a suggested three phase rehabilitation program after orthopedic injury or as a preventative measure against repetitive microtrama of the lower extremity. This protocol utilizes #1-#4 of the sport specific running programs (p48-49) to progressively increases weight bearing while maintaining specific fitness pertaining to running performance requirements in baseball, basket ball, and basketball.

Day	*Protocol*	*Type*	*Environment*
Phase 1.(1-3 weeks)			
Mon.	Workout #1	short interval	deep water
Tue.	Workout #2	active recovery	deep water
Wed.	Rest		
Thu.	Workout #3	Medium interval	deep water
Fri.	Workout # 2	Active recovery	deep water
Sat	Workout #4	Long interval	deep water
Sun	rest		
Phase II.(1-3 weeks)			
Mon.	Workout #1	short interval	shallow water (5-10% WB)
Tue.	Workout #2	active recovery	deep water
Wed.	Workout #3	medium interval	shallow water (5-10% WB)
Thu	Workout #2	short interval	deep water
Fri.	Workout #4	long interval	shallow water (5-10% WB)

Sat	Workout #2	short interval	deep water
Sun	rest		

Phase III.(1-3 weeks)

Mon.	Workout #1	short intervals	running pad (15-55% WB)
Tue.	Workout #2	active recovery	deep water
Wed.	Workout #3	medium intervals	running pad (15-55% WB)
Thu	Workout #2	short interval	deep water
Fri.	Workout #4	long interval	running pad (15-55% WB)
Sat	Workout #2	short interval	deep water
Sun	rest		

Using Resistive Equipment

Most resistive equipment designed for the water will increase the length or surface area of a limb making it harder to move that limb. Avoid working with resistive equipment in the pool until you improve your basic fitness. If you are ready for the additional challenge of resistive equipment here are some tips. [14]

- begin with slow small movements
- maintain correct body position and muscle control
- start in shallow water until you have perfected the movements
- when working in deep water use a floatation belt and tether line for stability
- avoid fully extending shoulders elbows, wrist ankle or knee joints
- keep resistive equipment in the water sudden changes in resistance when moving from water to air can lead to injury.
- Supplement your program with gentle stretches in the pool

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