

MULTIPLE SCLEROSIS ASSOCIATION

Moderator: Peter Damiri

May 21, 2014

2:01 pm CT

Peter Damiri: Hello everyone and welcome to the Multiple Sclerosis Association of America's Webcast, Advancing Knowledge of Aquatic Exercise and MS.

My name is Peter Damiri, and I am the Vice President of Programs and Services for MSAA and will be your host for tonight's program.

MSAA is proud to bring you information on this exciting wellness approach to MS and very honored to have an expert in aquatic and MS with us for tonight's program.

At this time I would like to introduce our guest presenter, Michele Harrison. Michelle is a Physical Therapist, Certified MS Specialist and Fitness Instructor for the Aquatic Exercise Association and Hydrotherapy Coordinator for the Rocky Mountain MS Center in Denver.

Michele thank you so much for being here and sharing your expertise with us. Welcome to the program.

Michele Harrison: Thank you.

Peter Damiri: Well tonight's webcast is part of MSAA's new national initiative known as Swim for MS. Swim for MS is a two-part program where we are encouraging water-based exercise as an option for people with MS, as well as giving volunteers who enjoy swimming a chance to create their own swim challenge to raise money to help the MS community. The money raised through Swim for MS fundraisers helps support MSAA's services, including this new aquatic exercise program.

The goal for the Swim for MS patient program is to increase awareness, understanding and availability of swimming and aquatic exercise as a positive wellness opportunity to the MS community.

I would also like to acknowledge and give special thanks to our Swim for MS sponsor, Genzyme, a Sanofi company. Through this collaborative sponsorship, MSAA is able to bring you tonight's webcast, as well as a variety of other educational materials for MS patients and healthcare professionals.

All of this new content is posted on our online aquatic center, swimforms.org, which includes a section for healthcare professionals. And the guy did that you see here is on-site and was co-authored by Michele Harrison and written in collaboration with the consortium of MS centers and the International Organization of MS Rehab Therapists.

This next slide is to give you a quick overview of the additional programs and services of MSAA. And to let you know that we welcome any patient referrals you may have for people in need of our services.

So at this time it is my pleasure to turn the program over to Michele and have her begin with tonight's presentation.

Michele Harrison: Thank you Peter. I want to say thank you to everybody tuning into this webinar. I get to speak on two things that I really love to do in the physical therapy. That's work with people with multiple sclerosis, as well as engaging them in the aquatic therapy as a form of exercise for fitness and wellness.

So we have a lot of information to cover in this webinar, so I'm going to jump right in. We will start with a real brief overview of what MS is. And then we'll just move into the importance of exercise for people with MS and aquatic exercise.

So multiple sclerosis is a demyelinating disease of the central nervous system. And it is characterized by unpredictable relapses and remissions. It is the leading cause of neurologic disability, the leading cause of neurologic disability among adults.

It is the primary cause of neurologic disability in women between the ages of 20 and 40 and the second leading cause of neurologic disability in men between the ages of 20 and 40. They estimate about 400,000 people in the United States have MS.

The symptoms are variable with MS, and that's one of the characteristics of MS. Things change from the initial diagnosis. Symptoms - and symptoms can change from day to day, it can change from morning to evening and throughout the course of the disease.

You see a list of symptoms listed below. And these are some of the more common symptoms that people note with MS. And - but there are others as well.

So probably one of the biggest complaints that I hear from people regarding MS is fatigue. And fatigue, there are different types of fatigue. One type of fatigue is just the decreased ability to participate in physical activity for long periods of time, or sometimes for any period of time.

There can be cognitive and mental fatigue issues for people. There can also be just a general sense of malaise that somebody has gotten up first thing in the morning, and they are already tired and they haven't done anything yet.

Another common symptom noted by people is trouble with walking difficulty. And this is really - it has a lot of different symptoms that make - can make walking hard for somebody.

And that is there can be problems with weakness. Fatigue can factor into this, stiffness or spasticity, sensory changes, problems with balance, these can all make walking difficult. Spasticity or stiffness can cause pain and can decrease people's ability to move efficiently or make activities or movements difficult.

Bladder and bowel problems are also an issue. Memory and cognitive issues. People note memory attention concentration problems can be seen with MS. The rate of depression in MS is higher than amongst other chronic neurologic disease processes or conditions.

There can be pain with MS. There was a period of time where it was thought that there wasn't pain with MS, but there can be. That pain can be due to areas

of demyelination in the nervous system that cause (unintelligible) or like it can be a sense of burning or just uncomfortable sensory sensations.

There can be trigeminal or facial pain, neuralgias. There can also be pain due to overuse, under use, injuries from some sensory movements or changes in movement patterns to say somebody has a normal gate pattern, and then they start to get hip or back pain, kind of a more musculoskeletal types of pain.

Visual deficits can also be a part of MS as the optic nerve is the demyelinated. Somebody can have optic neuritis, which can cause blindness. Usually this comes and goes. It's a more temporary issue. The people can also have blurred vision, double vision problems with vestibular ocular reflexes being abnormal.

Dizziness imbalance are also multi-pictorial for people. Balance can be due to weakness, problems with endurance, lack of flexibility, a variety of issue sensory problems. It can also be due to problems with vision. And also speech and swallowing deficits can be a problem for people with MS.

So since MS is disabling and it is a progressive disease, it makes it imperative for people with MS to participate in exercise to improve their overall physical fitness and their ability to participate in home/work community activities. And functional abilities, improve ability to walk, to stand, transferring and be mobile.

There was a point in time when they felt that exercise maybe exacerbated MS symptoms, but research studies have shown that people with MS actually improved functional abilities or level, aerobic fitness, balance and strength with exercise programs.

It reduces the risk for cardiovascular disease. Exercise also helps decrease depression by helping increase release of endorphins that decrease depression. It enhances quality of life.

And one of the bigger areas of interest in neurology lately has been neural reserve and looking at how we can increase neural reserve, making the brain plumper by - and exercise is one way that we do that, also social interaction as well as intellectual/mental stimulation.

The other area that has been of interest in neurology is increasing brain growth hormone and nerve growth factor. These chemicals are released when somebody exercises. And they increase nervous system repair, regeneration and they protect nervous system tissue.

So people with MS may find it difficult to exercise through traditional land-based methods. And this can be due to physical barriers or just even the increase in body temperature, say an increase in body temperature. Many people with MS experience a temporary worsening of symptoms when they get overheated. And this goes away as they cool down again.

And the water is a very effective - it transfers heat away from the body well. So it may be a good alternative to allow somebody to be active and not have problems with overheating with exercise.

Literature -- there are some studies out there on aquatic exercise and MS. And they show that people have improved - improvements in many ranges or many different areas I should say. Flexibility, improvements in range of motion, improved cardiovascular endurance.

And for people with MS, decreasing fatigue levels is big. Improving muscular strength, improving function for mobility to be able to transfer, to balance well, to walk and also the areas of quality of life and psychological well-being and decreasing depression.

And none of the studies showed any exacerbation of symptoms or adverse changes in neurologic status with aquatic exercise as an exercise option.

But I would like to add to that that I would like people to think of aquatic exercise as something that could be done early on for somebody with MS, somebody a very active. We can work on lots of different aerobic strength training activities. Even world-class athletes utilize the pool for cross training and rehabilitation themselves.

So I would like aquatic therapy not to be thought of as kind of the last thing that you try because other options didn't work. It may be one of the first ones that you try.

As with any exercise program, we need to do an assessment to start a program. And it will help provide information on kind of a snapshot, a current functional status of that person, that individual.

And it may (evidenced) by other health issues that may present as precautions or contraindications for exercise in the water, in the aquatic environments. And it can also provide information on how to start a program. What the goals might be for the program to individualize it. To be able to utilize a person's resources in that area, in their community so that they can fully participate in the exercise.

If you're doing aquatic physical therapy, you need to - and you're going to be billing insurance, you need to do a land-based assessment. And a lot of that information can also be utilized and fed into some of the aquatic templates assessment checkmarks that are available.

And if you're going to be a billing and insurance, then you have to have land-based goals to be able to document for insurance reimbursements. Special attention needs to be paid into the areas of neuromuscular and musculoskeletal systems for people with MS. But somebody living with MS may also have other health issues, problems in other systems. So it's really prudent to screen for other health issues as well.

Here are some commonly used tools for aquatic assessment. The top three -- the aquatic exercise review system, the ICS and the WOT or the water orientation test -- these are all in - there are templates of those in Lori Thein Brody and Paula Geigle's book, *Aquatic Exercise for Rehabilitation and Training*.

So the aquatic exercise review system looks at a variety of systems, again neuromuscular, musculoskeletal but also cardiovascular typological systems. It gives you tests and measures to again begin to assess the person. What their particular needs are. How you would define a program. And then be able to look at the changes of those over time through the treatment program.

The ICF checklist is the International Classification of Functioning Disability and Health utilized by the World Health Organization. This framework describes and organizes information on functioning and disability. It also gives a conceptual basis for defining and measuring health and disability.

Uses four domains usually -- body function and structure, activities and participation -- but also factors in personal and environmental factors into being able to design programs.

The water orientation test is strictly a water skill safety test. And it starts with the ability to enter the pool, to blow bubbles all the way up to basic swimming schools. Andrea Salzman, the Aquatic Resource Network, has designed the Berg balance test and aquatic Berg balance test. And is available on her website.

The Aquatic Exercise Association also has a training manual for fitness instructors. And that this has a health risk appraisal template and a physician's consent form, which are important to have for starting and aquatic program.

And that these were included. And be modified at those for some issues pertinent to people with MS as well. And that those are appendices within the manual of the Aquatic Exercise and MS Manual.

Peter Damiri: And Michele, I just wanted to jump in and say, as I said in the earlier slide, that manual is available on the MSAA website in the Swim for MS section in the healthcare section. And it's free of charge and can be ordered with a simple form to be downloaded and sent back to MSAA. So we encourage people if they're interested to go on our website and check it out.

Michele Harrison: Exactly. So when we are looking at water as an exercise option, it is as broad and varied as the people that may want to participate in this exercise option. There are so many - there's a myriad number of treatments and exercise options available.

And it's really only limited by knowledge and creativity of the aquatic therapist or aquatic exercise professional. But it really is important for anybody who works in water and works with patients/clients to have a solid foundation of aquatic physics and hydrodynamics to get the best results from participation in a water exercise program.

So our next section we're going to look at the physical properties of water. The first property is buoyancy. And that is the sense that you been in a pool. You walk in a pool, you feel lighter in the pool. That uplift force. And it can be helpful for some people to decrease weight-bearing either due to pain issues or just weakness.

That may enable somebody to move more independently in the water than on land. It is that uplift force. That movement towards the water surface are easier than a land activity. So if you lift your hand up, you lift your leg up in the water that feels easier up towards the water surface.

The buoyancy can be assistive up towards water surface if you have a movement that works where you're moving along the water surface, kind of parallel with water surface. That could be a support of motion. Or motions down to the pool floor are resistant.

And those can all be used to somebody's benefit in an exercise program. This property of buoyancy may also increase the ease of assisting somebody with MS with exercise or activities.

The next property of water is relative density. And this is whether an object floats or sinks. If the relative density of an object is more than the density of water, then the object will sink. So a very muscular limb or a limb with

elasticity will sink. Conversely, a person that has a flaccid limb with relatively density less than water will float.

And why is this important for us as exercise and therapists and aquatic exercise professionals? Well what it does is it is really going to influence what activities or exercises we choose for that person because of their specific density. The position that they're in, the postures that we choose for them to work in, the depth of water -- we can make activities easier or harder because of that.

And also it's going to have a bearing on equipment choices. What kind of equipment we choose to use with somebody. How much flotation we put on somebody or we don't. We can make an exercise very difficult for somebody by either too little buoyancy or too much for them. So we need to think about that as we are designing these programs.

The next property of water is hydrostatic pressure. And I would like to add at this point that all these properties, you can't work one without the other. So they all kind of work in tandem. So - and it you will see how that works well for some different exercise techniques and activities in the next section.

Hydrostatic pressure is that the fluid exerts pressure. All fluids exert pressure in all directions. So the deeper the body is immersed in water, the greater the pressure. An example is if you have ever dove into the deep end of the pool and you try and go down to the bottom, you feel a whole lot more pressure as you go down in that depend. That is what hydrostatic pressure is.

That pressure causes a centralization of blood from the limb to the chest. And that could make the work of breathing more difficult. And this may be not necessarily a contraindication, but something to be aware of if you bring

people into the pool who have respiratory or cardiovascular compromise. It could make somebody feel short of breath or fairly anxious.

So when a body is immersed in water, because of hydrostatic pressure there are also changes in kidney function. And so again, this isn't a contraindication, but you may need to be aware of this if you have somebody with kidney problems or limited kidney function.

So there are also positive aspects to hydrostatic pressure. Those include that can help stabilize somebody to walk, balance and stand easier or increase their ability to do those activities when they may not be able to do any of that on land.

It can also decrease edema for somebody. And it may decrease pain and hypersensitivity, which could make somebody more active and more successful with their exercise program. And the hydrostatic pressure, we could use that to our benefit to help train weak respiratory and muscle function.

The next hydro - the next property of water is viscosity. And that is a measure of fluid resistance to flow. So what does that mean? That means that there's an attraction between all molecules in a fluid. And the greatest of that is that the water air interface.

And different fluids, different amounts of friction between the molecules. And that this is a sensation that water is thicker and heavier to move through than answer.

So if you move your hand back and forth in the air side to side, there's no resistance to that motion. However, if you did that same motion in the water you might notice it feels thicker or heavier. That's what viscosity is.

And we can use that for balance activities, higher level skill training activities because when a body is submerged in water, it will experience resistance when it moves through the - when you're increase in speed and surface area as the movement of the object increases in the water. And we can use this to either increase or decrease exercise or activity difficulty.

One other point to bring up for viscosity is because there is increased resistance at the water surface, if somebody has a weak or a painful shoulder, you may or may not, depending on where you are in your treatment planning or your program, you may not want to have the person break through the water surface or do it on multiple times.

At the end of the training session if you're really trying to train strength and endurance, it may be appropriate. It would depend on the person and the goals for that particular person.

Refraction and reflection -- so refraction is the bending of light waves from denser medium touch of water to a thinner medium touch of air. And why does this need - I bring this up is it can make being able to measure movement and positions kind of difficult if you're out of the water and they are in the water. And you're trying to get accurate readings on something.

So just being aware of that. And I'll show you a picture that I think is interesting after this slide that kind of illustrates that.

Reflection is also the change of the direction of the light waves between two surfaces, say air and water. So we need to be aware of reflection and because of that can trigger problems with dizziness. It could cause problems for a person more prone to seizure activity.

And so we can try to decrease the effects of that by lowering the lighting and the facility, using sunglasses. Maybe having somebody focus on an object outside the pool that isn't moving but that doesn't bother them.

Some people, because of their visual problems with MS, may notice - they often fluorescent lights bother people. So being aware of visual issues that may influence somebody's ability to participate is important.

So here is a picture of two of us standing upright in the pool. And it really looks like in this slide that we're bending forward, but we're not. We're standing upright. So that's just an example of how the refraction can change what position it looks like that you're seeing.

The person that's submerged in the water, kind of what their posture is and what position they're in. You can also see a bit of the reflection. And you can imagine somebody with lots of visual problems and issues, how that might be an issue if there was lots of reflection in the water surface.

Peter Damiri: That's really interesting Michele. Now if you have an aquatic fitness instructor and they kind of look down into the pool to see how their students or the class is doing, are they able to compensate for that and kind of gauge whether the class is moving the way you've instructed them to move?

Michele Harrison: I think if somebody is aware of the bending of light waves, you can kind of compensate for that. And being aware that you may need to change position. You may need to get closer to the person.

It could be possible that you need to get in the water next to them and do an actual measurement if you were doing therapy. But I think as you become

more skilled and realizing what somebody's position looks like in the water, you can not have that be a barrier to having accurate position sense of the people or measurements.

Peter Damiri: Right.

Michele Harrison: The next property of water is the thermal transfer of heat. We touched on this briefly earlier. Water is - it retains heat and transfers heat much more efficiently than air does. And that's what makes it a useful medium for therapeutic benefits, particularly for people with MS because they tend to not tolerate heat as well.

The idea of the transfer of heat is important if the water is the correct temperature. It can help a person to stay cooler during an activity or exercise. So recommendations for people with MS are generally to have water temperature 86 degrees or below.

Usually your extremities are about 93. So that feels cool to you when you get in that water and your core temperature is higher of course. But the National MS Society recommends 81 to 84 degree water.

Now if somebody is very lame or they aren't very active in the water, they may really find that they get chilled or - and some people talk to me about the get sicker when they get chills in the water. So that's when I would utilize either a wetsuit or of us - a neoprene vest or a cap or something for somebody to utilize the coolness of the water, but not to become chilled. So again, they can be successful as well.

Water in motion -- this is kind of a complicated issue in water. But - and for the use of water to provide opportunities for balance training and coordination training. But I'm going to try and really simplify this down.

So when water moves, all the molecules move in one direction, and it's a steady continuous flow. We call that streamlined or (lamin) or flow. Turbulence occurs whenever you (unintelligible) that the water flows around or when the velocity of the water flow increases and the molecules move more irregularly. So this can really increase resistance.

This can provide all sorts of opportunities for core stabilization coordination and balance activities. So if somebody is in water and they're moving through the water, they're causing turbulent flow around them and behind them, partially because their body is an irregular surface in the water.

Now the pressure in front of the person is greater and behind the body it's less. This pressure, low pressure area behind the body is known as the wake. And the water that flows into this area is known as an eddy.

So we can use this principle to maximize somebody's ability to be able to stay in balance and walk. So if you walked in front of somebody with MS, this would create an area of lower pressure behind you, and may decrease the work of walking that they're doing.

An example of this would be a mama duck and then her little babies swimming behind her. She creates an area of a low pressure behind her that almost pulls those little ducks along with her. And so she decreases the amount of work they have to do to keep up with her and to move across the lake or pond that they're in. It's the same concept.

So if you walk beside somebody, you might increase the work of walking. So that's a way to progress somebody's walking program. This picture is showing me trying to produce turbulence behind somebody, producing in an area that will draw her backwards, that low pressure area.

I have her hands on her chest just so she won't be using her hands to stabilize herself. But as she's being drawn back, she really has to use a lot of leg stabilization, core stabilization to not be pulled backward by that low pressure area.

This technique could be done anywhere around the person. You could change leg position. You could have somebody start with the wide stance and move to a narrower stance, one leg. You could be on one side of a person, and if they tend to fall in one direction, and work on them being able to stabilize themselves from falling over in that direction. So that's an example of the use of turbulence.

Now we're going to move into aquatic exercise programming. And there are a myriad of aquatic exercise programs to choose from. Everywhere from a community-based exercise group to individualized treatments or therapy or a training session.

So looking at compliance with exercise, there are problems. And that's been well documented. But sometimes participation in a group may help increase motivation for getting out the door to do that exercise that day. The group members support each other. And that may help with compliance for long-term participation and exercise.

And that there are any number of techniques and exercise options for all ability levels in the aquatic environment. So what we're going to go through

today are just a few highlights. And this is not an exhaustive list of all the techniques that are out there. But I'm hoping that it may stimulate some interest for you to maybe follow up with some of these techniques and get much more in depth training or spend some time learning about these techniques, and the ones that you think might be most appropriate for your clients or patients.

At the next slide we're going to look at is the Halliwick technique in water-specific therapy. It originated in England and the 1950s by a gentleman named James McMillan. He was a boat builder. And he took the metacentric effects of how a boat floats and applied at those two bodies and water because he initially had wanted to help disabled children have a swim club for recreation.

But what the therapist noticed with this 10 point program that he had that the children participate in is that there were improvements in balance, postural control. They were able to participate in activities more. And so it has really evolved into water specific therapy techniques.

The 10 point program with three stages of learning. So the first stage of learning is mental adjustment. That's actually being able to independently enter the water and maybe be able to put your face in the water and even blow bubbles.

The second stage is balance. And any asymmetry in water is going to turn into a rotation. So a sagittal rotation is a side to side rotation. That can work on weight shifting, being able to stand on one limb at a time for walking.

Transfers rotation would be lying down on your back or floating in the water and then sitting up. And that that could help with trunk strength. It could also help with being able to go from lying down to sitting up.

A longitudinal rotation -- if you drop a pen or pencil in the middle of your head and you rotated around that pencil that would be a longitudinal rotation. And that rotation may help with efficient swimming strokes. It may also help with walking efficiently, being able to do a longitudinal rotation well, for somebody.

Combine rotations are - it's a combination of any and all of the rotations above. And it can really enhance balance, core stabilization and riding reaction.

The third stage is actually independent movement. And you can see depending on what the goal of the therapy or the treatment session is or the group, it could be swimming, independent swimming. It could be improving balance. It could be transfers, being able to transfer or improving transfer independence or even decreasing of the amounts of assistance as needed for transfers. Walking and reaching all could be really good goals for water specific therapy.

So here are a couple of pictures. The picture on the left is showing a transverse rotation, so somebody's going from lying down to sitting up. This is a great safety skill for somebody in the pool to be able to get yourself upright in the pool.

It could also, again be working on lying down to sitting up transfers. The picture on the right shows a lady performing more of a casual rotation, one legged balance standing activity weight shift activity. This again is a transfer to rotation activity.

But it's looking at a sit to stand transfer using the walker, the (unintelligible), hydrostatic pressure to enable somebody's skill from sit to stand and working on that skill. The next technique we're going to look at is the spring method. And it was developed and put through in the 1960s.

It utilizes PNF, proprioceptive neuromuscular facilitation techniques. And so it utilizes those PNF diagonals and they're modified for the walker for trunk, arms and legs. It improves strength, (unintelligible) and proximal control.

I find it useful for people who I am having difficulty to participate in trunk strength because of weakness or really higher end clients that need a challenge because it can be very difficult to move and control your body in some of these diagonals.

The (pattern) in the handhold and the positions are very specific for the best results. And this also requires that somebody is able to follow the instructions adequately to get the best benefit. So the picture on the left shows a - an arm strengthening technique.

You utilize (cup)s and a flotation to help stabilize or help somebody float in the water as you're moving them around. The picture on the right shows hip external rotation and abduction. This is a difficult exercise because she's having to hold her legs apart while she sits up.

So we're working on trunk control, trunk stability along with leg strengthening. The next techniques we'll look at, they are aquatic body work techniques, Watsu and Jahara techniques. Harold Dull developed Watsu and it is a combination.

It takes the principles of Zen Shiatsu because Harold Dull studied with Masunaga in Japan. And then combines those with stretching and soft tissue mobilization techniques.

Very effective for stretching tight muscles, to decrease soft tissue restrictions, decrease pain and to promote profound relaxation. Mario Jahara studied with Harold Dull and developed his own style of aquatic body work utilizing a short noodle to improve body alignment and posture.

So this is a one on one technique and something that usually wouldn't be done in an exercise group. Similarly, the (unintelligible) technique is a one on one technique. Some of those (Halowet) techniques are actually - they can be individual or they can be kind of group focused.

But back to the Watsu technique. In a clinical setting, say if you're doing a therapy program or a one on one training session, you may want to begin with ten to 15 minutes stretching soft tissue release and relaxation to get a result before engaging in exercise or functional activities.

This is an example of a hip stretch on the right and a trunk stretch called a corner stretch. (Unintelligible) on the left here shows - or actually the movement is side to side in the washer. It's real good for spinal - decreasing spinal limitations. And feels good.

Most people really enjoy this activity if their backs are tight. This stretch one does work (unintelligible) this activity because he's very lean and muscular and tends to sink. So it helps him float through the activity and be able to relax more.

Peter Damiri: And Michele, it looks like these are techniques that you really would have difficult replicating on land. It almost seems natural to be doing this in the water and the properties that you described earlier, really work in these settings.

Michele Harrison: Yes. Yes, they are. The water offers kind of 360 degrees of motion that wouldn't, you know, like a three dimensional template to work or environment to work in. And so I find, I moved back a slide but I'll move forward, you can see the next movements as well.

Those were - these were very difficult to do on land. But hopefully stretching and mobilization - I find the water is supportive. So sometimes I find better results with tissue stretching.

The slide on the right now is the Jahara technique working through the armpit, working underneath on the shoulder blade and up along the neck and occipital area for the upper trapezius hooked onto the bottom of the - so some techniques that are really helpful for decreasing pain, decreasing tissue limitation.

This lady on the right has a lot of neck, upper back and shoulder problems. And the water was the best place to help decrease those symptoms and the pain.

Peter Damiri: Right.

Michele Harrison: (I Chi) is a modified format of Tai Chi. And it has been adapted for the aquatic environment. It's developed by (June Cano) in Japan. It is a combination of (unintelligible) Tai Chi done as they do in the parts of China and Asia.

It's similar to that flow through and motion but it's synchronized with breathing patterns. The benefits of (I Chi) include improvement in balance, weight shifting, body awareness, postural control and stress management.

There was a research article written this past year that was done specifically on (I Chi) and people with MS. And I am not sure if that has actually been published at this point or not. But they had to - they actually showed really nice results with this study.

It showed that (I Chi) improved static standing balance for people with MS, improved functional mobility skills and increased strength and - arm and leg strength as well as decreased fatigue for people. So if you're interested in that you might try and find that.

It was (Johan Mombeck) from Holland along with, it looked like the University of Turkey students or physical therapists, did this study.

The water - because we talked about the hydrodynamic properties of viscosity and buoyancy and hydrostatic pressure, this enables people to stand and do some Tai Chi moves that they may not be able to even attempt on land - the weight shifting, the one legged balance activities, the full body coordinated activities.

It would be really, really difficult for them or they may not be able to do Tai Chi unless they did a seated format. And these are a couple movements of a lunge stance shifting.

On the right, if I had a video which would be a lot more informative for this movement technique, they were beginning to shift back lifting the forward leg

and then shift forward onto the forward leg lifting the rear leg. So I think if I did a presentation again I would really try and get a little video clip.

Because it would make those activities much more clear. The next technique we're going to talk about is the pack oriented approach that utilizes motor learning and control theories which became a lot more utilized at (unintelligible).

And these emphasis on these activities, this actual full, functional complete tasks or skills instead of pieces and parts of movement patterns, making up the skills. So it is movements you quickly kind of - or progress the movements. If somebody masters the skill you move onto the next one very quickly.

So any functional or recreational task could be practiced. It could be walking, it could be stepping over an obstacle to balance, reaching, lifting, household tasks - emptying the dishwasher or vacuuming or making a bed. You could - I have seen people get a vacuum and take them in the pool.

So - and weight them down so that somebody could work on that task to improve body position and body mechanics, so they don't have back pain or fatigue with doing that activity.

You could bring a golf club into - if it was clean, into the pool and work on your swing, to decrease back pain or to improve, if that was your goal, to improve your golf swing. The same thing with a tennis racket, maybe for shoulder or elbow pain, to work on that swing in that environment.

And here are just a couple of ideas of a task oriented approach. One would be stair climbing and the other one on the right, is walking. AquaStretch is a newer technique in the aquatic arena, developed by George Eversaul.

And it incorporates dynamic stretching with intuitive movement of the person you're working with, to decrease edema pain and restrictions that may be associated with decreases of (core) functioning.

So the person is stabilized at the edge of the pool with weights to the legs or trunk, depending on what kind of holds you may be doing with them. And then they're told to move as they feel they need to.

And then they are to freeze or hold the position where they have restriction or pain to kind of let you know where that is and you can apply a hold or pressure on that area. And then they move as they feel they need to again, until that area is - either the pain has diminished or is - has dissipated.

And you go through a series of these sequences of movement until the pain is again, either diminished or dissipated. And then we get to some more traditional style of exercise techniques and training, the first one being aerobic and endurance training.

The definition of an aerobics activity is continuous rhythmic movements of the larger muscle groups for a period of time that elevates the heart rate and it produces a cardiovascular training effect. And for people with MS, we're really looking to also decrease complaints of fatigue.

And there are lots of options here for aerobic and endurance training. It could be swimming, modified swimming, which we'll talk about in a bit, water walking, maybe water running, shallow or deep water aerobics depending on what the person is able to do and their ability (also).

And we utilize (poor) people - American College of Sports Medicine Guidelines for Aerobic and Endurance Training. And you can perform a graded exercise test to get really specific numbers on how many minutes to warm up, work out, the intensity level that you need to work at.

Possibly learning how to use a rate of perceived exertion scale, RPE scale, to be able to determine activity levels more efficiently. How many minutes of - and well, the workout pace itself.

But then how to progress that workout pace to meet the 15 to 60 minute or at least 15 to 20 minutes recommended minimum for aerobic activity, three to five times a week. This demonstrates a non-impact, non-weight bearing deep water program.

The slide on the left shows a gentleman doing cross country ski leg, on the right jumping jacks. Then also swimming. There are a variety of ways to help somebody swim if that's their preferred method of getting aerobic activity.

You can see on the right, the gentleman, he does (unintelligible) one. He has flotation around the middle to be successful at doing his laps and uses fins to help with leg strengthening and also to give his legs a little more power.

Resistance training/strength training is to improve muscular power and endurance. And resistance training and aerobic training work nicely together. And help - resistance training helps with endurance work and vice versa. So the aquatic environment lends many options for resistance training.

Just from the utilization of the viscosity of the water, the person can often increase resistance using that thickness of the water to make it a more resistant

activity for the (unintelligible) and be a strength training activity using - adjusting body surfaces and levers.

So meaning, if you walk sideways in the water that might be in - make it a little easier to slice through the water in less resistance versus moving - turning forward, walking forward through the water where you have more surface area.

You can also increase surface area by having short levers, longer levers, so having bent legs versus straight legs. Bent arms versus straight arms may increase the difficulty of an activity. So the shorter lever would be easier, the longer lever to move through the water, would be more difficult.

So those were all activities that are done totally just by using the properties of water. And you can enhance that with equipment. And there are tons of different types of equipment out there - mitts and paddles, fins, buoyant dumbbells of different buoyancies, noodles, aquatic para tubing and/or bands.

And there will be some pictures at the end of this webinar of different equipment for - to give you an idea. And again, we go by the ACSM recommendations for resistance training - at least two times a week, eight to 12 repetitions are recommended, light to moderate load.

And the ability to be able to complete a full range of motion. However, a person with MS maybe weak in the condition and may need to begin with only three to five repetitions. And that is a good place to start if somebody needs to modify in that way, to be able to participate.

And I also think with MS, people - they talk about working out to the point of volitional fatigue. And maybe when we start to see quality of movement

decrease and fatigue symptoms increasing, that maybe that's when we terminate the strength activities for people with MS.

Peter Damiri: And Michele, is there any difference in terms of the resistance that you would incur in the water versus the land in those recommendations? I mean do you modify of the recommendations because you are in the water?

Michele Harrison: Well somebody may find because of the resistance of the water, the viscosity of the water that maybe they can't do as many repetitions of a particular activity. But I think that can be modified with each and every activity that you do.

Peter Damiri: Right.

Michele Harrison: So these next couple of slides are showing some strength training ideas. The lady using the kick board is working on leg strength - being able to straighten the knee down to the floor. And this is because she tends to work - or walk in a very kind of crouched position.

So being able to stand upright and strengthening those quads, is an important thing for her. The - utilizing the board is increasing that surface area. So it's making that activity a little more difficult than just pushing the leg down to the pool floor.

That board could also be used for strength and mobility training of the ankle. Partially because of buoyancy and partially because of the surface area of the board. So you could work the knee or the ankle in this activity. On the right is - this is a diagonal sit up in the water.

And this gentleman is working his obliques when he's doing this activity. The slide on the left - the photo is just working more frontal plain rectus abdominus aquatic - or an aquatic abdominal exercise.

You can also do activities like (cork) stabilization (coolates) we call it, utilizing a noodle or a dumbbell for trunk stabilization as well. You can work lower abs as well as upper abs very efficiently in the pool. And sometimes I find for people, they have less back pain doing their abs in the pool.

The lady on the right is utilizing paddles so that would be an arm strength activity. But as she does this she's also working balance and core stabilization. Because as she moves those paddles up now that the water is going to try and push her backwards in the water.

And she has to be able to balance and stabilize her body to not fall backwards. And in the corner I'm going to point out that pink and purple square. That is an aquatic step. And that can be used for strength training as well, balance activities.

And you can utilize steps in the pool as well, for the same activities - being able to stand on one leg and lift yourself up. However, an aquatic step allows you to move that piece of equipment to whatever water depth that you want for that particular person.

Flexibility and stretching - and so recommendations are for stretching at least once a day and for many people with MS they have to stretch multiple times a day, to get the best effect. This is the way to help manage the symptoms of spasticity and loss of range of motion possibly due to inactivity.

So consistent stretching can also really enhance a person's ability to be able to participate in functional tasks - standing, transfers, walking, rolling, turning, bed mobility. All of these things can often be easier once a person is adequately stretched.

Stretching is often easier in the aquatic environment, again because of buoyancy, hydrostatic pressure and viscosity. Again, all of these aquatic properties - they all work nicely together often for somebody, to enable them to do an activity easier.

Stretches can be performed statically at the wall or can - you could do something more dynamic, away from the wall as well. Again, walk through is, you know, a way to stretch as well. But you have to have a giver and a receiver in that instance.

So for some of these people they would not be able to stand up and bend over without the walker, the buoyancy of the walker and then maybe using the wall for stability. So maybe they get a better stretch in this position.

The hamstring stretch on the right is just showing that you can also do this in the deep end as well. And they can be modified. But there are all sorts of stretches that you can do at the wall.

The next technique or skill set that we're going to look at is adaptive swimming. So as a person's ability to move changes, so does their ability to safely independently swim or move in the water.

So an aquatic therapist needs to know how to modify a stroke to maximize the person's ability to move through the water if they want to participate in

swimming. And to decrease the amount of restriction that they may have because of physical abilities.

So it can change which strokes you choose due to the body's shape, their ability to float and balance, a person's ability to consistently clear their face for breathing. That's an important skill. And so often people want to swim on their backs because their face stays clear.

But if we utilize goggles, earplugs, snorkels, teach people how to use these pieces of equipment, they may be really happy and it may be a more appropriate stroke for them to do say a crawl stroke or a breast stroke, something like that.

Strokes that are more symmetrical like elementary backstroke, may be easier for somebody who has core balance in the water, to perform because they won't roll as much. A person can also alternate between arm and leg strokes, so kicking could decrease fatigue of the way of being able to participate.

So I think you need to look at a longitudinal rotation while - via the (Halowet) technique. And this is that rotation. So what this lady is doing is she's trying to roll from her stomach onto her back. And that was one of her barriers to be able to do laps, which was her goal.

This lady used a power chair, she had no volitional movement of her (unintelligible), very little of her trunk and very limited arm motion.

But she really wanted to swim so she needed to be able to roll over onto her back whenever she needed to take a rest break or when she felt like she needed to take maybe a more substantial breath. And here she is rolling over. This is after some training.

So now she's independently rolling and she was able to do this. And that was thrilling for her to be able to swim laps on her own. (James) - we incorporate (James) into our group and this is a great way to increase interaction between people that's fun to - an exercise program or a group setting.

We do aquatic volleyball. We actually use a balloon because the balloon moves a little bit slower and people are able to get to it easier. Relay races, red light/green light. So when we're looking at these activities even the hokey pokey and crack the whip, they all work on balance.

They can work on strength. It works on of course, stabilization activities, eye/hand coordination and people don't even realize that they're working on therapeutic skills while they're having fun. The next section that we're going to look at is aquatic exercise equipment.

And since there has been such a resurgence in the popularity of aquatic exercise since the 1980s, there's also been just a boom of different exercise equipment options that have come out on the market.

And so we use equipment for support, to assist somebody, to be safe in the pool or to be able to perform an activity or to increase the difficulty of an activity. So there are some considerations when you're purchasing equipment. Some of the equipment is fairly expensive.

So we want to look at their ability and the equipment. How long is it going to last? Can the equipment be utilized for more than one activity instead? If each piece of equipment is used for one activity then it may not be a good buy for you.

Safety - participant safety, using the equipment, is really key as well as the ease of use. Can people get gloves on? Can they don and doff the - or a flotation belt and things? The other thing to think about when you're purchasing equipment is having an area to store it.

Having an area to be able to dry out the equipment in between uses. And then the equipment is going to need to be rinsed and cleaned on a consistent basis. Aquatic exercise equipment also includes access to the pool.

So it may require that a person utilizes a wheelchair if it's a long walk from the parking lot into the dressing room or the dressing room into the pool. We can also - there are aquatic wheelchairs to - that you can use to enter a pool or exit a pool if there's a ramp.

And a pool may have one or all of these entry access styles. Typical the ladder on the side with the steps in the side of the wall. For some people that's a real balance challenge and a hazard. Steps with railings can also be used. A ramp and/or a lift.

And ideally if you have all of those options, in my mind, that's the best for entry access. Pool attire - most pools require a bathing suit and not street clothes and partially because street clothes tend to get dirty and that clogs up filters in the pool.

The same thing with pool shoes. If you are going to wear shoes in the pool they need to be dedicated to the pool, so that you aren't dragging all sorts of dirt into the pool and making it dirty and clogging up the filter system.

And pools help protect feet on the deck as people are walking to and from the pool and also in the pool. Sometimes I've utilized socks on people's feet in a

pool where it's not too slick on the bottom, so that they don't scrape their toes as they're trying to move.

There are pool - or swimsuits, there are tankinis for women that may be easier to get on and off because you have a top and a bottom and it looks like a one piece. If a person wants that style suit.

And it may be easier to get on and off for somebody if they need to use the restroom or the toilet while, you know, they're in their suits. There are also swimsuits out there that are designed to wrap up around and Velcro on that are supposedly accessible too.

The use - we've mentioned this earlier, of neoprene vests, jackets, shorts and trousers can keep somebody warmer in that cooler environment or outdoor environment. And sometimes you need jackets and vests. They're a little easier to get on and off than maybe a traditional wetsuit or a cat suit.

But they are useful. Here is a picture of a couple of my volunteers and a participant on a hydraulic lift being used to get her in the pool. And the next few slides just are pictures to give you some ideas of different equipment you may want to think about.

And again, this is not an exhaustive list of what is available. But it may give you some ideas of some equipment that you want to have in your aquatic exercise toolbox. The left slide shows some different styles in (Met) collars, different lengths of dumbbells.

And dumbbells come in all different buoyancies depending on if you're using that for support, balance or resistance training. My - it would change which

dumbbell and buoyancy you might use. The aquatic belts are used for abdominal work.

They could be used during (unintelligible) work. And the ring on the left might be an option for somebody who can't hold onto a dumbbell to be able to balance or stabilize that leg or arm. On the right you see a different style of flotation vest.

In these two pictures - on the left you see some resistance training equipment. You have to drag paddles that can be used for swimming for balance activities. The Aqua Fin in the middle, the red with the two little wings, they're nice because you can put them around the wrists or the ankles.

So for strength or resistance training of arms or legs. The (Met) - there are all sorts of different kinds of (Met)s - ones that get on both sides, ones that just have a Velcro wrap around. And depending on your client population you may choose different styles.

There are ones that are just neoprene or lycra. But those are a little more difficult for somebody to get on their hands if their hands don't move as well. the para tubing and the para band are aquatic para tube and para band.

And I utilize those because the pool chemicals seem to really eat through some of the land based tubes and bands that I've tried. On the right are a variety of different (puff)s to be used.

This could be used with - to help somebody be able to lift the legs for walking, to do a deep water program with the blue vest with the straps. And it could be used for (unintelligible) who work for (unintelligible) work.

So again, a variety of different types of techniques for each piece of the equipment. On the left you see some noodles and there are quite a variety of different buoyancies for noodles as well.

So depending on if you're using it for a balance activity, for flotation in the deep end, as kind of a stabilizing bar - the amount of buoyancy you use you'll have to figure out if you want a very buoyant noodle or less buoyant.

If you get too buoyant of a noodle somebody may not be able to stabilize themselves for an activity. The pink board is a Wonder Board. The blue board is a kick board. These can be used for swimming. But they can also be used for balance activities, especially on the Wonder Board.

She can use either but the Wonder Board is a little more stable, a little more buoyant for sitting, kneeling, standing activities. And then our last slide here is showing just a variety of fins and flippers - short ones and longer ones and different widths and lengths depending on the person's ability.

Peter Damiri: Well thank you Michele. That was a very informative presentation. And I'm sure very beneficial for the viewers that are watching and listening to the program and hopefully interested in working with MS patients in some type of aquatic exercise or therapy session.

So absolutely fantastic job. Thank you so much. This does conclude our program, Advancing Knowledge of Aquatic Exercise in MS.

And I would once again like to thank Michele Harrison for her time and expertise, as well as our sponsor, Genzyme, a (Sanofi) Company, for sponsoring not only this webcast but many other additional projects and educational pieces including the booklet that many of these slides come from

that can be found on www.SwimforMS.org in the Healthcare section, professional section.

So Michele, once again thank you so much.

Michele Harrison: And Peter, I want to thank you and MSAA giving me this opportunity to present this webinar. As I said, they are two things that I really enjoy as part of my physical therapy career. I also want to thank everybody who tuned into this webinar for your time and attention to this information.

And if you would want to ask questions or want to get in touch with me you could through the Rocky Mountain MS Center in Denver, Colorado. Thank you so much.

Peter Damiri: That's great. And once again, thanks Michele. I - it is very obvious that you have a dedication and a passion for this topic. And we thank you so much for your expertise tonight. So that does conclude our program. On behalf of MSAA, I want to thank you for joining us and wish you a great night.

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