

Staying Active With Aquatics:**A Community Health Promotion Program for the Management of Osteoarthritis**Statement of Need:

Osteoarthritis (OA) is defined by the Centers for Disease Control and Prevention (CDC) as a degenerative disease of joints involving the breakdown of cartilage, joint lining, ligaments, and underlying bone which eventually results in pain and joint stiffness.¹ In part due to the increasing numbers of elderly Americans, each year many more people are affected by this condition. Nearly 27 million Americans were estimated to have OA in 2008, up from 21 million estimated in 1995.² In 2012, 52.5 million adults were found to have self-reported doctor-diagnosed arthritis.³ OA is the most common form of arthritis and is a leading cause of disability.^{2,4} The sheer prevalence of this disease and its connection with disability suggest the need for programs that will address the management of as well as the risk factors associated with OA.

The program, Staying Active With Aquatics (SAWA), will initially be conducted in Orange County, North Carolina (NC). The United States Census Bureau reported that the population of Orange County was 140,420 in 2014 while the total population of North Carolina was 9,943,964.⁵ In 2013 it was reported that 26% the residents in North Carolina (1,989,000 residents) had arthritis.⁶ Of those with arthritis, 39% were reported to be inactive.⁶ The SAWA program is intended for the obese, inactive adults (ages 65 and over) with OA who live in Orange County, NC. The program will be conducted at the SportsPlex, which is centrally located in Hillsborough, NC.

Physical activity is an important component of the management of OA that has been proven to help reduce pain, improve biomechanical function of joints, improve quality of life, and increase strength.⁷ Aquatic exercise as a form of physical activity is recommended by the

American College of Rheumatology as a valuable non-pharmacological intervention for the management for hip and knee OA.⁸ SAWA can provide the residents of Orange County who have OA with a program that will help them to become active in an effort to manage their OA.

Participation in an aquatic exercise program has been proven to reduce body weight in individuals with obesity, another recommended non-pharmacological intervention for OA by the American College of Rheumatology.^{8,9} Obesity is an independent risk factor for OA, therefore many people who are obese also have OA.⁷ In 2013, 36% of obese North Carolinians had OA.⁶ Being obese can lead to further pain and faster progression of OA, so weight loss is vital for persons with OA.^{7,10} The SAWA exercise program incorporates nutrition counseling and goal setting to optimize the combination of diet and exercise to promote weight loss.

According to the American Physical Therapy Association (APTA), “physical therapists (PTs) are health care professionals who help individuals maintain, restore, and improve movement, activity, and functioning, thereby enabling optimal performance and enhancing health, well-being, and quality of life.”¹¹ PTs also provide prevention and risk reduction services through programs like SAWA, which strives to manage OA through risk reduction, education, and counseling.¹¹ Because of their understanding of biomechanics, tissue structure and function, exercise prescription, and disability, PTs are qualified professionals to lead such a program.

The proposed program, SAWA, is based on the Social Ecological Model (SEM) and assumes that health behaviors are influenced by both individual and environmental factors.^{12,13} The concept that both individual and environmental determinants can affect health decisions is referred to as reciprocal causation.¹² According to the SEM, intrapersonal factors, interpersonal factors, institutional factors, community factors, and public policy are considered determinants of health behavior and should be addressed in health promotion programs such as SAWA.¹²

SAWA specifically targets the intrapersonal, interpersonal, and community determinants described by the SEM to promote physical activity for persons with OA. According to McLeroy et al., interventions at the intrapersonal level target characteristics of the individual such as knowledge, attitude, compliance intentions, and skills.¹² Like SAWA, interventions at this level often include educational programs, support groups, and counseling.¹² Similarly, interpersonal interventions, such as the group classes in this program, are utilized in an effort to “modify the interpersonal social influences which serve to encourage, support and maintain” inactivity.¹²

Community level factors include mediating structures such as family, social networks, churches and neighborhoods. Relationships among organizations within a particular region are also considered community factors and are important to consider in health promotion programs.¹² Emphasizing community participation has been identified as one aspect of a successful health promotion program.¹³ SAWA collaborates with local organizations and professionals to increase community awareness of OA as a chronic disease, to allow for full utilization of resources, and to promote compliance among participants.¹²

Nearly 23% of adults in America have arthritis, with the most common type being OA.^{2,4} In North Carolina, 1 of every 4 people suffers from OA and this number is going to continue to rise as life expectancy and obesity rates increase.¹⁴ There is a clear need for a community health promotion program for the management of OA in North Carolina, and the United States.

Many with OA experience activity limitation because of pain and decreased function.⁴ An aquatic program such as SAWA can allow for activity and help to improve function, manage risk factors of OA such as obesity, and prevent disability.^{4,7} Activity can often be painful for those with OA due to the degeneration of joint tissues, but aquatic exercise reduces weight-bearing forces which decreases pain and limits further joint deterioration.^{4,7,9} Evidence supports that those

who participate in exercise programs or regular exercise classes regularly have better outcomes and compliance.^{7,9} Additionally, aquatic programs are shown to have better participant compliance than land-based programs.⁷ The SAWA program addresses intrapersonal, interpersonal, and community factors that will facilitate better health decisions among participants in relation to the management of OA and promote compliance to lead to better long term outcomes.

Background:

The primary tissue impacted by the condition of OA is articular cartilage. Articular cartilage is composed of chondrocytes, extracellular components (collagen and elastin) and ground substance (fluids, proteoglycans, noncollagenous proteins, and glycoproteins). The main reparative cells, chondrocytes, account for only 10% of the total volume of the tissue.^{15,16} Unfortunately, due to its composition, articular cartilage has limited reparative capabilities.¹⁶

The primary job of articular cartilage is to absorb force and reduce friction between joint surfaces.^{15,16} In order to achieve this, the tissue is organized into four layers with collagen fibers of differing shapes and orientations that optimize the function of articular cartilage. The outermost superficial zone has elongated chondrocytes with fibers resting parallel to the surface so that it resists shear forces from the roll, spin, and glide of joint motions.¹⁶ This layer contains numerous metabolically inactive chondrocytes, thus this layer does not repair itself after injury and subsequently the other layers are exposed to greater shear stress. The transitional zone is more metabolically active than the superficial zone, and its collagen fibers are randomly oriented which minimizes the stress concentration between the layers.^{15,16} The next two layers are the deep zone and calcified cartilage; they have larger collagen fibers, high proteoglycan content, and low water content. The chondrocytes in these layers are oriented perpendicularly to the articular cartilage, or vertically, allowing them to resist compressive and tensile stresses.^{15,16} When force is

applied to articular cartilage, as when weight is applied through a joint, the meshwork of collagen fibrils and proteoglycans realigns and subsequently undergoes tensile stress as the fibers stretch from the load. With age or degeneration, collagen fibers exhibit decreased density and can only withstand a fraction of the load that healthy articular cartilage can withstand.¹⁶

Other structures in a joint besides the articular cartilage can also be affected by OA. The joint lining, ligaments, and underlying bone breakdown and deteriorate as a result of OA.¹ Additionally, after articular cartilage has become thin, bone will grow in an effort to repair the damage.¹⁷ Often, this can do more damage and lead to pain and unstable joints.¹⁷ Common symptoms of OA can include joint pain, stiffness, swelling, instability, inefficient muscle control, and ligamentous laxity.^{1,2,7}

OA is characterized by the deterioration of articular cartilage as a result of normal aging, wear and tear, or injury.¹⁶ OA is the most common type of arthritis and therefore affects the most people worldwide.² The knees, hips and joints of the spine and hands are commonly affected.^{1,2} Factors such as gender, age, preexisting joint injury, genetics, and weight can predispose a person to OA.^{7,14,16} Women are more likely to develop OA than men, especially over the age of 50.^{1,2} However, the risk for developing OA increases with age for men as well as women. OA commonly begins affecting people after the age of 40 and the risk has a positive correlation with age.¹ Between 70 and 80% of adults over 55 years have been found to have degenerative changes in their joints.⁹ Previous injury to the articular cartilage or to a joint in general, predisposes that joint to OA.⁷ This is because of the limited healing capabilities of articular cartilage. Genetic factors have been reported to account for up to 50% of the risk for developing OA.¹⁶

In addition to the above factors, obesity is considered to be a risk factor for OA; but it is one that is modifiable.¹⁸ Chronic obesity can double a person's risk for developing OA.⁹ With

increased body weight, joints are exposed to greater forces every time they are loaded which leads to destruction at a faster rate. While weight loss can help prevent OA from developing, it can also reduce the symptoms associated with OA. Reducing body weight by 10% can decrease symptoms of OA symptoms by 28%.⁹ It can be difficult for those with OA, especially those with OA *and* obesity, to exercise because of pain, immobility, and low levels of perceived severity and self-efficacy. Evidence supports that individuals with both conditions are 44% more likely to be physically inactive compared to those who are obese without OA.¹⁴

OA is the number one cause of disability in America.^{4,16} In part because of its symptoms, OA often leads to decreased function, limited physical activity, and disability.¹⁶ It is evident that obesity can further contribute to disability. Weight loss, particularly when accompanied with physical activity, is considered to be an effective prevention and treatment strategy for OA.¹⁴ The SAWA program strives to address obesity and the symptoms of OA using aquatic exercise, education, and nutritional counseling.

Water has unique properties that make aquatic exercise less painful than land-based exercise. The property of buoyancy reduces the effects of gravity and decreases weight bearing and joint loading by decreasing body weight.^{9,19} Turbulence and hydrostatic pressure create resistance to movement in the water which helps increase intensity and allow for equal muscle strengthening around a joint.^{19,20} The hydrostatic pressure helps to reduce swelling and contribute to pain reduction.²⁰ Warm water temperatures can also decrease pain, ease soft tissue contracture, and relieve muscle spasms and fatigue.²¹

For those with OA, exercise is intended to reduce pain and stiffness, preserve range of motion, restore impaired functional status, maintain joint function and integrity, and to prevent disease progression and muscle atrophy.⁹ Aquatic exercise has been found to meet these goals in

persons with OA. In their randomized controlled trial, Hinman and colleagues found that pain, joint stiffness, physical function, quality of life, and hip muscle strength significantly improved in patients over 50 years of age with OA who took part in an aquatic physical therapy program.²² This program was led by a PT and included functional weight bearing and progressive exercises during twelve, 45 to 60 minute sessions over six weeks.²²

Aquatic exercise is not only effective in the management of OA, but it also has been proven to reduce body weight.^{8,9} Lim et al. discovered that obese adults with knee OA who participated in an eight-week aquatic exercise program lost significantly more body weight than those who did not participate in an exercise program.⁹ Participants engaged in aerobic exercise during 40-minute sessions, three times per week, at an intensity of more than 65% of their maximal heart rate.⁹ Aerobic exercise, as will also be included in this program, can assist with weight loss in persons with OA.⁷ Shallow water walking, deep-water running, and swimming are all examples of aerobic water activities that will be included.⁷ In addition to aerobic exercises, strengthening and flexibility exercises will be incorporated as they have been shown to effectively reduce lower extremity OA symptoms, reduce pain, and delay disability.^{14,22} In their study, Hinman et al. had participants complete heel raises, lunges, and single-leg balance exercises indicating that lower extremity strengthening exercises can lead to reduced pain and increased muscle strength.²²

The program will incorporate education regarding the impacts of obesity on OA. This will help to address the intrapersonal determinant of the SEM. Also, by presenting the participants with this information, they will see that their obesity is a problem and is further affecting their quality of life. According to the Health Belief Model (HBM), individuals will act based on their beliefs.²³ Thus, if participants believe that their obesity is exacerbating their OA

symptoms, they will take action to reduce their obesity. Additionally, this education will result in a high level of perceived severity, or the belief that their condition is severe and there will be significant consequences if they don't treat it. The education and training included with the SAWA program will train participants so that they will be comfortable exercising on their own and hopefully improve their self-efficacy. Self-efficacy is a person's confidence in their ability to take action and produce desired outcomes.²³ According to the HBM, higher perceived severity and self-efficacy will result in compliant participants who will take action to lose weight.²³

A nutritionist will help provide education and meet with every participant in the SAWA program to provide dietary counseling. Dietary counseling has been documented to be helpful for weight loss.²⁴ Participants will be required to complete a food diary and meet with the nutritionist and PT prior to the beginning the program. Together they will set exercise and diet goals to follow throughout the program. They will meet with the nutritionist after five weeks and at the end of the 10-week program to assess progress and address any concerns. Participants will be encouraged to eat lots of fruits, vegetables, and antioxidants as these have been shown to contribute to healthy articular cartilage.¹⁶ By making general recommendations to participants and answering questions, hopefully participants will have improved confidence and self-efficacy. An athletic trainer will also be working with patients during this program. Their primary responsibility will be to assist the PT with taking and recording measurements, monitoring participants, and managing equipment. This collaboration with a nutritionist and athletic trainer is another example of a community level factor of the SEM that is utilized in this program.

Program Description

Program Objectives:

1. At the completion of the 10-week program, participants will demonstrate the ability to

independently exercise in water for one hour to allow for continued physical activity and weight loss after program conclusion.

2. At the completion of the 10-week program, all participants will have formulated at least four goals related to physical activity and nutrition that will serve to motivate them to continue exercising and eating healthy even after the program has ended.
3. At least 75% of participants will demonstrate at least a 5% loss of body weight by the end of the 10-week program in order to decrease the severity of their OA symptoms.
4. At the completion of the 10-week program, all patients will have a 6-point improvement in score on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to indicate improved pain, stiffness, function and overall management of OA.

Methods:

This community aquatic exercise program, SAWA, will promote activity in inactive, obese adults (over 65) with OA. The 10-week program will include three classes per week and be conducted in a warm water pool at the SportsPlex in Hillsborough, NC. All participants will attend an educational session regarding OA management prior to beginning the program. They will also meet with a nutritionist and PT before, halfway through, and at the conclusion of the program. The program will include aerobic, strengthening, and flexibility exercises in order to best manage symptoms of OA and promote weight loss to combat obesity and its contributions to OA. The combination of education, aquatic exercise, and nutritional counseling create a thorough approach to addressing OA and its risk factors in the inactive, obese older adult population in Orange County, NC.

Prior to beginning the exercise program, participants will be required to attend an educational session regarding OA management, meet with the PT and meet with the nutritionist.

The one-hour long educational session will present evidence-based information relating to risk factors for OA, the impacts of obesity on OA, prevention of worsening disease, and the influence of nutrition and physical activity in disease management. During the physical therapy session, the PT (with the assistance of the athletic trainer) will measure the participant's height, weight, heart rate, blood pressure, and strength (through functional land-based testing). They will also calculate the participant's body mass index (BMI) and 65% of their maximum heart rate, screen for possible contraindications to aquatic exercise, and administer the WOMAC outcome measure to assess pain, stiffness, function. All of these measures have been used in the evidence to gauge the effectiveness of aquatic exercise programs.^{7,9,18} The PT will educate the participant on SMART goals and the PT and participant will work together to create exercise goals to focus on during the program. The participant and PT will meet after five and ten weeks to measure height, weight, blood pressure, heart rate, strength and BMI, assess progress, update goals, and address any questions or concerns. The WOMAC will be administered again at the completion of the program.

Meeting with a nutritionist is another required and important part of the program since evidence supports the use of dietary counseling for weight maintenance programs.²⁴ Participants will bring with them a completed log of the foods and beverages they have consumed for three consecutive days. The nutritionist will review this information and educate the participant regarding healthy eating to support weight loss, particularly portion control and eating more fruits and vegetables. The nutritionist and participant will work together to create goals to focus on their nutrition and eating habits throughout the program. The participant will fill out another food log and meet with the nutritionist after five weeks and at the end of the program to assess progress, update goals, and address any questions or concerns.

The SportsPlex in Hillsborough, NC is a prime location for the implementation of this program. The facility is easily accessible as it is centrally located in Orange County and is close to interstates 40 and 85. There is ample parking and several spots dedicated to those with handicapped placards. The facility is also accessible by free public transportation which stops at the facility every hour between 8:00 AM and 5:00 PM on weekdays.²⁵ The pool itself is easily accessible via four steps with a railing or a ramp with a railing. The pool ranges in depth from three to four feet and is kept at a comfortable temperature between 86-87° F, which is recommended for those with arthritis.¹⁸ The facility already has the equipment required for the program, including kickboards, dumbbells of various sizes, submergible steps (four and eight inch), noodles, floatation belts, and submergible stationary bikes.

The exercise class will meet on Mondays, Wednesdays, and Fridays for 10-weeks from 10:30-11:30 AM. Each class will be 60 minutes long in order to meet the recommended weekly 150 minutes of moderate-intensity exercise.⁸ A PT will lead the sessions and he or she will be certified in CPR and as a lifeguard. A certified athletic trainer, also certified in CPR and as a lifeguard, will be present during the classes to help with gathering equipment and watching for signs of distress. The nutritionist will attend the class when their expertise is needed for the educational component in weeks 5, 6, 9, and 10. Class participation will be limited to eight participants to ensure that everyone can be monitored and given adequate feedback. More classes may be added if interest continues to grow and after this initial program has established success.

Each exercise session will begin with 10 minutes of an active warm-up to prepare the participant mentally and physically for activity. This general warm-up will lead to increased heart rate, respiratory rate, blood flow, core temperature, perspiration, and decreased viscosity of joint fluid.²⁶ Warm-up activities will include floating, stretching of the hamstrings, rectus

femoris, tensor fascia latae, and gastrocnemius/soleus complex, light walking, side-stepping, standing hamstring curls, squats, heel/toe raises, and cross-over walking. Stretching exercises will all be held for 30 seconds and performed between one and three times. Walking duration will begin with three minutes and increase in duration as the program progresses.

The main exercise portion will last for 40 minutes and include some aerobic, endurance, and strengthening activities. Endurance and aerobic activities will include resisted walking with a kickboard (forward and backward), seated flutter kick, noodle activities with a floatation belt, and swimming (side-stroke). These activities will be performed in two-minute intervals for five repetitions per set and the duration, repetitions, and sets will gradually increase each week. Endurance activities will be alternated with strengthening activities so that the participants will be able to be working near 65% of their maximal heart rate. Strengthening exercises may include squats, hamstring curls, step-ups, hip abduction/adduction, hip extension, hip flexion, and arm activities with dumbbells (push/pull, bicep curls, lateral arm raises, horizontal shoulder abduction/adduction). These exercises will initially be performed as two sets of 10 repetitions and will gradually increase in sets and reps to increase intensity throughout the weeks. Dumbbells with greater resistance may also be utilized to increase intensity. A 10-minute cool down will complete every class to promote a decrease in body temperature and heart rate. Appendix 1 lists some example exercises for each week. Participants will be prompted to assess their heart rate at the carotid artery at set intervals throughout the class and record them on an individual whiteboard at the edge of the pool. The PT will record heart rates for future reference.

During the cool-down of each session, the PT and nutritionist will educate participants on the assigned topic for the week (Appendix 1). Topics include assessing heart rate, components of an exercise session, benefits of aquatic exercise, management of OA symptoms, program

requirements, healthy eating tips, obesity and OA, goal setting, and encouragement for continued exercise, healthy eating, and goal setting.

Every participant will be encouraged to bring water bottles and take drink breaks throughout the session. They will be asked to keep moving in the water during drink breaks to keep up the exercise intensity. For their safety, they will be asked to wear water shoes to protect their feet from the surface of the pool and to prevent slipping on the deck or in the locker room.

The final session will be self-led by the participants. The PT, athletic trainer, and nutritionist will be present but will not provide any exercise instruction or prompting to assess heart rate. Participants will individually be able to choose activities that interest them and have the chance to prove that they are able to independently exercise for one hour.

Program Evaluation:

The success of the SAWA program is contingent upon completion of the program objectives. These objectives ensure that the program is effective in helping its participants lose weight, learn to exercise independently, and learn to manage their OA. In order to measure these objectives, certain measurements will need to be taken, questionnaires given, and data recorded during the final aquatic session and during the initial and final meetings with the PT and nutritionist.

The ability to independently exercise in water for one hour will be assessed during the final exercise class. During this class, participants will not receive any instruction or guidance and must demonstrate the ability to choose and correctly perform exercises for 60 minutes. The PT and athletic trainer will document whether or not each participant was successful in meeting this objective.

During their final meetings with the nutritionist and PT, participants will be required to

formulate at least four goals related to physical activity and nutrition and submit a written copy of these goals. The nutritionist and PT will not create the goals for the participants, but they will give feedback if necessary. The participant will come up with the goals on their own so that the goals will motivate them to continue exercising and to eat healthy even after the program has concluded.

Body weight measurements will be taken at the beginning and end of the program during the meetings with the PT. These measurements will be compared to determine percentage of body weight lost. The PT or athletic trainer will divide the post-program body weight by the pre-program body weight and multiply by 100% to determine the percentage of body weight lost. Six of the eight participants must have at least a 5% loss of body weight to consider this objective met.

The WOMAC will be administered to each participant by the PT at the beginning and end of the program and scores will be recorded. The post-program score will be subtracted from the pre-program score to determine change in score. For an improvement to occur, the difference must be a positive number, or the post-program score closer to zero. All eight participants must have at least a 6-point improvement for this objective to be considered met.

If any of the above objectives are not being met, especially if they are not being met after several course sessions, changes will need to be made to the program. This program has been well researched and is supported by current evidence however new research is always being published. Before changes are made, research should be conducted to look for updated evidence and this evidence should be thoroughly evaluated.

The cost of the program, community interest and need, and number of participants should be considered when determining the effectiveness of SAWA. If the costs to run the program are

not being met, such as there not being sufficient funds for pool rental, clinician pay, or equipment purchases, further funds will need to be acquired through sponsorships or increased registration costs.

Just as new research is always being published related to the efficacy of aquatic exercise for weight loss and the treatment of OA, statistics relating to disease prevalence are also changing. Program coordinators should continue to consult reports of the prevalence of OA and obesity in Orange County, NC to determine if SAWA would still be beneficial to this community.

Continued classes should be conducted as long as interest and need can sustain the program. If coordinators are having trouble filling the classes, interest and willingness to participate in this program may be dwindling. This may indicate that the program is no longer thriving and further recruitment or referral sources may be needed if the program will survive.

Strong evidence supports the design of the SAWA program, however some limitations still exist. This program lacks a long-term follow up period which is essential in determining long-term success of a weight loss program. The Institute of Medicine states that in order to be considered successful in terms of long-term weight loss, a person must lose at least 5% of their body weight and keep it off for at least one year.²⁷

Another limitation of this proposal is related to community and clinician interest. For this program to be successful, it is vital that a PT, nutritionist, and an athletic trainer be interested in leading the program. Further, the Sportsplex needs to be willing to host this program at their facility. Other local medical providers must be interested in this program and be willing to refer participants, especially for long-term success of SAWA. Further research should investigate if similar programs exist in Orange County, NC and to see if there is interest among the community

members and local medical providers.

A final limitation of this proposal is scheduling conflicts with the PT, athletic trainer, nutritionist, and participants. Before and after the program, they will need to find time to evaluate all eight participants. Assuming that these clinicians have full clinic schedules, it may be difficult to schedule eight patients into their already full caseload. However, by scheduling well ahead of time, scheduling conflicts may be able to be avoided. Further, although the participants are 65 years old or older, some may still be working and unable to attend the sessions as they are during the day.

Conclusion:

In the United States, OA is the most common form of arthritis and is a leading cause of disability.^{2,4} This condition affects over 50 million people in this country, and 1 of every 4 people in North Carolina.^{3,14} Those with OA often experience decreased function, limited physical activity, and disability, all of which can be further complicated by obesity.^{14,16} There is a clear need in North Carolina, and the United States, for a community health promotion program that will address the management of as well as the risk factors associated with OA. Evidence supports the use of weight loss in conjunction with physical activity as an effective strategy for the prevention and treatment of OA.¹⁴ The proposed program, SAWA, uses aquatic exercise, education, and nutritional counseling to help participants lose weight and learn to prevent progression of and manage their OA. This 10-week program is designed for success as it is supported by current and strong evidence. With proper funding, SAWA will be able to effectively address obesity and the symptoms of OA in residents of Orange County, NC.

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Week	Warm-Up Activities	Activities	Cool-Down Activities	Educational Component
1	<ul style="list-style-type: none"> • Floating • Stretching 	<ul style="list-style-type: none"> • Walking (chest deep) • Heel/toe raises • Standing hamstring curls • Push/pull with dumbbells 	<ul style="list-style-type: none"> • Floating • Stretching 	Assessing your heart rate <ul style="list-style-type: none"> • Carotid pulse • Maximum heart rate • Target heart rate • Aim for 65% of max heart rate
2	<ul style="list-style-type: none"> • Light walking • Heel/toe raises • Stretching 	<ul style="list-style-type: none"> • Walking (chest deep) with kickboard • Squats • Lateral arm raises, horizontal abduction with dumbbells • Standing hamstring curls 	<ul style="list-style-type: none"> • Light walking • Stretching 	Components of an exercise session <ul style="list-style-type: none"> • Warm-up • Aerobic Training • Cool-Down
3	<ul style="list-style-type: none"> • High knees walking • Stretching 	<ul style="list-style-type: none"> • Seated flutter kick • Step-ups (4 inch) • Noodle activities (cross country ski, rocking horse, biking, jumping jacks) • Biceps Curls with dumbbells 	<ul style="list-style-type: none"> • Floating • Stretching 	Benefits of aquatic exercise <ul style="list-style-type: none"> • Decreased weight bearing • Properties of water
4	<ul style="list-style-type: none"> • Side-stepping • Light walking • Stretching 	<ul style="list-style-type: none"> • Underwater biking • Standing hip abduction, adduction, and Extension • Noodle activities (cross country ski, rocking horse, biking, jumping jacks) • Lateral arm raises, horizontal abduction, biceps curls with dumbbells 	<ul style="list-style-type: none"> • Light walking • Standing rotation • Stretching 	Managing your OA symptoms <ul style="list-style-type: none"> • ICE • NSAIDs • Compression and Elevation for Swelling • Injections • Surgery
5	<ul style="list-style-type: none"> • Cross-over walking • Side-stepping • Stretching 	<ul style="list-style-type: none"> • Walking (chest deep) with kickboard • Step-ups (8 inch) • Seated flutter kick 	<ul style="list-style-type: none"> • High knees walking • Side-stepping • Stretching 	Mid-program Requirements <ul style="list-style-type: none"> • Set up appointments with PT and Nutritionist • Complete food log • List questions/concerns

6	<ul style="list-style-type: none"> • Floating • Easy Sidestroke • Stretching 	<ul style="list-style-type: none"> • Lateral arm raises, horizontal abduction, biceps curls with dumbbells • Treading water • Standing hip abduction, adduction, and Extension • Noodle activities (cross country ski, rocking horse, biking, jumping jacks) 	<ul style="list-style-type: none"> • Standing rotation • Heel-toe walking • Stretching 	Tips for healthy eating <ul style="list-style-type: none"> • At home • At restaurants
7	<ul style="list-style-type: none"> • Light walking • Heel-toe walking • Stretching 	<ul style="list-style-type: none"> • Underwater biking • Push/pull with kickboard • Swimming (Sidestroke) • Squats 	<ul style="list-style-type: none"> • Floating • Light walking • Stretching 	Obesity and OA
8	<ul style="list-style-type: none"> • Side-stepping • High knees walking • Stretching 	<ul style="list-style-type: none"> • Standing hip abduction, adduction, and Extension • Noodle activities (cross country ski, rocking horse, biking, jumping jacks) • Participant's Choice • Step-ups (8 inch) 	<ul style="list-style-type: none"> • Light walking • Stretching 	Importance of goal setting
9	<ul style="list-style-type: none"> • Floating • Stretching 	<ul style="list-style-type: none"> • Deep water jogging (in deeper pool) with floatation belt • Standing Hamstring curls • Squats • Underwater biking • Push/pull with kickboard 	<ul style="list-style-type: none"> • Participant's Choice • Stretching 	Open Question and Answer and Discussion
10	<ul style="list-style-type: none"> • High knees walking • Stretching • Participant's Choice 	<ul style="list-style-type: none"> • Swimming (Sidestroke) • Underwater biking • Step-ups (8 inch) • Noodle activities (cross country ski, rocking horse, biking, jumping jacks) • Participant's Choice 	<ul style="list-style-type: none"> • Floating • Light walking • Stretching • Participant's Choice 	Importance of continued goal setting, exercise, and healthy eating <ul style="list-style-type: none"> • Final meetings with PT and nutritionist