PHYT 824

Meredith Smythe

**Program Proposal**

Statement Of Need:

Osteoporosis and Osteopenia are conditions characterized by a reduction in bone mineral density where the bones become porous and fragile.1 Osteoporosis is a major public health threat for 44 million men and women over the age of 50 in the United States.1 One common feature of osteoporosis that often precedes diagnosis is a bone fracture.2 Osteoporosis often leads to bone fractures especially in the hip, spine and wrist.1 These fractures can affect the health of an older adult by causing chronic pain, long-term disability and death.2

Some of the more common osteoporotic fractures are of the hip and spine (compression fractures).2 Hip fractures often require hip replacement surgery and can lead to disability and even death.1 Approximately 1 in 5 people die within the first year of a hip fracture.2 Those who do not die often loose function and independence.2 Hip fractures are the main reason for loss of independence in older adults.3 33% of older adults who suffer a hip fracture become totally dependent or must move to a nursing home the year following the fracture.2 Limitations include the inability to preform activities of daily living such as dressing and bathing as well as walking and transferring. Vertebral fractures can be serious, leading to vertebral wedging, loss of height and spine deformation.1 They can cause chronic pain and decrease one’s ability to perform activities of daily living.1 Preventing fractures caused by osteoporosis should be a high priority when treating older adults due to the grave consequences of hip and vertebral fractures. With the projected increase in number of people diagnosed with osteoporosis in United States, estimated to be 61 million by 2020,2 it is even more important that there be prevention programs to treat the baby boomer generation.

Falls prevention training helps avoid fractures due to osteoporosis.1 Prevention training includes balance programs like yoga. Exercise, including weight-bearing exercise used in yoga, is associated with reduced risk of hip fractures in older women.3 The proposed program called “Yoga for Seniors” is designed to prevent osteoporotic fractures by improving balance and providing weight-bearing strength training in order to increase bone-density.

Background:

The Social Ecological Model (SEM) is often used as a meta-model for health behavior change because it includes multiple levels of social constructs. These levels are the individual level, the interpersonal level, the community and organizational level, and the population or policy level.4 Social ecological models incorporate peoples’ interaction with their physical and social environments.5 The SEM contains factors at each of the levels that are called determinants of change.4 The most effective behavior change programs incorporate interventions at multiple levels of the model.5 Yoga for Seniors aims to intervene at both the individual and interpersonal levels of the SEM. Determinants at the individual level that Yoga for Seniors will target include increasing knowledge about osteoporosis, improving balance skills, and motivating the participants to stay active. Yoga for Seniors aims to increase education on falls reduction, healthy eating and nutrition for osteoporosis, information on body mechanics, and financial resources for older adults. Determinants at the interpersonal level include influence from family, friends, classmates, providers, peers and social networks. Yoga for Seniors aims to intervene on this level by having the participants enlist family and friend support for performing their physical activity.

The program also includes workshops that integrate health behavior theories and other techniques in order to have participants increase their self-efficacy, problem solving, and self-management. The workshops integrate motivational interviewing, the Health Belief Model, and Social Cognitive Theory in their design. These health belief models fit into the SEM at the levels mentioned above. A study conducted in Iran investigated the use of the Health Belief Model and Social Cognitive Theory in the prevention of osteoporosis in women who were between 30 and 50 years old. The study was a quasi-experimental design with 120 women: 60 in the control group and 60 in the experimental group.6 The intervention included 10 educational sessions with topics on risks and ramifications of osteoporosis, nutritional information to prevent osteoporosis, planning and goal setting, eliciting support from peers and family, and benefits and barriers to exercise.6 At baseline and at six months bone scans were taken of the subjects to measure bone density and a validated questionnaire was administered.6  The questionnaire included questions about goal setting, self efficacy, social support, nutrition, and physical activity. At the six month follow-up the experimental group had increased their bone density and they showed scores of increased self-efficacy, self-regulation, social support, desirable nutritional changes, and physical activity compared to the control group.6

Motivational interviewing has been used successfully to treat people with substance abuse and tobacco dependence.7 It is a method that allows the patient to problem solve themselves. A randomized control trial of frail older adults used motivational interviewing along with goal setting, patient education, and physical activity in subjects aged 70 and over to improve mobility and reduce frailty.7 The experimental group increased their physical activity significantly more than the control group at six months after the intervention (mean between difference 17.9 minutes of physical activity/ day with a 95% confidence interval 4- 31.7 minutes/ day p= .027)7. This study suggests that motivational interviewing is an important component in increasing physical activity behavior in older adults.

In addition to integrating behavioral change theories, Yoga for Seniors aims at increasing strength and balance skills in participants in order to prevent falls. Balance is essential in preventing falls and associated bone fractures due to osteoporosis.1 There are numerous studies that support yoga as a form of balance training. An observational cohort study on postmenopausal osteoporotic women found that with 12 weeks of yoga (2x a week) there were significant strength and balance benefits.8  A randomized controlled trial of older adults with a history of falling compared Tai Chi, standard balance training/ rehabilitation, and yoga at improving balance and postural sway.9 Yoga was as effective as Tai Chi and standard balance training at improving postural sway.9

In addition to increasing balance yoga can directly influence bone density. Weight bearing exercise has a positive though small effect on bone mineral density especially when combined with diet changes and medicine.3 It is recommended that women with osteoporosis exercise for at least 30 minutes three times a week.3

Program Goals:

The overall goal of the program is to improve functional strength and balance in older adults in order to avoid falls. The program also aims to give the participants important skills in self-management including goal setting and self-monitoring.

Goals Include:

1. In 12 weeks to increase functional strength of participants so they are a 4/5 grossly in manual muscle strength.
2. In 12 weeks participants will be able to hold bilateral tandem stance for 30 seconds safely.
3. In 12 weeks participants will be able to complete a timed up and go test in less than 13.5 seconds.10 (This score is bellow the cut off score that is considered a falls risk).
4. In 12 weeks participants will be able to complete the 5 x sit to stand in less than 12 seconds. 11  (This score is bellow the cut off score that is considered a falls risk).
5. The last 10 weeks each participant will practice yoga once a week outside of the program.
6. By week 12 participants will have filled out their nutrition and exercise journal 85% of the time and will have revised a set of personal goals.

Program Description:

The program is 12 weeks long with an hour-long yoga class twice a week. Patients will be asked after week 2 to practice yoga by themselves (safely) once a week and to keep a yoga journal recording when they exercise. Additionally there will also be workshops that last an hour and a half throughout the 12 weeks. Patients will keep a food journal as well as an exercise log and self-monitor their progress. There will be five workshops each an hour and half long. The work shop topics include: healthy eating for osteoporosis and importance of diet and calcium, body mechanics, ways to increase physical activity with Motivational Interviewing, getting social support and goal setting, financial resources for seniors: medical, local agencies, healthy food options, and a final follow-up workshop 2 months after end of the program for reflection.

The program will also help connect the participants with resources in the community like the YMCA’s yoga classes and the yoga classes at the Chapel Hill senior center in order to help them continue with their physical activity once the program ends. Evaluation of the participants using outcome measures will be done at baseline, 6 weeks, 12 weeks, and then 2 months after the program for follow-up before the follow-up workshop.

Program Evaluation:

The outcome measures used to evaluate the success of to the program include manual muscle testing, functional strength testing, and static and dynamic balance tests. The outcome measures include the timed up and go, the 4 stage balance test, manual muscle testing, and five times sit to stand. The Timed Up and Go is a valid and reliable measure often used for community dwelling older adults.10 The 4 stage balance test measures static balance by progressing through increasingly difficult standing balance positions. Manual muscle testing is used to quantify the strength of particular muscles and the five times sit to stand is a measure of functional leg strength. The outcome measures will be conducted by a licensed physical therapist at the location of the workshops and yoga classes. The measures do not require any specialized equipment aside from a stopwatch and a chair.

Another method for evaluation will be a survey given to participants for feedback on the program on possible improvements. This will be given to the participants to fill out at 6 weeks and 12 weeks. This will provide the program with some feedback in order to improve participant satisfaction. Some of the possible stakeholders in this program are the families of the participants, the primary care physicians treating these subjects and community organizations such as the senior center and YMCA. Having participants improve their balance and avoid falling will positively affect all of these stakeholders. In addition to having the participants evaluate the program, at the end of the program there could be a questionnaire for a family member about the participant’s change of independence and balance throughout the program. The program could also reach out to community partners such as the Chapel Hill Senior Center for feedback and referrals. Because of HIPPA regulation it would be difficult to have physician input on the program without participants’ permission. However, as the program grows getting feedback from primary care physicians of participants may be beneficial.

References

1. Facts and Statistics | International Osteoporosis Foundation. *Iofbonehealthorg*. 2016. Available at: <https://www.iofbonehealth.org/facts-> statistics#category-20. Accessed November 14, 2016.

2. Impact of Osteoporosis | International Osteoporosis Foundation. *Iofbonehealthorg*. 2016. Available at: https://www.iofbonehealth.org/impact-osteoporosis. Accessed December 11, 2016.

3. Rosen, Harold N, Drezner MK. *Overview of Managment of Osteoporosis in Postmenopausal Women*. https://www-uptodate-com.libproxy.lib.unc.edu/contents/overview-of-the-management-of-osteoporosis-in-postmenopausal-women?source=machineLearning&search=osteopenia&selectedTitle=1~150&sectionRank=4&anchor=H40#H40. Accessed November 14, 2016.

4. Hill C. *Health Promotion And Wellness: Social Ecological Model And Social Factors*.; 2016.

5. Sallis J, Owen N, Fisher E. Ecological Models of Health Behavior. In: *Health Behavior and Health Education: Theory, Research, and Practice*; 2008:465-482.

6. Jeihooni AK, Hidarnia A, Kaveh MH, Hajizadeh E, Askari A. The effect of an educational program based on health belief model and social cognitive theory in prevention of osteoporosis in women. 2016.

7. Vries NM De, Staal JB, Wees PJ Van Der, et al. Patient-centred physical therapy is ( cost- ) effective in increasing physical activity and reducing frailty in older adults with mobility problems : a randomized controlled trial with 6months follow-up. 2016;(December 2015):422-435.

8. Tuzun, S, Aktas, I, Akarirmak, U, Sipahi, S, Tuzun F. Yoga might be an alternative training for the quality of life and balance in postmenopausal osteo ... *Eur J Phys Rehabil Med*. 2010;46(1):69-72.

9. Ni M, Mooney K, Richards L, et al. Comparative Impacts of Tai Chi , Balance Training , and a Specially-Designed Yoga Program on Balance in Older Fallers. 2014.

10. Timed Up and go. Rehabilitation Measures Website. http://www.rehabmeasures.org/Lists/RehabMeasures/DispForm.aspx?ID=903. Published October 30, 2010. Upadated August 28, 2014. Accessed November 14, 2016.

11. Five Time Sit to Stand. Rehabilitation Measures Website. http://www.rehabmeasures.org/Lists/RehabMeasures/DispForm.aspx?ID=1015. Accessed October 18, 2017. Published June 13, 2012. Updated July 31, 2015. Accessed October 18, 2016.