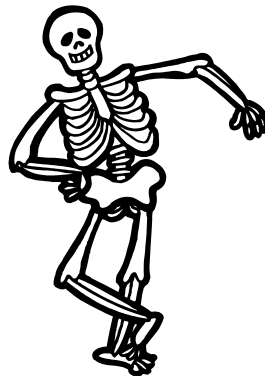


# **Healthy Bones:**

**A hospital wellness center-based  
osteoporosis prevention education  
and exercise program**



## **Statement of Need**

More than 10 million Americans have osteoporosis making it the most common bone disease.<sup>1,2</sup> An additional 34 million have low bone mass known as osteopenia, which puts them at risk for developing osteoporosis.<sup>1</sup> Physical impairments related to osteoporosis and osteopenia include fractures, kyphosis, digestive problems, and decreased mobility.<sup>15</sup> Each year 1.5 million people sustain an osteoporosis-related fracture.<sup>2</sup> The Office of the Surgeon General estimates that one in two women and one in five men will experience an osteoporosis-related fracture during their lifetime.<sup>2</sup> Despite knowledge in clinical guidelines, interventions for prevention and treatment are underutilized.<sup>7</sup> The rate of osteoporosis treatment post-fracture is less than 20% among elderly patients.<sup>7</sup>

Osteoporosis also leads to psychological and social issues such as depression, fear of falling, loss of confidence, loss of independence, social isolation, and decreased quality of life.<sup>15</sup> In addition, the financial impact of medical care for osteoporosis-related fractures in 2002 was \$18 billion.<sup>2</sup> The number of people aged 65 and older continues to grow as does the financial burden imposed by this disease.<sup>2</sup> Identified as a national health issue, the US Department of Health and Human Services included the reduction of osteoporosis and osteoporosis-related fractures in the objectives for Healthy People 2010.<sup>4</sup> Despite these facts, many people are not given adequate information about screening, prevention and treatment of osteoporosis by their health care professionals.<sup>3</sup> Therefore, a program focused on osteoporosis prevention education and exercise for older adults would be beneficial.

The Rex Hospital Wellness Centers located in Raleigh, Cary, Garner, and Wakefield, North Carolina would be an ideal location to offer this education and exercise program. These wellness centers provide services to more than 12,000 members annually. Greater than 8,500 members are above the age of 50, when developing osteoporosis is a greater concern in those with additional risk factors.<sup>1-3</sup> The Rex Wellness Centers already offer a range of wellness and prevention programs to members and for a fee to non-members. Programs are currently taught by a multidisciplinary group of health care professionals including exercise physiologists, personal trainers, nutritionists, and physical therapists.

## Background

Osteoporosis is “a skeletal disorder characterized by compromised bone strength, predisposing to an increased risk of fracture.”<sup>2</sup> It is characterized by bone that is low in mass and strength due to greater bone removal than deposition.<sup>1</sup> The World Health Organization defines osteoporosis as bone mineral density (BMD) less than or equal to 2.5 standard deviations below the reference population mean and low bone mass or osteopenia as BMD that is 1.0 to 2.5 standard deviations below the reference population mean.<sup>2,3</sup> Osteoporosis and osteopenia are considered “silent diseases” because they are often not detected until a fracture occurs.<sup>3</sup> These diseases can be identified, prevented and treated with a multi-dimensional medical approach to decrease the chances of associated morbidity and mortality.<sup>3</sup> Educating older adults about this disease and prevention could be beneficial in decreasing its incidence and side effects. Increasing knowledge and improving participation in healthy bone behaviors will allow older adults to take responsibility in managing their own bone health.

A self-management approach for chronic disease management has been successful for many diseases including osteoporosis.<sup>16</sup> Osteoporosis is a chronic disease without a cure, which requires an individual to take responsibility for following recommendations regarding exercise, diet, and medication to minimize negative outcomes.<sup>16</sup> This can be accomplished through a self-management education program where a health care provider instructs the individual in critical information and the individual takes ownership in implementing these changes.<sup>16</sup> This approach is based on Bandura’s self-efficacy model.<sup>16</sup> One such program included five educational sessions of osteoporosis information, necessary behavioral skills, and the individual’s role in disease management.<sup>16</sup> This program was beneficial and effective in a group of older women at risk for osteoporosis.<sup>16</sup> Another community intervention found the cognitive-behavioral approach to be effective in helping participants become self-managers of their bone health.<sup>8</sup> Both of these programs stress the importance making appropriate behavior changes once given necessary information to manage their health, which is the basis for the Building Better Bones program.<sup>8, 16</sup>

Several studies have found that multi-factorial education programs are effective in improving osteoporosis prevention and management.<sup>7-8,16</sup> A community-based care program that included patient education and recommendations for treatment improved management of patients at high risk of osteoporosis.<sup>7</sup> After educating individuals and their care providers about recommendations for osteoporosis treatment, more than 50 percent of the individuals were

participating in appropriate treatments 6 month after intervention, compared to 20 percent who did not receive the education intervention.<sup>7</sup> Another study found educational sessions about osteoporosis, nutrition, and healthy bone behaviors had a positive impact in older adults.<sup>8</sup> Participants were educated about osteoporosis and related issues over 6 weeks and encouraged to participate in healthy bone behaviors as instructed.<sup>8</sup> The participants demonstrated improved knowledge and participation in healthy behaviors immediately and 7 months after intervention.<sup>8</sup> Despite not including an exercise component, they stated that exercises for muscle strength and balance are essential components of a bone health program.<sup>8</sup>

Exercise interventions have been found to improve bone density, increase strength and balance, and decrease falls in older adults.<sup>9-12,17</sup> A recent review of literature supports strength training to improve bone mineral density and balance exercises to decrease falls.<sup>17</sup> After participating in a community-based exercise program that used body weight for resistance there was a positive training effect in women with osteoporosis.<sup>10</sup> An exercise program including strengthening and stretching resulted in improved strength and balance in older women with osteoporosis.<sup>11</sup> Implementing an education and exercise program could improve self-management for osteoporosis prevention and healthy bone behaviors in the local community of older adults.

### **Needs Assessment**

The osteoporosis education and exercise program will be offered to older adults through the Rex Wellness Centers. Participation will be restricted to the targeted population listed in the Clinician's Guide to Prevention and Treatment of Osteoporosis by the National Osteoporosis Foundation, which states recommendations apply to postmenopausal women and men age 50 and older.<sup>3</sup> Participants will be recruited from the general membership and local residents who are interested in learning about osteoporosis prevention and treatment. Information about the program will be disseminated through the Rex Wellness Center website, Your Life (Rex Healthcare's e-newsletter), Rex Healthcare's mailed newsletter, and marketing posters displayed in the lobby of the wellness center prior to the beginning of the program. Rex Healthcare also participates in health fairs throughout the area and can provide promotional material for this program to people who attend these events.

To ensure that the educational program covers the most appropriate and needed information for the participants, a questionnaire testing knowledge of enrollees will be administered prior to intervention. The questionnaire will be true-false questions with a “don’t know” option, adapted from the Osteoporosis Knowledge Assessment Tool (OKAT),<sup>13</sup> to assess knowledge of the following: the definition of osteoporosis, the risk factors for developing this disease, detection of this disease, the daily recommended amount of calcium and vitamin D, good dietary sources of calcium and vitamin D, supplements and classes of drugs that prevent and treat this disease, risk factors for falling, and the physical activity recommendations for good bone health.

In addition, participants will take the Osteoporosis Self-Management Index-Revised (OSMI-R) and Short Food Questionnaire.<sup>8</sup> These questionnaires about healthy behaviors and dietary intake of calcium and vitamin D will provide baseline, intermediary, and end-point data regarding impact of the intervention on these areas of the participants’ lifestyle. All of these assessments can be administered and scored by a wide variety of health care professionals once instructed in the tools.

### **Aims/Goals and Outcomes**

Specific aims of this program are as follows:

1. Educate older adults about osteoporosis disease and related side effects.
2. Improve knowledge in prevention and detection of osteoporosis.
3. Encourage healthy bone behaviors through education in exercise, fall prevention, nutrition, and medications and supplement recommendations.
4. Increase participation in osteoporosis prevention behaviors in daily living.

### **Intervention**

The program will include education and exercise sessions which will take place one time per week for 10 weeks with each session lasting an hour and a half. Research supports improvement in knowledge and behaviors for self-management of osteoporosis with programs ranging from 6 to 15 hours of education.<sup>8,16</sup> The education sessions of 60 min will cover material pertinent to osteoporosis prevention and treatment. The exercise sessions of 30 minutes duration will include exercises for general strengthening, balance, and flexibility. Enrollment will be

limited to 20 participants to allow sufficient interaction with each participant and provide proper oversight during exercise sessions.

#### Site Parameters:

The administration of pre and post tests and the education sessions will be held in a private classroom within the Rex Wellness Center. The classroom will have tables, chairs, and a projector for use during the education sessions. The exercise sessions will be held in the group fitness exercise room. It will include chairs for use with balance and strengthening exercises.

#### Intervention 1: Education

Each participant will complete the OKAT, OSMI-R, and Short Food Questionnaire prior to the first education sessions to assess baseline knowledge about osteoporosis and current behaviors known to be related to healthy behaviors.<sup>8, 13</sup>

The first education session will begin with a review of the correct responses to the OKAT. Subsequent education will include detailed information about osteoporosis risk factors, detection, prevention, and treatment. Each session will focus on a different aspect of osteoporosis education. Education sessions will be taught by a multidisciplinary team of Rex Healthcare employees including physical therapists, nutritionists, pharmacists, nurses, exercise physiologists and personal trainers based on the specific topic being covered. Participants will be given a notebook with a copy of handouts and resources used during the sessions for personal review of information covered.

#### Outcome Measures:

Participants will be asked to complete the OSMI-R<sup>8</sup> and Short Food Questionnaire<sup>8</sup> at the beginning of each education session to assess their participation in these behaviors over the preceding week and reinforce healthy bone behaviors. Participants will also be asked to complete the OKAT<sup>13</sup> at the last education session to assess the amount of learning achieved.

#### Intervention 2: Exercise

Participants will be educated in and perform exercises that help prevent bone loss and reduce the risk of falling. The exercises of this program include double leg squats, sit-to-stand-to-sit, stepping in all directions (forward, back, and side), resisted side steps, lunges with reaching, spinal extension with back and head to the wall, and single leg stance. These exercises have been shown to improve bone density, strength, and balance in older adults.<sup>10-12,17</sup> Exercise sessions will be led by physical therapists, exercise physiologists, and personal trainers employed

by Rex Healthcare. One professional will lead the exercise session while another professional circulates the room to ensure proper performance of the exercises by the participants. If improper form is identified, a professional will assist the participant to adopt proper technique for the exercise. The participants will be given handouts with pictures and written instructions for these exercises to be taken home and practiced between program sessions. Participants will be asked to keep track of the days they perform these exercises each week by writing it down on a log sheet.

#### Outcome Measures:

By the end of the program, participants will have had sufficient practice of these exercises and individualized correction to ensure proper technique. The participants will be able to continue these exercises on their own with the handouts. The frequency of participation in osteoporosis preventative exercises will be assessed with the OSMI-R<sup>8</sup> and inspection of the participants' log sheets. Participants who indicate performing exercises less than "3 to 4 days per week" will be encouraged to increase the performance of these exercises outside of the program.

#### **Anticipated Outcomes:**

1. Increased knowledge about osteoporosis and its prevention as measured by the OKAT in 100% of participants. OKAT scores will increase by 30% on average between pre and post-intervention assessments.
2. Increased intake of calcium and vitamin D as measured by the Short Food Questionnaire by 75% of participants. Intake of calcium and vitamin D will improve to meet daily recommendations of 1500 mg and 400 IU respectively through food and supplement sources at least 5 days per week.
3. Increased participation in healthy bone behaviors as measured by the OSMI-R. The OSMI-R will demonstrate improved self-management by rating all behaviors as occurring greater than or equal to "3-4 days per week" for at least 80% of participants.

#### **Evaluation**

This osteoporosis education program to encourage self-management through improving knowledge and healthy bone behaviors is supported by research and should achieve the stated outcomes. Achievement of outcomes will be measured by post-intervention administration of the OKAT, Short Food Questionnaire, and OSMI-R. The OKAT will measure each participant's

knowledge about osteoporosis and healthy behaviors to prevent osteoporosis. It will allow a comparison between pre and post-intervention to determine increase in knowledge by the participants. The Short Food Questionnaire will assess dietary intake of calcium and vitamin D. Completing this questionnaire weekly throughout the intervention will remind participants of the recommended intake and encourage self-monitoring to reach the dietary goals for bone strength. The questionnaire completed at the final session will determine if participants are meeting the recommendations at least 5 days a week to determine success on improving dietary intake. Finally, the OSMI-R will be administered throughout the intervention to remind participants of healthy bone behaviors and help participants track the frequency in which they participate in these behaviors during each week. The final OSMI-R will assess the frequency of these behaviors to determine change due to participation in this program.

In order to assess participant feedback about the program design and intervention, a questionnaire will be provided at the conclusion of the program. Participants will be asked how they heard about and why they participated in this program to determine best marketing practices in the future. They will be asked whether they felt they learned important information regarding osteoporosis and healthy bone behaviors, whether they felt the OKAT adequately assessed their knowledge, and whether the program provided sufficient practice of the exercises. Finally, the participants will be asked if the program provided appropriate and adequate resources for follow through outside of the classes and, if they feel the notebook was not enough, they can describe other resources they would find helpful if participating in the program again.

Using these assessment tools and questionnaires will provide information for modification and potential expansion of the program in the future. If scores of the OKAT do not improve as expected, reassessment of the educational content and delivery will be necessary when implementing the program the next time. If participants do not feel that the OKAT assessed their osteoporosis knowledge, the OKAT questionnaire may need to be revised. If participant participation in healthy bone behaviors does not improve as measured by the Short Food Questionnaire and OSMI-R, intervention directed toward changing behavior may need to be modified. If participants do not feel that adequate exercise practice was provided, the program can be modified in the future to allow increased exercise time. Finally, if participants feel that different or additional resources would be beneficial to have outside the program, efforts will be made to add or adapt resources to meet needs in the future.



On the positive side, if the outcome goals are consistently met, the program could easily be expanded to other community locations to improve osteoporosis knowledge and healthy bone behaviors in older adults. In addition, it would support the theory that self-management can be improved by increasing knowledge about this disease and its prevention.

Potential barriers of this intervention include cost to the Rex Hospital system to provide personnel for the program and to the participants who are not members of the Wellness Center. The personnel recommended for this program is similar to other programs offered through the Wellness Center, however this remains an expense for the hospital unless professionals volunteer their time to participate. In addition, non-members will be charged for enrollment in the program which could hinder their participation. The expense could limit the ability of this program to be expanded to other community locations unless those facilities are able to pay for the cost of the intervention, recruit volunteer providers, and/or charge participants for participation. Another potential limitation for program effectiveness is the participants' prior knowledge about osteoporosis and motivation to change behaviors to prevent bone loss. Lastly, the intervention is limited in its duration and does not assess long-term changes of behavior. Participants may improve behaviors during and for a short while after intervention, but then resume prior behavior patterns which would limit success in preventing osteoporosis.

### **Relevance/Synthesis**

The proposed intervention will increase knowledge about osteoporosis and its prevention and encourage healthy bone behaviors in the older adult population. It is based on programs that have been successful in promoting self-management in persons who have or are at risk of developing osteoporosis. Implementation at the Rex Wellness Centers will provide a facility with resources to run the program effectively, allow for evaluation of the program afterward, and provide a program model that can be replicated in other venues. This program can be used in a variety of community locations to impact the older adult population on a larger scale in the future. It has the potential to help prevent the development of osteoporosis and decrease the incidence of the many negative consequences of this disease.

## References

1. National Osteoporosis Foundation. *America's Bone Health: The State of Osteoporosis and Low Bone Mass in Our Nation*. Washington, DC: National Osteoporosis Foundation; 2002.
2. U.S. Department of Health and Human Services. *Bone Health and Osteoporosis: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General; 2004.
3. National Osteoporosis Foundation. *Clinician's Guide to Prevention and Treatment of Osteoporosis*. Washington, DC: National Osteoporosis Foundation; 2008.
4. U.S. Department of Health and Human Services. *Healthy People 2010 Objectives*. Rockville, MD: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion; 2000.
5. The World Health Organization. *WHO Scientific Group on the Assessment of Osteoporosis at Primary Health Care Level*. Geneva, Switzerland: The World Health Organization Press; 2007.
6. Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *J Am Geriatr Soc*. 2002;50(8):1329-1335.
7. Ciaschini PM, Straus SE, Dolovich LR, et al. Community based intervention to optimize osteoporosis management: randomized controlled trial. *BMC Geriatr*. 2010;10:60.
8. Davis GC, White TL, Yang A. A bone health intervention for older adults living in residential settings. *Res Nurs Health*. 2006;29(6):566-575.
9. Zijlstra GA, van Haastregt JC, van Rossum E, van Eijk JT, Yardley L, Kempen GI. Interventions to reduce fear of falling in community-living older people: a systematic review. *J Am Geriatr Soc*. 2007;55(4):603-615.
10. Hourigan SR, Nitz JC, Brauer SG, O'Neill S, Wong J, Richardson CA. Positive effects of exercise on falls and fracture risk in osteopenic women. *Osteoporos Int*. 2008;19(7):1077-1086.
11. Carter ND, Khan KM, McKay HA, et al. Community-based exercise program reduces risk factors for falls in 65- to 75-year-old women with osteoporosis: randomized controlled trial. *CMAJ*. 2002;167(9):997-1004.
12. Nitz JC, Choy NL. The efficacy of a specific balance-strategy training programme for preventing falls among older people: a pilot randomised controlled trial. *Age Ageing*. 2004;33(1):52-58.
13. Winzenberg T, Oldenburg B, Frendin S, Jones G. The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: the Osteoporosis Knowledge Assessment Tool. (OKAT). *BMC Musculoskeletal Disorders*. 2003;4(1):17.
14. Kempen GI, Yardley L, van Haastregt JC, et al. The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling. *Age Ageing*. 2008;37(1):45-50.
15. Lydick E, Zimmerman SI, Yawn B, et al. Development and validation of a discriminative Quality of Life Questionnaire for Osteoporosis (The OPTQoL). *J Bone Miner Res*. 1997;12:456-463.

16. Gold DT, Silverman SL. Osteoporosis self-management: Choices for better bone health. *South Med J.* 2004;97(6):551-554.
17. Lirani-Galvao AP, Lazaretti-Castro M. Physical approach for prevention and treatment of osteoporosis. *Arq Bras Endocrinol Metabol.* 2010;54(2):171-178.

Pledge: *I have neither given nor received unauthorized aid on this assignment.*