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Andrea L. Brookhart

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Leticia R. Moczygemba

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Community Pharmacist-Provided Osteoporosis Screening and Education: Impact on Patient Knowledge

Andrea L Brookhart, PharmD[1,2,*]; K. Michele Brown Fountain, PharmD[3]; Leticia R. Moczygemba, PharmD, PhD[1]; Jean-Venable R. Goode, PharmD, BCPS, FAPhA, FCCP[1]

Virginia Commonwealth University School of Pharmacy, Richmond, VA[1]; The Kroger Co., Kroger Pharmacy, Richmond, VA [2]; The Kroger Co. Mid-Atlantic Division, Roanoke, VA[3]

*At the time of writing Dr. Brookhart was resident with the Virginia Commonwealth University School of Pharmacy Postgraduate Year One Community Pharmacy Residency Program.

Abstract

Objective: To evaluate the impact pharmacist-provided screening and education had on patient knowledge of osteoporosis and preventive strategies.

Methods: A prospective, randomized, controlled study was conducted at 16 locations of a national supermarket chain pharmacy in the Richmond, Virginia area. Women 30 years and older with no history of osteoporosis were enrolled in the study. Patients self-selected into the study by agreeing to the bone density screening, pharmacist-provided education, and completion of a knowledge survey. Subjects were randomized to complete the osteoporosis-related knowledge survey either before (Group A) or after (Group B) the screening and education session. The survey was developed after guideline and literature evaluation and was pretested with a group of patients for content and clarity. The survey evaluated knowledge of osteoporosis, risk factors for the disease, appropriate age for testing, and preventive strategies. Groups A and B were compared using t-tests.

Results: A total of 110 women were enrolled in the study. The mean (±SD) age was 52.5 ± 13.1 years in Group A (n=52) and 52.7 ± 11.5 years in Group B (n=58). Knowledge scores were higher in the group who received pharmacist-provided education prior to completing the survey in each category (knowledge of the disease, risk factors, preventive strategies, and appropriate age for testing) and overall (p<0.001).

Conclusions: Community pharmacist-provided osteoporosis screening and education increased patient knowledge about osteoporosis and preventive strategies. Community pharmacist involvement with increasing patient knowledge may empower patients to engage in prevention strategies to improve bone mass.

Introduction

Osteoporosis is a disease in which bone mass and strength is reduced over time, increasing bone fragility and leading to more frequent fractures.[1] Osteoporosis affects 10 million people in the United States, and another 33.6 million have low bone mass.[2] Risk of osteoporosis increases with age and is greater in women than men; therefore, screening of at-risk populations is critical.[2] The gold standard for measuring and diagnosing conditions of low bone density is a dual-energy x-ray absorptiometry (DXA) scan. Evaluation of bone mineral density (BMD) with a DXA scan is recommended for women older than 65 years and men older than 70 years, adults with

a fracture after 50 years, and anyone older than 50 years with risk factors for low bone mass.[1,2] Osteoporosis can be treated with prescription medications and nonprescription calcium supplements, and it can also be prevented. Maintaining adequate calcium and vitamin D intake, performing proper weight-bearing exercise, and not smoking or consuming excessive alcohol are important for prevention of the disease.[2]

The National Osteoporosis Foundation (NOF) recommends that all women be informed of the risk factors for osteoporosis, because early screening and proper preventive measures are critical to avoid fractures.[1] This call for a well-informed population warrants a community-based screening and education program targeting women and girls of all ages. Quantitative ultrasonography using portable heel scanners is recommended by the United States Preventive Task Force as

Corresponding author: Jean-Venable R. Goode, PharmD, BCPS, FAPhA, FCCP; Virginia Commonwealth University School of Pharmacy, Richmond, VA. Email: jrgoode@vcu.edu

a portable alternative to the DXA for predicting future fracture risk and are therefore appropriate for screening.[3]

Community pharmacists, as highly accessible health care providers, have effectively screened patients using heel ultrasonometers and used the results to provide education and to refer high-risk patients to physicians for further evaluation and management.[4-7] Patients participating in osteoporosis screening services conducted by community pharmacists were satisfied with the service.[8-9] Several studies evaluated the effect pharmacist-provided osteoporosis screenings had on patient behaviors, such as discussing their screening result with a physician or taking calcium supplements. These studies found that pharmacist intervention resulted in favorable behaviors.[4,10-13] However, the literature does not contain studies that evaluate the impact of pharmacist-provided screening and education on women's knowledge of osteoporosis or strategies for prevention. Increasing patient knowledge of osteoporosis and preventive strategies may provide the tools to prevent the disease and improve bone mass.

Objective
The objective of this study was to evaluate the impact pharmacist-provided osteoporosis screening and education has on patient knowledge of osteoporosis and strategies for prevention.

Methods
A prospective, randomized, controlled study was conducted at 16 locations of a national supermarket chain pharmacy providing clinical services in the Richmond, Virginia area. The recruitment phase lasted from November 2012 to February 2013. Two osteoporosis screening sessions lasting 2 hours each were conducted at each of the 16 locations from January 2013 to February 2013.

The study was approved by the Virginia Commonwealth University Institutional Review Board. The survey collected demographic information and answers to knowledge assessment questions. Information was collected to about potential risk factors for osteoporosis and included menopausal status, current calcium and/or vitamin D supplement usage, and family history of osteoporosis. Whether or not the patient was a healthcare provider was collected as a demographic to evaluate the potential for underlying knowledge.

The knowledge portion of the survey (Appendix A) was developed using the NOF guidelines as a foundation. According to these guidelines, all women should be aware of adequate calcium and vitamin D intake, physical activity,

tobacco and alcohol cessation as prevention strategies for osteoporosis.[1] Basic pathophysiology, major risk factors, and long-term risks of osteoporosis were also identified as important items for the survey.[1] In addition, national recommendations for screening of women were selected for inclusion.[1-3] Once developed and agreed upon by all authors, the survey was pretested with a group of patients for content and clarity.

The survey contained ten questions that evaluated knowledge of osteoporosis, characteristics that predispose people to the disease, the appropriate age for testing, and knowledge of preventive strategies, including weight-bearing exercise, adequate consumption of calcium and vitamin D, and sources of these nutrients. Each knowledge survey item was assigned one of the following categories: osteoporosis knowledge, knowledge of risk factors, preventive strategies, and appropriate age for osteoporosis testing.

Screening sessions were advertised to customers of the supermarket and pharmacy using fliers throughout the store and employees' verbal referral at the prescription point of sale. Patients were able to schedule appointments via telephone, however; patients did not have to have an appointment to attend the screening session. Patients self-selected into the study by agreeing to the bone density screening and completing the knowledge survey. The inclusion criteria were female gender, age ≥30 years, and a medical history absent of osteoporosis. However, all women interested in the screening and education session were provided the service, regardless of whether they agreed to participate in the study.

Patients were randomized using a random number table containing a list of 250 entries of either 1 or 2. The primary author generated the table prior to the first screening, and each patient was randomized into Group A or Group B, as indicated by the table (1=Group A; 2=Group B). Group A took the knowledge survey before the screening and education service was provided by the pharmacist. Group B received the screening and education service provided by the pharmacist, followed by the knowledge survey. Patients were not asked to complete the knowledge survey both pre- and post-intervention, since the time points would have been too close together for adequate evaluation in one patient.

The primary author conducted all of the screening sessions which were approximately 15 minutes and included screening with the Achilles Express heel ultrasonometer, education, and survey completion.[14] The Achilles Express heel ultrasonometer manual stratifies T-scores into three categories: low risk (≥-1), moderate risk (-1.1 to -2.5), and

high risk (≤-2.5) of future fractures.[14] These scores lined up with the WHO definitions for T-score results of normal bone mass, low bone mass, and compromised bone mass, measured by DXA devices.[1]

Standardized verbal education was provided and included information about the result of the heel scan and osteoporosis. Osteoporosis information was obtained from multiple sources and included the following; general osteoporosis description, characteristics that predispose people to the disease, the appropriate age for testing, and common preventive strategies.[1-3] No patients who were screened and received education paid for the service, regardless of whether they chose to complete the survey.

The knowledge survey was scored by the primary author. Each survey item was marked correct or incorrect, with fractional scores assessed for multi-part questions. Each item in Group A was compared to Group B using t-tests both in each category as well as for overall score. Subsequently, each group was stratified into risk category groups, as indicated by their screening results. Low-risk and moderate-risk subgroups were analyzed using t-tests to detect differences in knowledge scores between the subgroups.

Results
A total of 110 women were enrolled in the study, screened for risk of future fractures, provided education, and surveyed for their knowledge. There were no significant differences in baseline demographics observed. The mean (±SD) age was 52.5 ± 13.1 years in Group A (n=52) and 52.7 ± 11.4 years in Group B (n=58). Demographics for patients were self-reported (see Table 1).

The majority of patients (50.9%) reported not taking a calcium supplement, vitamin D supplement, or supplements that contain both medications. However, 37.3% of patients reported taking calcium and vitamin D supplements, 0.9% taking calcium supplements only, and 10.9% taking vitamin D only. Patients reported that physicians had recommended both supplements (30%), calcium only (2.7%), vitamin D only (14.5%), or neither supplement (52.7%) to them.

Overall, 100 patients' results indicated a low risk of future fractures, and 10 patients tested at moderate risk of future fractures. No study patients fell into the high-risk category.

Performance on the knowledge survey improved in all categories in the group taking the survey after pharmacist education. Total score, or overall knowledge, also improved in the group who received pharmacist education before the survey (Figure 1).

When each group was stratified into those at low risk of future fractures and those who had moderate risk of future fractures, knowledge scores were similar. In Group A, overall knowledge score was 44.5% for those at low risk and 38.4% in those at moderate risk (p = 0.207). In Group B, overall knowledge score was 77.7% for those at low risk and 73.6% for those at moderate risk (p = 0.775).

Discussion
The literature contains studies which show that pharmacists are capable of screening, educating, and referring patients at risk for osteoporosis in the community setting.[4-13] In this study and previous studies, the education provided by pharmacists included an overview of osteoporosis, appropriate calcium and vitamin D intake, lifestyle measures for prevention (i.e. weight-bearing exercise, smoking cessation), and results from screenings performed.[4-9;11-13] Previous studies also included additional topics for patient education which are most appropriate when targeting an elderly population or a population already diagnosed with osteoporosis, like home safety and medications for treatment.[6,7] The duration of the education sessions in this study was appropriate, based on the previous literature citing education sessions between 10 and 20 minutes.[5,6,10,13]

However, the literature is absent of studies evaluating the impact of a pharmacist provided osteoporosis screening and education service on patient knowledge. This study demonstrated the pharmacist's ability to screen women for risk of future fractures and provide focused education within a 15-20 minute session. Furthermore, the results demonstrated that patient knowledge of the disease, risk factors, preventive measures, and age for testing increased after pharmacist intervention. Patient knowledge of risk level, risk factors, and preventive measures have been associated with positive lifestyle modifications and lower fall risk, which may, in turn, augment fracture risk.[15-18]

Patients screened in this study had an average age of 52.6 years consistent with other studies with similar inclusion criteria, ages ranging from 47.5 to 59.6 years.[4,5,10,12] Bone mass loss accelerates after menopause, and screening and educating patients prior to this time is a best practice to avoid disease.[1,2] The fact that mean age fell toward the low end of this range may be accounted for by the inclusion criterion of a medical history absent of osteoporosis.

The largest improvement in knowledge was seen with the question that addressed the age by which all women should receive testing for osteoporosis, 6.9% in Group A and 69% in Group B (p<0.001). This data shows that there is a deficit in women's knowledge about appropriate age for osteoporosis

testing. Pharmacists providing this information to patients may help increase the number of women being screened for this disease at the age recommended in the NOF guidelines.[1]

In Group A, a larger proportion (26.9%) of patients reported to be healthcare professionals than in Group B (19%). The proportion of patients who reported being healthcare professionals was larger in the group who took the survey at baseline, which supported the result that the pharmacist intervention improved knowledge despite a potential for higher baseline knowledge. However, all patients self-selected into the study, which may have meant that they were generally more health conscious and may have had higher baseline knowledge than the general public. The statistically significant increase in knowledge between groups indicates that the pharmacist intervention was effective despite this issue, but results may not be generalizable to the whole population.

The results of this study did not indicate that there was a significant difference between knowledge of patients with low risk of future fractures and those with moderate risk of future fractures (A: p=0.207; B: p=0.775). However, there was a very small sample size of patients at moderate risk of future fractures, and this study was not designed to evaluate this endpoint. Numerically, scores were lower in patients at moderate risk of future fractures (Group A: 44.5% vs. 38.4%; Group B: 77.7% vs. 73.6%). No study patients fell into the high risk category, which may be because the inclusion criteria stated patients should have a self-reported medical history absent of osteoporosis. Some previous studies in community pharmacies focused on the older women or post-menopausal women only, which would likely result in more patients in the higher risk categories.[6-8,11,13] Other studies that did not focus on women of older age allowed inclusion of women with diagnosed osteoporosis, which would also increase the number of high-risk scan results.[4-5,10]

The pharmacist is a highly accessible health care provider who can serve as an effective advocate for screening, treatment, and education for osteoporosis. As community pharmacists' role in healthcare evolves, the education they are capable of providing to patients may be used to contribute to better bone health outcomes and lower healthcare costs overall.

Limitations
The most significant limitation to this study was that the knowledge survey used was not validated. In addition, patients self-selected into the pharmacist provided screening and education service. Patients likely to self-select into the study may be more health conscious overall, which may skew

the results of their scans and knowledge survey results compared to the general population. Demographic data collected was also based on patient self-report. Finally, the knowledge survey was administered immediately following the pharmacist-provided screening and education. Ideally, the knowledge would have been evaluated in a follow-up several weeks later, to better evaluate retention of knowledge. This would likely be better linked to prevention of disease, since knowledge retained would have a greater impact if employed over time (e.g. weight-bearing exercise, calcium and vitamin D supplementation).

Conclusions
Community pharmacist-provided osteoporosis screening and education increased patient knowledge about osteoporosis, its risk factors, its preventive strategies, and the age by which women should be tested. Further studies that evaluate knowledge retained after a community screening and education service are warranted.

References
1. National Osteoporosis Foundation. Clinician's Guide to Prevention and Treatment of Osteoporosis. 2013. Available at http://nof.org/files/nof/public/content/resource/913/files/580.pdf. Last accessed January 14, 2014
2. US Department of Health and Human Services. Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, Office of the Surgeon General; 2004.
3. Screening for Osteoporosis. Recommendation Statement. United States Preventive Task Force. Available at http://www.uspreventiveservicestaskforce.org/uspstf10/osteoporosis/osteors.htm Last accessed January 11, 2014.
4. Goode JR, Swiger K, Bluml B. Regional Osteoporosis Screening, Referral, and Monitoring Program in Community Pharmacies: Findings from Project ImPACT: Osteoporosis. J Am Pharm Assoc. 2004;44:152-160.
5. Liu Y, Nevins JC, Carruthers KM, et al. Osteoporosis risk screening for women in a community pharmacy. J Am Pharm Assoc. 2007;47(4):521-526.
6. Johnson JF, Koenigsfeld C, Hughell L, et al. Bone health screening, education, and referral project in northwest Iowa: creating a model for community pharmacies. J Am Pharm Assoc. 2008;48(3):379-387.

7. Yuksel N, Majumdar SR, Biggs C, et al. Community pharmacist-initiated screening program for osteoporosis: randomized controlled trial. Osteoporos Int. 2010;21(3):391-8.

8. MacLaughlin EJ, MacLaughlin AA, Snella KA, et al. Osteoporosis screening and education in community pharmacies using a team approach. Pharmacotherapy. 2005;25(3):379-386.

9. Lai LK, Armstrong EP, Salcido AL, et al. Women's perception of bone-mineral density testing and osteoporosis education in the community pharmacy. Consult Pharm. 2003;18(11):968-976.

10. Summers KM, Brock TP. Impact of pharmacist-led community bone mineral density screenings. Ann Pharmacother. 2005;39(2):243-248.

11. Naunton M, Peterson GM, Jones G. Pharmacist-provided quantitative hee ultrasound screening for rural women at risk of osteoporosis. Ann Pharmacother. 2006;40(1):38-44.

12. Peters S, Singla D, Raney E. Impact of pharmacist-provided osteoporosis education and screening in the workplace. J Am Pharm Assoc. 2006;46(2):216-218.

13. McConaha JL, Berdine HJ, Skomo ML, et al. Impact of the fracture risk assessment on patient and physician behavior in osteoporosis prevention. J Pharm Pract. 2014;27(1):25-30.

14. ACHILLES EXPRESS: Bone Ultrasonometer [Internet]. Madison (WI): GE Lunar Corporation; Accessed 2013 June 1. Available from: www.gemedicalsystems.com.

15. Sale JE, Gignac MA, Hawker G, et al. Non-pharmacological strategies used by patients at high risk for future fracture to manage fracture risk--a qualitative study. Osteoporos Int. 2014;25(1):281-288.

16. Burke-Doe A, Hudson A, Werth H, et al. Knowledge of osteoporosis risk factors and prevalence of risk factors for osteoporosis, falls, and fracture in functionally independent older adults. J Geriatr Phys Ther. 2008;31(1):11-7.

17. Francis KL, Matthews BL, Van Mechelen W, et al. Effectiveness of a community-based osteoporosis education and self-management course: a wait list controlled trial. Osteoporos Int. 2009;20(9):1563-70.

18. Laslett LL, Lynch J, Sullivan TR, et al. Osteoporosis education improves osteoporosis knowledge and dietary calcium: comparison of a 4 week and a one-session education course. Int J Rheum Dis. 2011;14(3):239-47.

Table 1: Self-reported Patient Demographics	Group A No (%) (n=52)	Group B No (%) (n=58)	Total (%) (n=110)	p-value
Mean Age ± SD				
	52.5 ± 13.1	52.7 ± 11.4	52.6	0.937
Menopausal status				
Pre-menopausal	17 (32.7)	17 (29.3)	34 (30.9)	0.5486
Peri-menopausal	8 (15.4)	16 (27.6)	24 (21.8)	0.1434
Post-menopausal	27 (51.9)	25 (43.1)	52 (47.3)	0.2745
Race				
American Indian/Alaska Native	0 (0)	1 (1.7)	1 (0.9)	0.3137
Asian	1 (1.9)	0 (0)	1 (0.9)	0.2462
Black	6 (11.5)	16 (27.6)	22 (20)	0.0445
Hispanic	1 (1.9)	1 (1.7)	2 (1.8)	0.6777
Native Hawaiian/Pacific Islander	0 (0)	0 (0)	0 (0)	n/a
White/Caucasian	43 (82.7)	40 (69.0)	83 (75.5)	0.0746
Other	1 (1.9)	0 (0)	1 (0.9)	0.2462
Education level				
Some high school	0 (0)	1 (1.7)	1 (0.9)	0.3137
High school diploma/GED	13 (25)	14 (24.1)	27 (24.5)	0.689
Some college	8 (15.4)	12 (20.7)	20 (18.2)	0.4834
Associate's degree	5 (9.6)	3 (5.2)	8 (7.3)	0.2975
Bachelor's degree	11 (21.1)	11 (19.0)	22 (20)	0.598
Master's degree	5 (9.6)	10 (17.2)	15 (13.6)	0.2613
Professional degree	9 (17.3)	7 (12.1)	16 (14.5)	0.3429
Yearly household income				
<$10,000	2 (3.8)	3 (5.2)	5 (4.5)	0.6334
$10,001 - $25,000	9 (17.3)	9 (15.5)	18 (16.4)	0.614
$25,001 - $40,000	5 (9.6)	17 (29.3)	22 (20)	0.0131
$40,001 - $55,000	8 (15.4)	6 (10.3)	14 (12.7)	0.3379
$55,001 - $70,000	4 (7.7)	3 (5.2)	7 (6.4)	0.4707
>$70,000	15 (28.8)	18 (31)	33 (30)	0.7389
Family history of osteoporosis				
Yes	16 (30.8)	25 (43.1)	41 (37.3)	0.2899
No	24 (46.2)	25 (43.1)	49 (44.5)	
Unknown	12 (23.1)	8 (13.8)	20 (18.2)	
Healthcare professional				
Yes	14 (26.9)	11 (19.0)	25 (22.7)	0.2978
No	38 (73.1)	46 (79.3)	84 (76.4)	
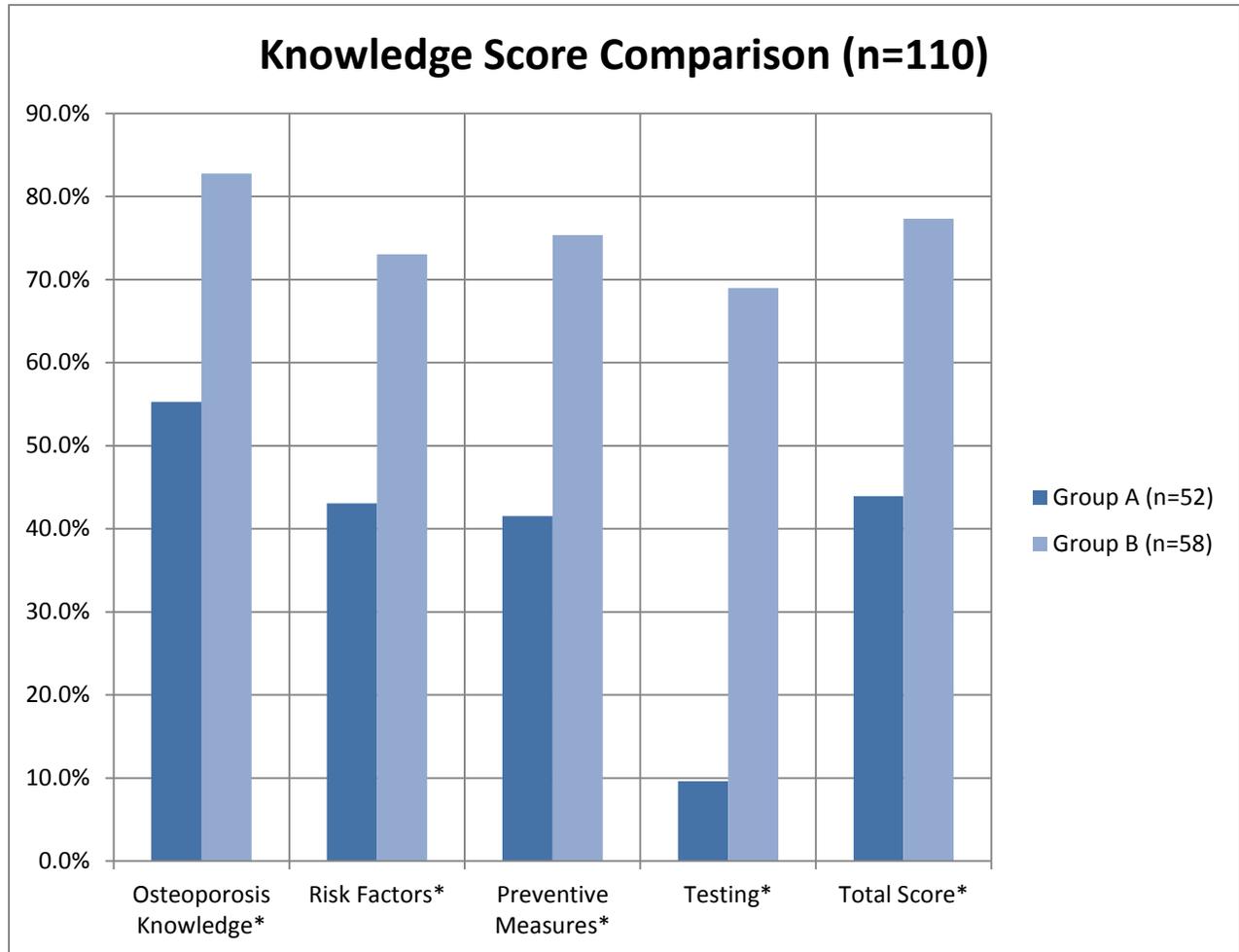
Figure 1: Knowledge Score Comparison
***Statistically significant difference in score, p<0.001**

Appendix A

This survey is voluntary.   **Please check the box next to the category that best applies to you.**

Please select which category describes you best:
- ☐ Pre-menopausal *(not yet going through menopause)*
- ☐ Peri-menopausal *(currently going through menopause)*
- ☐ Post-menopausal *(already experienced menopause)*

Age:

_____

Please select which race/ethnicity describes you best:
- ☐ African-American/Black
- ☐ Asian
- ☐ American Indian/Alaska Native
- ☐ Native Hawaiian/Pacific Islander
- ☐ White/Caucasian
- ☐ Other: _____

Please select the highest level of education you have achieved:
- ☐ Some high school
- ☐ High school diploma/GED
- ☐ Some college
- ☐ Associates degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Professional/doctoral degree
- ☐ Other: _____

Please select your total yearly household income:
- ☐ <$10,000
- ☐ $10,001 – $25,000
- ☐ $25,001 – $40,000
- ☐ $40,001 – $55,000
- ☐ $55,001 – $70,000
- ☐ >$70,000

Do you currently take calcium or vitamin D supplements?
- ☐ Yes, calcium + vitamin D
- ☐ Yes, calcium only
- ☐ Yes, vitamin D only
- ☐ No, neither

Has a doctor ever recommended that you take calcium or vitamin D supplements?
- ☐ Yes, calcium + vitamin D
- ☐ Yes, calcium only
- ☐ Yes, vitamin D only
- ☐ No, neither

Do you have a family history of osteoporosis?
- ☐ Yes
- ☐ No
- ☐ Unsure

Are you a healthcare professional?
- ☐ Yes
- ☐ No

Please circle the letter next to the answer you select as correct.

1. What is osteoporosis?
- a. Tiny holes in bone
- b. Swelling causing weakening of the major joints (like the knees and hips)
- c. Greater bone removal than replacement, causing weaker bones
- d. Chronic pain in the lower back

2. Women reach highest (peak) bone mass at what age?
- a. 4-5 years
- b. Puberty
- c. 30 years
- d. Just before menopause

3. Risk of developing osteoporosis is <u>higher</u> in (check all that apply):
- ☐ Men
- ☐ Women
- ☐ Those who are thin
- ☐ Those who are overweight
- ☐ Those 65 years and older
- ☐ Those younger than 65 years
- ☐ Those who use alcohol
- ☐ Those who use tobacco products
- ☐ Those with a family history of the disease
- ☐ Those who are White/Caucasian
- ☐ Those who are Asian
- ☐ Those who are African-American/black
- ☐ Those who are Hispanic

4. Which of the following can help maintain bone strength? Check all that apply.
- ☐ High-impact exercise (i.e. running)
- ☐ Low-impact exercise (i.e. swimming)
- ☐ Weight lifting
- ☐ Water aerobics
- ☐ Yoga
- ☐ Fish oil supplements
- ☐ Calcium supplements
- ☐ Vitamin A supplements
- ☐ Discontinuing use of tobacco products
- ☐ Discontinuing use of alcohol

5. True or False? Bone and joint pain is a common symptom of osteoporosis.
- a. True
- b. False

6. How much calcium should you take in every day to prevent osteoporosis?
- a. 600 mg
- b. 800 mg
- c. 1000 mg
- d. 1200 mg

7. What is the recommended amount of vitamin D you should have every day?
- a. 400 IU
- b. 600 IU
- c. 800 IU
- d. 1000 IU

8. Which of the following foods contain the most calcium per serving?
- a. Nuts (almonds, walnuts, etc.)
- b. Dark green, leafy vegetables
- c. Milk
- d. Lean protein sources (chicken, lean beef, etc.)

9. All women should begin to be tested for osteoporosis with a bone scan at what age?
- a. 40 years
- b. 50 years
- c. 65 years
- d. 75 years

10.   Which of the following are the long-term risks of osteoporosis?
- a. Bone and joint pain
- b. Increased falls
- c. Bone fractures
- d. Need for knee replacement

Thank you for your participation in this survey.