2016

Bone Health Education for Osteoporosis Risk Reduction in Premenopausal Women: A Quality Improvement Project

Gloria Nichols Nichols
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Gloria Nichols

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Eileen Fowles, Committee Chairperson, Health Services Faculty
Dr. Melanie Braswell, Committee Member, Health Services Faculty
Dr. Patrick Palmieri, University Reviewer, Health Services Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

Bone Health Education for Osteoporosis Risk Reduction in

Premenopausal Women: A Quality Improvement Project

by

Gloria J. Nichols

MSN, Walden University, 2009

WHNP, University of Texas Southwestern Dallas, 1997

BA, University of Texas San Antonio, 1984

ADN, San Antonio College, 1976

Project Submitted in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2016

Abstract

In the United States, about 8.5 million women live with osteoporosis. Osteoporosis is a debilitating systemic skeletal disorder characterized by low bone mass and reduced bone mineral density that occurs with the loss of estrogen. The mortality rate for this group is about 3 to 4 times higher than other women and as many as 1 in 3 experience a fracture. Guided by the Health Belief Model, this project evaluated how a bone health fact sheet impacts knowledge about osteoporosis and self-efficacy for preventative behavioral change in premenopausal women (age 40-58 years). The project also evaluated if an electronic medical record (EMR) alert system with an additional bone health education in the patient instruction menu can improve participation by 11 health care providers (HCPs). Prior to the participants receiving the fact sheet, the knowledge, health beliefs, and perceived risks for developing osteoporosis were measured using the Revised Osteoporosis Knowledge Test (ROKT) and the Osteoporosis Health Belief Scale (OHBS). Although 87% of participants identified menopause as a major osteoporosis risk factor, fewer women (33%) knew that surgical removal of the ovaries was also a risk factor and half agreed or strongly agreed that calcium and exercise can prevent osteoporosis. After receiving the fact sheet, the participants had an average confidence score of 62% on the Osteoporosis Self-Efficacy Scale (OSES) for engaging in exercise and an average confidence score of 65% for adhering to calcium intake guidelines. Furthermore, the EMR alert system facilitated 100% documentation by HCPs. These results indicated the fact sheet can motivate premenopausal women to engage in osteoporosis preventive behaviors. Importantly, the EMR reminder with education fact sheet can facilitate the active involvement of HCPs in patient education.

Bone Health Education for Osteoporosis Risk Reduction in

Premenopausal Women: A Quality Improvement Project

by

Gloria J. Nichols

MSN, Walden University, 2009

WHNP, University of Texas Southwestern Dallas, 1997

BA, University of Texas San Antonio, 1984

ADN, San Antonio College, 1976

Project Submitted in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2016

Dedication

      This project is dedicated to my Lord and Savior, Jesus Christ who placed within me at the age of twelve the desire to become a nurse along with the promise that if I commit my life to Him the desires of my heart would come to pass. Thank you, Lord, for the mind to comprehend, wisdom to discern and interpret, and the strength to endure until the completion of this project despite delays, personal tests and trials.

Acknowledgements

Thanks, to my husband, Leslie, who has been with me from the onset of this educational journey. Your confidence in me never wavered. Your love, prayers, and support kept me encouraged. Thank you, babe, I love you.

I would also like to thank my committee members, Dr. Eileen Fowles, Dr. Melanie Braswell, and Dr. Patrick Palmieri, for their time, expertise, and guidance toward the completion of this project. Thanks to Dr. Phyllis Gendler for permission to use the instruments that were included in this project.

To my mentor and preceptor throughout the development and implementation of the project, Dr. Christine de la Garza, thank you.

Table of Contents

i

List of Tables

Section 1: Overview of the Evidence-Based Project

The doctor of nursing practice (DNP) graduate is prepared to use science, evidence-based theories, knowledge, skills, experience, and expertise to identify a practice problem and new practice approaches to promote patient safety, quality care, and best outcomes (American Association of Colleges of Nursing [AACN], 2006). According to the AACN (2006), the DNP-prepared nurse is a leader who has committed to using all knowledge and skill to promote quality improvement and to facilitate organizational change. The increasing complexity of today's health care system and focus on primary prevention is the basis for the early identification of and solutions to practice-based problems in health care settings (Friis & Sellers, 2009; Kelly, 2011). The health care setting for this quality improvement project was a gynecology practice of eight physicians and three nurse practitioners. Bone health education in this practice is a primary prevention strategy that is used to facilitate the development of preventive behaviors in premenopausal women to minimize their risk of developing osteoporosis. Historically this practice has not included a tool to disseminate bone health education to premenopausal women; therefore, I chose the development of this tool as a component of the practicum experience. The bone health education tool (Appendix G) for this project was presented and approved by the health care providers (HCPs) for implementation as an educational tool for the patients and the staff of the organization.

Another facet of this practice-based problem was the lack of documentation that bone health education had been provided in the electronic medical record (EMR) by the HCPs. The implementation of the bone health education tool and changes to the EMR

template to facilitate documentation that the tool had been used were implemented as organizational changes in practice by the HCPs. This change was needed to eliminate the gap in patient education and to promote quality care through prevention. The physicians and nurse practitioners (NPs) in the organization are qualified to provide bone health education to premenopausal women, an evidence-based strategy designed to facilitate preventive behavior to reduce the risk of developing osteoporosis. HCPs must actively participate in the dissemination and documentation of bone health education. To effectively engage in this process, the HCPs needed the following: a reliable tool to assess patient knowledge and changes to the electronic medical record (EMR) template to facilitate documentation that bone health education had been provided.

Osteoporosis is a risk factor for natural and surgically induced menopausal women and is also a global concern (Barbieri, 2009; North American Menopause Society, 2010; Nguyen, Wang, &Okamura, 2014; Soleymanian, Niknami, Hajizadeh, Shojaeizadeh, & Montazeri, 2014). The condition is "a systemic skeletal disorder" (Saravi, 2013, p. 1) of low bone mass with microarchitectural deterioration of bone tissues and reduced bone mineral density (BMD) of less than 2.5 standard deviations below the adult peak mean (Mauck & Clarke, 2006). This debilitating musculoskeletal disease is also cited in the literature as a silent threat due to the absence of symptoms until a fragility fracture occurs (Korkmaz, Tutoglu, Korkmaz, & Boyaci, 2014; Roush, 2011; Sedlak, Doheny, Estok, Zeller, & Winchell, 2007; Soleymanian et al., 2014). Estrogen deficiency and the subsequent effect on bone deterioration that occurs with natural and surgically induced menopausal women validates the threat of an increased

risk for an osteoporotic fracture (Al-Anazi, Qureshi, Javaid, &Qureshi, 2011; NAMS, 2010; Roush, 2011). The hip, wrist, ribs, and spine are commons sites of osteoporotic fractures (Al-Anazi et al., 2011; Gammage & Klentrou, 2011; Korkmaz et al., 2014).

A review of the literature suggests that bone health education is an evidence-based intervention that can enhance osteoporosis prevention in women (Endicott, 2013; Nguyen et al., 2014; Moyer, 2013; Sedlak, Doheny, Estok, & Zeller, 2005). The consensus among researchers suggests that a control of modifiable risk factors such as nutrition, physical activity, decreased caffeine intake, increased vitamin D, and calcium intake should be included in health promotion/prevention projects (Gammage & Klentrou, 2011; Giangregorio et al., 2009; Healthy People, 2020). According to Giangregorio et al. (2009), there are women who rely on their perceived good health and low BMD to justify why they do not need to engage in preventive behaviors.

Background

Menopause, a natural process, signals the end of a woman's menstrual cycle and is defined as having occurred after the cessation of menses for one full year (Singh, 2009). The age range for natural menopause is 40-58 years with the median age being 51.3 years (Singh, 2009; Totapan & Yildiz, 2012). Cancerous and noncancerous conditions such as endometriosis and uterine fibroids are reasons that surgically induced menopause can occur at any age. The loss of estrogen, a major risk factor for osteoporosis (Al-Anazi et al., 2011) occurs with natural or surgically induced menopause. The decline in estrogen triggers an increase in bone loss and bone deterioration, thereby increasing the risk for osteoporosis. Most cases of osteoporosis occur in menopausal

women in whom osteoporotic fractures contribute to the high morbidity and mortality rate for this disorder (Gammage & Klentrou, 2011; Kass-Wolff, 2011; Shuler, Conjeski, & Hamilton, 2011). The mortality rate of people with osteoporosis is 2.8-4 times higher than those persons of a similar age (Moyer, 2013). The quality of life for an estimated 10 million people in the United States with osteoporosis (Dickenson, 2014), 80% of who are women, (Adkins, 2012) has been affected by this disabling disorder.

Problem Statement

There had not been any prior assessment of premenopausal women's knowledge, beliefs, or perceived susceptibility to osteoporosis. The organization was able to use this assessment to fill gaps in the educational needs of premenopausal women. Contributing to the practice problem was a lack of consistent documentation of bone health education due to the unavailability of a bone health education tool, and an EMR template that did not include bone health in the patient education/instruction menu.

Due to the accelerated bone loss that occurs with menopause, women are two to three times more prone then men to developing osteoporosis (Al-Anazi et al., 2011). Because fractures are associated with significant morbidity and mortality in postmenopausal women and may be the first indication of osteoporosis (Kass-Wolff, 2011; Nguyen et al., 2014; Shuler et al., 2011), premenopausal women should receive bone health education. The goal of educating women on bone health is to minimize the risk of developing osteoporosis after natural or surgically induced menopause (Wilkins, 2007). Schousboe, Debold, Kuno, Chen, Weiss, & Abbott (2005) cited a lack of

knowledge among individuals on preventive measures to slow or minimize the risk of developing osteoporosis.

In a study of the effectiveness of bone health education as a motivator to change behavior, Rolnick, Kolpher and Jackson (2001) concluded that additional inquiry was needed. Although researchers demonstrated estrogen therapy and other pharmacological interventions are effective in increasing bone mineral density (BMD), the risks associated with use are not readily accepted by some women (Wilkins, 2007). Premenopausal women must be provided with credible, trustworthy, and reliable bone health instruction in an effort to motivate them to take ownership of their care and participate in preventive behaviors to reduce their risk of developing osteoporosis.

Purpose Statement

The purpose of this quality improvement project was health promotion through the dissemination and documentation of bone health education. Changes to the EMR template to facilitate the HCPs dissemination and documentation of bone health education increased the knowledge of premenopausal women on preventive behaviors to minimize their risk of developing osteoporosis. The HCPs documented the dissemination of bone health education by noting that the fact sheet had been given to premenopausal women during their office visit. The goal of the project was to increase the dissemination and documentation of bone health education for premenopausal women ages 40-58 years, to facilitate the development of preventive behaviors to decrease the risk of developing osteoporosis.

Project Objectives

1. The objectives for this project are: To measure the knowledge, health beliefs, and perceived risks for developing osteoporosis in premenopausal women.

2. To measure the consistency of documentation of bone health education in the EMR by the HCPs.

Based on these objectives, this educational project was supported by information obtained from the literature on patient education narrowed to the prevention of osteoporosis. The stakeholders in this project were women who would benefit from bone health education and the HCPs and nurses who would embrace this organizational change as a benchmark for quality care.

Project Question(s)

Will premenopausal women, ages 40-58, who receive bone health instruction prior to the onset of natural or surgically induced menopause, engage in preventive behaviors to reduce their risk of developing osteoporosis?

Will the implementation of a bone health education tool and changes to the EMR template facilitate bone health education and improve documentation by health care providers?

These project questions were developed to establish that the dissemination and documentation of bone health education to premenopausal women by health care providers are congruent with the organization's commitment to quality improvement initiatives to increase the likelihood of best health outcomes (Kelly, 2011) for its stakeholders. This evidence-based initiative to improve quality was the basis for a change

in practice by the health care providers and the organization's protocol on the documentation of patient education.

Conceptual Framework for the Project

According to Mitchell, Fisher, Hastings, Silverman, and Wallen (2010), the strength and applicability of the evidence and the success of a research project begins with the selection of the appropriate evidence-based practice model to answer the research question. The health belief model, or HBM (Becker & Maiman, 1975; Rosenstock, 1974, 1988, 1990) has been used extensively in health promotion initiatives, assisted with the examination of premenopausal woman's "perceived susceptibility of the health problem, perceived severity, perceived benefits, perceived barriers, and cues to action" (McEwen & Ellis, 2011, p. 290). The premise of the HBM for this project was that bone health education, including the dissemination of evidence-based research and treatment options would help the target audience receive, accept, and use the information and interventions (Mitchell et al., 2014; Stern et al., 2014) to change behavior. The HBM as a theoretical framework helped to explain why and under what circumstances the women would choose to take part in activities to reduce the risk of developing osteoporosis.

According to Sedlak et al. (2005) and Sedlak et al. (2007), it is important to identify a woman's knowledge, health beliefs, and perceived susceptibility to osteoporosis prior to designing a bone health instruction program to enhance participation in preventive behaviors. Knowledge of susceptibility to a disease or condition has been cited in the literature as a motivating factor for primary and secondary prevention (Sedlak

et al., 2005; Sedlak et al., 2007). The knowledge obtained in the educational project had the potential to facilitate the acquisition of new knowledge to promote self-efficacy and lifelong adherence to the preventive behavior changes (Sedlak et al., 2005; Sedlak et al., 2007).

Because knowledge alone is not enough to facilitate a change in behavior, it was imperative the health beliefs and attitudes of these women also be considered as a factor and as a potential barrier to preventive health behavior (Soleymanian et al., 2014). This information equipped me with knowledge that could facilitate the dissemination of bone health instruction based on the beliefs, attitudes, and learning styles of these women. An understanding of the health beliefs and attitudes of these women will also enable HCP's to provide counseling on the modifiable risk factors in a culturally appropriate manner (Roush, 2011). The HBM can also provide information that can be used to determine future fracture risk. Gammage and Klentrou (2011), Nielsen et al., (2012), Sedlak et al., (2007), Soleymanian et al., (2014), and Roden (2004) cited the HBM as a useful tool to facilitate preventive behavior change and to assess, and to manage illness.

Nature of the Project

This project included the Revised Osteoporosis Knowledge Test, Osteoporosis Health Belief Scale, and the Osteoporosis Self-Efficacy Scale to assess the knowledge, health beliefs, and perceived risks for developing osteoporosis in premenopausal women ages 40-58. The patient panels of the HCPs were used to generate the sample of premenopausal women on the day of their scheduled visit.

The purpose of this project was to determine whether adding bone health education to the EMR template would result in consistent documentation that the information had been disseminated to premenopausal women. This project required a change in practice by the organization and the HCPs because there had never been a tool to facilitate the dissemination of bone health education. Data collection to answer this question consisted of a retrospective review of the EMR for completion of the system alert that documentation of bone health education was done by each HCP during the 2-week period.

Definitions of Terms

The following definitions were used to guide this project:

Natural menopause: The cessation of menses for one year without surgical intervention (Mayo Clinic, 2015; Singh, 2009).

Nurse practitioner: An advanced practice registered who has completed the academic and clinical study to provide health care and has earned the designation as nurse practitioner and is licensed by the Texas Board of Nursing.

Osteopenia: A bone mineral density (BMD) that is between one standard deviation (*SD*) and 2.5 *SD* below the mean of the young reference group (World Health Organization, 1994).

Osteoporosis: A BMD 2.5 *SD* or more below the mean of the young reference group (WHO, 1994). A skeletal disorder characterized by loss of bone mass, low bone mineral density, reduced bone strength, and increased bone fragility (Kass-Wolff, 2011; Mauck & Clarke, 2006; Saravi, 2013).

Osteoporosis Knowledge Test (ROKT): A 32-item multiple-choice test designed to assess a participant's belief that a person is more or less likely to get osteoporosis in response to exercise and calcium (Kim, Horan, & Gendler, 1991). The ROKT was revised by Gendler, Coviak, Martin, and Kim in 2011 and 2012.

Osteoporosis Health Belief Scale (OHBS): A 42-item tool that is used to assess an individual's perception of the seriousness of osteoporosis, beliefs about developing osteoporosis, and motivating health factors (Kim et al., 1991). The OHBS was revised by Gendler et al. in 2011, and 2012.

Osteoporosis Self-Efficacy Scale (OSES): A 12-item self-assessment tool for participants to assess the likelihood of their engaging in osteoporosis preventive behaviors (Kim et al., 1991). The OSES was revised by Gendler et al. in 2011 and 2012.

Surgically induced menopause: The cessation of menses due to the removal of the uterus and ovaries.

Assumptions and Limitations

An assumption is a condition or principle thought to be true that has not been proven, verified, or scientifically tested (Burns & Grove, 2009; Polit & Beck, 2007). One assumption of the project was that instruction on bone health education would motivate women to participate in preventive behaviors to decrease their risk of developing osteoporosis. Another assumption was that a woman's personal belief about her perceived susceptibility to osteoporosis would facilitate sustained adherence to the bone health measures. I also assumed that natural and surgically induced premenopausal women would be able to identify at least two major and two modifiable risk factors for

osteoporosis after completion of bone health instruction. In addition, I assumed that these women would also be able to verbalize the recommended daily dose of calcium.

Limitations are restrictions that may be theoretical (weaknesses in the study framework) or methodological (weaknesses in the study design), both of which can decrease the generalizability of the findings (Burns & Grove, 2009). A limitation of this project was the population from which the sample was obtained. The population sample did not consistently include women of different cultures or socioeconomic statuses that could affect a response to bone health instruction based on their personal beliefs or values. The health belief model (HBM), which was the conceptual framework used for this project, did not take into account cultural differences. According to Sedlak et al., (2005) and Sedlak et al., (2007), disease prevention activities must be tailored to the target audience, which should have similar characteristics, and should be personalized to fit the interests, concerns, cultures, and learning styles of the participants. Another limitation was the inability to assess the sustainability of the intervention by the participants in the project.

Scope of the Project

The purpose of this project was to determine the knowledge, beliefs, and perceived susceptibility to developing osteoporosis in premenopausal women, which had not been considered previously by the organization in the development of patient education. Women who had experienced natural or surgically induced menopause and were 39 years or younger were excluded from the sample. Women who had a prior diagnosis of osteopenia or osteoporosis were also excluded from the project. This project

was also designed to promote a change in practice for HCPs that would facilitate their ability to disseminate and document that bone health education had been given to premenopausal women.

Evidence-Based Significance

Natural and surgically induced menopause is an uncontrollable risk factor for osteoporosis (American College of Obstetricians and Gynecologist, [ACOG], 2012; Gass, 2012; Schousboe et al., 2005). Dickenson (2014) estimated that there are 10 million people in the United States with osteoporosis, and 80% of these individuals are women (Adkins, 2012). The deterioration of bone due to the loss of estrogen and the increase in bone fragility that occurs with osteoporosis accounts for 50% of the osteoporotic fractures in women over the age of 50 (Barbieri, 2009; Dickinson, 2014; Moyer, 2013). Complications from osteoporosis also contribute to an increased fear of falling, impaired mobility, and a loss of independence (Giangregorio et al., 2009). Once an osteoporotic fracture has occurred, there is an 86% increased risk of additional fractures (Nielsen Huniche, Brixen, Sahota, & Masud, 2013). Osteoporosis has the potential to negatively affect a person's self-confidence, body image, and mental status due to a change in his or her quality of life and a loss of independence (Korkmaz et al., 2014).

An objective of *Healthy People 2020* is to reduce the percentage of adults with osteoporosis from 5.9% to 5.3%. Another objective of *Healthy People 2020* is to reduce the number of female hospitalizations due to hip fractures from 823.5 per 100,000 to 741.2 per 100,000. Osteoporosis as a chronic disease can have a physical, social, and economic impact on individuals (Korkmaz et al., 2014). The total annual cost of

osteoporotic fractures is expected to exceed $20 billion by 2015 (Burge et al., 2007;

Roush, 2011).

Implications for Social Change

Osteoporosis is a threat to the health and quality of life of postmenopausal women

(Berry et al., 2010; Gammage et al., 2011; NAMS, 2010). It is imperative that women at

risk of developing osteoporosis be made aware of those risks, preventive strategies, the

bone mineral density (BMD) test, and the available complimentary, alternative, and

pharmaceutical management options. Bone health instruction for women should include a

discussion of the link between the loss of estrogen that occurs with menopause and

increased bone deterioration, fragility, and fracture risks (Giangregorio et al., 2009).

Members of the health care team needed to commit to bone health education initiatives to

improve the quality of life of premenopausal women. The effects of osteoporosis are a

long-term burden for the family of the affected individual (Nielsen et al., 2012).

Health care providers have a professional responsibility to communicate to

women about osteoporotic fracture risks to facilitate their understanding of preventive

behaviors. The objective of this project was to close the gap that existed in the quality of

care for osteoporosis by recommending guidelines and information that would be

communicated to patients by their health care providers (Hess, Johnston, Iobst, & Lipner,

2013).

Summary

The major theme of the literature was that bone health education was an evidence-

based strategy that could motivate women to change or engage in behaviors to minimize

the risk of developing osteoporosis. Primary prevention and practice measures to promote safety and improve the quality of care are congruent with the initiatives of health care reform. Health care providers need to discuss and document bone health education at the annual well-woman exam visit and at any problem visit for fractures or musculoskeletal changes. The practice-based problem of no educational tool to disseminate bone health information and the lack of consistent documentation of that information warranted an organizational and provider practice change. This project was designed to close the gap in patient education and promote quality care through prevention.

Nurses have a professional responsibility to assess premenopausal women for risk factors by obtaining a thorough history and conducting a full assessment with each patient encounter. Nurses are also in a position to provide premenopausal women with the information they need to make positive behavior changes. This project was designed to help women identify risk factors for osteoporosis and take ownership of their care, which is congruent with the objectives of health care reform.

The social and economic impact of osteoporosis on women, families, and the community warrant evidence-based strategies in the health care system to help women reduce their risk of developing osteoporosis. This project was of particular importance to my commitment as a nurse practitioner to educate and empower women to make informed decisions about their health. The development of this project was supported by the executive committee, physicians, practice administrator, and information technology specialist. This project enabled me to use acquired skills in information systems/technology to assist in the design of an EMR template to facilitate

documentation of bone health instruction by HCPs. Knowledge and use of technology to support quality improvement initiatives allow a DNP-prepared graduate to demonstrate leadership in a health care setting (AACN, 2006).

The development of this project began with a review of the scholarly literature on menopause as a risk factor for osteoporosis, and bone health education as an evidence-based strategy to motivate women to engage in preventive behaviors. The information obtained from the literature review was used to determine the conceptual model and approach to the practice problem of the dissemination and documentation of bone health education.

Section 2: Review of Literature and Theoretical and Conceptual Frameworks

The practice problem that prompted the development of this project was no prior assessment of the knowledge, health beliefs, and perceived susceptibility to osteoporosis in premenopausal women. There was also the lack of consistent documentation of bone health education due to the absence of an educational tool and an EMR template that did not include bone health in the patient education/instruction menu. This quality improvement project was designed to promote safety through prevention, quality care, and improved patient outcomes through the dissemination and documentation of bone health education. The project questions for the project were as follows: Would premenopausal women age 40-58 who receive bone health instruction prior to the onset of natural or surgically induced menopause commit to engaging in preventive behaviors to reduce their risk of developing osteoporosis? Would the implementation of a bone health education tool and changes to the EMR template facilitate use of a bone health education and improve documentation by health care providers?

A literature review provides the opportunity to critique and synthesize the current knowledge on a topic of interest, gaps in what is known about the subject, and whether additional inquiry of the topic would generate new knowledge for nursing practice (Oermann & Hays, 2011). My literature review provided support for the effectiveness of the proposed evidence-based intervention (Burns & Groves, 2009). There was consensus in the literature that osteoporosis is a major health problem that warrants evidence-based strategies to facilitate the development of preventive behaviors to minimize the risk of premenopausal women developing osteoporosis. Bone health education, prior to the onset

of menopause, was identified in the literature as an evidence-based strategy that could be used to close the knowledge gap that exists concerning the prevention of this debilitating disorder. Researchers also emphasized HCPs commitment to communicate to premenopausal women primary prevention strategies that have been proven to promote health, safety, and an improved quality of life. This section of the paper presents the literature search strategies, key search terms, and conceptual framework for the project.

<div align="center">Literature Search Strategy and Key Search Terms</div>

The literature search covered a 10-year span (2004-2014) to assess possible changes in the approach to osteoporosis prevention. A review of scholarly evidence was conducted using the following databases: CINAHL, ERIC, ProQuest, PubMed, and Medline to evaluate the evidence in support of bone health education as an evidence-based strategy to promote preventive behavior to minimize the risk of developing osteoporosis. The types of literature searched included peer-reviewed articles, books, seminars, systematic reviews, and meta-analyses. Key words used in the literature search were as follows: *Natural menopause*, *surgically induced menopause*, *bone health*, *prevention*, *patient education*, *patient teaching*, *risks*, *osteoporosis*, *osteopenia*, *prevalence*, *bone mineral density*, and *benefits.*

<div align="center">**Specific Literature**</div>

Menopause

The onset of natural or surgically induced menopause is a significant risk factor for the development of osteoporosis. Estrogen is "essential in women for healthy bone" (Bradford, Gerace, Roland, & Chrzan, 2010, p. 181) and increases the lifespan of bone-

forming osteoblasts. The loss of estrogen that occurs with menopause shortens the lifespan of these osteoblasts, increasing bone fragility and risks for fractures (Bradford et al., 2010; Roush, 2011; Stone, 2012). The reduction of estrogen that occurs with menopause is a major contributor to the development of osteoporosis in women. Health care providers can identify declining and fluctuating estrogen levels that occur with menopause by evaluating the serum estradiol level annually for women at risk for developing osteoporosis. Menopausal women can experience a 1% to 5% loss of BMD per year (Nathan & Judd, 2007).

Osteoporosis

A review of the literature indicates osteoporosis has devastating effects on individuals, families, communities, and the nation resulting in increased hospitalizations, and long-term care facility admissions. The projected economic impact is more than $25 billion a year over the next 10 years (Burge et al., 2007; Dickinson, 2014; Moyer, 2013; Roush, 2011). The incidence of osteoporotic fractures is greater than the incidence of breast cancer, stroke, and heart attack combined (Jemal, 2010; Lloyd-Jones, 2009; McCloskey, 2009).

According to the 2008 National Osteoporosis Foundations Guidelines criteria for the diagnosis of osteoporosis, this disease was reported in 30% of all postmenopausal women in the United States and Europe (Akdemir, Bilir, Cinemre, Pekuz, & Gokosmanoglu, 2008; Berry et al., 2010). A review of the literature also concluded that postmenopausal women >50 years of age have a 40% risk of an osteoporotic fracture in their lifetime (Akdemir et al., 2008; Berry et al., 2010; Gammage et al., 2011).

Researchers also determined that in addition to family history, the risk of developing

osteoporosis in natural or surgically induced menopause was due to bone loss triggered

by the decline in estrogen levels (ACOG, 2012; Phillips, 2012). Although age and female

gender are the two major contributing factors for osteoporosis, smoking, increased

caffeine and/or sodium intake, chronic corticosteroid use, calcium and or vitamin D

deficiencies, and a high protein diet are also cited as factors that increase the risk for

developing osteoporosis (Dickinson, 2014; Moyer, 2012; Phillips, 2012).

Bone Health

Bone health instruction has been cited as an evidence-based strategy that can

impact the practice of behaviors that can decrease the risk of developing osteoporosis.

There exists a gap in the quality of osteoporosis care by today's health care providers

(Hess et al., 2013) inclusive of bone health instruction. The debilitating impact of

osteoporosis is a motivating factor for the development of an efficient and coordinated

approach to the early identification of those individuals at risk for osteoporosis and the

initiation of preventive strategies such as bone health education. Through an awareness of

the risk of osteoporosis women have been equipped with the knowledge needed to

reassess their own self-concept regarding susceptibility and prevention (Nielsen et al.,

2012). Bone health instruction is a vital health promotion strategy that has been cited as

an effective intervention to increase personal knowledge of osteoporosis prevention

behaviors (Rousch, 2011; Sedlak et al., 2007). According to de Villiers (2009),

menopausal women should be encouraged to embrace lifestyles that benefit bone health.

Osteoporosis education has been cited as an evidence-based strategy to facilitate increased knowledge as "a prerequisite for promoting healthy self-care behaviors" (Ailenger, Lasus, & Braun, 2003, p. 198). Zhang et al. (2012) cited an increase in osteoporosis knowledge in 240 nursing students following an osteoporosis educational program. Tussing and Chapman-Novakofski (2005) also cited the importance of active participation in the learning process as crucial in motivating behavior change. In a study of 792 men and women, Edmonds, Turner and Usdan (2012) cited the need for bone health instruction beginning at birth as necessary to overall health, osteoporosis prevention, and quality of life.

The literature suggests that a multidisciplinary evidence-based bone health education program including nutrition, diet, calcium, vitamin D, exercise, imaging, and patient specific pharmaceuticals should be considered in the management of osteoporosis (Dickinson, 2014; Korkmaz et al., 2014; Nielsen et al., 2012; Shuler et al., 2011). Dickinson (2014) supported weight bearing exercises, smoking cessation, and decrease in alcohol consumption as beneficial, and noted that bone health education was not sufficient to offset the onset of osteoporosis. A multidisciplinary approach was recommended to empower patient involvement (Nielsen et al., 2012).

A goal of my project was to provide bone saving instruction aimed at preventing bone fractures and maintaining or increasing bone density. The bone health instruction fact sheet was structured so HCPs could communicate to women the link between estrogen deficiency and bone quality, increased fracture risk, modifiable risk factors, (Bechtle, 2013; Shams, Spitzer, Kennelly, & Tosi, 2011). Another approach to bone

health is the use of bisphosphonates and selective estrogen receptor modulators (SERMS), which are effective in the treatment and prevention of osteoporosis by reducing bone resorption and decreasing bone turnover. Nonpharmacologic and pharmacologic approaches to osteoporosis prevention were also included in bone health instruction strategies (Stone, 2013).

Conceptual Model and Frameworks Revisited

The HBM was the theoretical framework used to guide this project. HCPs will use an understanding of the health beliefs, perceived risks, and attitudes of premenopausal women to develop culturally appropriate health promotion initiatives to minimize the development of barriers to the acceptance of bone health instruction (Soleymanian et al., 2014). According to Gammage et al., (2011), Nielsen et al., (2012), Roden (2004), Sedlak et al., (2007), and Soleymanian et al., (2014), the HBM is a useful tool to facilitate preventive behavior change and to assess and manage illness. The premise of the HBM for this project was that bone health education, including the dissemination of evidence-based treatment options, would "help the target audience, receive, accept and use the information and interventions" (Mitchell et al., 2014) to change behavior.

This project also required an organizational change that included what Ferlie and Shortell (as cited in White and Dudley-Brown, 2012) described as four levels of change designed to promote quality improvement in health care. The premise of this framework is that a change in practice, such as the implementation of a bone health education tool, and changes to the EMR template to facilitate documentation that the information had been disseminated would require a change in practice by the health care provider, team

members, organization, and cultural environment of the organization (White and Dudley-Brown, 2012). The HBM and Ferlie and Shortell's change model have been used extensively in health promotion initiatives (McEwen & Ellis, 2011).

Background and Context Revisited

The organization was an obstetrics and gynecology practice of eight physicians and three nurse practitioners. The mission of the organization is to provide evidence-based quality care to promote the health, safety, and best outcomes for women who selected the practice as their choice for premier women's health. This organization has never had a formal assessment of the premenopausal woman's knowledge, beliefs, and perceived susceptibility to developing osteoporosis. The unavailability of a bone health education tool and the absence of bone health education/instructions on the EMR template for the HCPs to select created a gap in patient education that had to be closed. Preparation for the implementation of this project began with the selection of reliable instruments to assess the knowledge, beliefs, and perceived susceptibility for the development of osteoporosis in premenopausal women. A discussion of these instruments is provided in Section 3 of this paper. After the bone health education tool was developed, approved by the HCPs, and introduced to the team members, the tool was implemented during the 2-week project period.

My role was project developer and HCP for the organization. Oversight for the project was provided by the physician preceptor for the project. The women who decided to become involved in the project were informed that their participation was voluntary,

withdrawal could occur at any time without reprisal, and the project would be administered under the direction of the organization.

Summary

The literature review addressed the impact of menopause as a risk factor in developing osteoporosis and the significance of bone health education as a facilitator of preventive behaviors. A review of the literature also indicated health care providers have a responsibility to assess the bone health knowledge, perceived risks, and susceptibility of women and to disseminate risk reduction information. There must be an efficient and coordinated approach to the early identification of individuals at risk for osteoporosis and the initiation of preventive strategies such as bone health education.   This nurse practitioner as a leader, clinician, scholar, and educator was prepared to develop and facilitate the dissemination of bone health prevention to premenopausal women. This was also an opportunity to lead a practice and organizational change that would promote quality improvement through education and system documentation. The literature supports the use of evidence-based tools to assess the knowledge, health, beliefs, perceived susceptibility, and self-efficacy of women regarding osteoporosis prevention. Section 3 of this paper presents the approach for this project.

Section 3: Approach

The purpose of this quality improvement project was to promote safety through prevention, quality care, and improved patient outcomes through the dissemination and documentation of bone health education. Changes to the EMR template to facilitate the HCPs ability to disseminate and document bone health education increased the knowledge of premenopausal women regarding preventive behaviors to minimize the risk of developing osteoporosis. The increase in knowledge was measured by their ability to identify two major risk factors and two modifiable risk factors for osteoporosis in addition to knowing the importance of exercise and that vitamin D was required for the absorption of calcium. Prior to the participants being given bone health education, the knowledge, health beliefs, and perceived risks for developing osteoporosis was measured using the Revised Osteoporosis Knowledge Test (ROKT) and the Osteoporosis Health Belief Scale (OHBS). Following the receipt of bone health education, the OSES was given to participants to measure the impact of the instruction on facilitating a change in preventive behavior. This descriptive approach enabled me to examine the problem of interest (Burns & Grove, 2009), osteoporosis prevention in premenopausal women and inconsistent documentation of bone health education by the health care provider. The approach for this project included an examination of the sample, data collection procedures, instrumentation, and data analysis for each project question.

The success of this project was based in part on the roles I had at the practicum site. As a student, I developed an evidence-base bone health education tool. As a nurse educator, I was in a position to disseminate the tool to premenopausal women, staff, and

health care providers. As an educator and clinician (NP), I was also in a position to recommend practice changes such as changes to the EMR template to facilitate documentation of bone health education by health care providers. The purpose of this project was to apply the evidence that bone health education can motivate premenopausal women to engage in behaviors to prevent osteoporosis, and to demonstrate that the EMR can be used to facilitate consistency in documentation by health care providers.

Approach to Project Question 1

Premenopausal women participated in the questionnaire/survey component of this study to generate information about the characteristics, beliefs, and perceived susceptibility for osteoporosis by premenopausal women. After the women received bone health education, the OSES (Appendix D) was used to measure the outcome of the educational intervention. The absence of randomization of the study sample posed a threat to the internal validity of the testing and subsequent generalizability of the findings (Burns & Grove, 2009; Cantrell, 2011; Hartung & Touchette, 2009).

Sample and Recruitment

The target population was premenopausal women ages 40-58 preparing for natural or surgically induced menopause. Upon arrival to the clinic for a visit with the HCP, each premenopausal woman meeting the age criteria for the project was given an invitation to participate in the osteoporosis knowledge project.

Data Collection

Participants were recruited from the panel of patients from the eight physicians and three nurse practitioners at the practicum site. A prospective review of the panel of patients to identify potential participants was conducted on each day of the 2-week project period. I conducted the review as project developer with oversight from the physician preceptor. The patient panel of each physician and the nurse practitioners at the practicum site was the source from which the sample was obtained for the project. This project was designed to determine the health beliefs, perceived susceptibility, and health motivation of women from all ethnic backgrounds. Women from any ethnic background meeting the inclusion criteria were included in the prospective sample.

The check-in/check-out receptionists were provided instructions regarding the identified potential participants for the study from the prospective patient visits for each health care provider. These individuals were also provided with instructions on how to review the project instruments for completeness.

Data collection began at the time of a participant check-in for the office visit. Participants were given a packet containing the ROKT, OHBS, and OSES. The questionnaires were completed by the participants while in the waiting and or exam room prior to being seen by the HCP. The bone health instruction fact sheet was given to each participant prior to their completion of the OSES. Each packet was given a unique code number that included the participant's age, assigned physician or nurse practitioner, and ethnicity. All of the coded instruments and forms were turned in during the check-out

process. The returned forms were given to the project developer for data entry, evaluation, and analysis with oversight from the physician preceptor.

Instruments

A literature search revealed several instruments that had been used to determine factors that influence behaviors in health promotion and prevention. The Revised Osteoporosis Knowledge Test (ROKT), the Osteoporosis Health Belief Scale (OHBS), and the Osteoporosis Self-Efficacy Scale (OSES) were selected as the appropriate instruments for this project. The ROKT, OHBS, and OSES instruments had been tested for content validity and reliability (Qi-Bing, Resnick, & Nahm, 2014; Edmonds, Turner, & Usdan, 2012; Gammage et al., 2011; Gendler et al., 2011, 2012; Kim et al., 1991; Soleymanian et al., 2014). The Revised Osteoporosis Knowledge Test (ROKT), which was administered first to the participants, is a 32-item multiple-choice test to assess an individual's knowledge and belief that a person is more or less likely to get osteoporosis in response to exercise and calcium (Kim et al., 1991.; The ROKT was revised by Gendler et al., in 2011, and 2012. This test consists of two subscales, nutrition and exercise, each with a reliability coefficient of 0.83 and 0.81 respectively with a Pearson correlation coefficient of 0.87 (Gendler et al., 2011, 2012). The ROKT was tested for validity using content validity and point-biserials correlations.

The Osteoporosis Health Belief Scale (OHBS) is a 42-item questionnaire that is used to assess an individual's perception of the seriousness of osteoporosis, beliefs about developing osteoporosis, and motivating health factors (Kim et al., 1991; Gendler et al., 2011, 2012. The reliability of this instrument was reported as .90 (Horan et al., 1993).

The Osteoporosis Self-Efficacy Scale (OSES) contains 12 items to measure an individual's confidence for engaging in osteoporosis preventing behaviors. Exercise and calcium are the focus of the two subscales that compose this self-efficacy assessment. Factor analysis and discriminant factor analysis were used by the developers of the instrument to evaluate the validity of the OSES. The reliability coefficient of the OSES on both scales was reported as .90 (Kim et al., 1991). The OSES was revised by Gendler et al., in 2011, and 2012.

Decisions about the applicability of study findings to practice changes are based on the validity and reliability of the findings (Burns & Groves, 2009). Strategies to limit threats to validity, reliability, and consistency to reduce errors included the following: administration of the ROKT and the OHBS prior to providing the participant with bone health education; anonymity of the project planner, and concise directions for participants. The receptionists were also given directions regarding the instruments that were used in the project.

Data Analysis

The data collected from the ROKT, OHBS, and OSES instruments were expected to reveal a change in attitude, belief, and behavior in regards to osteoporosis prevention. After the participants completed the ROKT, OHBS, and OSES and had been given bone health education, I expected that 100% of the women would be able to identify at least two major and two modifiable risk factors for osteoporosis, that 95% of the women would commit to engaging in at least two weight bearing exercises twice a week, and that 100% of the women would be able to recognize the recommended daily dose of calcium.

The response that was expected from the bone health education intervention was that premenopausal women would be motivated to engage in preventive behaviors to decrease their risk of developing osteoporosis.

The Statistical Package for Social Sciences (*SPSS*) Version 23 was used to organize, analyze, and synthesize the data to answer Project Question 1 (Burns & Groves, 2011). Descriptive analysis was used to determine how the premenopausal women scored on the ROKT, OHSB, and OSES using instructions provided by the developers of these instruments. The age and ethnicity of the participants were also used in the data analysis to identify differences in the responses of the premenopausal women. This information was used to create a table that would provide an overview of the sample population and any variables related to the project.

Approach to Project Question 2

Sample

The eight physicians and three nurse practitioners in the practicum site composed the sample of health care providers for the project. This quality improvement project was conducted to assess the dissemination and documentation of bone health education in the EMR by each of the health care providers. One goal of the project was to determine whether changes to the EMR template would facilitate documentation by the health care providers.

Data Collection

I conducted a retrospective review of the EMR for each health care provider. Only EMRs of respondents who met the criteria of premenopausal women were included in the

review as a part of the data collection. The eight physicians and nurse practitioners in the organization see an average of seven to nine premenopausal women per week. In a 2-week period, the frequency of encounters with premenopausal women was expected to generate 56-126 EMRs from the health care providers to review for the project.

Instruments

The use of technology in health care, such as the EMR, provided an opportunity to document the dissemination of patient-centered education that had been developed to promote safety, quality care, and improved patient outcomes (Zaccagnini & White, 2011). The component of measurement for the project was the consistency of documentation of bone health education in the EMR by physicians and nurse practitioners. Each of the health care providers was given the option to select that bone health education had been completed on the EMR template. The selection of this option on the EMR was designed to elicit the same information from each of the health care providers as a measurement of the consistency of documentation in support of the project question.

Data Analysis

The Statistical Package for Social Sciences (SPSS) Version 23 was used to organize, analyze, and synthesize the data to answer Project Question 2 (Burns & Groves, 2011). Measurement of each health care provider's use of the EMR template to document bone health education was used to identify and analyze gaps in performance (Kelly, 2011) by the health care providers. A change in the process of care, the dissemination of bone health education by the health care providers did occur. Changes to the EMR

template did facilitate the use of an evidence-based tool (structure), and an increase in provider documentation (outcome). This information was then used to provide support for practice and organizational changes congruent with the process of care, structure, and outcome model for quality (Donabedian, 1988).

Setting

This project was designed to promote quality improvement in an obstetrics and gynecological (OB/GYN) practice of eight physicians and three nurse practitioners (NPs). The natural setting of an OB/GYN office represented a real-life environment that had been deemed appropriate for descriptive studies (Burns & Grove, 2009). Potential participants were identified from the health care provider's panel of patients through a review of the electronic medical record over a 2-week period or until a sample of 40-60 women meeting the inclusion criteria had been obtained. The practicum site provided the participants who composed the target population.

I took steps to minimize the risk of bias and manipulation in the collection of data for this project (Burns & Grove, 2009). The project was administered under the supervision of a physician preceptor and nurse administrator at the practicum site. Volunteer participants for this project also came from my panel of patients. As a health care provider, my role was to disseminate and document bone health education during the office visit. A standardized bone health education fact sheet was distributed to the physicians and nurse practitioners for dissemination to the women who had been identified as participants in the study. At check-out, the receptionist collected forms and

forward them to me. I prepared all of the completed forms for data entry and analysis with oversight from the physician preceptor.

Protection of Human Rights

This project was conducted attentive to the participants right to self-determination, the right to full disclosure, respect, the right to fair treatment, confidentiality and privacy, and protection from discomfort or harm (Burns & Grove, 2009; Polit & Beck, 2004). Participants were provided with the credible and reliable information about the project to facilitate voluntary informed consent prior to a being accepted as a participant in the project. Measures to ensure the protection of human rights and informed consent are an ethical responsibility of the researcher and are congruent with the U.S. Department of Health, Education, and Welfare Regulations, the Code of Federal Regulations, TITLE 45, Part 46, Protection of Human Subjects and the ANA Code of Ethics. Participants upon signing the consent to take part in study were informed of their right to withdraw from the project at any time without fear of retaliation.

Approval for the project was obtained from the Institutional Review Board (IRB) of Walden University prior to the implementation of the project. The approval number that was assigned by the IRB for the project was 03-03-16-00057312. The administrator for the practicum site, physician preceptor provided oversight for the project. Oversight for the project, including the recruitment of participants, the collection, and analysis of data was provided by this writer's preceptor who had been approved by the School of Nursing at Walden University. Participants were given a predetermined code number that identified their health care provider only. All forms were to include the participants age

and date of birth. The names of the participants were not obtained at any time during the project.

<div style="text-align: center;">**Evaluation**</div>

An evaluation of the project was conducted upon its completion to determine the success of the program in relation to the expectations and objectives of the project (Kettner, Morney, & Martin, 2013) and if the intended affects were accomplished. The RE-AIM, reach, effectiveness, adoption, implementation, and maintenance model described by (Planas, 2008) was used to evaluate the outcomes of the project. This framework was used to evaluate the impact of the intervention on a specific population (reach), natural and surgically induced menopausal women. After an assessment of perceived risks, based on the HBM and receipt of bone health education pre-menopausal women were empowered to make an informed decision and commit to engaging in preventive behaviors (effectiveness) to decrease the risk of developing osteoporosis. The long term effects of the increased knowledge and preventive behaviors will result in a reduction in the number of women developing osteoporosis and the subsequent increased health care costs due to this debilitating disease.

Adoption of the bone health intervention for these women was measured by the health care provider role as patient advocate in counseling women on osteoporosis prevention and documentation in the EMR. I collaborated with the information specialist in making changes to the EMR template to facilitate documentation by the HCPs. Maintenance of the intervention will be measured by an annual review of the policies and procedures of the organization that promote the intervention and retrospective review of

the electronic medical record of women in the target group for documentation that bone health education has been provided. The information gathered from the evaluation was used to describe the achievements of the program, explanations for these, and set outs ways in which further development for other health care issues might be realized to better the organization. All of the data was evaluated by the project developer and the physician preceptor.

Summary

The ROKT, OHBS, and OSES were used to assess the knowledge, beliefs, and perceived risks of developing osteoporosis in English speaking pre-menopausal women age 40-58. Participants were recruited from a panel of patients for the physicians and nurse practitioners in an OB/GYN practice. The protections of human rights were enforced for the duration of the project. The *SPSS,* version 23, was used to organize the data for analysis.

The success of the project did require a commitment from the physicians, nurse practitioners, licensed vocational nurses, medical assistants and the check-in/check-out receptionists to encourage participants to complete the osteoporosis study packet at each stage of the office visit. These institutional stakeholders were given a PowerPoint© presentation on the purpose of the project, instructions for implementation, with emphasis on how their role in the project would be instrumental in the success of the project.

Section 4 provides a discussion of the project findings, implications for practice, strengths and limitations of the project. This section also includes an assessment of my role as a practitioner, scholar, and project manager.

Section 4: Findings, Discussion, and Implications

This quality improvement project was designed to promote health promotion for premenopausal women through the dissemination and documentation of bone health education by health care providers. The practice problem that was the catalyst for this project was threefold: there had not been any prior assessment of the premenopausal women's knowledge of osteoporosis, a bone health education tool (Appendix G) was not available, and the electronic medical record (EMR) template did not include bone health education in the patient/instruction menu. There was a need to assess the knowledge, health beliefs, and perceived susceptibility to osteoporosis in premenopausal women. This information was needed to close the knowledge gap and determine whether bone health education would motivate premenopausal women to commit to preventive behaviors to minimize their risk of developing osteoporosis.

The project questions were as follows: Would premenopausal women age 40-58 who receive bone health instruction prior to the onset of natural or surgically induced menopause commit to engaging in preventive behaviors to reduce their risk of developing osteoporosis? Would the implementation of a bone health education tool and changes to the EMR template facilitate use of a bone health education and improve documentation by health care providers? I expected that these women would be able to do the following after receiving bone health education: identify at least two major and two modifiable risk factors for osteoporosis, commit to engage in exercise at least twice a week, and be able to recognize the recommended daily dose of calcium. This section presents the goals, objectives, findings, outcomes, and evaluation of the project as related to the project

questions. The implications for practice within the organization and in the nursing community are also described

.Evaluation/Analysis/Findings/Discussion

Fifty-five survey packets containing the Revised Osteoporosis Test (ROKT), Osteoporosis Health Belief Scale (OHBS), and Osteoporosis Self-Efficacy Scale (OSES) were distributed to premenopausal women ages 40-58 who met the project criteria. The ROKT (Appendix B), OHBS (Appendix C), and OSES (Appendix D) were used to evaluate the knowledge, health beliefs, perceived susceptibility of developing osteoporosis, and self-efficacy in premenopausal women. The project was conducted over a period of 2 weeks. Fifty-five survey packets were returned. Seven surveys were eliminated due to the failure of respondents to complete two of the three questionnaires in the packet. Three surveys were eliminated due to the respondents not meeting the age criteria for the project. The remaining sample for the project was 45 premenopausal women ($N = 45$). The mean age of the respondents was 48 years.

Analysis

The analysis of the data from the ROKT, OHBS, and OSES questionnaires involved the examination of the individual scores and the subscales for each of the instruments. Each subscale was created according to the developers' guidelines for the instrument. Nutrition (Items 1-11 and 18-32) and exercise (Items 1-17 and 30-32) comprised the two subscales for the ROKT (Kim et al., in 2011, and 2012). A score of 1 was awarded for each correct response and 0 for an incorrect response. Respondents could receive a total nutrition subscale score ranging from 0 to 26. A score of 0 to 20

could have been obtained by respondents on the exercise subscale. The two subscales

also shared common items that assessed risk factors, screening, treatment, and bone

development.

Respondents were also asked to complete the OHBS. This 42-item questionnaire

had seven subscales: susceptibility, seriousness, benefits of exercise, benefits of calcium

intake, barriers to exercise, barriers to calcium intake, and health motivation. There were

6 items in each subscale, which created an opportunity for the respondent to receive a

total score of 6 to 30 for each subscale. Each item contained five response options on a

Likert scale. The "strongly agree" response was scored as 5, and the "strongly disagree"

response was scored as 1.

The 12-item OSES included two subscales: exercise (Items 1-6) and calcium

intake (Items 7-12). The respondents were asked to indicate on a scale from "not at all

confident" to "very confident" their ability to engage in behaviors to prevent

osteoporosis. Each respondent's score was measured on a 100 millimeter line with 0

being "not at all confident" to 100 millimeters being "very confident." The range of score

for each item was 0-100.

Findings and Analysis of the ROKT

The ROKT was used to assess the knowledge of osteoporosis prevention in

premenopausal women. There had not been an assessment of bone health knowledge in

premenopausal women prior to the implementation of this project. Table 1 shows the

ROKT data for the 45 respondents. This table shows a mean score of 10 on the exercise

subscale and a mean score of 14.0 on the nutrition subscale. The assessment of

knowledge was deemed necessary to close the gap in knowledge to facilitate

development of the best primary prevention strategies.

Table 1

Pre-menopausal women's knowledge, health beliefs, and self-efficacy scores

	Minimum	Maximum	Mean	*SD*	α
ROKT Revised Osteoporosis Knowledge Test					
ROKT-ExS	1.0	16.0	10.0	4.0	.78
ROKT-NuS	2.0	21.0	14.0	4.5	.77
ROKT-Total	3.0	25.0	16.4	5.6	
OHB Osteoporosis Health Belief Scale					
OHB SuscS	6.0	33.0	18.0	5.4	.59
OHB SerS	6.0	26.0	17.3	4.6	.82
OHBBenExS	.00	30.0	24.0	6.0	.96
OHBBarExS	6.0	21.0	11.2	4.3	.73
OHBBenCaS	.00	61.0	22.4	4.3	.44
OHBBarCaS	6.0	24.0	11.2	4.5	.91
OHBHMo S	15.0	30.0	23.4	4.1	.81
OSE Osteoporosis Self- Efficacy Scale					
OSEExIndSc	.00	100	62.0	33	
OSEExS	.00	600	372	199	.98
OSECaIndSc	.00	100	65.0	30.0	
OSECaS	.00	600	387	175	.98

Note. ROKT-Ex S = Revised Osteoporosis Knowledge Exercise Subscale; ROKT-NuS = Revised Osteoporosis Nutrition Subscale; OHBSuscS = OHB Susceptibility Subscale; OHBSerS = OHB Seriousness Subscale; OHB Ben ExS = OHB Benefits of Exercise Subscale; OHBBarEx S = OHB Barriers to Exercise Subscale; OHBBenCaS = OHB Benefits of Calcium Subscale; OHBBarCa S = OHB Barriers to Calcium Subscale; OHBHMoS = OHB Health Motivation Subscale; OSEExIndSc = OSE Exercise Individual Scores; OSEExS = OSE Exercise Subscale; OSECaIndSc =OSE Individual Scores; OSECaS = OSE Calcium Subscale.

   Although 87% of respondents knew that being menopausal could increase their

chance of getting osteoporosis, only 33% knew that surgical removal of the ovaries was

also a risk factor for osteoporosis. Sixty percent of the respondents correctly identified

smoking as a risk factor; however, only 40% knew that the consumption of two or more

alcoholic drinks per day could also increase their risk of developing osteoporosis. Although 71% of respondents knew that vitamin D was required for the absorption of calcium, only 55% knew the recommended daily dose of calcium. Sixty-two percent (28 respondents) correctly identified aerobic dancing as an acceptable activity to reduce the risk of developing osteoporosis; however, only 27% (12 respondents) knew that 30 minutes of daily exercise was recommended.

Respondents were also able to identify acceptable sources of calcium, including cheese (87%), sardines (49%), broccoli (71%), yogurt (87%), and ice cream (56%). Although 60% of respondents knew that a bone density scan could be used to diagnose osteoporosis, only 55% were aware that osteoporosis could be treated with medication.

The analysis of data collected from the ROKT suggests that a gap in knowledge regarding the prevention of osteoporosis existed in the premenopausal respondents. This information supports the need for the dissemination of bone health education to premenopausal women by health care providers.

Findings and Analysis of the OHBS

Table 1 shows the scores of 45 respondents on seven subscales: susceptibility, seriousness, benefits to exercise, barriers to exercise, benefits of calcium, barriers to calcium intake, and health motivation. The HBM is the concept that supports the findings of OHBS. According to the HBM, health behavior is determined by a person's "perceived susceptibility of the health problem, perceived severity, perceived benefits, perceived barriers, and cues to action," (McEwen & Ellis, 2011, p. 290). This information was deemed important to the design of a bone health education tool tailored to

premenopausal women as motivation to participate in preventive behaviors (Sedlak et al., 2005; Sedlak et al., 2007). The mean scores for the respondents were as follows: susceptibility (18.0), seriousness (17.3), benefits to exercise (24.0), barriers to exercise (11.2), benefits of calcium (22.4), barriers to calcium intake (11.2), and health motivation (23.4). This project was designed to close the gap of knowledge that had existed for premenopausal women regarding the prevention of osteoporosis. According to Nielsen et al. (2012), it is the awareness of risks of osteoporosis that facilitate women's belief about susceptibility. My findings suggest that the health care providers had not adequately disseminated bone health education to these women to affect their belief about susceptibility for osteoporosis and their ability to change modifiable risk factors such as taking calcium and exercising.

Findings and Analysis of the OSES

Self-efficacy is the belief of a person's ability to initiate, maintain, and persist in performing an activity despite distractions (Endicott, 2013). The responsibilities of family, career, health, age, and lifestyle changes may affect the premenopausal woman's confidence in her ability to initiate and maintain efforts to prevent the development of osteoporosis. Table 1 show that the respondents mean individual score on the exercise scale was 62% while the overall score was 372. The mean individual and overall calcium score for the respondents was 65% and 387 respectively. These women had a mean confidence of 62% for self-efficacy to engage in exercise and a 65% confidence in adherence to calcium intake. The above average self-efficacy scores were obtained after reviewing the bone health fact sheet. These findings suggest that osteoporosis-specific

education increased the premenopausal women's knowledge and belief in engaging in and adhering to preventive strategies.

Analysis of Research Question 1

This question addressed whether premenopausal women ages 40-58 given bone health education prior to the onset of natural or surgically induced menopause would engage in preventive behaviors to reduce their risk of developing osteoporosis. The bone health education tool was placed in the exam rooms of each health care provider to enable each of the respondents to review it prior to completion of the OSES and their visit with the physician or nurse practitioner. Table 2 shows that these women had a mean confidence of 62% for self-efficacy to engage in exercise and a 65% confidence in adherence to calcium intake. Table 2 shows that 61% of the respondents knew the recommended length of time to exercise. Sixty-five percent of the respondents were confident that they would do the recommended exercises to minimize their risk of developing osteoporosis.

Table 2

Pre-menopausal women's knowledge of the length of time to exercise and commitment to exercise. (N =45)

	Minimum	Maximum	Mean	SD
Ex Time	.00	100	61.4	34.0
Will do Ex	.00	100	65.2	33.5

Analysis of Research Question 2

This research question addressed whether the implementation of a bone health education tool and changes to the EMR template facilitate and improve documentation of bone health education by health care providers. During the project period, a system alert

was placed in the EMR to prompt seven physicians and three nurse practitioners in an

obstetrics and gynecology practice to disseminate and document bone health education

on premenopausal women ages 40-58. The dissemination and documentation of bone

health education by health care providers was examined. This practice of health care

providers (HCPs) has a patient population of approximately 14,000 women 40-58 years

of age. During the 2-week period for the project, 1,649 premenopausal women were seen

by the health care providers. The counseling code and the system alert on the EMR

facilitated a timely assessment of the documentation activities of each provider. The

mean score of documentation by the health care providers was 164.9. There was 100%

documentation compliance among the health care providers. The system alert facilitated

compliance with the project initiative to disseminate and document bone health as a

quality indicator to improve patient safety and the best outcomes through primary

prevention.

Knowledge of Major Risk Factors

The response that was expected of the respondents following receipt of bone

health education was that these women would be able to identify two major risk factors

for osteoporosis. Table 3 shows that 87% of the respondents answered correctly that

menopause is a major risk factor in the development of osteoporosis. However, 33% of

respondents, as shown in Table 3, did not know that surgical removal of the ovaries was

also a major risk factor in the development of osteoporosis.

Table 3

Women's knowledge of menopause as a major risk factor for osteoporosis

		Frequency	Percent
Menopause	Incorrect	6	13.3
	Correct	39	86.7
	Total	45	100

Table 4

Women's knowledge of the surgical removal of the ovaries as a major risk factor for osteoporosis

		Frequency	Percent
Ovaries	Incorrect	30	66.7
	Correct	15	33.3
	Total	45	100
	Total	45	100

Modifiable Risk Factors

Modifiable risk factors are diet and or lifestyle changes that can directly impact a disease or condition. Respondents at the completion of bone health education were expected to be able identify two modifiable risk factors in the development of osteoporosis. Table 5 shows that 60% of the women did not know that consuming more than two alcoholic drinks per day was a risk factor for osteoporosis. Sixty percent of the respondents, as seen in Table 5 were able to identify smoking as a modifiable risk factor in the prevention of osteoporosis. There was the expectation that after the dissemination of bone health education 100% of the respondents would be able to verbalize at least two modifiable risk factors for osteoporosis.

Table 5

Women's knowledge of consuming more than two alcoholic drinks per day as a modifiable risk factor for osteoporosis. (N = 45)

		Frequency	Percent
Alcohol	Incorrect	27	60.0
	Correct	18	40.0
	Total	45	100

.

Table 6

Women's knowledge of smoking on a daily basis as a modifiable risk factor for osteoporosis. (N =45)

		Frequency	Percent
Smoking	Incorrect	18	40.0
	Correct	27	60.0
	Total	45	100

Commitment to Engage in Exercise

There was the expectation that 95% of the respondents would commit to exercise for the recommended length of time to minimize the risk of developing osteoporosis. Table 2 shows that 61% of the respondents knew the recommended length of time to exercise. Sixty-five percent (Table 2) of the respondents were confident that they would do the recommended exercises to minimize their risk of developing osteoporosis.

Table 2

Pre-menopausal women's knowledge of the length of time to exercise and commitment to exercise. (N =45)

	Minimum	Maximum	Mean	SD
Ex Time	.00	100	61.4	34.0
Will do Ex	.00	100	65.2	33.5

Knowledge of Calcium Intake

Fifty-six percent of the respondents (Table 7) knew the recommended daily dose of calcium. Seventy-one percent of the respondents (Table 8) knew that vitamin D was required for calcium absorption. According to Sedlak et al.,(2005), and Sedlak et al., (2007) knowledge of susceptibility to a disease or condition, such as the lack of calcium, has been a motivating factor in promoting self-efficacy and adherence to preventive behavior changes.

Table 7

Women's knowledge of the recommended daily dose of calcium. (N = 45)

		Frequency	Percent
Calcium	Incorrect	20	44.4
	Correct	25	55.6
	Total	45	100

Table 8

Women's knowledge that Vitamin D is required for the absorption of calcium. (N = 45)

		Frequency	Percent
Vitamin D	Incorrect	13	28.9
	Correct	32	71.1
	Total	45	100

.

Evaluation/Discussion

The analysis of data collected from the ROKT suggests that a gap in knowledge regarding the prevention of osteoporosis did exist in the pre-menopausal respondents. This information did support the need for the dissemination of bone health education to pre-menopausal women by the health care providers. After receiving bone health

education, the participants had a mean confidence of 62% for self-efficacy to engage in exercise and a 65% confidence in adherence to calcium intake. These findings indicate that bone health education can motivate pre-menopausal women to engage in osteoporosis preventive behaviors. The use of the system alert on the EMR and the addition of bone health education to the patient education instruction template did prove to facilitate consistency of dissemination and documentation by the health care providers.

Data from the ROKT, OHBS, and OSES, did confirm a gap in knowledge among pre-menopausal women regarding the prevention of osteoporosis. After the respondents were given bone health instruction these women were able to identify two major and two modifiable risk factors for osteoporosis. These women, 62% were able to express with confidence a commitment to engage in exercise and 65% of the women plan to consume the recommended daily dose of calcium. The data also showed that 60%of the women did not know that consuming more than two alcoholic drinks per day was a risk factor for osteoporosis. Approximately 67% of the respondents did not know that surgical removal of the ovaries was a major risk factor in the developing osteoporosis. There exists an imperativeness to educate pre-menopausal women on osteoporosis which is a threat to the quality health and quality of life of women (Berry et al., 2010; Gammage et al., 2011; NAMS, 2010).

This quality improvement project was designed to determine if changes to the EMR, inclusive of a system alert, and the addition of bone health on the patient instruction template would facilitate consistent dissemination and documentation of bone health by the health care providers. During the two-week period for the project 1,649 pre-menopausal women were seen by the health care providers. The system alert, bone health

education too, and changes to the patient instruction template contributed to 100%

compliance with the dissemination and documentation goals of the project.

Implications

The implication for social change is the prevention of osteoporosis in pre-

menopausal women through the effective dissemination of bone health education. Health

care providers must be cognizant that a failure to communicate the risks of osteoporosis

could have a devastating effect on the lives of pre-menopausal women. There has to be a

commitment from health care providers to eliminate the knowledge gap regarding

osteoporosis prevention in pre-menopausal women. Osteoporosis has had a devastating

effect on the lives of women, their families, the community and the nation resulting in

increased hospitalizations, long term care facility admissions, and an economic impact

that has been projected to exceed 25 billion over the next ten years (Burge et al., 2007;

Dickinson, 2014; Moyer, 2013; Roush, 2011). Bone health education has been cited in

the literature as an evidence-based strategy that must be initiated by health care providers

(Hess et al., 2013).

The use of a system alert on the EMR can be an effective tool to facilitate clinical

decision making, and the documentation of education and preventive strategies (Soares et

al., 2012). Changes to the EMR, such as a system alert, and additions to the patient

instruction template was a practice change that was effective and could applied to other

practice based problems. These findings suggest that the EMR template could be

constructed to identify disease specific risk factors which could facilitate the HCPs

decision making as to what education is needed for the patient.

Policy

The making of health care policy in today's health care system mandates that providers and organizations develop initiatives and or standards that reflect accountability, and are focused on the quality of care and improved patient outcomes (Wachter & Pronovost, 2009). This quality improvement project was developed to facilitate a policy change to benefit the care of pre-menopausal women. The DNP prepared nurse has the qualifications to participate in and or lead in the development of policy changes within an organization (Zaccagnini & White, 2011).

Research

Premenopausal women are at risk for osteoporosis due to the "fluctuating and declining levels of estrogen levels that are needed to maintain bone health," (Endicott, 2013, p. 5). A review of the literature suggests that bone health education is an evidence-based intervention to improve women's knowledge of osteoporosis, major and modifiable risk factors, and the lifestyle and behavior changes needed to minimize their risk of developing osteoporosis (Endicott, 2013; Nguyen et al., 2014; Sedlak et al., 2005). The bone health education tool that was developed for the project, changes to the patient instruction menu and the system alert on the EMR did facilitate the dissemination and documentation of osteoporosis prevention strategies to pre-menopausal women. Rolnick et al., (2001) also cited bone health education as a motivator to change behavior.

According to McEwen and Ellis (2011) the premise of the HBM, the examination of an individuals' "perceived susceptibility of the health problem, perceived severity, perceived benefits, perceived barriers, and cues to action," (p.290) will the provide

information needed to design a tailored educational program for the target population. After an assessment of the participants' knowledge of osteoporosis the OHBS and OSES instruments were used to determine their health beliefs, perceived susceptibility, and commitment to engage in preventive behaviors.

<p style="text-align: center;">**Strengths and Limitations of the Project**</p>

According to Burns and Grove (2009) theoretical and methodological limitations, and, or restrictions can decrease the generalizability of the project findings. The HBM as the conceptual framework for this project does not take into account cultural differences. One limitation of the project was the failure to obtain a sample of pre-menopausal women that represented the different cultures. This failure was due in part to inconsistent documentation of the woman's ethnicity on the questionnaires. Sedlak et al., (2005) and Sedlak et al. (2007), suggest that disease prevention activities should be tailored to the target audience, personalized to fit the interests, concerns, culture, and learning style of the participants. Information regarding the ethnicity of these women could have been used to create prevention strategies congruent with their cultural and health beliefs.

The development of a system alert and accompanying counseling code for the EMR to facilitate the dissemination and documentation of bone health education was created in collaboration with the information technology specialist for the organization. During the two weeks that were designated for the project the system alert was able to capture the documentation activities of seven physicians and three nurse practitioners. Due to maternity leave one physician was out of the office for the duration of the project. The alert was user friendly and could be modified for use with other practice problems.

Analysis of Self

This DNP program and project has prepared me to have an impact on social change for individuals, groups, organizations, local and global communities (Walden University, 2015). The knowledge, skills, experience, and expertise that I have acquired through 40 years of nursing, with the last 19 years as a women's health nurse practitioner has equipped me with the tools necessary to be an agent of change for my organization and the body of nursing. This project has been instrumental in my acquisition of new knowledge and in the development of new competencies that will enable me to effectively participate in and or lead in organizational and system changes, the analysis of evidence-based practice, the application of information technology in health care, advocacy in health care policy, collaboration, and prevention for populations (AACN, 2006).

As a Practitioner

As a practitioner I have come to realize that my role as a DNP must extend beyond my expertise as a nurse practitioner to include involvement in organizational, economic, and collaborative leadership in the delivery of health care that has become increasingly more complex (Zaccagnini & White, 2011). This DNP prepared practitioner has also learned the imperativeness of understanding the scientific underpinnings and the evidence that supports practice changes (AACN, 2006). I have learned that it is incumbent upon the practitioner to the research that supports evidence-based practice and to be skilled in the translation and communication of practice changes to all of the stakeholders that will be affected by those changes. The opportunity to develop a quality

improvement project for the organization was for me a chance to demonstrate my

commitment as a practitioner to deliver patient-centered care designed to improve patient

outcomes. I will continue to volunteer for quality improvement projects within the

organization and in the community.

As a Scholar

I have a professional responsibility to be cognizant of new and existing

knowledge and the importance of this knowledge in evidence-based practice in my role

as a DNP prepared scholar. This acquisition of knowledge is imperative in the

development of projects for the organization, and in the creation of protocols and system

changes designed to improve the quality of care for the patient/stakeholder of the

organization. Through reading peer-reviewed journals, and other course materials I

learned how to apply and evaluate new knowledge related to my project (Terry, 2012).

This program of study has prepared me with the knowledge that I needed to develop an

evidence-base bone health education tool that will serve as a guide to improve practice

and patient outcomes. As a scholar, and associate faculty member for an international

university I am committed to engage lifelong learning.

As Project Manager

The identification of a practice based problem, the absence of a tool and or

protocol to facilitate the dissemination and documentation of bone health education

created an opportunity for me to develop a quality improvement project to address this

problem. My role as project manager began with being placed on the meeting agenda for

the physician partners. This meeting gave me the opportunity to describe the project, and

how the project, with a few practice changes, would improve the quality of care for pre-menopausal women. According to Lowery (2009) once a problem has been identified within an organization it is imperative that problem be an item on the organizations' meeting agenda. Sustainable change (Kirkpatrick & Weaver, 2013) is the expected outcome of this project. I plan to ask the physician partners to continue the use of the bone health education alert on the EMR, bone health education in the patient instruction menu, and distribution of the bone health fact sheet to all patients as a quality indicator for the organization.

As project manager I able to start a project and see it through to its completion using the organization and research skills that I have learned throughout this educational journey. Through these skills I was able to communicate to the stakeholders, the physicians, staff, and the pre-menopausal women in the project that there is evidence that supports bone health education as a major factor in the prevention of osteoporosis.

Summary

Bone health is not just for premenopausal women. Primary prevention, such as, with nutrition and lifestyle changes to minimize the risk of developing osteoporosis should begin with the onset of puberty and or adolescence.

The purpose of this quality improvement project was to promote safety through prevention, quality care, and improve patient outcomes through the dissemination and documentation of bone health education. Changes to the EMR template did facilitate consistent documentation of the dissemination of bone health education by the health care providers.

The ROKT and OHBS used in the project did identify a gap in the participant's knowledge regarding the major risk factors for osteoporosis. This project provided evidence that there must be an assessment of the knowledge, health beliefs, perceived susceptibility, and self-efficacy for the medical, lifestyle and nutritional changes for all women.

Section 5: Dissemination

The dissemination of the information from this capstone project will be in the form of a PowerPoint presentation. This purpose of the presentation will be to communicate to my organization that this project identified a practice-based problem, included strategies to promote safety, improved patient outcomes, promoted quality improvement, and contained best practices for the patients and stakeholders (Gray, 2013; White & Dudley-Brown, 2012). The PowerPoint presentation will also be used for future dissemination at a professional nursing conference.

Dissemination to the Organization

The quality of care begins with the point of care, which is improved through the dissemination of knowledge (White & Dudley-Brown, 2012). There will be an opportunity to recommend a practice change (bone health education) at the point of care with all members of the patient population at a meeting of the physician's partners and staff. The implementation of practice changes to improve the delivery and quality of care is congruent with DNP *Essentials II* regarding the role of the DNP as a leader within the organization (AACN, 2006). A PowerPoint presentation can be used as visual support to an oral presentation (Bradshaw & Lowenstein, 2007).

Dissemination to a Professional Nursing Organization

According to Zaccagnini and White (2011), professional conferences, organizational meetings, national meetings, and local meetings are an appropriate venue for the dissemination of new knowledge to the body of nursing. As a member of Nurse Practitioners in Women's Health (NPWH) and the American Association of Nurse Practitioners (AANP) I plan to respond to requests by these organizations for a speaker to present a study that is pertinent to the body of nursing and that will improve practice. The bone health education tool that I have developed, including the process to facilitate its distribution and documentation in the electronic medical record (EMR) by health care providers, is noteworthy. Both of these venues include an audience of primary and women's health care providers that would benefit from the findings of this quality improvement project. The presentation will include the background, purpose, nature of the project, problem statement, sample, setting, procedure, data collection, results, and conclusion.

Scholarly Project

Background

Osteoporosis is a risk factor for natural and surgically induced menopausal women and is also a global concern (Barbieri, 2009; North American Menopause Society, 2010; Nguyen et al., 2014; Soleymanian et al., 2014). This debilitating systemic skeletal disorder is characterized by low bone mass and reduced bone mineral density that occurs with the loss of estrogen seen in natural or surgically induced menopausal women. The practicum site had never had a formal assessment of the premenopausal

women's knowledge, beliefs, and perceived susceptibility to developing osteoporosis. The unavailability of a bone health education tool and the absence of bone health education/instructions on the EMR template for the HCPs to select created a gap in best practice that needed to be closed.

Setting

The organization is an obstetrics and gynecology practice of eight physicians and three nurse practitioners. The mission of the organization is to provide evidence-based quality care to promote the health, safety, and best outcomes for women who selected the practice as their choice for premier women's health.

Purpose

The purpose of this quality improvement project was to promote safety through prevention, quality care, and improved patient outcomes through the dissemination and documentation of bone health education. Changes to the EMR template to facilitate the HCPs dissemination and documentation of bone health education will increase the knowledge of premenopausal women on preventive behaviors to minimize their risk of developing osteoporosis. The goal of the project was to increase the dissemination and documentation of bone health education for premenopausal women 40-58 years of age, to facilitate the development of preventive behaviors to decrease the risk of developing osteoporosis.

Nature of the Project

This project used the Revised Osteoporosis Knowledge Test, Osteoporosis Health Belief Scale, and Osteoporosis Self-Efficacy Scale to assess the knowledge, health

beliefs, perceived susceptibility, and commitment to engage in behaviors to minimize the risk of developing osteoporosis. There was also a need to determine whether adding bone health education to the EMR template would promote consistent documentation that the information had been disseminated to premenopausal women. This project was designed to promote quality improvement in an obstetrics and gynecological (OB/GYN) practice of eight physicians and three nurse practitioners (NPs). Participants for the questionnaires/surveys were identified from the health care provider's panel of patients over a 2-week period until a sample of 45 women meeting the inclusion criteria had been obtained.

Sample

The target population was premenopausal women ages 40-58 preparing for natural or surgically induced menopause. Seven physician and three nurse practitioners in the organization were the health care providers for the project.

Procedure and Data Collection

During the project period, a system alert was placed in the electronic medical record (EMR) to prompt seven physicians and three nurse practitioners to disseminate and document bone health education. At the conclusion of the 2-week project period, 1,649 premenopausal women had been seen by the HCPs. These data were captured by tracking the number of times the system alert was completed and the counseling was documented.

Fifty-five survey packets, consisting of the Revised Osteoporosis Test (ROKT), Osteoporosis Health Belief Scale (OHBS), and the Osteoporosis Self-Efficacy Scale

(OSES) were distributed to premenopausal women ages 40-58 who met the project criteria. Fifty-five survey packets were returned. Seven surveys were eliminated due to a failure of the respondents to complete two of the three questionnaires. Three surveys were eliminated due to the respondents not meeting the age criteria for the project. The remaining sample for the project was 45 premenopausal women ($N = 45$). The mean age of the respondents was 48 years.

Results

Although 87% of respondents knew that being menopausal could increase their chance of getting osteoporosis, only 33% knew that surgical removal of the ovaries was also a risk factor for osteoporosis. The analysis of data suggested that a gap in knowledge regarding the prevention of osteoporosis existed. After receiving bone health education, participants had a mean confidence of 62% for self-efficacy to engage in exercise and a 65% confidence in adherence to calcium intake. These findings indicate that bone health education can motivate premenopausal women to engage in osteoporosis preventive behaviors. There were 1,649 premenopausal women seen by the health care providers during the project period. The system alert on the EMR facilitated documentation as noted in a mean score of 164.9 by the health care provider.

<div align="center">Conclusion</div>

Knowledge of the major and modifiable risk factors for osteoporosis and prevention behaviors was cited as a strategy to minimize risk for developing osteoporosis (Gammage et al., 2011; Giangregorio et al., 2009; Healthy People, 2020). Bone health education has also been cited as a motivator for preventive behaviors. This study

indicated a gap in women's knowledge regarding the risk factors for osteoporosis. Health care providers should consider the dissemination of bone health education to all women across their lifespan.

References

Adkins, E. S. (2012). *Best practice to promote bone health in post-menopausal women through adequate intake of calcium and vitamin D.* (Doctoral dissertation). Retrieved from http://scholarcommons.sc.edu/etd/1673

Ailenger, R. L., Braun, M. A., Lasus, H., & Whitt, K. (2005). Factors influencing osteoporosis knowledge: A community study. *Journal of Community Health Nursing, 22*(3), 135-142. Retrieved from http://www.jstor.org/stable/3427853

Akdemir, N., Bilir, C., Cinemre, H., Pekuz, M., & Gokosmanoglu, F. (2010). Relationship of bone densitometry and bone resorption markers with menopausal type and duration. *Turkish Journal of Rheumatology, 25*(1), 29-33. http://dx.doi.org/10.5152/tjr.2010.05

Al-Anazi, A. F., Qureshi, V. F., Javaid, K., & Qureshi, S. (2011). Preventive effects of phytoestrogens against postmenopausal osteoporosis as compared to the available therapeutic choices: An overview. *Journal of Natural Science Biology Medicine, 2*(2), 154-163. http://dx.doi.org/10.4103/0976-9668.92322

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice.* Washington, DC: Author. Retrieved from http://www.aacn.nche.edu/publications/position/DNPEssentials.pdf

American College of Obstetricians and Gynecologists. (2012). Osteoporosis. ACOG Practice Bulletin N. 129: Osteoporosis. *Obstetrics & Gynecology, 120* (3), 718-734. http://dx.doi.org/10.1097/ACOG.0b013e31826dc446

Barbieri, R. L. (2009). Osteoporosis. In American College of Obstetricians and

Gynecologists (Ed.), PRECIS: *Primary and preventive care, 4* (pp. 171-176). Washington, DC: Editor.

Bechtle, J. (2013). Osteoporosis risk reduction and bone health. *Nursing for Women's Health*, *17*(3), 245-251. http://dx.doi.org/10.1111/1751-486X.1203

Becker, M. H., & Maimam, L. A. (1975). Socio behavioral determinants of compliance with health and medical care recommendations. *Medical Care, 13*, 10-24. Retrieved from http://www.jstor.org/stable/3763271

Berry, S., Kiel, D., Donaldson, M., S., Kanis, J., Johansson, H., & Samelson, E. (2010). Application of the national osteoporosis foundation guidelines to postmenopausal women and men: The Framingham osteoporosis study. *Osteoporosis International, 21*(1), 53-60. http://dx.doi.org/10.1007/s00198-009-11273

Bradford, P. G., Gerace, K. V., Roland, R. L., & Chrzan, B. G. (2010). Estrogen regulation of apoptosis in osteoblasts. *Physiology Behavior, 99*(2), 181-185. http://dx.doi.org/10.1016/j.physbeh.2009.04.025

Bradshaw, M. J., & Lowenstein, A. J. (2007). *Innovative teaching strategies in nursing and related health professions* (4th ed.). Sudbury, MA: Jones and Bartlett.

Burge, R., Dawson-Hughes, B., Solomon, D. H., Wong, J. B., King, A., & Tosteson, A. (2007). Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *Journal of Bone and Mineral Research, 22*(3), 465-475. http://dx.doi.org/10.1359/jbmr.061113

Burns, N., & Grove, S. K. (2009). *The practice of nursing research: Appraisal, synthesis and generation of evidence* (6th ed.). St. Louis, MO: Saunders Elsevier.

Cantrell, M. A. (2011). Demystifying the research process: Understanding a descriptive comparative research design. *Pediatric Nursing, 37*(4), 188-189.

deVilliers, T. J. (2009). Bone health and osteoporosis in postmenopausal women. *Best Practice & Research*: *Clinical Obstetrics & Gynecology, 23*(1), 73-85. http://dx.doi.org/10.1016/j.bpobgyn.2008.10.009

Dickinson, E. (2014). Osteoporosis, fragility fractures, and associated surgeries. *OR Nurse, 8*(2), 16-24). http://dx.doi.org/10.1097/01.ORN.0000444118.41428.35

Donabedian, A. (1988). The quality of care: How can it be assessed? *The Journal of the American Medical Association, 260*, 1743-1748. http://dx.doi.org/10.1001.jama.1988.03410120089033

Edmonds, E., Turner, L., & Usdan, S. (2012). Osteoporosis knowledge, beliefs, and calcium intake of college students: Utilization of the health belief model. *Open Journal of Preventive Medicine, 2*, 27-34. http://dx.doi.org/10.4236/oljpm.2012.21005

Endicott, R. D. (2013). Knowledge, health beliefs, and self-efficacy regarding osteoporosis in perimenopausal women. *Journal of Osteoporosis, 2013*(853531), 1-6. http://dx.doi.org/10.1155/2013/853531

Ferlie, E. B., & Shortell, S. M. (2001). Improving the quality of health care in the United Kingdom and the United States: A framework for change. *Milbank Quarterly, 79*(2), 281-315. doi: 10.1111/1468-009.00206

Friis, R. H., & Sellers, T. A. (2009). *Epidemiology for public health practice.* (4th ed.). Sudbury, MA: Jones and Bartlett.

Gass, M. (2012). Osteoporosis. *Obstetrics and Gynecology, 120*(3), 718-724.

    http://dx.doi.org/10.1097/AOG.0b013e31826dc45d

Gendler, P. E., Coviak, C. P., Martin, J. T., Kim, K. K., Dankers, J. K., Barclay, J. M., &

    Sanchez, T. A., (2014). Revision of the osteoporosis knowledge test: Reliability

    and validity. *Western Journal of Nursing Research.*

    http://dx.doi.org/10.1177/0193945914537565

Giangregoro, L., Dolovich, L., Cranney, A., Adili, A., deBeer, J., Papaiannou, A.,

    Thabane, L., & Adachi, J. D. (2009). Osteoporosis risk perceptions among

    patients who have sustained a fragility fracture. *Journal of Patient Education and*

    Counseling, *74*(2), 213-220. http://dx.doi.org/10.1016/jpec.2008.08.201

Gray, M. (2013). The doctor of nursing practice: Defining the next steps. *Journal of*

    Nursing Education, 52(8), 462-464. http://dx.doi.org/10.3928/01484834-

    20130719-02

Hartung, D., & Touchette, D. (2009). Overview of clinical research design. *American*

    Journal of Health-System Pharmacy, 66, 398-408.

    http://dx.doi.org/10.2146/ajhp080300

Hess, B. J., Johnston, M. A., Iobst, W. F., & Lipner, R. S. (2013). Practice-based learning

    can improve osteoporosis care. *Journal of American Geriatrics Society, 61*, 1651-

    1660. http://dx.doi.org/10.1111/jgs.12451

Horan, M. L., Kim, K. K., & Gendler, P. (1993). *Development and evaluation of*

    osteoporosis self-efficacy scale. Paper presented at the Midwest Nursing Research

    Society Conference. Cleveland, OH.

Horan, M. L., Kim, K. K., Gendler, P., Froman, R. D., & Patel, M. B. (1998).

Development and evaluation of the osteoporosis self-efficacy scale. *Research in Nursing and Health, 21*(5), 395-403. http://dx.doi.org/10.1002/(SICI)1098-240X(199810)21:5<395::AID-NUR3>3.0.CO;2-1

Jemal, A. (2010). Cancer statistics. *CA: A Cancer Journal for Clinicians, 60*(5), 277-300. http://onlinelibrary.wiley.com.doi/10.322/caac.20073

Kass-Wolff, J. (2011). Menopause and the hormone controversy: Clarification or confusion? *Nurse Practitioner, 36*(7), 22-29. http://dx.doi.org/10.1097/01.NPR.0000398779.49929.40

Kelly, D. L. (2011). *Applying quality management in healthcare: A system approach,* (3rd ed.). Chicago, IL: Health Administration Press.

Kettner, P. M., Moroney, R. M., & Martin, L. L. (2013). *Designing and managing programs: An effectiveness-based approach* (4th ed.). Thousand Oaks, CA: Sage.

Kim, K. K, Horan, M. L., & Gendler, P. (1991). *Development and evaluation of the osteoporosis knowledge test.* Grand Valley University. Allendale. Mi.

Kim, K. K., Horan, M. L., Gendler, P., & Patel, M. K. (1991). Development and evaluation of the osteoporosis health belief scale. *Research in Nursing and Health, 14*(2), 155-166. http://dx.doi.org/10.1002/nur.4770140210

Kirkpatrick, J. M., & Weaver, T. (2013). The doctor of nursing practice capstone project: Consensus or confusion? *Journal of Nursing Education, 52*(8), 435-441. http://dx.doi.org/10.3928/01484834-20130719-02

Korkmaz, N., Tutoglu, A., Korkmaz, I., & Bovaci, A. (2014). The relationships among

vitamin D level, balance, muscle strength, and quality of life in postmenopausal

patients with osteoporosis. *Journal of Physical Therapy*

Science, 26(10), 1521-1526. http://doi.org/10.1589/jpts.26.1521

Lloyd-Jones, D. (2009). Heart disease and stroke statistics-2009 update: A report from

the American Heart Association Statistics Committee and Stroke Subcommittee.

Circulation, 119(3), 480-486. http://doi.org/10.1161/circulationaha.108.191259

Lowery, B. (2009). Obesity, bariatric nursing, and the policy process: The connecting

points for patient advocacy. *Bariatric Nursing & Surgical Patient Care, 4*(2),

133-138. http://doi.org/10.1089/bar.2009.9977

Mauck, K. F., & Clarke, B. L. (2006). Diagnosis, screening, prevention, and treatment of

osteoporosis. *Mayo Clinic Proceedings, 81*(5), 662-672.

http://dx.doi.org/10.4065/81.5.662

Mayo Clinic. (2015, January 7). *Diseases and conditions: Menopause*. Retrieved from

http://www.mayoclinic.org/diseases-conditions/menopause/basicdefinition/con-

20019726_37

McCloskey, E. V. (2009). *FRAX: Identifying people at high risk for fracture.* Nyon,

Switzerland: International Osteoporosis Foundation. Retrieved from

https://www.iofbonehealth.org/sites/default/files/PDFs/WOD%20Reports/FRAX_

report_09.pdf

McEwen, M., & Wills, E. M. (2011). *Theoretical basis for nursing*. Philadelphia, PA:

Lippincott Williams & Williams.

Mitchell, S., Fisher, C., Hastings, C., Silverman, L. B., & Wallen, G. R. (2010). A

thematic analysis of theoretical models for translational science in nursing:

Mapping the field. *Nursing Outlook, 58*(6)*,* 287-300.

http://dx.doi.org/10.1016/j.outlook.2010.07.001

Moyer, V. (2013). Vitamin D and calcium supplementation to prevent fractures in adults:

U.S. Preventive Task Services Task Force recommendations statement*. Annals of*

*Internal Medicine, 158(*9), 691-696. http://dx.doi.org/10:7326/0003-4819=158-9-

201305070-00603

Nathan, L., & Judd, H. L. (2007). *Menopause and postmenopause*. In A. H. DeCherney,

L. Nathan, T. M. Goodwin, & N. Laufer (Eds.). *Current diagnosis and treatment:*

Obstetrics and gynecology (10th ed., pp. 961-964). New York, NY: McGraw-Hill

Medical.

Nielsen, D., Huniche, L., Brixen, K., Sahota, O., & Masud, T. (2013). Handling

knowledge on osteoporosis: A qualitative study. *Scandinavian Journal of Caring*

Sciences, 27(3), 516-524. http://dx.doi.org/10.1111/j.1471-6712.2012.01055.x

North American Menopause Society (NAMS). (2010). Management of osteoporosis in

postmenopausal women: 2010 position statement of the North American

Menopause Society. *Menopause, 17*(1) 25-54.

http://dx.doi.org/10.1097/gme.0b013e3181c617e6

Nguyen, V. H., Wang, Z., & Okamura, S. (2014). Osteoporosis health beliefs of women

with increased risk of the female athlete triad*. Journal of Osteoporosis,*

2014(676304), 1-5. http://dx.doi.org/10.1155/2014/676304

Oermann, M. H., & Hays, J. C. (2011). *Writing for publication in nursing* (2nd ed.). New

York, NY: Springer Publishing Company.

Qi-Bing, B. B., Resnick, B., & Nahm, F. S. (2014). Reliability and validity of the revised osteoporosis test. *Journal of Nursing Measurement, 22*(2), 342-356. http://dx.10.1891/1061-3749.22.2.342

Patel, V. L., Yoskowitz, N. A., & Arocha, J. F. (2009). Towards effective evaluation and reform: A cognitive and learning sciences perspective. *Advances in Health Science Education, 14*(5), 791-812. http://dx.doi.org/10.1007/s10459-007-9091-1

Phillips, F. (2012). Advising women on menopause and diet. *Practice Nurse, 42*(18), 28-32.

Planas, L. G. (2008). Intervention design, implementation, and evaluation. *American Journal of Health Systems Pharmacy, 65*(19), 1854-1863. http://dx.doi.org/10.2146/ajhp070366

Polit, D. F., & Beck, C. T. (2007). *Nursing research: Generating and assessing evidence for nursing practice* (8th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Quallington, J., & Perry, J. (2014). Patient centered research: A new approach to care. *Pediatric Nursing, 25*(2), 94-97. http://dx.doi.org/10.12968/pnur.2014.25.2.94

Roden, J. (2004). Revisiting the HBM: Nurses applying it to young families and their health promotion needs. *Nursing and Health Sciences, 6*, 1-10. http://dx.doi.org/10.1111/j.1442-2018.2005.00167.x

Rolnick, S. J., Kopher, R., Jackson, J., Fischer, L. R., & Compo, R. (2001). What is the impact of osteoporosis education and bone mineral density testing for postmenopausal women in a managed care setting? *Menopause, 8*(2)*, 141-148.

Rosenstock, I. M. (1974). The health belief model and preventive health behavior. *Health Education and Behavior, 2*(4)*,* 354-386. http://dx.doi.org/10.1177/109019817400200405

Rosenstock, I. M., Stretcher, V. J., & Beck, M. H. (1988). Social learning theory and the health belief model. *Health Education and Behavior, 15*(2)*,* 175-183. http://dx.doi.org/10.1177/109019818801500203

Rosenstock, I. M. (1990). The health belief model: Explaining health behavior through expectancies. In K. Glanz, F. Lewis, & B. Rimer (Eds.), *Health behavior and health education: Theory, research and practice* (pp. 39-62). San Francisco, CA: Jossey Bass.

Roush, K. (2011). Prevention and treatment of osteoporosis in postmenopausal women: A review. *American Journal of Nursing, 111*(8), 26-35. http://dx.doi.org/10.1097/01.NAJ.0000403358.44058.17

Saravi, F. D. (2013). Osteoporosis self-assessment tool performance in a large sample of postmenopausal women of Mendoza, Argentina. *Journal of Osteoporosis, 2013*, 2-6. http://dx.doi.org/10.1155/2013/150154

Schousboe, J. T., Debold, R. C., Kuno, L. S., Chen, Y., & Abbott, T. A. (2005). Education and phone follow-up in postmenopausal women at risk for osteoporosis. *Disease Management &Health Outcomes, 13*(6), 395-404. http://dx.doi.org/10.2164?0015677-200513060-00004.

Sedlak,C. A., Doheny, M. O., Estok, P. J., & Zeller, R. A. (2005). Tailored interventions to enhance osteoporosis prevention in women. *Orthopedic Nursing, 24*(4), 270-

276.

Sedlak, C. A., Doheny, M. O., Estok, P. J., Zeller, R. A., & Winchell, J. (2007). DXA,

health beliefs, and osteoporosis prevention behaviors. *Journal of Aging and*

Health, 19(5), 742-756. http://dx.doi.org/10.1177/0898264307304303

Shams, J., Spitzer, A. B., Kennelly, A. M., & Tosi, L. L. (2011). Bone quality:

Educational tools for patients, physicians, and educators. *Clinical Orthopedic*

Related Research, 469(8), 2248-2259. http://dx.doi.org/10.1007/s11999-011-

1809-y

Shuler, F., Conjeski, J. M., & Hamilton, R. L. (2011). Incorporating the WHO FRAX

assessment tool into nursing practice. *American Journal of Nursing, 111*(8), 59-

62. http://dx.doi.org/10.2164?00115677-200513060-00004.

Soares, M., Jocob, K., Hoonakker, P., Khunlerkit, A., Tattersal, M., & Jon, K. (2012).

Computer decision support tools in primary care. *Work, 41*(Suppl), 4474-4478.

http://dx.doi.org/10.3233/wor-2012-0747-4474

Soleymanian, A., Niknami, S., Hajizadeh, E., Shojaeizadeh, D., & Montazeri, A. (2014).

Development and validation of a health belief model based instrument for

measuring factors influencing exercise behaviors to prevent osteoporosis in pre-

menopausal women (HOPE). *BMC Musculoskeletal Disorders, 14*(61), 1-8.

http://dx.doi.org/10.1186/1471-2474-15-61

Stern, C., Jordan, Z., & McArthur, A. (2014). Developing the review question and

inclusion criteria. *American Journal of Nursing, 114*(4), 53-56.

http://dx.doi.org/10.1097/01NAJ.0000445689.67800.86

Stone, D. (2012). It is never too late to build healthy bones. *Nursing & Residential Care, 14*(6), 292-295. http://dx.doi.org/10.12968/nrec.2012.14.6.292

Terry, A. J. (2012). *Clinical research for the doctor of nursing practice.* Sudbury, MA: Jones & Bartlett Learning.

Topatan, S., & Yildiz, H. (2012). Symptoms experienced by women who enter into natural and surgical menopause and their relation to sexual functions. *Health Care Women International, 33*(6), 529-539. http://dx.doi.org/10.1080/07399332.2011.646374

Tussing, L., & Novakotski, K. C. (2005). Osteoporosis prevention education: Behavior theories and calcium intake. *Journal of Academy of Nutrition & Dietetics, 105*(1), 92-97. http://dx.doi.org/10.1016/j.jada.2004.10.025

U.S. Department of Health and Human Services. (2010). *Healthy People 2020.* Retrieved from http://www.healthypeople.gov/2020/TopicsObjectives2020/pdfs/HP2020_brochure.pdf

Walden University. (2015). *About the school.* http://www.waldenu.edu/colleges-school-of-nursing/about

Wachter, R. M., & Pronovost, P. J. (2009). Balancing "no blame" with accountability in patient safety. *New England Journal of Medicine, 361*(14), 1401-1406. http://dx.doi.org/10.1056/NEJMsb0903885

White, K. M., & Dudley-Brown, S. (2012). *Translation of evidence into nursing and health care practice.* New York, NY: Springer Publishing.

Wilkins, C. (2007). Osteoporosis screening and risk management. *Clinical Interventions in Aging, 2*(3), 389-394. Retrieved from

http://www.ncbi.nlm.nih.gov/pmc/articles/pmc2685263

World Health Organization. (WHO). (1994). Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. *Technical Report Series No. 843.* Geneva, Switzerland: Author. Retrieved from

http://apps.who.int/iris/handle/10665/39142

Zaccagnini, M. E., & White, K. W., (2011). *The doctor of nursing practice essentials: A new model for advanced practice nursing.* Sudbury, MA: Jones and Bartlett.

Zhang, Y. P., Li, X. M., Wang, D. L., Guo, X. Y., & Guo, X. (2012). Evaluation of educational program on osteoporosis awareness and prevention among nurse students in China. *Nursing & Health Science, 14*(1), 74-80.

http://dx.doi.org/10.1111/j.1442-2018.2011.00665x

Ziccardi, S. L., Sedlak, C. C., & Doheny, M. O. (2004). Knowledge and health beliefs of osteoporosis in college nursing students. *Orthopedic Nursing, 23*(2), 128-133.

Appendix A: Permission to Use Project Instruments

April 2, 2015

Gloria Nichols, MSN, RN, BA, WHNP-BC
Doctor of Nursing Practice Student

Dear Ms. Nichols,

Thank you for your interest in the Osteoporosis Health Belief Scale (OHBS), Revised Osteoporosis Knowledge Test (ROKT, 2011, 2012), Osteoporosis Self-Efficacy Scale-21(OSES-21) and Osteoporosis Self-Efficacy Scale-12 (OSES-12). You have my permission to use the instruments. Please keep us informed of any publications and/or presentations and send us an abstract or summarize your study results when completed.

I wish you much success with your study.

Sincerely,

Phyllis Gendler, PhD, RN
Professor Emerita of Nursing
Cook-DeVos Center for Health Science
Kirkhof College of Nursing
Grand Valley State University
301 Michigan St. NE
Grand Rapids, MI 49503
Phone: 616-331-7161
Fax: 616-331-7362
E-mail: gendlerp@gvsu.edu

Appendix B: OSTEOPOROSIS KNOWLEDGE TEST

(Revised 2011, 2012)

Osteoporosis (os-te-o-po-ro-sis) is a condition in which the bones become very brittle and weak so that they break easily.

Below is a list of things which may or may not affect a person's chance of getting osteoporosis. After you read each statement, think about if the person is:

MORE LIKELY TO GET OSTEOPOROSIS, or

LESS LIKELY TO GET OSTEOPOROSIS, or

NEUTRAL, IT HAS NOTHING TO DO WITH GETTING OSTEOPOROSIS, or

DON'T KNOW.

When you read each statement, circle **ONE** of the 4 choices for your answer.

ML = MORE LIKELY **LL** = LESS LIKELY **NT** = NEUTRAL

DK = DON'T KNOW

1. Eating a diet <u>LOW</u> in dairy products	ML	LL	NT	DK
2. Being menopausal; "change of life"	ML	LL	NT	DK
3. Having a parent or grandparent who has osteoporosis	ML	LL	NT	DK
4. Being a White or Asian woman	ML	LL	NT	DK
5. Being an elderly man	ML	LL	NT	DK
6. Having ovaries surgically removed	ML	LL	NT	DK
7. Taking cortisone (steroids e.g. Prednisone) for long time	ML	LL	NT	DK
8. Being overweight	ML	LL	NT	DK
9. Having an eating disorder	ML	LL	NT	DK

10. Consuming more than 2 alcoholic drinks per day   ML   LL   NT   DK

11. Smoking on a daily basis   ML   LL   NT   DK

12. To strengthen bones, it is recommended that a person exercise at a moderately intense level for 30 minutes a day at least

A. 3 days a week   D. Don't know
B. 4 days a week
C. 5 days a week

13. Exercise makes bones strong, but it must be hard enough to make breathing

A. Just a little faster   D. Don't know
B. Much faster, but talking is possible
C. So fast that talking is not possible

14. Which of the following activities is the best way to reduce a person's chance of getting osteoporosis?

A. Swimming   D. Don't know
B. Walking briskly
C. Stretching

15. Which of the following activities is the best way to reduce a person's chance of getting osteoporosis?

A. Bicycling   D. Don't know
B. Yoga
C. Lifting weights

16. Which of the following activities is the best way to reduce a person's chance of getting osteoporosis?

A. Jogging or running   D. Don't know
B. Golfing using golf cart
C. Gardening

17. Which of the following activities is the best way to reduce a person's chance of getting osteoporosis?

A. Bowling   D. Don't know
B. Doing laundry
C. Aerobic dancing

18. Which of these is the best source of calcium?

A. Apple   D. Don't know
B. Cheese
C. Cucumber

19. Which of these is the best source of calcium?

A. Peanut Butter   D. Don't know
B. Turkey
C. Canned Sardines

20. Which of these is the best source of calcium?

A. Chicken   D. Don't know
B. Broccoli
C. Grapes

21. Which of these is the best source of calcium?

A. Yogurt   D. Don't know
B. Strawberries
C. Cabbage

22. Which of these is the best source of calcium?

A. Ice cream   D. Don't know
B. Grape fruit
C. Radishes

23. Which of the following is the recommended amount of calcium intake for an adult?

A.   600 mg - 800 mg daily   D. Don't know
B. 1000 mg - 1200 mg daily
C. 1400 mg - 1600 mg daily

24. How much milk must an adult drink to meet the recommended amount of calcium?

A. 1 glass daily   D. Don't know
B. 2 glass daily
C. 3 or more glasses daily

25. Which of the following is the <u>best reason</u> for taking a calcium supplement?

A. If a person skips breakfast   D. Don't know
B. If a person does not get enough calcium
from diet
C. If a person is over 45 years old

26. Which vitamin is required for the absorption of calcium?

A. Vitamin A   D. Don't know
B. Vitamin C
C. Vitamin D

27. Which is the best source of the vitamin required for the absorption of calcium?

A. Carrots   D. Don't know
B. Oranges
C. Sunlight

28. Which is the best food source of the vitamin required for the absorption of calcium?

A. Spinach   D. Don't know
B. Cheese
C. Salmon

29. Which of the following is the recommended amount of the vitamin required for the absorption of calcium for an adult, 50 years old and older?

A. 800-1000 IU daily   D. Don't know
B. 1200-1400 IU daily
C. 1600-1800 IU daily

30. When is the best time to build strong bones?

A. Childhood   D. Don't know
B. Adolescence
C. Young adulthood

31. Osteoporosis can be diagnosed by

A. Blood test   D. Don't know
B. DXA scan
C. Symptoms

For the next question, circle one answer from the 4 choices. Be sure to circle **ONLY ONE**answer. If you think there is more than one correct answer, choose the **BEST** answer. If you are not sure, circle D. Don't know.

32. Once you have osteoporosis

A. There is nothing you can do about it   D. Don't know
B. You can take medication to treat it
C. You must be careful lifting objects

Thank you for completing the survey.
Please check to be sure you answered all of the questions

Developed by Katherine Kim PhD, Mary Horan PhD, and Phyllis Gendler PhD (1991). Grand Valley State University, with support from the Grand Valley State University Research Grant-in- Aid. Revised by Phyllis Gendler PhD, Cynthia Coviak PhD, Jean Martin PhD, and Katherine Kim PhD (2011, 2012). Question 26 was developed as an addition to the Osteoporosis Knowledge Test by Pamela von Hurst (2006).

Appendix C: OSTEOPOROSIS HEALTH BELIEF SCALE

Osteoporosis (os-te-o-po-ro-sis) is a condition in which the bones become excessively thin (porous) and weak so that they are fracture prone (they break easily).

Below are some questions about your beliefs about osteoporosis. There are no right or wrong answers. We all have different experiences which will influence how we feel. After reading each statement, circle if you STRONGLY DISAGREE, DISAGREE, are NEUTRAL, AGREE, or STRONGLY AGREE with the statement.

It is important that you answer according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe. We need the answers that best explain how you feel.

Read each statement. Circle one best option that explains what you believe.

SD = STRONGLY DISAGREE

D = DISAGREE

N = NEUTRAL

A = AGREE

SA = STRONGLY AGREE

SD D N A SA   1. Your chances of getting osteoporosis are high.

SD D N A SA   2. Because of your body build, you are more likely to develop
                                 osteoporosis.

SD D N A SA   3. It is extremely likely that you will get osteoporosis.

SD D N A SA   4. There is a good chance that you will get osteoporosis.

SD D N A SA   5. You are more likely than the average person to get osteoporosis.

SD D N A SA   6. Your family history makes it more likely that you will get osteoporosis.

SD D N A SA   7. The thought of having osteoporosis scares you.

SD D N A SA   8. If you had osteoporosis you would be crippled.

K. Kim, M. Horan, P. Gendler, 1991. Reproduction without authors' express written consent is not permitted. Permission to use this scale may be obtained from Phyllis Gendler at Grand Valley State University, Grand Rapids, MI 49503.

SD/STRONGLY DISAGREE

D/DISAGREE

N/NEUTRAL

A/AGREE

SA/STRONGLY AGREE

SD D N A SA   9. Your feelings about yourself would change if you got osteoporosis.

SD D N A SA   10.   It would be very costly if you got osteoporosis.

SD D N A SA   11.   When you think about osteoporosis you get depressed.

SD D N A SA   12.   It would be very serious if you got osteoporosis.

SD D N A SA   13.   Regular exercise prevents problems that would happen from osteoporosis.

SD D N A SA   14.   You feel better when you exercise to prevent osteoporosis.

SD D N A SA   15.   Regular exercise helps to build strong bones.

SD D N A SA   16.   Exercising to prevent osteoporosis also improves the way your body looks.

SD D N A SA 17. Regular exercise cuts down the chances of broken bones.

SD D N A SA 18. You feel good about yourself when you exercise to prevent osteoporosis.

For the following 6 questions, "taking in enough calcium" means taking enough calcium by eating calcium rich foods and/or taking calcium supplements.

SD D N A SA 19. Taking in <u>enough calcium</u> prevents problems from osteoporosis.

SD D N A SA 20. You have lots to gain from taking in <u>enough calcium</u> to prevent osteoporosis.

SD D N A SA 21. Taking in <u>enough calcium</u> prevents painful osteoporosis.

SD D N A SA 22. You would not worry as much about osteoporosis if you took in <u>enough calcium</u>.

SD D N A SA 23. Taking in <u>enough calcium</u> cuts down on your chances of broken bones.

SD D N A SA 24. You feel good about yourself when you take in <u>enough calcium</u> to prevent osteoporosis.

SD = STRONGLY DISAGREE

D/DISAGREE

N/NEUTRAL

A/AGREE

SA/STRONGLY AGREE

SD D N A SA 25. You feel like you are not strong enough to exercise regularly.

SD D N A SA 26. You have no place where you can exercise

SD D N A SA   27.   Your spouse or family discourages you from exercising.

SD D N A SA   28.   Exercising regularly would mean starting a new habit which is hard for you to do.

SD D N A SA   29.   Exercising regularly makes you uncomfortable.

SD D N A SA   30.   Exercising regularly upsets your everyday routine.

SD D N A SA   31.   Calcium rich foods cost too much.

SD D N A SA   32.   Calcium rich foods do not agree with you.

SD D N A SA   33.   You do not like calcium rich foods.

SD D N A SA   34.   Eating calcium rich foods means changing your diet which is hard to do.

SD D N A SA   35.   In order to eat more calcium rich foods you have to give up other foods that you like.

SD D N A SA   36.   Calcium rich foods have too much cholesterol

SD D N A SA   37.   You eat a well-balanced diet.

SD D N A SA   38.   You look for new information related to health.

SD D N A SA   39.   Keeping healthy is very important for you.

SD D N A SA   40.   You try to discover health problems early.

SD D N A SA   41.   You have a regular health check-up even when you are not sick.

SD D N A SA   42.   You follow recommendations to keep you healthy.

Please check to see that you have answered all items.

Appendix D: OSTEOPOROSIS SELF EFFICACY SCALE

We are interested in learning how confident you feel about doing the following activities. We all have different experiences, which will make us more or less confident in doing the following things. Thus, there are no right or wrong answers to this questionnaire. It is your opinion that is important. In this questionnaire, EXERCISE means activities such as walking, swimming, golfing, biking, aerobic dancing.
Place your "X" anywhere on the answer line that you feel best describes your confidence level.

If it were recommended that you do any of the following THIS WEEK, how confident or certain would you be that you could:

1.   begin a new or different exercise program

Not at all   Very
confident ├────────────────────────────────┤   confident

2. change your exercise habits

Not at all   Very
confident ├────────────────────────────────┤   confident

3. put forth the effort required to exercise

Not at all   Very
confident ├────────────────────────────────┤   confident

4. do exercises even if they are difficult

Not at all   Very
confident ├────────────────────────────────┤   confident

5. exercise for the appropriate length of time

Not at all   Very
confident ├────────────────────────────────┤   confident

6. do the type of exercises that you are supposed to do

Not at all   Very
confident ├────────────────────────────────┤   confident

7.   increase your calcium intake

Not at all   Very
confident ├————————————————————————┤ confident

8.   change your diet to include more calcium rich foods

Not at all   Very
confident ├————————————————————————┤ confident

9.   eat calcium rich foods as often as you are supposed to do

Not at all   Very
confident ├————————————————————————┤ confident

10.   select appropriate foods to increase your calcium intake

Not at all   Very
confident ├————————————————————————┤ confident

                                    Very
├————————————————————————┤ confident

11.   stick to a diet which gives an adequate amount of calcium

Not at all   Very
confident ├————————————————————————┤ confident

12.   obtain foods that give an adequate amount of calcium even when they are not readily available

Not at all   Very
confident ├————————————————————————┤ confident

Appendix E: OSTEOPOROSIS SELF-EFFICACY SCALES SCORING
INSTRUCTIONS

When scoring the OSES, first with a ruler, measure from the left anchor on the visual analogue in millimeters to the line where the subject has marked, on each item. The line from "Not at all confident" to "Very confident" should measure exactly 10 cm (100 mm). The subject's score on each item should be measured to the nearest millimeter. Thus the range for each item is 0 – 100.

The OSES has 2 subscales. Exercise includes OSE01-OSE06 for the 12 item OSES, and OSE01 – OSE10 for the 21 item OSES. Calcium includes OSE07 – OSE12 for the 12 item OSES, and OSE11 – OSE21 for the 21 item OSES. In order to calculate the scores for each subscale (calcium and exercise), first add the scores for each item within the respective subscale, then divide the total score for each subscale (calcium and exercise) by the number of items in the respective scale to obtain the individual subscale score. The total possible for each subscale ranges from 0 to 100.

OSTEOPOROSIS SELF-EFFICACY SCALE (12 Item)

Variable Labels

OSE01: begin a new or
different exercise program
OSE02: change exercise
habits
OSE03: put forth the effort
required to exercise
OSE04: do exercises even if
they are difficult
OSE05: exercise for
appropriate length of time
OSE06: do type of exercises that you
are supposed to do
OSE07: increase your calcium intake
OSE08: change your diet to include more
calcium rich foods
OSE09: eat calcium rich foods as often as
you are supposed to do

OSE10: select appropriate foods to increase
your calcium intake
OSE11: stick to diet which gives adequate
amount of calcium

OSE12: obtain foods that give adequate
amount of calcium

Psychometric Analysis of the Osteoporosis Self-Efficacy Scale (OSES12item)

The psychometric analysis of the Osteoporosis Self-Efficacy Scale (OSES12item) is based on data from our 1990-1991 osteoporosis project with 201 women, 35 years or older.

The OSES has two subscales: The Osteoporosis Self-Efficacy Exercise Scale has 6 items (questions 1 – 6). The Osteoporosis Self-Efficacy Calcium Scale has 6 items (questions 7-12). Reliability coefficients for internal consistency (Cronbach alpha) of both subscales were .90. Validity of the OSES was evaluated by factor analysis and discriminant function analysis.

Citation:
Horan, M., Kim, K., & Gendler, P. Development and evaluation of osteoporosis self-efficacy scale. Paper presented at the Midwest Nursing Research Society Conference, Cleveland, OH, 1993.

Appendix F: Consent to Participate in the Project

Study Title: Bone Health Education to Reduce the Risk of Developing Osteoporosis in Menopausal Women

The purpose of the project is to measure the knowledge, health beliefs, and perceived risks for developing osteoporosis in women prior to the onset of natural or surgically-induced menopause. This study has also been designed to measure the impact of bone health education on the behavior of women preparing for natural or surgically-induced menopause.

The study has been approved by the physicians at Seven Oaks Women's Center and has received approval from the Institutional Review Board of Walden University. The study will consist of completing three questionnaires to assess your knowledge, belief, and self-determination regarding for developing osteoporosis. Participation in this study will take about 20-30 minutes, the expected time for today's office visit. You are free to ask any questions about the study or about being a subject at any time during the study. Feel free to contact the office administrator at 210-692-9500 if you have further questions.

Your participation is the study is voluntary, and you may withdraw from the study at any time without any repercussions.

The information that you will provide in the study will be coded and not linked to your name in any way. All of the study data collected will be coded and stored in a secure place with regard to privacy and confidentiality as mandated by the policies and procedures of the organization and federal regulations.

I have read this consent form and voluntarily consent to participate in this study.

_____

Participants Signature   Date

Appendix G: Bone Health Education Fact Sheet

Risk Factors for Osteoporosis

- Age, female gender, heredity, and the loss of estrogen due to menopause.
- Preventive Strategies
    - Modify Risk Factors (Changeable)
        - Decrease caffeine (Limit coffee, tea, colas).
        - Decrease salt intake
        - Limit high protein intake
        - Stop smoking
        - Decrease alcohol consumption
        - What you can do?
        - Increase physical activity (3-5 times a week for 30-40 minutes).
            - Weight bearing exercises (walking, running, tennis, dancing, hiking, climbing stairs, etc.).
        - Consult your physician if on chronic steroid use
        - Increase calcium intake
        - Increase vitamin D intake

Dietary Recommendations to Decrease the Risk of Developing Osteoporosis

Calcium Intake
- Age: 19-50, 1000mg per day
- Age: 51-70, 1200mg per day
- 71, 1200mg per day
- Calcium Rich Foods (Examples: Dairy, green leafy vegetables, beans, citrus, almonds, sardines, tofu, calcium fortified pasta)
- Calcium Supplements (Examples: Citracal, Caltrate, Oscal, Viativ, Tums)

Vitamin D
- Age: 19-50, 600 IU daily
- Age: 51-70, 600 IU daily
- >71: 800IU daily
- Vitamin D Rich Foods (Examples: Salmon, tuna, beef, liver, cheese, orange juice, dairy, yogurt, fortified ready-to-eat cereals).
- Vitamin D Supplements

Medical Recommendations to Identify Risks for Developing Osteoporosis
- Annual preventive physical and risk factor assessment.
- Bone Mineral Density Test

Treatment Options for Osteoporosis

- Pharmaceuticals
  - Bisphosphonates (Ex:Actonel, Aredia, Boniva, Didronel, Fosamax, Prolia, Reclast, Zometa)
  - Selective estrogen receptor modulators (SERMS) (Ex: Evista, Tamoxifen)

This page was left blank.

This page was left blank.

This page was left blank.