2021

# Prevention and Self-Care Education for Osteoporosis in a Rural Orthopedic Clinic

Jean Sanford
*Walden University*

# Walden University

College of Nursing

This is to certify that the doctoral study by

Jean Sanford

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. Diane Whitehead, Committee Chairperson, Nursing Faculty
Dr. Joan Hahn, Committee Member, Nursing Faculty
Dr. Jonas Nguh, University Reviewer, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2021

Abstract

Prevention and Self-Care Education for Osteoporosis in a Rural Orthopedic Clinic

by

Jean Sanford

MSN, University of Phoenix 2006

BSN, Western Kentucky University 1989

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2021

Abstract

Osteoporosis affects 25 million people in the United States causing over 1.5 million fractures every year. The gap in practice at a rural southeast orthopedic clinic was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia. The purpose of the project was to develop a program to educate clinic providers on prevention and self-care management for osteoporosis and osteopenia. The Knowles theory of adult learning framed the project components. A 10-question pretest/posttest assessing knowledge was administered to 10 registered nurse participants. For the presurvey, five participants demonstrated a lack of knowledge of medication administration and the need for consulting with an endocrinologist. All participants responded correctly to the 10 posttest questions. All participants ($N$ = 10) completed the program evaluation results using a Likert scale (rated 1 = *strongly disagree* to 5 = *strongly agree*). No participants disagreed to any of the items; 80%–100% agreed or strongly agreed that all 9 learning objectives were met. Participants were given an education handout to use as a guide for assessing and treating patients at risk for osteopenia or osteoporosis. The importance of using the guidelines in the handout to assess and treat at-risk patients was shared with clinic administration. Clinic providers can promote patient self-care behaviors that promote bone health through patient education on osteoporosis and osteopenia. Positive social change for patients and families can occur through prevention and management of these diseases.

Prevention and Self-Care Education for Osteoporosis in a Rural Orthopedic Clinic

by

Jean Sanford

MSN, University of Phoenix 2006

BSN, Western Kentucky University 1989

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2021

## Dedication

This entire project is dedicated to my Lord Jesus. He has allowed me to be a nurse and help people all these years. He has given me the knowledge, perseverance, and health to pursue further education, allowing the completion of my doctorate in nursing. He beats everything I have ever seen by helping me in so many ways when there seemed to be no way. Thank you, Lord, for your blessings on me.

Acknowledgments

I want to acknowledge my husband, Dave, who has stood by me during my entire educational journey. He always encourages me when others do not. He provides quiet time for me when I am stressed with a project and always proofreads my papers. His love, prayers, and encouragement keep me focused. He has been so unselfish and helpful in every way. Thank you love, for everything you have done. I want to acknowledge everyone who has helped me in any way to reach my goal of a Doctor of Nursing practice degree. Without their encouragement, I probably would have given up during the rough times.

Table of Contents

List of Tables

Section 1: Nature of the Project

## Introduction

Osteoporosis is defined as a bone condition in which the bones in the body become brittle and weak due to their strength and mass reducing over time, causing fragility (Centers for Disease Control and Prevention, 2016). The consequence of osteoporosis is a bone fracture, often occurring when an individual falls, bends, or sneezes. Osteoporosis is a common disease globally among the aging population, especially women approaching the menopause phase (Brookhart et al., 2015; Porter & Varacall, 2020). Osteoporosis is an age-related disorder characterized by alteration of bone microstructure and reduced bone mass, leading to increased fracture risk and bone fragility. Osteoporosis fractures lead to a substantial increase in mortality, morbidity, disability, and a significant decrease in quality of life.

Osteoporosis affects around 25 million people in the United States, causing over 1.5 million fractures every year. Research shows that osteoporosis-related fractures can occur in any part of a person's skeleton apart from the skull. However, the fractures commonly occur in the proximal femur, lumbar and thoracic vertebrae, and distal forearm. More than half of postmenopausal White women in the United States report an osteoporosis-related fracture, out of which only 33% with a hip fracture may return to full independence. The incidences and prevalence of osteoporotic fractures increase with age, but they are more prevalent among White people than Black people and higher among women than men. Nonetheless, Black women and men face the same risk as their White counterparts when diagnosed with osteoporotic fractures. A single osteoporotic fracture

can cost as much as $30,000, and the overall cost of long-term and acute care related to these fractures is over $10 billion annually. With the high percentage of the aging population in the United States, osteoporotic care's economic burden is expected to reach over $240 billion by 2040. The risk of osteoporosis fracture among White men is 20%, but men with a hip fracture have twice the one-year mortality rates as White women (Ackley et al., 2016).

Osteopenia is a clinical condition characterized by a significant decrease in bone mineral density (BMD) below the reference value. However, the mineral value reduction does not go low enough to meet the diagnostic parameters regarded as osteoporotic (Kangalgil et al., 2018). Unlike osteoporosis, which is characterized by porous and less dense bones likely to break and whose patients usually walk with a stooped back, the former is traditionally regarded as a midway path toward osteoporosis. Patients with osteopenia usually have bones with a lower density than usual, but the condition is not as severe as osteoporosis; therefore, treating osteopenia in time may slow or prevent the infection from progressing to bone loss that can lead to osteoporosis. Healthy adults' peak bone density typically occurs when they are around 30 years old (Nieves, 2013). This value is the basis used to establish the range of T-scores, which are then used to examine patients' BMD scores. Studies show that a person whose T-scores range between –1.0 to –2.5 is considered to have osteopenia; those whose T-scores fall below –2.5 are diagnosed with osteoporosis.

Osteopenia and osteoporosis are diagnosed through measurement of a patient's BMD. A dual-energy X-ray absorptiometry (DEXA) scan is the BMD test used by the

National Osteoporosis Foundation as the recommended method to diagnose osteopenia and osteoporosis. The DEXA scan can measure BMD in the spine, hip, or femoral neck and sometimes in the wrist (Kangalgil et al., 2018). The three sites are chosen because they are the most common sites of bone fracture. This method is also the most accurate and reliable predictor of a person's future fracture risk. The DEXA scan can give two results: a Z-score and a T-score. A Z-score helps compare the BMD scores of a patient to the average of healthy individuals of the same sex and age. On the other hand, a T-score compares a patient's BMD to a 30-year-old healthy person of the same gender. These scores are always calculated in standard deviations below or above average.

Osteoporosis is one of the most preventable diseases. Practical interventions, such as a healthy diet, physical exercise, and regular osteoporosis risk screenings are important aspects of prevention. Education and self-management of this disease are an essential part of primary healthcare.

Rural and remote communities have reduced access to medical services and allied health (Elliott et al., 2013). A lack of specialized services limited private medical facilities, and reduced access to government healthcare services are frequent concerns in rural and remote communities. There is a lack of awareness about the need for primary healthcare services, such as regular screening, to reduce osteoporosis prevalence (Tufts, 2011). In this project, I focused on an education program for providers on patient self-care management of osteoporosis and osteopenia at a rural clinic in the southeast United States.

## Problem Statement

Osteoporosis is a preventable and treatable medical condition. Due to this disease's dangerous ramifications, it is imperative to implement current best practices for patient education on prevention and self-care management. Although providers in a rural orthopedic clinic were screening for osteoporosis, no evidence-based patient education was provided to patients to prevent and manage these diseases. Bone health is critically significant to the quality of life and overall health of the public. Healthy bones are integral in everyday life because they provide a person with the frame and skeleton to protect against injuries and facilitate safe mobility.

Additionally, bones are the central storeroom for minerals that play pivotal roles in the function of the body's life-supporting systems. Unhealthy bones, such as with osteoporosis, hamper the effective execution of these systems' functions, which can lead to debilitating bone fractures (Atanelov, 2016). Scarcity exists regarding awareness and information in rural areas about bone diseases and how to manage them among the healthcare professionals and the public. The field of concern relates to serving racial and ethnic minorities and underserved populations, such as underinsured and uninsured people in rural areas (Park et al., 2017). The field of bone health is appropriate to a public health strategy for healthcare promotion.

## Purpose Statement

The gap in practice at the study site clinic was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia. The purpose of this project was to develop an evidence-based education program for clinic providers for

patient education on prevention and self-care management of osteoporosis and osteopenia in a rural orthopedic clinic in the southeast United States. The project question was: Will a provider education program on prevention and self-care management for osteoporosis and osteopenia improve the knowledge of this topic for clinic providers?

## Nature of the Doctoral Project

Sources of evidence for developing this project included CINAHL Plus, Embase, MEDLINE, ProQuest Nursing & Allied Health, and PUBMED. Current guidelines from professional and government agencies were explored. Keywords used in searches were *osteoporosis, osteopenia, DEXA, BMD Scans,* and *X-Ray*. I developed an evidence-based education program for clinic providers on current practice recommendations for patient prevention and self-care management of osteoporosis and osteopenia. This staff education project followed the guidelines from the DNP Manual for Staff Education. The participants completed a pre- and post-knowledge survey and a program evaluation survey. These surveys were analyzed using descriptive statistics. The gap in practice was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia.

## Significance

The stakeholders affected by this practice change included physicians, nurse practitioners, and physician's assistants. Other stakeholders included the patients and their families and the rural community. Preventing osteoporosis and osteopenia and successful management of these diseases will improve the quality of life for these patients and their families. Decreasing the risk and actual treatment for these diseases will

decrease lost wages and medical and hospital costs. In return, this will help to improve the quality of life and improve life expectancy. The potential positive change implication of this project is that knowledge about bone health is vital for clinic providers in rural areas to help improve the quality of care and patient satisfaction (Park et al., 2017; Varghese et al., 2019). Equipping clinic providers with adequate knowledge and skills about management, prevention, teaching patients about self-management and self-regulation, promoting positive social interaction, increasing health beliefs, and influencing policymaking are needed to reduce this disease's prevalence.

## Summary

Osteoporosis and osteopenia are conditions that can be prevented, and if present, they can be treated. These conditions can occur for a variety of normal aging and medical conditions. Patients in rural communities with decreased primary healthcare have been identified as even more at risk for osteoporosis and osteopenia. Due to these diseases' dangerous ramifications, it was imperative to present an education program for providers on patient education current practice recommendations for patient prevention and self-care management of osteoporosis and osteopenia. The project question was: Will a provider education program on prevention and self-care management for osteoporosis and osteopenia improve the knowledge of this topic for clinic providers? In Section 1, I introduced the gap in practice, the problem, and practice question for this project. In Section 2, I will identify the theory supporting the project, the evidence supporting the project, and my role in the project.

Section 2: Background and Context

## Introduction

The literature review for this study provided a background to improve the practice for osteopenia and osteoporosis patients at an individual rural orthopedic clinic in the southeast United States. Osteoporosis had not been a primary focus at the clinic. The review of the literature demonstrated the emphasis on patient-centered care for osteopenia and osteoporosis. The purpose of this project was to develop and present an evidence-based education program to clinic providers on current screening guidelines and treatment. The gap in practice was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia. The project question was: Will a provider education program on prevention and self-care management for osteoporosis and osteopenia improve the knowledge of this topic for clinic providers? In this section, I explore the following issues: concepts, models and theories, relevance to nursing practice, current guidelines for osteoporosis and osteopenia, patient education, my role as a student practitioner, and the project team.

## Concepts, Models, and Theories

Malcolm Knowles's adult learning theory framed this project. Knowles, who developed the concept of *andragogy*, or adult learning theory, identified six assumptions for his theory. Table 1 depicts these assumptions and their relationship to this education program (McEwen & Wills, 2014)

**Table 1**

*Relationship of Adult Learning Theory to Education Program*

| Knowles' assumptions | Relationship to education program |
|---|---|
| Adults need to know why they need to learn something. | An education program for the providers will assist them to understand the importance of patient education |
| Adults' self-concept moves from dependent to self-directed. | Once the providers have the information, they will move towards using this in providing care. |
| Adult experiences can serve as a rich source of learning. | Providers have observed patients with osteoporosis and osteopenia |
| In adults, real-life problems serve as a readiness to learn. | The above observations enable the providers to have past resources from which to learn. |
| Adults see the need to apply learning immediately to the problem. | The education program will provide information on the importance of educating patients on risk factors and self-care management of this disease; the patients |
| Adults are motivated to solve immediate and pressing problems. | The providers will understand how important this issue is to the practice. |

*Note.* Adapted from *The adult learner: A neglected species* (3rd ed.) by M. Knowles, 1984, Gulf Publishing.

## Relevance to Nursing Practice

A thorough search of the scholarly literature was performed using the following online databases: CINAHL; MEDLINE; OVID Nursing Journals, Cochrane Systematic Reviews, and Pro-Quest Nursing & Allied Health. The following search terms were used: *nurse practitioner, DEXA, bone density, osteoporosis, osteopenia, FRAX,* and *osteoporosis screening*. Patients with osteoporosis and osteopenia disorders usually receive treatment immediately after being diagnosed with the disease. Nurses are among the front-line people in creating awareness to their patients about disorders, treatment, and prevention (Sozen et al., 2017). In rural communities, lack of primary care services often delays

diagnosis and treatment for these diseases. Due to patient unfamiliarity with these disorders, their treatment can be delayed which can lead to more negative effects (Park et al., 2017; Varghese et al., 2019). In a recent study conducted in the United States, researchers found that more than 65% of women diagnosed with osteoporosis or osteopenia had not received any treatment 1 year after the diagnosis (Fay & Cunningham, 2015).

With this project, I aimed to strengthen provider knowledge on current evidence for treatment of osteoporosis and osteopenia. Current research supports a comprehensive approach for osteoporosis and osteopenia, including lifestyle modification, risk factors, side effects, and therapy goals. Despite the efficiency of osteoporosis and osteopenia treatment to patients, other factors influence the success of the treatment and preventive measures of the disorders (Gai et al., 2019; Rosen, 2019).

**Guidelines for Osteoporosis and Osteopenia**

The American Association of Clinical Endocrinologists (AACE, 2020) released osteoporosis and osteopenia guidelines (Camamcho et al., 2020). These guidelines included stratification according to high-risk and very-high-risk features. Based on these guidelines, people considered to be at high risk of experiencing fractures fall into four categories: (a) people who had a fracture within the last year; (b) people who experience multiple fractures; (c) those who use corticosteroids drugs and osteoporosis or osteopenia approved therapy for a longer time; and (d) individuals who have a very high fracture probability assessed by the Fracture Risk Assessment Tool (FRAX). The AACE (Camacho et al., 2020) also stipulated a guideline related to romosozumab for

postmenopausal osteoporosis. Romosozumab is a drug that is considered in treating patients with osteoporosis or osteopenia fractures. The drug increases the bone density of patients, playing a significant role in strengthening them. As a result, the AACE has given a guideline recommending healthcare workers to use the drug in patients with the highest risks of having fractures. However, the guideline states that the drug should be used for a limited time of 1 year and needs to be followed up with other long-term medicines, such as denosumab. Appendix A outlines the current recommendations from the AACE.

**Prevention of Osteoporosis and Osteopenia**

There are several recommendations for people of all ages to prevent having weakened bones that can lead to osteoporosis. Some of these interventions include consuming foods high in Vitamin D and calcium. Additionally, one should engage in weight-bearing exercises, such as dancing, climbing stairs, hiking, walking, jogging, and playing tennis (Sinaki & Pfeifer, 2017). Doctors also advise people with osteoporosis to avoid activities that involve bending forward at the waist or those that twist the spine. These activities include doing sit-ups, swinging a golf club, and touching toes. Adhering to these interventions can help keep bones healthy and robust, preventing osteoporosis.

Research has demonstrated that people's bones tends to become weaker as they age. However, certain habits and choices hasten the process. For instance, practices such as insufficient Vitamin D and calcium, smoking, drinking excessive alcohol, using specific medication such as anticonvulsants, and not engaging in enough weight-bearing exercise quickens the process of having osteopenia. Therefore, to prevent the disease, one

should engage in interventions and activities to increase bone density (Sinaki & Pfeifer, 2017).

**Patient Education**

Prevention is the key to avoid disabling osteoporosis. To prevent the disease, the person must understand the disease and what can be done for self-efficacy. Although most persons have a general knowledge of osteoporosis, many misconceptions and fears remain.

A qualitative study of 757 participants was conducted by des Bordes, (2020), that showed what these participants knew, believed, and were concerned about regarding osteoporosis. It was demonstrated many had lack of knowledge and had received their information from friends, family, television, or newspapers. Getting information from healthcare providers were one of the last ways these participants acquired knowledge. One participant would not talk about dietary factors for osteoporosis because her physician had never talked with her about it. Some were afraid of the stigma of being sick if they were diagnosed with osteoporosis, while others were concerned that they would lose height or get a hump on their back. Some were afraid the test to diagnosis the disease would cause cancer. Some showed anger at the diagnosis while others exhibited denial. Patient education is important, not only to provide correct information, but to reinforce areas of the patient's knowledge.

Another study completed by Jensen, A. L., et. al. (2018) also showed that of 15 participants, most were knowledgeable about the disease but some of the participants had inadequate knowledge such as types of supplements and amounts needed. The main

problem shown by this study was lack of interest in the disease because few could see the significance to themselves. Many of these participants confused osteoporosis with arthritis. Some participants felt that stress and repressed emotions caused osteoporosis. Others had the concept that dwelling on the diagnosis of osteoporosis could make the disease worse and that nothing could be done about the condition anyway. Many of these women felt they were not adequately informed by their healthcare provider and that because a lot of physicians were male, they felt the disease was considered unimportant causing the physician to not pay enough attention to them. Lack of knowledge is a good background for irrational concerns and fears. Barriers of knowledge includes how much education the patient has, education level, culture and certain social groups, language barriers, an individual's, or family's economic and social position in relation to others.

A third study took place in a retirement village. Having the study at the retirement village drastically increased participation. Despite some being treated for osteoporosis they had little knowledge of the disease. Exercises were demonstrated and return demonstration was given by the residence. The purpose was to show the residents weight bearing exercises and that daily exercises could increase flexibility, strength, balance, and posture, therefore increasing bone density. Some felt the exercises were easier with their friends than if they were at home alone (Gianoudis, J. et. al. 2014).

## Local Background and Context

This southeastern orthopedic clinic had four physicians. Two physicians are rotated in surgery daily and two are rotated at the clinic. Each physician sees at least 30 patients per day. The majority of the patients are women over 50. The physicians did

provide verbal information on the disease conditions, but there was no consistent education provided to patients by clinic nurses.

## Role of the DNP Student

My role for this project was to develop and present an evidence-based education program to the clinic providers on risk factors and self-care management of osteoporosis and osteopenia. Providers can then use this information for managing patients at risk and with these diseases. This staff education project followed the steps in the DNP Staff Education Manual. This education program (Appendix B) was presented along with a handout with recommendations for implementing a best practice for osteoporosis prevention and treatment options.

## Role of the Project Team

Several clinic staff members were asked to serve as expert panel members to review the education program and handout before implementing this project. These panel members reviewed the education program prior to implementation. Final changes were completed based on panelist recommendations.

## Summary

The gap in practice at a rural orthopedic clinic was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia. This purpose of this project was to develop and present an evidence-based education program to clinic providers on osteoporosis and osteopenia current screening guidelines and treatment, including self-management of the disease. Section 2 discussed the adult learning theory framing this project, the evidence supporting the need for management of osteoporosis

and osteopenia, and the local background and context for the project. My role and the role of the expert panel were discussed.

Section 3: Collection and Analysis of Evidence

## Introduction

Osteoporosis and osteopenia are preventable and treatable medical conditions. Due to their dangerous ramifications for patients, clinic providers must devise and implement best practices and patient education on prevention and self-care management (Seo, 2018). Although providers in a rural orthopedic clinic were screening for osteoporosis, no evidence-based patient education was provided to patients to prevent and manage these diseases. Bone health is critically significant to the quality of life and overall health of the public. Moreover, healthy bones are integral in everyday life because they provide a person with the frame and skeleton for protection against injuries and to facilitate safe mobility.

In a rural area, the lack of primary care services impacts the education of patients on self-management of osteoporosis (Varghese et al., 2019). The gap in practice was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia in a rural orthopedic clinic in the southeast United States. The purpose of this project was to develop an evidence-based education program for clinic providers for patient education on prevention and self-care management of osteoporosis and osteopenia in a rural orthopedic clinic in the southeast United States.

## Practice-Focused Question

The project question was: Will a provider education program on prevention and self-care management for osteoporosis and osteopenia improve the knowledge of this topic for clinic providers? This intervention is relevant to the practice question of the

development of an educational program that providers can use to educate patients using current practice guidelines.

## Sources of Evidence

The gap in practice for this rural clinic is a lack of evidence-based patient education information for providers to educate patients at risk for osteoporosis or osteopenia. Although providers do screen patients for these diseases, there was a lack of patient education to assist patients with self-care management. In this project, I aimed to provide staff education to providers on patient prevention and self-care management for osteoporosis and osteopenia.

## Evidence Generated for the Doctoral Project

This project followed the guidelines outlined in the Walden University DNP Manual for Staff Education.

### Participants

The participants invited to attend the education program were healthcare providers working in a rural orthopedic clinic in the southeast United States. I projected a sample size of 10 participants, all healthcare workers in the clinic. I worked with the clinic manager to identify the method of presenting the program. Due to COVID-19 restrictions, however, I was unable to present the education program in person. The clinic manager, the committee chair, and I decided to have the participants complete the learning objectives via a learning packet.

**Procedures**

To develop an educational program, stakeholders' input and cooperation were sought during the preliminary stages of planning and execution to reduce and avoid the facility's limitations during the implementation stage. These discussions occurred during the Doctor of Nursing practice practicum courses. Upon Walden University Institutional Review Board (IRB) approval, the expert panel reviewed the pretest and posttest survey and the education program prior to implementation. No changes were recommended. The site approval agreement was signed by clinic administration.

Ten packet envelopes consisting of anonymous questionnaire signature forms, a pretest, the education program, a posttest, and a program survey were given to the clinic manager. Participants picked up the packets and returned them in the sealed envelope within 2 weeks. I retrieved the completed packets from the clinic.

**Evaluation**

Participants completed a pretest prior to the program (Appendix C) and the same questions were answered after the presentation in a posttest. A program evaluation survey (Appendix D) was also be completed.

**Protections**

The clinic representative signed the site approval documentation for a staff education doctoral project. Participants signed the consent form for anonymous questionnaires before the education program. Walden IRB approval was obtained.

## Analysis and Synthesis

Results of the pretest and posttest and the program evaluation were analyzed using descriptive statistics. Results of the surveys will be shared with the clinic administration.

Section 4: Findings and Recommendations

## Introduction

The gap in practice at a rural southeast orthopedic clinic was a lack of patient education on prevention and self-care management of osteoporosis and osteopenia. The purpose of this project was to educate clinic providers on prevention and self-care management for osteoporosis and osteopenia. COVID-19 restrictions prevented me from providing the education in person; therefore, participants completed a learning packet consisting of a pretest and posttest and an education handout.

## Findings and Implications

Ten participants completed both the pretest and posttest surveys. All participants responded correctly (yes) to 10 questions on the post survey. For the presurvey, one participant responded *no* for Question 5; four participants responded *no* for Question 8; five participants responded *no* for Question 9; and 5 participants responded *no* for Question 10. For the postsurvey, all responses to all questions from all participants were *yes*. Table 2 shows the pre and post survey results. Participants were given a handout they could use to refer to current guidelines for osteoporosis.

**Table 2**

*Pretest and Posttest Results*

| Questions | Pretest responses | | Posttest responses | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| 1. I recognize the risk for osteoporosis. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 2. I understand how the diagnosis is made. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 3. I know the evaluation methods to use after diagnosis. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 4. I recognize the basic measures to promote bone health. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 5. I understand how pharmacological therapy is assigned. | (n = 9) | (n = 1) | (n = 10) | (n = 0) |
| 6. I understand what medications are appropriate to use. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 7. I recognize how therapy is monitored. | (n = 10) | (n = 0) | (n = 10) | (n = 0) |
| 8. I understand the purpose of augmentation therapy. | (n = 6) | (n = 4) | (n = 10) | (n = 0) |
| 9. I understand the rules of sequential therapy and combinations. | (n = 5) | (n = 5) | (n = 10) | (n = 0) |
| 10. I understand when it is necessary to consider an endocrinologist | (n = 5) | (n = 5) | (n = 10) | (n = 0) |

The program evaluation consisted of three sections: content, instructional methods, and learner achievement of objectives. Due to the inability of the presenter to enter the clinic, the evaluation section of the presenter was removed from the survey. All participants completed the program evaluation results using Likert scale ratings: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. Due to COVID-19 restrictions, participants had to complete the education program on their own using a learning packet. No participants responded strongly disagree (1) or disagree (2) to any of the items. Under the content section 4 (40%) of the participants responded neutral (3) to question 1. One participant (10%) responded neutral (3) to questions 2 and 3. For the instructional methods section one participant responded neutral (3) to question 4. For the learner achievement of objectives items 5 through 9 had no more than two

participants that responded neutral (3) to the items. Table 3 describes the results of the program evaluation.

**Table 3**

*Program Evaluation Results*

| Questions | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Content | | | | | |
| 1. The content was interesting to me | | | 4 (40%) | 4 (40%) | 2 (20%) |
| 2. The content extended my knowledge of the topic | | | 1 (10%) | 3 (30%) | 6 (60%) |
| 3. The content was consistent with the objectives | | | 1 (10%) | 3(30%) | 6 (60%) |
| 4. The content was related to my job | | | | 6 (60%) | 4 (40%) |
| 5. Objectives were consistent with purpose/goals of activity | | | | 7 (70%) | 3 (30%) |
| Instructional Methods | | | | | |
| 1. The instructional material was well organized | | | | 6 (60%) | 4 (40%) |
| 2. The instructional methods illustrated the concepts well | | | | 5 (50%) | 5 (50%) |
| 3. The handout materials given are likely to be used as a future reference | | | | 4 (40%) | 6 (60%) |
| 4. The teaching strategies were appropriate for the activity | | | 1 (10%) | 3 (30%) | 6 (60%) |
| Learner Achievement of Objectives | | | | | |
| 1. Understand risk for osteoporosis/osteopenia | | | | 3 (30%) | 7 (70%) |
| 2. Explain criteria for diagnosis of osteoporosis | | | | 2 (20%) | 8 (80%) |
| 3. Identify further methods of evaluation upon diagnosis | | | | 2 (20%) | 8 (80%) |
| 4. Understand basic measures to promote bone health | | | | 2 (20%) | 8 (80%) |
| 5. Understand determination of pharmacologic therapy | | | 1 (10%) | 3 (30%) | 6 (60%) |
| 6. Identify appropriate medications | | | 2 (20%) | 1 (10%) | 7 (70%) |
| 7. Discuss therapy monitoring | | | 2 (20%) | 1 (10%) | 7 (70%) |
| 8. Understand the significance of stabilization of compression fractures | | | 1 (20%) | 3 (30%) | 6 (70%) |
| 9. Identify when a clinical specialist or endocrinologist should be considered | | | 1 (10%) | 1 (10%) | 8 (80%) |

*Note.* 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

## Strengths and Limitations of the Project

Strengths of this program included the commitment of all participants to complete the pre/posttest surveys, the education program, and the program evaluation. The use of the handout as an evidenced-based guide to educating patients was another strength. As noted earlier, nurses' availability to participate in this project was limited by the COVID pandemic, impacting participants ability to dialogue during a face to face program.

## Summary

Section 4 discussed the results of the education program. All participants were eager to help with this project and completed the educational packet within the time frame set by the presenter. The pretest results revealed that additional education was needed on medication management and referrals for osteoporosis and osteopenia. The results of the posttest demonstrated that an educational program in a rural clinics improved nurses' knowledge of osteoporosis and osteopenia prevention and self-management. Section 5 will introduce the project dissemination and my analysis of self.

Section 5: Dissemination Plan

## Introduction

An educational handout defining osteoporosis and osteopenia, treatments, and preventions was part of the education program. I suggested that the clinic adapt the policy of providing a handout on self-management of osteoporosis and osteopenia to all their patients over 60 years of age. As part of translation of evidence, this DNP project will be published online using the ProQuest MI. I am also aspiring to submit an abstract of this research project to the Nurse Practitioners in Women's Health conference review committee.

## Analysis of Self

DNP education is used to enhance nursing professionals' leadership roles by providing the necessary tools, skills, and knowledge to complete tasks related to this field. Completing this project has enhanced my skills and knowledge of becoming an effective nursing leader in several ways. Through this project, I learned how one could translate evidence into practice. As a result, I was able to use my knowledge to develop strategies toward positive social change. Through this education program, I believe that patients will acquire knowledge to help them live healthy lifestyles that will prevent these disorders. While completing this project, I faced challenges of researching and writing the correct information, putting things in the right and orderly manner, proofreading, obtaining appropriate research, and moving to each next step. However, amid all these problems, I stayed focused and dedicated to filling the gap between patient and nurse awareness of the preventive and self-management strategies of osteoporosis and

osteopenia. I am a dedicated practitioner interested in identifying gaps in the evidence for nursing.

## Summary

The results of this project demonstrated that implanting educational programs in rural clinics can improve nurses' knowledge of osteoporosis and osteopenia's preventive and self-management patient education. Planning and implementing an educational program in a rural clinic is one way of encouraging and motivating the healthcare workers to address potentially increasing diagnoses of osteoporosis and osteopenia. This project has played a significant role in enhancing my leadership skills, which will allow me to make successful changes in healthcare.

References

Ackley, B., Ladwig, G., & Flynn, Makic, M. (2016). *Nursing diagnosis handbook: An evidence-based guide to planning care*. Elsevier Health Sciences.

Anderson, W. J., Harding, C., & Seal, A. (2018). Increasing the knowledge, identification, and treatment of osteoporosis through education and shared decision-making with residents living in a retirement village community. *Australasian Journal on Ageing, 37*(1), E17–E22. https://doi.org/10.1111/ajag.12494

Atanelov, L. (2016). *Resident's handbook of medical quality and safety*. Springer International Publishing.

Camacho, P. M., Petak, S. M., Binkley, N., Diab, D. L., Eldeiry, L. S., Farooki, A., Harris, S. T., Hurley, D. L., Kelly, J., Lewiecki, E. M., Pessah-Pollack, R., McClung, M., Wimalawansa, S. J., & Watts, N. B. (2020). American Association of Clinical Endocrinologist/American College of Endocrinology clinical practice guidelines for the diagnosis and treatment of postmenopausal osteoporosis – 2020 update. *Endocrine Practice, 26*(1), 1–46. https://doi.org/10.4158/GL-2020-0524SUPPL

des Bordes, J., Prasad, S., Pratt, G., Suarez-Almazor, M. E., & Lopez-Olivo, M. A. (2020). Knowledge, beliefs, and concerns about bone health from a systematic review and metasynthesis of qualitative studies. *PloS One, 15*(1), e0227765. https://doi.org/10.1371/journal.pone.0227765

Fay, G., & Cunningham, C. (2015). Awareness and management of osteoporosis among

general practitioners in Ireland. *Physiotherapy Practice and Research, 36*(2), 107–113. https://doi.org/10.3233/ppr-150057

Gai, Q., Lv, H., Li, Y., Fu, Q., & Li, P. (2019). Education intervention for older adults with osteoporosis: a systematic review. *Osteoporosis International, 31*(4), 625–635. https://doi.org/10.1007/s00198-019-05166-5

Gianoudis, J., Bailey, C. A., Ebeling, P. R., & Nowson, C. A., (2014). Effects of a targeted multimodal exercise program incorporating high-speed power training on falls and fracture risk factors in older adults: A community-based randomized controlled trial. *Journal of Bone and Mineral Research, 29*(1), 182–191. https://doi.org/10.1002/jbmr.2014

Jensen, A. L., Wind, G., Langdahl, B. L., & Lomborg, K. (2018). The impact of multifaceted osteoporosis group education on patients' decision-making regarding treatment options and lifestyle changes. *Journal of Osteoporosis, 2018*, 1–10. https://doi.org/10.1155/2018/9703602

Knowles, M. (1978). Andragogy: Adult learning theory in perspective. *Community College Review, 5*(3), 9–20. https://doi.org/10.1177/009155217800500302

Maddah, M., Sharami, S., & Karandish, M. (2011). The educational difference in the prevalence of osteoporosis in postmenopausal women: A study in northern Iran. *BMC Public Health, 11*(1). https://doi.org/10.1186/1471-2458-11-845

Maddah, M., Sharami, S., & Neyestani, T. (2019). Vitamin D insufficiency among postmenopausal women in urban and rural areas in Guilan, northern Iran. *Journal of Nutrition for the Elderly, 28*(4), 386–393.

https://doi.org/10.1080/01639360903393523

Nieves, J. W. (2013). Nonskeletal risk factors for osteoporosis and fractures. *Osteoporosis*, 817-839.

Park, K., Yoo, J., Kim, H., Jang, S., Park, Y., & Ha, Y. (2017). Education and exercise programs improve osteoporosis knowledge and change calcium and vitamin D dietary intake in community-dwelling elderly. *BMC Public Health*, *17*(1).

Rosen, H. (2019). Patient education: Osteoporosis prevention and treatment. Retrieved 10 November 2020, from https://www.uptodate.com/contents/osteoporosis-prevention-and-treatment-beyond-the-basics

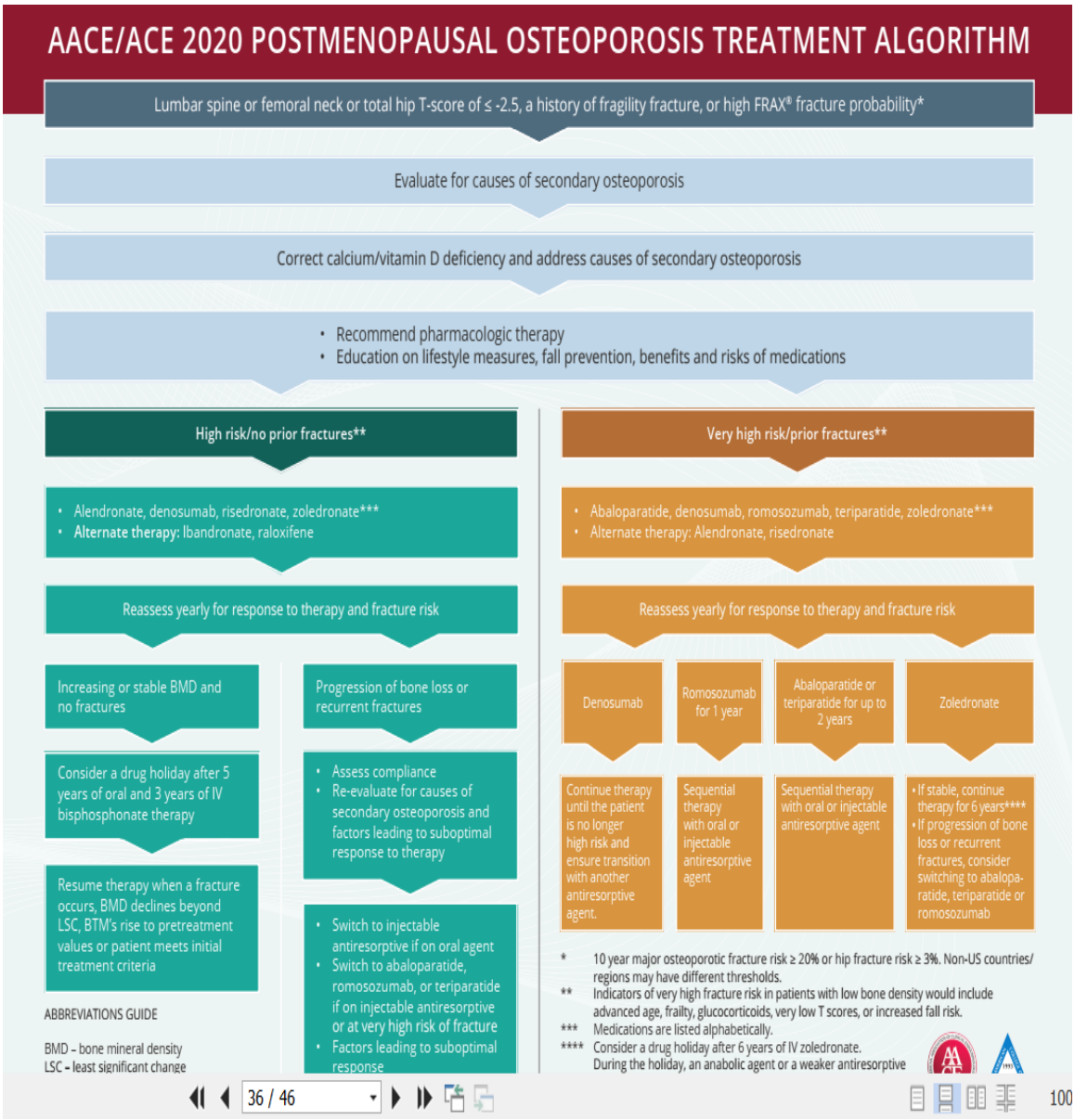
Seo, J. (2018). Complicated osteoporotic spinal Fractures: risk factors and related issues. *Osteoporosis and Sarcopenia*, *4*(4), S8.

Sinaki, M., & Pfeifer, M. (2017). Non-pharmacological management of osteoporosis: exercise, nutrition, fall, and fracture prevention. New York: Springer.

Sozen, T., Ozisik, L., & Calik Basaran, N. (2017). An overview and management of osteoporosis. *European Journal of Rheumatology*, *4*(1), 46-56. https://doi.org/10.5152/eurjrheum.2016.048

Varghese, A., Siva, R., Paul, T., & Selvaraj, K. (2019). Risk factors and knowledge of osteoporosis in rural pre-menopausal women. *Indian Journal of Continuing Nursing Education*, *20*(1), 22.

Appendix A: AACE/ACE 2020 Algorithm



Appendix B: Pre- Post- Survey

Please answer with Y or N

1. I recognize the risk for osteoporosis.
2. I understand how the diagnosis is made.
3. I know the evaluation methods to use after diagnosis.
4. I recognize the basic measures to promote bone health.
5. I understand how pharmacological therapy is assigned.
6. I understand what medications are appropriate to use.
7. I recognize how therapy is monitored.
8. I understand the purpose of augmentation therapy.
9. I understand the rules of sequential therapy and combinations.
10. I understand when it is necessary to consider an endocrinologist specialist.

Appendix C: Education Program

| Learning Outcomes | Assessment | Intervention | Explanation |
|---|---|---|---|
| Understand risk for osteoporosis/osteopenia<br><br>Explain criteria for diagnosis of osteoporosis | A t-score of -2.5 or less measured in the lumbar spine, femoral neck, total hip, or 33% of the radius even with no fractures. Even if dual-energy X-ray absorptiometry (DXA) measurement shows a T-score better than −2 | (Once the diagnosis is made using the t-score the diagnosis remains regardless of DEXA). | Osteoporosis is diagnosed based on presence of fragility fractures in the absence of other metabolic bone disorders even with a normal bone mineral density (T-score). |
| Identify further methods of evaluation upon diagnosis of osteoporosis | Thorough history and physical assessment with fracture risk. Consider bone density test. Consider FRAX. Measure vitamin D levels. | FRAX<br>Determines the mineral density of the bone and determines the risk of a fracture of a major bone in the next 10 years. | Evaluate for risk of fractures. Evaluate for secondary causes of osteoporosis. Evaluate for obvious vertebral fractures. Consider use of bone markers which can predict rate of bone loss. |
| Understand the basic measures to promote bone health | Counsel on diet with adequate vitamin D and calcium, Counsel on ways to reduce risk of falls. Advise to have an active lifestyle, including weight-bearing balance, and resistance exercises. | Consider ordering physical therapy to increase strength and improve quality of life. | Always involve the patient in choices and prevention. Consider cost and effectiveness, support, and resources. |

(continued)

| | | | |
|---|---|---|---|
| Understand determination of pharmacologic therapy | Recommended for patients with low bone mass and a history of fracture; T-score of −2.5 or less; consider patients on medication that could cause fractures e.g. Glucocorticoids; consider patients with fractures in the last 12 months. | Consider patients with osteoporosis but who has low risk for fractures. | Recommended for patients with osteopenia who have had fractures of the hip or spine. |
| Identify appropriate medications used to treat osteoporosis/osteopenia | alendronate, denosumab, risedronate, and zoledronate are good choices for beginning therapy for patients with high risk. | If patients cannot take oral therapy Abaloparatide, denosumab, romosozumab, and teriparatide, and zoledronate must be considered. | Abaloparatide and teriparatide must not be given over 2 years. Teriparatide therapy must be followed with a bisphosphonate or denosumab Romosozumab treatment must be limited to 1 year and followed by a long-term drug such a bisphosphonate or denosumab. For oral bisphosphonates, consider a medication break after 6 to 10 years if no fractures nut in patients with very high fracture risk. continue for 5 years. |

(continued)

| | | | |
|---|---|---|---|
| Discuss monitoring of therapy | The patient must be monitored to make sure that the treatment is effective. Periodic bone density of 1-2 years is recommended. Monitor the patient for osteonecrosis of the jaw. | Bone density shows whether bones are being strengthened. Labs must be drawn periodically on office follow-up. | Maintain vitamin D levels to (preferable range, 30 to 50 ng/mL) Maintain calcium at 8.6 to 10.3 mg/dL |
| | The most common types of therapy are usually given from 3 to 5 years, but the optimal length of treatment has not been officially established. | Risk factors must be taken into consideration. | Bisphosphonate treatment should be stopped if extensive dental procedures are done such as several teeth extracted. |
| | Prevention of fractures. Preventing falls and reducing the impact force of falls. | Treatment is aimed at increasing bone strength. | |
| | Combination therapies not recommended because of lack of understanding of them. Additionally, not recommended because of cost and possible side effects. | | |
| Understand the significance of stabilization of the compression fracture by surgery (vertebral augmentation? | Although it relieves pain and helps prevent fractures of the adjoining vertebrae, one study showed significant risk of fractures after having a vertebroplasty, but this treatment remains uncertain. | | |

(continued)

| | |
|---|---|
| Identify when should a clinical specialist or endocrinologist be considered? | For a major trauma, subsequent fractures, continued bone loss despite treatment. Secondary conditions such as hyperthyroidism, hyperparathyroidism, hypercalciuria, or high prolactin, severe osteoporosis or young age, low phosphorus, high or low alkaline phosphatase), unexplained DXA abnormalities conditions that hinder management (e.g., decreased kidney function, hyperparathyroidism, or malabsorption). |

Adapted from: Camacho, P. M., Petak, S. M., Binkley, N., Diab, D. L., Eldeiry, L. S., Farooki, A., ... & Pessah-Pollack, R. (2020). American Association of clinical endocrinologist/American college of endocrinology clinical practice guidelines for the diagnosis and treatment of postmenopausal osteoporosis – 2020 update. *Endocrine Practice*, *26*(s1), 1-46.

Appendix D: Program Evaluation

## EDUCATION EVALUATION FORM

As a learner please assist in the evaluation of this presentation. Please circle the number beside each statement that best reflects the extent of your agreement. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. Thank you.

| | Disagree | | | | Agree |
|---|---|---|---|---|---|
| **Content** | | | | | |
| 1. The content was interesting to me | 1 | 2 | 3 | 4 | 5 |
| 2. The content extended my knowledge of the topic | 1 | 2 | 3 | 4 | 5 |
| 3. The content as consistent with the objectives | 1 | 2 | 3 | 4 | 5 |
| 4. The content was related to my job | 1 | 2 | 3 | 4 | 5 |
| 5. Objectives were consistent with the purpose/goals of activity | 1 | 2 | 3 | 4 | 5 |
| **Instructional Methods** | | | | | |
| 1. The instructional material was well-organized | 1 | 2 | 3 | 4 | 5 |
| 2. The instructional methods illustrated the concepts well | 1 | 2 | 3 | 4 | 5 |
| 3. The handout materials given are likely to be used as a future reference | 1 | 2 | 3 | 4 | 5 |
| 4. The teaching strategies were appropriate for the activity | 1 | 2 | 3 | 4 | 5 |
| **Learner Achievement of Objectives** | | | | | |
| 1. Understand risk for osteoporosis/osteopenia | 1 | 2 | 3 | 4 | 5 |
| 2. Explain criteria for diagnosis of osteoporosis | 1 | 2 | 3 | 4 | 5 |
| 3. Identify further methods of evaluation upon diagnosis of osteoporosis | 1 | 2 | 3 | 4 | 5 |
| 4. Understand the basic measures to promote bone health | 1 | 2 | 3 | 4 | 5 |
| 5. Understand determination of pharmacologic therapy | 1 | 2 | 3 | 4 | 5 |
| 6. Identify appropriate medications used to treat osteoporosis/osteopenia | 1 | 2 | 3 | 4 | 5 |
| 7. Discuss monitoring of therapy | 1 | 2 | 3 | 4 | 5 |
| 8. Understand the significance of stabilization of the compression fracture by surgery (vertebral augmentation) | 1 | 2 | 3 | 4 | 5 |
| 9. Identify when should a clinical specialist or endocrinologist be considered | 1 | 2 | 3 | 4 | 5 |