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Osteoporosis Risk Assessment Impacts Bone Densitometry, and Fall Fractures In Primary Care

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Abstract

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MS, Walden University, 2017

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Doctoral Project Submitted in Partial Fulfillment

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Abstract

In the United States, approximately 10 million adults 50 years and older are plagued by osteoporosis; this number has been projected to climb to 14 million by 2020. Osteoporosis is a debilitating disorder characterized by significant loss of bone mass and mineral density. Without proper screening and diagnosis, patients may not receive the appropriate medical treatments to avoid worsening of their condition and its associated complications. Nurses can help identify patients at risk for osteoporosis by administering osteoporosis screening during routine office visits. The practice-focused question asked whether the Fracture Risk Assessment Tool (FRAX) increased the proportion of bone density testing and decreased the proportion of falls with fractures. The purpose of this doctoral project was to evaluate the effectiveness of quality improvement (QI) project on the proportion of bone density testing and falls with fractures among primary care clinic patients 50 years and older 12 months after implementation. The theoretical framework that guided this doctoral project was the Donabedian model of care. De-identified and aggregated data before and after tool implementation was obtained from the QI department. The use of the FRAX increased the proportion of bone density testing by 58 percentage points (from 13% to 71%) and decreased the proportion of falls with fractures by 4.3 percentage points (from 28.3% to 24%). The project findings were shared with the QI manager within the facility. The implication for nursing practice is that improved screening and initiation of preventive measures can reduce osteoporosis-related fractures. The implication for positive social change is the prevention of early death and disability achieved through early screening, detection, and treatment of osteoporotic symptoms.

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Dedication

To God almighty, whom in his infinite grace, blessing, wisdom, and knowledge, has successfully led me through this rigorous educational path. "Thank you, Master Jesus." To my beautiful children, Chibuike, Akwaugo, Nkechi, and Ifeanyi, who has steadfastly stood by me through thick and thin, even on the days I promise them outings but never fulfilled it due to submission deadlines, yet they never loved me less. To my great parents who never relented in their prayers and support throughout this journey. To my siblings, friends, and well-wishers, you guys rock, and thanks for seeing me through this path of success with your words of encouragement. To my Chair, Dr. Ojeda, without you, I would have dropped out of this program a long time ago, for you refused to give up on me.

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Thank you all from the deepest part of my other committee members, Dr. Dittman and Dr. Schweickert, for your unrelenting support, advice, and constructive corrections and suggestions to this project's success my heart. A special thanks to Dr. Ali and the entire Noble Primary Care staff for providing me a conducive environment throughout my clinical rotations that led to my success in this project. To my children, parents, siblings, friends, and well-wishers for their endless encouragement, prayers, and support, thanks immensely. My Joy knows no bounds!

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Section 1: Nature of the Project

Introduction

An estimated 10 million and 44 million people in the United States are plagued with osteoporosis and low bone density, respectively. This staggering number predisposes these individuals to fractures and their associated debilitating consequences (Bethel et al., 2019). About 1 in 3 women and 1 and 5 men will suffer a fracture related to osteoporosis in their lifetime, and about 30% of those affected die in the first year of osteoporosis diagnosis (Sözen et al., 2017). Annually, out of the 300,000 patients that sustain osteoporosis-related fractures, only a 15% return to baseline functional level, 50% never return to baseline, while 25% end up in the nursing homes (National Osteoporosis Foundation, 2015). The annual osteoporosis cost is estimated at $19 billion. By the year 2025, there will be 3 million new osteoporosis cases, and the cost of care will rise to $25.3 billion (National Osteoporosis Foundation, 2015). This doctoral project found that the QI project has contributed to a positive social change by increasing the providers' awareness to promptly identifying those at risk for fracture-related falls, thus the initiation of early treatment. With increased knowledge, nurses can educate patients on the ways to avert this disease, ways to manage it, to keep from getting to a debilitating state, injury reduction, prolonged hospitalizations, and nursing home admission, income loss, and even death (Tu et al., 2018). The early screening for osteoporosis contributes to the detection of at-risk patients and the initiation of early treatment for osteoporosis, thus improving outcomes such as a decline in fractures from falls (Thulkar & Singh, 2015).

Problem Statement

Despite the number of available screening tools for osteoporosis, there is still an inconsistency in patients' rate identified as having this disease, thereby leading to a higher misdiagnosis (Tu et al., 2018). Injuries from osteoporosis occur regularly, resulting in significant rates of physical and psychological challenges (Tu et al., 2018). Approximately 50% of falls among adults 50 years and older are related to osteoporosis, while about 25% of those falls lead to chronic debilitation (Sözen et al., 2017). A gap in practice occurs when clinicians fail to disseminate their research findings into practice among health care providers and policymakers for possible adoption (Azimi et al., 2015). An inadequate translation of research into practice is a by-product of lack of or inadequate dissemination (Azimi et al., 2015; White et al., 2016). Research evidence findings related to osteoporosis and its debilitating consequences ought to be exchanged among the providers of care, policymakers, and the researcher (White et al., 2016). Osteoporosis has posed a massive health concern among individuals 50 years and older as it increases the risk for fracture and falls among this population. Low bone density is the culprit in one out of every three fracture-related deaths (American College of Rheumatology, 2015).

The local practice problem was the high proportion of falls with fractures and a low proportion of bone density testing performed in the primary care clinic patients 50 years and older due to lack of a standardized risk assessment method and sometimes missed assessment of some patients for osteoporosis (M. Morales, personal communication, December 2, 2019). Owing to these problems, three years ago, this

primary care clinic adopted and implement the use of the Fracture Risk Assessment Tool (FRAX) (M. Morales, personal communication, December 2, 2019). The FRAX is a computerized fracture-risk assessment tool that utilizes the global population-based models in conjunction with clinical risk factors to determine a person's 10-year risk of sustaining a fracture (International Osteoporosis Foundation, 2017a). The FRAX tool's reliability and validity have been established in the general population, as shown by various studies (Goldshtein, 2018). This tool was implemented to track and improve the proportion of falls with fractures and the proportion of bone density testing among the clinic's patients 50 years and older, thus decreasing the disease burden such as injuries, disability, and even death.

The doctoral project's relevance to nursing practice, nurses have a massive role in the early detection and prompt treatment of patients exhibiting osteoporotic symptoms. Nurses have the role of initiating individualized patient education to prevent osteoporosis-related injuries and promote lifestyle changes that will foster injury prevention (Park et al., 2017). By conducting meticulous patient screenings, nurses can communicate effectively with other healthcare team members to initiate preventive measures that result in the treatment and prevention of osteoporosis and fall-related fractures among their patients (Jensen et al., 2018). The promotion of behavioral change through knowledge enrichment is within the scope of nursing practice. In collaboration with the interprofessional team members, nurses in the health care arena can provide the needed education to the patients and family members on fall prevention strategies at

home, patients' lifestyle modifications, the essence of osteoporosis screening, and treatments (Park et al., 2017).

Purpose Statement

This doctoral project aimed to evaluate a QI project that was already implemented by the primary care clinic to improve osteoporosis risk assessment by implementing the FRAX tool. The FRAX tool uses the patient's clinical risk factors to determine the patient's 10-year risk for developing osteoporosis. With the FRAX tool, providers can determine the patients who might require further testing or treatment based on their score (Kandola,2020).

The meaningful gap in practice that this doctoral project addressed was the lack of evaluation of the FRAX tool's effect on patient outcomes. The purpose of this doctoral project was to evaluate whether the QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk was effective in increasing the proportion of bone density testing and decreasing the proportion of falls with fractures among clinic patients 50 years and older12 months after implementation.

The practice-focused question that this doctoral project answered was whether the FRAX osteoporosis risk assessment tool increased the proportion of bone density tests performed and decreased the proportion of falls with fractures among patients 50 years and older at a primary care clinic 12 months (four quarters) postimplementation.

This doctoral project addressed the gap-in-practice of lack of FRAX tools' effectiveness on decreasing falls with fractures and increasing bone density testing. The nurses at this primary care clinic are responsible for ensuring that the patients found to be

at risk for osteoporosis while using the FRAX tool receive a follow-up bone density testing. The nurses achieved by nurses flagging the patients' charts as a reminder to the providers to place an order for bone density testing. The nurses educated at-risk patients on the importance of obtaining bone density testing. The nurses also ensured that every bone density testing performed was documented (G. Merchant, personal communication, September 2, 2020).

Nature of the Doctoral Project

The category for this doctoral project was QI evaluation. The primary care clinic implemented the project. Given that the primary care clinic has not evaluated its effectiveness, this doctoral project focused on evaluating the FRAX tool's effectiveness at the local primary care clinic. The purpose of this doctoral project was to evaluate whether the QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk was effective in increasing the proportion of bone density testing and decreasing the proportion of falls with fractures among clinic patients 50 years and older 12 months after implementation. The data used for this doctoral project was received from the QI department. The QI department provided me with aggregated data that was already de-identified. The received data were on the frequency of the use of the FRAX tool by the clinicians at the primary care clinic 12 months (four quarters) after the tool implementation; the proportion of bone density testing 12 months (four quarters) before and after the tool implementation; the proportion of falls with fractures 12 months (four quarters) before and after the tool implementation among the patients 50 years and older. The received data were described and compared before and after the

implementation of the FRAX tool. The results were reported using descriptive data. From the results, it was found that the FRAX tool was effective in decreasing the proportion of falls with fractures. It was also found that the FRAX tool was effective in increasing the proportion of bone density testing.

Significance

This QI project had several stakeholders: patients, the primary care clinic, nurses, interprofessional care providers, and the organization. The most critical stakeholder for this doctoral project was the patients screened for osteoporosis risk using the FRAX tool. Information from the office manager was that before implementing the FRAX risk assessment tool, the primary care clinic had no standard screening method for osteoporosis, and most of the time, some of the patients did not receive screening (M. Morales, personal communication, December 2, 2019). Most patients lack the basic knowledge of detecting osteoporosis signs and symptoms and applying measures to reduce falls with fractures (Park et al., 2017). Most clinic patients are likely to go undetected and untreated due to a lack of screening for osteoporosis, leading to increased risk for fractures (Park et al., 2017).

This doctoral project’s significance in the primary care clinic was in delivering excellent care and improved screening by the providers leading to early detection, treatment, and prevention of osteoporosis in patients 50 years and older.

This doctoral project's contribution to nursing practice was improved screening and initiation of preventive measures by the nurses, and this can be achieved via an increase in the delivery of meticulous patient screening, assessment, and the application

of preventive measures to reduce osteoporosis-related fractures. Nurses have the most regular and consistent contact with patients; therefore, they are frequently charged with administering the screening tools. For the nurses, finding out that what they are doing have positive outcomes on their patients, acting as a motivating factor in keeping up with the trend.

This doctoral project impacted interprofessional healthcare providers because critical information retrieved from the nurses' initial patients screening contributed to compliance with evidence-based recommendations on the appropriate use of the FRAX risk assessment tool for the decreased proportion of falls with fractures increased bone density testing proportion.

This doctoral project's impact on the organization supported compliance with regulatory requirements and improved reputation with the community. This was achieved via the revamped care guidelines and protocols at the organization by adopting the latest trend in care for osteoporosis prevention in the target population. This organization also used the project's findings to build and maintain a reputation for excellent care provision through improved compliance with regulatory agency requirements. These changes in care protocol have contributed to a decrease in the proportion of falls with fractures among the clinic’s patients, thus leading to the achievement of a positive public image and reputation (G. Merchant, personal communication, January 5, 2020).

This doctoral project could be implemented in different settings and other patient populations. The evaluation of a newly implemented care tool can occur in various

settings and guide practice. This doctoral project is crucial in any setting of care where care standardization and quality improvement were intended.

This doctoral project's positive social change implication occurred at various levels, such as at the patient and organizational levels. At the organizational level, this doctoral project impacted positive social change by making healthcare providers more aware of the need to inform patients at high risk of developing osteoporosis of those risks, diagnostic testing, the available preventive strategies, treatment options, and the accompanying side effects (G. Merchant, personal communication, January 5, 2020). It has also led to a standardized osteoporosis assessment; thus, early disease detection and initiation of prompt treatment. Providers and the organization benefited from understanding that osteoporosis risk assessment led to real changes in practice and patient outcomes. Ultimately, the project has helped the organization to maintain and build a reputation for excellent care through improved compliance with regulatory agency requirements. Patients were impacted by benefiting from early detection, prevention, and treatment of osteoporosis by reducing injuries and a decline in health (G. Merchant, personal communication, January 5, 2020).

Summary

Osteoporosis is a significant menace to health that, if not handled promptly, could lead to prolonged disability and even death. However, healthcare providers often struggle to provide care to osteoporosis prone patients, especially when organizations fail to implement standardized, evidence-based protocols for screening and treatment. This doctoral project evaluated a QI project implemented to evaluate the FRAX osteoporosis

risk assessment tool's effect on the proportion of bone density testing and the proportion of falls with fractures among patients 50 years and older at a primary care clinic. The identified gap-in-practice was the lack of evaluation of the FRAX tool's effect on the patient's outcomes in the clinic patients 50 years and older. This doctoral project evaluated the 12 months (four quarters) before and the 12 months (four quarters) after the FRAX tool implementation data and found that the tool increased the proportion of bone density testing performed and decreased the proportion of falls with fractures among the clinic patients 50 years and older. The project's evidence source was received from the clinic's QI department. The manager provided me with the de-identified and aggregated data on the proportion of bone density testing and the proportion of falls with fractures on the patients 50 years and older, 12 months before and 12 months after the tool implementation. This project's significant positive social change implication was providing care consistency, improved care outcomes, and prevent injuries from falls with fractures in the clinic patients. Section 2 will address the concepts, models, and theories that guided this doctoral project. The project's relevance to nursing practice, its local backgrounds and contexts, the project team's role, and my role for this project were addressed.

Section 2: Background and Context

Introduction

The practice problem was the high proportion of falls with fractures and a low proportion of bone density testing performed in the primary care clinic patients 50 years and older due to lack of a standard assessment (M. Morales, personal communication, December 2, 2019). Owing to these problems, three years ago, this primary care clinic adopted and implemented the use of the FRAX tool (M. Morales, personal communication, December 2, 2019). The practice-focused question that guided this doctoral project asked whether the FRAX osteoporosis risk assessment tool increased the proportion of bone density tests performed and decreased the proportion of falls with fractures among patients 50 years and older at a primary care clinic 12 months (four quarters) postimplementation. The purpose of this doctoral project was to evaluate whether the QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk was effective in increasing the proportion of bone density testing and decreasing the proportion of falls with fractures among clinic patients 50 years and older 12 months after implementation.

In the following sections, I will discuss the concepts used for developing this project, the project's relevance to the nursing profession, the local background and context, and my project role as a Doctor of Nursing Practice (DNP) student.

Concepts, Models, and Theories

In today’s healthcare, the vast variations in care provision resulted from care providers' failure to adopt evidence-based practice (EBP) guidelines in the clinical

settings (Tu et al., 2018). The application of EBP in care delivery is critical as it will ensure the utilization of the latest research findings, thus optimizing care (Ameh et al., 2017). Challenges and barriers associated with the implementation of EBP have been blamed for its inconsistency in the application by care providers (Ameh et al., 2017).

Donabedian's model of healthcare quality was chosen for this DNP project. This model was initially developed in 1966 by Avedis Donabedian, a health services researcher and physician (Donabedian, 1966). This model's framework provides a basis for the assessment of quality in healthcare delivery. Donabedian's model is flexible in its applicability within various healthcare settings and levels of care, including small group practices and ambulatory care clinics to achieve optimal patient outcomes (Donabedian, 1966; McDonald et al., 2007).

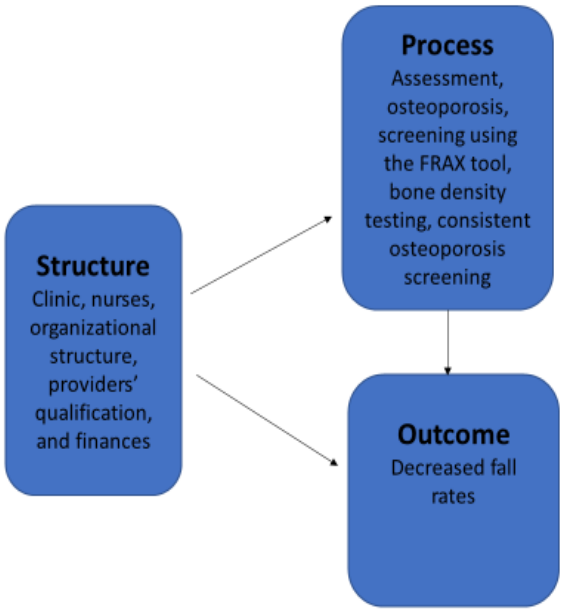
The significant concepts included in this model are; structure, process, and outcome (Berwick & Fox, 2016; Donabedian, 1966). These concepts' relationship is linear, with the structure influencing the process, influencing outcomes (Berwick & Fox, 2016; Donabedian, 1966). The structure is the context in which care is delivered to patients, and this includes the physical environment, nurses, facility, the organizational structure, providers' designations, attributes of the material, and the finances of the organization (Berwick & Fox, 2016). The processes are the actions implemented in delivering care to patients with the primary goal of improving health. The outcomes are the health effects on patients that result from the underlying structures and specific processes that were implemented (Berwick & Fox, 2016; Donabedian, 1966).

The Donabedian model was developed to evaluate the quality and inform care improvement efforts in healthcare as it can also be applied in other fields (Ayanian & Markel, 2016). For example, the framework has been applied in education for developing a program that introduces interprofessional education in health sciences. The education researchers chose the Donabedian model because they believed that action should be guided by theory and theory-informed by action (Botma & Labuschagne, 2017). Several professional organizations and healthcare payer institutions have developed payment metrics to equate performance with the quality of care delivered—value-based metrics, using the Donabedian quality framework (Lighter, 2015). The Donabedian framework has also been applied as a predictor of satisfaction with elderly care provision (Kajonius & Kazemi, 2016). The Institute of Medicine (IOM) applied the Donabedian framework to determine how quality influences providers' healthcare costs (Jones, 2016). The RAND Corporation adopted the Donabedian framework on behalf of the United States military services for the monitoring, assessment, and improvement of the quality of care delivered to the military service personnel for the management of psychological health issues such as posttraumatic stress disorder and major depressive disorder (Hepner et al., 2015).

The relationship between this DNP project and the Donabedian framework is shown in Figure 1.

Figure 1

Donabedian's Model of Healthcare Quality



Terms Clarification

The chosen term used in this DNP project needing clarification is the term 'fall.' This term has several other meanings such as fall is defined as a spontaneous activity or event that causes an individual to end up on the ground, floor, or on a lower level (World Health Organization, 2018). Fall could also be defined as any incident resulting in a person unintentionally embarking on a rest on the ground or a lower level not resulting from a substantial natural incident such as a stroke or heart attack or an enormous peril (Quigley, 2016). Fall could also be defined as an unintended resting on the ground, other lower level, or floor, not resulting from natural causes or massive inherent force (Staggs et al., 2015). The definition of fall by the American Nurses Association and the National

Database for Nursing Quality Indicators (ANA-NDNQI) is an unintended dropping to the floor brought about by extrinsic factors such as a chair, trash can, wet floor or intrinsic physiological factors such as syncope, stroke, or osteoporosis (National Database of Nursing Quality Indicators, 2010). For this DNP project, the fall definition used is as stipulated by the ANA-NDNQI, which includes dropping to the floor caused by an intrinsic factor, osteoporosis.

Relevance to Nursing Practice

Osteoporosis is a silent and debilitating chronic bone disease that leads to loss of bone mass and a decreased bone mineral density (BMD). This loss in bone density is a precursor for fragility fracture (Thulkar & Singh, 2015). In the United States, an estimated 10.2 million are affected by osteoporosis, while 43.4 million people are affected by low bone density (Goode et al., 2020). An increase in the rate of osteoporosis has been associated with a rise in fracture-related falls, increased mortality, morbidity, economic and health-related burdens, and these consequences get worse with increasing age (Goode et al., 2020). There is a public health concern based on healthcare providers' failure to utilize the recommended care guideline for osteoporosis screening and treatment (Goode et al., 2020). From 2008 to 2014, the screening rate declined by almost 34.1% in individuals 50 years and older (Gillespie & Morin, 2017).

Healthcare providers' failure to utilize a consistent and standard screening guideline for osteoporosis could potentially contribute to failure to provide safe, timely, and effective care in patients 50 years and older (Park et al., 2017). In the three months following an osteoporosis-related hip fracture in individuals 50 years and older, the

mortality rate increased from 2.8 to 4 times compared to their counterparts with non-osteoporosis-related fractures (Goode et al., 2020). After an osteoporosis-related fracture, 80% of patients cannot perform activities of daily living (ADLs), about 64% need nursing home care, and 20% will remain in a nursing home for the rest of their life (Goode et al., 2020). Most patients with osteoporosis-related falls will experience isolation, depression, and fear of falls with subsequent fractures. An increase in age plus a decrease in osteoporosis screening equals increased fracture. An estimated 40% of individuals affected with fracture-related falls never return to their pre-fall state (International Osteoporosis Foundation, 2014).

The nurse's responsibility is to provide care to patients with osteoporosis risk and promote lifestyle changes (Park et al., 2017). Through meticulous patient screening and assessment, nurses can initiate preventive measures to foster a decreased fracture rate (Park et al., 2017). The promotion of behavioral change through knowledge enhancement is within the scope of nursing practice. Thus, nurses, along with other members of the interprofessional healthcare team, are responsible for providing education, implementing the best practices, and adopting the latest evidence-based practice guidelines for caring for patients at risk for osteoporosis for the reduction of fracture-related falls and the improvement of patients outcomes (Goode et al., 2020). Through this doctoral project, the modalities that led to a decreased proportion of falls with fractures and increased bone density were uncovered.

Local Background and Context

This local primary care clinic is in the Southwestern region of the United States. The clinic annually serves an estimated 10,000 adult patients, 70% (7000) are aged 50 years and older. The clinic's professional staffing pool consists of five physicians, five nurse practitioners, two radiology technicians, four medical assistants, two laboratory technicians, and three office clerks. The clinic is certified by the Centers for Medicare and Medicaid Services (CMS) to provide healthcare to the adult population (K. Flanagan, personal communication, April 21, 2019). The larger part of the patients' care is funded mostly by Medicare and Medicaid, with a few private insurances. The primary health conditions treated at this clinic are osteoporosis, falls, fractures, diabetes, hyperlipidemia, chronic pain, hypothyroidism, hyperthyroidism, hypertension, common cold, osteoarthritis, asthma, chronic obstructive pulmonary disease, emphysema, bronchitis, chronic heart disease, human immunodeficiency virus, and chronic kidney disease (K. Flanagan, personal communication, April 21, 2019).

Before adopting and implementing the FRAX osteoporosis risk assessment tool, the clinic screened patients for osteoporosis with annual height measurements to check for up to 2 cm or more in height loss and the rib to pelvis measurement for loss of 2 or fewer fingerbreadths. The clinic was plagued with a high proportion of falls with fractures and a low proportion of bone density testing due to the lack of a standardized risk assessment method and sometimes missed assessment of some osteoporosis patients. (M. Morales, personal communication, December 2, 2019).

Role of the DNP Student

I have an established relationship with this primary care clinic, as it is the site for my DNP field experience. Based on this, I was recognized as a nurse practitioner student based on this mutual relationship between the employees and myself. For this project, I assumed the role of a project evaluator. The project was conducted while maintaining professional integrity. The evaluation of this QI project helped uncover the areas of success and areas that needed improvement in the future. During my field experience and with the office manager's assistance, I ascertained the significant area that has mostly impacted the clinic, thus evaluating the results of the implemented QI tool for osteoporosis risk assessment in this primary care clinic. In keeping with the DNP essentials III, clinical scholarship, and analytical methods for evidence-based practice scholarship and research are the hallmarks of doctoral education (American Association of Colleges of Nursing, 2006). This QI project achieved the DNP essential III via the effect the introduction of the FRAX tool had on the clinic's patients' proportion of falls with fractures and bone density testing. I utilized the skills I acquired from this program to evaluate the practice change adopted by this primary care clinic to improve care quality.

Summary

There is a massive variation between knowledge and EBP application at this primary care clinic, and this was confirmed via staff observations at care provision and from holding private conservations with the clinic's staff. In the provision of nursing care, the utilization of a standardized protocol and guidelines ensured optimal care provision

for patients 50 years and older. This project's chosen framework, the Donabedian model, helped achieve this doctoral project's purpose and answer the practice-focused question. Adopting and implementing the appropriate framework for a project will ensure that the intended project's goals and outcomes are achieved. For this project, the expected provision of consistent osteoporosis care by providers of the clinic, determining the proportion of the bone density testing, and the proportion of falls with fractures reduction rate among the clinic's patients 50 years and older. Nurses are at the hem of the provision of optimal patient care through meticulous screening, assessment, and the promotion of lifestyle changes for decreasing the incidence of falls with fractures in patients. Section 3 discussed the project's practice question, evidence sources, analysis, and synthesis that contributed to a successful project.

Section 3: Collection and Analysis of Evidence

Introduction

Osteoporosis is a contributor to the rise in fall-related fractures and the associated debilitating consequences among individuals 50 years and older (Goode et al., 2020). Approximately 50% of falls among adults 50 years and older are related to osteoporosis, while about 25% of those falls lead to chronic debilitation (Bethel et al., 2017). Despite the number of available screening tools for osteoporosis, there is still an inconsistency in their use, thereby leading to high misdiagnosis (Tu et al., 2018). At this local primary care clinic, the practice problem was the high proportion of falls with fractures and a low proportion of bone density testing performed in the primary care clinic patients 50 years and older due to lack of a standardized risk assessment method and sometimes missed assessment of some patients for osteoporosis (M. Morales, personal communication, December 2, 2019). Owing to these problems, three years ago, this primary care clinic adopted and implemented the use of the FRAX (M. Morales, personal communication, December 2, 2019). With interdisciplinary collaboration, nurses can provide for the patients; their family members fall prevention strategies for use at home, patients' lifestyle modifications strategies, and the importance of osteoporosis screening and treatments (Park et al., 2017).

The purpose of this doctoral project was to evaluate whether the QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk was effective in increasing the proportion of bone density testing and decreasing the proportion of falls with fractures among clinic patients 50 years and

older12 months after implementation. This section will address the practice-focused question, sources of evidence, analysis, synthesis, and evaluation techniques.

Practice-Focused Question

The practice problem was the high proportion of falls with fractures and a low proportion of bone density testing performed in the primary care clinic patients 50 years and older due to lack of a standardized risk assessment method and sometimes missed assessment of some patients for osteoporosis (M. Morales, personal communication, December 2, 2019). This doctoral project's gap in practice was the lack of evaluation of the FRAX tool's effect on the patients' outcomes.

The practice-focused question that guided this doctoral project asked whether the FRAX osteoporosis risk assessment tool increased the proportion of bone density tests performed and decreased the proportion of falls with fractures among patients 50 years and older at a primary care clinic 12 months (four quarters) postimplementation.

The purpose of this doctoral project was to evaluate whether the QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk was effective in increasing the proportion of bone density testing and decreasing the proportion of falls with fractures among clinic patients 50 years and older 12 months after implementation.

Consistent use of the osteoporosis risk assessment tool decreases unnecessary bone-density testing while improving the accurate identification of patients needing treatment for osteoporosis (Tu et al., 2018). This QI project was designed to improve osteoporosis risk assessment and treatment by determining the proportion of bone density

testing and falls with fractures 12 months before and after implementing the FRAX osteoporosis risk assessment tool on the primary clinic's patients 50 years and older.

Operational Definitions

Bone Density Testing. This bone scan is conducted on individuals to determine the bone's weakness or thinness (Gale Encyclopedia of Medicine, 2020).

The bone density testing is used to evaluate for calcium and other minerals, and based on the results, a diagnosis of osteoporosis or osteopenia can be made (National Institutes of Health, 2020). The bone density testing can identify osteoporosis, fracture risk and determine the bone response to osteoporosis treatment (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2018). According to the National Osteoporosis Foundation, bone density testing is a single test with the ability to diagnose osteoporosis before the occurrence of a broken bone. This testing result provides information on the thickness of the patients' bone, and providers can also decipher the patients at high risk for developing osteoporosis (National Osteoporosis Foundation, 2020). The bone density testing definition used at the clinic was by the National Institute of Arthritis and Musculoskeletal and Skin Disease. The type of bone density testing used at the clinic is the dual-energy X-ray absorptiometry (DXA). The DXA uses a minimal amount of radiation X-ray to detect even the smallest amount of bone loss in the spine, hip, and even in the entire skeletal system (International Osteoporosis Foundation, 2017b).

Falls. An unplanned incident results in a person resting on the floor or a level beneath, not resulting from an intrinsic event or a massive event which results in a person coming to rest unintentionally on the ground or a level beneath, not as a result of a

significant intrinsic event such as a cardiovascular accident or an overwhelming hazard (Huang et al., 2015; Tinetti et al., 1988).

According to the ANA-NDNQI (2010), fall can be defined as an unplanned lowering to the floor contributed by out by extrinsic factors such as a chair, trash can, wet floor or intrinsic physiological factors such as syncope, stroke, bone loss, or osteoporosis (National Database of Nursing Quality Indicators, 2010; Staggs et al., 2015). For this DNP project, the fall definition used is as stipulated by the ANA-NDNQI, which includes dropping to the floor caused by an intrinsic factor, osteoporosis (National Database of Nursing Quality Indicators, 2010; Staggs et al., 2015).

FRAX Tool. This tool consists of a series of demographic and health-related questions that predict the 10-year absolute risk of developing a fracture based on an algorithm in individuals 50 years and older while incorporating clinical risk factors with or without bone mineral density results (Roux et al., 2014).

Sources of Evidence

The data relevant to the project was obtained from the quality improvement department of the primary care clinic. The quality improvement department provided me with de-identified and already aggregated data on falls with fractures and bone density testing among the clinic patients 50 years and older before and after implementing the FRAX osteoporosis risk assessment tool. The collection and analysis of the data on the proportion of falls with fractures and the proportion of bone density testing were crucial for answering the project focused question. The collected and analyzed data helped the clinic to understand the FRAX tool's effect on the proportion of falls with fractures and

bone density testing. From the doctoral project findings, the clinic can now figure out the areas needing improvement both now and in the future.

Archival and Operational Data

The clinic's operational data relevant to this project was received from the quality improvement department. Before receiving the data, I obtained the completed Site Approval Form (Appendix A) from the organization's representative responsible for granting access to data and arranging their delivery. Every three months, the quality improvement department routinely extract and aggregate the data (G. Merchant, personal communication, June 29, 2020). Upon receiving the IRB approval, I requested the data on the frequency of the FRAX use, bone density testing proportion, and falls with fractures proportion among the clinic's patients 50 years and older, 12 months (four quarters) before and 12 months (four quarters) after the FRAX tool's implementation. The IRB is an administrative body established to protect human research subjects' rights and welfare recruited to participate in research activities conducted under the institution's auspices with which it is affiliated (Grady, 2015). To answer the practice-focused questions, the proportion of bone density testing and the proportion of falls with fractures on the clinic patients, 50 years and older were compared for 12 months (four quarters) before the implementation of the FRAX osteoporosis risk assessment tool (January 2016 to December 2016) and for 12 months (four quarters) after the implementation of the FRAX osteoporosis risk assessment tool (January 2017 to December 2017). The FRAX tool use was implemented at the local clinic in January 2017 (M. Morales, personal communication, December 2, 2019). This analysis was based on comparing the data on

the proportion of the clinic's patients, 50 years and older, who received bone density testing four quarters before and four quarters after implementing the FRAX tool. Data on the consistency of the FRAX tool's use will also be reported using frequencies in four quarters following the tool's implementation.

Some providers may fail to document referrals for or the results of bone density testing in the patients' charts, affecting the accuracy of calculated rates. The clinic's QI department supplied me with the de-identified and aggregated data needed to complete this doctoral project.

Analysis and Synthesis

The patients' data included in the analysis for this project were data on falls with fractures and bone density testing performed on the clinic patients 50 years and older 12 months before and 12 months after implementing the FRAX assessment tool. The data were collected and compared on the before and after FRAX assessment tool implementation. This project's data will be analyzed using descriptive data. First, the frequency of the use of the FRAX osteoporosis risk assessment tool was reported. The proportion of the bone density testing and falls with fractures 12 months (four quarters) before and 12 months (four quarters) after implementing the FRAX tool were compared using the descriptive data to assess for trends. There were no missing data found in any of the quarters, both from the quarters before the implementation or in any of the quarters after implementing the assessment tool.

Summary

This doctoral project evaluated the osteoporosis risk assessment's effectiveness using the FRAX tool for improving osteoporosis screening and, ultimately, osteoporosis treatment, which resulted in fewer falls with fractures and increased bone density testing. The evaluation of the QI project was able to answer the practice-focused question posed for this doctoral project. Thus, after the IRB approval was obtained, the project moved to compare the data on the proportion of falls with fractures and the proportion of bone density testing performed on patients of the clinic patients, 50 years and older, four quarters before and four quarters after the implementation of the FRAX tool. The project used de-identified and aggregated data from the primary care clinic's QI department as part of the routine data reporting process. The data were reported using descriptive data. It was found that the implementation of the FRAX osteoporosis risk assessment tool's use positively impacted the proportion of bone density testing and the proportion of falls with fractures among members of the target population at the primary care clinic.

In section 4 of the project, the findings and implications of the project were discussed. Recommendations were made to the clinic based on the doctoral project findings. The project team's contributions, strengths, and limitations were discussed.

Section 4: Findings and Recommendations

Introduction

The local primary care clinic was plagued with a high proportion of falls with fractures and a low proportion of bone density testing owing to lack of a standardized tool for and inconsistency with osteoporosis risk assessment and testing among patients 50 years and older (M. Morales, personal communication, December 2, 2019). In response to this problem, the clinic instituted using the FRAX risk assessment tool to identify the patients who might have osteoporosis or may be at high risk for falls with fractures. This gap in practice that this doctoral project addressed was the lack of evaluation of the FRAX tool's effects on the patients' outcomes at the local primary care clinic. The practice-focused question that this doctoral project answered was whether the FRAX osteoporosis risk assessment tool increased the proportion of bone density tests performed and decreased the proportion of falls with fractures among patients 50 years and older at a primary care clinic 12 months (four quarters) postimplementation. The purpose of this DNP project was to evaluate the effectiveness of the quality improvement project that instituted the FRAX osteoporosis risk assessment tool to detect osteoporosis risk among primary care clinic patients 50 years and older. The sources of evidence used for this doctoral project were collected from the clinic’s QI department. The QI department provided me with the de-identified and aggregated data on the FRAX tool's frequency for 12 months after its implementation and the proportion of bone density testing, and the proportion of falls with fractures among the clinics’ patients 50 years and older. The received data were reviewed based on my IRB approval number 09-18-20-

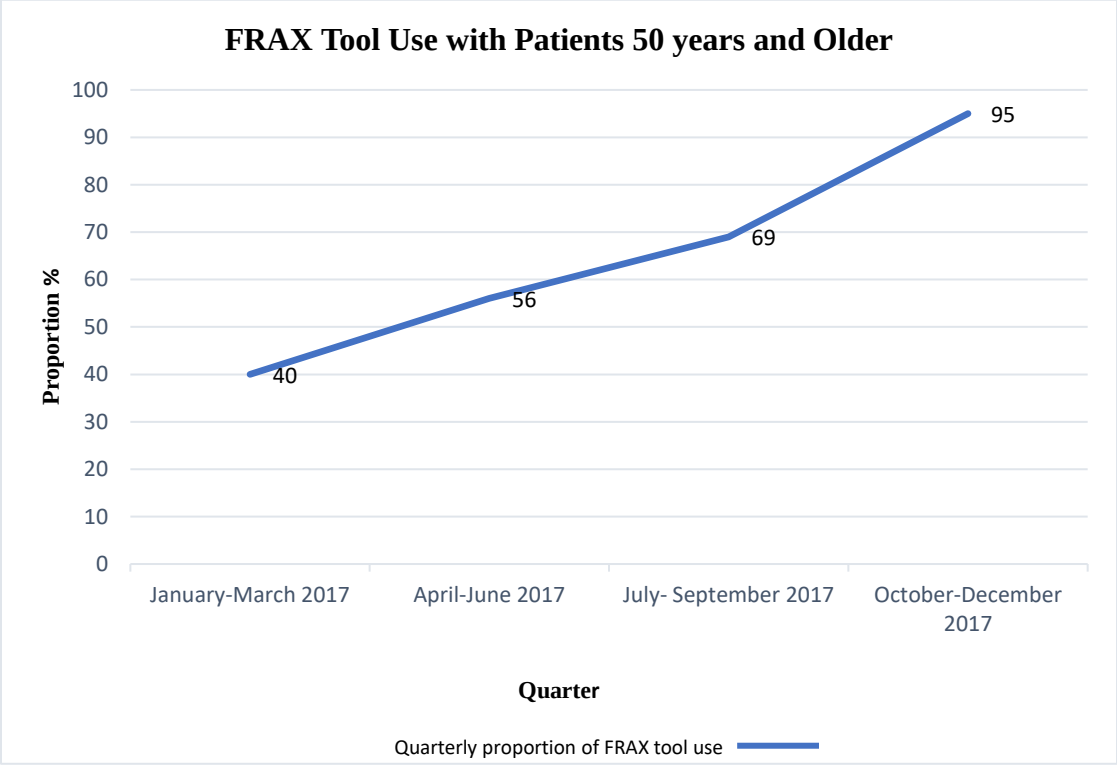
0635115. The data were analyzed using the frequency of the FRAX tool use, the proportion of bone density testing, and the proportion of falls with fractures for 12 months (four quarters) before and 12 months (four quarters) after implementing the FRAX screening tool.

Findings and Implications

In this section, I will discuss the findings of the data analyses and their implications. The data on the frequency of FRAX tool use, the proportion of bone density testing, and the proportion of falls with fractures four quarters before and after the FRAX tool's implementation were received from the QI department. The results describe the rate of FRAX tool usage and any differences in rates of bone density testing and falls with fractures before and after its implementation.

Figure 2

Process: Proportion of FRAX tool use, January 2017-December 2017



Based on the data received on the frequency of FRAX tool use, Figure 2 illustrates that in the first quarter of the tool's implementation, its use was at 40%; however that number increased steadily over time, eventually reaching 95% of use in the fourth quarter. This slow but steady upward trend could be related to slow compliance or initial resistance to change on the providers' part. It could be that the providers needed to be reminded to use the tool during their initial patient assessment. Resistance to change has been shown to have adverse effects on the progress of a newly implemented tool in any organization (Damawan & Azizah, 2020). Towards the fourth quarter, the tool's use increased to 95%. The implication of the rise in the use of the FRAX tool use from quarter to quarter could

mean the organization could secure more buy-in among its providers. This may be due to the providers becoming more aware of the outcomes the tool's use had on the proportion of bone density testing performed on the clinic's patients 50 years and older and quarterly decreases in the proportion of falls with fractures and increasing (M. Morales, personal communication, October 12, 2020).

Figure 3

Process: Proportion of bone density testing January 2016-December 2017

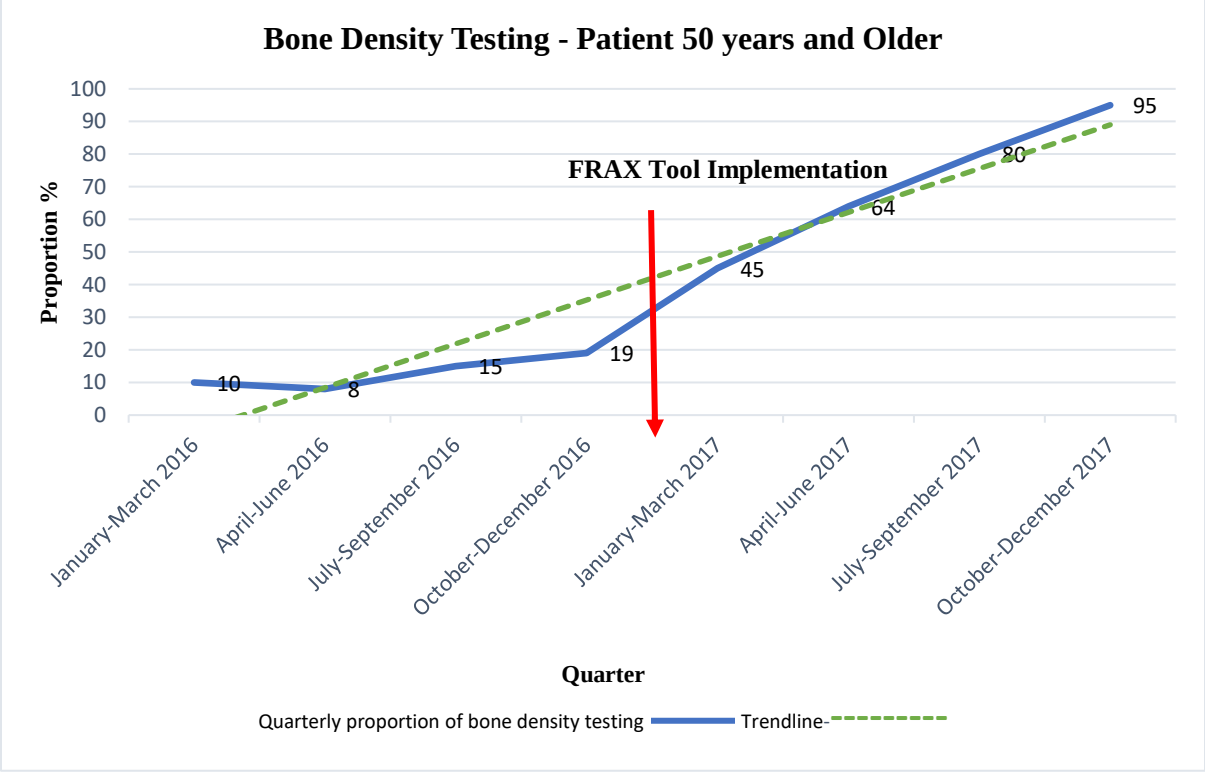


Figure 3 illustrates the data received on bone density. From January to December 2016, the proportion of bone density testing performed on the clinic's patients 50 years and older was less than 20%. In the first quarter following the implementation of the FRAX tool, it could be seen that the proportion of the bone density testing performed

rose dramatically and continued to rise. From the trend line, it can be seen that even before the FRAX tool was implemented, the trend was towards increased bone density testing as it was after the implementation. But the trend before the FRAX tool's implementation showed only a slight increase in bone density testing, and this could probably be because the order for bone density was inconsistent, the patients were not being screened consistently, thus inconsistent identification of at-risk patients. However, after the FRAX tool's implementation, there was a considerable increase in the proportion of patients that received bone density testing; this could mean that after the implementation of the FRAX tool, they were able to consistently and accurately identify those patients at risk for osteoporosis and fractures, therefore, more bone density testing was ordered. The implication of the steady rise in the proportion of bone density testing is that there was an increase in the number of patients discovered at risk for osteoporosis and fracture via the use of the FRAX tool.

The rate of bone density testing post implementation of the FRAX improved over time. Forty-five percent of patients received bone density testing in the first quarter, increasing to 95% in the fourth quarter. Before the implementation of the FRAX, the overall proportion of patients who received bone density testing was 13% over 12 months, after the implementation of the FRAX the overall proportion rose to 71%; an increase of 58 percentage points. The implication of the steady rise in the proportion of bone density testing is that the FRAX tool's implementation was effective in increasing the proportion of bone density testing performed on the clinic patients 50 years and older.

This allows for early intervention and treatment of those diagnosed with osteoporosis or osteopenia through bone density testing.

Figure 4

Patient outcome: Proportion of falls with fractures, January 2016-December 2017

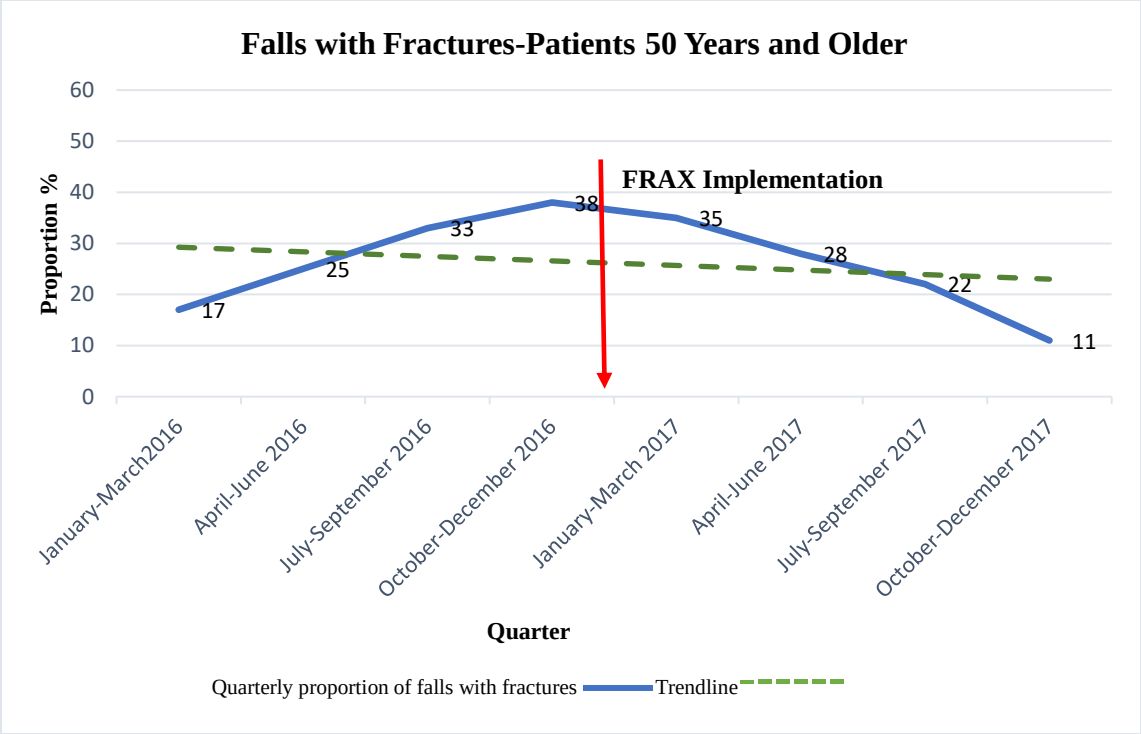


Figure 4 illustrates that in 2016, the clinic's proportion of falls with fractures in patients 50 years and older continued to steadily increase from 17% in the first quarter to 38% in the fourth quarter before the implementation of the FRAX tool. It could also be seen that from the first quarter after the FRAX tool implementation, there was a downward trend in the proportion of falls with fractures. In the first quarter, after the tool's implementation, the proportion of falls with fractures dropped to 35% and continued to drop into the fourth quarter to 11%. Based on the results, it can be ascertained that as the FRAX tool use increased, the proportion of bone density testing

increased; the improvement in bone density testing implies that more patients received treatments and interventions for their osteoporosis symptoms and risks. However, while the quarterly proportion of falls with fractures decreased overtime during the year following the implementation of the FRAX, the overall trend in the proportion of falls with fractures was towards a slight decrease when compared to pre-implementation. In comparison, the overall proportion of falls with fractures before was 28.3% and after the tool's implementation, it was 24%, a 4.3 percentage point decrease. This slight decrease could be because the occurrence of falls with fractures is multifactorial, including environmental fall hazards that may exist in the home, which would not have changed as a result of implementing the FRAX tool. Another contributing factor to this slight decrease in the proportion of falls with fractures could be non-compliance to the recommended treatments and medications on the part of those patients screened and found at risk for osteoporosis and falls with fractures using the FRAX tool.

There were no unanticipated limitations or outcomes that would affect the project findings. The implications of the findings for individuals, communities, and institutions are as follows: before using the tool, some individuals with osteoporosis may have been missed during routine assessments and, therefore, may not have received the appropriate and timely intervention. The findings imply that the proportion that received bone density testing increased, allowing for early detection and treatment. At the community level, factors such as the rate of adherence to recommended treatment and medications as well as hazards in the home environment may have contributed to the proportion of falls with fractures seen before and after the implementation of the FRAX. In contrast, the local

facility’s improved performance in the screening of patients and the detection of those at risk for osteoporosis and falls with fractures demonstrates a commitment to the provision of high-quality care, earning respect from the community. The project findings will solidify a care policy at the local clinic requiring every provider to utilize the FRAX tool in their initial assessment of every patient 50 years and older. The potential positive social change implication is that improved screening for osteoporosis may ultimately contribute to the prevention of early death and disability among those 50 years of age and older.

Recommendations

The high proportion of falls with fractures and low bone density testing among the clinic's patients 50 years and older posed a massive concern. The gap in practice that this doctoral project was set out to address was the lack of evaluation of the FRAX tool's effects on patient outcomes. This project has succeeded in addressing the identified gap in practice at the clinic, as shown in the project findings. The findings from the evaluation of the quality improvement project demonstrated that the project contributed substantially to improving patient outcomes among the clinic's patients, 50 years, and older.

Based on the project's findings, recommendations were made to the clinic’s office manager to incorporate the doctoral project’s findings as part of a continuous cycle of quality and performance improvement using the Plan-Do-Check-Act (PDCA) model (American Society for Quality, 2020; Skhmot, 2017). The PDCA uses a four-stage approach to improve processes and resolve problems (Skhmot, 2017). The use of the

PDCA will help the organization recognize the need for a change and plan activities towards change. In the “Plan” stage, the organization recognizes an opportunity to change and plan for the change. In the “Do” stage, the organization conducts a minimal sized test change. In the “Check” stage, the organization will review and analyze the change's result to determine the effectiveness of a project (American Society for Quality, 2020). In the “Act” stage, changes are solidified, or adjustments are made based on the stages' findings. If the change fails, the cycle should be restarted from the beginning, but if it is successful, it should be applied on a larger scale to plan a new project, starting the cycle all over (American Society for Quality, 2020). Using the PDCA tool, the local clinic can continuously evaluate and improve the quality improvement project to achieve better patient care outcomes.

Contribution of the Doctoral Project Team

For this project, there was no other member of the project team. The office manager provided background information on the implementation of the FRAX and the quality improvement manager supplied me with the data set used in this evaluation. I assumed the role of the project evaluator. I solely analyzed and interpreted the data from this project, and based on the analysis; I was able to determine that the quality improvement project contributed to improved care at the local clinic as supported by the results of the finding, the proportion of bone density testing was increased, and falls with fractures trended towards a decrease at the local clinic.

Strengths and Limitations of the Project

The doctoral project's greatest strength was the quality improvement manager's unparalleled cooperation in providing the relevant data needed for this project's success. This doctoral project provided evidence that improved screening administered by nurses can lead to improved care and treatment of osteoporosis, in that as the use of the FRAX tool increased the proportion of bone density testing increased, while the proportion of falls with fractures decreased in the target population. One limitation of the project was the time constraint. The quality department manager and the office manager had schedule conflicts, which affected my requests' attendance. This issue was resolved by the three of us, the office manager, the quality improvement department manager, and me, sending text messages among ourselves on the three best days with times of the week we would be available, and the office manager would choose a day and time from our selected and then send everyone a text; thus the time constraints problem was resolved. As a recommendation for future projects on similar topics and methods, I recommended to the clinic manager that they could expand on this project by tracking the number and types of treatments and interventions that result from compliance with bone density testing and correlate them with the rate of falls with fractures. Through this tracking practice, the quality improvement manager would understand what interventions and treatments work best and what does not improve care outcomes in their patient population.

Section 5: Dissemination Plan

One of the Doctor of Nursing Practice (DNP) roles prepared nurses in healthcare is to influence practice using and applying evidence in different population groups and settings (Alexander, 2016). The dissemination of evidence is paramount for transferring information to important stakeholders, interprofessional colleagues, and peers (Brownson et al., 2018). For this doctoral project, I reported the quality improvement manager's findings, who is responsible for disseminating the results to the organization's members and caregivers. The appropriate venues for the dissemination would be at the clinic at nursing seminars. For disseminating the project outcomes and findings beyond the local facility, publication in the ideal journal to reach the intended audience would make the best use of the information (Edwards, 2015). Based on the nature of the project and its findings, I will choose the Orthopedic Nursing Journal, the American Nurses Association Journal, and the Journal of Excellence in Nursing and Healthcare Practices to reach a broader audience.

Analysis of Self

As a Practitioner

I have learned a lot, and my knowledge base has widened tremendously throughout this project, coupled with the knowledge acquired from the program as a unit. This project has been a daunting task due to the rigorous process of embarking on deeper thinking to strategize and re-strategize when necessary for this project's success. Schedule conflict posed a challenge during this project, juggling between keeping a full-

time job, family responsibilities, and handling this doctoral project. I chose to change my job classification from full-time to part-time to accommodate the project's rigors to resolve this issue. As a DNP prepared practitioner, I have acquired skills in understanding organizational culture. Throughout this project, I have acquired the skills that have earned me a spot at the same table as policymakers, administrators, and key stakeholders at my organization. Thus, I have acquired the confidence and skills needed for evaluating QI projects at my organization.

As a Scholar

This doctoral project has offered me the necessary skills needed to practice at the zenith of my profession to improve nursing practice and deliver optimal healthcare. I have also derived the skills to train the next generation of nursing practitioners. As a scholar, I have improved my skills in interpreting data and making recommendations based on those findings to improve patient care outcomes.

As a Project Manager

I have gained lots of insight into interpreting project results and advising department managers on the project result. I have sharpened my communication skills as I can now communicate with personnel at various organizational levels through my experiences via this project. As a project manager, I have acquired excellent leadership skills by completing this doctoral project, as it has prepared me to convince my colleagues to adopt a change proposal. I have acquired the collaborative skills to lead and manage other care providers to achieve the continuous need to improve the community's health**.** As a project manager, I can define the objectives and goals of a proposed project.

I can help to ensure the completion of any QI project. I am now very confident to function in any sector of nursing.

The project completion was very challenging and rewarding at the same time. At first, balancing a full-time job and family responsibilities with this project's rigors was very daunting; to checkmate this problem, I had to cut down to working part-time to allow me enough time to fulfill the demands of this project. The most challenging section of this project was the data analysis, but this was combated by working in sync with my project chair for guidance, directions, and corrections. The next challenge I encountered was the time involved in making the proposal corrections and feedback, and most time, I felt like I was not making any headway. By maintaining regular and frequent communication with my chair, I was able to overcome this challenge. Another considerable challenge I encountered was meeting with the office manager and the quality improvement department manager. To resolve this challenge, the three of us; the office manager, the quality improvement department manager, and myself, shared text messages among ourselves with the three best days and times of the week we would be available; the office manager coordinated the days and times and came up with a day and time, and then sent everyone a text; thus the time constraints problem was resolved. The insight I have gained on this doctoral project's journey was that much patience and time is required to complete this journey, but my sense of accomplishment and anticipated rewards of obtaining my doctoral degree far outweigh the challenges.

Summary

In conclusion, osteoporosis has remained an enormous menace to the health of individuals 50 years and older; the primary concern is that it is known as a silent disease without showing symptoms until it is too late, leading to an increased rate of the disease burden. Osteoporosis has remained underdiagnosed and undertreated among the patients 50 years and older despite the multitude of available care protocols owing to inconsistencies in care protocols and delivery. The purpose of this doctoral project was to evaluate whether a QI project of using the FRAX osteoporosis risk assessment tool designed for the detection of osteoporosis risk had an effect on the proportion of bone density testing and falls with fractures among primary care clinic patients 50 years and older. The results indicated that compliance with the FRAX tool's use increased over time and was effective in increasing the proportion of bone density testing. While the rate of falls with fractures dropped slightly during the year following implementation, an overall improvement trend was noted. The doctoral project findings were shared with the quality improvement manager, who will then disseminate the results of the findings to the organization's members and administrators. This project's findings can be used to improve outcomes among individuals and communities at high risk by the institutions that serve them. The project contributes to positive social change by providing information that can improve the care of those most at risk for osteoporosis, associated fractures, and even early death. Throughout this project, I have acquired and refined my skills as a practitioner, a scholar, and a project manager.

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