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Improving Osteoporosis Screening Rates in a Rural Primary Care Clinic

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Title of Manuscript: Improving Osteoporosis Screening Rates in a Rural Primary Care Clinic: A Quality Improvement Project

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Conflicts of Interest: None

Key Words: osteoporosis, screening, primary care, electronic health record, bone density, dual energy x-ray absorptiometry

Abstract

Background and Objectives: Osteoporosis related fracture rates are high yet lack of screening and education on osteoporosis remains a significant problem. The United States Preventative Services Task Force (USPSTF) recommends bone mineral density testing in women ≥ 65 and in women aged 50-64, based on specific risk factors. Using a screening tool such as the simple calculated osteoporosis risk tool (SCORE) is beneficial in identifying individuals that should be referred for BMD testing. Screening for BMD using dual-energy absorptiometry (DXA) is the gold standard in predicting major fractures, allowing for timely intervention in the primary care setting. Consequently, a plan was developed using these tools to increase osteoporosis screening rates.

Methods: The quality improvement project was implemented using the Donabedian model for quality care at a rural primary care clinic in the Midwestern United States. Eligible participants included women ≥ 50 years of age. A process was developed to screen individuals for osteoporosis using the SCORE tool in the electronic health record (EHR). A screening score of ≥ 6 indicated the need to refer for DXA. The QI project measures included: total number of patients screened, quantity of DXA referrals, completed DXA scans, and a pre/post-implementation staff survey.

Results: There was a statistically significant increase in the number of patients screened for osteoporosis risk in comparison to the pre-implementation period.

Conclusions: The process for osteoporosis screening improved screening rates.

Background

Osteoporosis affects 10 million individuals in the United States alone and is anticipated to cost more than $90 billion annually by the year 2040 (Cox & Hooper, 2021; Johnson et al., 2021). Fractures resulting from osteoporosis are the only symptom of low bone density and cause decreased mobility and increased morbidity and mortality. In fact, the one-year mortality rate for a hip fracture is 23% in those aged 80 or older, with usual care (Wu et al., 2018). Osteoporosis related fracture rates are high yet lack of screening and education on osteoporosis remains a significant problem (Cox & Hooper, 2021).

The USPSTF guideline recommends bone mineral density testing in women ≥ 65 and in postmenopausal women aged 50-64, based on specific risk factors (USPSTF, 2018). Screening for bone mineral density using DXA is the gold standard in predicting major fractures, allowing for timely intervention in the primary care setting (Leslie & Crandall, 2019). A patient-centered approach involving provider-initiated identification of patients at risk for fracture, as well as education, is necessary since patients often underestimate their own fracture risk (Grover et al., 2014). Evidence reveals that a multimodal approach using screening tools, utilization of the EHR, and patient self-scheduling of DXA scans has demonstrated the highest improvement in screening rates. The purpose of this article is to outline the process development efforts undertaken to apply current literature findings, evidence-based practice, and current USPSTF guidelines to improve osteoporosis screening rates in a rural primary care clinic.

Methods

Literature Review

The literature synthesis and review followed the framework process of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis as illustrated in Figure 1 (PRISMA; Moher et al., 2009). A comprehensive electronic search was conducted in the CINAHL and PubMed databases. Search criteria included: English language, published within the last five years (i.e., between 2017-2022), clinical and research trials, randomized controlled trials, meta-analyses, and systematic reviews. In both databases, the age range was limited to adults aged 45 and over.

Summary of Findings

The literature on improving osteoporosis screening rates is vast. However, many interventions are not widely studied so the evidence is limited. The final ten articles represented a variety of study designs, and only one randomized control trial. Systematic reviews were decisively excluded as they analyzed many of the same studies;

however, there was a yield of five due to the breadth of information and comparison of interventions. This review demonstrated evidence and efficacy of using a multimodal intervention approach to increase osteoporosis screening in primary care. Four main themes were identified within the literature; 1. Fracture Liaison Services and Bone Health Teams, 2. Screening Tools, 3. Self-Scheduling, and 4. EHR Utilization.

The first theme identified are fracture liaison services and bone health teams. Lawrence et al. (2017) found that primary care patients enrolled in the bone health team had significantly higher rates of osteoporosis screening with DXA than current practice. On the other hand, fracture liaison services are more focused on post-fracture care opposed to primary prevention (Leslie & Crandall, 2019). The second theme identified was the various osteoporosis screening tools. Williams et al. (2017) found that an osteoporosis risk tool has the potential to be integrated in an EHR and alert providers to patients who have an increased risk and should be referred for a DXA, improving detection rates by expanding the population of individuals who are screened. The Simple Calculated Osteoporosis Risk Estimation tool (SCORE) is a screening tool simpler than the Fracture Risk Assessment Tool (FRAX), yet performs at least as well, and sometimes better according to a systematic review by Crandall (2015). The third theme identified was patient self-scheduling for osteoporosis screening. Patient self-scheduling of DXA plus education demonstrated significant improvement in increasing bone mineral density screening (Leslie & Crandall, 2019; Nayak & Greenspan, 2018). The fourth theme identified was the integration of a screening tool and clinical decision support system alert into the EHR. Osteoporosis screening with an EHR-integrated screening tool paired with an integrated reminder within a clinical decision support system are effective tools in identifying patients who are at risk for osteoporosis (Gupta et al., 2022).

Organizational Assessment

An organizational assessment was completed using Burke & Litwin (1992) model of organization performance and change, which includes twelve interacting factors. The twelve elements include external environment, mission and strategy, leadership, organization culture, structure, systems, management practice, working climate, tasks and skills, individual values and needs, motivational level, and individual and general performance. This is a causal model as the image depicts arrows going in both directions indicating an 'open-systems principle' meaning any change to one factor will eventually impact the other factors (Burke & Litwin, 1992). The model assisted in the identification of organizational shortcomings to improve delivery of care and patient outcomes.

The structure and leadership factors of the model are closely related in this practice. The practice owner is a physician with thirty years of experience and employs three other providers, another physician, and two nurse practitioners. There are also four medical assistants and six clerical staff that report to the office manager. The providers report to the practice owner. It is important to note that the practice is located in a provider shortage area, therefore has high patient volume.

Management practices are led by the office manager, who meets with providers regarding documentation, reimbursement, and outcome measures. She also reviews policies, procedures, and staff concerns, and generates reports regarding quality measures. The systems factor refers to standardized policies and mechanisms that facilitate work, primarily manifested in the organization's reward systems and performance appraisal. Regarding osteoporosis screening, it was found during the organizational assessment that patients were not being regularly screened, that there was no system in place, and that screening was ultimately not a priority. Motivation refers to the willingness of employees to act and accomplish goals through change in behavior. Most employees in the clinic report being motivated to provide comprehensive patient care to improve outcomes and expressed willingness to participate in organizational change. Aligning the values of the clinic with the factors discussed above was predictably favorable in successful implementation of the intervention and improved patient outcomes.

Guiding Framework

The guiding framework for this quality improvement project was the Health Belief Model as seen in Figure 2. The HBM, originally formulated to address preventative health behaviors in the United States, is adaptable to diverse topics, and is one of the most widely applied conceptual frameworks of health behavior (Jones et al., 2015). The model is composed of six constructs that predict health behavior including risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action (Jones et al., 2015). Primary prevention is the major theme of the Health Belief Model; therefore, it was applied to the providers and medical staff, to elicit change. A risk tool will be utilized to determine severity of risk. The SCORE tool, which relies on the following risk factors (age, body weight, race, hormone therapy, fracture history, and history of rheumatoid arthritis), will be utilized as a screening tool to determine the need for further risk-factor data collection (Crandall, 2015). Furthermore, benefits to action and barriers to action would be best addressed through prevention education for providers.

The variables of the Health Belief Model that will be more difficult to address are self-efficacy and cues to action. Individuals' self-efficacy is subjective; however, through continuous education and screening reminders,

providers can positively influence patients' actions toward health promotion. Cues to action are widely different between individuals based on internal and external factors (Jones et al., 2015). Internal factors such as health beliefs and personal views, and preferences may explain whether one chooses preventative screenings or not. External cues to action will be provider driven using the SCORE risk tool and the clinical decision support alerts. The risk tool will guide DXA scan referral decision making.

Intervention

Providers and medical assistants were educated on osteoporosis and the implementation tool via an informal staff education meeting. The education emphasized the significant of screening and the consequences of underscreening and underdiagnosing osteoporosis. The risk tool was explained in detail, as well as its significance in identifying those in need for a DXA referral. The SCORE tool was originally planned to be integrated into the EHR but due to unforeseeable barriers, was modified to a paper version for the purposes of the quality improvement project. The tool was, however, added to annual wellness visit templates in the EHR and has the potential to positively impact osteoporosis screening within the clinic. If the SCORE tool yielded a score of six or greater, the patient was referred for a DXA scan. The proposed measurable outcomes were improved osteoporosis screening rates for the target population, DXA referral rates, completed DXA rates, effectiveness of staff educational materials, and improved provider knowledge and utilization of the new screening tool.

Due to the project's quality improvement methodology, the project excluded collection of protected health information and patient identifiers. The institutional review board determination was completed in February 2023 and confirmed the project as quality improvement, not research.

Findings

Qualifying Encounters

A retrospective chart review collected over a two-year period (pre-implementation) revealed a total of 119 women over the age of 50 who were screened for osteoporosis, according to the International Classification of Diseases (ICD)-10 code: Z13.820. There were 681 active patients that met the inclusion criteria of being female and of age 50 or greater. This reveals a 17% incidence of osteoporosis screening in the clinic.

A chart review during the implementation period revealed a total of 144 qualifying encounters of patients who met inclusion criteria to be screened for osteoporosis using the SCORE tool. Of these 144 encounters, 70 patients had documentation of being screened for osteoporosis (48%). Therefore, the resulting sample size for data

collection and analysis was 144 patients (Figure 3). The data was further analyzed for age themes within the samples. Of the 119 women during the pre-implementation period, 37 were between 50-64 years of age (31% of sample size) and 82 patients were ≥ 65 years of age (69% of sample size). Of the 70 patients screened, 38 were 50-64 years of age (54% of sample size) and 32 were ≥ 65 (46% of sample size).

The osteoporosis screening measures were analyzed using a two proportion Z-test. Pre- and post-implementation data were compared. The test showed that the inclusion of an osteoporosis screening tool integrated into clinical practice did elicit a statistically significant change in screening rates with a p-value of < .00001. The result is significant at $p < 0.5$.

Bone Mineral Density Referral

As stated, there were 70 women screened for osteoporosis using the SCORE screening tool within the implementation period. Of those 70 women, 23 did not qualify based on their score, 24 refused referral for a DXA scan, and 10 were up to date on receiving DXA scan. The main themes identified in the DXA refusals were lack of patient education and/or older age > 85 years. The patients in the latter age group cited they did not see a benefit to screening due to age or already had been diagnosed with osteoporosis in the past. The remaining 13 patients were sent referrals for DXA scans. The referrals were faxed to the patient's preferred hospital and an order was either mailed to the patient or left at the front desk for patient retrieval.

Staff Surveys

Prior to the project start date, pre-implementation paper surveys were completed during an informal staff educational session. A total of eight pre-implementation surveys were completed (four providers, four medical assistants). The purpose of the staff surveys was to assess for knowledge related to osteoporosis as well as the ease of implementation of the interventions into current workflow, and effectiveness of the intervention. The providers and medical assistants completed two different surveys due to their different roles in the clinic. It is to be noted, that the surveys were not meant to measure provider and medical assistant knowledge but to measure their self-reported perception. Figure 4 depicts the survey questions.

After the implementation period was complete, the post-implementation surveys were presented to the same eight employees. A total of three post-implementation surveys were completed. The medical assistants stated they were "too busy" to complete the post-implementation survey; therefore, data related to the questions is limited. Due to insufficient post-implementation survey completion, there was not significant aggregate data to verify a

legitimate comparison.

One of the two providers who completed the post-implementation survey indicated improvement in self-reported knowledge of current osteoporosis screening guidelines and an improvement in screening for risk and referring for DXA. This demonstrates a one-to-one improvement in behavior based on the data shown in Figures 5 and 6. While the surveys lacked staff engagement, there was an increase in awareness of osteoporosis risk as evidenced by the completion of the SCORE tool and the use of the ICD-10 code: Z13.820.

Barriers to Successful Implementation

Integration of Tool into the EHR

The original timeline for the project took into consideration the intent to integrate the SCORE tool questionnaire into the EHR by January of 2023. However, due to program-wide updates that the EHR vendor was currently undergoing, they were unable to accommodate new templates for the clinic. It was then decided to prolong the implementation start date to explore solutions.

This barrier was addressed by changing the mode of implementation tool to a paper tool. The change in the intervention increased strain on the project leader with this time-consuming process. The project leader manually entered the screening tool scores into each respective chart. The project leader then, with the help of a nurse practitioner within the office, referred qualifying patients for DXA scan.

Staff Turnover

Prior to the implementation of this quality improvement project, the project site experienced a high rate of staff turnover, as well as change of roles within the clinic. A key stakeholder for the project became no longer employed at the clinic during this time. Furthermore, office support staff were transitioned into roles not familiar to them. Negative impacts included limited time for staff to engage in quality improvement, increased strained workplace dynamics, and decreased sustainability of the project. This placed significant pressure on the staff and in turn was detrimental to the implementation period of the quality improvement project.

Interventions to minimize the negative impacts of staffing issues included individual staff education. Furthermore, the project leader identified each patient eligible for screening by completing paper screening tools and leaving them with each respective medical assistant for each day during the implementation period.

Lack of Workflow Adoption

Staff member engagement was minimal during the implementation period. Organizational managers and

the project leader made multiple attempts of engagement which were met with significant resistance and dismissal. The office manager was uninvolved and did not take part in encouraging staff to participate. Because of this, the project leader completed most of the screening tools and entered them into each chart. Chart audits were completed at minimum biweekly, re-education was completed, and reminders were given by participating staff members. Ultimately, lack of workflow adoption impacted the ability to collect and analyze patient data for screening improvements and was a key barrier to the success of the project.

Discussion

The project aim was to determine if implementing an osteoporosis risk screening tool would increase the screening rates and DXA referrals within the clinic. The main component of the quality improvement project was accomplished as screening rates increased significantly from 17% to 48% within the four-week implementation period. Success in screening rates was accomplished by the project leader, although, a few staff members assisted in collecting the forms for the project leader to document in the EHR.

The organizational assessment revealed strong stakeholder engagement, staff buy-in, and agreements on intervention acceptance into the workflow. However, barriers to implementation were unanticipated and impeded successful integration of the intervention into the EHR. Changes in staffing also greatly impacted project success due to the vacancy of a key stakeholder of the QI project. Originally, this team member was to be responsible for reminders of intervention and relaying information back to the project lead. Staff had minimal accountability for completing the intervention, aside from when the project leader was present. And although these barriers were overcome; the original intent of the project intervention was unsuccessful.

Another component of the project was to conduct pre- and post-implementation staff surveys to determine ease of use of the intervention, as well as gauge knowledge of the phenomenon. This was not accomplished as there was not sufficient staff engagement nor completion of the post-implementation surveys due to lack of engagement as well as role changes within the clinic. Upon reflection of the multiple barriers to measurable outcomes, and the consideration of inadequate adoption of interventions, by clinic staff, should be emphasized. Literature review findings outlined the importance of multimodal interventions in achieving adequate outcomes. Therefore, due to unforeseen barriers, the analysis of the quality improvement project is lacking.

Although barriers negatively impacted the outcomes of the project, awareness and patient care were reportedly improved. The assistant manager (i.e., the individual who was able to obtain the necessary pre- and post-

implementation data) verbalized a great improvement in screening as well as an important addition to the EHR. While the original plan was to incorporate the tool to be calculated in the EHR failed, the questions from the tool were added to each AWV chart and can improve osteoporosis screening within the clinic. Overall, the project leader was able to integrate the Doctor of Nursing Practice skills and competencies into a viable project plan by utilizing best evidence related to osteoporosis screening and overcoming multiple barriers to attain a positive result.

Implications for Practice

In hindsight, there should have been emphasis on gaining buy-in from the office manager, in addition to the site owner and the assistant manager, whom both expressed enthusiasm during the entire quality improvement process. Obtaining more involvement from the office manager may have had positive influence on participation from the office staff. Furthermore, upon review of the pre-implementation surveys, they were unanimously in agreement that the questionnaire addition to the EHR would be beneficial in screening for osteoporosis risk. However, that knowledge and or/belief system did not translate into behavior change. Referring to the HBM, it seems as if the perceived susceptibility/perceived severity and the perceived benefits were not lacking but the motivation to enact the intervention. Therefore, personal beliefs and attitudes seem to have been the major barrier over lack of knowledge.

As previously mentioned, an educational PowerPoint was presented to staff, and they were given copies of the materials. This relates to the HBM and the component of self-efficacy. While staff was properly educated and given the materials, they did not practice efficacy in prioritizing the intervention to improve the primary prevention initiative. Furthermore, cues to action are based on many factors such as health beliefs, personal views, and preferences. Again, the perceived knowledge did not correlate with cues to action as related to the HBM.

Another component that was problematic was the patient education piece. Due to the many workarounds and the many patients who received phone calls after their visit, it is believed that the lack of explanation of the risk tool resulted in the many refusals for DXA referral. Using the HBM, providers would have had better leverage in suggesting a DXA if they were able to explain the tool, what the scores mean, and explain the risk for osteoporosis and fractures, in the moment. On the other end, patients who did accept the DXA referral, many were educated on risk and were invited to and willing to schedule the test. Another important point is the multiple DNP projects culminating in the practice. In the future, it would be beneficial to have fewer DNP students from multiple institutions attempting a quality improvement project simultaneously.

Conclusion

Osteoporosis screening is often overlooked in primary care and screening is variable between providers. A quality improvement project was implemented to address the lack of osteoporosis screening and DEXA referrals. Although barriers within the clinic impeded the planned interventions and outcomes, there was a significant increase in screenings within the implementation timeframe. Furthermore, staff received valuable education and a template was added to certain appointments containing the screening questions. The knowledge acquired through the development, implementation, and analysis of the project was key for future quality improvement initiatives.

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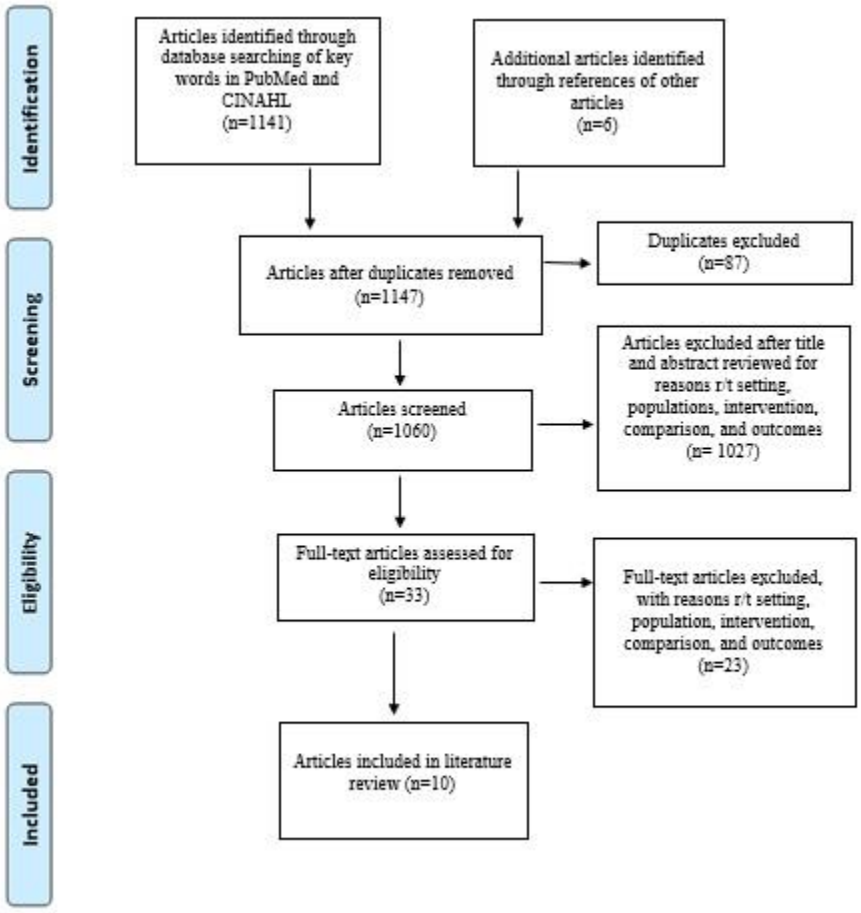
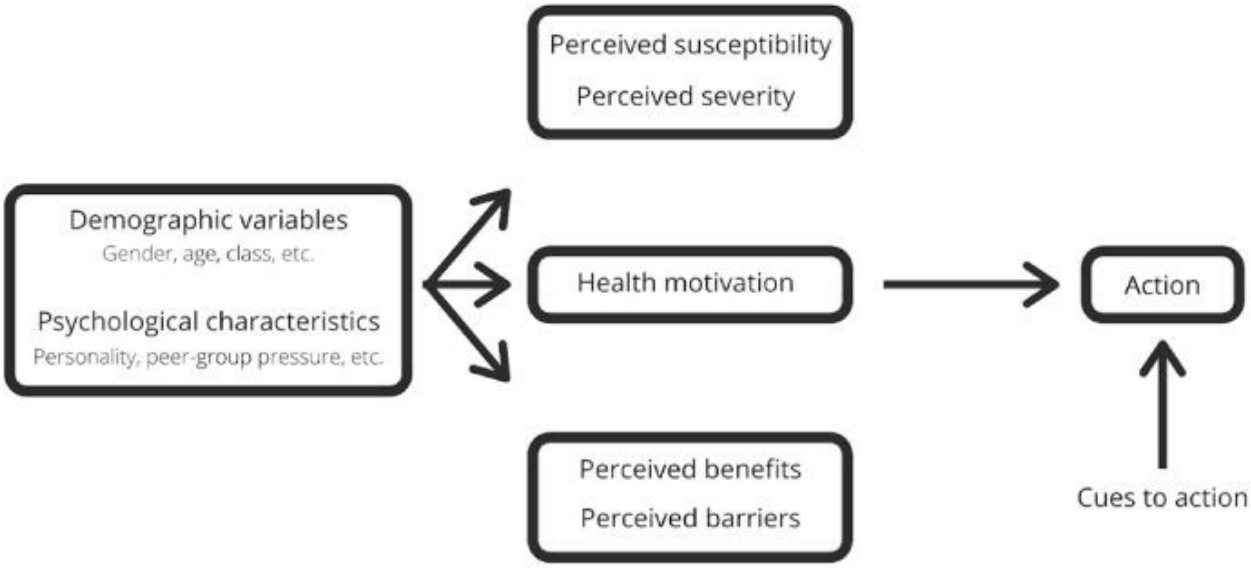
Figures

Figure 1. *PRISMA Diagram*



Flow diagram of the search selection process. Adapted from "Preferred reporting items for systematic review and meta-analyses: The PRISMA statement" by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by PLoS Medicine.

Figure 2. *The Health Belief Model*



Note: Adapted from Champion and Sugg Skinner 2008[4]

From "The Health Belief Model: How Public Health Can Address the Misinformation Crisis Beyond COVID-19," by Houlden, Hodson, Veletsianos, Reid, and Thompson-Wagner, 2021, *Public Health in Practice, 2*, 100151. Adapted from Champion and Sugg Skinner 2008.

Figure 3. *Pre-/Post-Implementation Percentage of Patients Screened*

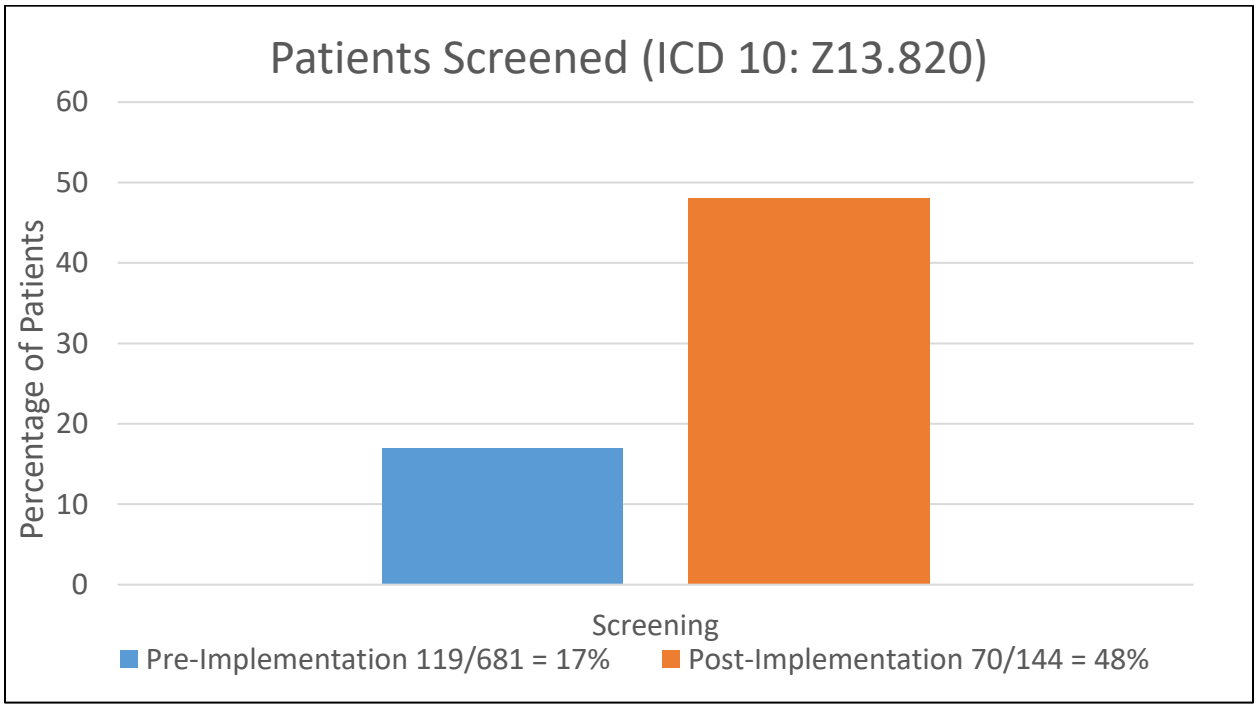


Figure 4. *Staff Surveys*

Pre/Post-Implementation Medical Assistant Survey

1. Do you know what osteoporosis is? Yes/No
2. Do you believe osteoporosis is a serious disease? Yes/No
3. Is it natural for patients to experience non-traumatic fracture? Yes/No
4. Do you feel a questionnaire in the EHR would be beneficial in identifying those at risk for fracture? Yes/No

Pre/Post-Implementation Provider Survey

1. Osteoporosis is an important health issue. Yes/No
2. Are you aware of the risks and costs of osteoporotic fractures? Yes/No
3. Are you aware of the current USPSTF osteoporosis screening recommendations? Yes/No
4. How often do you screen patients for osteoporosis? Always/Seldom/Never
5. How often do you refer patients for a DXA scan when indicated? Always/Seldom/Never
6. Do you feel a questionnaire in the EHR would be beneficial in identifying those at risk for fracture? Yes/No

Figure 5. *Provider Pre-Implementation Survey Result*

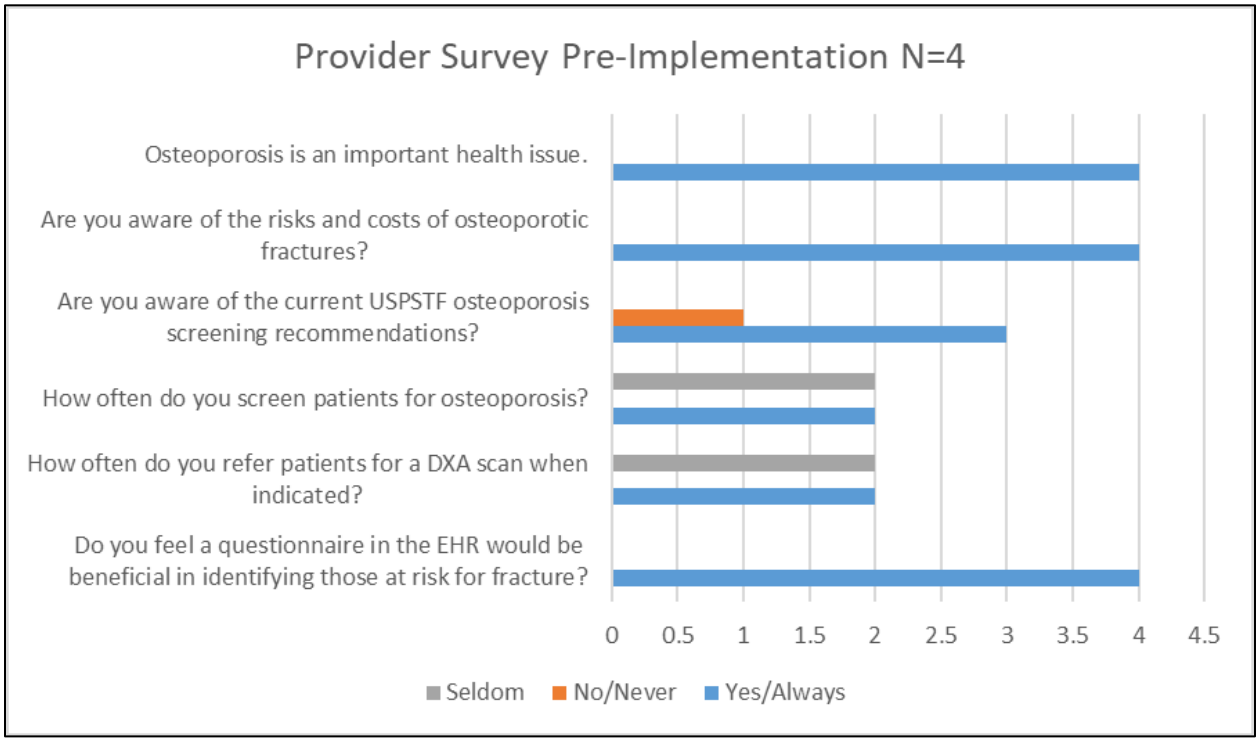
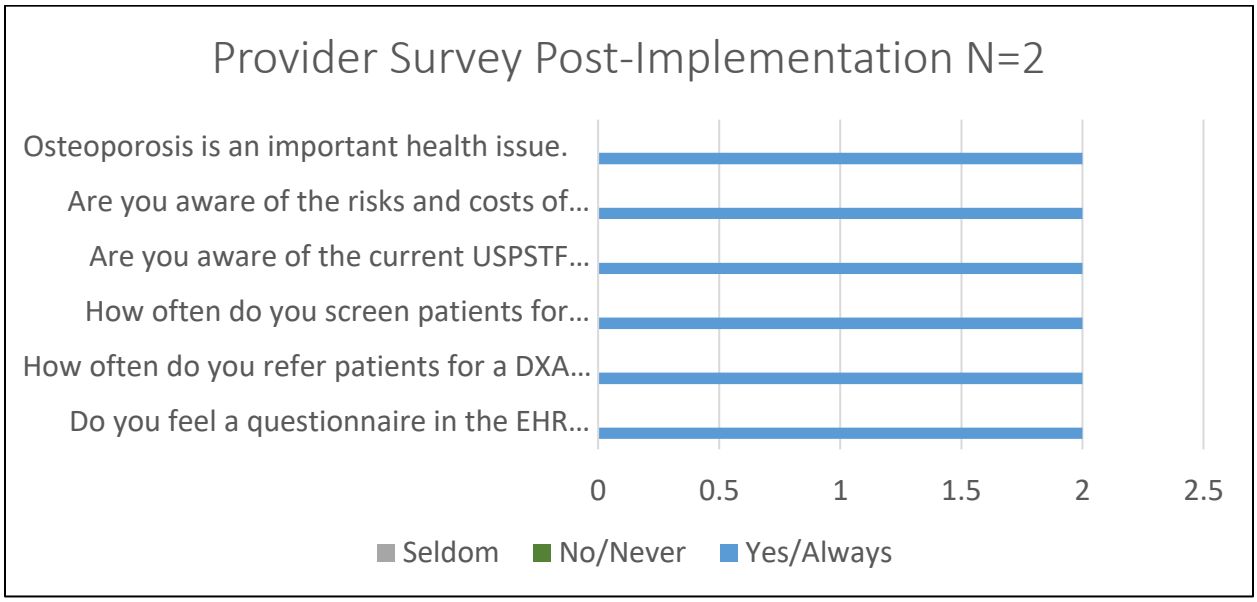


Figure 6. *Provider Post-Implementation Survey Result*



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DNP Project Final Defense

4/12/23

Grand Valley State University
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  - Dr. George Carley, DO

Objectives for Presentation

1. Review the clinical problem of low osteoporosis screening rates in the primary care setting.
2. Describe the intervention setting and summary of organizational assessment findings.
3. Review findings of the literature review related to improving osteoporosis screening rates within a primary care practice.
4. Describe models and frameworks utilized to guide the project.
5. Describe project design, data collection, and implementation strategies.
6. Review project results and application to practice.
7. Obtain approval of the project defense.

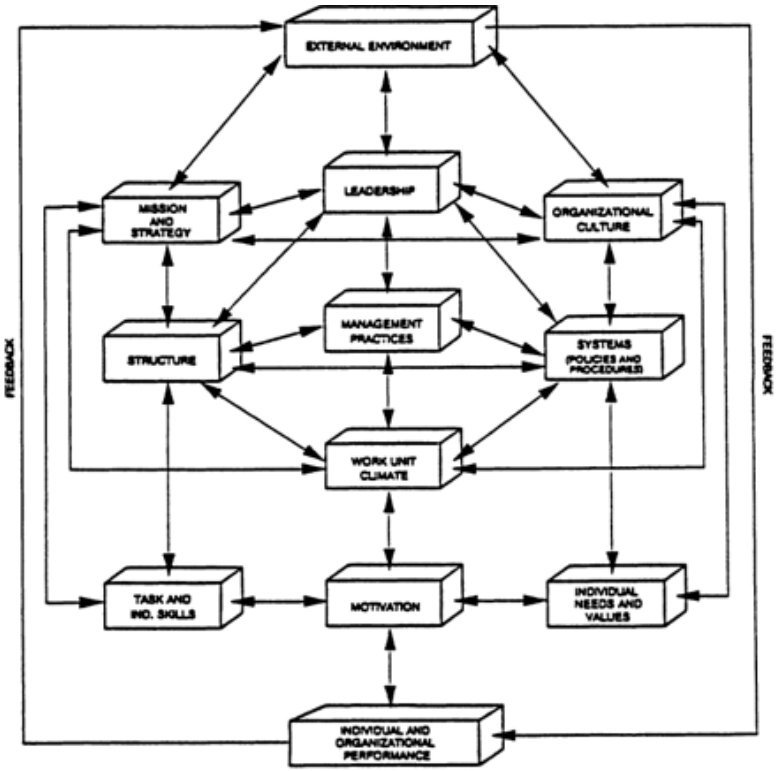
Clinical Problem

- Osteoporosis affects 10 million individuals in the United States alone and is anticipated to cost more than $90 billion annually by the year 2040 (Cox & Hooper, 2021; Johnson et al., 2021).
- Fractures resulting from osteoporosis are the only symptom of low bone density and cause decreased mobility and increased morbidity and mortality.
- Screening for bone mineral density (BMD) using dual-energy absorptiometry (DXA) is the gold standard in predicting major fractures, allowing for timely intervention in the primary care setting (Leslie & Crandall, 2019).
- Osteoporosis related fracture rates are high yet lack of screening and education on osteoporosis remains a significant problem (Cox & Hooper, 2021).
- There are two HEDIS measures related to osteoporosis that are applicable to individuals on Medicare.
- The USPSTF guideline recommends BMD testing in women ≥ 65, while the NOF and the AACE guidelines recommend osteoporosis screening in postmenopausal women aged 50-69 "based on a risk factor profile" (Crandall, 2015).

Organizational Setting

- Rural primary care practice in the Midwest
- Independently owned by a physician since 1993
- Accepts Medicare/Medicaid, private insurance, and self-pay
- Four providers (MD, DO, WHFNP-BC, FNP-C)
- > 6,500 active patients
  - Less than 20% of women aged 50 and older were screened for osteoporosis from September 1st, 2020, to November 1st, 2022.

Framework: Burke & Litwin



From "A Causal Model of Organizational Performance and Change," by W.W. Burke, and G.H. Litwin, 1992, *Journal of Management*, *18*(3), p.528. Copyright 1992 by the Southern Management Association.

SWOT Analysis

Strengths

- Clearly defined mission statement
- ***Stakeholder buy-in***
- Clear and concise goals
- Motivated by unmet quality measures
- ***Little to no cost to implement proposed intervention***
- ***Employee commitment to improved patient outcomes***
- ***Customizable EHR to promote a technology-based DNP project***
- Experienced staff

Weaknesses

- High patient volume
- ***Inadequate education on current, newer EHR***
- ***Underutilization of EHR tools***
- Privately-owned practice, lack of larger affiliated organization
- Staffing issues
- Lack of time to provide care and document on complex patient population
- ***Lack of risk screening tool for osteoporosis***

Opportunities

- Grants and incentive through HEDIS, HAP, HRSA
- ***Utilization of tools in the EHR to assist with screening***
- ***EHR utilization to improve patient outcomes***
- ***Improve communication between providers, medical assistants, and patients***
- Improving quality documentation increases opportunity to capture incentive revenue from payors
- ***Improved osteoporosis screening using a screening tool, to improve patient outcomes***
- Meet previously unmet HEDIS measure benchmarks

Threats

- Reluctance of change or fear of increased workload
- ***High incidence of cancellations "no show" clients***
- Reduction in incentive based on quality measure reporting

Literature Synthesis

- Purpose

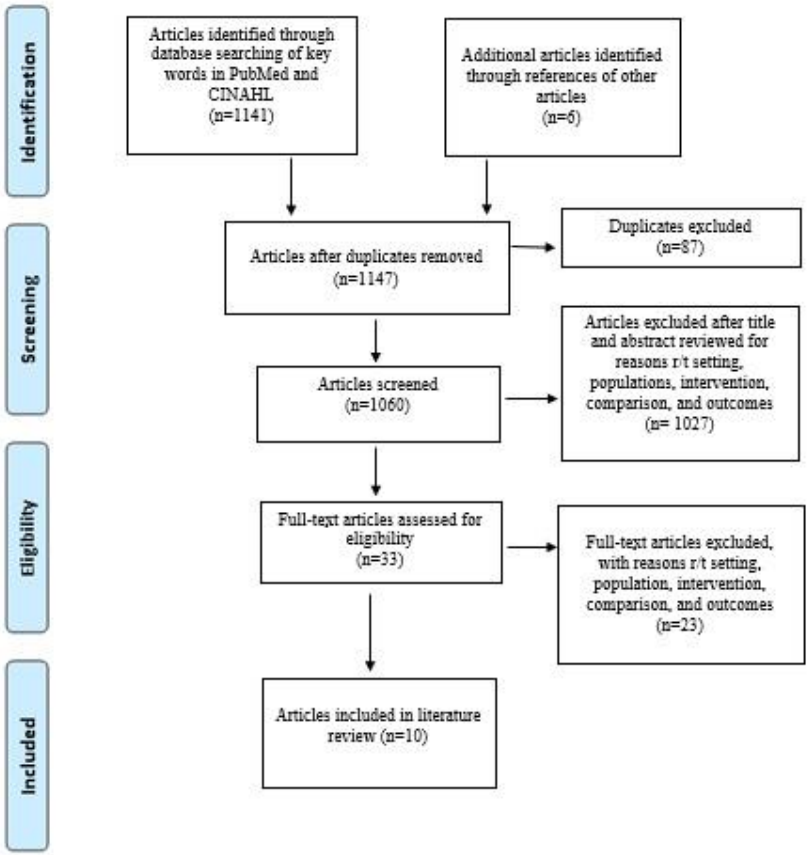
  -Analyze current scholarly literature related to osteoporosis screening and relevant interventions to improve screening rates in primary care

- Aims

  -What are the identifiable barriers and facilitators of osteoporosis screening in primary care?

  -What does the evidence indicate as the clinical standard in improving osteoporosis screening in primary care?

PRISMA Figure



Flow diagram of the search selection process. Adapted from "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement" by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by PLoS Medicine.

Synthesis of Results

Theme 1: Fracture Liaison Services and Bone Health Team

- Lawrence et al. (2017) found that primary care patients enrolled in the BHT had significantly higher rates of osteoporosis screening with DXA than current practice.
- FLS are more focused on post-fracture care opposed to primary prevention (Leslie & Crandall, 2019).

Theme 2: Screening Tools

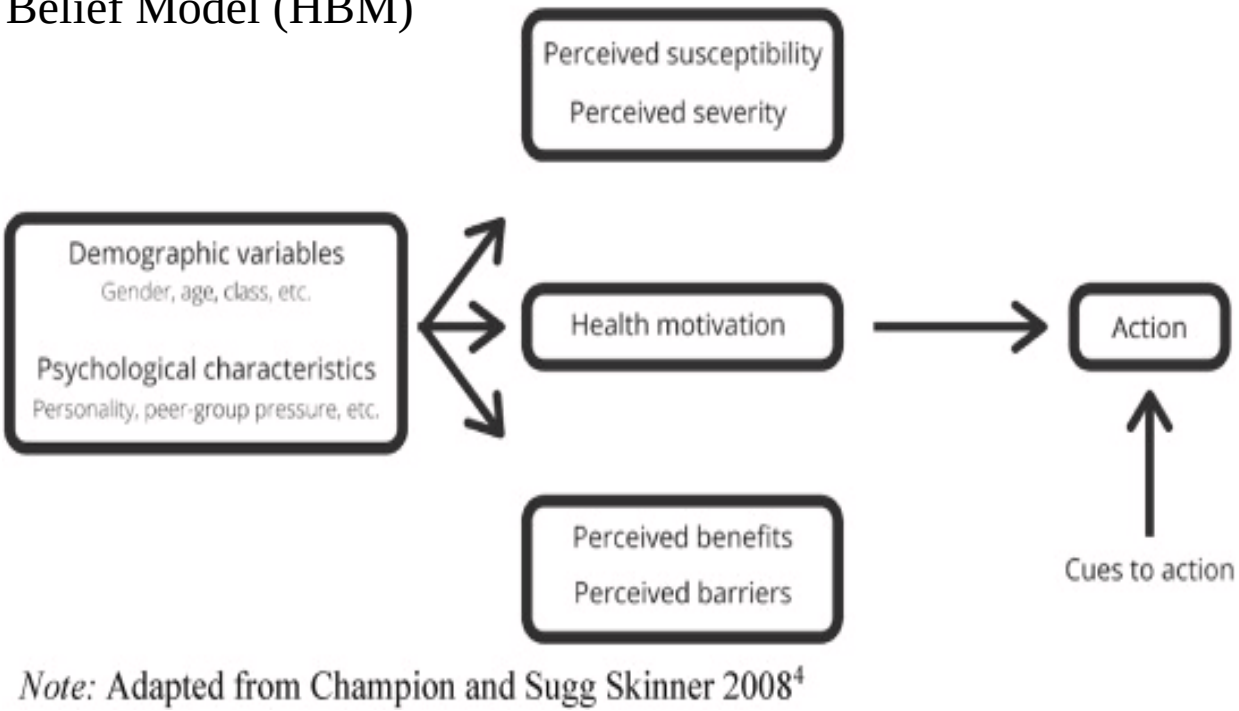
- Williams et al. (2017) found that an osteoporosis risk tool has the potential to be integrated in an EHR and alert providers to patients who have an increased risk and should be referred for a DXA scan, improving detection rates by expanding the population of individuals who are screened.
- The SCORE tool is a screening tool simpler than FRAX, yet performs as well as FRAX, and sometimes better according to a systematic review by Crandall (2015).

Synthesis of Results

- Theme 3: Self-Scheduling
  - Patient self-scheduling of DXA scan plus education demonstrated significant improvement in increasing bone mineral density screening (Leslie & Crandall, 2019; Nayak & Greenspan, 2018).
- Theme 4: EHR Utilization
  - Osteoporosis screening with an EHR-integrated screening tool paired with an integrated reminder within a CDSS are effective tools in identifying patients who are at risk for osteoporosis (Gupta et al., 2022).

Framework/Conceptual Model for Phenomenon

Health Belief Model (HBM)



Note: Adapted from Champion and Sugg Skinner 2008[4]

From "The Health Belief Model: How Public Health Can Address the Misinformation Crisis Beyond COVID-19," by Houlden, Hodson, Veletsianos, Reid, and Thompson-Wagner, 2021, Public Health in Practice, 2, 100151. Adapted from Champion and Sugg Skinner 2008. Copyright 2021 Elsevier.

Clinical Practice Questions

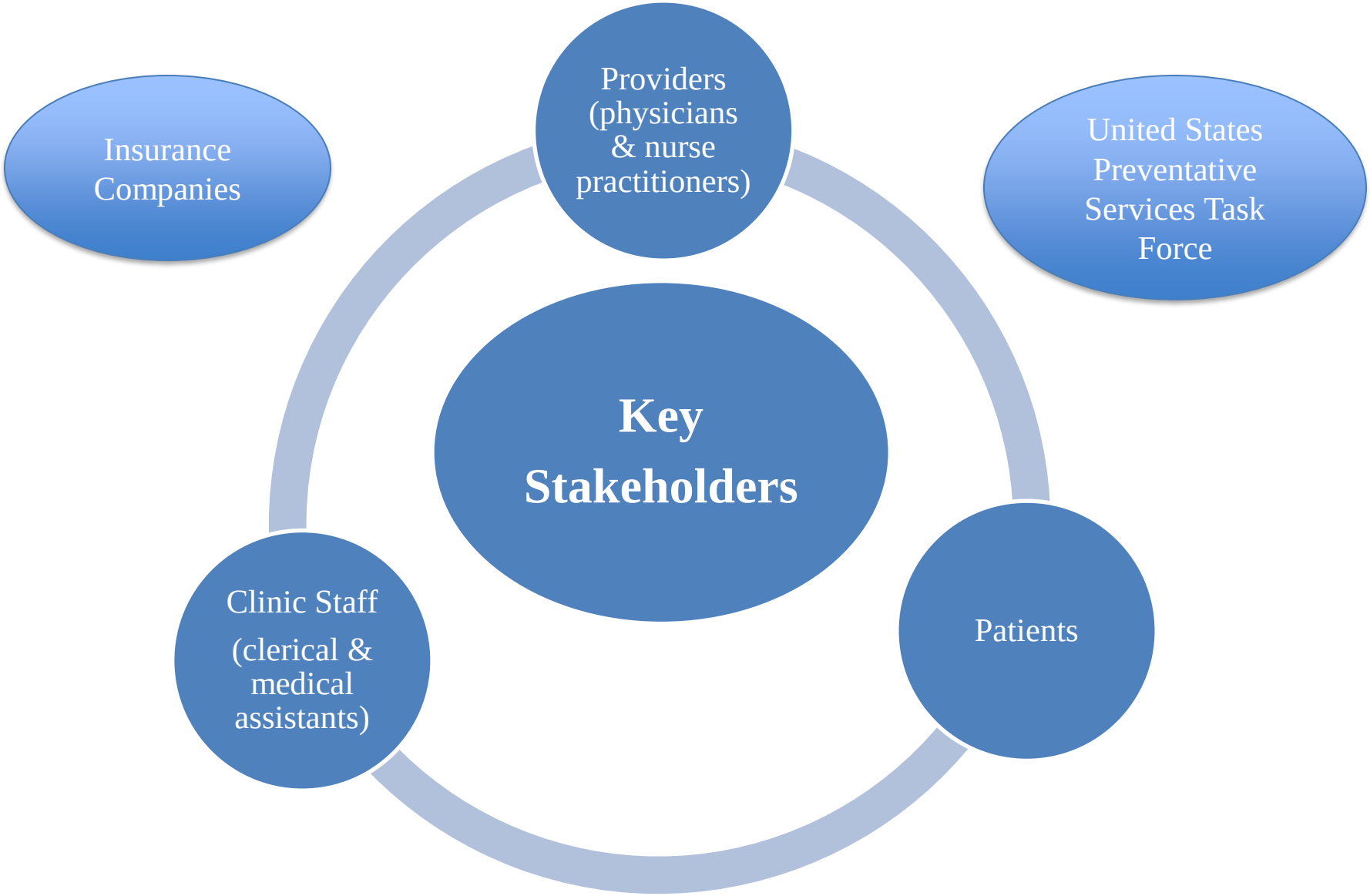
1. **Will the implementation of an osteoporosis risk screening tool with EHR utilization improve the rates of DEXA referrals?**
2. **Will education of providers and medical assistants increase their participation in the use of an osteoporosis screening tool?**

Purpose and Project Type

The purpose of this quality improvement project was to improve osteoporosis screening rates for postmenopausal women of age ≥ 50 based on best evidence.

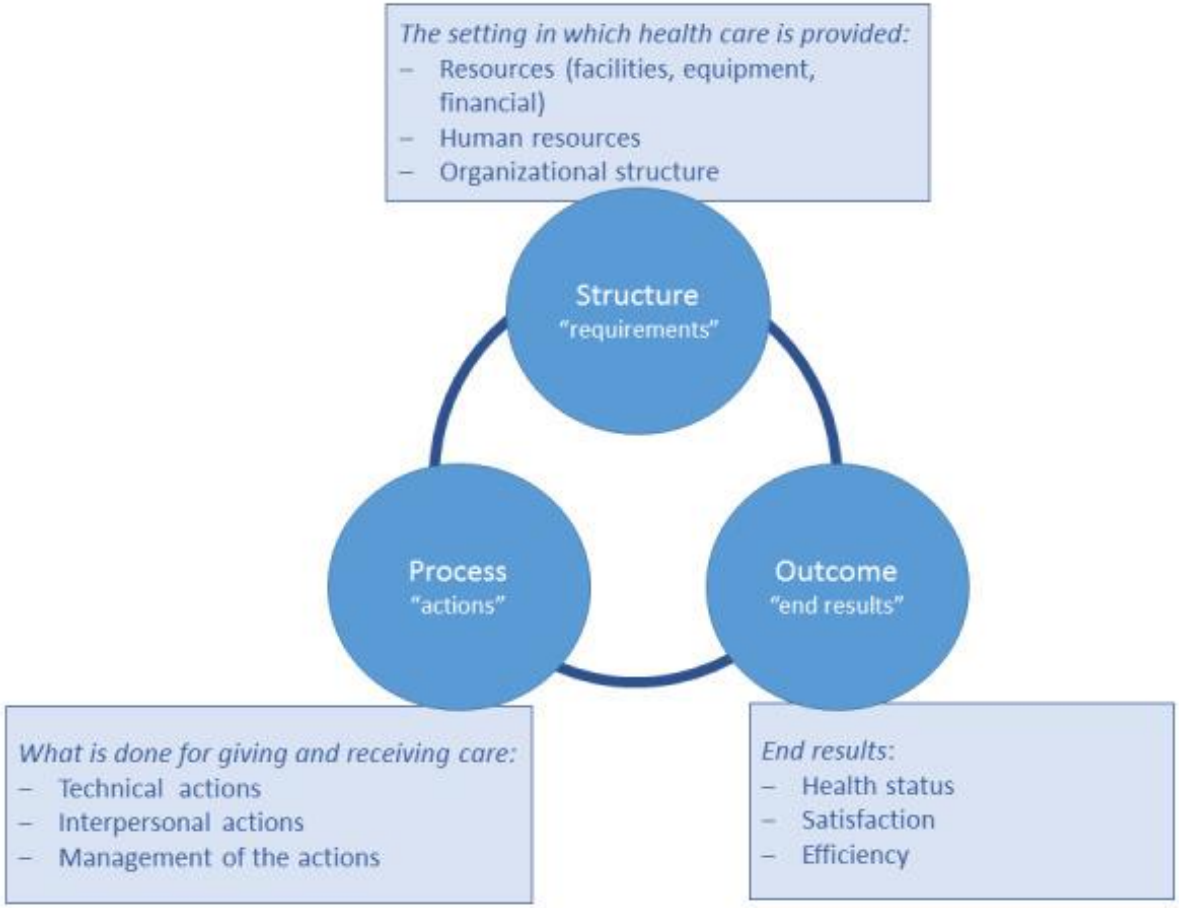
Setting and Project Design

- Quality Improvement project in a privately-owned rural primary care clinic in the Midwest.
- In alignment with the HRSA ANEW grant, the goal of this project was to improve osteoporosis screening rates for underserved women utilizing informatics in the form of an EHR imbedded screening tool and CDSS reminder.


Insurance Companies
Providers (physicians & nurse practitioners)
United States Preventative Services Task Force
Key Stakeholders
Clinic Staff (clerical & medical assistants)
Patients

Implementation Framework

The Donabedian model for quality of care



(Tossaint-Schoenmakers et al., 2021)

Project Purpose and Objectives

The purpose of this project was to develop an osteoporosis screening process by utilizing technology within the primary care setting for women aged 50 and older.

<u>Objectives</u>:

1. **Identify relevant ICD-10 codes, CPT codes, and billing codes and determine costs/insurance coverage with key stakeholders by January 16th, 2023.**
2. **Obtain IRB approval from GVSU by January 13th, 2023.**
3. **Collect pre-implementation data related to osteoporosis screening referrals by January 16th, 2023.**
4. **Distribute educational materials at lunch "in-service" and update key stakeholders on the new osteoporosis screening process within the EHR by January 20th, 2023.**
5. **Collect EHR data in 6-week time period via data extraction, specifically ordered DXA scans, and completed DXA scans, between January 23rd, 2023, and March 6th, 2023.**
6. **Complete statistical analysis of pre- and post- implementation data by March 20th, 2023.**
7. **Final defense presentation of quality improvement project and upload final defense to Scholar Works by April 2023.**

Implementation Strategies

Implementation Strategy (Powell et al., 2015)	Description	Framework Alignment
1. Conduct Local Needs Assessment	Organization Assessment and informal staff interviews	Structure Process
2. Assess for Readiness and Identify Barriers and Facilitators	Organizational Assessment and informal staff interviews	Structure Process
3. Audit and Provide Feedback	Audit EHR and provide feedback during educational meeting	Process

Implementation Strategies

Implementation Strategy (Powell et al., 2015)	Implementation Tool	Framework Alignment
4. Develop Educational Materials	PowerPoint, Provider Handouts, MA Handouts	Process
5. Conduct Educational Meetings	1-hour lunch "in-service" for staff	Process
6. Distribute Educational Materials	PowerPoint, Provider Handouts, MA Handouts	Process

Implementation Strategies

Implementation Strategy (Powell et al., 2015)	Implementation Tool	Framework Alignment
7. Facilitation	SCORE risk screening tool integration into EHR	Process
8. Purposely Reexamine the Implementation	Monitor EHR and informal interviews with staff to assess barriers.	Process
9. Remind Clinicians	Use of CDSS within EHR, bi-weekly informal meetings.	Process
10. Audit and Provide Feedback	Analysis of pre- and post-implementation.	Process Outcome

Evaluation & Measures

Topic	Concept	How Measured	When Measured	Who Measures
Implementation Strategies	Conduct local needs assessment	Discussion, audits, EHR review, observation	Pre-implementation (June 2022)	Student and clinical site mentor/team
	Assess readiness and identify barriers and facilitators	Discussion	Pre-implementation (June-September 2022)	Student
	Audit and provide feedback	EHR audit	Pre-implementation (September-November 2022)	Student
	Develop educational materials	Pre/Post-implementation survey	Pre-implementation (December 2022)	Student
	Conduct educational meeting	Attendance	Pre-implementation (January 2023)	Student
	Distribute educational materials	Attendance	Pre-implementation (January 2023)	Student
	Purposely reexamine the implementation	EHR audit, discussion	Intra-implementation (1/23/23-3/6/23)	Student
	Remind clinicians	EHR audit, discussion	Intra-implementation (1/23/23-3/6/23)	Student
	Audit and provide feedback	EHR audit, pre/post-implementation survey	Post-implementation (3/20/23)	Student
Patient Outcomes	Increase in completed DXA scans	EHR audit	Post-implementation (3/20/23)	Student
	Improved osteoporosis screening rates for target population	EHR audit	Post-implementation (3/20/23)	Student
System Outcomes	Improved provider/MA knowledge and beliefs, and utilization of the new screening tool/CDSS	EHR audit, pre/post-implementation survey	Post-implementation (3/20/23)	Student

Analysis Plan

Measure	Tool	Measurement Plan
Improved osteoporosis screening rates for target population	Electronic health record	Two sample Z-test
DXA referral rates	Electronic health record	Pre/post rate comparison via graphical bar chart
Completed DXA rates	Electronic health record	Pre/post rate comparison via graphical bar chart
Effectiveness of educational materials	Staff pre/post-implementation survey	Graphical bar chart
Improved provider knowledge and utilization of the new screening tool/CDSS	Staff pre/post-implementation survey	Graphical bar chart

Staff Surveys

Pre/Post-Implementation Medical Assistant Survey

1. Do you know what osteoporosis is? Yes/No
2. Do you believe osteoporosis is a serious disease? Yes/No
3. Is it natural for patients to experience non-traumatic fracture? Yes/No
4. Do you feel a questionnaire in the EHR would be beneficial in identifying those at risk for fracture? Yes/No

Pre/Post-Implementation Provider Survey

1. Osteoporosis is an important health issue. Yes/No
2. Are you aware of the risks and costs of osteoporotic fractures? Yes/No
3. Are you aware of the current USPSTF osteoporosis screening recommendations? Yes/No
4. How often do you screen patients for osteoporosis? Always/Seldom/Never
5. How often do you refer patients for a DXA scan when indicated? Always/Seldom/Never
6. Do you feel a questionnaire in the EHR would be beneficial in identifying those at risk for fracture? Yes/No

Staff Educational Materials

Improving Osteoporosis Screening Rates in Primary Care

Evidence-Based Recommendations and Interventions for Osteoporosis Screening

The Impact of Osteoporosis

- Osteoporosis affects 10 million individuals in the U.S. alone and is anticipated to cost more than $90 billion annually by 2040.
- Fractures resulting from osteoporosis are the only symptom of low bone density and cause decreased mobility and increased morbidity and mortality.
  - The one-year mortality rate for a hip fracture is 23%.
- Screening for bone mineral density (BMD) using dual-energy absorptiometry (DXA) is the gold standard in predicting major fractures.
- Osteoporosis fracture rates are high yet lack of screening and education remains a significant problem.

(Cox & Hooper, 2021; Johnson et al., 2021; Leslie & Crandall, 2019; Wu et al., 2018)

Objectives

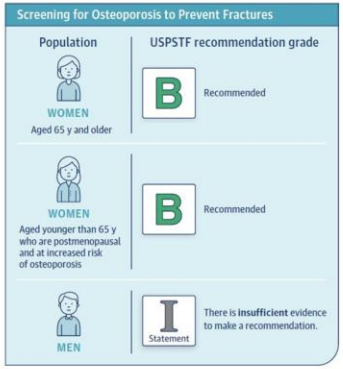
- Discuss Clinical Phenomenon
- USPSTF Osteoporosis Screening Recommendations
- Process for SCORE Tool Implementation
- CDSS Alert Overview

Project Intervention

- Develop and offer provider/staff education on USPSTF osteoporosis screening recommendations
- Utilization of SCORE screening tool on every postmenopausal woman ≥ 50
- Integrate SCORE tool into the EHR
- Activate the existing osteoporosis screening CDSS alert
- Provide copies of presentation, USPSTF recommendations, and SCORE screening tool to provider and office staff
- Conduct a brief pre- and post- implementation staff survey

Staff Educational Materials

2018 United States Preventative Services Task Force Osteoporosis Screening Recommendation



(USPSTF, 2018)

Variable	Score	Conditions
Race	+5	Woman is not black
Rheumatoid arthritis	+4	Woman has rheumatoid arthritis
History of fractures	+4	For each type (wrist, rib, hip) of nontraumatic fracture after age 45 (maximum score = 12)
Age	+3	Times first digit of age in years
Estrogen therapy	+1	Woman has never received estrogen therapy
Weight	−1	Times weight in pounds divided by 10 and truncated to nearest integer

(*Adapted from* Lydick et al. [4].)

Simple Calculated Osteoporosis Risk Estimation (SCORE)

Simple Calculated Osteoporosis Risk Estimation (SCORE)

	FRAX	SCORE	OST	ORAI
	Age	Age	Weight	Age
	Sex	Weight	Age	Weight
	Body mass index	Race		Current estrogen use
	History of fracture	Fracture history		
	History of parental hip fracture	Rheumatoid arthritis		
	Current smoking	Estrogen use		
	Glucocorticoid use			
	Rheumatoid arthritis			
	Alcohol use			
	Disease history associated with secondary osteoporosis			
Suggested threshold for bone density screening	≥9.3%*	≥6	<2	≥9

*10-Year major osteoporotic fracture risk.
FRAX, Fracture Risk Assessment Tool; SCORE, Simple Calculated Osteoporosis Risk Estimation; OST, Osteoporosis Self-Assessment Tool; ORAI, Osteoporosis Risk Assessment Instrument.

SCORE Implementation

Step 1: Access the SCORE template within patient chart.

Step 2: MA will administer the SCORE to every woman ≥ 50 and enter score into the EHR.

Step 3: Provider will assess the SCORE score and use to guide clinical decision making.

Step 4: A referral for DXA scan will be recommended and sent by provider, if indicated by a SCORE result > 6.

Ethical Considerations

- CITI training complete
- HIPAA compliant chart review
  - Completed onsite
  - Protected Health Information
    - Any identifiable data on paper was kept locked in a drawer within the clinic and destroyed via locked commercial shredder
    - Deidentified data: number of completed risk screenings using ICD-10: Z13.830, number of DXA referrals, number of completed DXA
- IRB determination by GVSU
- "Not Research"

IRB Determination

GRAND VALLEY STATE UNIVERSITY
www.gvsu.edu

Date: January 27, 2023

To: Anne McKay
From: Office of Research Compliance & Integrity
Project Title: Improving Osteoporosis Screening Rates in a Rural Primary Care Clinic
Project Number: 23-183-H
Submission Type: IRB Research Determination Submission

Action: Not Research
Effective Date: January 27, 2023
Review Type: Administrative Review

Thank you for your submission of materials for your planned scholarly activity. It has been determined that this project does not meet the definition of research* according to current federal regulations. The project, therefore, does not require further review and approval by the IRB.

Scholarly activities that are not covered under the Code of Federal Regulations should not be described or referred to as *"research"* in materials to participants, sponsors or in dissemination of findings. While performing this project, you are expected to adhere to GVSU's code of conduct and any discipline-specific code of ethics.

A summary of the reviewed project and determination is as follows:

The proposed project seeks to integrate an osteoporosis screening tool (SCORE) into the electronic health record (EHR) of a primary care practice. This is a quality improvement project at a single clinic. The project is systematic in nature, but it is not generalizable. Therefore, it does not meet the federal definition of research and does not require IRB review.

This determination letter is limited to IRB review. It is your responsibility to ensure all necessary institutional permissions are obtained prior to beginning this project. This includes, but is not limited to, ensuring all contracts have been executed, any necessary Data Sharing Agreements and Material Transfer Agreements have been signed, and any other outstanding items are completed.

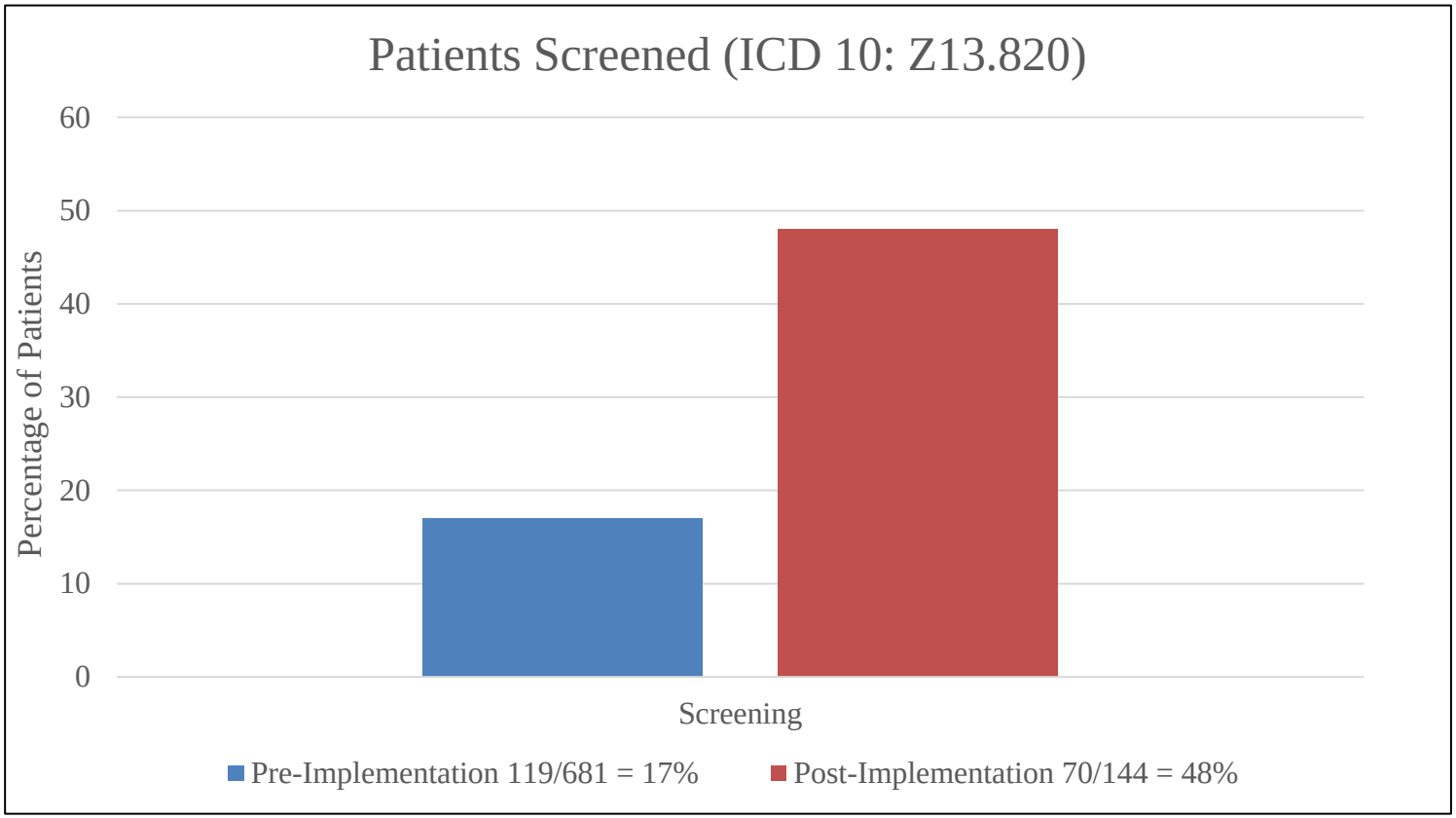
If you have any questions, please contact the Office of Research Compliance and Integrity at (616) 331-3197 or rci@gvsu.edu. Please include the project title and project number in all correspondence with our office.

*Research is a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge (45 CFR 46.102 (d)).

Office of Research Compliance and Integrity | 1 Campus Drive | 049 James H Zumberge Hall | Allendale, MI 49401
Ph 616.331.3197 | rci@gvsu.edu | www.gvsu.edu/rci

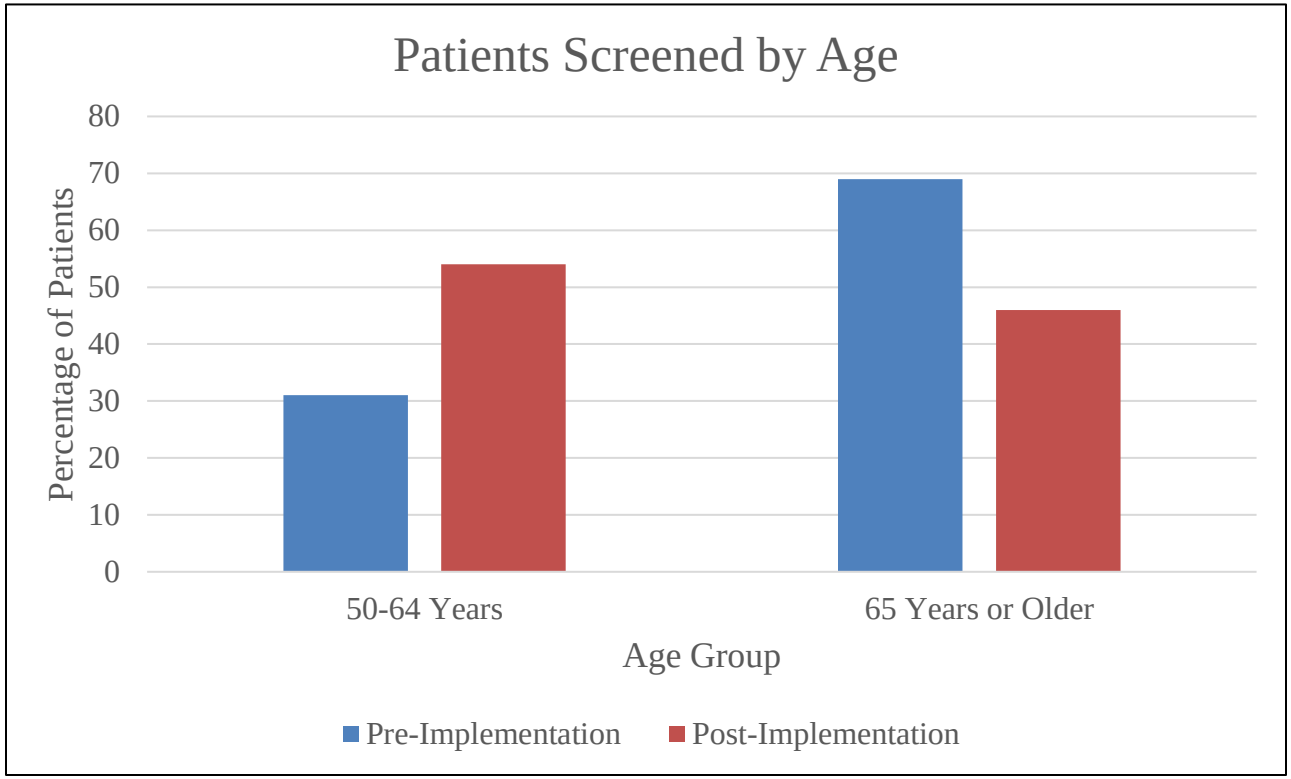
RESULTS

Results: Patient Outcomes



- Two sample Z-test, P value < 0.0001 (0.05 level of significance)
- **31% significant increase in the number of patients screened for osteoporosis risk**

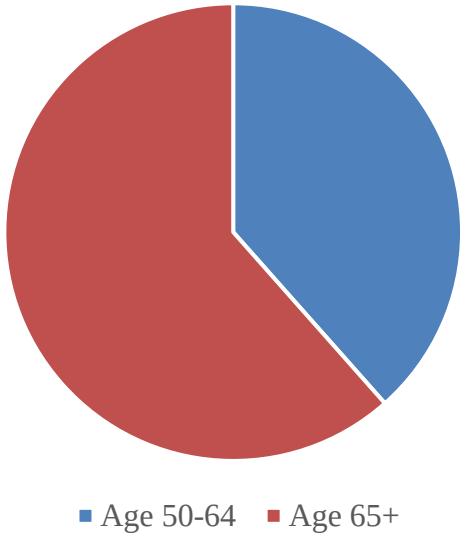
Results: Age Groups



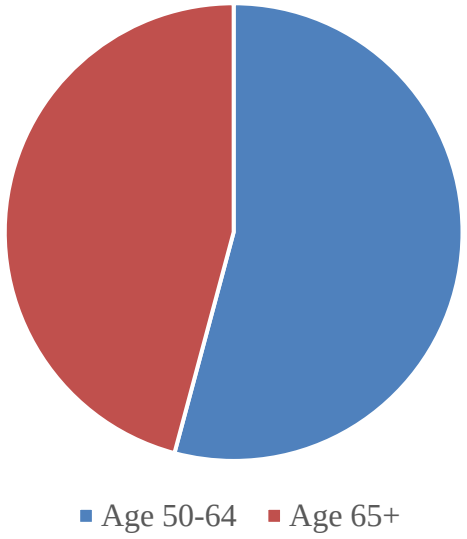
- Two sample Z-test for both age groups, P-value < 0.00165 (0.05 level of significance)
- **23% increase in screening for risk in the 50-64 age group**

Results: Qualified for DEXA (53%)

DEXA Referral (35%)

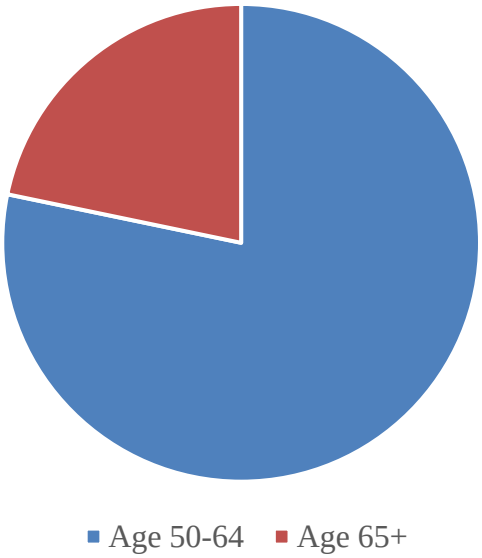


DEXA Refusal (65%)

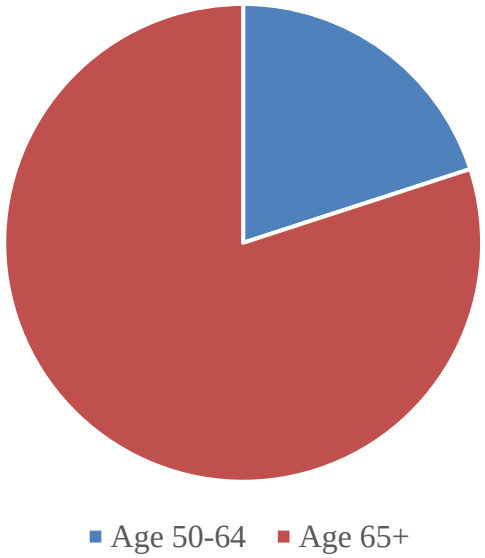


Results: Did Not Qualify for DEXA (47%)

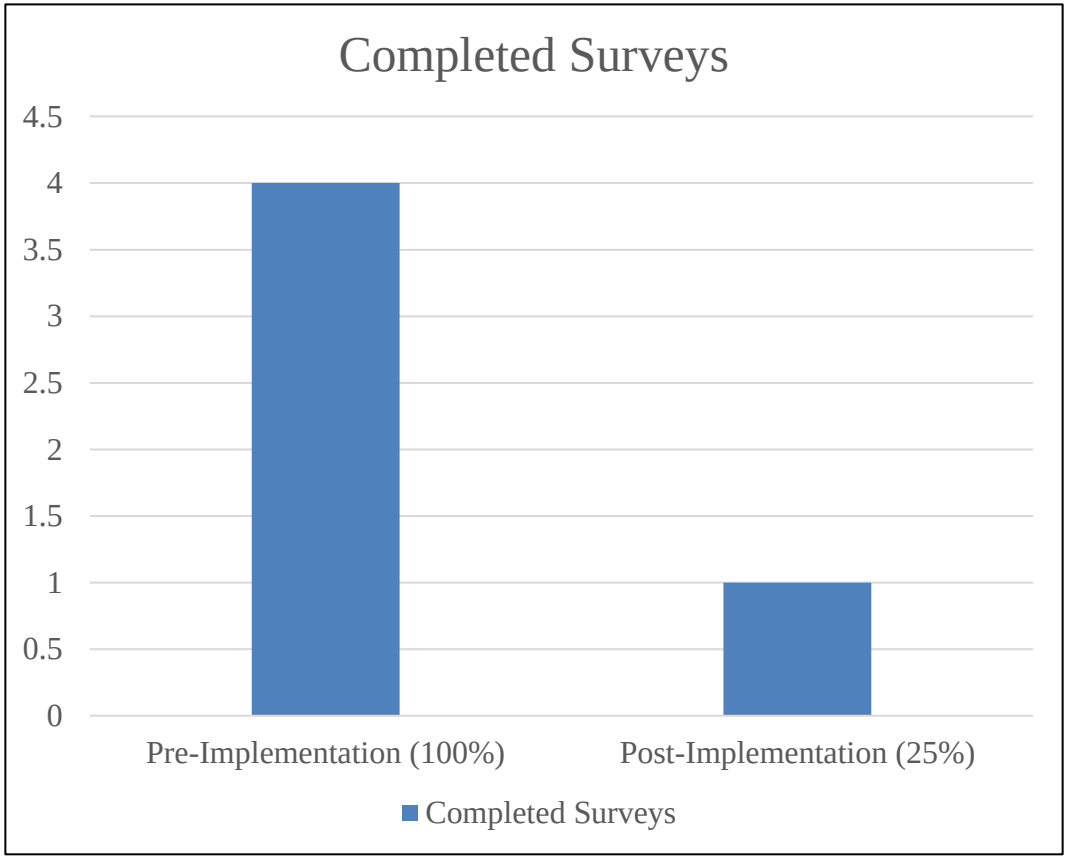
SCORE < 6 (30%)



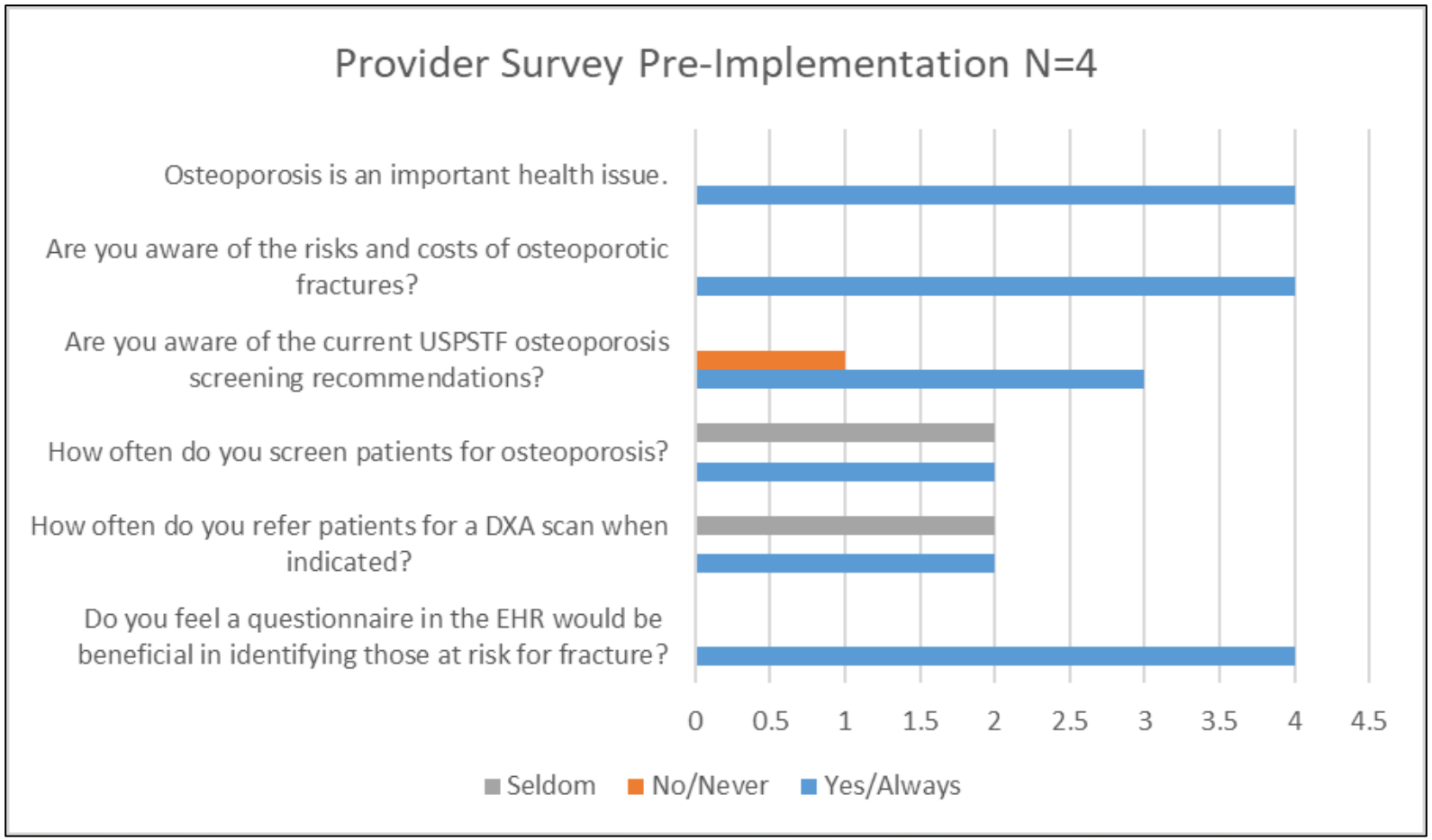
DEXA Up to Date (70%)



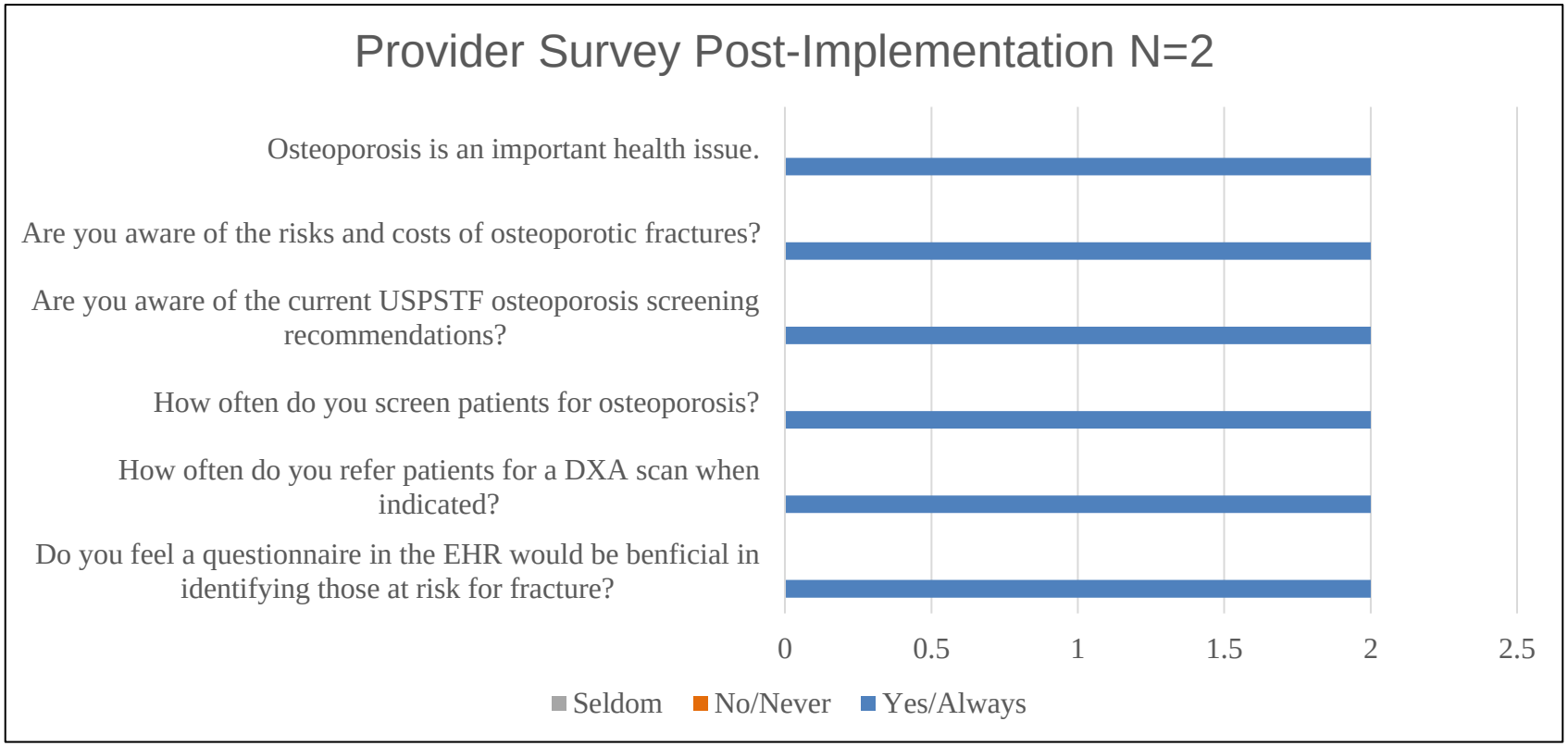
Medical Assistant Surveys



Provider Pre-Implementation Survey



Provider Post-Implementation Survey



Barriers

- Integration of SCORE tool into the EHR
- Staff turnover
- Role changes
- Lack of workflow adoption

Discussion/Limitations

- Implementing a screening tool for osteoporosis
  - Increase risk screening rates, DEXA referrals, and completed DEXA scans
- Organization assessment revealed strong stakeholder engagement
- Successful adaptation to barriers resulted in the screening tool integrated into the EHR
- SCORE questionnaire added to an EHR template
- CDSS alert activated in the EHR

Implications for Practice

- Stakeholder engagement
  - Providers and clerical staff (MAs, office manager, front desk)
- Implementation and adherence to workflow processes
  - Easily accessible educational materials
  - Strong communication
- Patient education
- Other DNP projects

Sustainability Plan

- Key stakeholder buy-in
  - Management
- Acceptance from providers
  - Improved risk screening rates
  - Use of USPSTF osteoporosis screening recommendation
- Change champion

(Powell et al., 2015)

Budget & Resources

Revenue	
Project manager time: *(in-kind donation)*	9,600.00
Team member time: *(in-kind donation)* - Site mentor- DO - Assistant manager - Medical assistants - Nurse Practitioner	 4,440.00 760.00 12,160.00 2,320.00
Consultations: *(in-kind donation)* - Statistician	 200.00
Equipment: *(in-kind donation)* -Organization laptop -Educational materials	 700.00 40.00
Estimated total revenue:	**$30,220.00**
Expenses	
Project manager time: *(in-kind donation)*	9,600.00
Team member time: *(in-kind donation)* - Site mentor- DO - Assistant manager - Medical assistants - Nurse Practitioner	 4,440.00 760.00 12,160.00 2,320.00
Consultations: *(in-kind donation)* - Statistician	 200.00
Equipment: *(in-kind donation)* - Organization laptop - Educational materials	 700.00 40.00
Estimated total expense:	**$30,220.00**
Net Operating Plan	**$0.00**

Conclusion

At a rural primary care clinic in the Midwest, lack of screening for osteoporosis based on USPSTF recommendations was identified.

-Clinical Questions:

1. Will the implementation of an osteoporosis risk screening tool with EHR utilization improve the rates of DXA referrals?
2. Will education of providers and medical assistants increase their participation in the use of an osteoporosis screening tool?

-Outcome: Although barriers within the clinic impeded planned interventions, there was still a significant increase in screening for osteoporosis.

Dissemination

- Final defense at GVSU
- Present findings to organizational stakeholders
- Upload to ScholarWorks

DNP Essentials Reflection

DNP Essential	Achieved by:
I: Scientific Underpinnings for Practice	Literature review: Using best evidence to support improved screening practices.
II: Organizational and Systems Leadership	Organizational assessment, SWOT analysis, stakeholder engagement, communication with leadership team.
III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice	Developing, implementing, and analyzing a process to increase osteoporosis screening.
IV: Information Systems/Technology	Integration of screening tool into the EHR.
V: Advocacy for Health Care Policy	Advocated for screening in a specific population within the organization to improve patient outcomes.
VI: Interprofessional Collaboration	Collaboration with NPs, MD, DO, MAs, office staff and leadership team.
VII: Clinical Prevention and Population Health	Improved screenings through staff engagement and facilitation of the QI project.
VIII: Advanced Nursing Practice	Completed project hours.

Handouts

1. PRISMA Figure
2. Literature Review Table
3. Implementation Strategies
4. Evaluations and Measures Table
5. Implementation Tools
    1. Simple Calculated Osteoporosis Risk Estimation (SCORE)
    2. USPSTF Osteoporosis Screening Recommendation
    3. Pre/Post-Implementation Medical Assistant Survey
    4. Pre/Post-Implementation Provider Survey
6. Presentation “Osteoporosis Screening”
7. Result Tables

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