Introduction

Fragility fractures occur due to decreased bone density (BMD) and are of concern for both men and women. These fractures result from low energy mechanisms and most frequently involve spine, hip, and wrist. If BMD is not addressed, patients can have subsequent fractures. There are significant morbidity and health care costs that occur with secondary fragility fractures after the initial fracture. There were 10.2 million older adults with osteoporosis in 2010, and there were 43.4 million adults with low bone mass in the US in 2010, these numbers are expected to grow to 13.6 million people with osteoporosis and 57.8 million people with low bone mass by 2020. Thus, it is essential to investigate the effectiveness of early screening and treatment plans for reducing the incidence of subsequent fragility fractures. The MU orthopedic trauma service has been proactive in recommending DEXA scan screening and follow-up for the management of patients that sustain a fragility fracture if they aren’t undergoing current treatment for osteoporosis. The goal is to minimize further risk of fracture in these patients. We are interested in determining the effectiveness of our current program and understanding the potential barriers that prevent their patients from following with bone health recommendations. We are also interested in determining the effectiveness of the medical community at diagnosing and managing osteoporosis. We hypothesize that our current protocol is effective at osteoporosis screening and subsequent treatment 75% of the time.

Objectives

1. Determine effectiveness of osteoporosis screening protocol
2. Identify components of osteoporosis diagnosis and management.
   a) Determine if the patients diagnosed with osteoporosis are appropriately following treatment recommendation and if not, then why.
   b) Determine the importance of pharmacological and non-pharmacological management to patients diagnosed with osteoporosis.
   c) Determine if the patients have been educated on the damaging effect of bone disease on overall health as they approach the critical age range for osteoporosis (55+).
3. Assess risk factors through the Fracture Risk Assessment Tool (FRAX) for subsequent fracture in patients that present to the orthopedic trauma center with fracture.
   a) Determine if patient undiagnosed with osteoporosis that present to the orthopedic trauma clinic with fractures and high FRAX score should be treated for osteoporosis or have their BMD measured through DEXA scan.
   b) Identify the trend in DEXA scan recommendations.

Methods

1. After obtaining the MU IRB-approved consent, the patient is asked questions from the Fracture Risk Assessment Tool (FRAX) and study-specific questionnaire.
2. After obtaining consent, the patient is asked questions from the questionnaire, if a patient diagnosed with osteoporosis (Fracture Risk Assessment Tool and study-specific questionnaire) BMD was not used to determine FRAX score.
   a) Sample question from Fracture Risk Assessment Tool: Did either of your parents have a broken or fractured hip? Yes or No.
   b) Sample question from the study-specific questionnaire: Has anyone ever recommended you a bone scan (DEXA scan) or bone density scan? If yes, who?

Results

% of patients diagnosed with osteoporosis taking medications for osteoporosis, if not, why?

![Figure 1](image)

% of patients diagnosed with osteoporosis by different specialty

![Figure 2](image)

% of patients diagnosed with osteoporosis by different specialty

![Figure 3](image)

% of patients taking medications for osteoporosis currently.

![Figure 4](image)

% of patients with fracture taking medications.

![Figure 5](image)

% of patients with fracture taking medications.

![Figure 6](image)

% of patients recommended DEXA scan in the past

![Figure 7](image)

% of patients that were appropriately screened for osteoporosis through DEXA scan within past two years

![Figure 8](image)

% of patients that were appropriately screened for osteoporosis through DEXA scan within past two years

![Figure 9](image)

FRAX score with treatment recommendations in patients not diagnosed with osteoporosis

![Figure 10](image)

FRAX score with treatment recommendations in patients not diagnosed with osteoporosis

![Figure 11](image)

FRAX score with treatment recommendations in patients not diagnosed with osteoporosis

![Figure 12](image)

Discussion/Conclusions

Patients diagnosed with osteoporosis:

- 37.9% of patients diagnosed with osteoporosis were taking FDA-approved osteoporosis medications (Fosamax, Forteo, Prolia, Reclast, or Evista) (Figure 1).
- Out of the 62.07% of patients not taking any of the following medications for osteoporosis, 20.69% reported that they were not prescribed any medications.
- Only 4.35% claimed that their cost was the primary reason for not taking medications; 3.45% claimed that side-effects were the reason for not taking medications.
- On average, patients that were taking medications for osteoporosis had continuous treatment for 3.21 years.
- 49.30% of patients not diagnosed with osteoporosis and not getting treatment for osteoporosis had a 5-year risk of fracture of ≥ 2% for hip fractures or ≥ 20% for major osteoporotic fracture (Figure 2).
- It was observed that the patients not taking medications for osteoporosis were diagnosed on average 11.69 ± 13.81 years ago, while the patients not taking the medications for osteoporosis were diagnosed on average 3.82 ± 3.95 years ago (Figure 3).
- The difference was statistically significant with the p-value of 0.0382.
- 72.41% of patients claimed that they did not receive education on prevention of osteoporosis, 9.20% claimed to have received education on prevention of osteoporosis from OS, and 6.13% claimed to have received it from their PCP (Figure 4).

Patients not diagnosed with osteoporosis:

- Only 50.79% patients were recommended DEXA scan in the past (Figure 5).
- 62.26% of patients who had one or more of the risk factors for osteoporosis that should have gotten a DEXA scan, did not get a DEXA scan within the past two years (Figure 6).
- 49.30% of patients not diagnosed with osteoporosis patients had a 10-year risk score of ≥ 3% for hip fractures or ≥ 20% for major osteoporotic fracture (Figure 7).
- 56.34% of patients had a fragility fracture (FF) before the questionnaire (40.85% - 1 FF, 11.27% - 2 FF, 4.26% - >2 FF).

Conclusions

It can be concluded that one of the several reasons that patients (not diagnosed with osteoporosis) were not getting appropriately treated for osteoporosis and presented with fractures was the lack of DEXA screening. Additionally, patients mostly depend on both the PCP and the OS for recommendations of DEXA scan. As has been shown by other studies, OS needs to be more proactive in diagnosis and appropriate treatment referral since we’re seeing the patient for their fracture.

In the group diagnosed with osteoporosis, most common reason for not taking the medication was because it was not prescribed. The lack of follow up with patients regarding osteoporosis may be attributed to them not being prescribed medications. Side-effects and cost of the medications were not the main reasons for the lack of compliance. Statistically significant difference was noted when comparing patients taking medications. Patients taking medications for osteoporosis were more likely to be taking medications for osteoporosis. Percentage of patients that recall being told about osteoporosis treatment options at the time of the diagnosis was similar between the group diagnosed by PCP and OS. However, about 1/5 of patients remembered not being informed about bone health options in both groups. In both populations, an overwhelming majority reported the lack of education on prevention of osteoporosis. Most patients claimed they received their preventative education through work, self-interest, or organization programs. These patients also were more confident about their knowledge of osteoporosis compared to patients recalling not receiving preventative education on osteoporosis. However, there was no significant difference between patients receiving education from PCPs vs compared to patients not receiving education on their knowledge about osteoporosis. It is difficult to determine if a patient did receive education and forgot, or they never received an education. One of the limitations of the study was that BMD data was not used to determine FRAX 10-year risks scores. BMD measurements increase the accuracy of FRAX 10-year risks scores.

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