

2018

Understanding Dual Energy X-Ray Absorptiometry (DEXA) Bone Scan Results and Treatments

Jennifer C. Morris
University of Vermont

Follow this and additional works at: <https://scholarworks.uvm.edu/fmclerk>



Part of the [Medical Education Commons](#), and the [Primary Care Commons](#)

Recommended Citation

Morris, Jennifer C., "Understanding Dual Energy X-Ray Absorptiometry (DEXA) Bone Scan Results and Treatments" (2018). *Family Medicine Clerkship Student Projects*. 402.
<https://scholarworks.uvm.edu/fmclerk/402>

This Book is brought to you for free and open access by the Larner College of Medicine at ScholarWorks @ UVM. It has been accepted for inclusion in Family Medicine Clerkship Student Projects by an authorized administrator of ScholarWorks @ UVM. For more information, please contact donna.omalley@uvm.edu.

UNDERSTANDING DUAL ENERGY X-RAY ABSORPTIOMETRY (DEXA) BONE SCAN RESULTS AND TREATMENTS

Jennifer Morris, M3

University of Vermont Larner
College of Medicine

September 2018

Mentor: Max Bayard, MD

2. Problem Identification

- 1/2 of all postmenopausal women will have an osteoporosis-related fracture in their lifetime¹
 - 25% will get a vertebral fracture
 - 15% will get a hip fracture
- Franklin County, VT (population 46,825) has an aging population, where 14.5% of the population was over age 65 in 2015⁹
- An estimated 8.4% of the Franklin County was affected by chronic osteoporosis in 2015⁹
- Patients come into the St. Albans NOTCH primary care office for a follow-up to their DEXA scan to learn about what their results mean and discuss any questions/concerns

3. Public Health Cost

- Osteoporosis affects an estimated 200 million women worldwide
 - Approximately 2/3 of women aged 90 are affected¹¹
 - Approximately 8.9 million fractures annually¹²
- The estimated cost for treatment is approximately 15.2 billion dollars per year in the United States by 2040¹³
- Osteoporotic fractures can cause chronic pain and disability, decrease independence, decrease quality of life, and increase mortality¹
 - One study of 40 female and 10 male patients diagnosed with hip fractures (control of 35 and 15, respectively)¹⁰
 - An association between hip fractures and increased mortality was found (p=0.001)
 - Main cause of death was sepsis in 7 hip fracture patients
 - Mortality
 - Within the first six months= 10 deaths
 - Within the first year= 6 additional deaths

4. Community Perspective

- Dr. Jennifer Kelly, Osteoporosis & Metabolic Bone Clinic at UVM Medical Center
 - “Most patients do not have a strong understanding of why a DEXA scan is important unless they requested it or had an interest in it otherwise (fracture, perhaps).”
 - “Many patients find the results confusing and need to have [the results] explained to them.”
 - “Unfortunately, many patients base their knowledge on the medications used for treatment on things they’ve heard from friends or have read on the internet. They are much more afraid of very rare side effects rather than all of the safety data available.”
- Susan Jacques, ANPC MSN
 - “In my experience, no one could understand the long report send for BMD results. I had to go over it with them. But I do think women understand the treatments available.”
- Paraphrased from St. Albans community member:
 - I didn’t get what the report said. That’s why I came in to talk to the doctor.

5. Intervention and Methodology

- Performed a literature review on osteoporosis, DEXA bone scans, and current recommendations for treatment
- Interviewed local healthcare providers and a community member about the issue
- Created a brochure for office distribution:
 - To be handed out to all 65+ year old women
 - To standardize the information given to all patients
 - To provide written material for patients to review later, as patients may find it difficult to recall everything the provider is saying in the present
- The brochure includes information about:
 - What osteoporosis and DEXA bone scans are
 - What the bone scan results mean
 - Possible treatment options

Treatment Options (Continued)

4. Bisphosphonates^{2,4,5}:

- Examples: Alendronate, zoledronic acid, risedronate
- The Fracture Intervention Trial showed that in women with osteoporosis, bisphosphonates reduce the incidence of hip, vertebral, and nonvertebral fracture by nearly 50 percent, particularly during the first year of treatment
- For instance, if one had a 10% risk of fracture within the next ten years, the use of bisphosphonates can reduce that risk down to 5%
- **Magnitude of effect (NNT):** It takes treating 50-60 people over 1-3 years to prevent one nonvertebral fracture
- **Risks:** upper gastrointestinal (esophagus) discomfort, atypical hip fracture, osteonecrosis of the jaw

5. Selective Estrogen Receptor Modulators⁵:

- Replaces estrogen in postmenopausal women, which slows bone loss
- Examples: Raloxifene
- Decreases the risk of vertebral fracture by 40 percent in women with osteoporosis, but it has no effect on the risk of nonvertebral fracture
- **Magnitude of effect (NNT):** It takes treating 60-89 people over 1-3 years to prevent one fracture
- **Risks:** hot flashes, thromboembolic events (strokes), leg cramps

References

1. U.S. Preventative Services Task Force. *Osteoporosis to Prevent Fractures: Screening*. Final Recommendation Statement. <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/osteoporosis-screening>
2. Cummings SR, Black DM, Thompson ED, et al. Effect of alendronate on risk of fracture in women with low bone density but without vertebral fractures: results from the Fracture Intervention Trial. *JAMA*. 1998. <https://www.ncbi.nlm.nih.gov/pubmed/9875874>
3. National Osteoporosis Foundation. *Bone Density Exam/Testing*. <https://www.nof.org/patients/diagnosis-information/bone-density-examtesting/>
4. Crandall CJ, Newberry SJ, Diamant A, et al. Comparative effectiveness of pharmacologic treatments to prevent fractures: an updated systematic review. *Ann Intern Med*. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/25199883>
5. Eastell R. Treatment of postmenopausal osteoporosis. *NEJM*. 1998. <https://www.nejm.org/doi/full/10.1056/NEJM199803123381107>
6. Ward KD, Kleges RC. A meta-analysis of the effects of cigarettes smoking on bone mineral density. *Calcif Tissue Int*. 2001. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352985/>
7. Institute for Quality and Efficiency in Health Care. Preventing Osteoporosis. Informed Health Online. 2008. <https://www.ncbi.nlm.nih.gov/books/NBK279530/>
8. Howe TE. Exercise for preventing and treating osteoporosis in postmenopausal women. *Cochrane Systematic Review*. 2011. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000333.pub2>



SCREENING FOR OSTEOPOROSIS:
WHAT DO MY RESULTS MEAN?
Created by:
Jennifer Morris, M3

SCREENING FOR OSTEOPOROSIS: WHAT DO MY RESULTS MEAN?

An educational pamphlet about the dual energy X-ray absorptiometry (DEXA) scan results and treatment options

Osteoporosis³:

- means "porous bone"
- is a bone disease that occurs when the body loses too much bone or makes too little bone, causing the bones to break more easily

Osteopenia³:

- means low bone density
- can lead to osteoporosis

Osteoporosis Screening¹

The U.S. Preventative Services Task Force (USPSTF) recommends screening for osteoporosis in:

- women aged 65 years and older
- women younger than 65 whose fracture risk is greater than that of a 65-year old white woman without additional risk factors

Fracture Risk Assessment (FRAX) Tool:

- estimates the risk of getting a fracture within a ten-year period
- considers age, gender body mass index, parental fracture history, glucocorticoid use, rheumatoid arthritis history, tobacco use, alcohol use
- a 65-year old white woman with **no** other risk factors has a **9.3% 10-year risk for a fracture** due to osteoporosis, hence the recommendation for screening

What is a DEXA scan?³

- An enhanced x-ray of your hip and spine used to help diagnose osteoporosis before a fracture occurs
- The scan estimates the density of your bones, calculating the likelihood of a future fracture

What do my results mean?³

T-score:

- A T-score calculates how your bone density compares to the bone density of a healthy 30-year old
- The lower a person's T-score (i.e. more negative), the lower the bone density

T-Score	Interpretation	Recommendations
-1 to 1	Normal	
-2.5 to -1	Osteopenia	May take osteoporosis medication, especially if 10-year probability of hip fracture is ≥3% or of osteoporosis-related fracture ≥ 20%
≥ -2.5	Osteoporosis	Should consider taking an osteoporosis medication

Z-score:

- A Z-score calculates how your bone density compares to the bone density of a person of the same age and sex
- A Z-score of 0 means your bone density is average for your age

Treatment Options

1. Proper nutrition⁵:

- Adequate caloric intake
- Calcium: 1200-1500 mg daily
- Vitamin D: 800 IU daily

2. Exercise⁸:

- At least 30 minutes, three times per week
- Aerobics, weight bearing, and resistance exercises are all effective in increasing the bone density of the spine in postmenopausal women
- Walking is also effective on the hip
- Weight bearing aerobic exercises are exercises where your bones support your weight, such as walking and jogging
- However, it is recommended that women choose **any** regular weight-bearing exercise regimen that they enjoy because **sticking with** an exercise program is more important than which activity is chosen

3. Quitting smoking⁶:

- Smoking one pack per day throughout adult life was associated with a 5 to 10 percent reduction in bone density.

6A. RESULTS

6b. Results

- The educational brochure standardizes information presented by providers about DEXA scans results while also covering the definition of osteoporosis/osteopenia and treatment options
- The brochure is to be distributed at the Northern Tier Center for Health (NOTCH) St. Albans location
- Providers are confident that this intervention will help patients understand their DEXA bone scan results

7. Evaluation of Effectiveness and Limitations

- Evaluation of effectiveness could occur through:
 - Surveying patients immediately after reading the brochure on their interpretation of the information
 - Surveying providers on what they believe is level of understanding of the patients through the number of clarifying questions asked by the patients
- Limitations:
 - Not everyone will read the brochure
 - Language and educational barriers to understanding the brochure
 - Data is limited to females only

8. Recommendations for Future Projects

- In-depth brochure evaluation survey for both providers and patients
 - Focus on what additional information is missing and if any information needs to be clarified
- Six month follow-up survey for patients
 - This can be compared to the survey that was given immediately after reading the brochure
 - And can answer the following questions:
 - Were the patients were more likely to get a DEXA scan after reading the brochure? Did this brochure contribute to this decision?
 - Did the brochure make a lasting impact? Can the patient recall the information from the brochure?
- Distribution of brochure to other primary care offices
 - Potential study on incidence of hip fractures seen in the ED before and after the brochure has been distributed to different offices

9. References

1. U.S. Preventative Services Task Force. *Osteoporosis to Prevent Fractures: Screening*. Final Recommendation Statement. <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/osteoporosis-screening>
2. Cummings SR, Black DM, Thompson ED, et al. Effect of alendronate on risk of fracture in women with low bone density but without vertebral fractures: results from the Fracture Intervention Trial. *JAMA*. 1998. <https://www.ncbi.nlm.nih.gov/pubmed/9875874>
3. National Osteoporosis Foundation. *Bone Density Exam/Testing*. <https://www.nof.org/patients/diagnosis-information/bone-density-examtesting/>
4. Crandall CJ, Newberry SJ, Diamant A, et al. Comparative effectiveness of pharmacologic treatments to prevent fractures: an updated systematic review. *Ann Intern Med*. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/25199883>
5. Eastell R. Treatment of postmenopausal osteoporosis. *NEJM*. 1998. <https://www.nejm.org/doi/full/10.1056/NEJM199803123381107>
6. Ward KD, Klesges RC. A meta-analysis of the effects of cigarettes smoking on bone mineral density. *Calcif Tissue Int*. 2001. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352985/>
7. Institute for Quality and Efficiency in Health Care. Preventing Osteoporosis. *Informed Health Online*. 2008. <https://www.ncbi.nlm.nih.gov/books/NBK279530/>
8. Howe TE. Exercise for preventing an treating osteoporosis in postmenopausal women. *Cochrane Systematic Review*. 2011. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000333.pub2>
9. Northwestern Medical Center. 2016 Community Health Needs Assessment: *Overview and Summary of the Top Six Priorities*. <https://www.northwesternmedicalcenter.org/pdf/2016-nmc-chna-and-summary-slides-approved-030216/>
10. Negrete-Corona J, Alvarado-Soriano JC, Reyes-Santiago LA. Hip fracture as a risk factor for mortality in patients over 65 years of age. Case-control study. *Acta Ortop Mex*. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/26016287>
11. Kanis JA. WHO Technical Report, University of Sheffield. 2007. https://www.sheffield.ac.uk/FRAX/pdfs/WHO_Technical_Report.pdf
12. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int*. 2006. <https://www.ncbi.nlm.nih.gov/pubmed/16983459>
13. Cummings SR, Rubin SM, Black D. The future of hip fractures in the United States. Numbers, costs, and potential effects of postmenopausal estrogen. *Clin Orthop Relat Res*. 1990. <https://www.ncbi.nlm.nih.gov/pubmed?term=2302881>

10. Interview Consent

Thank you for agreeing to be interviewed. This project is a requirement for the Family Medicine clerkship. It will be stored on the Dana Library ScholarWorks website. Your name will be attached to your interview and you may be cited directly or indirectly in subsequent unpublished or published work. The interviewer affirms that he/she has explained the nature and purpose of this project. The interviewee affirms that he/she has consented to this interview.

Yes _____ Dr. Jennifer Kelly – Email

Yes _____ Susan Jacques – Verbal