

Osteoporosis Prevention in Primary Care

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ABSTRACT

Osteoporosis is a devastating disease that is increasing in prevalence as our population ages. Prevention of osteoporosis is important to decrease osteoporosis-related fractures. Primary care practitioners are in the ideal position to actively screen women for osteoporosis and counsel them on risk reduction. This paper reviews population-based strategies for osteoporosis prevention and identification of high-risk women in a primary care practice. Practical methods of incorporating osteoporosis prevention counseling into a busy practice are presented.

INTRODUCTION

Osteoporosis is a disease that includes both low bone density and microarchitectural distortion of bones. Both of these conditions predispose people with osteoporosis to low-trauma fractures. Hip fractures are the most devastating sequelae of osteoporosis, causing both excess morbidity and mortality. Of those who experience a hip fracture, 25% to 30% will die within the first year, and up to 50% will never leave a long-term care facility. Osteoporosis also contributes to vertebral and arm fractures, which can cause chronic pain and disability. The estimated annual cost of osteoporosis in the United States is between \$10 billion and \$15 billion.¹

It is estimated that 10 million Americans have osteoporosis of the hip and nearly 19 million more have osteopenia at the hip. Postmenopausal caucasian women have close to a 50% chance of experiencing an osteoporosis-related fracture during their lifetime. Women comprise 75% to 80% of all osteoporosis-related hip fractures.² Osteoporosis in men is a growing problem, but since it is so much more prevalent in women, this article will focus on prevention strategies in women.

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Table 1 provides a list of risk factors for osteoporotic fracture.

Osteoporosis prevention is complicated, but it holds promise as the best way to decrease future fractures. Prevention theories include a population-based strategy as well as targeting high-risk individuals.³ In a primary care practice, osteoporosis prevention will encompass both approaches. Bone mineral density (BMD) is an important predictor of future fracture risk. Each standard deviation decrease in bone density is associated with a twofold increase in fracture risk. However, not all women with similar bone densities have the same risk of fracture. Predisposition for falling in a woman with a low BMD increases her risk of fracture 27 times.²

PREVENTION STRATEGIES

Primary prevention of osteoporosis is focused on adolescents, young women, and perimenopausal women. The goal of primary prevention of osteoporosis is to ensure that women reach their maximal peak bone mass (PBM) and minimize bone loss through their early adult years. Peak bone mass is the maximum amount of whole body bone mineral content that a woman accumulates. PBM is a major determinant of future osteoporosis risk. Ninety percent of PBM is acquired by age 18, with at least 25% being acquired during the 2-year period of maximum growth. Most rapid bone gain is usually between ages 11 and 14. Bone gain slows about 2 years after menarche.⁴ Exact timing of PBM is debatable but probably occurs between the ages of 20 and 25. PBM is mostly controlled by genetic factors, but achieving full genetic potential depends on optimization of lifestyle factors including adequate dietary calcium intake and physical exercise, as well as avoiding bone toxins like smoking and excess alcohol.⁵ Slow bone loss usually begins by age 30 to 35 with a period of rapid bone loss after menopause.

Secondary prevention of osteoporosis focuses on fracture prevention in women who have osteopenia or osteoporosis by bone density measurement. Secondary

prevention encompasses lifestyle modification, pharmacologic therapy, and fall prevention. A secondary prevention approach usually targets peri- or postmenopausal women or women at high risk for secondary osteoporosis.

Tertiary prevention of osteoporosis is a strategy to prevent future fractures in women with osteoporosis who have already sustained a fracture. Tertiary prevention strategies include lifestyle modification, but also will almost always include pharmacologic therapy and fall prevention strategies.

IDENTIFYING HIGH RISK INDIVIDUALS

Primary osteoporosis is bone loss that occurs during the normal aging process. As such, aging is an important risk factor for osteoporosis. Secondary osteoporosis is bone loss caused by other medical disorders or medications. It is important for primary care practitioners to identify women who are at high risk for secondary osteoporosis to prevent fractures. The list of conditions that predispose women to secondary osteoporosis is long.⁶ The most common causes of secondary osteoporosis are included in Table 2 and will be reviewed here. Other conditions contributing to secondary osteoporosis include inflammatory bowel disease, cystic fibrosis, sickle cell disease, hyperthyroidism, and immobility due to stroke or Parkinson's disease. Women with depression have been found to have a higher rate of low BMD and fractures than women who have never been depressed. Women with depression are more likely to fall, which partially explains the relationship.⁷

Women with disabilities

Immobilization causes a rapid bone loss. Women with disabilities have several risk factors for osteoporosis including immobility and avoidance of sunlight (and consequent vitamin D deficiency). Women with multiple sclerosis are at particular high risk of fractures due to immobility, frequent steroid use, and frequent use of immunosuppressants.⁸ In addition, many women with disabilities do not have routine health maintenance exams. A study of women with multiple sclerosis found that 50% of the sample of 220 women were not taking calcium supplements despite being at high risk for fractures.⁹ Several studies of children with neurologic disabilities and cerebral palsy document that the risk of osteoporosis in this group is exceedingly high.^{10,11} Adults with cognitive disabilities are frequently medicated with anticonvulsants as mood stabilizers, which puts them at increased risk of osteoporosis.¹²

Table 1. Risk factors for osteoporotic fracture²³

| |
|---|
| Female gender |
| Increasing age |
| Estrogen deficiency |
| Caucasian race |
| Low weight and BMI (<127 lbs) |
| Family history of osteoporosis and fracture |
| Smoking |
| History of a prior fracture |

Table 2. Risk factors for secondary osteoporosis⁶

| |
|-----------------------------|
| Women with disabilities |
| Antiepileptic medications |
| Type I diabetes |
| COPD |
| Renal (or other) transplant |
| End stage renal failure |
| Chronic steroid use |
| CVA |
| Hyperthyroidism |
| Eating disorder |
| Female athlete triad |

Glucocorticoid use

Glucocorticoids are the most common cause of secondary osteoporosis. Exogenous glucocorticoid therapy can cause rapid bone loss, especially in the first 6 to 12 months of therapy. The minimum dose of prednisone needed to trigger bone loss is not known. Recent studies indicate that only 2.5 mg per day of prednisone or inhaled steroids can cause some bone loss.⁶ Fracture risk increases with increasing dose and duration of therapy. All patients on chronic steroids should get both calcium and vitamin D supplementation.¹³ All women taking more than 7.5 mg per day of prednisone for more than 3 months should have a BMD test. Postmenopausal women with osteopenia or osteoporosis should be started on a bisphosphonate in addition to calcium and vitamin D supplementation.

Anticonvulsant Therapy

Many antiepileptic medications can decrease BMD and increase bone turnover. Phenytoin and carbamazepine have been the most studied and have been found to cause direct toxic effects on osteoblasts. Valproate, felbamate, phenobarbital, primidone and topiramate have also been implicated in bone loss.¹⁴ As anticonvulsants are increasingly being used for mental health disorders and chronic pain in addition to seizure management, it is important for primary care practitioners to identify women on anticonvulsants as high risk for osteoporosis.

Table 3. Recommended daily allowances of calcium and vitamin D by age²²

| | |
|------------------------|-------------|
| Calcium | |
| Premenopausal | 1000-1200mg |
| Postmenopausal | 1200-1500mg |
| Pregnant and lactating | 1200-1500mg |
| Vitamin D | |
| Women <65 | 400 IU |
| Women >65 | 800 IU |

Type I Diabetes

Type I diabetes is consistently related to low bone density in adults. The level of BMD correlates with glucose control and presence of diabetic complications. One recent study demonstrated a 12-fold increase in hip fracture rate in women with type I diabetes compared to women in the general population.¹⁵ Both increasing metabolic control and fall prevention strategies are important fracture prevention strategies in women with diabetes.

Eating disorders and female athlete triad

Young women with eating disorders are often amenorrheic due to low estrogen states. The female athlete triad is a group of symptoms including disordered eating, amenorrhea, and osteoporosis seen in athletes. Young women with the female athlete triad are at higher risk for stress fractures and future osteoporosis. The osteoporosis caused by amenorrhea from the female athlete triad or eating disorders may not be reversible. The goal in treatment is to help a woman achieve ovulatory cycles by decreasing exercise and possibly increasing body weight. While trying to reach that goal, it is appropriate to prescribe oral contraceptive pills to these women.¹⁶

Renal failure and renal transplant

Women on dialysis for end stage renal failure are 3 to 6 times more likely to have a hip fracture. Renal failure causes low bone density and also probably induces a metabolic bone disease, which can alter the microarchitecture of bones predisposing people to fracture. All patients with renal failure should be supplemented with both calcium and vitamin D.¹⁷ The incidence of osteoporosis in people who have had a renal transplant is up to 60%, probably due to years on dialysis and immunosuppressant medications. All patients should have a BMD test at the time of the transplant, 6 months later, and then yearly.¹⁸

Chronic obstructive pulmonary disease (COPD)

Women with COPD have a very high incidence of os-

teoporosis-related fractures. The etiology of osteoporosis in women with COPD is likely multifactorial including frequent steroid use, low BMI, low levels of physical activity and smoking. Women with COPD should have screening BMD tests at age 60 and supplementation with calcium and vitamin D.¹⁹

POPULATION-BASED STRATEGY

A population-based strategy for osteoporosis prevention targets all women in the population. In a primary care practice, all women should be screened for osteoporosis risks (Table 1) or identified as being high risk for secondary osteoporosis (Table 2). A lifecycle approach may be helpful. In children and adolescents, a focus should be on attaining peak bone mass. It is important for all young women to maintain adequate calcium intake, perform weight-bearing exercise, and avoid bone toxins. In young adult women, dietary counseling continues to be important with special emphasis on adequate calcium while pregnant and nursing. In perimenopausal women, osteoporosis risk assessment should be a routine part of health maintenance counseling. As women go through menopause, risk assessment and prevention counseling become more important. Adequate calcium and vitamin D intake have been shown to reduce bone loss and fractures in peri- and post-menopausal women.²⁰ The US Preventive Services Task Force recently developed recommendations for screening BMD exams in all women at age 65 and at age 60 in women with other risk factors for osteoporosis.²¹

INCORPORATING OSTEOPOROSIS PREVENTION INTO A BUSY PRACTICE

The list of prevention topics for primary care practitioners to cover gets longer every year. Osteoporosis risk assessment and prevention counseling need not take a long time. The first piece of a comprehensive osteoporosis prevention strategy is to think of it routinely while doing other prevention counseling. In the context of overall health promotion, osteoporosis prevention overlaps with many issues. For example, counseling on smoking cessation and increasing exercise affect osteoporosis risk. While counseling about low fat, high fiber diets, a discussion of calcium consumption can be easily incorporated. A rapid dietary screen can determine who needs to take a calcium supplement to achieve the recommended daily allowance (RDA) for calcium (Table 3). The vast majority of calcium consumption in this country comes from dairy products.²² Questions like "Do you drink milk? Other dairy prod-

ucts? Calcium fortified juices?” can be easily and quickly incorporated into an overall prevention discussion. Premenopausal women aim for 3 to 4 servings of dairy products or fortified juices per day. Postmenopausal women and women who are pregnant or lactating aim for 4 to 5 servings per day. Primary care providers should recommend a calcium supplement in women who are vegan, who do not eat any dairy products, who are at high risk for osteoporosis, and most postmenopausal women.

Calcium is absorbed better from food than from supplements, so it is more beneficial to increase dietary calcium intake than take a supplement. There are some non-dairy foods that are high in calcium such as green leafy vegetables, but it is difficult to meet the RDA for calcium without eating dairy products. Vitamin D is necessary to absorb calcium in most women. While they can synthesize vitamin D from sunlight, in areas of the country such as Wisconsin, where sunlight is not present for many months at a time, a supplement may be necessary. Most milk is supplemented with vitamin D and most multivitamins have adequate doses of vitamin D to meet the RDA. Most vegans should take a multivitamin to get enough vitamin D. Elderly women may need a supplement because the RDA for women over 65 increases from 400 IU to 800 IU.

CONCLUSION

Osteoporosis prevention is important throughout a woman's life. Primary care providers should be able to recognize women at high risk for osteoporosis and incorporate osteoporosis prevention strategies into every health maintenance visit.

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