OSTEOPOROSIS and its associated fractures constitute a huge public health problem. The nationwide cost for direct treatment (inpatient, outpatient and nursing home costs) of osteoporosis-related fractures in 1995 alone was estimated at $13.8 billion. The cost in Oregon in 2003 for hospital care of osteoporotic hip fractures was $90 million—and this does not include nursing home costs, outpatient costs, caregiver expenses, lost productivity, or fractures in other sites. In addition to the economic impact, there are significant human costs. In 2003, 4978 hospitalizations in Oregon were for treatment of hip fractures—91% of these occurred in patients ≥45 years and 83% were in those ≥65 years old. Using national data we estimate that 77–81% of all Oregon hip fractures are associated with osteoporosis, and 84–88% of hip fractures in patients ≥45 were due to osteoporosis.

The estimated lifetime risk of an osteoporotic fracture in a 50-year-old postmenopausal white female is nearly 40%, and her lifetime risk of a hip fracture is 14%. Many fractures in elderly men and other ethnic populations are due to osteoporosis. About 20% of patients with hip fractures die within the first year, and only 1/3 regain pre-fracture functional levels.

Fracture risk is a function of decreased bone strength and exposure to trauma (e.g., falls). In this CD Summary we focus on factors associated with preventing osteoporosis and maintaining bone strength. Practitioners should recognize, however, that preventing falls is an additional effective strategy to minimize fracture risk. (See www.cdc.gov/ncipc/factsheets/falls.htm)

PREVENTING OSTEOPOROTIC FRACTURES

The burden of osteoporotic fractures rests primarily on the elderly. Current practices to minimize the morbidity due to osteoporosis include treatments to maintain or restore bone density, e.g. calcium, vitamin D, bisphosphonates, and until recently, hormone replacement therapy. However, the osteoporosis literature suggests prevention strategies that can be considered throughout a patient’s lifetime.

BUILT STRONG BONES EARLY!

In addition to targeting the elderly, a reasonable (but less proven) strategy to reduce osteoporosis morbidity is to increase peak bone mass during childhood and adolescence. Higher peak bone mass is associated with a lower fracture risk later in life. As the figure below suggests, individuals achieving a higher peak bone mass in childhood and adolescence (solid line) may defer osteoporosis and the associated fracture risk compared to individuals achieving a lower peak bone mass (dotted line).

WHAT ABOUT SCREENING?

Bone density accounts for about 70% of bone strength, and is a function of peak bone mass and bone loss. Bone mass levels off after the early 20s, and then begins to decline in the early 50s especially in postmenopausal women. The US Preventive Services Task Force recommends that providers screen all women ≥65 years old for osteoporosis, and screen those women ≥60 years who have additional risk factors for osteoporosis. This recommendation is based on evidence that bone densitometry accurately predicts the risk for fracture, and that treating asymptomatic women with osteoporosis reduces their risk for fracture.

It is important to note that women with pre-existing atraumatic or minimally traumatic fractures were not
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**Table:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Provider actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood and adolescence</td>
<td>Counsel patients about importance of adequate dietary calcium and high impact exercise</td>
</tr>
<tr>
<td>Early fifties and postmenopause</td>
<td>Counsel adequate calcium and vitamin D, regular exercise and avoid smoking and excess alcohol</td>
</tr>
<tr>
<td>Women &gt;60 years with risk factors</td>
<td>Screen for osteoporosis, treatment if appropriate</td>
</tr>
<tr>
<td>Women &gt;65 years</td>
<td>Screen for osteoporosis, treatment if appropriate</td>
</tr>
<tr>
<td>All adults with minimal trauma fractures</td>
<td>Evaluate and treat for osteoporosis if appropriate</td>
</tr>
</tbody>
</table>

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Considered in the general screening population, because these women already meet the World Health Organization definition of osteoporosis. A pre-existing osteoporosis related fracture is a strong predictor of a future fracture. Consequently, the American National Osteoporosis Foundation emphasizes the need to initiate effective anti-resorptive therapy in women with such prevalent fractures irrespective of the patient’s bone mineral density. Existing data suggest that this opportunity for secondary prevention is frequently missed.

**What about diagnosis?**

A recent study of patients presenting to an emergency room with minimal trauma fractures of distal forearm, spine, pelvis, humerus, ankle and hip, demonstrated that only 1–3% received a diagnosis of osteoporosis. Clinically, treatment rates were higher than diagnosis rates: follow-up of these patients showed that 30% received some form of osteoporosis treatment after the first fracture. Nonetheless, most received only calcium supplements; bisphosphonates were rarely prescribed. Further, 70% of the patients with minimal trauma fractures received no osteoporosis treatment at all.

Closer to home, review of the 2003 Oregon hospital discharge data shows that only 13% of the admissions for hip fractures had a listed diagnosis code for osteoporosis, despite the fact that an estimated 80% of the fractures are attributable to osteoporosis. No data exist on the proportion of Oregon patients who received osteoporosis treatment following their hip fracture. Nonetheless, instituting appropriate osteoporosis therapy after a minimal trauma fracture is another opportunity for Oregon providers to prevent future fractures in high-risk patients.

**Summary**

Osteoporosis is a disease of the elderly; however, providers may be able to minimize the fracture morbidity and mortality with timely intervention throughout life by: encouraging healthy diets and physical activity in children and adolescents; counseling postmenopausal women to exercise regularly, avoid smoking, and maintain adequate calcium and vitamin D intake; screening appropriately and treating women ≥65 and those women ≥60 at increased risk; and evaluating and treating those patients who have already sustained a minimal trauma fracture in order to prevent a second osteoporotic fracture.

**References**

4. Laitinen J, Kuiskaami K, Heikkinen J, et al Body size from birth to adulthood and bone mineral content and density at 31 years of age: results from the N. Finland 1966 birth cohort study. Osteoporos Int 2005; Mar 22, Epub (published on line only so far and available abstract on PubMed)