Primary Prevention

Pharmacologic and Supplemental Preventive Measures

Supplements: Calcium and Vitamin D

Total daily intake of calcium is recommended for all pre- or postmenopausal women and older men (1,000 mg/day for premenopausal women; 1,200 mg/day for postmenopausal women and men aged 50 or older). Many individuals require supplemental calcium therapy. (Evidence–based: B)

NOTE:

- Calcium carbonate contains the most elemental calcium per dose. It should be taken with food to enhance absorption.
- Calcium citrate contains less elemental calcium than the carbonate salt, but it is better absorbed and may be preferred in patients with reduced gastric acid production or high gastric pH requiring long–term H2 antagonist or proton pump inhibitor therapy and in patients who have undergone bariatric surgery. It is more expensive and usually requires more tablets to be taken per day than calcium carbonate.

Total daily intake of vitamin D (at least 1,000 IU/day), preferably vitamin D3, is recommended for all pre–or postmenopausal women and men aged 50 or older. (Consensus–based)

Screening for vitamin D deficiency is not recommended for identifying vitamin D deficiency in adults aged 50 years or older without osteoporosis. (Consensus–based)

Pharmacologic Preventive Therapy

Hormone therapy (in Post-menopausal women) solely for the prevention of osteoporosis is not recommended. (Consensus–based)

There is no recommendation for or against treatment with any prescribed pharmacologic therapy for premenopausal women.

Non-pharmacologic Preventive Measures

Lifestyle

The following lifestyle changes are recommended for all adults:

- Exercise – regular weight-bearing and muscle-building exercise (Consensus-based)
- Smoking cessation (Consensus-based)

Safety Proofing

Home safety proofing is recommended for postmenopausal women and men at risk of falling. (Consensus-based)

NOTE: Home safety proofing includes removing rugs, adding grab bars, establishing adequate lighting (e.g., nightlights), and securing electrical cord placement.

Hip Protectors

The routine use of hip protectors is not recommended as an intervention for reducing the risk of hip fractures in postmenopausal women and men aged 50 or older. (Evidence-based: D)

Screening with Dual Energy X-ray Absorptiometry (DXA)

Post-menopausal Women

Ages 65 years and older
A bone mineral density (BMD) test by DXA is recommended for postmenopausal women aged 65 or older who are not on drug treatment for osteoporosis. (Evidence-based: B)

For women aged 65 years or older who are not taking prescription antifracture medication (and who have had a baseline BMD test), future rescreening for low BMD with DXA is an option. (Weak recommendation)

Clinical considerations:

- Clinicians should assess the patient's willingness to initiate treatment before deciding to rescreen.
- Clinicians should consider calculating a current FRAX score using the patient's most recent T-score to make rescreening and treatment decisions.
- If DXA testing is obtained, suggested rescreening intervals based on initial T-score (lowest T-score from total hip, femoral neck, or lumbar spine) are as follows:

<table>
<thead>
<tr>
<th>Initial T-Score</th>
<th>Suggested Minimum Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 1.4</td>
<td>10 years</td>
</tr>
<tr>
<td>-1.5 to -1.9</td>
<td>5 years</td>
</tr>
<tr>
<td>-2.0 to -2.4</td>
<td>2 years</td>
</tr>
</tbody>
</table>

Ages less than 65 years

For postmenopausal women under age 65, a BMD test by DXA is an option when selected risk factors are present. (Consensus-based)

For individuals under age 65 who are at high risk, such as those with a prior fragility fracture after age 50 or glucocorticoid use for 3 months or more at doses ≥ 5 mg, refer to the Fracture Risk Assessment Tool (FRAX)* to estimate individual fracture risk. (Consensus-based)

*In addition to advancing age and female sex, risk factors in the FRAX model include low body mass index (BMI), personal history of fragility fracture after age 50, parental history of hip fracture, rheumatoid arthritis, long-term exposure to systemic corticosteroids (3 months or more at doses ≥ 5 mg), high alcohol intake (about 3 ounces per day), cigarette smoking, and other causes of secondary osteoporosis (e.g., type 1 diabetes, osteogenesis imperfecta in adults, untreated long-standing hyperthyroidism, hypogonadism or premature menopause (< 45 years), chronic malnutrition, or malabsorption and chronic liver disease). It is useful to review the FRAX model and risk factors with patients.

<table>
<thead>
<tr>
<th>Pre-menopausal Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine screening for osteoporosis with a BMD test by DXA is not recommended for premenopausal women. (Consensus-based)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening with DXA is an option for men aged 70 or older with risk factors. (Consensus-based)</td>
</tr>
</tbody>
</table>

Bone Mineral Density Testing with DXA

Measurement Sites

When BMD testing is indicated, the total proximal femur (total hip), femoral neck, and lumbar spine are recommended measurement sites for DXA to predict risk of osteoporotic fracture in women and men. (Evidence-based: B)

Alternative Measurement Sites

DXA of the forearm (distal one-third of the radius) is an option for patients in whom hip and spine BMD cannot be measured or interpreted. (Evidence-based: B)

T-score Interpretation

The lowest T-score from the measurements of the total hip, femoral neck, and lumbar spine (L1 to L4, composite score) is recommended to establish a diagnosis of osteoporosis (T-score ≤ -2.5) or low BMD (T-score between -1.0 and -2.5). (Consensus-based)

Absolute Fracture Risk

Fracture Risk Assessment Tool (FRAX)

The Fracture Risk Assessment Tool (FRAX) is strongly recommended for assessing absolute fracture risk in women or men before initiation of treatment. (Evidence-based: A)

NOTE: FRAX is not designed to assess fracture risk in patients on bisphosphonate treatment.

Estimation of Fracture Risk in High-risk Individuals

For individuals under age 65 who are at high risk, such as those with a prior fragility fracture after age 50 or glucocorticoid use for 3 months or more at doses ≥ 5 mg, refer to the Fracture Risk Assessment Tool (FRAX) to
estimate individual fracture risk.  
*(Consensus-based)*

**Threshold for Pharmacologic Therapy**

Pharmacologic treatment for osteoporosis in women or men is recommended when the 10-year probability of hip fracture reaches 3%.  
*(Consensus-based)*

Pharmacologic treatment for osteoporosis in women or men is optional when the 10-year probability of hip fracture is < 3%.  
*(Consensus-based)*

**NOTE:** The safety and efficacy of long-term use of bisphosphonates for more than 5 to 10 years are uncertain; therefore, the decision to start openended treatment in younger patients should be considered carefully.

**Treatment for Individuals with Osteoporosis or a High Fracture Risk**

**Treatment for Women Not Taking Corticosteroid Therapy**  
*This section is currently under revision*

**Bisphosphonates**

**Alendronate**

Alendronate (10 mg/day or 70 mg/week) is recommended as a first-line therapy for:

- Postmenopausal women with a prior fragility fracture.  
  *(Evidence-based: A)*
- Women aged 65 or older with a diagnosis of osteoporosis (T-score ≤ −2.5).  
  *(Evidence-based: A)*
- Postmenopausal women with a FRAX 10-year risk of hip fracture ≥ 3%.  
  *(Consensus-based)*

Alendronate is an option for postmenopausal women under the age of 65 diagnosed with osteoporosis (T-score ≤ −2.5), but without a FRAX 10-year risk of hip fracture ≥ 3%.  
*(Consensus-based)*

**Ibandronate**

Ibandronate is an option for postmenopausal women over the age of 65 with a prior vertebral fracture.  
*(Evidence-based: B)*

**Risedronate**

Risedronate (5 mg/day or 35 mg/week) is a recommended alternative to alendronate.  
*(Evidence-based: A)*

**Zoledronate**

Zoledronic acid (intravenous 5 mg annually) is an option for postmenopausal women over the age of 65 with high risk and a prior vertebral fracture.  
*(Evidence-based: B)*

**Clinical Considerations**

- Bisphosphonates are not recommended in women of childbearing age without adequate contraception.
- Bisphosphonates should be used with caution in patients with chronic kidney disease and reduced glomerular filtration rate.
- Screening for vitamin D deficiency and supplementation with vitamin D to an acceptable level of > 30 ng/ml before initiating bisphosphonate therapy is recommended.
- The major determinant of fracture risk reduction with bisphosphonate therapy is continuing to take the therapy.
- Short-term interruption of bisphosphonates is not associated with rapidly rising risk of fracture. Some patients not at high risk for fracture may not need to continue long-term bisphosphonate therapy.

**Selective Estrogen Receptor Modulators (SERM)**

Raloxifene is an option for postmenopausal women with low risk for thrombotic complications.  
*(Evidence-based: B)*

**NOTE:** Raloxifene treatment may be particularly applicable to women at high risk for breast cancer.

**Calcitonin**

This recommendation is currently under revision

**Teriparatide**

Teriparatide (recombinant PTH) by daily injection is an anabolic agent that may be an option for high-risk women not tolerant of or responsive to other agents. It should be used only after specialist evaluation.  
*(Evidence-based: B)*
Treatment for Men Not Taking Corticosteroid Therapy

Alendronate (10 mg/day or 70 mg/week) is recommended as a first-line therapy for men aged 70 or older diagnosed with osteoporosis or with a FRAX 10-year risk of hip fracture ≥ 3%.

(Consensus-based)

Pharmacologic treatment for osteoporosis is optional in men under the age of 70 who are diagnosed with osteoporosis (T-score ≤ -2.5) but without a FRAX 10-year risk of hip fracture ≥ 3%.

(Consensus-based)

Treatment for Men and Women Taking Corticosteroid Therapy

Bisphosphonates

Alendronate (10 mg/day or 70 mg/week) or risedronate (5 mg/day or 35 mg/week) is recommended as first-line therapy for men and women who are taking oral corticosteroid medication at a dose of ≥ 5 mg/day prednisone or equivalent for a duration of 3 months or more and have a FRAX 10–year risk of hip fracture ≥ 3%.

(Consensus–based)

Teriparatide

Teriparatide (recombinant PTH) by daily injection is an anabolic agent that is an option for treating osteoporosis in glucocorticoid–treated patients not tolerant of or responsive to other agents. It should be used only after specialist evaluation.

(Evidence–based: B)

Monitoring Treatment

DXA

Routine BMD testing by DXA is not recommended for monitoring the rate of bone loss after initiation of treatment in women or men.

(Consensus–based)

NOTE: A major determinant of fracture risk reduction with bisphosphonate therapy is continuing to take the therapy.

Bone Turnover Testing

There is no recommendation for or against routine bone turnover testing with biochemical markers for monitoring women and men taking antiresorptive therapy for osteoporosis.

(Evidence–based: I)

Discontinuation of Bisphosphonate Treatment

Bisphosphonate therapy is generally not recommended after 10 years of continuous use.

(Weak recommendation)

There is insufficient evidence to recommend for or against discontinuation of bisphosphonates after 5 to < 10 years of therapy.

Clinical Considerations:

For patients who have taken bisphosphonates for ≥ 5 years, the decision to continue or discontinue treatment may take the following issues into account:

- For patients at lower risk of fragility fracture, the risk of rare but serious atypical femur fractures may outweigh the relatively small additional reduction in fragility fracture risk conferred by continuing treatment. The primary factor that increases the risk for atypical femur fracture is duration of bisphosphonate use.
  - The risk of atypical femur fracture ranges from ~1 per 50,000 for < 2 years of treatment to ~1 per 1,000 for 8-10 years of treatment.

- For patients at higher risk of fragility fracture, the benefit of reduced fragility fracture risk may outweigh the potential harms. Factors that may increase the risk of fragility fracture include the following:
  - Prior history of fragility fracture
  - Risk for falling
  - Age (increased risk with increased age, especially > 75 years)
  - Low pre- and post-treatment bone density
  - High-risk pre-treatment FRAX score

Based on one small study (the FLEX trial), continuous use of alendronate for 10 years reduced the risk for symptomatic vertebral fracture from ~1 in 20 to ~1 in 40, compared to stopping after 5 years of treatment.

- If bisphosphonate treatment is discontinued, there is little evidence to guide the length of discontinuation, including if and when treatment should resume.
  - The estimated half-life of bisphosphonates is measured in years and is approximately 10 years for alendronate.
  - In the FLEX trial, the relative risk for clinical vertebral fracture began to increase about
2-3 years after alendronate was discontinued.

- Patients with secondary causes of osteoporosis (e.g., rheumatoid arthritis, long-term corticosteroid use) may require additional discussion with their respective specialists.