Fundamentals of Osteoporosis for Nurses and Advanced Practice Nurses
The Role of the Nurse in the Management of Osteoporosis

- Coordinate a multidisciplinary team for osteoporosis management
- Manage effective fracture liaison service (FLS)
- Identify, assess, and stratify osteoporosis risks
- Educate and counsel patients on their individual risks for osteoporosis, especially their modifiable behavioral lifestyle risks
- Develop a mutually agreeable plan of osteoporosis care with the patient
- Establish a discharge and an outpatient follow-up
- Evaluate outcomes of risk modification and treatment

Advanced practice nurses can assess, evaluate, and manage the osteoporosis care and provide treatment when appropriate.
Osteoporosis Care: A Team-Based Approach

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Treatment Gap

In a retrospective study, many patients with osteoporosis did not receive treatment after a fragility fracture\(^1\)

- Approximately 4 out of 5 patients (78\%) with a history of hip or wrist fracture did not fill a prescription for the treatment of osteoporosis in the 6 months after their fracture\(^1\)

- Data indicate that there are many missed opportunities for helping to prevent fractures in patients with osteoporosis\(^2\)

Data from a large, retrospective study of 21,192 patients enrolled in the Pennsylvania Pharmaceutical Assistance Contract for the Elderly (PACE). PACE allows eligible lower-income Medicare beneficiaries to purchase medications for a small co-payment. Patients were included in the study if they had been enrolled in PACE and Medicare for 2 consecutive years from 1994 to 2000, and had a hip or wrist fracture. Prescription data were examined to determine whether patients received a medication for osteoporosis before or after a fracture. In the year 2000, there were 2,436 hip fractures and 1,620 wrist fractures. Of these fracture patients (total n=4,056), only 898 (22\%) filled a prescription for an osteoporosis medication in the 6 months after the fracture. There was no difference in the likelihood of starting medication by fracture type (wrist vs hip).


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Economic Burden of Osteoporosis

– In the US in 2005, there were >2 million total fractures and the cost to the healthcare system associated with osteoporosis-related fractures has been estimated at $17 billion

– Men account for >25% of the burden

– Hip fractures account for 14% of incident fractures and 72% of fracture costs

– By 2025, annual fractures and costs are projected to rise by almost 50% to $25.3 billion

– The most rapid growth is estimated for people 65–74 years of age, with an increase >87%

Osteoporosis Epidemiology

– Approximately 1 in 2 women over the age of 50 will have an osteoporosis-related fracture in her remaining lifetime¹

– In the United States, there are approximately 2 million fragility fractures each year²

– Nearly 20% of women who sustain a new vertebral fracture will experience a subsequent vertebral fracture within 12 months*³

– One year after hip fracture, 40% of patients are still unable to walk independently; moreover, 27% of these patients enter a nursing home for the first time⁴

– Men with hip fractures have approximately 36% risk of dying within 1 year, and men have a greater risk of mortality than women⁴

*As indicated by analysis of data from 4 osteoporosis treatment trials.


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Osteoporosis in Men

– Approximately 3 million American men age 50 or older have osteoporosis

– Up to 1 in 4 men over age 50 will have an osteoporosis-related fracture in his remaining lifetime

– Almost 30% of all hip fractures occur in men

– Men are also at risk for vertebral fractures

– Men fracture approximately 10 years later in life than women, on average

– Despite its prevalence, osteoporosis in men remains underdiagnosed and underreported

– Some risk factors for osteoporosis in men are
  – History of nontraumatic fracture
  – Hypogonadism
  – Advanced age
  – Glucocorticoid use
  – Alcohol excess

Osteoporosis in Ethnicities

From 2005 to 2025 in the United States, the following increases in fragility fractures are predicted:

- Caucasian\(^1\) ↑ 37%
- African American\(^1\) ↑ 79%
- Hispanic\(^1\) ↑ 175%
- Other subpopulations\(^1\) ↑ 175%
  (Asian/Pacific Islander, American Indian, other)

What Is Osteoporosis?

– Osteoporosis is defined as a skeletal disorder characterized by compromised bone strength predisposing an individual to increased risk for fracture\(^1\)

– Bone strength reflects the integration of bone mineral density and bone quality

– Fractures occur in patients with osteoporosis because the load-bearing capacity of their bones is reduced\(^1\)

– Low bone mass develops without any symptoms until a fracture occurs\(^2\)

– The loss of living bone tissue makes bones fragile and more likely to fracture\(^2\)

---

Structural Changes in Osteoporotic Bone

Normal Bone

Osteoporotic Bone

- Decreased bone mineral density\textsuperscript{1,2}
- Decreased trabecular thickness and number\textsuperscript{2}
- Conversion of plates to rods\textsuperscript{1}
- Increased stress risers\textsuperscript{2}
- Increased perforations\textsuperscript{2}
- Decreased mechanical strength\textsuperscript{2}

Bone Is a Living Tissue

- Bone is a complex, continuously remodeled tissue
- The adult skeleton is completely regenerated every 10 years
- In healthy human adults, 3–4 million bone remodeling units (BRUs) are initiated each year
- 1 million BRUs are actively engaged in bone turnover at any time
- The interval between remodeling events at one location is 2–5 years
- Bone is a composite material of collagen (for toughness) and mineral (for stiffness)

Anatomy of Healthy Bone

Bone turnover, the process of bone resorption and bone formation, is coupled\(^1\)

- A continuous process by which damaged or older bone is removed and replaced by new bone\(^2\)

- Accomplished within basic multicellular units (BMUs) by a team of cells working in concert\(^1\)

- Helps to maintain the mechanical strength of bone\(^1,3\)

- Plays a key role in mineral homeostasis\(^1\)

Normal Bone Remodeling of Cancellous Bone

Bone remodeling is the continuous physiologic process by which damaged bone is broken down and replaced by new bone to maintain mechanical strength.\(^1,2\)

The cells of bone remodeling include the following:

- Osteocytes detect damage and communicate via the canalicular network to direct targeted repair\(^1\)
- Osteoclasts resorb damaged bone\(^1\)
- Osteoblasts form new bone\(^1\)

Resorption—Osteoclasts Resorb Older or Damaged Bone

- Osteoclasts are large, terminally differentiated, multinucleated cells that remove mineralized bone matrix\textsuperscript{1,2}; these cells:
  - Resorb bone mineral through acidification\textsuperscript{2}
  - Resorb bone collagen through proteolytic digestion\textsuperscript{2}
  - Create the resorption pit\textsuperscript{2}
- The resorption phase ends with osteoclast apoptosis\textsuperscript{3}

\textsuperscript{2} Teitelbaum SL. \textit{Science}. 2000;289:1504-1508.
Reversal—The Transition Between Resorption and Formation

The reversal phase follows osteoclast-mediated resorption\(^1\)

During the reversal phase

- Collagen remnants are removed and the bone surface is prepared for subsequent osteoblast-mediated bone formation\(^2\)
- Formation is coupled to resorption\(^3\)

Formation—Osteoblasts Are Specialized Bone-Forming Cells

- Osteoblasts are derived from mesenchymal stem cells\textsuperscript{1}

- They synthesize the organic matrix and then regulate its mineralization\textsuperscript{2}

- Osteoblasts have 3 fates following bone formation\textsuperscript{2}
  - Undergo apoptosis (50%–70%)
  - Incorporate into the bone matrix and differentiate into osteocytes
  - Remain on the surface and differentiate into bone-lining cells


Osteocytes Are Terminally Differentiated Osteoblasts Embedded in Bone

- Osteocytes are the most abundant and longest-lived cell in bone\textsuperscript{1,2}

- They are terminally differentiated osteoblasts that become embedded in the lacunae within the bone matrix during the formation of new bone\textsuperscript{2}

- These cells communicate with each other and cells on the bone surface via multiple cellular processes that run through the canaliculi\textsuperscript{1}

- Osteocytes orchestrate bone remodeling along with regulation of osteoclast and osteoblast activity\textsuperscript{2}

- They serve as mechanosensors that detect damage and mechanical strain and direct targeted remodeling\textsuperscript{2-4}

- Osteocytes play an important role in the regulation of bone formation\textsuperscript{5}

\textsuperscript{1} Manolagas SC. \textit{Endocr Rev.} 2000;21:115-137.
\textsuperscript{2} Bonewald LF. \textit{J Bone Miner Res.} 2011;26:229-238.
Bone Turnover and Balance

Neutral Bone Balance\(^1\)

Negative Bone Balance\(^1\)

Positive Bone Balance\(^1\)


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Factors That Make a Fracture More Likely to Be a Fragility Fracture

- Fracture site\(^1-3\)
  - Spine
  - Pelvis
  - Ankle
  - Hip
  - Wrist
  - Humerus

- History of fragility fracture\(^2\)

- Patient with low BMD\(^1-3\)

- Advanced age\(^1-3\)


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Prevalence of Women With Vertebral Fragility Fracture by Age Groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>n</th>
<th>All (%)</th>
<th>Moderate-Severe (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50–54 years</td>
<td>108</td>
<td>4.6</td>
<td>1.9</td>
</tr>
<tr>
<td>55–59 years</td>
<td>153</td>
<td>7.2</td>
<td>2.6</td>
</tr>
<tr>
<td>60–64 years</td>
<td>169</td>
<td>11.8</td>
<td>1.8</td>
</tr>
<tr>
<td>65–69 years</td>
<td>166</td>
<td>14.5</td>
<td>6.0</td>
</tr>
<tr>
<td>70–74 years</td>
<td>143</td>
<td>24.5</td>
<td>10.5</td>
</tr>
<tr>
<td>≥75 years</td>
<td>66</td>
<td>46.3</td>
<td>23.9</td>
</tr>
<tr>
<td>Total†</td>
<td>805</td>
<td>21.4</td>
<td>9.7</td>
</tr>
</tbody>
</table>

- In this recent study of women over the age of 50:
  - Approximately 1 in 3 had osteoporosis
  - As many as 1 in 5 women had a vertebral fracture and 1 in 10 had a moderate-severe vertebral fracture
  - Only 1.5% of the women with vertebral fractures, however, were aware of their condition

*Cross-sectional study of a random sample of 824 postmenopausal women in Valencia, Spain.
†Total weighted to represent age distribution in the city of Valencia, Spain.
Osteoporosis Management

- Fracture Risk Assessment → FRAX®
- Medical history
- Psychosocial assessment
- Medication history
- Osteoporosis history
  - Fractures
  - Prior therapy
- Imaging
- Laboratory tests
- Physical exam
- Treatment
# Clinical Risk Factors for Fracture

<table>
<thead>
<tr>
<th>Demographic&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Physical&lt;sup&gt;1-3&lt;/sup&gt;</th>
<th>Comorbidity&lt;sup&gt;1-3&lt;/sup&gt;</th>
<th>Medication&lt;sup&gt;1-3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Low body wt or excessive BMI</td>
<td>Hypogonadism</td>
<td>Chronic glucocorticoid use</td>
</tr>
<tr>
<td>Sex</td>
<td>Hx of falls/fall risk</td>
<td>Malabsorptive disorder</td>
<td>Chronic use of seizure medications</td>
</tr>
<tr>
<td>Social&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Lifetime low estrogen</td>
<td>Renal</td>
<td>PPIs</td>
</tr>
<tr>
<td>Smoking</td>
<td>Immobility</td>
<td>Hepatic</td>
<td></td>
</tr>
<tr>
<td>Excess alcohol</td>
<td>Previous fragility fx</td>
<td>Thyroid</td>
<td></td>
</tr>
<tr>
<td>Family hx of fx</td>
<td>Ht loss</td>
<td>Parathyroid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low bone mass</td>
<td>Vitamin D deficiency</td>
<td></td>
</tr>
</tbody>
</table>

Fragility Fracture Incidence Increases With Age\(^1\)

This graph represents women over age 50; men have almost no wrist fractures, and the vertebral and hip fractures are shifted almost 10 years to the right.

Increased Age Predicts Higher Hip Fracture Risk at Any Particular BMD

Increasing age may be an indicator of impaired bone quality.

Fractures Increase the Risk of Future Fractures¹

Relative Risk of Subsequent Fractures According to Initial Fracture Type

Dashed line = relative risk of 1.
These data are from a prospective cohort study (Dubbo Osteoporosis Epidemiology Study) in Australia of 2,245 women and 1,760 men aged 60 years or older. There were 905 women and 337 men with an initial fracture, of whom 253 women and 71 men experienced a subsequent fracture.

*Relative risk is based on absolute risk (/1000 person-years) divided by initial fracture incidence (32/1000 person-years for women and 16/1000 person-years for men).
†Lower limb fractures include those of the ankle.

The FRAX® tool has been developed by the World Health Organization (WHO) to evaluate fracture risk of patients. It is based on individual patient models that integrate the risks associated with clinical risk factors as well as bone mineral density (BMD) at the femoral neck. The FRAX® algorithms give the 10-year probability of fracture. The output is a 10-year probability of hip fracture and the 10-year probability of a major fragility fracture (clinical spine, forearm, hip, or shoulder fracture). The National Osteoporosis Foundation (NOF) recommends osteoporosis treatment in patients with low bone mass in whom a US-adapted WHO 10-year probability of a hip fracture is 3% or more or in whom the risk for a major osteoporosis-related fracture is 20% or more. FRAX® pertains only to untreated patients.

FRAX® WHO Fracture Risk Assessment Tool¹

Diagnostic Imaging

- Imaging
  - DXA
  - X-rays
  - CT scans
  - Ultrasounds
  - Bone scans
DXA Measures the Amount of Mineral in Bone in a Two-Dimensional Area (Areal BMD)

- BMD is calculated by the ratio of bone mineral content to the measured area\(^1\)
- BMD provides a surrogate measure of bone mass\(^2\)
- Dual-energy x-ray absorptiometry (DXA) is a method to estimate bone mass by measuring bone mineral content within the area of bone tissue scanned (g/cm\(^2\))\(^1\)
- The area scanned, including bone and marrow compartments, is projected in 2 dimensions and provides an areal value for BMD\(^1\)

Clinical Assessment of Lumbar Spine BMD With DXA

57-Year-Old White Female
Height 62.0 in
Weight 114.0 lb

DXA Scan Results from Hologic, Inc.

Image Courtesy of Hologic, Inc.
Limitations of DXA Technology

- Normative data do not necessarily apply to all ethnic groups\(^1\)
- BMD measurements are not routinely weight adjusted\(^1\)
- Features of bone geometry (bone size, spatial distribution of bone mass) are not generally considered in the clinical interpretation of BMD\(^1\)
- BMD measurements cannot distinguish individuals with low BMD but intact vs disrupted microarchitecture\(^1\)
- BMD fails to account for bone size\(^2\) and cannot distinguish the separate contributions from cortical and cancellous bone\(^3\)
- Newer bone is less mineralized than older bone, and the same amount of bone matrix having either a high or a low degree of mineralization will correspond to a higher or a lower BMD\(^4\)
- Change in BMD as a result of different types of treatment (anti-resorptives vs anabolics) may be due to different mechanisms and is not appropriate to compare directly


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Indications for BMD Testing\(^1\)

- Women age 65 and older and men age 70 and older, regardless of clinical risk factors
- Younger postmenopausal women and men age 50–69 about whom you have concern based on their clinical risk factor profile
- Women in the menopausal transition if there is a specific risk factor associated with increased fracture risk such as low body weight, prior low-trauma fracture, or high-risk medication
- Adults who have a fracture after age 50
- Adults with a condition (eg, rheumatoid arthritis) or taking a medication (eg, glucocorticoids in a daily dose \(\geq 5\) mg prednisone or equivalent for \(\geq 3\) months) associated with low bone mass or bone loss
- Anyone being considered for pharmacologic therapy for osteoporosis
- Anyone being treated for osteoporosis, to monitor treatment effect
- Anyone not receiving therapy in whom evidence of bone loss would lead to treatment

### WHO Definition of Osteoporosis Based on BMD Measurements by DXA

<table>
<thead>
<tr>
<th>Definition</th>
<th>Bone Mineral Density Measurement</th>
<th>T-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>BMD within 1 SD of the mean bone density for young-adult women</td>
<td>T-score ≥–1</td>
</tr>
<tr>
<td>Low bone mass (osteopenia)</td>
<td>BMD 1–2.5 SD below the mean for young-adult women</td>
<td>T-score between –1 and –2.5</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>BMD ≥2.5 SD below the normal mean for young-adult women</td>
<td>T-score ≤–2.5</td>
</tr>
<tr>
<td>Severe or “established” osteoporosis</td>
<td>BMD ≥2.5 SD below the normal mean for young-adult women in a patient who has already experienced ≥1 fractures</td>
<td>T-score ≤–2.5 (with fragility fracture[s])</td>
</tr>
</tbody>
</table>

Vertebral fractures can be identified using visual criteria, measurements of vertebral height loss, or a combination of these approaches.

With permission from John Wiley and Sons.
AACE-Suggested Laboratory Tests

All patients with osteoporosis may have the following tests before initiating treatment to rule out secondary causes of bone loss:\(^1\):

- Complete blood cell count
- Serum chemistry studies (calcium, renal function, phosphorus, and magnesium)
- A 24-hour urinary calcium excretion
- Serum 25(OH)D level

AACE=American Association of Clinical Endocrinologists.
Additional AACE-Suggested Laboratory Tests

If the patient’s clinical history, physical examination, or routine laboratory tests indicate a need, special tests that may be appropriate before initiating treatment include:

- Thyroid-stimulating hormone for suspected thyroid disease\(^1\)
- Testosterone for hypogonadism\(^1\)
- Erythrocyte sedimentation rate for suspected malignancy or inflammatory disease\(^2\)
- Urinary cortisol or other tests for suspected adrenal hypersecretion\(^2\)
- Parathyroid hormone for possible primary or secondary hyperparathyroidism\(^2\)
- Serum protein electrophoresis (SPEP) and light chains for suspected myeloma\(^2\)
- Tissue transglutaminase antibodies for suspected celiac disease\(^2\)

Bone Turnover Markers

- Markers (serum or urine) of bone resorption (osteoclast products) include the following\(^1\):
  - N-telopeptide of collagen cross-links (NTx)
  - C-telopeptide of collagen cross-links (CTx)

- Serum markers of bone formation (osteoblast products) include the following\(^1\):
  - Bone-specific alkaline phosphatase (BSAP)
  - Osteocalcin (OC)
  - Carboxyterminal propeptide of type I collagen (P1CP)
  - Aminoterminal propeptide of type I collagen (P1NP)

Clinical Use of Bone Turnover Markers

– Indicator of bone quality
– Prediction of bone loss in untreated postmenopausal women
– Prediction of fractures in untreated postmenopausal women
– Monitoring of response to therapy in postmenopausal osteoporosis

Physical Exam

– Height/weight
– Blood pressure (orthostatic hypotension)
– Vision & hearing
– Spine alignment & kyphosis
– Muscle strength
– Neurologic changes
– Mobility
– Balance
– Gait
Nonpharmacologic Interventions to Reduce Fracture Risk

- Regular weight-bearing exercise\(^1\)
- Muscle & core strengthening\(^1\)
- Fall prevention\(^2\)
  - Vision and hearing checks
  - Neurological evaluation, if necessary
  - Review of prescription medications for side effects that affect balance
  - Improved safety strategies at home
- Avoidance of tobacco\(^2\)
- Avoidance of excessive alcohol intake\(^2\)
- Adequate calcium and vitamin D intake\(^2\)

Vitamin D and Calcium Intake

– Women under age 50 and men under age 70 need a total of 1000 milligrams (mg) of calcium from all sources* and all adults under age 50 need 400–800 international units (IU) of vitamin D every day¹

– Women age 50 and older and men age 70 and older need a total of 1200 mg of calcium from all sources* and all adults age 50 and older need 800–1000 IU of vitamin D every day¹,²

– Vitamin D is necessary for calcium to be absorbed³

– Vitamin D plays a major role in calcium absorption, bone health, muscle performance, balance, and risk of falling²

– The NOF recommends an intake of 800–1000 IU of vitamin D per day for adults over age 50. This intake will bring the average adult’s serum 25(OH)D concentration to the desired level of 30 ng/mL (75 nmol/L) or higher²

*This includes the total amount of calcium you get from both food and supplements.


Discussing Osteoporosis With Your Patients

- Osteoporosis is a preventable disease that can result in devastating physical, psychosocial, and economic consequences\(^1\)

- 86% of all women aged 45–75 years had never discussed osteoporosis with their physicians, and more than 80% were unaware that osteoporosis is directly responsible for disabling hip fractures\(^2\)

- The focus of patient education is on the prevention of osteoporosis and subsequent fractures

- Patients should be educated about the risk factors for osteoporosis, with a special emphasis on family history and the effects of menopause

- Patients also need to be educated about the benefits of calcium and vitamin D supplements, as well as strategies to prevent falls in the elderly


NOF Osteoporosis Treatment Guidelines to Initiate Pharmacological Management

Postmenopausal women and men age 50 and older presenting with the following should be considered for treatment:

- A hip or vertebral (clinical or morphometric) fracture
- T-score < −2.5 at the femoral neck or spine after appropriate evaluation to exclude secondary causes
- Low bone mass (T-score between −1.0 and −2.5 at the femoral neck or spine) and 10-year probability of hip fracture >3% or a 10-year probability of a major fragility fracture >20% based on the US-adapted WHO algorithm

It’s Important to Talk With Patients About Osteoporosis After a Fragility Fracture

- Severe osteoporosis diagnosis makes sufferers feel like they have lost control of the condition, are getting old, and are not living the life they want
- Sufferers continue to look for opportunities to “explain away” fractures instead of attributing them to their osteoporosis
- It takes an “event,” typically a fragility fracture, for a sufferer to accept the seriousness of his/her osteoporosis

The following slides provide a framework of key points to make when having these important discussions with your patients:

- Overview of the Illness
- Osteoporosis Is Serious
- Diagnosis and Treatment
Help Patients Understand: Osteoporosis

- **What Is Osteoporosis?**¹
  - Osteoporosis is a condition in which the bones become weak and can break more easily

- **Osteoporosis Is Common**²
  - About 12 million Americans already have the disease

- **Some Risk Factors Include**¹:
  - **Age**: Osteoporosis can affect people of all ages, but it is far more common in older people than younger people
  - **Sex**: Women have lighter, thinner bones than men. Many women also lose bone quickly after menopause
  - **Low Body Weight**: Women and men with small bones are more likely to have osteoporosis
  - **Family History**: If either of your parents had osteoporosis or a history of broken bones, you are more likely to break a bone

Help Patients Understand: Osteoporosis Is Serious

- Fractures due to osteoporosis are most likely in the hip, spine, and wrist, but any bone can be affected\(^1\)

- Approximately 1 in 2 women and up to 1 in 4 men over age 50 will have an osteoporosis-related fracture in their remaining lifetime\(^2\)

- Women with a hip fracture are at a 2.5-fold greater risk of a second one\(^3\)

- For some people affected by the disease, simple activities such as lifting a child, bending down to pick up a newspaper, bumping into furniture, or even sneezing can cause a bone to break

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Help Patients Understand: Diagnosis and Treatment

- **Osteoporosis Can Sneak Up on You**¹
  - You can’t feel your bones becoming weaker. Often, breaking a bone is the first clue that you have osteoporosis

- **Diagnosis**²
  - A bone mineral density test helps to estimate the density of your bones and your chance of breaking a bone
  - Your bone mineral density test results are reported using **T-scores**. The lower a person’s T-score, the lower the bone mineral density
    - A T-score of –1.0 or above is normal bone mineral density
    - A T-score between –1.0 and –2.5 means you have low bone mineral density, or osteopenia
    - A T-score of –2.5 or below is a diagnosis of osteoporosis

- **Treat Your Osteoporosis**
  - Medications
  - Fall-prevention tips
  - Diet and exercise
  - Physical therapy

---


Summary

- Osteoporosis is defined as a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture
  - Bone strength reflects the integration of bone mineral density and bone quality
- Bone turnover is a continuous process by which damaged or older bone is removed and replaced by new bone
- Bone is a composite material comprised of collagen (for toughness) and mineral (for stiffness)
- Fractures occur in patients with osteoporosis because bone strength is too low to bear applied loads
- There are many pharmacological therapies that are available to reduce the risk of fractures
- Nurses have an important role in coordinating osteoporosis care and treatment