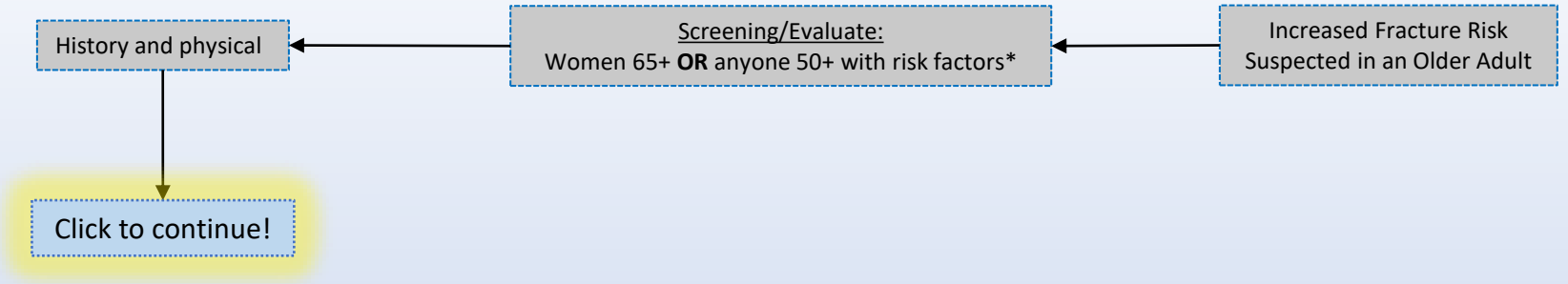
Full Flowchart

Screening



Risk Stratification and Diagnosis

Work Up

Treatment

Frequently Asked Questions

Full Flowchart

Screening

Increased Fracture Risk Suspected in an Older Adult

Screening/Evaluate:
Women 65+ **OR** anyone 50+ with risk factors*

History and physical

Risk Stratification and Diagnosis

Determine fracture risk using bone mineral density and FRAX

Low Risk: ***"Normal"***
- ❑ No prior osteoporotic fracture; and
- ❑ BMD: > -1.0; and
- ❑ FRAX: <3% at hip and <20% major fracture

Moderate Risk: ***Osteopenia***
- ❑ No prior osteoporotic fracture; and
- ❑ BMD: <-1.0 and > -2.5; and
- ❑ FRAX: <3% at hip and <20% major fracture

High Risk: ***Osteoporosis***
- ❑ Prior osteoporotic fracture; or
- ❑ BMD: ≤ - 2.5; or
- ❑ FRAX: ≥3% at hip OR ≥ 20% of major fracture

Very High Risk: ***Osteoporosis with high-risk features***
- ❑ Multiple osteoporotic fractures; and
- ❑ BMD: ≤ - 2.5
- Consider endocrinology consultation

Work Up

Click to continue!

No antiresorptive therapy
- Consider medications review
- Consider lifestyle and nutritional optimization

Determine next time of next fracture risk assessment (2-4 years)

Treatment

Frequently Asked Questions

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No antiresorptive therapy
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Determine next time of next fracture risk assessment (2-4 years)

No

Consider **bisphosphonate** therapy

Yes

Work Up

Initiate standard interventions and start further evaluation
- ❑ Obtain baseline labs: CBC, CMP, phosphorus, 25-vitamin D, TSH, 24-h urine calcium
- ❑ Consider additional secondary work up as needed, including medications
- ❑ Recommend activity and exercise
- ❑ Evaluate calcium and vitamin D intake
- ❑ Ensure recent oral examination by dentist

No

Is the eGFR <30 ml/min or evidence of CKD-MBD?

Yes

Click to continue!

Treatment

- Consider nephrology consultation
- **Bisphosphonates contraindicated**

Frequently Asked Questions

Full Flowchart

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Determine next time of next fracture risk assessment (2-4 years)

No

Is the eGFR <30 ml/min or evidence of CKD-MBD?

Yes

Treatment

Antiresorptive/anabolic indicated. Options:

Bisphosphonates
- Oral (5 years): Alendronate 70 mg weekly (or 10 mg daily) or Risedronate 35 mg weekly (or 150 mg monthly);
- IV (3 years): Zoledronic acid 5 mg yearly
- **Denosumab**: 60 mg SQ every 6 months

Teriparatide 20 mcg SQ daily or **Abaloparatide** 80 SQ mcg daily x 1 year (followed by denosumab or bisphosphonate)

Romosozumab: 210 mg SQ monthly x 12 months (reserved for specialists)

❑ Consider discussing risk of osteonecrosis of jaw and atypical femur fractures

- Consider nephrology consultation
- **Bisphosphonates contraindicated**

Follow **bisphosphonate** flowchart

Follow **denosumab** flowchart

Follow **Teriparatide** or **Abaloparatide** flowchart

Follow **Romosozumab** flowchart
Consult endocrinology

Frequently Asked Questions

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- ❑ Consider additional secondary work up as needed, including medications
- ❑ Recommend activity and exercise
- ❑ Evaluate calcium and vitamin D intake
- ❑ Ensure recent oral examination by dentist

Consider **bisphosphonate** therapy

No

No antiresorptive therapy
- Consider medications review
- Consider lifestyle and nutritional optimization

Determine next time of next fracture risk assessment (2-4 years)

Yes

Is the eGFR <30 ml/min or evidence of CKD-MBD?

No

Yes

Treatment

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- **Bisphosphonates contraindicated**

Follow **bisphosphonate** flowchart

Follow **denosumab** flowchart

Follow **Teriparatide** or **Abaloparatide** flowchart

Follow **Romosozumab** flowchart
Consult endocrinology

Frequently Asked Questions

PEARL: In one year follow up of community dwelling patients after hip fracture, 80% required a gait aid, 15% lived in long-term care, and 10% are bedridden.

Osteoporosis is a systemic disease characterized by weakened and fragile bone strength which leads to increased risk of bone fractures

An osteoporotic fracture is a fracture that occurs with trauma of a **fall from standing height or less**.

A **major osteoporotic fracture** is a fracture of the:

- Spine (vertebral compression)
- Wrist (distal radius)
- Shoulder (proximal humerus)
- Hip (femoral neck)

We have many potent therapies but don't do a good job treating recognizing and treating osteoporosis

Click for more info!

Screening/Evaluate:
Women 65+ **OR** anyone 50+ with risk factors*

PEARL: Don't use DEXA to screen for osteoporosis in women younger than 65 or men younger than 70 with no risk factors (Choosing Wisely)

Most guidelines suggest screening:
women 65+
OR anyone 50+ with risk factors
and life expectancy >12 months:

Risk factors
- ❑Recent fracture history (regardless of impact)
- ❑History of falls
- ❑Family history of osteoporosis or parent with hip fracture
- ❑Chronic inflammatory disorder (especially rheumatoid arthritis)
- ❑Weight < 58 kg (127 lb)/10% weight loss
- ❑Glucocorticoids for 3+ months
- ❑Severe Hypovitaminosis D (<12 ng/mL)
- ❑Current smoker
- ❑Heavy alcohol use (3+ units daily)
- ❑Risk for secondary osteoporosis

*Click for more info!

History and physical

Minimum evaluation for fracture risk

History	❑ Prior fractures and mechanism of injury (force of fall from standing height?) ❑ History of falls or concerned about falling ❑ Dietary calcium estimation: Number of dairy servings x 300 mg + 300 mg in general diet (unless restrictive diet like vegan, keto, etc.) ❑ Loss of height (1.5 inches or 3.8 cm suggestive of vertebral fracture)* ❑ Weight (especially <51 kg or 112 lbs) ❑ Medications (particularly glucocorticoids, antiepileptics, long-term heparin) ❑ Family history of osteoporosis or parent with hip fracture
Physical exam	❑ Oral examination (evaluating need for invasive dental work: fractured teeth, periodontal disease, inflammation, extractions or implants needed) ❑ Fall assessment: ----Gait evaluation (abnormal suggest fall risk) -----Sit to stand (difficulty suggests fall risk)

Click for more info!

Determine fracture risk using bone mineral density and FRAX

PEARL: There are more absolute number of fractures in the osteopenia range than osteoporosis on BMD. Thus, fracture risk needs both BMD and FRAX assessment

Bone mineral density (BMD):

- Dual-energy x-ray absorptiometry (DXA) is gold standard for assessing BMD
- Measures T-score, which compares patient's BMD to that of a young-adult reference population ("normal"), and is reported as standard deviation
  - Normal is a bone density = 0 +/- 1
  - Osteopenia/low bone mass is = -1 to -2.4
  - Osteoporosis is lower than -2.5
- A major drawback is that most fragility fractures occur in individuals without BMD-defined osteoporosis (such as osteopenia range) and thus a relatively poor tool alone

Fracture Risk Assessment Tool (FRAX):

- A probability based, risk factor approach to fracture risk over 10 years.
- Goal is to determine which patients without osteoporosis by bone density will develop fractures and thus benefit from intervention
- Important risk cut offs: ≥3% at hip OR ≥ 20% of any major osteoporotic fracture probability of fracture over 10 years

Click for more info!

Low Risk: ***"Normal"***

- ❑ No prior osteoporotic fracture; and
- ❑ BMD: > -1.0; and
- ❑ FRAX: <3% at hip and <20% major fracture

A **major osteoporotic fracture** is a fracture of the:

- Spine (vertebral compression)
- Wrist (distal radius)
- Shoulder (proximal humerus)
- Hip (femoral neck)

Click for more info!

No antiresorptive therapy
- Consider medications review
- Consider lifestyle and nutritional optimization

A **major osteoporotic fracture** is a fracture of the:
- Spine (vertebral compression)
- Wrist (distal radius)
- Shoulder (proximal humerus)
- Hip (femoral neck)

Click for more info!

Determine next time of next fracture risk assessment (2-4 years)

There is no universally accepted recommendation for when to repeat BMD in low-risk patients.

Guidelines suggest reevaluating fracture risk in 2-4 years erring on the side of more frequent with higher fracture risk and lower bone density.

Click for more info!

Moderate Risk: ***Osteopenia***

- ❑ No prior osteoporotic fracture; and
- ❑ BMD: <-1.0 and > -2.5; and
- ❑ FRAX: <3% at hip and <20% major fracture

A **major osteoporotic fracture** is a fracture of the:

- Spine (vertebral compression)
- Wrist (distal radius)
- Shoulder (proximal humerus)
- Hip (femoral neck)

Guidelines recommend considering the use of bisphosphonates to prevent future fractures

The decision on how to address fracture risk in an osteopenic range should be individualized to their underlying fracture risk factors and risk/burden of bisphosphonate therapy.

Click for more info!

Consider **bisphosphonate** therapy

Guidelines recommend considering the use of bisphosphonates to prevent future fractures

The decision on how to address fracture risk in an osteopenic range should be individualized to their underlying fracture risk factors and risk/burden of bisphosphonate therapy.

Click for more info!

High Risk: ***Osteoporosis***

- ❑ Prior osteoporotic fracture; or
- ❑ BMD: ≤ - 2.5; or
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PEARL: Antiresorptive therapy prevents bone breakdown while anabolic therapy builds bone

A **major osteoporotic fracture** is a fracture of the:

- Spine (vertebral compression)
- Wrist (distal radius)
- Shoulder (proximal humerus)
- Hip (femoral neck)

The benefits of antiresorptive/anabolic osteoporosis therapy **strongly** outweigh their risks

Bisphosphonates, denosumab, teriparatide/abaloparatide, and romosozumab are all considered first line

- We suggest **bisphosphonates** in a primary care setting as they are inexpensive, effective and well tolerated, and available in oral formulations (as well as IV infusion).

Click for more info!

PEARL: Antiresorptive therapy prevents bone breakdown while anabolic therapy builds bone

A **major osteoporotic fracture** is a fracture of the:

- Spine (vertebral compression)
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The benefits of antiresorptive/anabolic osteoporosis therapy strongly outweigh their risks

Very high-risk patients should be considered for anabolic therapy (teriparatide/abaloparatide or romosozumab), although the antiresorptives (bisphosphonates and denosumab) are also considered first line.

- **Endocrine consultation is recommended**

Click for more info!

Very High Risk: ***Osteoporosis with high-risk features***

- ❑ Multiple osteoporotic fractures; and
- ❑ BMD: ≤ - 2.5
- Consider endocrinology consultation

Full Flowchart

Screening

Risk Stratification and Diagnosis

PEARL: The risk of osteonecrosis of the jaw is rare (on bisphosphonates: about 1 in 10,000-100,000) but increases to 1 in 200 with extraction/invasive dental procedure)

- Obtain baseline labs: CBC, CMP, phosphorus, 25-vitamin D, TSH, 24-hour urine calcium and creatinine
  - Additional as needed work up: PTH, testosterone (men)
- Recommend activity and exercise
  - At least 150 minutes of moderate intensity aerobic activity
  - At least twice weekly whole-body strengthening
  - Balance training if fall risk
- Evaluate calcium and vitamin D intake
  - Calcium – 1,200 mg daily of total intake
  - Vitamin D – Serum level of >30 ng/dL, minimum 600-800 IU daily
  - Click for more information on standard interventions and further evaluation

- All antiresorptive and anabolic osteoporotic medications have risk of osteonecrosis of jaw (ONJ) and atypical femur fractures (AFF)
  - Risk of ONJ is about 1:10,000-1:100,000
  - Risk of AFF is about 1:2000
  - Click for more information on ONJ and AFF

Initiate standard interventions and start further evaluation

- ❑ Obtain baseline labs: CBC, CMP, phosphorus, 25-vitamin D, TSH, 24-h urine calcium
- ❑ Consider additional secondary work up as needed, including medications
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Work Up

Treatment

Frequently Asked Questions

Chronic kidney disease – mineral and bone disorder is a systemic disease of the kidneys, bone, and cardiovascular system

It manifests with **abnormal serum calcium, phosphorus, parathyroid hormone, and alkaline phosphatase** due to abnormal vitamin D metabolites, growth hormone, and fibroblast growth factor 23 (FGF-23) as early as CKD stage 3a

Click for more info!

Is the eGFR <30 ml/min or evidence of CKD-MBD?

Click for more info!

Antiresorptive/anabolic indicated. Options:

Bisphosphonates

- Oral (5 years): Alendronate 70 mg weekly (or 10 mg daily) or Risedronate 35 mg weekly (or 150 mg monthly);
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