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7th EMIRATES FAMILY MEDICINE SOCIETY CONGRESS 2024

DUBAI | UAE | 22 to 24 APRIL

DUBAI WORLD TRADE CENTRE

Osteoporosis prevention, screening & treatment

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Organized by

WiredIN

Osteoporosis

- Affects 200 million people globally
  - Significant morbidity and mortality
- 2016 UAE report suggested 3.1% prevalence
- UAE women w/ ↑ rates of vit D deficiency
  - Minimizing sunlight exposure
    - conservative dressing style
    - avoiding heat indoors during hot sunny weather.

Osteoporosis

- Low bone mass
  - reflective of inadequate calcium deposition
- Leading to…
  - structural deterioration of bone tissue
  - Increased fracture risk

Definitions……

- Osteoporosis
  - Spine or hip bone mineral density 2.5 standard deviations *below* the mean measurement of healthy, young women
  - Reported as a ‘T-score” of -2.5 or below
  - *Hip DEXA has best correlation with outcomes*

Dual-Energy X-ray Absorptiometry (DEXA)

Definitions……

- Osteopenia (T-score between -1 to -2.5)
  - Spine or hip BMD between 1 and 2.5 standard deviations below mean for healthy, young women.
  - *Not a diagnosis – a descriptor*

Other criteria w/o a BMD < -2.5

- H/O a fragility or vertebral fracture
- ACE/others also approach those with osteopenia and a 10-year risk of a fracture ≥ 20% or a risk of a hip fracture of ≥ 3% as having osteoporosis..

Primary Osteoporosis ….

Osteoporosis associated with normal aging….

- Reduced gonadal function
- Decreased levels of estrogen
- Leading to bone loss…

Primary Risk Factors

- Low body weight (BMI < 21kg/m^2)
- Early menopause
- Tobacco abuse
- Excessive ETOH (> 2drinks daily)
- FH of osteoporotic fracture

Secondary Osteoporosis (not from aging)

- Endocrine disorders
  - T1DM; Hemochromatosis; Hypogonadism; Hyperthyroid
- Chronic disease
  - COPD; RA/SLE; IBD; HIV; Liver disease; Renal insufficiency
- Nutritional influences
  - Anorexia nervosa; Celiac; Gastric bypass; Vitamin D deficiency
- Medication effects
  - Anticonvulsants; Lithium; Glucocorticoids; Immunosuppressants; PPIs; SSRIs

Pathophysiology

- ‘Thin’ bones
  - due to ineffective calcium metabolism and deposition
- Dependent on Vitamin D & Parathyroid function

Calcium

99% of Calcium is stored in bone

- Parathyroid hormone (PTH) releases Ca^+ from bone
  - primary regulation
- Calcitonin promotes Ca^+ uptake by bone
  - minimal effect
- Dependent on Vitamin D…

Vitamin D

- Not a Vitamin ⟶ a hormone
- Obtained from Diet or Sun exposure
- Promotes Ca^{+} binding proteins in small intestine.
- Promotes Ca^{+} re-absorption in the kidney
- A normal level (30-50 ng/mL) ↓ fracture risk
- Some evidence that levels > 70 ↑ fracture risk…

PTH/Calcium regulation

- ↓ serum Ca^+ levels stimulate the parathyroid to ↑ PTH
- **Main PTH effect is on bone**
  - inhibits osteoblasts/promotes osteoclasts
  - resultant rapid mobilization of Ca^+ from bone (resorption)
- Increases intestinal absorption of Ca^+
- Promotes renal re-absorption of Ca^+

Screening

USPSTF Screening Recommendations

- Does Not recommend screening men
  - Others recommend screening men ≥ 70 years of age…
- All women ≥ 65 years; *and*
- Younger women with a 65-yo woman's fracture risk!

65 yo 10-year fracture risk = 8.4%

So how do you figure that out???

Younger women with a 65-yo woman's fracture risk!

65 yo *10-year fracture risk = 8.4%*

The FRAX® tool by WHO

To evaluate your patient's fracture risk…

Calculates 10 yr probability of hip fracture

www.shef.ac.uk/FRAX/

FRAX® Fracture Risk Assessment Tool

Home | Calculation Tool | Paper Charts | FAQ | References | CE Mark | English

- Asia
- Europe
- Middle East & Africa
- North America
- Latin America
- Oceania

Calculation Tool

Please answer the questions be

Country: Abu Dhabi

- Abu Dhabi
- Botswana
- Egypt
- Ethiopia
- Iran
- Jordan
- Kuwait
- Lebanon
- Morocco
- Palestine
- Qatar
- Saudi Arabia
- South Africa
- Syria
- Tunisia
- Zimbabwe

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth
   Age: Date of Birth: Y: M: D:
2. Sex ○ Male ○ Female
3. Weight (kg)
4. Height (cm)
5. Previous Fracture ◉ No ○ Yes
6. Parent Fractured Hip ◉ No ○ Yes
7. Current Smoking ◉ No ○ Yes
8. Glucocorticoids ◉ No ○ Yes
9. Rheumatoid arthritis ◉ No ○ Yes
10. Secon
11. Alcoh
12. Femo

Select

Weight Conversion

Pounds ➡ kg

Convert

Height Conversion

Inches ➡ cm

Convert

00032272

Individuals with fracture risk assessed since 1st June 2011

FRAX® Fracture Risk Assessment Tool

Home | Calculation Tool | Paper Charts | FAQ | References | CE Mark | English

Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: Abu Dhabi Name/ID: About the risk factors

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth
   Age: 61 Date of Birth: Y: 1962 M: 12 D: 20
2. Sex: ○ Male ● Female
3. Weight (kg): 45.8
4. Height (cm): 154.9
5. Previous Fracture: ● No ○ Yes
6. Parent Fractured Hip: ● No ○ Yes
7. Current Smoking: ● No ○ Yes
8. Glucocorticoids: ● No ○ Yes
9. Rheumatoid arthritis: ● No ○ Yes
10. Secondary osteoporosis: ● No ○ Yes
11. Alcohol 3 or more units/day: ● No ○ Yes
12. Femoral neck BMD (g/cm^2): Select BMD

Clear | Calculate

BMI: 19.1
The ten year probability of fracture (%)

without BMD

Major osteoporotic	4.2
Hip Fracture	1.3

65 yo risk = 8.4%
No need for scan

Weight Conversion

Pounds → kg

101 Convert

Height Conversion

Inches → cm

61 Convert

32272
Individuals with fracture risk assessed since 1st June 2011

FRAX® Fracture Risk Assessment Tool

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Calculation Tool

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10. Secondary osteoporosis: ● No ○ Yes
11. Alcohol 3 or more units/day: ● No ○ Yes
12. Femoral neck BMD (g/cm^2): Select BMD

Clear | Calculate

BMI: 19.1
The ten year probability of fracture (%)
without BMD

Major osteoporotic	8.5
Hip Fracture	2.5

65 yo risk = 8.4%
Obtain Dexa Scan

Weight Conversion

Pounds → kg

101 Convert

Height Conversion

Inches → cm

61 Convert

72
Individuals with fracture risk assessed since 1st June 2011

DEXA Scan…

Assess bone mineral density at the hip & lumbar spine

T score ≤ -2.5 = Osteoporosis

Once diagnosed – what's the work-up?

Work-up – rule out 2nd causes..

- CBC (immune deficiency)
- BUN/Creat/LFT's
- Alk PO_4 (↑ Paget's disease)
- Ca^+ (↑hyperparathyroid;↓malsorption)
- 25-hydroxyvitamin D
- Parathyroid Hormone

If other suspected 2nd causes..

- TSH (hyperthyroid)
- Estradiol (hypogonadism – pre-menopausal)
- SPEP (multiple myeloma)
- Testosterone (men)

Treat any underlying causes….

Treatment Options

For All ….

- Limit ETOH/Stop smoking
- Walking/Weight training
- Falls prevention strategies
  - Avoid throw rugs, handrails, PT gait training
- Vitamin D (1,000 IU per day)
  - maintain level 30-50 ng/mL
- Calcium (1,200 mg per day)

Is Calcium Bad for Health??

Women's Health Initiative follow-up analysis of VitD/Ca

- Supplement ↓ odds of dying from cancer by 7%.
- However, it also ↑ odds of fatal heart disease by 6%.
  - ? calcium supplements ↑ coronary artery calcification?

Bottom line: "no net effect on all-cause mortality".

Annals of Internal Medicine https://doi.org/10.7326/M23-259

Medications…

Antiresorptive w/proven hip fx reduction:

- Bisphosphonates (alendronate, risedronate, or zoledronic acid)
- Denosumab

Antiresorptive medications inhibit osteoclasts → *limiting bone breakdown…*

Oral Bisphosphonates

(anti-resorptive: inhibit osteoclasts)

- Alendronate (Fosamax) & Risedronate (Actonel)
  - Demonstrated effectiveness at hip, vertebral & wrist
  - Weekly alendronate 70mg; risedronate 35 mg
- Ibandronate (Boniva)
  - Demonstrated effectiveness at the *spine only*
  - Monthly 150mg

Prescribing Oral Bisphosphonates ….

- Take with a full glass of water.
- 30 - 60 minute wait before reclining or consuming medications or food to ↓ upper GI adverse effects
- Avoid if renal disease as renal excretion…
  - Creatinine Cl < 35 mL/min/1.73 m2
  - GFR < 30 (CKD stages G4/G5)

IV Bisphosphonates

- Zoledronic acid (Reclast)
  - 5 mg yearly X 3 years (↓ vertebral and hip fractures)
- Ibandronate (Boniva)
  - 3 mg every 3 months X 4 doses (shown to ↑BMD)

Cost is high, consider for high-risk patients unable to tolerate oral therapy, or hospitalized for hip fracture

Denosumab (Prolia)

Inhibits Receptor Activator of Nuclear-factor *KB* Ligand

- RANKL mediates osteoclast activity
- Inhibiting RANKL activity ↓ osteoclasts
  - ↓ the development of osteoporotic bone

Prescribing Denosumab (Prolia)

- 60 mg subcutaneously every 6 months
- Indicated for those with
  - Osteoporotic fracture
  - Failed other agents
  - CKD stages 4 or 5
- Ca/Vit D supplement required/monitored
- Concern is for immune side effects
  - severe infections and skin disease

Jaw osteonecrosis w/anti-resorptives?

- Exposed bone in mouth that fails to heal after weeks
- 5% of bone cancer patients treated with high doses of IV anti-resorptive agents (bisphosphonates or denosumab), undergoing dental procedures
  - No evidence that stopping before procedure reduces risk
- Rare in typical use

Atypical femur Fx w/anti-resorptives?

- Femoral shaft Fx with minimal or no trauma
- Long-term alendronate (>5 yrs), sometimes w/other antiresorptive drugs, steroids or PPIs
- Report groin/thigh pain weeks/months before
- ? excessive suppression of bone-turnover prevents remodeling to repair microtrauma, w/weak bone

NEJM 2020:383(8):743-753

Those at Very High Risk for Fracture..

- Recent Fx (last 12 months)
- Fx during osteoporosis treatment
- Multiple fractures
- T-score < −3.0
- High risk of falls
- FRAX > 4.5% for hip or > 30% for major osteoporotic fx

→ Consider *Anabolic Agents*

↑ Bone mineral density

Anabolic Agents

PTH Analogues

- Teriparatide (Forteo) 20 mcg SQ daily X 2 years
- Abaloparatide (Tymlos) 80 mcg SC daily X 18 months

Sclerostin Inhibitor

- Romosozumab (Evenity) 210 mg SQ monthly x 1 year

Second- Line Agents….

Selective Estrogen Receptor Modulator (SERM): non-steroids w/estrogen agonist activity on bones

- Raloxifene (Evista) 60 mg QD

Calcitonin – no longer recommended – but analgesic properties in acute & chronic vertebral compression fracture

- 200 iu intranasally or 100 iu SQ daily

A Treatment 'Road Map'

Does your patient meet treatment criteria?

- Prior spine or hip fracture?
- T-score ≤ −2.5?
- FRAX score ≥ 3% for hip or ≥ 20% for any major osteoporotic Fx?

If yes → are they at a 'very high risk for Fracture?

- Recent Fx (last 12 months)?
- Multiple fractures?
- T-score < −3.0 ?
- High risk of falls ?
- FRAX > 4.5% for hip or > 30% for any major osteoporotic fx?

If yes → PTH [teriparatide (Forteo) ***or*** abaloparatide (Tymlos)] ***or*** Scerostin Inhibitor (romosozumab (Everity)]

If Not a very high risk → Typical Treatment

Typical Treatment options

Assess Renal Function
Creatinine clearance < 30 (stage V)?

YES → Denosumab for 10 years

NO

Oral Bisphosphonate [alendronate (Fosamax) ***or*** risedronate (Actonel)] ***OR***
IV Bisphosphonate [zoledronic acid (Reclast) for 3 years

Bisphosphonates – how long?

The optimal length of oral therapy is unknown

- 5 yrs *alendronate* followed by *placebo for* 5 yrs ***vs.*** 10 years of *alendronate:*
  - no change in incidence of hip and nonvertebral Fx
  - however an increase in vertebral fractures
- A low-risk women with no personal history of vertebral fracture may (should) consider an interruption in treatment after 5 years

What about men (>70) ???

Consider BMD if at increased risk:

- Low body wgt (BMI < 20)
- Previous fragility fracture
- Corticosteroid/Androgen deprivation therapy

- Evaluate for 2nd causes
- Bisphosphonates considered 1st line Rx
- Testosterone beneficial for osteoporosis and hypogonadism

Serum bone markers?

PINP: procollagen type I N-propeptide

- a marker of bone formation

CTX: C-terminal telopeptide of type I collagen

- a marker for bone resorption

Check 6 months after therapy to see if reflective of effective treatment?

malabsorption of medication ?

poor compliance ?

further evaluation for 2nd causes ?

change to IV therapy ?

Repeat DEXA??

- Obtain a baseline and repeat DXA every 1 to **2 years** until findings are stable.
- Continue with follow-up DXA every 1 to **2 years** depending on clinical circumstances.

Additional Readings...

Archives of Osteoporosis (2020) 15:109
https://doi.org/10.1007/s11657-020-00778-5

CONSENSUS STATEMENT

Diagnosis and management of osteoporosis in postmenopausal women in Gulf Cooperation Council (GCC) countries: consensus statement of the GCC countries' osteoporosis societies under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO)

Osteoporosis: Common Questions and Answers
***Am Fam Physician*. 2023; 107(3): 238-246.**

Thank you!