Fragility Fractures and Secondary Fracture Prevention
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Objectives
- Define Fragility Fractures and discuss importance of identification for prevention of secondary fractures
- Discuss osteoporosis and fragility fracture risk
- Demonstrate ability to identify patient with fragility fracture and proper treatment referral
- Discuss current treatment plan for patient with osteoporosis and fragility fracture based on evidence-based treatment recommendations
- Discuss Calcium and Vitamin D recommendation based on age and risk factors

Fragility Fracture defined...
- Results from little or no trauma and/or low energy such as a ground-level fall related to osteoporosis or poor bone health
- Problem = Energy transfer and bone strength
- Typically in the hip, vertebrae, distal radius or proximal humerus
- Diagnostic criteria for Osteoporosis (regardless of Bone Mineral Density (BMD))
- All low or no trauma fractures should be investigated as Fragility Fractures
Fragility Fractures

Background and significance

- More than 2 million fragility fractures per year
- 1 in 2 women over age 50 will have a fragility fracture in her lifetime
- 1 in 4 men over age 50 will have a fragility fracture in his lifetime
- More than heart attacks, strokes and breast cancer combined
  - Fragility Fractures = 2.1 million
  - Stroke = 795,000
  - Heart attack = 785,000
  - Breast cancer = 207,000

Fragility Fractures

$ Financial significance $

- Direct care costs from osteoporosis related to fractures exceed $19 billion annually and are expected to grow to $25 billion by 2025

Post-fracture Outcomes

- 25% women and 37% men die in the first year following a fracture
- 2/3 never return home to independent living
- 80% fragility fracture patients DO NOT receive recommended osteoporosis care following a fracture
- Fragility fracture places patient at 86% higher risk of repeat fracture
Goal of care after Fragility Fracture:
Recognize the significance!!

- "Exacerbation" of a chronic illness, OSTEOPOROSIS, and treat accordingly, i.e., BONE ATTACK
- Recognize other factors contributing to the fragility fracture
  - Fall/Balance issues
  - Neurologic disorders
  - Other chronic diseases (COPD, Autoimmune diseases, GERD)
  - Failure to take RX'd meds

Hospitalization Burden for Osteoporotic Fractures and Other Serious Diseases in Older US Women

Percent of hospitalizations for osteoporotic fractures and other serious diseases combined, 2000-2011


Osteoporosis Care Lags FAR BEHIND Other Major Diseases/Conditions (2013 HEDIS HMO)

Post-MI vs. Post Fragility Fracture

Post-MI Standard of Care
- Beta-blockers
- Ace-inhibitors
- ASA
- Statins
- Anti-platelet (Brilinta, Plavix) x 1 year
- Cardiac Rehab

Post-Fragility Fracture Standard of Care
- Complete Bone Health Evaluation
- Calcium
- Vitamin D
- Osteoporosis Prescription Medication treatment
- Balance evaluation and training, if appropriate
- Weight-bearing exercises
- Social service interventions, if needed

Initiate referral to a Fracture Liaison Service (FLS)
- A special program designed to identify, investigate, and initiate appropriate treatment for patients at high risk for secondary fractures due to compromised bone health.
- "FRAGILITY FRACTURE CONSULT"
- NOTIFY TRAUMA CLINICIANS IF YOU FEEL APPROPRIATE CONSULT

Cox Health Injury Prevention
- Prevention is the vaccine for the disease of injury.
  (American College of Surgeons)
Best Practice Framework
Fracture Liaison Service

- In 2013, the International Osteoporosis Foundation published a landmark paper focused on increased implementation of FLS programs for the prevention of secondary fractures around the world.
- Low participation of PCP's in secondary fracture prevention was focus of the report.

**GOAL=SECONDARY FRACTURE PREVENTION!!!**

Fracture Liaison Service Advantages

- FLS vs. standard osteoporosis management models (PCP, endocrinology, etc.)
  - Increase in post-fracture treatment implementation
  - Extend time of treatment adherence
  - Decrease secondary fracture risk
  - Decrease mortality
  - Provide cost savings through decrease fracture rates
  - Increased quality-adjusted life years

Cox Health Fracture Liaison Service: Team members

- Three Core Members
  - Physician Champion
    - Dr. Tim Woods
  - FLS coordinator or practitioner
    - DeAnn Stowe, ACNP-BC
  - Nurse navigator
    - Office nurse
Osteoporosis defined...

- Osteoporosis is defined by the American Association of Clinical Endocrinologists as "a (silent) skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture"
- Bone strength reflects two main features: Bone density and Bone quality

Osteoporosis risk factors

- Age
- Female gender
- Family history
- Previous fracture
- Ethnicity
- Menopause (Natural or surgical)
- Glucocorticoid use > 3 mon (at any time in life)
- Rheumatoid arthritis
- GERD/malabsorption disorders
- Alcohol (3 or more drinks/day)
- Smoking
- Low BMI
- Poor Nutrition
- Vitamin D deficiency
- Eating disorder
- Insufficient exercise
- Low dietary calcium intake
- Frequent falls

2016 AACE Diagnosis of Osteoporosis in Postmenopausal Women

- 1. T-score -2.5 or below in the lumbar spine, femoral neck, total and/or 33% (one-third) radius
- 2. Low-trauma spine or hip fracture (regardless of Bone Mineral Density)
- 3. Osteopenia or low bone mass (T-score between -1 and -2.5) WITH a fragility fracture of proximal humerus, pelvis, or possibly distal forearm
- 4. Low bone mass or osteopenia and high FRAX fracture probability based on country specific thresholds
- FRAX is a diagnostic tool used to evaluate 10 year probability of bone fracture
Indications for Bone Mineral Density Testing
(AACE GUIDELINES)

- All women 65 and older
- All post-menopausal women
- History of fragility fracture
- Osteopenia noted with X-ray
- Starting or taking Glucocorticoid, Steroidal use (3mon or longer)
- Secondary Osteoporosis:
  - Diabetes Mellitus
  - Hypothyroidism
  - Alcoholism
  - Medications
  - Eating disorders
- Other peri- or post-menopausal women with risk factors
  - Low body weight (<127lb or BMI < 20)
  - Long-term glucocorticoid, steroidal use (Clonic or longer)
  - Family history of fragility fracture
  - Early menopause (<40yrs)
  - Current smoker
  - Excessive ETOH use

Have we lost sight of the REAL PROBLEM?!

Only 30 years ago, Osteoporosis was defined by the occurrence of a fracture (PRIOR TO DEVELOPMENT OF DEXA SCANS)
10% of "osteoporosis-related" fractures with NORMAL T-scores
Some Bone Health Experts advocate focus on "FRACTURE" and not terms such as "fragility fracture" or "osteoporotic fracture"
Osteoporosis treatment: Evidence-based Guideline-Driven

- Recommend RX medication
- Evaluate for causes of secondary osteoporosis
- Correct Calcium/Vitamin D deficiency and address causes of secondary osteoporosis
- Calcium recommendations for women 50 years or older: 1200mg/day with dietary intake evaluation
- Vitamin D: 1,000-2,000 iu daily. Measure Vitamin D level; if < 30 consider RX treatment with Vitamin D2
- Education on lifestyle measures, fall prevention, benefits and risks of RX medication

Mechanism of action of Osteoporosis Medication

RX medications for Osteoporosis treatment

**Anti-Resorptives** (slow bone loss)
- Bisphosphonates
  - Fosamax, Actonel, Boniva, Zoledronic Acid
  - Contraindicated with CKD and GERD
- Desnorurab (Prolia)
  - Goal of treatment prevent worsening of bone loss

**Anabolics** (increase the rate of bone formation)
- Teriparatide (Forteo) and Abaloparatide (Tymlos)
- Only 2 medications approved by the FDA that rebuild bone
- Goal of treatment to build a "healthy bone bank account"
- Renal concerns
Osteoporosis treatment:
Evidence-based Guideline-Driven

NO prior fragility fracture or moderate risk
- Anti-resorptive therapy: Alendronate (Fosamax), Denosumab (SQ), risedronate (Actonel), Zoledronic acid (IV)
- Re-assess yearly for response to therapy and fracture risk

Prior fragility fractures or indicators of higher fracture risk
- Denosumab (SQ), Teriparatide (SQ), Zoledronic Acid (IV)
- Re-assess yearly for response to therapy and fracture risk

National Institutes of Health
Recommended Dietary Allowances

Calcium

| Table 1: Recommended Dietary Allowances (RDAs) for Calcium [1] |
|-------------------|-----------------|-----------------|-----------------|-----------------|
| Age               | Male (mg)       | Female (mg)     | Pregnant (mg)   | Lactating (mg)  |
| 0-6 months*       | 200             | 200             | 200             |                 |
| 7-12 months*      | 260             | 260             | 260             |                 |
| 1-3 years         | 700             | 700             | 700             |                 |
| 4-8 years         | 1,000           | 1,000           | 1,000           |                 |
| 9-11 years        | 1,300           | 1,300           | 1,300           |                 |
| 12-15 years       | 1,300           | 1,500           | 1,500           | 1,500           |
| 16-18 years       | 1,300           | 1,500           | 1,500           | 1,500           |
| 19-50 years       | 1,000           | 1,000           | 1,000           | 1,000           |
| 51-70 years       | 1,000           | 1,200           |                 |                 |
| 71+ years         | 1,200           | 1,200           |                 |                 |

CALCIUM:
Points to Remember

- Calcium recommendations
  - 50 and older: 1200mg daily
  - Divided doses
  - Encourage use of Dietary Calcium Calculator
    - https://www.iofbonehealth.org/what YOU can do/ways TO augment calcium intake/
    - https://www.nof.org/patients/treatment/calciumvitamin-D/steps-to-estimate-your-calcium-intake/

- Types of calcium
  - Calcium carbonate
    - 40% elemental calcium
    - Use with PPI’s
  - Calcium citrate
    - 21% elemental calcium
    - May cause constipation
  - Calcium gluconate/lactate
    - Low elemental calcium
  - Coral/Bone/Shell/Calcite
    - Contain heavy metals, particularly lead
Vitamin D: Don’t forget the KEY!!

- The “sunshine vitamin”
  - Actually a hormone....
- Desired Serum: >30
- Total 25(OH)D
- Recommendations:
  - Under 50 = 400-800iu daily
  - Over 50 = 1,000-2,000iu daily
- Naturally available
  - Fatty fish
  - Fortified foods

Vitamin D deficiency EPIDEMIC!!

- Why?!
  - Sun-block
  - Avoidance of “hot time of day”
  - Poor dietary habits
  - Gastric bypass surgery
  - Aging population

Special considerations
Gastric bypass

- AGB (Adjustable Gastric Band)
- Roux-en-Y
- Gastric Sleeve
- Calcium Recommendations:
  - 1,000-1500mg daily (divided doses)
  - (300-1600-2400mg daily)
- Vitamin D Recommendations:
  - 3000iu daily
  - American Society of Metabolic and Bariatric Surgery
  - Integrated Health Nutritional Guidelines for the Surgical Weight Loss Patient 2016 Update: Micronutrients
Focus on Life-Long Treatment plan

- Consider limits of current medications available
  - Anti-resorptives: recommended use 5-10 years (based on fracture risk)
    - Bisphosphonates: Alendronate, Fosamax, Boniva, Zolendronic acid, etc.
    - RANKL inhibitor: Denosumab (Prolia)
- Anabolics: recommended use 2 years
  - Teriparatide (Forteo) and Tymlos

Don’t forget fall risk........

- Every 19 minutes, an elderly adult dies from a fall

We must do better........

- Every 11 seconds, an elderly adult is treated in an ED for a fall-related injury
Osteoporosis caused bone to break but did not cause fall.

- Stay physically active
- Hearing and vision testing
- Adequate sleep
- Limit alcohol
- Stand slowly
- Use assistive devices when unsteady
- Wear non-skid, rubber-soled shoes
- Careful on wet, icy surfaces

AFTER FALL:
- Notify primary care provider
- Request assessment of medications
- Notify PCP of dizziness
- Encourage reposition in physical therapy if recommended by PCP

National Council on Aging
Fall risk reduction

- Evidence based fall prevention programs
  - Tai Chi (reduced falls by 33%)
  - The Stepping On Program (reduced falls by 30%)
  - Otago Exercise Program (reduced falls by 15%)

WHO IS IT GONNA BE?
Me or You??
THE FUTURE OF BONE HEALTH
To conclude......

- "The good physician treats the disease; the great physician treats the patient."
  - Sir William Osler

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References

- Why Own the Bone? (n.d.). Retrieved from http://www.ownthebone.org/OTB/About/Why_Own_the_Bone/About/Why_Own_the_Bone.aspx?hkey=e655a654-77d6-43c2-9d35-931d7edad403