A Patient’s Journey with Osteoporosis: From Diagnosis through Treatment

May 1, 2013
Anaheim, California

Educational Partner:
Session 2: A Patient’s Journey with Osteoporosis: 
From Diagnosis through Treatment

Learning Objectives

1. Implement osteoporosis assessment guidelines regarding diagnosis and fracture prevention.  
2. Initiate treatment of osteoporosis according to risk assessment scores and bone mineral density measurements.  
3. Choose an appropriate treatment option for patients with osteoporosis and consider the benefit:risk ratio of short-term and long-term therapy across all classes of medications.  

Faculty

E. Michael Lewiecki, MD, FACP, FACE  
Osteoporosis Director  
New Mexico Clinical Research & Osteoporosis Center  
Albuquerque, New Mexico

E. Michael Lewiecki, MD, FACP, FACE, is clinical assistant professor of medicine at University of New Mexico School of Medicine and director of New Mexico Clinical Research & Osteoporosis Center. He is a consultant in osteoporosis and metabolic bone disease, supervisor and interpreter of bone density studies at the Center, and an educator with a special interest in the management of osteoporosis and metabolic bone disease. He is principal investigator for the Center’s osteoporosis clinical trials and author of many scientific publications on osteoporosis and bone densitometry.

Dr Lewiecki is past president of the International Society for Clinical Densitometry (ISCD). He is a faculty member for the ISCD educational programs in bone densitometry, vertebral fracture assessment, and management of osteoporosis. Dr Lewiecki is senior editor of the Journal of Clinical Investigation, associate editor of the Journal of Clinical Densitometry, and an editorial board member of Osteoporosis International and other peer-reviewed journals. He has received national and international awards, including Physician of the Year by the ISCD in 2002, the ISCD Paul D. Miller Service Award in 2006, and the Laureate Award of the New Mexico Chapter of the American College of Physicians in 2006.

He is a fellow of the American College of Physicians and the American College of Endocrinology. Dr Lewiecki is president and founder of the Osteoporosis Foundation of New Mexico and director of its educational activities. He established and is program director of the annual Santa Fe Bone Symposium.

Dr Lewiecki, who was raised in the Boston, Massachusetts, area, is a graduate of Amherst College in Amherst, Massachusetts, and Northwestern University Medical School in Chicago, Illinois. He completed postgraduate medical training at University of New Mexico Health Sciences Center and now resides in Albuquerque, New Mexico.

Michael Maricic, MD  
Clinical Associate Professor of Medicine  
University of Arizona School of Medicine  
Tucson, Arizona

Michael Maricic, MD, is director of Catalina Pointe Clinical Research and clinical associate professor of medicine at the University of Arizona School of Medicine in Tucson.

While at the University of Arizona, Dr Maricic has served as head of the section of rheumatology and as program director for both the internal medicine residency and the rheumatology fellowship programs. He has chaired both the curriculum committee and the graduate medical education advisory committee. Dr Maricic has received the Dean’s Teaching Award for Excellence and the Virginia Furrow Award for Excellence in Graduate Medical Education and was elected Alpha Omega Alpha by the medical student class. The internal medicine house staff named him the Outstanding Attending in both 2003 and 2004.

Dr Maricic is a fellow of the American College of Rheumatology and past chairman of its educational materials and audiovisual aids committees. He is a member of the American Society for Bone and Mineral Research, a past member of the National Osteoporosis Foundation Newsletter Editorial Board, and past associate editor of the Journal of Clinical Densitometry, currently serving on its editorial board.
He has authored 40 peer-reviewed articles and numerous chapters on osteoporosis and rheumatology and has coedited the textbooks *Decision Making in Internal Medicine, Clinical Care in the Rheumatic Disease*, and *Bone Disease in Rheumatology*.

**Faculty Financial Disclosure Statements**

The presenting faculty reports the following:

E. Michael Lewiecki, MD, FACP, FACE, receives grant/research support (principal investigator, funding to New Mexico Clinical Research & Osteoporosis Center) from Amgen, Eli Lilly and Company, GlaxoSmithKline, and Merck. He is on the scientific advisory board of Amgen, Eli Lilly and Company, and Merck. He is on the speaker bureaus for Eli Lilly and Company, Novartis, and Warner Chilcott. He is a consultant for GlaxoSmithKline.

Michael Maricic, MD, serves on the speaker bureau for, is a consultant for, or receives clinical research grant support from Amgen, Eli Lilly and Company, Novartis, and Roche.

**Education Partner Financial Disclosure Statement**

The content collaborators at CME Incite have reported the following:

Rose O’Connor, PhD, and Monique Pond, PhD, have no financial relationships to disclose.

**Suggested Reading List**


SESION 2
9:45 AM – 11:00 AM

A Patient’s Journey With Osteoporosis: From Diagnosis Through Treatment

SPEAKERS
E. Michael Lewiecki, MD, FACP, FACE
Michael Maricic, MD

Presenter Disclosure Information

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Off-Label/Investigational Discussion

In accordance with pmICME policy, faculty have been asked to disclose discussion of unlabeled or unapproved use(s) of drugs or devices during the course of their presentations.

Drug List

- Estrogen
- Alendronate
- Risedronate
- Ibandronate
- Zoledronate
- Calcitonin
- Raloxifene
- Denosumab
- Teriparatide

- Estrogen
- Fosamax®
- Actonel®, Atelvia®
- Boniva®
- Reclast®
- Miacalcin®, Fortical®
- Evista®
- Prolia®
- Forteo®

Learning Objectives

- Implement osteoporosis assessment guidelines regarding diagnosis and fracture prevention
- Initiate treatment of osteoporosis according to risk assessment scores and bone mineral density (BMD) measurements
- Choose an appropriate treatment option for patients with osteoporosis and consider the benefit:risk ratio of short- and long-term therapy across all classes of medications
Demographic Question

Approximately how many patients have you seen in the last 60 days with osteoporosis?

1. None
2. 1-5
3. 6-10
4. 11-20
5. Over 20

Outcomes Question 1

A 56-year-old postmenopausal woman has a T-score of -2.3 at the FN. She meets NOF guidelines for pharmacologic treatment to reduce fracture risk in which one of the following cases?

1. Wrist fracture at 49 years
2. Mother had hip fracture at 82 years
3. FRAX 10-year probability of major osteoporotic fracture is 22%
4. FRAX 10-year probability of hip fracture is 2%

Outcomes Question 2

Which one of the following is a clinical risk factor for input with FRAX?

1. Diabetes mellitus
2. Rheumatoid arthritis
3. Proton pump inhibitor therapy
4. Long-term anticonvulsant therapy

Outcomes Question 3

Which one of the following is FDA approved for the treatment of osteoporosis in both men and women?

1. Ibandronate
2. Calcitonin
3. Raloxifene
4. Denosumab

Outcomes Question 4

A 72-year-old woman was diagnosed with osteoporosis at 67 years, with a femoral neck T-score of -3.2. After 5 years of oral bisphosphonate therapy, her T-score has stabilized at -2.8. What should be your next course of action?

1. Stop treatment, since there is no benefit beyond 5 years
2. Add salmon calcitonin to further reduce fracture risk
3. Continue alendronate, since benefits probably outweigh risks
4. Switch to another bisphosphonate, so that she continues to achieve an adequate response to therapy

Osteoporosis: Diagnosis and Screening

Michael Maricic, MD
Clinical Associate Professor of Medicine
University of Arizona
Tucson, AZ
Katherine’s Story

- 65-year-old grandmother in relatively good health
- Presents for a routine check-up
- Menopause commenced at 48 years, but she never accepted hormone therapy
- Has never taken oral glucocorticoids
- She is 5 ft 2 in, but says that she used to be 5 ft 3 in

Is Katherine at risk for developing osteoporosis?

Osteoporosis

NIH Consensus Statement 2000

- ... a skeletal disorder characterized by compromised bone strength predisposing a person to increased risk of fracture
- Bone strength primarily reflects integration of bone quality and bone density

Normal vs Osteoporosis

Bone mass + bone quality = bone strength


Normal Bone Remodeling

1. Osteoclast Resorption
2. Osteoblast Recruitment
3. New Bone Formation
4. Osteoblast Apoptosis/Osteocyte Transition

Postmenopausal Bone Loss

1. Increased Osteoclast Resorption
2. Increased Osteoblast Recruitment
3. Inadequate Osteoblast Osteoid Formation
4. Net Bone Loss Osteocyte Transition

Impact of Osteoporosis

- 44 million Americans have low bone mass
- 12 million have osteoporosis
  - Estimated to increase to >14 million by end of 2020
- 50% of women and 25% of men >50 years will suffer ≥1 osteoporotic fracture in their lifetimes
- Prevalence of osteoporosis will rise with increases in elderly population

Distribution of Osteoporotic Fractures: Combined Total for Men and Women

- Vertebral (27%)
- Wrist (19%)
- Hip (14%)
- Pelvic (7%)
- Other (33%)

Consequences of Fractures

- Increased risk of future fractures
- Chronic pain
- Loss of height
- Impaired pulmonary function
- Medical expenses/lost income
- Hospitalization
- Surgery

- Need for rehabilitation
- Nursing home care
- Loss of self-esteem
- Depression
- Loss of independence
- Disability
- Death


Vertebral Fractures

- Most common fractures
- Only 1/3 of VFs are clinically apparent
- Progressive
- Associated with
  - Deformity, height loss, back pain
  - Morbidity and mortality
- Predict future VFs and non-VFs


Incident VF Rapidly Increases Risk of Next VF

Incidence During Study Year 0-1 (n=2570)
Incidence Within 1 Year Following 1st Fracture (n=381)

6.6
19.2

Presence of ≥ 1 VF at baseline increased risk of additional VF 8-fold during Study Year 1


Prevalent VF Predicts Risk of Future Hip Fracture

Cumulative Incidence of Hip Fracture in Men and Women, %

N=6459 postmenopausal women, aged 55-81 years
Followed for average of 3.8 years

Relative Risk of Death Following Clinical Fractures

Fracture Intervention Trial (FIT)

- Any Symptomatic
- O N=6459 postmenopausal women
- O Aged 55-81 years
- O Followed for average of 3.8 years

Relative Risk of Death During First Year

- O Forearm
- O Spine
- O Hip


Hip Fractures Are Associated With Increased Morbidity and Mortality

- Of patients who experience a hip fracture
  - 80% are unable to carry out at least 1 independent activity of daily living
  - 40% are unable to walk independently
  - 30% become permanently disabled
  - 20% die within 1 year

Hip fractures account for 14% of incident fractures but 72% of fracture costs

Clinical Evaluation

- History
  - Assessment of risk factors for low bone mass, falls, and fractures
- Physical exam
- Laboratory tests and measurement of BMD

Clinical Risk Factors

- Age
- Previous low trauma fracture
- Current cigarette smoking
- Rheumatoid arthritis
- High alcohol intake (>2 units/d)
- Parental history of hip fracture
- Prior or current glucocorticoid use

ARS Question

Is BMD testing for Katherine indicated?
1. Yes
2. No

Bone Density Measurement: DXA Is the “Gold Standard”

- Widely used in epidemiologic studies from which prevalence data are derived
- WHO criteria based on BMD measured by DXA
- Correlation with fracture risk
- Low radiation
- Excellent precision

Bone Mass Measurement Act

July 1, 1998

- Estrogen-deficient women at clinical risk for osteoporosis
- Individuals with vertebral abnormalities
- Individuals receiving long-term glucocorticoid therapy
- Individuals with primary hyperparathyroidism
- Individuals being monitored to assess response to or efficacy of an FDA-approved osteoporosis drug therapy

2013 NOF Guidelines

Indications for BMD Testing

- Women ≥65 years and men ≥70 years, regardless of clinical risk factors
- Younger postmenopausal women, women in the menopausal transition, and men aged 50-69 years with clinical risk factors for fracture
- Adults with fracture after age 50 years
- Adults with conditions such as rheumatoid arthritis or taking medications (such as glucocorticoids ≥5 mg/d ≥3 months) associated with low bone mass or bone loss
WHO Diagnostic Categories

<table>
<thead>
<tr>
<th>Classification</th>
<th>T-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>-1.0 or greater</td>
</tr>
<tr>
<td>Low bone mass (osteopenia)</td>
<td>Between -1.0 and -2.5</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>-2.5 and below</td>
</tr>
<tr>
<td>Severe osteoporosis</td>
<td>-2.5 with history of fragility fracture</td>
</tr>
</tbody>
</table>


Diagnosis in Postmenopausal Women and in Men Aged ≥50

- Osteoporosis may be diagnosed in postmenopausal women and in men aged 50 years and older if the T-score of the lumbar spine, total hip, or femoral neck is -2.5 or less.
- In certain circumstances, the 33% radius (also called 1/3 radius) may be utilized.

*Note: Other hip regions of interest, including Ward's area and the greater trochanter, should not be used for diagnosis. Application of recommendation may vary according to local requirements.


ARS Question

Katherine’s lowest T-score is -2.3 at the FN. What is her diagnosis?

1. Normal
2. Osteopenia
3. Osteoporosis
4. Severe osteoporosis

Use Clinical Judgment

- T-score ≤-2.5 does not always mean that osteoporosis is present
- Primary disease may be something else (eg, hyperparathyroidism, osteomalacia, or multiple myeloma)
- T-score >-2.5 does not eliminate the possibility of osteoporosis
- Clinical diagnosis of osteoporosis may be made in the presence of a fragility fracture

Perform FRAX in patients with osteopenia

Diagnosis of Osteoporosis

- Densitometric diagnosis
  - DXA
  - WHO criteria
- Clinical diagnosis
  - Fragility fracture

Vertebral Fracture (VF) Assessment

- ORecognition of VF may
  - O Change diagnostic classification
  - O Change estimate of fracture risk
  - O Change treatment decisions
Combined Effect of Bone Density and Prevalent Fractures

<table>
<thead>
<tr>
<th>Rate Ratio</th>
<th>Bone Mass (mg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest Third</td>
<td>7.1</td>
</tr>
<tr>
<td>Middle Third</td>
<td>14.9</td>
</tr>
<tr>
<td>Highest Third</td>
<td>25.1</td>
</tr>
<tr>
<td>Non prevalent fracture</td>
<td>4.4</td>
</tr>
<tr>
<td>T-score &gt; -2.5</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Problem: Most Women With Fracture Have T-score > -2.5

Study of Osteoporotic Fractures in 243 Women With Hip Fractures


Clinical Evaluation of Katherine

- History
  - Menopause commenced at age 48 years but she never accepted hormone therapy
  - Never taken oral glucocorticoids
- Physical exam
  - She is 5 ft 2 in, but says that she used to be 5' 3 in
  - Weight: 120 lb
- Laboratory tests
  - What tests should be done to assess skeletal health and fracture risk?

ARS Question

What laboratory tests should be done in the evaluation for secondary causes of osteoporosis?

1. Serum creatinine, calcium, phosphorus, and alkaline phosphatase
2. Serum 25(OH)D
3. 24-hour urinary calcium
4. All of the above

Clinical Evaluation: Laboratory Tests

- Serum calcium, phosphorus, and alkaline phosphatase
- Creatinine
- Serum 25(OH)D
- 24-hour urine calcium
- TSH (in women receiving thyroid supplementation)

The above tests identify 92% of patients with secondary causes

Adapted from Tannenbaum C, et al. J Clin Endocrinol Metab. 2002;87:4431-4437.

Unmet Needs

- Underdiagnosis
- Undertreatment
- Poor adherence to treatment
Undertreatment of Osteoporosis in Men and Women Who Have Experienced a Hip Fracture

Hospital admission
Hospital discharge
1-5 year follow-up

Taking Treatment, %

Men: n=110
Women: n=253

*P<0.001 for % of men taking treatment vs % of women taking treatment

Real-World Persistence to Daily and Weekly Bisphosphonate Therapies

Patients, %

P=NS

Low Adherence and Nonpersistence Lead to Compromised Fracture Risk Reduction

Fracture Risk (Hazard Ratio)

N=11,249

*P<0.001

N=25,537

*29% Risk Reduction

Low adherence = filled prescriptions to treat osteoporosis <80% of the time; high adherence = filled prescriptions to treat osteoporosis ≥80% of the time.

N=11,249

Fracture Risk Hazard Ratio

Low Adherence

Nonpersistent

Persistent

1.000

0.843

12.6

9.4

N=25,537

*16% Risk Reduction

24-Month Fracture Risk, %

Summary

- Osteoporosis results in great cost, morbidity, and mortality to both men and women
- Prevalence of osteoporosis and fractures is rising worldwide
- Only 1/3 of VFs are clinically apparent
- Presence of ≥1 VF increases risk of subsequent VFs and non-VFs
- Combination of BMD testing and presence of clinical risk factors is a better predictor of fracture risk than BMD or CRF alone

Fracture Risk Assessment and Treatment of Osteoporosis

E. Michael Lewiecki, MD
Clinical Assistant Professor of Medicine
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Albuquerque, NM

Fracture Risk Assessment:
BMD, CRFs, FRAX

Intervention Thresholds

Treatment

Follow-up

Low Adherence

High Adherence

Nonpersistence

Persistence

0

1.0

0.8

0.6

0.4

0.2

0.0

0

2

4

6

8

10

12

14

CrF, clinical risk factor.
Age Is an Independent Risk Factor for Osteoporotic Fractures


Prior Fracture Increases Relative Risk of Subsequent Fractures


ARS Question

Do the NOF guidelines recommend using FRAX for making treatment decisions with Katherine?

1. Yes, because she has osteopenia and no prior hip fracture or VF
2. Yes, because she is a Caucasian postmenopausal woman
3. No, because it makes no difference for treatment decisions
4. No, because she is <70 years

FRAX: Assess Fracture Risk in Untreated Patients From 40-90 Years

- Access: http://www.shef.ac.uk/FRAX
- Input: BMD + CRFs
- Rationale: BMD + CRFs predict fracture risk better than either alone
- Output: 10-year fracture probability


CRF, clinical risk factor.
### NOF Treatment Guidelines

Postmenopausal women and men ≥50 years with the following should be considered for treatment, after evaluation for secondary causes of osteoporosis:

<table>
<thead>
<tr>
<th>Osteoporosis</th>
<th>Osteopenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>• T-score ≤-2.5 at FN, TH, or LS, or</td>
<td>• T-score between -1.0 and -2.5 at FN or LS, and</td>
</tr>
<tr>
<td>• Hip or vertebral (clinical or morphometric) fracture</td>
<td>• FRAX 10-year probability of hip fracture ≥3% or major osteoporotic fracture ≥20%</td>
</tr>
</tbody>
</table>

### Universal Recommendations

- Regular weight-bearing and muscle-strengthening exercise
- Fall prevention
- Avoid tobacco use and excess alcohol
- Calcium 1000-1200 mg/d
  - IOM: RDA 1,000-1,200 mg, UL 2,000 mg
- Vitamin D 800-1,000 IU/d, target ≥30 ng/mL
  - IOM: RDA 600-800 IU, target >20 ng/mL, UL 4,000 IU

### Katherine’s Story: 5 Years Later

- 70-year-old grandmother in relatively good health
- She is now 5 ft 1 in; lost 1 in in past 5 years; she used to be 5 ft 3 in
- BMD testing: FN T-score -2.3
- FRAX 10-year probability
  - 12% for major osteoporotic fractures
  - 2.8% for hip fractures
- Diagnosis: osteopenia

### Katherine’s VF Assessment

Fracture T12

### Treatment Decisions

- Individual patient factors
  - Efficacy and safety for individual patient
  - Nonskeletal risks and benefits
  - Comorbidities
  - Expected adherence to therapy
  - Patient beliefs, concerns, preferences
  - Insurance coverage/affordability
  - Risk communication, shared decision making

IOM, Institute of Medicine; RDA, recommended daily allowance; UL, tolerable upper intake level.


Katherine’s VF Assessment

Fracture T12


FDA-Approved Medications: Indications

<table>
<thead>
<tr>
<th>Drug</th>
<th>PMO Prevention</th>
<th>PMO Treatment</th>
<th>GIO (Women and Men) Prevention</th>
<th>GIO (Women and Men) Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estrogen</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alendronate PO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Risedronate PO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Risedronate Delayed-Release PO</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ibandronate PO</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Ibandronate IV</td>
<td>✓</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Zoledronate IV</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Calcitonin IN</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Raloxifene PO</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denosumab SC</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teriparatide SC</td>
<td>✓</td>
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</tbody>
</table>

GIO, glucocorticoid-induced osteoporosis; PMO, postmenopausal osteoporosis.

FDA-Approved Medications: Efficacy

<table>
<thead>
<tr>
<th>Medication</th>
<th>BMD</th>
<th>BTM</th>
<th>Fracture Risk</th>
</tr>
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<tbody>
<tr>
<td>Estrogen</td>
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<td>Risedronate</td>
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<tr>
<td>Raloxifene</td>
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<td>Ibandronate</td>
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<tr>
<td>Zoledronate</td>
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<tr>
<td>Calcitonin</td>
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<td></td>
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</tr>
<tr>
<td>Teriparatide</td>
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BTM, bone turnover marker.

Non-Bisphosphonates: Safety Issues

- Estrogen/hormone therapy
  - Increased risk of myocardial infarction, stroke, pulmonary emboli, and deep vein thrombosis
- Estrogen agonist/antagonist: Raloxifene
  - Increased risk of deep vein thrombosis
- Calcitonin
  - FDA advisory committee voted that the risks outweigh the benefits for the treatment of postmenopausal osteoporosis (March 5, 2013)
- RANKL inhibitor: Denosumab
  - Increased risk of skin infections and osteonecrosis of the jaw
- Parathyroid hormone: Teriparatide
  - Treatment is not recommended for more than 2 years due to concerns of increased risk for osteosarcomas

Bisphosphonate Safety Issues: Balancing Benefits and Risks

- Combination therapy
- Oversuppression of bone turnover
- Osteonecrosis of the jaw
- Atypical femur fractures
- Atrial fibrillation
- Esophageal cancer
- Impaired fracture healing
- Drug holidays
  - No guidelines
  - Very little data

Drug Holiday

- Temporary withholding of bisphosphonate after at least 3-5 years in appropriate patients
  - NOT “drug retirement”
  - NOT “stopping treatment”
  - ONLY applies to bisphosphonates
  - Rationale: persistence of antifracture benefit while possibly reducing long-term risks
  - Very little data, many opinions
  - Periodic re-evaluation of balance of benefits and risks
  - Consider for patients no longer at high fracture risk
    - T-score >-2.0, no major fracture
    - End drug holiday when fracture risk is again high
    - T-score ≤-2.5, fracture, FRAX, BTM


Fracture Risk Assessment

Intervention Thresholds

Treatment

Follow-up: Monitoring, Adherence

Clinical Challenges
After Beginning Treatment

- Motivating patient to fill prescription and take it correctly, regularly, and for a sufficient length of time to provide benefit
- Determining how (or if) to follow and monitor patient to assure that benefit is achieved
- Managing nonresponders/suboptimal responders
- Deciding when (if ever) to stop or change therapy
- Knowing when (if ever) to restart, if treatment is stopped
- Managing side effects, perceived side effects, and fear of side effects

Improving Adherence to Therapy

- Risk communication
- Shared decision making
- Longer dosing intervals
- Less complex administration
- Injectable therapy
- Patient education
- Follow-up contact

ARS Question

Which of the following is most correct in the setting of Katherine’s low BMD and recent VF?

1. Fracture risk is high; treatment benefits outweigh treatment risks
2. Fracture risk is low; treatment risks outweigh treatment benefits
3. Fracture risk is not known; best approach is to repeat DXA in 1-2 years
4. Fracture risk is high, but risks of treatment are excessive

Monitoring in Clinical Practice: Assess Long-term Benefit:Risk Ratio

- BMD (DXA)
  - Measure 1-2 years after starting therapy
  - Goal: stability or increase
- BTM (NTX, CTX, BSAP, P1NP, etc)
  - Measure ~3 months after starting therapy or when BMD response is not as expected
  - Goal: significant decrease with antiresorptive agent and increase with anabolic agent
  - Cause for concern and further evaluation
    - Significant loss of BMD
    - Lack of expected change in BTM
    - Fracture while receiving therapy

BSAP, bone-specific alkaline phosphate; CTX, C-telopeptide of collagen type 1; NTX, N-telopeptide of collagen type 1; P1NP, N-terminal serum type 1 procollagen.

Summary

- FRAX used to assess fracture risk in untreated patients from age 40-90 years
- NOF recommends pharmacotherapy be considered in postmenopausal women and men ≥50 years of age in each scenario
  - T-score ≤-2.5
  - Presence of hip fracture or VF
  - T-score between -1.0 and -2.5 at FN or LS and FRAX 10-year probability of hip fracture ≥3% or major osteoporotic fracture ≥20%
- Many therapeutic options available for women with PMO
- Treatment decisions must consider all available information and good clinical judgment
Osteoporosis Case Study

- 71-year-old Caucasian man
- Weight: 175 lb
- Height: 5 ft 10 in
- Smoker
  - Diagnosed with COPD
  - Chest x-ray shows VF

ARS Question

Is bone-density testing indicated?

1. No, because he is under age 75 years
2. No, because fracture risk is low
3. Yes, according to standard guidelines
4. Yes, because he is a smoker

Martin

- COPD was treated
- Evaluation for osteoporosis was not done
  - No DXA
  - No FRAX
- 2 years later, Martin has a hip fracture

Could something have been done to prevent Martin’s hip fracture?

ARS Question

Which pharmacotherapies could have been considered for Martin to reduce his fracture risk?

1. Denosumab
2. Zoledronate
3. Alendronate and risedronate
4. All of the above

Outcomes Question 1

A 56-year-old postmenopausal woman with a T-score of -2.3 at the FN meets NOF guidelines for pharmacologic treatment to reduce fracture risk in which one of the following cases?

1. Wrist fracture at age 49 years
2. Mother had hip fracture at age 82 years
3. FRAX 10-year probability of major osteoporotic fracture is 22%
4. FRAX 10-year probability of hip fracture is 2%
### Outcomes Question 2

Which one of the following is a clinical risk factor for input with FRAX?

1. Diabetes mellitus
2. Rheumatoid arthritis
3. Proton pump inhibitor therapy
4. Long-term anticonvulsant therapy

### Outcomes Question 3

Which one of the following is FDA approved for the treatment of osteoporosis in both men and women?

1. Ibandronate
2. Calcitonin
3. Raloxifene
4. Denosumab

### Outcomes Question 4

A 72-year-old woman was diagnosed with osteoporosis at 67 years, with a femoral neck T-score of -3.2. After 5 years of oral bisphosphonate therapy, her T-score has stabilized at -2.8. What should be your next course of action?

1. Stop treatment, since there is no benefit beyond 5 years
2. Add salmon calcitonin to further reduce fracture risk
3. Continue alendronate, since benefits probably outweigh risks
4. Switch to another bisphosphonate, so that she continues to achieve an adequate response to therapy

### Questions?