FUNCTIONAL AND PSYCHOSOCIAL COMPLICATIONS OF OSTEOPOROSIS

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Disclosures
Consultant: Amgen
Speaker: Amgen, Radius
FUNCTIONAL AND PSYCHOSOCIAL CONSEQUENCES OF OSTEOPOROSIS

• Osteoporosis: high risk of fracture due at least in part to increased skeletal fragility
  – Increased skeletal fragility may be due to
    • Genetically low bone mass
    • Increased bone loss
  – More likely in women than men and Caucasians and Asians than blacks and Hispanics but… can occur regardless of age, race or sex
• A fracture can be a life-changing event

Watts NB and Manson JE. JAMA 2017:317:253-254
CONSENSUS STATEMENT

Treatment of Estrogen Deficiency Symptoms in Women Surviving Breast Cancer


Consensus Conference

The Consensus Conference, convened to address this problem at the Boar’s Head Inn, Charlottesville, Virginia, September 21–23, 1997, was a unique meeting involving international experts and breast cancer survivors.

Dr. Joann Finkerton, University of Virginia (USA); Dr. Trevor Powles, The Royal Marsden Hospital (England); Dr. Jerny Lynn Prior, University of British Columbia (Canada); Dr. Kathleen Pritchard, Sunnybrook Health Science Centre University of Toronto (Canada); Dr. Joseph Ragan, British Columbia Cancer Agency (Canada); Elda Raitely, Susan G. Komen Foundation (USA); Nina Rumen, patient advocate (Canada); Dr. Mary Ropka, University of Virginia (USA); Dr. Ron K. Ross, USC Norris Comprehensive Cancer Center (USA); Dr. Richard Santen, University of Virginia (USA); Dr. Carol Sawai, Sunnybrook Health Science Centre University of Toronto (Canada); Dr. Rena Sellin, MD Anderson Cancer Center University of Texas (USA); Dr. Craig Slighluff, University of Virginia (USA); Dr. Sandie Swain, Comprehensive Breast Center (USA); Prvilegy Tynerhouse, Virginia Breast Cancer Foundation (USA); Dr. Nelson Watts, Emory University School of Medicine (USA); Elizabeth Whammond, patient advocate (Canada); Dr. Michael Wells, University of Virginia (USA).
FUNCTIONAL AND PSYCHOSOCIAL CONSEQUENCES OF OSTEOPOROSIS

Ms. O is an 82-year-old woman who has enjoyed good health and life in general.

She was diagnosed with breast cancer 6 years ago, made it through lumpectomy, radiation and chemotherapy.

She has been taking an aromatase inhibitor.

6 months ago she fell in her kitchen, sustaining 3 vertebral fractures.

Activities were severely limited for 2-3 months due to pain, which now has largely resolved.

Although pain has improved, life is not the same anymore...

Watts NB and Manson JE. JAMA 2017:317:253-254
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- Activities were severely limited for 2-3 months due to pain, which now has largely resolved.
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- She no longer drives; depends on friends and family.
- Invitations from friends have dropped off, probably because she can’t reciprocate.
- She is 4.5” shorter than she used to be – “I can’t reach things on the second shelf anymore”.
- She is afraid to use a step stool – “that’s how I fell in the first place”.
- She has stopped going to crowded places (symphony, theater, shopping) – “little kids run unsupervised; someone might knock me down”.

Watts NB and Manson JE. *JAMA* 2017:317:253-254
FUNCTIONAL AND PSYCHOSOCIAL CONSEQUENCES OF OSTEOPOROSIS

• Fractures due to osteoporosis are not the same as skeletal-related events (SREs) due to cancer -- pathologic fractures, spinal cord compression, necessity for radiation to bone (for pain or impending fracture) or surgery to bone

• In addition to general risk factors (age, sex, family history, prior fracture), a special category is cancer treatment-induced bone loss (hormone-ablative therapy – HALT – androgen deprivation therapy [ADT] and aromatase inhibitors [AIs])

Watts NB and Manson JE. JAMA 2017:317:253-254
OSTEOPOROSIS IS A SERIOUS PUBLIC HEALTH PROBLEM

- 2 million fractures yearly
- Direct cost $17 billion
- Affects 10 million Americans (80% women)
- Additional 34 million have low bone mass
  - vs 36 million with uncontrolled HT
  - vs 48 million with uncontrolled elevated LDL
- At age 50, lifetime risk of fracture is
  - 1/2 women (vs 1/8 lifetime risk for breast cancer)
  - 1/5 men (vs 1/6 lifetime risk for prostate cancer)

Distribution of Fractures

- Vertebra: 27%
- Hip: 14%
- Wrist: 19%
- Pelvis: 7%
- Other: 33%

HOSPITALIZATIONS FOR OSTEOPOROSIS-RELATED FRACTURES AND OTHER CONDITIONS

HOSPITALIZATIONS FOR OSTEOPOROSIS-RELATED FRACTURES AND OTHER CONDITIONS

PATIENTS WITH PRIOR FRACTURE ARE AT HIGH RISK FOR FUTURE FRAGILITY FRACTURES

Adapted from Klotzbuecher CM et al. J Bone Miner Res. 2000;15:721-739
DISTAL FOREARM FRACTURES

DISTAL FOREARM FRACTURES

- Third most common osteoporotic fracture (~250,000/year)
- Prior forearm fracture is a marker for future fracture¹
- Most are caused by fall on outstretched hand
- Most are diagnosed clinically and usually confirmed with radiography
- Complications
  - Pain
  - Temporary disability; difficulty dressing, toileting, meal preparation
  - Degenerative arthritis
  - Reflex sympathetic dystrophy
  - Six months after fracture, 23% report fair to poor recovery in function²
- Within 30 days, 7% readmission rate, more likely for patients with anxiety/depression³

HIP FRACTURES

Femoral Neck ~40%

Intertrochanteric Region ~40%

Graph modified from Cooper C et al. Trends Endocrinol Metab 1992;3:224-229
HIP FRACTURES

• Second most common osteoporotic fracture (~300,000 per year)
• Marker for future fracture risk:*  
  – RR for vertebral fracture 2.5, hip fracture 2.3
• Most are caused by fall from standing height  
  – Only about 5% are “spontaneous”  
  – Only 1% of falls lead to hip fracture
• Diagnosis  
  – Most are diagnosed clinically  
  – Often confirmed with radiography  
  – Most are hospitalized and require surgery

COMPLICATIONS OF HIP FRACTURE

- Up to 24% excess mortality within 1 year\textsuperscript{1}
- In the US, nearly 65,000 women die yearly from complications of hip fracture\textsuperscript{2}
- Hip fracture survivors
  - 50% are permanently incapacitated\textsuperscript{3}
  - 20% require long-term nursing home care\textsuperscript{4}
- Italian study reported QOL improved with in-hospital counseling\textsuperscript{5}

2. Col NF et al. *JAMA* 1997; 227:1140-1147
VERTEBRAL FRACTURES

• Most common osteoporotic fracture (~750,000 per year)
• Marker for future fracture risk:*
  – RR for forearm fracture 1.4, vertebral fracture 4.4, hip fracture 2.3
• Risk rises in women at age 50-55, in men at age 60-65, and increases linearly with age
• Most are “spontaneous” or due to lifting, pushing, pulling, etc.
• Patients with “clinical” vertebral fractures have severe pain, seek medical attention, get an x-ray that shows the fracture
• Only 25% to 30% of vertebral fractures are diagnosed clinically

CONSEQUENCES OF VERTEBRAL FRACTURES

- Back pain
- Loss of height
- Deformity (kyphosis, protuberant abdomen)
- Reduced pulmonary function
- Diminished quality of life (loss of self-esteem, distorted body image, dependence on narcotic analgesics, sleep disorder, depression, loss of independence)
- Increased mortality
QUALITY OF LIFE IS REDUCED AFTER VERTEBRAL FRACTURES

- 1545 postmenopausal women in Korea
- Age 72 (cases), 68 (controls)
- Variable: EQ 5D*

*EQ-5D = European Quality of Life 5 Domains

MORTALITY AFTER FRACTURES

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MORTALITY AFTER FRACTURES IS GREATER IN MEN AND INCREASED WITH MANY FRACTURE TYPES

Tran T et al, J Clin Endocrinol Metab 2018;103:3205-3214
QUALITY OF LIFE IS REDUCED AFTER FRACTURE

Data from GLOW*
57,141 women age ≥55
International Cohort
- Australia
- Belgium
- Canada
- England
- France
- Italy
- Netherlands
- Scotland
- Spain
- US

EQ-5D**

*Global Longitudinal Study of Osteoporosis in Women
**European Quality of Life 5 Dimension Index

IMPACT OF FRACTURE AND RECOVERY

- Hip fractures
- Fragility fractures: wrist, humerus, ankle, vertebrae
- Excess morbidity associated with fracture event
- Morbidity attributable to ageing alone

Graph showing morbidity across different ages with peak at 80-90 years.
DEPRESSION AND DISABILITY AFTER FRACTURE

• Study from the Netherlands\textsuperscript{1}
  – 101 patients after orthopedic trauma (fractures, tendon or ligament injuries); followup only in 65
  – Symptoms of depression 1-2 mos after trauma correlated with disability 5-8 months after trauma
  – Disability at 5-8 months correlated with symptoms of PTSD and catastrophic thinking
• Similar findings from US\textsuperscript{2}

STAGES OF PSYCHOSOCIAL IMPAIRMENT WITH OSTEOPOROSIS

- Primary impairment
  - Individuals begin to lose the capacity to fulfill competing demands of multiple social roles
  - Roles requiring physical activity become increasingly difficult to conduct

STAGES OF PSYCHOSOCIAL IMPAIRMENT WITH OSTEOPOROSIS

- Secondary impairment
  - Inability to reciprocate reduces social involvement with non-family sources of support
  - Reduced social interaction with nonfamily support can result in loneliness, isolation, and depression

STAGES OF PSYCHOSOCIAL IMPAIRMENT WITH OSTEOPOROSIS

• Tertiary impairment
  – Social interactions become impossible because of physical health and lack of reciprocity
  – Depression is the single most prevalent mental health problem in osteoporosis; depression is treatable
  – Overall quality of life is substantially reduced

HOW CAN WE IDENTIFY PEOPLE AT RISK?
DATA FROM NORA
National Osteoporosis Risk Assessment

Adapted from Siris E et al. Arch Intern Med. 2004;164:1108
Ten Year Probability of Symptomatic Fracture (%)

FRACTURE RISK INCREASES WITH AGE

**Calculation Tool**

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

### Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth
   - Age: 63
   - Date of Birth: Y: _ _ _ _ M: _ _ _ _ D: _ _ _ _

2. Sex
   - Male
   - Female

3. Weight (kg)
   - 59.9

4. Height (cm)
   - 160

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/cm²)
    - Threshold T-score: -2.3
    - Hologic: 580

**BMI:** 23.4

The ten year probability of fracture (%)

- **With BMD**
  - Major osteoporotic: 11
  - Hip Fracture: 2.0

If you have a TBS value, click here: Adjust with TBS

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**Weight Conversion**

- Pounds: 132
- kg: 63

**Height Conversion**

- Inches: 63
- cm: 160

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**06323231**

Individuals with fracture risk assessed since 1st June 2011.
RISK OF FRACTURE IS INCREASE FOR MEN WITH PROSTATE CANCER RECEIVING ADT

- Study from Sweden
  - 159,662 control men
  - 6,954 with prostate cancer and current ADT

Wallander M et al, Osteoporos Int 2019;30:115-125

Percent with Fracture

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>With ADT</th>
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<tbody>
<tr>
<td>Any fracture</td>
<td>1.40 (1.28,1.53)</td>
<td>1.38 (1.20,1.58)</td>
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<tr>
<td>Hip fracture</td>
<td>1.44 (1.28,1.51)</td>
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<tr>
<td>MOF</td>
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P<0.001 for those with ADT vs Controls
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<tr>
<th>Drug</th>
<th>Postmenopausal Osteoporosis</th>
<th>Glucocorticoid-induced Osteoporosis</th>
<th>Men</th>
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<tbody>
<tr>
<td></td>
<td>Prevention</td>
<td>Treatment</td>
<td>Prevention</td>
</tr>
<tr>
<td>Estrogen</td>
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<td></td>
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<tr>
<td>Calcitonin (Miacalcin®, Fortical®)</td>
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<td>✓</td>
<td></td>
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<tr>
<td>Raloxifene (Evista®)</td>
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<td>✓</td>
<td></td>
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<tr>
<td>Ibandronate (Boniva®)</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>Alendronate (Fosamax®)</td>
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<td>Risedronate (Actonel®)</td>
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<td>Zoledronate (Reclast®)</td>
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<td>Denosumab (Prolia®)</td>
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<tr>
<td>Teriparatide (Forteo®)</td>
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<tr>
<td>Abaloparatide (Tymlos®)</td>
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<tr>
<td>Romosozumab (Evenity®)</td>
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</tbody>
</table>
COMPONENTS OF FRACTURE RISK

SKELETAL RISK FACTORS

- Low BMD
- Previous fracture
- High bone turnover
- Family history of osteoporosis

NON-SKELETAL RISK FACTORS

- Poor eyesight
- Poor hearing
- Poor balance
- Muscle weakness
- Age

Calcium
Bone-active agents

Vitamin D

Reduce fall risk
Hip protectors
FRACTURE RISK IS HIGHER IN PATIENTS WHO ARE FRAIL OR ILL

<table>
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<th>RR for hip fracture</th>
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<tr>
<td>Self-rated health&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>3 or more chronic illnesses&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>3 or more medical problems&lt;sup&gt;3&lt;/sup&gt;</td>
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</tr>
<tr>
<td>Impaired ADLs&lt;sup&gt;4&lt;/sup&gt;</td>
<td>1.5</td>
</tr>
<tr>
<td>Low grip strength&lt;sup&gt;5&lt;/sup&gt;</td>
<td>2.1</td>
</tr>
</tbody>
</table>

META-ANALYSIS OF FICSIT STUDIES

"Frailty and Injuries: Cooperative Studies of Intervention Techniques"

From Province MA et al, JAMA 1995;231:1341-1347
OTHER MANAGEMENT MEASURES

- Fall risk reduction
- Hip protectors
- Assistive devices
- Psychosocial support
- Occupational therapy
- Pain management
ASSISTIVE DEVICES

- Bed Handles
- Reacher
- Bath Rail
- Canes
- Transfer Aid
- Back Pillow
- Wheel Chair
- Shower Chair
- Walker
FUNCTIONAL AND PSYCHOSOCIAL CONSEQUENCES OF OSTEOPOROSIS

• A fracture due to osteoporosis can be a life-changing event

• Identify patients at high risk – older age, family history, prior fracture, diseases or drugs that cause bone loss and increase fracture risk (especially androgen deprivation therapy and aromatase inhibitors)

• Effective counter-measures are available to reduce fracture risk

• Comprehensive strategies are necessary to maintain or restore function and minimize psychosocial consequences
FUNCTIONAL AND PSYCHOSOCIAL CONSEQUENCES OF OSTEOPOROSIS

Thank you for your attention!