Integrating Falls Prevention with UE Fracture Rehabilitation

JANE FEDORCZYK, PT, PHD, CHT, ATC

Introduction

- Osteoporosis and low bone mass are estimated to be a major public health threat
- 44 million or 55% of women and men aged 50 and older in the US
  National Osteoporosis Foundation, 2014
- Women are twice as likely as men to sustain a low energy fracture due to low bone mass

Risk Factors for Low Bone Mass

- Genetics
- Smoking
- Depression
- Inactive lifestyles
- Development of less than optimal peak bone mass in youth
- Health conditions
  - Gender
  - Age
  - Race
  - Alcohol Abuse
  - Bone architecture & turnover
  - Low BMI
  - Medications

Hamdy, 2010

Risk for low bone mass is ↑by:

<table>
<thead>
<tr>
<th>Medications</th>
<th>Health Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proton-pump inhibitors</td>
<td>Thyroid</td>
</tr>
<tr>
<td>Tamoxifen</td>
<td>Organ Transplant</td>
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<tr>
<td>Aromatase</td>
<td>Breast Cancer</td>
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<tr>
<td>Steroids</td>
<td>Crohn’s Disease</td>
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<tr>
<td>Selective Serotonin Reuptake Inhibitors (SSRIs)</td>
<td>Alcoholism</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Eating Disorders</td>
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<tr>
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<td>Celiac Disease</td>
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</table>

Low Energy (LE) Fractures

- Low energy fracture: “Fall from less than standing height.”
- Distal radius and radial head fractures are common
- In 2004, among persons aged 45 and older:
  - 6.2 million healthcare visits were for osteoporosis
  - Additional 5.7 million visits attributed to a LE fracture
- 1.23 million were treated in emergency departments, primarily for wrist fractures

Falls Risk

- The strongest single risk factor for fracture is falls; not just low bone mass
  (Marques, et al., 2011)
- Decreasing falls risk and facilitating upper extremity weight bearing may reduce fractures and improve bone health
  (Thompson, et al., 2010)
Wrist Fractures Predict Future Osteoporotic Fractures
- 1 in 7 women are expected to sustain a wrist fracture in their lifetime (Lyngcoln, 2005)
- History of wrist fracture is highly predictive of hip fracture (Hung, 2005)
- Prior wrist fracture strongly predicts 3-year risk of any future osteoporotic fracture.

DR Fracture → Hip Fracture
- This common sequence of events is extremely concerning, as hip fractures have been linked to a high rate of mortality
- Individuals who had sustained a hip fracture had a 1-in-4 chance of dying within 12 months of the fracture
- Highlights the importance of fracture prevention

Balance & Gait Traits of Middle Age
- Recent large-scale surveys on accidental falls have revealed middle-age adults have higher incidence of falls (21%) than young adults (18%).
- Healthy middle-aged adults showed significant and meaningful variations in muscle patterns and characteristics during different phases of stepping as compared to young adults (Chu, et al., 2009)
- Deterioration in balance function clearly starts at relatively young ages and further accelerates from at about 60 years upwards (Era, et al., 2006).

Role of Physical Therapist with UE Fracture Rehabilitation
- Screen each patient for the risk of future fractures and balance to help avoid or delay future fractures
- Develop and implement a plan to help improve balance and core strength (BCS)

Screening Measures
- Fracture Risk Screen
  - FORE FRC calculator
- Balance Screen
  - TUG and FR
  - Timed narrow base of support, partial tandem, full tandem, and single leg stance
  - Activities Specific Balance Confidence scale (ABC)

Pilot Data Collection
Sample of Convenience
- 3 males, 9 females
- No UE fractures
Descriptive Statistics:

<table>
<thead>
<tr>
<th>Age: FRC</th>
<th>FR (any fx)</th>
<th>FRC hip fx</th>
<th>ABC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.6</td>
<td>4.6%</td>
<td>&lt;1%</td>
<td>95.7</td>
</tr>
<tr>
<td>(48-60)</td>
<td>(2-13%)</td>
<td>(0)</td>
<td>(87.8-99.3)</td>
</tr>
</tbody>
</table>

TUG (sec) FR (in) NBOS (sec) Partial Tandem (sec) Full Tandem (sec) SLS (sec)

6.8 (4.4-13.7) 10.3 (5-14) >10 (0) >10 (0) 9.3 (5.4-10+) 9.8 (8.7-10+)

Statistics shown: mean (range)

Observations from Pilot Data

- 9/12 had a low fracture risk
- 2/12 maintained SLS <10 seconds
- 2/12 maintained tandem <10 seconds
- Functional Reach limited by other impairments and may not necessarily indicate balance ability
- ABC scores indicate importance of implementing balance enhancing activity due to decreased confidence with icy side walks, escalators, and standing on stool.

Subjects Provided with Education

- Increase awareness to prevent falls in 50+ year olds
- Promote education on risk factors that can lead to low bone mass
- Safety recommendations on ways to make changes in the home to decrease risk of falls

Screening Postmenopausal Women for Fall and Fracture Prevention

- All ambulatory, postmenopausal women who are older than 50 should be screened and treated.
- PTs can determine both risks, make appropriate medical referral, and provide rehabilitative care.

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
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<tr>
<td>48</td>
<td>F</td>
<td>5.6</td>
<td>12</td>
<td>&gt;10</td>
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<tr>
<td>50</td>
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<td>6.2</td>
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<td>50</td>
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<td>7.4</td>
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<tr>
<td>50</td>
<td>F</td>
<td>6.1</td>
<td>15</td>
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<tr>
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<td>9</td>
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Table 1. Fall—Fracture Risk Stratification

<table>
<thead>
<tr>
<th>Fall Risk</th>
<th>Fracture Risk</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low fall/non-fracture risk</td>
</tr>
<tr>
<td>Medium</td>
<td>Low fall/high fracture risk</td>
</tr>
<tr>
<td>High</td>
<td>High fall/high fracture risk</td>
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</tbody>
</table>

(Downey et. al., 2013)
Future Work: Changes to Screening

- Trial of Fear Avoidance vs. ABC
- Use of FGA for balance
  - 5 minutes or less to administer test
  - Normative data for FGA exists for adults aged 40-89 with excellent inter-rater reliability
- Consistent instructions provided for all screening measures

Yoga Improves

- Balance
- Proprioception
- Flexibility
- Gait Characteristics
- ↓ the fear of falling
- ↓ rate of bone resorption

(Ülger and Yaglı, 2011)
(Perrin, 2003)
(Phoosuwan, et al., 2009)

Conclusion

- Literature on gait and balance characteristics of middle age (45-65) is limited.
- Further exploration of deficits in this age population may indicate importance of early intervention for falls prevention in this population.
- Yoga may be an appropriate, comprehensive, and prevention-focused approach of therapeutic exercise to enhance balance and reduce the risk of falls and UE fractures whether it be preventative in middle or old age.

Thank You

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Marissa Valle, PT, DPT
Samantha Woolman, PT, DPT
Kayla Wright, PT, DPT
Susanna Gregorzek, MHS, OT, CHT
Falls Risk Assessment and Prevention in UE Fracture Rehabilitation


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