Physical Functioning Among Women Aged 80 Years And Older with Previous Fracture

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Introduction

• Worldwide increase in people 65 years and older
• In developed countries, the oldest (80+ years) account for 26% of those aged 65 in 2008
• The percentage the world’s population that is older than 85 years of age will increase by 300% from 2005 to 2040
• Physical functioning limitations and associated reductions in living independency significantly affect quality of life in the oldest old and it is an increasing public health burden.
The Oldest Old is a Relative Term

Level 80: “My age is very inappropriate for my behavior.”
Fracture and Functioning

• Osteoporosis and low bone density: 53.6 million US adults aged 50 or older
• Fracture--major clinical manifestation
  -- 1.5 million fractures occur annually in the US
  -- only one-third hip fracture patients (age 50+) regain their prior level of function 6 months post-fracture
• A 50-year-old white American women
  -- 40% chance for a fracture in her life
  -- 13% chance of having decline in functioning after any fracture
• Little is know about the effect on physical functioning of fractures in general as well as effects of site-specific fractures
Study Objectives

• To test hypothesis: Women who had a fracture during the Women’s Health Initiative follow-up have a decreased physical functioning in comparison to WHI women without any fracture during the follow-up

• To examine cohort characteristics associated with functioning reductions within subsets of site-specific fracture cases
Study Participants

• WHI data released on September 17, 2012. The analysis sample included 33,386 WHI women with a follow up time of 15.2 years (SD= 1.3 years)

• Inclusion criteria:
  – survived to 80 years of age and older
  – had at one assessment for incident fractures between WHI baseline and 2012
  – had at least one physical functioning assessment after age 80 (subsequent to the fracture, in participants who experienced fracture)
Fracture Assessments

• Self-reported fractures to this question: “Since last reporting date, has a doctor told you that you had a broken, fractured, or crushed bone?”. If yes, the anatomical location will be identified.

• Medical records were used for hip fracture adjudication through 2012

• The positive agreements for single-site fractures and medical records were reported in a previous WHI study (Z Chen 2004):
  – Hip 78%
  – Forearm 81%
  – Spine 51%
Fracture Categories

- Site specific: hip, pelvis, spine, elbow, hand, lower arm, upper arm, foot, knee, upper leg and lower leg
- Combined: upper limb fractures (elbow, hand, lower arm, upper arm), lower limb fractures, (knee, upper leg, lower leg) and central body fractures (hip, pelvis and spine)
Physical Functioning

• Physical functioning subscale of RAND 36-item health survey (SF36)
• Score 0-100 -- a higher score means better functioning
• Ask whether they have limitations in doing the following activities:
  – Vigorous activities---running, lifting heavy objects or participating in strenuous sports
  – Moderate activities---moving a table, pushing a vacuum cleaner, bowling, or play golf
  – Lifting or carrying groceries
  – Climbing several flights of stairs
  – Climbing one flight of stairs
  – Bending, kneeling or stooping
  – Walking more than a mile
  – Walking several blocks
  – Walking one block
  – Bathing or dressing yourself
Statistical Analyses

• Descriptive analyses for demographic information, physical measurements and life-style information by tertile of physical functioning score (PFS) and incident hip fractures

• Distribution of site-specific fractures by tertile of PFS

• Unadjusted and adjusted differences in PFS between women with an incident fracture vs. those without any fracture by fracture site

• Case-only analysis on the association between PFS and cohort characteristics by fracture site
Results

• N = 33,386

• Age: Mean ± SD = 85 ± 3.4

• PFS on the most recent questionnaire
  – Mean ± SD = 57 ± 28
  – Min = 0
  – Max = 100

• PFS by Incident hip fractures
  – No hip fracture: Mean ± SD = 58 ± 27
  – Yes hip fracture: Mean ± SD = 43 ± 28
Fractures During The WHI Follow-up

- Hip 1,139
- Central body 4,148
- Upper limb 5,328
- Lower limb 4,610
The Distribution of Fracture Occurring During WHI Follow-up By Tertile Of Physical Functioning Score
The Distribution Of Women Without Any Fracture By PFS Tertile
Differences In PFS Between Women With A Fracture And Women Without Any Fracture At That Site

<table>
<thead>
<tr>
<th>Fracture Type</th>
<th>Unadjusted Difference (95% CI)</th>
<th>Adjusted Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hip Fracture</strong></td>
<td>-15.1 (-16.7, -13.5)</td>
<td>-11.7 (-13.1, -10.3)</td>
</tr>
<tr>
<td><strong>Selected Other Fracture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelvis</td>
<td>-9.08 (-10.8, -7.35)</td>
<td>-8.69 (-10.2, -7.21)</td>
</tr>
<tr>
<td>Spine</td>
<td>-12.9 (-14.0, -11.70)</td>
<td>-9.81 (-10.8, -8.85)</td>
</tr>
<tr>
<td>Lower arm</td>
<td>-1.90 (-2.91, -0.90)</td>
<td>-2.12 (-2.98, -1.26)</td>
</tr>
<tr>
<td>Upper arm</td>
<td>-6.63 (-7.97, -5.30)</td>
<td>-4.04 (-5.18, -2.89)</td>
</tr>
<tr>
<td>Upper leg</td>
<td>-14.1 (-16.2, -12.0)</td>
<td>-10.5 (-12.3, -8.76)</td>
</tr>
<tr>
<td>Lower leg</td>
<td>-3.83 (-5.13, -2.53)</td>
<td>-1.92 (-3.03, -0.81)</td>
</tr>
<tr>
<td><strong>Any Fracture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central body</td>
<td>-12.5 (-13.4, -11.6)</td>
<td>-10.0 (-10.8, -9.28)</td>
</tr>
<tr>
<td>Upper limb</td>
<td>-3.17 (-3.98, -2.36)</td>
<td>-2.51 (-3.20, -1.82)</td>
</tr>
<tr>
<td>Lower limb</td>
<td>-4.90 (-5.75, -4.04)</td>
<td>-3.30 (-4.04, -2.57)</td>
</tr>
</tbody>
</table>
# Case-only Analysis On Risk Factors For PFS Reduction

<table>
<thead>
<tr>
<th>Hi Fracture (n = 1,095)</th>
<th>Hip or Other Central Body Fracture (n = 3,970)</th>
<th>Upper Limb Fracture (n = 5,086)</th>
<th>Lower Limb Fracture (n = 4,401)</th>
</tr>
</thead>
<tbody>
<tr>
<td>older age (5 years), multiple fracture sites, baseline physical functioning, history of CVD, history of cancer, Change in BMI for more than 5 units; alcohol consumption in the past 3 month is protective</td>
<td>older age (5 years), over one year since fracture, multiple fracture sites, baseline physical functioning, history of CVD, BMI change for more than 5 units; alcohol consumption in the past 3 month is protective</td>
<td>older age (5 years), over one year since fracture, multiple fracture sites, baseline physical functioning, history of CVD, history of cancer, current or past smoker, BMI change for more than 5 units; alcohol consumption in the past three month is protective</td>
<td>older age (5 years), over one year since fracture, multiple fracture sites, baseline physical functioning, history of CVD, history of cancer, past smoker, BMI change for more than 5 units; alcohol consumption in the past three month is protective</td>
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Strengths & Limitations

• Strength---
  – Large race/ethnically diverse of cohort of women 80+
  – 15 years follow-up
  – Large number of fractures
  – Standardized assessments on physical functioning
  – Large number of co-variates

• Limitations---
  – Somewhat small minority group
  – Higher SES level population
  – Possible residual confounding
  – No information on recurrent fractures at the same anatomical site
Conclusions

• Prior fractures in women 80+ are associated with functional disability

• If these associations are causal, more research is needed
  — for fracture management
  — for better understanding of
    • the natural history
    • unintended iatrogenic influences
    • and adverse clinical outcomes of what might appear to be benign and treatable fracture occurrences
Thank You!