Hip Pain During Walking and Cognitive Status Early Post-operation Predict Discharge Destination in Men with Hip Fracture: A Prospective Study

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7 May 2018

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Background

Hip fracture is a well-known geriatric fracture that requires hospitalization

- International clinical guidelines
- Coordinated & multidisciplinary care approach
- Provide right care at the right time

(Scottish Intercollegiate Guidelines Network (SIGN) Clinical Guideline, 2009; Handoll et al., 2011)

Physiotherapists rehabilitate the patients achieving their maximum function and potential → community re-integration

(SIGN Clinical Guideline, 2009; NICE Clinical Guideline, 2010)
Background

Successful surgery

Adequate rehabilitation

► Become dependent
► Unable to regain pre-fracture status
► Permanent disability
► Fail to return to original residential status (Cameron et al., 2010)

Predicting discharge destination
→ Better discharge planning
### Results from Literature Review

<table>
<thead>
<tr>
<th>16 Variables for predicting discharge destination in previous studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Age</td>
</tr>
<tr>
<td>• Gender</td>
</tr>
<tr>
<td>• Marital status</td>
</tr>
<tr>
<td>• Place of fall</td>
</tr>
<tr>
<td>• Type of fracture</td>
</tr>
<tr>
<td>• Type of surgery</td>
</tr>
<tr>
<td>• Time to surgery</td>
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<tr>
<td>• Post-operative complications</td>
</tr>
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</table>

Knowledge Gap

Predictors
- Age
- Health status
- Pre-fracture functional status
- Pre-fracture ADL state
- PT training
- Availability of caregiver

NOT Predictors
- Gender
- Type of fracture
- Type of surgery
- Place of fall
- Length of hospital stay
- Marital status

Potential Predictors
- Level of hip pain
- Early post-operation mobility function
- Cognitive function
- Self-efficacy on performing exercise
Objective

To identify potential predictors of returning home at early hospitalization stage after hip fracture in community-dwelling older men and women

Ethical approvals were granted by:

- Research Ethics Committee (Kowloon Central/ Kowloon East)
- Human Subjects Ethics Sub-committee of the Hong Kong Polytechnic University
Subject Recruitment

- Age $\geq$ 65
- With unilateral hip fracture managed operatively in QEH under the care of Department of Orthopaedics & Traumatology

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Have literacy in Chinese</td>
<td>• Inability to walk before hip fracture</td>
</tr>
<tr>
<td>• Live at their own home</td>
<td>• Pathological hip fracture/ with malignancy in origin</td>
</tr>
<tr>
<td></td>
<td>• Associated injuries such as upper limbs fracture or pelvic fracture</td>
</tr>
<tr>
<td></td>
<td>• Major concomitant injuries such as multiple trauma due to road traffic accident, rheumatoid arthritis</td>
</tr>
<tr>
<td></td>
<td>• Admission after hip fracture occurred more than 24 hours</td>
</tr>
<tr>
<td></td>
<td>• Inability/ unwilling to give informed consent</td>
</tr>
<tr>
<td></td>
<td>• Inability to read &amp; write Chinese</td>
</tr>
<tr>
<td></td>
<td>• Language barrier</td>
</tr>
</tbody>
</table>
All recruited subjects were cared under integrated, standardized multidisciplinary clinical pathway for fragility hip fracture.

- Underwent operation after hip fracture
- Active Rehabilitation
- Telephone interview at 6 week post-operation → Final discharge destination
Pre- & Post-operative Physiotherapy

- Chest Physiotherapy
- Pain & Swelling Control
- Mobilization Exercise
- Strengthening Exercise
- Bed Mobility, Transfer & Ambulation Training
- Endurance & Cardiovascular Training
- Balance, Gait & Functional Training
- Patient & Caregiver Empowerment
### Potential Predictors & Outcome Measures

<table>
<thead>
<tr>
<th>Potential Predictors (Independent Variables)</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain During Walking</td>
<td>• Numeric Pain Rating Scale (NPRS)</td>
</tr>
<tr>
<td>Mobility Function</td>
<td>• Elderly Mobility Scale (EMS)</td>
</tr>
<tr>
<td>Functional Independence in Daily Living</td>
<td>• Modified Barthel Index (MBI)</td>
</tr>
<tr>
<td>Cognition</td>
<td>• Mini-Mental State Examination (MMSE)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>• Self-efficacy for Exercise (SEE) Scale</td>
</tr>
</tbody>
</table>

*Potential predictors were assessed at 2\textsuperscript{nd} ambulatory training session*
Statistical Analysis

Dependent variable is **dichotomous** (whether or not the subjects are discharged back to their own home at 6 weeks post-operation)

Multiple logistic regression analysis using ‘Enter’ method for determining the significant predictors & their respective odds ratios

**For Male Subjects:**
Returning Home: $-2.123 + (-0.024) \cdot \text{age} + (-0.753) \cdot \text{pain during walking} + 0.357 \cdot \text{MMSE} + 0.005 \cdot \text{SEE} + (-0.003) \cdot \text{EMS} + 0.005 \cdot \text{MBI}$

**For Female Subjects:**
Returning Home: $0.587 + (-0.032) \cdot \text{age} + (-0.034) \cdot \text{pain during walking} + 0.029 \cdot \text{MMSE} + 0.03 \cdot \text{SEE} + (-0.06) \cdot \text{EMS} + 0.041 \cdot \text{MBI}$

- SPSS (Version 24.0) used for statistical analysis
- Level of significance **alpha-value: 0.05**
Results
80 community-dwelling older subjects with unilateral hip fracture managed operatively were recruited.

Mean age: $84.2\pm6.0$ years; 32 men & 48 women

In 6th week, 50% and 69.6% of men and women were able to return to home respectively.
## Results

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>Number (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Documented dementia</td>
<td>7 (8.7%)</td>
</tr>
<tr>
<td>• Availability of caregiver</td>
<td></td>
</tr>
<tr>
<td>- Pre-operation</td>
<td>21 (26.2%)</td>
</tr>
<tr>
<td>- Post-operation</td>
<td>8 (10%)</td>
</tr>
<tr>
<td>• Delayed operation (&gt;48 hours)</td>
<td>24 (30.0%)</td>
</tr>
<tr>
<td>- Confusion</td>
<td>1 (1.2%)</td>
</tr>
<tr>
<td>- Anaemia</td>
<td>2 (2.5%)</td>
</tr>
<tr>
<td>- Cardiac problem</td>
<td>4 (5.0%)</td>
</tr>
<tr>
<td>- Long holiday</td>
<td>5 (6.2%)</td>
</tr>
<tr>
<td>- Others (e.g. pending relatives’ decision)</td>
<td>12 (15.0%)</td>
</tr>
<tr>
<td>• Number of medication</td>
<td></td>
</tr>
<tr>
<td>- 0</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>- 1-2</td>
<td>19 (23.8%)</td>
</tr>
<tr>
<td>- 3-7</td>
<td>61 (76.2%)</td>
</tr>
</tbody>
</table>
## Results – Male Subjects

<table>
<thead>
<tr>
<th>Male</th>
<th>$p$ value</th>
<th>95% CI (confidence interval)</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.831</td>
<td>0.78-1.22</td>
<td>0.98</td>
</tr>
<tr>
<td>NPRS $2^{nd}$ walk</td>
<td>0.04</td>
<td>0.23-0.97</td>
<td>0.47</td>
</tr>
<tr>
<td>EMS $2^{nd}$ walk</td>
<td>0.95</td>
<td>0.64-1.61</td>
<td>1.01</td>
</tr>
<tr>
<td>MBI $2^{nd}$ walk</td>
<td>0.93</td>
<td>0.86-1.18</td>
<td>1.01</td>
</tr>
<tr>
<td>MMSE post-op</td>
<td>0.04</td>
<td>1.01-2.03</td>
<td>1.43</td>
</tr>
<tr>
<td>SEE Scale</td>
<td>0.93</td>
<td>0.95-1.06</td>
<td>1.00</td>
</tr>
</tbody>
</table>

After adjusting for age, **less hip pain during walking & better cognitive status at 2nd ambulatory training session** were found to be significant predictors for returning home.
## Results – Female Subjects

<table>
<thead>
<tr>
<th>Female</th>
<th>p value</th>
<th>95% CI (confidence interval)</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>0.67</td>
<td>0.84-1.12</td>
<td>0.968</td>
</tr>
<tr>
<td><strong>NPRS 2nd walk</strong></td>
<td>0.84</td>
<td>0.69-1.35</td>
<td>0.97</td>
</tr>
<tr>
<td><strong>EMS 2nd walk</strong></td>
<td>0.86</td>
<td>0.59-1.57</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>MBI 2nd walk</strong></td>
<td>0.32</td>
<td>0.96-1.12</td>
<td>1.04</td>
</tr>
<tr>
<td><strong>MMSE post-op</strong></td>
<td>0.71</td>
<td>0.89-1.20</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>SEE Scale</strong></td>
<td>0.18</td>
<td>0.99-1.08</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Traditional social role of Chinese female is to take care of their life-long partners and families → emotional component seemed to be an important element
Overall accuracy (or hit rate) of the logistic regression function for male subjects was 84.6% → good discriminatory power to differentiate between “able to return home group” & “unable to return home group”
Clinical Significance

Patient Stratification Care Approach

- Less hip pain
  - Better Cognition
  - Likely
    - Patient empowerment
    - Support services in community

- More hip pain
  - Poorer Cognition
  - Unlikely
    - Caregiver empowerment
    - Suitable rehabilitation unit/nursing home

2nd ambulatory training session
Smooth Transition
Discharge

Service Planning
Clinical Significance

Predictors

- Age
- Health status
- Pre-fracture functional status
- Pre-fracture ADL state
- Availability of caregiver
- PT training

Non-modifiable predictors

- Hip pain during walking
- Cognitive status

Modifiable predictors

Goal-oriented service

- Better symptomatic management (pain control)
- Optimize restorative rehabilitation (365-day service)
- Provide psychosocial support (patient / caregiver empowerment)

**ALL can receive appropriate level of care!**
Hip pain during walking & cognitive status early post-operation were significant predictors for discharge destination in men with fractured hip.

- Needs identification
- Stratified care
- Early, safe & smooth discharge

Efficient utilization of levels of care
Reduce hospital stay & enhance quality of life
Facilitate patient flow & better healthcare resource allocation
Reference

Thank You
## Outcome Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Numeric Pain Rating Scale (NPRS)**         | - 11-point scale (0-10)  
- Subjective intensity of pain experienced during walking                  |
| **Elderly Mobility Scale (EMS)**             | - Score: 0 (totally dependent) to 20 (independent)  
- 7 functional activities: bed mobility, transfers, locomotion, balance and key position changes |
| **Modified Barthel Index (MBI)**             | - Score: 0 to 100  
- Measure functional independence                                               |
| **Mini-Mental State Examination (MMSE)**     | - Score: 0 to 30  
- Measure cognitive ability that correlates with function in daily tasks      |
| **Self Efficacy for Exercise Scale (SEE Scale)** | - Score: 0 to 90  
- Self-report their confidence to engage in exercise where in the face of different barriers |