Promoting Functional Independence in the Context of an Acute Illness

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Objectives

1. Describe the prevalence of risk factors for functional decline among older persons who become acutely ill.
2. Explain potential barriers to hospital mobility for older adults.
3. Describe interventions to promote mobility among hospitalized elders.
Delirium

• Present on admission in 10-15% of older patients
• Occurs during admission for additional 10-30% of patients
• Predictor of prolonged hospital stay
• Associated with increased rates of hospital death and nursing home placement
• Demonstrated prevention measure:
  – **Avoidance of low mobility (bed rest or bed to chair transfers)**

Falls

• Average of 2.2 – 9.4 falls per 1000 bed days
• After controlling for age, rates vary depending on hospital service
• Major Risk factor:
  – Muscle weakness/ Deconditioning

Schwendimann R, et al. BMC Nursing 2005
Pressure Ulcers

• Annual incidence of hospital-acquired pressure ulcers 2.9 to 29%.
• ICUs; 33% incidence and 41% prevalence.
• Older patients admitted for non-elective orthopedic procedures, 66% incidence.
• Stage III-IV pressure ulcers considered a “never event” by CMS.
• Primary risk factor: bed rest/low mobility

Functional Decline

- Decline in ability to perform one or more basic Activities of Daily Living (ADL).
- Rates range from 15-35% during hospitalization.
- Only 10% recover prior to discharge.
- 15% not at pre-hospital level at 3 months.
- Major risk factor is **bed rest/ low mobility**

Boyd CM, J Am Geriatr Soc, 2009
Measuring Life-Space

Scores range from 0 – 120 with higher scores reflecting greater mobility.
Subjects stratified, random sample of Medicare beneficiaries living in 5 counties in central Alabama.

Study over-sampled males, African Americans, and rural residents.
Methods

• 211 hospitalizations among 687 participants over 4 years
  – Surgical admissions = 44;
  – Non-surgical admissions = 167

• Life-Space Assessment every 6 months

• Using multilevel change model to determine trajectory of Life-Space before and after hospitalization.
Life-Space Trajectories after Hospitalization

- Surgical admissions
- Non-surgical admissions

Years after enrollment vs. Life-Space composite
Key Point Regarding Hospital Hazards

• Many hospital hazards described share two predisposing factors:
  – Older age
  – Low mobility, defined as being limited to bed or chair
Potential Barriers to Hospital Mobility

Patient-related factors
- Illness severity
- Comorbid conditions
- Altered mental status
- Patients symptoms

Institution-related factors
- Staffing patterns
- Environment encourages bed rest
- Lack of ambulatory devices

Treatment-related factors
- Hospital devices
- Admitting diagnosis
- Side effects of medications

Attitudinal factors
- Attitude toward mobility
- Expectation of hospital stay
- Concern about falls
Methods

• **Participants:**
  – 10 patients, age $\geq$ 75 years admitted to medical wards at UAB Hospital
  – Patient’s nurse & physician also recruited (n=29)

• **Questionnaire Development:**
  – Semi-structured interview guide
  – New themes incorporated into interview
  – Interviews audiotaped, transcribed and examined for common themes
Barrier: Lack of Importance

"I think nurses in general would prefer the patient to stay in bed. I believe they perceive it as a risk for falls and a risk for pulling out their IVs or any other medical device and it is probably not viewed as an important factor in someone who is recovering from an illness."
Barrier: Environment

“I think it is just that patients, when they are in the hospital, they feel they are supposed to be in bed. And they are more comfortable there and a lot of times they can see the TV better.”
Implications

• Study an important step in development of successful interventions to minimize low mobility.
• Suggests there are modifiable and non-modifiable reasons for low mobility.
• Does not address the potential that illness severity and comorbid illness are key reasons for low mobility.
Prevalence and Outcomes of Low Mobility in Hospitalized Older Patients

Cynthia J. Brown, MD, Brown CJ, Friedkin RJ, Inouye

OBJECTIVES: To estimate the prevalence of different levels of mobility in a hospitalized older cohort, to measure the degree and rate of adverse outcomes associated with different mobility levels, and to examine the physician activity orders and documented reasons for bedrest in the lowest mobility group.

DESIGN: A prospective cohort study.

SETTING: An 80-bed university teaching hospital.

PARTICIPANTS: Four hundred ninety-eight hospitalized medical patients, aged 70 and older.

MEASUREMENTS: Using average mobility level, scored from 0 to 12, the low-mobility group was defined as having a score of 4 or less, intermediate as a score of higher than 4 to 8, and high as higher than 8. Outcomes were functional decline, new institutionalization, death, and death or new institutionalization.

RESULTS: Low and intermediate levels of mobility were common, accounting for 80 (16%) and 157 (32%) study patients, respectively. Overall, any activity of daily living (ADL) decline occurred in 29%, new institutionalization in 13%, death in 7%, and death or new institutionalization in 22% of patients in this cohort. When compared with the high mobility group, the low and intermediate groups were associated with the adverse outcomes in a graded fashion, even after controlling for multiple confounders. The low-mobility group had an adjusted odds ratio (OR) of 5.6 (95% confidence interval CI = 2.9–11.0) for ADL decline, 6.0 (95% CI = 2.5–14.8) for new institutionalization, 34.3 (95% CI = 6.3–185.9) for death, and 7.2 (95% CI = 3.6–14.4) for death or new institutionalization.

CONCLUSIONS: Low mobility and bedrest are common in hospitalized older patients and are important predictors of adverse outcomes. This study demonstrated that the adverse outcomes associated with low mobility and bedrest may be viewed as irrevocable events leading to complications, such as functional decline. J Am Geriatr Soc 52:1263–1270, 2004.

Key words: mobility; bedrest; hospital complications; geriatrics; sarcopenia.

Low mobility and bedrest are common occurrences during hospitalization. One study found that older patients were documented to be on bedrest for 23% of 3,500 patient-days studied. Another study found that 33% of older hospitalized patients were confined to bed or chair during three separate survey days. One report noted that 65% of patients experienced a decline in mobility from their pre-admission baseline to the second hospital day, with most patients failing to improve by discharge. These studies constitute the body of literature on the prevalence of low mobility and bedrest in hospitalized patients, yet none of the studies have examined mobility and associated adverse outcomes throughout the entire hospital course.

Hospitalization has been shown to be associated with adverse outcomes such as high rates of functional disability, increased lengths of stay, and increased likelihood of nursing home placement upon discharge. One study found older patients to be more at risk for medical and iatrogenic complications during hospitalization, which may contribute to these adverse outcomes. It has also been suggested that use of bedrest during hospitalization may be more
Prevalence and Outcomes of Low Mobility in Hospitalized Older Patients

- 498 hospitalized medical patients, age $\geq$ 70 years
- Mobility scale based on nurse report:
  - degree of assistance needed
  - number of times transferred and ambulated
- Average of all mobility observations for each patient, scores trichotomized.
  - 0-4: low mobility
  - 4.1-8: intermediate mobility
  - 8.1-12: high mobility
Prevalence of Low Mobility

- Bed rest present at some point during hospitalization for 33% of older patients
- 16% patients experienced low mobility, defined as bed or bed to chair activity, throughout hospitalization
# Increased Risk of Adverse Outcomes by Mobility

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Low Mobility</th>
<th>Intermediate Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any decline in ADLs</td>
<td>5.6</td>
<td>2.5</td>
</tr>
<tr>
<td>New Institutionalization at Discharge</td>
<td>6.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Death</td>
<td>34.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Death or New Institutionalization</td>
<td>7.2</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Adjusted for ADLs, Demographics, APACHE II, Charlson and ICU/CCU stay; Odds Ratio compared to High mobility group ($P < .006$)
Graded Relationship Between Mobility Level and Adverse Outcome

% with Outcome

- **Functional**
  - Low: 60%
  - Intrm: 40%
  - High: 0%

- **New**
  - Low: 30%
  - Intrm: 10%
  - High: 60%

- **In-Hospital Death**
  - Low: 10%
  - Intrm: 0%
  - High: 60%

- **Death or Institutionalization**
  - Low: 50%
  - Intrm: 40%
  - High: 10%
Documented Reasons for Bed Rest in Low Mobility Patients (176 obs in 66 pts)

<table>
<thead>
<tr>
<th>Diagnosis or Procedure</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No indication documented</td>
<td>102 (58)</td>
</tr>
<tr>
<td>Imminently terminal condition</td>
<td>18 (10.2)</td>
</tr>
<tr>
<td>Rule-out myocardial infarction</td>
<td>17 (9.7)</td>
</tr>
<tr>
<td>Hypoxemia with exertion</td>
<td>8 (4.5)</td>
</tr>
<tr>
<td>Acute post-operative period</td>
<td>6 (3.4)</td>
</tr>
<tr>
<td>Acute deep vein thrombosis</td>
<td>5 (2.8)</td>
</tr>
</tbody>
</table>
Conclusions

• Low mobility was associated with adverse outcomes after controlling for illness severity and comorbidities.
• Reasons for bed rest were frequently not documented.
• However, still lack a validated measure of mobility.
Epidemic of Low Mobility

• 45 hospitalized VA medical patients
  – age ≥ 65 years
  – not delirious or demented
  – able to walk in the 2 weeks prior to admission

• Mean proportion of time spent lying, sitting, and standing/walking determined for each hour after hospital admission using wireless monitors and previously validated algorithm.
Results

• Mean length of stay 5.1 days
• Generated 2592 one-hour periods of data
• No patient remained in bed entire measured hospital stay
• 83% of measured hospital stay spent lying in bed.
• Time spent standing/walking
  – Ranged from 0.2% to 21%
  – Median time was 3% or 43 minutes/day.
Conclusions

• Wireless monitors are a valid method of measuring mobility.

• Hospital patients are spending at least 80% of their time in bed.

• On average, less than 5% of time spent standing or walking.
Potential Interventions to Improve Mobility During Hospitalization

• Consult Physical Therapy
• Hospital Elder Life Program (HELP)
• Graduated Walking Programs
  – Specially trained transporters
  – Enhanced mobility program
Solution: Consult Physical Therapy

- In one 1000 bed hospital, PT receives 45-50 new referrals daily
- Patients seen once a day
- Average missed visit rate: 22%
- 8% patients referred day of discharge
- 10-12% of new PT referrals, no skilled need (i.e. inappropriate referrals)
Solution: Hospital Elder Life Program (HELP)

• Target six risk factors for delirium:
  – Cognitive Impairment
  – Sleep deprivation
  – Visual impairment
  – Hearing Impairment
  – Dehydration
  – Immobility
    • Early mobilization protocol; ambulation or ROM
    • Minimize use of immobilizing equipment
Solution: Early Ambulation with Trained Transporters

- Pilot study in community-based hospital using specially trained transporters to walk ward patients during slow periods.
- Included nights and week-ends
- Participants spent 2.4 days in program, with average of 5.6 walks per patient.
- Program feasible, but too small to demonstrate changes in outcomes.

Tucker D, Geriatr Nursing 2004
Safety and Efficacy of a Hospital Mobility Program
Specific Aim

• To examine the impact of a hospital mobility program on activities of daily living (ADL) and community mobility as measured by the Life-Space Assessment (LSA) compared to usual care.
Methods

- 100 patients from Birmingham VAMC
  - Not delirious or demented, walking 2 weeks PTA
- Randomly assigned to Mobility Program (MP) or Usual Care (UC).
- Daily assessments by blinded assessors.
- One month telephone follow-up.
- Physicians blinded to assure no change in usual care (e.g. activity orders, PT consults).
Methods (cont.)

**Mobility Program (MP)**
- Twice daily walks with assistance.
- Provision of rolling walker, if safe.
- Daily motivational interviewing.
- Provision of folder; document goals, barriers.

**Usual Care (UC)**
- Twice daily friendly visits.
- Provision of folders with friendly messages.
## Assessments

<table>
<thead>
<tr>
<th>In-Hospital</th>
<th>One month follow-up</th>
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<tbody>
<tr>
<td>• ADL ability</td>
<td>• ADL ability</td>
</tr>
<tr>
<td>• Baseline LSA</td>
<td>• Post-hospital LSA</td>
</tr>
<tr>
<td>• Depression</td>
<td></td>
</tr>
<tr>
<td>• APACHE II</td>
<td></td>
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<tr>
<td>• Charlson Comorbidity index</td>
<td></td>
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<tr>
<td>• Chart review for LOS, PT consults</td>
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### Baseline Characteristics (N = 100)

<table>
<thead>
<tr>
<th></th>
<th>Usual Care</th>
<th>Walking Program</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>73.4 ± 7.0</td>
<td>74.4 ± 6.9</td>
<td>0.48</td>
</tr>
<tr>
<td><strong>Gender, male</strong></td>
<td>49 (98%)</td>
<td>48 (96%)</td>
<td>0.56</td>
</tr>
<tr>
<td><strong>Race, black</strong></td>
<td>8 (16%)</td>
<td>11 (22%)</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>LOS, mean</strong></td>
<td>3.6 ± 2.4</td>
<td>4.6 ± 4.0</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>median</strong></td>
<td>3.0</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td><strong>GDS</strong></td>
<td>5.0 ± 3.0</td>
<td>4.7 ± 3.2</td>
<td>0.63</td>
</tr>
<tr>
<td><strong>Charleson Comorbidity</strong></td>
<td>4.1 ± 2.6</td>
<td>4.4 ± 2.4</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>APACHE</strong></td>
<td>15.3 ± 11.8</td>
<td>14.3 ± 10.6</td>
<td>0.67</td>
</tr>
<tr>
<td><strong>PT Ordered</strong></td>
<td>17 (34%)</td>
<td>24 (48%)</td>
<td>0.15</td>
</tr>
</tbody>
</table>
Results

• In-hospital, 3 falls in 2 patients reported – all in UC group

• 8 participants did not complete study; 2 UC and 6 WP
  – Death (n=3; 2WP, 1UC)
  – Medical complications (n=4, 4WP)
  – Patient refusal (n=1, 1UC)

• Missing ADL and LSA scores imputed
## Pre-Post Hospital Function

<table>
<thead>
<tr>
<th></th>
<th>Usual Care</th>
<th>Mobility Program</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline ADL</td>
<td>8.8 ± 2.3</td>
<td>8.4 ± 1.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Post-Hospital ADL</td>
<td>8.2 ± 2.2</td>
<td>8.1 ± 2.0</td>
<td>0.7</td>
</tr>
</tbody>
</table>

P-values for group differences between pre and post hospital outcomes adjusted for baseline, age, gender, race
Pre-Post Life-Space Assessment

<table>
<thead>
<tr>
<th></th>
<th>Usual Care</th>
<th>Mobility Program</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline LSA</td>
<td>51.5 (21.1)</td>
<td>53.9 (29.4)</td>
<td>0.4</td>
</tr>
<tr>
<td>Post-Hospital LSA</td>
<td>41.6 (21.5)</td>
<td>52.5 (29.0)</td>
<td>.0096</td>
</tr>
</tbody>
</table>

P-values for group differences between pre and post hospital outcomes adjusted for baseline, age, gender, race.
Independent Predictors of Post-Hospital LSA

- Independent predictors of post-hospital LSA using linear regression:
  - Baseline LSA (p<.0001)
  - Length of stay (p=.012)
  - Group assignment; MP or UC (p=.017)

- Model controlled for: Demographics, Depression, Illness Severity, Comorbidity score, LOS, Group Assignment (WP or UC) and baseline LSA.
Conclusions

• Participants in UC group experienced a mean 10-point decline in LSA scores, while those in MP group experienced a 1-point decline.

• Among survivors, being assigned to MP group was independently associated with a higher one-month post-hospitalization LSA.
Take Home Points

• Interventions designed to address modifiable barriers and provide a safe environment can increase mobility.

• Adverse outcomes (i.e. delirium, pressure ulcers, falls, and functional decline) probably can be prevented with increased mobility.
Exercising in the Park
Beijing, China 2007