ICU Mobility for the Trauma Patient: Opportunities and Challenges
Amy N. Hildreth, MD
Objectives

- Identify dangers of immobility
- Identify barriers to mobility
- Describe benefits of mobility
- Discuss who should participate in mobility
- Weigh risks and benefits of mobility
THE DANGERS OF GOING TO BED

BY

R. A. J. ASHER, M.D., M.R.C.P.

“It is my intention to justify placing beds and graves in the same category and to increase the amount of dread with which beds are usually regarded. I shall describe some of the major hazards of the bed. There is hardly any part of the body which is immune from its dangers.”

-British Medical Journal, Dec. 13, 1947
Barriers to ICU Mobility

- Safety concerns
- Wounds, lines, and tubes
- Time demands
- ICU delirium and oversedation
- Equipment costs
- Obesity
- Lack of mobility orders
- Cultural and educational factors
- Communication
Effects of Prolonged Immobility

- Musculoskeletal
  - Muscle wasting
  - Contractures
  - Osteoporosis

- Cardiovascular
  - Postural hypotension
  - Tachycardia
  - DVT/PE
Effects of Prolonged Immobility

- Respiratory
  - Pneumonia
  - Atelectasis
- Dermatologic
  - Pressure ulcers
  - Dependent edema
Effects of Prolonged Immobility

- Neurologic
  - Pressure neurophathies
  - Critical illness polyneuropathy
- Psychiatric
  - Anxiety
  - Depression
  - Sleep disturbance
Effects of Prolonged Immobility

• Metabolic/Endocrine
  • Decrease in lean body mass
  • Increase in body fat
  • Impaired glucose tolerance

• GU/GI
  • Urinary stasis/incontinence
  • Constipation
“They generally demonstrated increased nervousness and irritability and complained of aching in their back muscles, particularly during the first week of bed rest. Their appetites and caloric Intake remained unchanged throughout the study, but body weights decreased by 0.2-2.2 kg during bed rest.”
Neuromuscular Weakness

• Multifactorial
  • Bedrest
  • Inflammation
• Critical Illness Polyneuropathy
Benefits of Early Mobility

• Increased ventilator-free days
• Improved return to functional independence
• Decreased duration of delirium
• Decreased hospital and ICU LOS
• Increased strength and exercise capacity
• No effect on mortality in RCTs

Kayambu et al, CCM 2013
<table>
<thead>
<tr>
<th>Randomised Controlled Trials</th>
<th>Statistics for each study</th>
<th>Hedge's g and 95% Confidence Interval</th>
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<tbody>
<tr>
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Kayambu et al, CCM 2013
### Randomised Controlled Trials

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<th>Length of ICU Stay</th>
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<td>Odds Ratio (n=274)</td>
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Favours physical therapy  Favours standard care

Kayambu et al, CCM 2013
Adverse Events

- Oxygen desaturation
- Change in heart rate or blood pressure
- Accidental removal of support equipment
- Fall
- No serious adverse events that required life saving measures or alterations in the patient’s medical care*

*Li et al, PM&R, in press
Mobility- Not an All-or-Nothing Proposition

- Positioning
- Passive and active turning
- Exercise while in bed (e.g. pedals)
Mobility- Not an All-or-Nothing Proposition

- Positioning
- Passive and active turning
- Exercise while in bed (e.g. pedals)
- Sitting at edge of bed
- Transferring to chair
Mobility- Not an All-or-Nothing Proposition

• Positioning
• Passive and active turning
• Exercise while in bed (e.g. pedals)
• Sitting at edge of bed
• Transferring to chair
• Standing independently
• Walking
Criteria for Mobility

• Neurologic readiness
• Respiratory stability
• Cardiovascular stability
• Absence of unstable fracture
Mobility Orders

• Part of SICU admission order set

• Mandatory entry in order to proceed to next order
  • Mobility protocol
  • Bedrest
    • Must specify reason for bedrest
Inclusion Criteria

• All patients admitted to SICU

• Not mechanically ventilated OR
• Mechanically ventilated with tracheostomy
Exclusion Criteria

• Active myocardial infarction
• Coagulopathy
  • PTT > 100
  • INR > 5
  • Platelets < 10,000
• Open abdominal fascia
• Altered mental status
• Continuous Renal Replacement Therapy
Exclusion Criteria

• Heart Rate > 120 beats/minute
• Systolic Blood Pressure < 90 mm Hg
• Presence of new or unstable arrhythmia
• Oxygen saturation < 90%
• FiO2 > 0.6
• Respiratory Rate > 30 breaths/minute
Nursing Mobility Protocol

• Assessment within 6 hours of ICU admission
• Screening for inclusion/exclusion criteria
• Patients sit in chair with assistance once per shift
• Monitoring for physiologic stop criteria
• If exclusion criteria present, assessment every 6 hours
Two Study Groups

• Group A
  • 50 patients
  • Retrospective evaluation
  • Beginning May 2008

• Group B
  • 50 patients
  • Prospective cohort
  • Beginning January 2009
<table>
<thead>
<tr>
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<th>Group A (n=50)</th>
<th>Group B (n=50)</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Age (years)</td>
<td>59.7 ± 15.6</td>
<td>50.0 ± 11.4</td>
<td>.805</td>
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<tr>
<td>Sex</td>
<td>23 male, 27 female</td>
<td>26 male, 24 female</td>
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<tr>
<td>Admission SOFA score</td>
<td>3.7 ± 2.2</td>
<td>3.7 ± 2.8</td>
<td>.906</td>
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<tr>
<td>Discharge SOFA score</td>
<td>2.7 ± 2.4</td>
<td>2.5 ± 1.8</td>
<td>.254</td>
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</table>
A and B Group Outcomes

- % Orders Entered*
- % Mobility Attained*
- % Order Compliance*

Legend:
- A Group
- B Group

* p < .05
Barriers to ICU Mobility

• Safety concerns
• Wounds, lines, and tubes
• Time demands
• ICU delirium and oversedation
  • Equipment costs
• Obesity
  • Lack of mobility orders
• Cultural and educational factors
• Communication
Keys to Success

• Patient selection
• Team approach
• Communication
• Education
• Multimodal approach
• ICU culture change
• Champion
Questions Remaining

• What is the ideal “dose” of ICU mobility?

• What is the best type of ICU activity?

• Who should mobilize patients in the ICU?

• What are outcomes in trauma patients?
“Teach us to live that we may dread, Unnecessary time in bed. Get people up and we may save, Our patients from an early grave.”

- Richard Asher