The Effects of Early Mobility in Reducing Length of Stay for Adult Patients in the Intensive Care Unit Due to Trauma: A Systematic Review

Stephanie Klug, SPT
Molly Loftus, SPT
Stephanie Zaccaria, SPT
Dana Maida, PT, DPT, Geriatric Certified Specialist
Janette Scardillo, PT, DPT, Certified Brain Injury Specialist
Overview

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Patients in the ICU due to Trauma

- High risk for complications associated with immobility\(^1\)
- Extensive orthopedic and neurological injuries\(^1\)
- Difficult to mobilize these patients\(^2\)
  - Lines and tubes
  - Medical stability
  - Sedation
  - Severe weakness
Early Mobility

- No standard definition for the term “early”\(^3\)
- Safe intervention to decrease the negative effects of bed rest and preserve ICU and hospital functional outcomes\(^4\)
- Early mobility programs typically consists of exercises that begin in bed and progress to the end goal of ambulation\(^4\)
- Typically beginning as soon as patients demonstrate sufficient physiologic stability\(^4\)
Early Mobility Contraindications

- **Neurologic**
  - No response to verbal stimulation
  - Elevated ICP
  - Agitation requiring sedative

- **Respiratory**
  - Inability to maintain SpO2 >86%
  - FiO2 >0.6 or PEEP >12cmH2O
  - RR >40breaths/min

- **Circulatory**
  - MAP <60 mmHg or >115mmHg
  - HR >120 bpm or <50bpm at rest
  - Dysrhythmia requiring medication

- **Other**
  - Renal replacement therapy
  - Unstable fractures
  - Open abdomen
Six systematic reviews have found overall positive benefits of early mobility delivered in the ICU\textsuperscript{4}

Early mobility has been shown to decrease ICU and hospital lengths of stay\textsuperscript{6}

Importantly physical therapy can be performed safely for patients who are critically ill\textsuperscript{7}
Purpose

To determine if mobility is an effective intervention to reduce length of stay (LOS) for adult (>18 y/o) patients in the Intensive Care Unit (ICU) due to trauma
Methods

Databases

- CINAHL
- ProQuest
- Pubmed
- HealthSource:Nursing/Academic Edition
Methods

Search terms

(“Physical therapy” OR “physiotherapy”) AND ("Intensive Care Unit" OR “ICU”) AND ("length of Stay" OR “LOS”) AND ("Trauma") NOT ("Pediatric" OR "Neonatal")
Methods

Search limits

- English language
- Published within past 10 years
- Peer-reviewed
Methods

Selection Criteria

- Patients in the ICU due to trauma
- Adults >18 years
- Mobility performed as an intervention
- Measures of hospital and ICU length of stay
Records identified through database searching (n=305)

Additional records identified through other sources (n=0)

Records after duplicates removed (n=286)

Records screened (n=286)

Full-text articles assessed for eligibility (n=31)

Studies included in qualitative synthesis (n=5)

Studies included in quantitative synthesis (meta-analysis) (n=0)

Records excluded (n=255)
- irrelevant- 222
- conference presentation- 12
- inappropriate study design- 13
- inappropriate setting- 8

Full-text articles excluded, with reasons (n=26)
- Inappropriate patient population- 10
- Proposed study protocol- 9
- Inappropriate setting- 5
- Inappropriate outcome measure- 2
<table>
<thead>
<tr>
<th>Author and Title</th>
<th>Study Design</th>
<th>Sackett Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Booth K et al</strong> - Progressive Mobility Protocol Reduces Venous Thromboembolism Rate in Trauma Intensive Care Patients(^1)</td>
<td>Pre and Post Intervention Study</td>
<td>4</td>
</tr>
<tr>
<td><strong>Clark DE et al</strong> - Effectiveness of an Early Mobilization Protocol in a Trauma and Burns Intensive Care Unit(^6)</td>
<td>Case Control Study</td>
<td>3B</td>
</tr>
<tr>
<td><strong>Gillick BT et al</strong> - Mobility criteria for upright sitting with patients in the neuro/trauma intensive care unit: an analysis of length of stay and functional outcomes(^9)</td>
<td>Case Control Study</td>
<td>3B</td>
</tr>
<tr>
<td><strong>Pandullo SM et al</strong> - Time for critically ill patients to regain mobility after early mobilization in the intensive care unit and transition to a general inpatient floor(^6)</td>
<td>Retrospective Study</td>
<td>4</td>
</tr>
<tr>
<td><strong>Sottile PD et al</strong> - Physical Therapist Treatment of Patients in the Neurological Intensive Care Unit(^7)</td>
<td>Retrospective Study</td>
<td>4</td>
</tr>
</tbody>
</table>
Sample sizes ranged from 30-2,167 participants
Both males and females were included
Average age range: 44.1-65 years
Specific setting
- Neuro/Trauma ICU – 2
- Burn/Trauma ICU - 1
- Neurological ICU - 1
- General ICU- 1
Study Characteristics Continued

- 3 studies specified a classification system of mobility progression \(^{1,6,8}\)
  - Amount of classifications ranged from 3 to 6
  - Lower levels performed PROM and bed mobility
  - Higher levels performed transfers and ambulation
1 study utilized a progression program without defining levels\textsuperscript{7}
- Categorized as ROM, bed based interventions, transfers, standing, and ambulation

1 study performed an upright sitting program\textsuperscript{9}
- Participants were assisted from supine to upright sitting with lower extremities in a dependent position off the side of the bed.
Study Characteristics Continued

Primary Outcomes

- Hospital Length of Stay$^{1,6,7,8,9}$
- ICU Length of Stay$^{1,6,7,8,9}$

Secondary Outcomes

- Glasgow Coma Scale (GCS)$^{7,9}$
- Injury Severity Scale (ISS)$^{1,8}$
<table>
<thead>
<tr>
<th>Author of Article</th>
<th>Mechanism of Injury</th>
<th>Specific Diagnosis</th>
<th>Scale Utilized for Severity of Injury</th>
<th>Hospital LOS</th>
<th>ICU LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booth et al&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Not specified</td>
<td>TBI, undefined trauma</td>
<td>ISS</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Clark et al&lt;sup&gt;8&lt;/sup&gt;</td>
<td>Blunt trauma, Penetrating injury, Burns</td>
<td>SCI, fracture</td>
<td>ISS</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Gillick et al&lt;sup&gt;9&lt;/sup&gt;</td>
<td>MVA, pedestrian injury, gunshot, assault</td>
<td>SDH, EDH, cerebral edema, Pneumocephalus, Hydrocephalus, cerebellar infarct SCI, spine subluxation</td>
<td>GCS</td>
<td>Decreased</td>
<td>Decreased</td>
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<tr>
<td>Pandullo et al&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Decreased</td>
<td>Decreased</td>
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<tr>
<td>Sottile et al&lt;sup&gt;7&lt;/sup&gt;</td>
<td>Not specified</td>
<td>SAH, SDH, ICH, trauma</td>
<td>GCS</td>
<td>Not specified</td>
<td>Not specified</td>
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Conclusion

There is weak to moderate evidence available on whether early mobilization affects length of stay in patients following trauma.
Conclusion

- Physical therapy was safely involved in the ICU care of all patients following trauma
- Although not statistically significant, hospital and ICU LOS improved in all studies to some degree
Clinical Relevance

- Early mobility is a beneficial physical therapy intervention for patients with trauma
- Safety
- Reduction in acute care stay
- Importance of PT involvement in early mobility protocol
Limitations

- Varied study designs
- Small sample sizes
- Limited definitions of protocols
- Definition of early mobility as a treatment
- Varied mechanism of injury
Future Research

- Include long-term follow-up with larger sample size
- Identify a standard definition of early mobility
- Identify a standardized early mobility classification
- Identify effects of early mobility on quality of life
Early mobility has been shown to decrease a patient’s hospital and ICU length of stay in patients following trauma.

Utilizing early mobility as a treatment in the ICU is a safe and feasible option for patients following a traumatic event to prevent the detrimental effects of bed rest.

Physical therapists play a vital role in implementing an early mobility protocol as part of the interdisciplinary team.
Acknowledgements

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References


Questions?