ASK THE QUESTION

Question: In adult ICU and med-surg patients, does the use of early mobility protocols reduce fall rates and decrease length of stay?

SEARCH FOR EVIDENCE

Databases: PubMed, Scopus, CINAHL


Filters: English, Published last 10 years

CRITICALLY ANALYZE THE EVIDENCE

There were five articles found addressing the outcomes of early mobility protocols on adult ICU patients. No articles were found directly addressing the use of early mobility protocols in adult med-surg patients, and no studies directly addressed the impact on fall rates. Four systematic reviews and meta-analyses (Castro-Avila, et al., 2014; Li et al., 2013; Nydahl et al., 2017; Tipping et al., 2017) addressed this question, but inclusion criteria and outcomes of interest varied. Authors for all four of these studies noted there was significant heterogeneity in the definition of early mobility in the literature, as well as in the frequency, length and protocols of the interventions included in their analyses. There was also one recent, multi-center RCT (Schaller et al., 2016) that was evaluated.

Length of stay:
Castro-Avila, et al. (2014) completed a meta-analysis of 6 RCTs and quasi-experimental studies comparing early rehabilitation to usual care in ICU patients. They found that while early rehabilitation resulted in a significant increase in the number of patients walking without assistance in hospital discharge (RR 1.42, 95% CI 1.17-1.72), and risk of ICU-acquired weakness, that ICU length of stay (LOS) and hospital LOS were not significantly different. Similarly, Li et al. (2013) performed a systematic review of 17 studies of mechanically-ventilated adult patients and found that physical function (walking ability) was significantly improved in early mobilization patients compared to usual care, but that the majority of trials indicated no significant reductions in ICU or hospital LOS.
A multi-center, international RCT by Schaller et al. (2016) evaluated functional status and LOS in 200 adult surgical ICU (SICU) patients at five university medical centers assigned to either an early, goal-directed mobilization protocol (n=104) or control (n=96). The goal-directed mobilization protocol included a strict mobilization algorithm combined with daily, facilitated interprofessional communication on patient progress. Both groups had daily awakening trials, spontaneous breathing trials, and neuro assessments, and were regularly screened for arousal, delirium, and pain intensity. SICU LOS was significantly shorter in the intervention group (group difference -3.0 days, 95% CI –6.0 to –1.0, p=0.0054), as was hospital LOS (group difference -6.5 days, 95% CI -11.0 to -1.5, p=0.011). Additionally, the number of delirium-free days in the ICU was significantly higher in the intervention group (group difference 3 days, 95% CI 0.5-5.5, p=0.016).

Other related outcomes:
Tipping et al. (2017) completed a meta-analysis of 14 RCTs and quasi-experimental studies comparing the mortality rates of adult ICU patients provided early rehabilitation or usual care. They found that mortality was not significantly different at ICU discharge (risk difference 0.02, 95% CI -0.01 to 0.05), hospital discharge (risk difference -0.00, 95% CI -0.04 to 0.03) or at 6 months post (risk difference 0.01, 95% CI -0.06 to 0.08). However, early rehabilitation did show improvements in muscle strength at ICU discharge (3 studies) and walking ability at hospital discharge (2 studies).

Nydahl et al. (2017) performed a meta-analysis of safety data in 43 articles regarding patient mobilization and rehabilitation in the adult ICU. They evaluated the reporting of “potential safety events” (i.e., clinical deterioration) and “safety events with consequences” (i.e., adverse effects not corrected by stopping intervention or additional intervention needed). This analysis resulted in a pooled 2.6% incidence rate for potential safety events. Additionally, falls were reported in 0.07% of sessions (27 studies), cardiac arrest was reported in 0.03% of sessions (26 studies) and hemodynamic changes were reported in 1.8% of sessions (33 studies).

Based on these findings, further research that includes more consistently-defined early mobility protocols is warranted to establish whether length of stay is reliably reduced by the use of these protocols.

<table>
<thead>
<tr>
<th>PICO Question: In adult ICU and med-surg patients, does the use of early mobility protocols reduce fall rates and decrease length of stay?</th>
<th>GRADE CRITERIA (See Appendix A)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author/Date/Journal</strong></td>
<td><strong>Purpose of Study</strong></td>
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<tr>
<td>Castro-Avila, et al., 2014, PloS One</td>
<td>To determine the effect of early rehabilitation for functional status in adult ICU/high-dependency unit (HDU) patients</td>
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<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Study Type</th>
<th>Methods</th>
<th>Results</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li et al., 2013, Archives of Physical Medicine and Rehabilitation</td>
<td>To investigate the effectiveness and safety of active mobilization on improving physical function and hospital outcomes in adult patients undergoing mechanical ventilation for more than 24 hours</td>
<td>Systematic review</td>
<td>17 studies (1614 patients) Excluded passive-only therapies, and where intervention was during hospital stay and after discharge Active mobilization: assisted training such as in-bed exercises, sitting on the edge of the bed, standing beside the bed, transfer to a chair and assisted or independent ambulation</td>
<td>Substantial heterogeneity prevented use of formal meta-analysis methodology Physical function (narrative assessment): Walking ability was significantly improved in the early mobilization patients (3 studies) LOS (narrative assessment): Majority of trials (n=5 RCTs) indicated no significant reductions in length of ICU stay (7 studies) Majority of trials (n=2 RCTs) indicated no significant reductions in length of hospital stay (3 studies)</td>
<td>Study Limitations = None Systematic Review Review did not address focused clinical question Search was not detailed or exhaustive Quality of the studies was not appraised or studies were of low quality Methods and/or results were inconsistent across studies</td>
</tr>
<tr>
<td>Nydahl et al., 2017, Annals of the American Thoracic Society</td>
<td>To synthesize safety data regarding patient mobilization and rehabilitation in the adult</td>
<td>Systematic review &amp; meta-analysis</td>
<td>43 articles (7546 patients) -22,351 sessions Excluded passive-only therapies “Potential safety events”: clinical deterioration in patient status or an event exceeding each study’s 583 potential safety events were reported -2.6% incidence rate Falls were reported in 0.07% of sessions (27 studies) Cardiac arrest was reported in</td>
<td>Study Limitations = None Systematic Review Review did not address focused clinical question Search was not detailed or exhaustive Quality of the studies was not appraised or studies were of low quality Plausible confounders (When plausible residual confounding is directly impacting the magnitude of effect)</td>
<td></td>
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No trials found a significant difference in ICU stay between early rehabilitation and usual care groups (6 studies) No trials found a significant difference in hospital stay between early rehabilitation and usual care groups (4 studies)
| Date of ICU, including falls, removal of endotracheal tubes, removal or dysfunction of intravascular catheters, removal of other catheters/tubes, cardiac arrest, hemodynamic changes, and desaturation | a priori safety limits (e.g., systolic blood pressure < 160 mm Hg)  
“Safety events with consequences”: potential safety event associated with any of the following: (1) stopping mobilization/rehabilitation; (2) adverse health consequences that were not resolved by stopping mobilization/rehabilitation; or (3) interventions or additional therapy required to address the event | 0.03% of sessions (26 studies)  
Hemodynamic changes were reported in 1.8% of sessions (33 studies) | appraised or studies were of low quality  
Methods and/or results were inconsistent across studies |
|---|---|---|---|
| Tipping et al., 2017, Intensive Care Medicine | To determine the effect of active mobilization and rehabilitation in the adult ICU on mortality, function, mobility, muscle strength, quality of life, days alive and out of hospital to 180 days, ICU and hospital lengths of stay, duration of mechanical ventilation and discharge destination | Systematic review & meta-analysis | 14 RCTs and quasi-experimental studies (1753 patients)  
Excluded if passive-only therapy, rehab started after ICU discharge or in rehabilitation facilities  
Active mobilization: included any combination of active exercises in bed, bed mobility practice, progression of mobility from sitting, to standing and ambulation, tilt table therapy or hoisting to a chair -frequency at least daily; 15-31 minutes per day  
Control: received standard physical therapy as determined by the treating center during the ICU admission and standard medical and nursing care -frequency range: daily to 1 time per week |
| Schaller et al., 2016, Lancet | To test whether early, goal-directed mobilization leads to improved | RCT -multicenter, international  
-200 adult SICU patients at 5 university medical centers assigned to an early, goal-directed mobilization protocol (n=104) or control (n=96) group from 2011-15 | Intent-to-treat analysis:  
-significantly higher mean achieved SOMS level in the intervention group than in the control group (group difference 0.7, 95% CI 0.4–1.0, p<0.0001) | Study Limitations =  
None  
RCT & Quasi-Experimental Studies  
Insufficient sample size  
Lack of randomization |
mobility, decreased surgical ICU (SICU) length of stay, and increased functional independence of patients at hospital discharge

-mechanically ventilated for < 48 hr, but expected to require ventilation for at least another 24 hours at screening
-intervention began within 24 hours of enrollment
-excluded patients with Glasgow Coma Scale < 5 for a motor component, admitted for more than 5 days at screening, cardiopulmonary arrest, raised intracranial pressure, unstable fractures, pregnancy, acute MI, lower leg amputation, rapidly developing neuromuscular disease and ruptured or leaking aortic aneurysm

-both groups had daily awakening trials, spontaneous breathing trials, and neuro assessments; both groups regularly screened for arousal, delirium, and pain intensity

Strict mobilization algorithm combined with facilitated interdisciplinary communication [SICU optimal mobilization score (SOMS) ranged from 0-4]

-5 level algorithm for daily mobilization goal ranging from no activity (0) to ambulation (4) based on safety criteria and progressed
-daily goal posted at the patient’s bedside and discussed during morning rounds

Control group protocols for mobilization and physical therapy varied slightly by study center

-patients in intervention group left the SICU with a significantly higher mobilization level as documented by the final SOMS level (52% at SOMS level 4 vs 25%; p<0.001)

-functional independence scores at hospital discharge were significantly higher in the intervention group (group difference 3, 95% CI 1-4, p=0.0002)

-SICU LOS was significantly shorter in the intervention group (group difference −3.0 days, 95% CI −6.0 to −1.0, p=0.0054)

-hospital LOS was significantly shorter in the intervention group (group difference −6.5 days, 95% CI −11.0 to −1.5, p=0.011)

-Delirium-free days in the ICU were significantly higher in the intervention group (group difference 3 days, 95% CI 0.5-5.5, p=0.016)

Adverse events were reported in 2.3% of mobilization days

-hypotension most frequent

REFERENCES


### Appendix A: GRADE criteria for rating a body of evidence on an intervention

Developed by the GRADE Working Group

#### Grades and interpretations:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td>High</td>
<td>Further research is very unlikely to change our confidence in the estimate of effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.</td>
</tr>
<tr>
<td>Low</td>
<td>Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.</td>
</tr>
<tr>
<td>Very low</td>
<td>Any estimate of effect is very uncertain.</td>
</tr>
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</table>

#### Type of evidence and starting level

<table>
<thead>
<tr>
<th>Evidence Type</th>
<th>Starting Level</th>
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<tbody>
<tr>
<td>Randomized trial</td>
<td>High</td>
</tr>
<tr>
<td>Observational study</td>
<td>Low</td>
</tr>
<tr>
<td>Any other evidence</td>
<td>Very low</td>
</tr>
</tbody>
</table>

#### Criteria for increasing or decreasing level

**Reductions**

- Study quality has serious (–1) or very serious (–2) problems
- Important inconsistency in evidence (–1)
- Directness is somewhat (–1) or seriously (–2) uncertain
- Sparse or imprecise data (–1)
- Reporting bias highly probable (–1)

**Increases**

- Evidence of association† strong (+1) or very strong (+2)
- Dose-response gradient evident (+1)
- All plausible confounders would reduce the effect (+1)

†Strong association defined as significant relative risk (RR 2-5 or 0.5-0.2) based on consistent evidence from two or more studies with no plausible confounders;

Very strong association defined as significant relative risk (RR >5 or <0.2) based on direct evidence with no threats to validity