ICU Rehabilitation –
The Physiotherapist’s Perspective

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Why is early rehabilitation in the ICU important?

- By 2026, the anticipated need for mechanical ventilation will increase by 80%  

- Long-term physical disability (6 minute walk) persists for up to 5 years post-ICU  
  *NEJM.* 2011;364:1293-304.

- Lower levels of physical fitness are directly associated with all-cause mortality and cardiovascular disease  

- PT & OT often under-prescribed in the ICU  

- Early rehab can reduce ICU and hospital LOS  
  *Arch Phys Med Rehabil* 2010;91:536-42.
Prospective 1- and 5-year follow-up study of 109 ICU survivors

Setting: 4 Canadian ICUs
Population: Adult patients with ARDS

Outcomes:
Primary – 6 minute walk test
Pulmonary function tests
Health-related quality of life

Clinical Course

6 minute walk distance

<table>
<thead>
<tr>
<th>Time</th>
<th>N</th>
<th>Distance</th>
<th>% Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>83</td>
<td>281 m</td>
<td>49%</td>
</tr>
<tr>
<td>6 months</td>
<td>82</td>
<td>396 m</td>
<td>64%</td>
</tr>
<tr>
<td>12 months</td>
<td>83</td>
<td>422 m</td>
<td>66%</td>
</tr>
<tr>
<td>60 months</td>
<td>64</td>
<td>436 m</td>
<td>76%</td>
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RCT of cycling in the ICU


Primary outcome
6 minute walk distance @ hospital discharge ($\Delta=50$ m)

196 m [126-329m]  

p<0.05

143 m [37-226m]
RCT of early PT/OT in the ICU

**Primary Outcome:**
Independent functional status @ hospital discharge
(FIM + independent walking)

- **Medical ICU**
  - **Daily interruption of sedation + Early OT/PT 7d/wk**
    - N=49
    - 59% (29/49) p=0.02
  - **Daily interruption of sedation + Standard care OT/PT**
    - N=55
    - 35% (19/55)
It’s about receiving therapy while on mechanical ventilation

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Intervention N=49</th>
<th>Control N=55</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PROM</td>
<td></td>
<td></td>
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<tr>
<td>• AAROM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AROM</td>
<td></td>
<td></td>
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<tr>
<td>• Bed Mobility</td>
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<tr>
<td>• Transfers (sitting)</td>
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<tr>
<td>• Sitting balance</td>
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<tr>
<td>• ADLs</td>
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<tr>
<td>• Transfers (standing)</td>
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<tr>
<td>• Ambulation</td>
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<tr>
<td>Median time to start therapy (d)</td>
<td>1.5 [1.0 to 2.1]*</td>
<td>7.4 [6.0 to 10.9]</td>
</tr>
</tbody>
</table>

* = p<0.0001

0.32 h/d = 19.2 minutes
But not all patients can participate in early rehab
Neuromuscular electrical stimulation is a potential solution
Research Question

Clinicaltrials.gov # NCT00709124

In mechanically ventilated adult ICU patients, does twice-daily NMES therapy applied bilaterally to lower extremity muscle groups compared to sham therapy reduce muscle weakness at hospital discharge?

Quadriceps

Tibialis Anterior

Gastrocnemius
Outcome Measurement Timing

Clinical Course

- ICU Admission
- Study Entry >24h MV
- 1 Day MV
- NMES/Sham Therapy
- Routine PT
- Awake

Study Outcome Assessments

- Test #1
- Test #2
- Test #3

Sample Size Calculation

- N=82 maximum
- N=54 maximum (27 per group)

Enrollment (as of 11/16/2011)

- N=19
- N=15
Success factors for early ICU rehab

• Team work
• Coordination
• Communication