Barriers to Early Rehabilitation in Critically Ill Patients

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Objectives

• To review what we know about the current practice of early mobility
• To discuss barriers and facilitators to early mobility
• To provide some practical guidelines on implementation of early mobility
Bed Rest for Recovery

• "In every movement of the body, whenever one begins to endure pain, it will be relieved by rest."
Bed rest: a potentially harmful treatment needing more careful evaluation

THE LANCET • Vol 354 • October 9, 1999

• Systematic Review
  – 39 trials of bedrest
  – NOT ONE trial showed benefit (and many showed harm)
For acutely hospitalized adults who have been mechanically ventilated for >24 hours, we suggest protocolized rehabilitation directed toward early mobilization.
Physical therapy utilization in intensive care units: Results from a national survey

Katherine E. Hodgin, MD; Amy Nordon-Craft, MA; Kim K. McFann, PhD; Meredith L. Mealer, RN; Marc Moss, MD

– Automatic evaluation of ICU patients by PT at 1% of hospitals
– PT involvement highly impacted by admitting diagnosis (stroke, spinal cord injury, MVA vs. medical admission)

Hodgin et al., Crit Care Med, 2009
We’re not doing enough mobility

Berney et al., Crit Care Resusc
None of these patients were mechanically ventilated.

Berney et al., Crit Care Resusc
We’re not doing enough mobility

<table>
<thead>
<tr>
<th>Level of Mobilization</th>
<th>Total (n = 775) (%)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Endotracheal Tube (n = 401) (%)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining in bed&lt;sup&gt;d&lt;/sup&gt;</td>
<td>590 (76)</td>
<td>370 (92)</td>
</tr>
<tr>
<td>No mobilization</td>
<td>81 (11)</td>
<td>61 (15)</td>
</tr>
<tr>
<td>Turning in bed</td>
<td>342 (44)</td>
<td>224 (56)</td>
</tr>
<tr>
<td>Sitting in bed</td>
<td>167 (22)</td>
<td>85 (21)</td>
</tr>
</tbody>
</table>

*Nydahl et al., Crit Care Med 2013*
BARRIERS AND FACILITATORS
Barriers and Facilitators

1. Does early mobility REALLY work?
2. Is it dangerous?
3. Team Conflict and Co-ordination
4. Using a Protocol
1. Does it REALLY work?
For acutely hospitalized adults who have been mechanically ventilated for >24 hours, we suggest protocolized rehabilitation directed toward early mobilization. (conditional recommendation, low certainty in the evidence).
Early exercise in critically ill patients enhances short-term functional recovery*

- Randomized 90 patients
  - Bed based cycling program
  - Usual care
- Primary outcome
  - Six minute walk at hospital discharge
  - 196 (intervention) vs 143 metres (controls), p<0.05
- Also had improved quadriceps strength and HRQOL

*Burtin et al., Crit Care Med, 2009
Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial

William D Schweickert, Mark C Pohlman, Anne S Pohlman, Celerina Nigos, Amy J Pawlik, Cheryl L Esbrook, Linda Spears, Megan Miller, Mietka Franczyk, Deanna Deprizio, Gregory A Schmidt, Amy Bowman, Rhonda Barr, Kathryn E McCallister, Jesse B Hall, John P Kress

Lancet, 2009

- Mechanically ventilated adult medical ICU patients
- Functionally independent at baseline
- <72 hours of mechanical ventilation
Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial

William D Schweickert, Mark C Pohlman, Anne S Pohlman, Celerina Nigos, Amy J Pawlik, Cheryl L Esbrook, Linda Spears, Megan Miller, Mietka Franczyk, Deanna Deprizio, Gregory A Schmidt, Amy Bowman, Rhonda Barr, Kathryn E McCallister, Jesse B Hall, John P Kress

- More patients returned to independent function (59 vs 30%, \( p=0.02 \))
- Reduced ICU delirium days (2 vs 4, \( p=0.03 \))
- No difference in ICU or hospital LOS
ICU Early Physical Rehabilitation Programs: Financial Modeling of Cost Savings*  
Lord et al., Crit Care Med, 2013

Impact of Early Mobilization on Glycemic Control and ICU-Acquired Weakness in Critically Ill Patients Who Are Mechanically Ventilated  
Patel et al., Chest, 2013
Exercise rehabilitation for patients with critical illness: a randomized controlled trial with 12 months of follow-up

Linda Denehy¹, Elizabeth H Skinner², Lara Edbrooke¹, Kimberley Haines², Stephen Warrillow³, Graeme Hawthorne⁴, Karla Gough⁵, Steven Vander Hoorn⁶, Meg E Morris⁷ and Sue Berney²

- ICU patients with length of stay at least 5 days
- Intervention
  - Mix of functional and strength training and cardiovascular training (cycle ergometer)
  - Started in ICU, continued on ward and until 8 weeks after hospital discharge
- Planned sample size = 200
- Primary outcome – six minute walk test at six months
Exercise rehabilitation for patients with critical illness: a randomized controlled trial with 12 months of follow-up

Linda Denehy, Elizabeth H Skinner, Lara Edbrooke, Kimberley Haines, Stephen Warrillow, Graeme Hawthorne, Karla Gough, Steven Vander Hoorn, Meg E Morris and Sue Berney

- 92% intubated during ICU stay
- 55% mechanically ventilated at study entry
Exercise rehabilitation for patients with critical illness: a randomized controlled trial with 12 months of follow-up

Linda Denehy¹, Elizabeth H Skinner², Lara Edbrooke¹, Kimberley Haines², Stephen Warrillow³, Graeme Hawthorne⁴, Karla Gough⁵, Steven Vander Hoorn⁶, Meg E Morris⁷ and Sue Berney²

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Baseline</th>
<th>ICU discharge</th>
<th>Discharge to home</th>
<th>3 months post-ICU discharge</th>
<th>6 months post-ICU discharge</th>
<th>12 months post-ICU discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD)</td>
<td>n</td>
<td>Mean (SD)</td>
<td>n</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>6MWT (m) Usual</td>
<td>60</td>
<td>187.9 (126.1)</td>
<td>58</td>
<td>266.7 (136.8)</td>
<td>52</td>
<td>382.1 (139.4)</td>
</tr>
<tr>
<td>care Intervention</td>
<td>63</td>
<td>146.4 (79.4)</td>
<td>59</td>
<td>244.2 (124.0)</td>
<td>48</td>
<td>384.5 (147.9)</td>
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- No difference in secondary endpoints (timed up and go, HRQOL)
Standardized Rehabilitation and Hospital Length of Stay Among Patients With Acute Respiratory Failure
A Randomized Clinical Trial

Morris et al., JAMA 2016

• Single centre, randomized 300 patients to graded physical therapy regimen including PROM, PT and resistance training
• Started in ICU, continued on the ward
• Primary outcome – hospital LOS
• No difference in primary outcome
  – LOS 10 days in both groups (p=0.41)
• No difference in duration of ventilation or ICU care
A Randomized Trial of an Intensive Physical Therapy Program for Patients with Acute Respiratory Failure


120 patients

61 Usual early mobility

59 Intensive early mobility
A Randomized Trial of an Intensive Physical Therapy Program for Patients with Acute Respiratory Failure


- No difference in
  - Physical function at 1, 3 or 6 months
  - ICU free days
  - Hospital free days
  - Likelihood of discharge home vs. other facility
Where does this leave us?

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>N</th>
<th>Primary Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schweickert et al., Lancet</td>
<td>2009</td>
<td>104</td>
<td>Improved independent function at hospital discharge</td>
</tr>
<tr>
<td>Burtin et al., Crit Care Med</td>
<td>2009</td>
<td>90</td>
<td>Improved six minute walk at hospital discharge</td>
</tr>
<tr>
<td>Denehy</td>
<td>2013</td>
<td>150</td>
<td>No difference in six minute walk at 6 months</td>
</tr>
<tr>
<td>Moss</td>
<td>2016</td>
<td>120</td>
<td>No difference in physical function at one month</td>
</tr>
<tr>
<td>Morris</td>
<td>2016</td>
<td>300</td>
<td>No difference in hospital LOS</td>
</tr>
</tbody>
</table>
BUT IS IT A “BARRIER”?
“I think it’s incredibly important that a patient is able to leave whatever situation brought them to the ICU in the same state – if not partially better – than what they came in with”

~RT
“I think it limits or even reverses muscle wasting”
~PT

So I think there’s a growing body of evidence that supports that it’s helpful in shortening the ICU and hospital length of stay.”
~MD
2. IS EARLY MOBILITY HARMFUL?
Providers still worry about harm

• 42% of physicians in Washington survey report “patient safety” as a barrier to mobilization

Jolley et al., BMC Anesthesiology, 2014
“I think the biggest risk to me is the dislodgment of lines or endotracheal tube hardware... which I have seen occur, that’s the biggest risk.”

~MD
Safety of physical therapy interventions in critically ill patients:
A single-center prospective evaluation of 1110 intensive care unit admissions

Thiti Sricharoenchai, MD a,b,c, Ann M. Parker, MD a,b, Jennifer M. Zanni, PT, DScPT d,e, Archana Nelliott, BS a,b, Victor D. Dinglas, MPH a,b, Dale M. Needham, MD, PhD a,b,d,*

- Observational study of 1110 ICU admissions
- 5267 physiotherapy sessions
  - 34 physiological abnormalities and potential safety events
  - (6 per 1000 sessions)
- **No** cardiorespiratory arrests
- **No** removal of central venous or dialysis catheters, or endotracheal or tracheostomy tubes
3. TEAM CONFLICT AND CO-ORDINATION
CO-ORDINATING A TEAM
We haven’t quite figured out “teamwork” or “interprofessional collaboration”
Making an Early Mobility Session Happen

✓ Patient meets criteria
  ✓ Awake, physiologically stable, no uncontrolled pain
✓ Nurse available (not covering other patients)
✓ No conflicting high acuity events nearby
✓ Physiotherapist available
✓ Respiratory therapists available (if needed)
✓ No off-unit testing scheduled
✓ Equipment available
“the problem is that it’s a multidisciplinary process so it does involve, you know, all the RTs, all the nurses, all the physios, the dieticians. To get everybody to organize to do anything is always a challenge.”

~RT
# Communication Challenges

<table>
<thead>
<tr>
<th></th>
<th>CCM MD</th>
<th>PT</th>
<th>RN</th>
<th>RT</th>
<th>Referring MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>At bedside rounds</td>
<td>45.3</td>
<td>31.8</td>
<td>43.1</td>
<td>21.2</td>
<td>11.6</td>
</tr>
<tr>
<td>At shift change</td>
<td>24.1</td>
<td>14.5</td>
<td>53.</td>
<td>13.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

*Koo et al., CMAJ Open, 2016*
WHOSE JOB IS IT ANYWAY?
It’s **my** job to set goals.

Well, it’s a collaboration between the physician and the nurse taking care of the patient

~RN
It’s **my** job to set goals.

I’m making my own individualized goals for that patient. I have the care plan in mind but I’m thinking about what I think is realistic for that person.

~PT
Team conflict

Lack of task ownership

Role Clarity

Lack of task expertise

Confusion for families
INTRA-TEAM CONFLICT
Differing views of early mobility

There are a few physicians who are very against any movement out of bed before day five, for their own reasons.

~RT
Conflicts within the team may be a barrier.

We have to be collaborative in order to be successful, so it’s just hard when people say, “No, I don’t like it.”

~PT
4. USING PROTOCOLS
### Hospital-Level Factors Associated with Report of Physical Activity in Patients on Mechanical Ventilation across Washington State

Sarah E. Jolley¹, Christopher R. Dale², and Catherine L. Hough³

¹Division of Pulmonary and Critical Care Medicine, Louisiana State University Health Sciences Center, New Orleans, Louisiana; and ²Swedish Health Systems and ³Division of Pulmonary and Critical Care Medicine, University of Washington, Seattle, Washington

<table>
<thead>
<tr>
<th>High-Level Activity Hospitals (n = 22)</th>
<th>OR</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital volume &gt; 20,000 patient-days/yr, n (%)</td>
<td>16 (72.7)</td>
<td>5.33</td>
<td>1.54–18.48</td>
</tr>
<tr>
<td>ICU volume &gt; 5,000 patient-days/yr, n (%)</td>
<td>15 (68.2)</td>
<td>5.20</td>
<td>1.51–17.93</td>
</tr>
<tr>
<td>Part of a larger hospital network, n (%)</td>
<td>13 (59.1)</td>
<td>2.57</td>
<td>0.80–8.21</td>
</tr>
<tr>
<td>Academic ICU, n (%)</td>
<td>11 (52.4)</td>
<td>4.40</td>
<td>1.23–15.63</td>
</tr>
<tr>
<td>Intensivist-led ICU, n (%)</td>
<td>4 (18.2)</td>
<td>1.17</td>
<td>0.28–4.94</td>
</tr>
<tr>
<td>Advanced care providers in ICU, n (%)</td>
<td>17 (77.3)</td>
<td>4.33</td>
<td>1.24–14.93</td>
</tr>
<tr>
<td>Computerized order entry, n (%)</td>
<td>17 (77.3)</td>
<td>1.32</td>
<td>0.37–4.75</td>
</tr>
<tr>
<td>Written protocol for ICU activity, n (%)</td>
<td>14 (63.6)</td>
<td>5.54</td>
<td>1.60–19.18</td>
</tr>
</tbody>
</table>

**Definition of abbreviations:** CI = confidence interval; ICU = intensive care unit; OR = odds ratio.
**ABCDE, but in That Order?**

A Cross-Sectional Survey of Michigan Intensive Care Unit Sedation, Delirium, and Early Mobility Practices

Melissa A. Miller¹, Sushant Govindan¹, Sam R. Watson², Robert C. Hyzy¹, and Theodore J. Iwashyna¹,³

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**Diagram:**

- **SAT Use**
  - **A/D/E** (Complete)
    - YES → YES → YES
  - **E without A and/or D** (Incomplete)
    - NO → YES → YES
    - YES → NO → YES
    - NO → NO → YES

- **Delirium Assessment**
  - YES

- **Early Mobilization**
  - 12%
  - 4%
  - 17% 52%
  - 31%
  - 36%

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**Comparison**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>OR for High-Level Exercise† (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/D/E² vs. nonmovers⁶</td>
<td>15.6 (4.7–51.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>A/D/E vs. E without A or D³</td>
<td>3.5 (1.4–8.6)</td>
<td>0.0063</td>
</tr>
<tr>
<td>E without A or D vs. nonmovers</td>
<td>4.5 (1.6–12.2)</td>
<td>0.004</td>
</tr>
</tbody>
</table>

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Miller et al., Annals of ATS, 2015
High levels of QI data collection predicted high levels of mobility
We knew that once we had the protocol out there we couldn’t just walk away from it, but that we had to continue to keep on it. And it’s still a work in progress, but I think it’s pretty successful in our unit.”

~RN
FINAL THOUGHTS
1. Develop a protocol

• Include the whole ABCDE bundle
• Collect data
2. Cultivate enthusiasm

- Educate about survivorship
- Show staff videos
- Send staff to mobility conferences, to high achieving centres
3. Address concerns about safety

• Include safety measures in your protocols
• Engage physicians to support decision making
4. Consider teamwork

• Which roles need to be explicit?
• How do you deal with shared roles?
• How will you co-ordinate your team and deal with scheduling conflicts?
Study Team

Thesis Committee
• Dr. Brian Cuthbertson
• Dr. Eddy Fan
• Dr. Gordon Rubenfeld
• Professor Jill Francis (UK)

Collaborators
• Dr. Louise Rose
• Dr. Michelle Kho
• Dr. Dale Needham

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