Early Mobility in the ICU

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Assistant Professor and
Director of Clinical Education
Department of Physical Therapy

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BIO

- **Teaching Responsibilities:** geriatrics and acute care; clinical education.
- **Current Clinical Practice:** CHI Memorial
- **Previous Clinical Practice:** adult and geriatric environments in acute and sub acute environments; population expertise medical frailty and dementia
- **Research:** geriatric and clinical education
- **Education:** *BS in Physical Therapy and MEd in Health Education with a certificate in Social Gerontology* – University of South Alabama; *Doctorate in Physical Therapy* – University of Tennessee at Chattanooga; *Faculty Scholars Program* from the University of Alabama at Birmingham Geriatric Education Center; *EdD in Learning and Leadership* – *anticipated graduation 2020* – University of Tennessee at Chattanooga
- **Certifications:** Geriatric Certified Specialist from the American Board of Physical Therapy Specialties, a Certified Clinical Instructor from the American Physical Therapy Association and a Master Trainer for the Matter of Balance program from Maine Health
- **Passion:** reduce hospital acquired weakness in all populations, but especially the older adult population
Disclosures

• There are no financial disclosures or conflicts of interest to report
Agenda

• History and Current Practice
• Current Evidence
• Barriers
• Rising to the Standards
• Practical Considerations
• Clinical Outcomes
Objectives

• Explain the evidence supporting early mobility in critically ill adults
• Describe current practices for early mobility in the ICU and the role of inter-professional team members in the adult ICU
• Explain the principles of clinical decision making for safe and effective early mobility in the ICU
• Describe and discuss how to change ICU and clinical practice to implement early mobility for critically ill adults
<table>
<thead>
<tr>
<th>Role</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>A</td>
</tr>
<tr>
<td>Administrator</td>
<td>B</td>
</tr>
<tr>
<td>Intermediate provider</td>
<td>C</td>
</tr>
<tr>
<td>Nurse</td>
<td>D</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>E</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>F</td>
</tr>
<tr>
<td>PT / OT / ST</td>
<td>G</td>
</tr>
<tr>
<td>Social Worker</td>
<td>H</td>
</tr>
<tr>
<td>Other</td>
<td>I</td>
</tr>
</tbody>
</table>
History

Unfavorable Effects of Immobility

- Changes in muscle fibers and inflammatory marker
- Thromboembolism
- Pressure wounds
- Osteoporosis
- Pneumonia
- Depression
- ICU Acquired Weakness


Potential Improvement with Mobility

- Return to independent function by hospital discharge
- Shorter duration of delirium
- Decreased days on ventilator
- Decreased Length of Stay
- Increased quality of life


• Acute Care Section of APTA
• 667 Hospitals
• ICU based physical therapy services
• Barriers:
  – Staffing
  – Prioritization policies
  – Intervention guidelines
Intensive Care Unit Structure Variation and Implications for Early Mobilization Practices
An International Survey

Rita N. Bakhru¹,², David J. McWilliams³, Douglas J. Wiebe⁴,⁵,⁶, Vicki J. Spuhler⁷,⁸, and William D. Schweickert⁹

• International Study of ICU Practice – 951 ICU’s (500 in the United States)
• Multivariate analysis of EM Practices
• EM practice significantly associated with:
  – Lower nurse / patient staffing ratios
  – Dedicated physical therapist
  – Multidisciplinary rounds
  – Setting daily goals for patients
Intensive Care Unit Structure Variation and Implications for Early Mobilization Practices
An International Survey
Rita N. Bakhru¹,², David J. McWilliams³, Douglas J. Wiebe⁴,⁵,⁶, Vicki J. Spuhler⁷,⁸, and William D. Schweickert⁹

• Barriers in the US – no EM program
  – Equipment
  – PT Staffing
  – Competing priorities
  – Patient safety
  – Patient weight
Barriers and Strategies for Early Mobilization of Patients in Intensive Care Units

Rolf Dubb, Peter Nydahl, Carsten Hermes, Norbert Schwabbauer, Amy Toonstra, Ann M. Parker, Arnold Kaltwasser, and Dale M. Needham


• Barriers
  – Patient related
  – Structural barriers
  – Cultural barriers
  – Process related

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Barriers and Strategies for Early Mobilization of Patients in Intensive Care Units

Rolf Dubb¹⁺, Peter Nydahl²⁺, Carsten Hermes³, Norbert Schwabbauer⁴, Amy Toonstra⁵, Ann M. Parker⁶, Arnold Kaltwasser¹, and Dale M. Needham⁷


• Strategy to overcome patient related barriers
  – Interprofessional meetings
  – Protocols
    • Safety
    • Delirium
    • Sedation
Barriers and Strategies for Early Mobilization of Patients in Intensive Care Units

Rolf Dubb\textsuperscript{1*}, Peter Nydahl\textsuperscript{2*}, Carsten Hermes\textsuperscript{3}, Norbert Schwabbauer\textsuperscript{4}, Amy Toonstra\textsuperscript{5}, Ann M. Parker\textsuperscript{6}, Arnold Kaltwasser\textsuperscript{7}, and Dale M. Needham\textsuperscript{7}


- **Strategy to overcome structural barriers**
  - Additional staff (PT, OT)
  - Protocols
  - Dedicated therapist
  - Staff education
Barriers and Strategies for Early Mobilization of Patients in Intensive Care Units

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- Strategy to overcome cultural barriers
  - Interprofessional champions
  - Multi-professional education and training
  - Bedside decision making
  - Promotion of early mobility
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- Strategy to overcome process related barriers
  - Regular screening for readiness
  - Interprofessional champions
  - Education and training
**Research**

**Open Access**

**Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults**

- 23 multidisciplinary experts
- Systematic review of the literature
- Active mobilization (in and out of bed)
- Results on the next 7 slides for out of bed

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## Respiratory Considerations

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Potential Risk</th>
<th>Significant Potential Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endotracheal Tube</td>
<td>Fraction of inspired oxygen &gt; 0.6</td>
<td>Percutaneous oxygen saturation &lt; 90%</td>
</tr>
<tr>
<td>Tracheostomy Tube</td>
<td>Respiratory rate &gt; 30 bpm</td>
<td>Ventilation Mode HFOV</td>
</tr>
<tr>
<td>Fraction of inspired oxygen &lt; 0.6</td>
<td>PEEP &gt; 10 cmH$_2$O</td>
<td>Prone positioning</td>
</tr>
<tr>
<td>Percutaneous oxygen saturation &gt; 90%</td>
<td>Ventilator dysynchrony</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate &lt; 30 bpm</td>
<td>Nitric oxide</td>
<td></td>
</tr>
<tr>
<td>PEEP &lt; 10 cmH$_2$O</td>
<td>Prostacyclin</td>
<td></td>
</tr>
</tbody>
</table>

- **Low Risk**: Use ICU protocols - proceed as usual care
- **Potential Risk**: Benefits may outweigh risks - know precautions and contraindications; proceed gradually
- **Significant Potential Risk**: MD, senior nursing staff and senior therapy staff consult - parameters and safety precautions

# Cardiovascular Considerations – Blood Pressure

<table>
<thead>
<tr>
<th>Low Risk</th>
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</tr>
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<tbody>
<tr>
<td>MAP greater than lower limit of target range while receiving no or low level support</td>
<td>MAP greater than lower limit of target range while receiving moderate level of support</td>
<td>Intravenous antihypertensive therapy for HTN emergency</td>
</tr>
<tr>
<td>Known or suspected severe pulmonary hypertension</td>
<td></td>
<td>MAP below target range with symptoms or despite support</td>
</tr>
<tr>
<td></td>
<td>MAP greater than lower limit of target range on high level of support</td>
<td></td>
</tr>
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# Cardiovascular Considerations – Arrhythmias

<table>
<thead>
<tr>
<th>Transvenous or epicardial pacemaker with stable underlying rhythm</th>
<th>Bradycardia not requiring pharmaceutical treatment; or awaiting emergency pacemaker</th>
<th>Bradycardia requiring pharmaceutical treatment; or awaiting emergency pacemaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any tachyarrhythmia with VR &lt;120 bpm</td>
<td>Stable tachyarrhythmia with VR &lt;150 bpm</td>
<td>Transvenous or epicardial pacemaker with dependent rhythm</td>
</tr>
<tr>
<td>Stable tachyarrhythmia with VR &gt;150 bpm</td>
<td></td>
<td></td>
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## Cardiovascular Considerations – Devices

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</tr>
</thead>
<tbody>
<tr>
<td>Ventricular assist device</td>
<td>ECMO - Single bicaval dual lumen cannulae inserted into a central vein</td>
<td>Femoral IABP</td>
</tr>
<tr>
<td>Pulmonary artery catheter or other continuous cardiac output monitoring device</td>
<td>ECMO - Femoral or subclavian not single bicaval dual lumen cannulae</td>
<td></td>
</tr>
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## Cardiovascular Considerations – Other

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<tr>
<td></td>
<td>Shock of any cause with lactate &gt;4mmol/L</td>
<td>Cardiac ischemia (ongoing CP and / or dynamic EKG changes)</td>
</tr>
<tr>
<td></td>
<td>Known or suspected acute DVT / PE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Known or suspected severe aortic stenosis</td>
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# Neurological Considerations

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<tbody>
<tr>
<td>LOC - Patient drowsy, calm or restless (RASS -1 to +1)</td>
<td>LOC - Patient lightly sedated or agitated (RASS -2 to +2)</td>
<td>LOC - Patient unarousable or deeply sedated (RASS &lt;-2)</td>
</tr>
<tr>
<td>Delirium CAM ICU negative</td>
<td>Delirium CAM ICU positive and able to follow simple commands</td>
<td>LOC - Patient very agitated or combative (RASS &gt;+2)</td>
</tr>
<tr>
<td>Delirium CAM ICU positive and not able to follow simple commands</td>
<td>ICP - without active management of IC hypertension</td>
<td>ICP - active management IC hypertension and not in desired range</td>
</tr>
<tr>
<td>ICP - without active management of IC hypertension</td>
<td>Crainectomy</td>
<td>Open lumbar drain (not clamped)</td>
</tr>
<tr>
<td>Crainectomy</td>
<td>Subgaleal drain</td>
<td>Spinal precautions (pre-clearance or pre fixation)</td>
</tr>
<tr>
<td>Subgaleal drain</td>
<td>Acute spinal cord injury</td>
<td>Uncontrolled seizures</td>
</tr>
<tr>
<td>Acute spinal cord injury</td>
<td>Subarachnoid hemorrhage with unclipped aneurysm</td>
<td>Vasospasm post aneurysmal clipping</td>
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### Other Considerations

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<tr>
<td>ICU Acquired weakness</td>
<td>Suspicion of active bleeding or increased bleeding risk (from line displacement or fall)</td>
<td>Unstable/unstabilized major fracture of pelvic, spinal or lower limb long bone</td>
</tr>
<tr>
<td>CRRT including femoral catheters</td>
<td>Patient is febrile with temp &gt; acceptable maximum despite active management</td>
<td>Large open surgical wound of chest / sternum or abdomen (unless treating surgeon approves)</td>
</tr>
<tr>
<td>Venous arterial and femoral catheters</td>
<td>Active hypothermia management</td>
<td>Known uncontrolled active bleeding</td>
</tr>
<tr>
<td>All other drains and attachments such as (NG tube, central venous catheter, pleural or wound drain, intercostal catheter, urinary catheter)</td>
<td></td>
<td>Femoral sheaths</td>
</tr>
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Safety

• Interdisciplinary approach
• Follow consensus guidelines


Rising to the Standards

• Culture
• Administrative engagement
• Physician engagement
• Interdisciplinary team
  – RN
  – MD
  – RT
  – PT, OT, ST


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Practical Considerations

- Financial modeling has shown, even with conservative estimates, implementation of early ICU mobility is cost effective
  - Positive ROI
  - Positive patient outcomes


Potential Outcomes with Mobility

- Return to independent function by hospital discharge
- Shorter duration of delirium
- Decreased days on ventilator
- Decreased Length of Stay
- Increased quality of life


Resources

• “For patient videos and news about ICU mobility and improving patient outcomes after critical illness or surgery, visit the Johns Hopkins Web site at www.hopkinsmedicine.org/OACIS and select “OACIC Videos and News”

• For additional patient videos about ICU mobility and patient-centered rounds using the ABCDEF bundle, visit the Society of Critical Care Medicine (SCCM) ICU Liberation Web site at http://www.iculiberation.org/news/Pages/New-Video-Series-Centers-on-Patient-Centered-Rounds-Using-ABCDEF-Bundle.aspx

• For patient testimonials regarding the impact of cognitive impairment, depression and post-traumatic stress disorder, visit http://www.icudelirium.org/testimonials.html

• To view an international network of ICU mobilization centers and access relevant resources, visit http://www.mobilization-network.org

• For videos focused on the ICU experience of patients, visit the SCCM Web site on post-intensive care syndrome at http://www.myicucare.org/Thrive/Pages/Post-intensive-Care-Syndrome.aspx and find “Helpful Video Links” at the bottom of the page. The videos also are available at https://www.youtube.com/playlist?list=PLsb8sp1zaJWpYFl3CD_nLYoPbGxYkOM3r.

• On Twitter, follow @icurehab for updates on ICU rehabilitation or contribute to the conversation using #icurehab”
References


