

Early Mobility in the ICU

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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

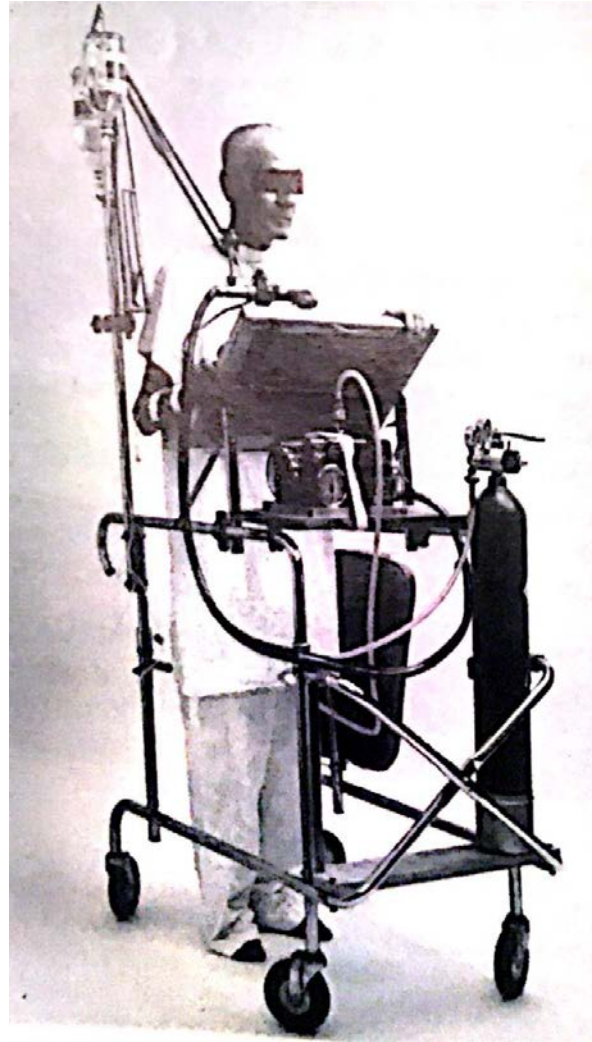
Objectives

- 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

Designate your practice role related to the ICU

- Physician **A**
- Administrator **B**
- Intermediate provider **C**
- Nurse **D**
- Respiratory Therapist **E**
- Pharmacist **F**
- PT / OT / ST **G**
- Social Worker **H**
- Other **I**

History



Burns JR, Jones FL. Early ambulation of patients requiring ventilatory assistance. *Chest*. 1975;68(4):608.

Unfavorable Effects of Immobility

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

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Needham DM. Mobilizing patients in the intensive care unit: improving neuromuscular weakness and physical function. *Jama*. 2008;300.

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

Early Mobility Guide for Reducing Ventilator-Associated Events in Mechanically Ventilated Patients. Vol 17: AHRQ; 2017.


Abrams D, Javidfar J, Farrand E, et al. Early mobilization of patients receiving extracorporeal membrane oxygenation: a retrospective cohort study. *Critical Care*. 2014;18(1):R38.

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Needham DM. Mobilizing patients in the intensive care unit: improving neuromuscular weakness and physical function. *Jama*. 2008;300.

Physical Therapy

Physical Therapist Practice in the Intensive Care Unit: Results of a National Survey

Daniel Malone , Kyle Ridgeway, Amy Nordon-Craft, Parker Moss, Margaret Schenkman, Marc Moss
Author Notes

Physical Therapy, Volume 95, Issue 10, 1 October 2015, Pages 1335-1344



- 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. Bakhru^{1,2}, David J. McWilliams³, Douglas J. Wiebe^{4,5,6}, Vicki J. Spuhler^{7,8}, and William D. Schweickert⁹
Annals of the American Thoracic Society Vol 13, No 9, pp 1527-37, Sept 2016

- 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

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- 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^{1*}, Peter Nydahl^{2*}, Carsten Hermes³, Norbert Schwabbauer⁴, Amy Toonstra⁵, Ann M. Parker⁶, Arnold Kaltwasser¹, and Dale M. Needham⁷

Annals of the American Thoracic Society Vol 13, No 5, pp 724-30, May 2016

- Barriers
 - Patient related
 - Structural barriers
 - Cultural barriers
 - Process related

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- Strategy to overcome patient related barriers
 - Interprofessional meetings
 - Protocols
 - Safety
 - Delirium
 - Sedation

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- Strategy to overcome structural barriers
 - Additional staff (PT, OT)
 - Protocols
 - Dedicated therapist
 - Staff education

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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

Respiratory Considerations

Low Risk	Potential Risk	Significant Potential Risk
Endotracheal Tube	Fraction of inspired oxygen > 0.6	Percutaneous oxygen saturation < 90%
Tracheostomy Tube	Respiratory rate > 30 bpm	Ventilation Mode HFOV
Fraction of inspired oxygen < 0.6	PEEP > 10 cmH ₂ O	Prone positioning
Percutaneous oxygen saturation > 90%	Ventilator dyssynchrony	
Respiratory rate < 30 bpm	Nitric oxide	
PEEP < 10 cmH ₂ O	Prostacyclin	

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

Hodgson CL, Stiller K, Needham DM, et al. Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults. *Critical Care*. 2014;18(6):658.

Cardiovascular Considerations – Blood Pressure

Low Risk	Potential Risk	Significant Potential Risk
MAP greater than lower limit of target range while receiving no or low level support	MAP greater than lower limit of target range while receiving moderate level of support	Intravenous antihypertensive therapy for HTN emergency
	Known or suspected severe pulmonary hypertension	MAP below target range with symptoms or despite support
		MAP greater than lower limit of target range on high level of support

Low Risk	Use ICU protocols - proceed as usual care
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Cardiovascular Considerations – Arrhythmias

Low Risk	Potential Risk	Significant Potential Risk
Transvenous or epicardial pacemaker with stable underlying rhythm	Bradycardia not requiring pharmaceutical treatment; or awaiting emergency pacemaker	Bradycardia requiring pharmaceutical treatment; or awaiting emergency pacemaker
Any tachyarrhythmia with VR <120 bpm	Stable tachyarrhythmia with VR <150 bpm	Transvenous or epicardial pacemaker with dependent rhythm
		Stable tachyarrhythmia with VR >150 bpm

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Cardiovascular Considerations – Devices

Low Risk	Potential Risk	Significant Potential Risk
Ventricular assist device	ECMO - Single bicaval dual lumen cannulae inserted into a central vein	Femoral IABP
	Pulmonary artery catheter or other continuous cardiac output monitoring device	ECMO - Femoral or subclavian not single bicaval dual lumen cannulae

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Cardiovascular Considerations – Other

Low Risk	Potential Risk	Significant Potential Risk
	Shock of any cause with lactate >4mmol/L	Cardiac ischemia (ongoing CP and / or dynamic EKG changes)
	Known or suspected acute DVT / PE	
	Known or suspected severe aortic stenosis	

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Neurological Considerations

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

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Other Considerations

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

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Safety

- Interdisciplinary approach
- Follow consensus guidelines

Sricharoenchai T, Parker AM, Zanni JM, Nelliott A, Dinglas VD, Needham DM. Safety of physical therapy interventions in critically ill patients: a single-center prospective evaluation of 1110 intensive care unit admissions. *J Crit Care*. 2014;29(3):395-400.

Perme C, Nalty T, Winkelman C, Kenji Nawa R, Masud F. Safety and Efficacy of Mobility Interventions in Patients with Femoral Catheters in the ICU: A Prospective Observational Study. *Cardiopulmonary physical therapy journal*. 2013;24(2):12-17.

Damluji A, Zanni JM, Manthey E, Colantuoni E, Kho ME, Needham DM. Safety and feasibility of femoral catheters during physical rehabilitation in the intensive care unit. *Journal of critical care*. 2013;28(4):535. e539-535. e515.

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Rising to the Standards

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

Dubb R, Nydahl P, Hermes C, et al. Barriers and strategies for early mobilization of patients in intensive care units. *Annals of the American Thoracic Society*. 2016;13(5):724-730.

Practical Considerations

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

Lord RK, Mayhew CR, Korupolu R, et al. ICU early physical rehabilitation programs: financial modeling of cost savings. *Critical care medicine*. 2013;41(3):717-724.

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Potential Outcomes with Mobility

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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=PLsb8sp1zaJWpYF13CD_nLYoPbGxYkOM3r.
- On Twitter, follow @icurehab for updates on ICU rehabilitation or contribute to the conversation using #icurehab”

References

Burns JR, Jones FL. Early ambulation of patients requiring ventilatory assistance. *Chest*. 1975;68(4):608.

Dock W. The evil sequelae of complete bed rest. *Journal of the American Medical Association*. 1944;125(16):1083-1085.

Needham DM, Korupolu R, Zanni JM, et al. Early physical medicine and rehabilitation for patients with acute respiratory failure: a quality improvement project. *Arch Phys Med Rehabil*. 2010;91.

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