


*Early Mobilization with Critically Ill Patients  
Respiratory State Conference  
September 27<sup>th</sup>, 2012*



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Lead Critical Care Therapist**





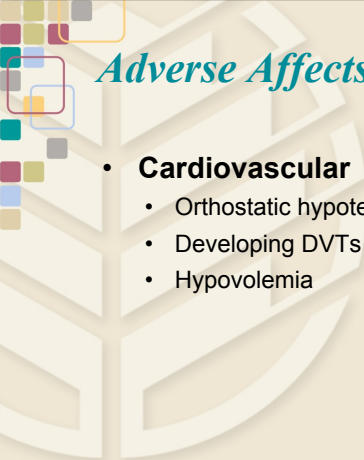
## *Objectives*

- Identify complications associated with bedrest in critically ill patients.
- Describe the research supporting early mobilization with critically ill patients.
- Identify critically ill patients who are appropriate for early mobilization and PT/OT interventions.
- Understand the importance of a multi-professional approach and the key elements required to implement an early mobilization program in the critical care environment.
- Understand the importance of patient positioning for optimal respiratory function.
- Understand the importance of collaboration of PT/OT and Respiratory Therapy in the weaning process from the ventilator.



## *Adverse Effects of Bedrest*






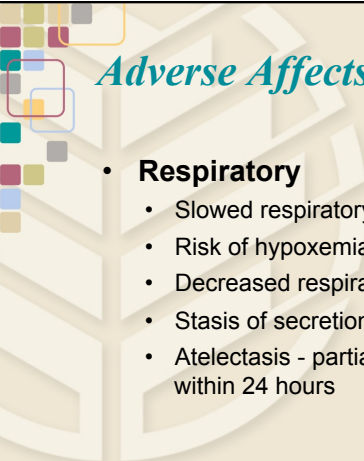
## *Adverse Affects of Bedrest*

- **Cardiovascular**
  - Orthostatic hypotension
  - Developing DVTs
  - Hypovolemia

Dean, E. Bedrest and Deconditioning. Neurology Report. 1993; 17(1):6-9.



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## *Adverse Affects of Bedrest*


- **Respiratory**
  - Slowed respiratory rate
  - Risk of hypoxemia
  - Decreased respiratory movement
  - Stasis of secretions = increased risk for bronchitis, pneumonia, etc
  - Atelectasis - partial or complete atelectasis of the left lower lobe within 24 hours

Dean, E. Bedrest and Deconditioning. Neurology Report. 1993; 17(1):6-9.

Brower: Crit Care Med 2009;37: S422-S428




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## *Adverse Affects of Bedrest*

- **Motor**
  - Contracture development
  - Muscle atrophy
    - Skeletal muscle strength declines at a rate of 1-1.5% per day in strict bedrest patients
  - Decreased Protein Synthesis
  - Osteoporosis
  - Max aerobic capacity was 12 % lower after 10 days of bedrest

Dean, E. Bedrest and Deconditioning. Neurology Report. 1993; 17(1):6-9.  
Brower: Crit Care Med 2009;37: S422-S428



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## *“Functional Impact of 10 Days of Bed Rest in Healthy Older Adults”*

Kortebein et al. Functional Impact of 10 Days of Bed Rest in Healthy Older Adults. Journal of Gerontology. 2008. 63A, 10:1076-1081.





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### *Kortebein et al.*

- Healthy older women and men were placed on bedrest for 10 days
- Results
  - Decreased lower extremity strength
  - Decreased stair climbing ability
  - Decreased max aerobic capacity by 12%
  - Decreased desire for voluntary activity


Kortebein et al. Functional Impact of 10 Days of Bed Rest in Healthy Older Adults. Journal of Gerontology. 2008. 63A, 10-1076-1081.




### *Adverse Affects of Bedrest*

- **Metabolic**
  - Decreased metabolic rate
  - Negative nitrogen balance
    - Tissue atrophy
    - Bone demineralization
    - Electrolyte and fluid imbalance
  - Change in body temperature with increased perspiration, loss of fluids

Dean, E. Bedrest and Deconditioning. Neurology Report. 1993; 17(1):6-9.






## *Adverse Affects of Bedrest*

- **Gastrointestinal**
  - Peristalsis
    - Hypomobility
    - Constipation
    - Impaction
  - Urinary Function
    - Urinary stasis
    - UTI
    - Increase risk of renal calculi
- Ability to clear medication?

Dean, E. Bedrest and Deconditioning. Neurology Report. 1993; 17(1):6-9.



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## *Any other Adverse Affects you can think of?*

- Delirium
- Pressure Ulcers
- Joint Contractures
- Critical Illness Polyneuropathy
- Critical Illness Myopathy


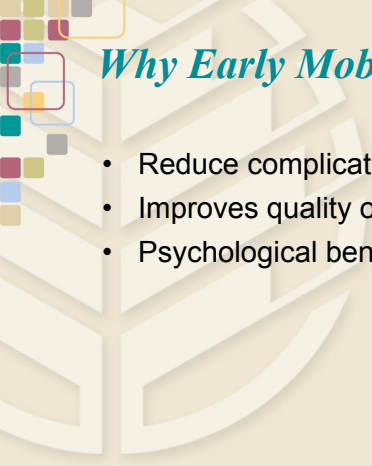


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## *Why Early Mobilization?*

- Reduce complications of bedrest
- Improves quality of life
- Psychological benefits



## *Research*




## *“Early Activity is Feasible and Safe in Respiratory Failure Patients”*

Bailey et al. Early Activity is Feasible and Safe in Respiratory Failure Patients. Crit Care Med. 2007; 35(1):139-145.

## *Initiating Treatment*

- Goal = Ambulate >100 ft prior to ICU discharge
- Early Mobilization = starting with initial physiologic stability through the ICU stay
- Criteria for initiating activity
  - Neurologic – patient response to verbal stimulus
  - Respiratory –  $F_{iO_2} < \text{or} = .6$  and positive end-expiratory pressure < or = 10 cm H<sub>2</sub>O
  - Circulatory – absence of orthostatic hypotension and catecholamine drips







## Procedure

- Patient Selection
  - In the RICU
  - 103 patients with respiratory failure
  - Required mechanical ventilation for >4 days
- Activity events
  - Sit edge of bed without back support
  - Sit in chair after transfer from edge of bed
  - Ambulates with or without assistance using walker and/or support from RICU staff

Bailey et al. Early Activity is Feasible and Safe in Respiratory Failure Patients. Crit Care Med. 2007; 35(1): 139-145.




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## Conclusion

- Results = 69% were able to ambulate >100 ft upon ICU discharge
- Minimal “Adverse” Events
- Conclusion = It is feasible to perform physical and occupational therapy in the ICU setting with patients who are critically ill.
- “Early activity is a candidate therapy to prevent or treat the neuromuscular complications of critical illness.”

Bailey et al. Early Activity is Feasible and Safe in Respiratory Failure Patients. Crit Care Med. 2007; 35(1): 139-145.



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*“Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure”*

Morris et al. Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure. Crit Care Med. 2008; 36(8):2238-2243



*Morris et al.*


- **Subjects:** Patients in a MICU who required mechanical ventilation on admission secondary to acute respiratory failure.
- **Two Groups:**
  - Protocol (Mobility) Team (n=165): Critical Care RN, RN assistant, PT
  - Usual Care Team (n=165)




*Morris et al.*

- Interventions for Protocol Group:
  - Level 1 (unconscious)
    - PROM, Turning
  - Level 2 (conscious)
    - Add Active Resistive PT exercises, Sitting position
  - Level 3 (conscious)
    - Can move arm against gravity
    - Add sitting edge of bed
  - Level 4 (conscious)
    - Can move Leg against gravity
    - Add transfers OOB to chair

Morris et al. Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure. Crit Care Med. 2008; 36(8): 2238-2243




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*Morris et al.*

- **Results:**
  - No significant increase in cost of protocol team
  - Protocol group:
    - Patients had less time to OOB activity
    - Increased PT in the ICU
    - Decreased LOS in ICU
    - Decreased LOS in the hospital

Morris et al. Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure. Crit Care Med. 2008; 36(8): 2238-2243



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*“Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial.”*

Schweickert WD et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial. Lancet. 2009; 373:1874-82.

*Schweickert WD et al.*

- Patient selection
  - Indep prior to hospitalization
  - Ventilated less than 72 hours and expected at least 24 more
- Two groups:
  - Early exercise and mobilization with PT and OT = Intervention Group (49)
  - PT and OT ordered by the primary care team = Control Group (55)


Schweickert WD et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial. Lancet. 2009; 373:1874-82.



***Schweickert WD et al.***

- Improved outcomes in the Early mobilization group compared to the control group
- Therapy was started on average 1.5 days after intubation in mobility group vs. 7.4 days in control group
- Results:
  - increased functional status at hospital DC
  - shorter delirium duration
  - decrease in number of days requiring mechanical ventilation
  - No difference in LOS
  - Trend to increased DC home vs. other locations

Schweickert WD et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial. Lancet. 2009; 373:1874-82.


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***“Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project”***

Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. Arch Phys Med Rehabil. 2010; 91:536-542.


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*Needham et al.*

- Objectives:
  - Reduce sedation and delirium to allow for mobility
  - Increase rehab consults and treatments
  - Decrease LOS

Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. Arch Phys Med Rehabil. 2010; 91:536-542.


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*Needham et al.*

- Before
  - PT when ordered by the primary team
  - Standard Bedrest order
  - Routine RN care
  - No Screen for Delirium
- After
  - Automatic PT/OT consult
  - Created guidelines for initiation of PT/OT
  - Standard Mobility as tolerated order
  - Decreased continuous infusion of benzos and narcotics to “as needed” bolus infusions
  - Screened for Delirium

Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. Arch Phys Med Rehabil. 2010; 91:536-542.


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*Needham et al.*

- Results:
  - Decreased Benzo use – lower median sedation doses
  - Improved delirium status
  - Improved functional mobility status
  - Decreased LOS in ICU by 2.1 days
  - Decreased LOS in hospital by 3.1 days

Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. Arch Phys Med Rehabil. 2010; 91:536-542.




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*“Feasibility of Physical and Occupational Therapy Beginning from initiation of mechanical Ventilation”*

Pohlman et al. Feasibility of physical and occupational therapy beginning from the initiation of mechanical ventilation. Crit Care Med 2010. 38, (11): 2089-2094.



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*Pohlman et al.*

- Objective:
  - Describe a Protocol for PT and OT paired with daily interruption of sedation
- Randomized Controlled Trial
- Daily PT/OT screen for eligibility
- Therapy was initiated if patient able to follow  $\frac{3}{4}$  commands

Pohlman et al. Feasibility of physical and occupational therapy beginning from the initiation of mechanical ventilation. Crit Care Med 2010. 38, (11): 2089-2094.

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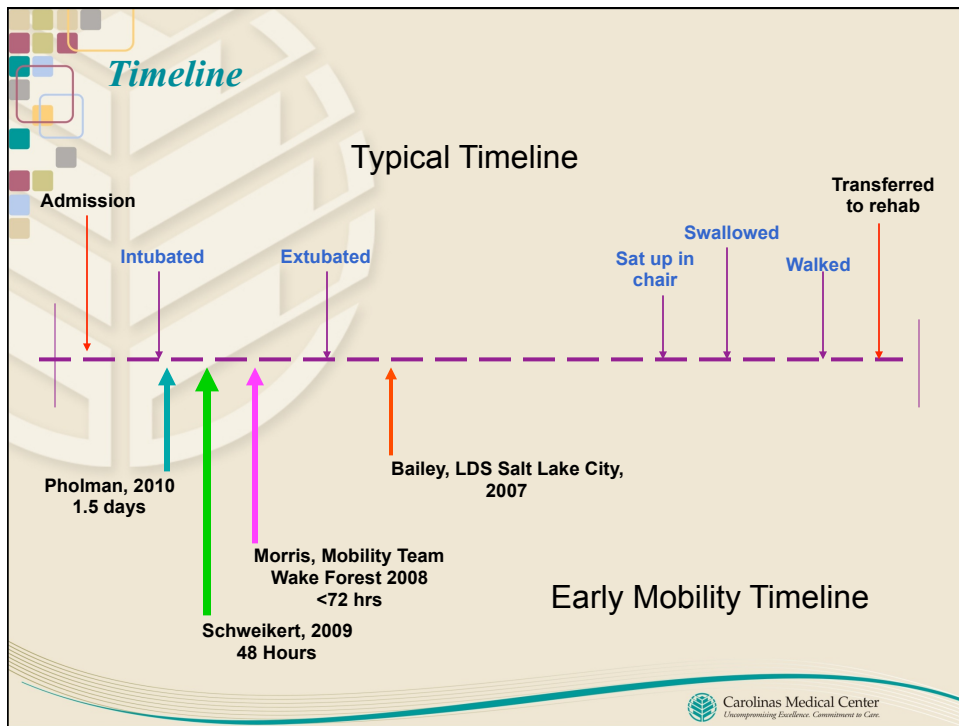
*Pholman et al.*

- 49 mechanically ventilated patients received PT/OT on average 1.5 days after intubation
- With ETT events = 69% Sit EOB, 33% OOB to chair, 33% stood, 15% ambulated
- Therapy only stopped in 4% and only due to ventilator asynchrony or agitation
- Conclusion:
  - PT/OT are feasible IMMEDIATELY after intubation

Pohlman et al. Feasibility of physical and occupational therapy beginning from the initiation of mechanical ventilation. Crit Care Med 2010. 38, (11): 2089-2094.

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*“Feasibility and observed safety of interactive video games for physical rehabilitation in the intensive care unit: a case series”*

Kho et al. Feasibility and observed safety of interactive video games for physical rehabilitation in the intensive care unit: a case series. Journal of Critical Care. 2011.



*Kho et al.*

- Observational Study of patient in MICU – monitored safety events
- 0 safety events occurred
- Patients reported enjoyment

## *Guidelines for Therapy for Patients Who Are Critically Ill*

Bailey et al. Early Activity is Feasible and Safe in Respiratory Failure Patients. Crit Care Med. 2007; 35(1):139-145.

Morris et al. Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure. Crit Care Med. 2008; 36(8):2238-2243

Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. Arch Phys Med Rehabil. 2010; 91:536-542.

## *Contraindications to Consider When Deciding to Initiate PT or OT:*

- MAP <65 or >110
- HR <40 or >130 bmp
- RR <5 or >40 bmp
- SpO2 <88%
- Elevated ICP
- Active GI bleeding
- Active MI
- Insecure airway
- Patient agitation required increased sedation in last 30 minutes

### *Contraindications to Consider Discontinuing PT or OT Session:*

- MAP <65
- HR <40 or >130 bpm
- RR <5 or >40 bpm
- SpO<sub>2</sub> <88%
- Ventilator Dysynchrony
- Patient Distress – Nonverbal cues/gestures, combative
- New onset arrhythmia
- Onset of MI
- Concern for airway device integrity or ETT removal
- Fall

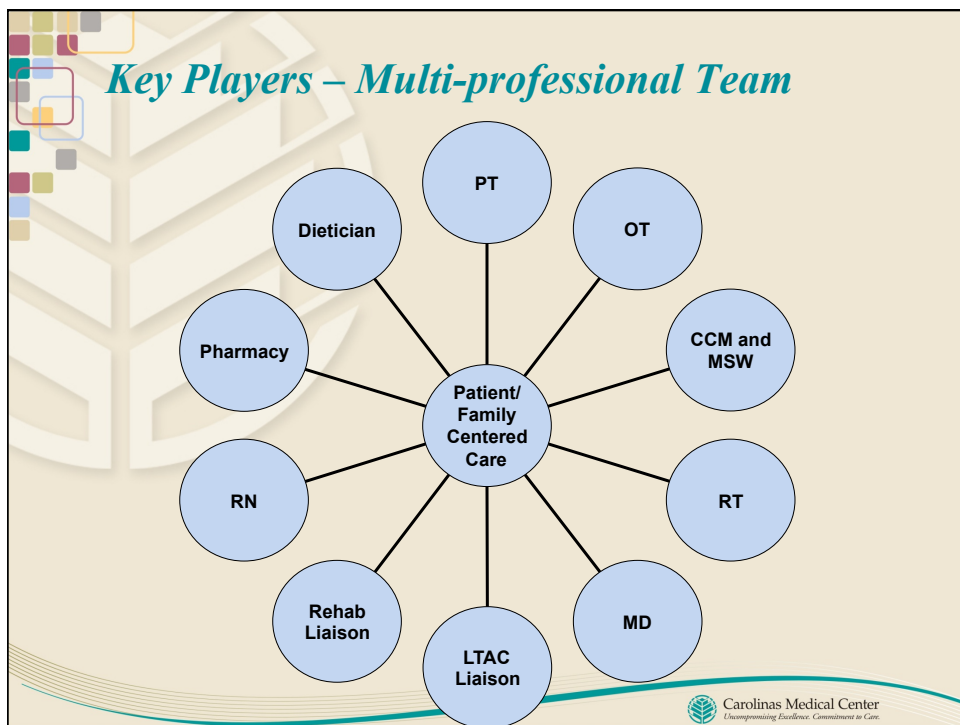
### *Other Tips!*

- Focus on patient presentation or response.
- Weigh the Risk/Benefit for mobilization vs. immobility.
- Communicate with RN regarding patient's baseline vitals and specific parameters.
- Monitor parameters for ventilation settings in patient course and plan of care.
- FiO<sub>2</sub> ≥60% and PEEP ≥ 10 demonstrate a high level of ventilatory support.
- If patient has not required vasopressor increase in the last 2 hours consider initiating treatment.
- Communicate with Physician with any questions/concerns.

*Research says we should mobilize...So now what?*

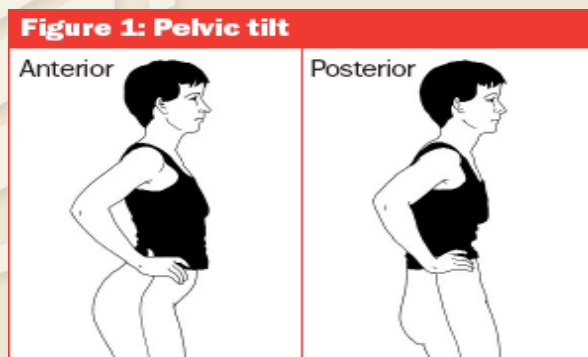


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*How does positioning play a role in breathing?*

*Pictures: Anter/Post Pelvic Tilt*





Try it! How does this affect breathing dynamics?????



## Complications from non-optimal positioning

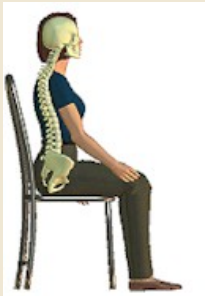
- Skin breakdown on sacrum
- Back pain
- **Decreased lung volumes**
- Active vs. inactive sitting





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## Positioning

- Towel rolls
  - Thoracic vertical roll
  - Thoracic horizontal roll
  - Lumbar roll
- \* Landers (2003)
  - Increase in lumbar lordosis (anterior pelvic tilt) to open anterior chest = increase lung volumes.
- Abdominal Binders
  - Attach in the back




Landers, M., G. Baker, et al. A comparison of tidal volume, breathing frequency, and minute ventilation between two sitting postures in healthy adults. *Physiotherapy Theory and Practice*. 2003; 19(2):109-19.

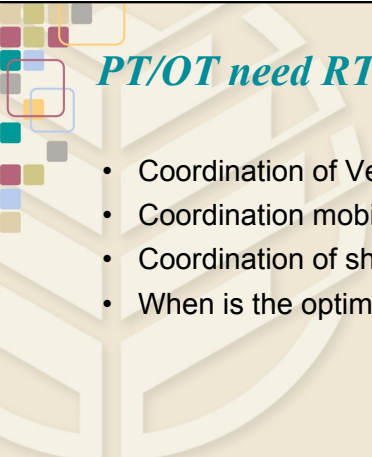
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*Collaboration of PT/OT and Respiratory Therapy  
in the weaning process from the ventilator*




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*PT/OT need RTs help 😊*

- Coordination of Vent weaning and PT/OT sessions
- Coordination mobility/ambulation when on vent
- Coordination of shower when on vent
- When is the optimal time to work with patients?



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## *Optimal Time for Weaning?*

Full Support Ventilator Mode      Weaning Mode      Trach Collar      Nasal Cannula



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**When is it the optimal time for weaning?**


- Weaning on its own?
- Mobility/activity?
- Weaning and mobility/activity combined?

**ANSWER: IT DEPENDS**

*Coordination is key!*



## *Keys to a Successful Early Mobility Program*





### *Keys to success – Getting Started*

- Evidence Based Approach
- Multi-professional approach
- Champions from each discipline
  - Consistency in key players/therapists
- Education to Staff
- Communication - Multi-professional Rounding?



### *Keys to Success – Minimizing Barriers*

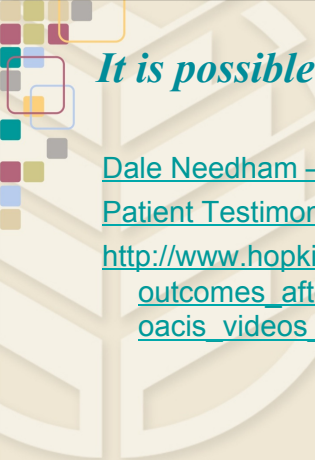
- Continued Education to Staff
- Promoting Culture Change
- Addressing Barriers
  - Sedation?
  - Time?
  - Tech Assistance?
- Continual Adjustment of Program
- Equipment?
  - Trach ties
  - Portable ventilator
  - Chairs







***It is possible!***

[Dale Needham – JHU](#)  
[Patient Testimonial – JHU](#)  
[http://www.hopkinsmedicine.org/pulmonary/research/  
outcomes\\_after\\_critical\\_illness\\_surgery/  
oacis\\_videos\\_news.html](http://www.hopkinsmedicine.org/pulmonary/research/outcomes_after_critical_illness_surgery/oacis_videos_news.html)





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***Other Great Resources!***

- John Hopkins Mobility Website
  - [http://www.hopkinsmedicine.org/news/media/releases/  
get\\_moving\\_johns\\_hopkins\\_research\\_shows\\_early\\_mobility\\_better\\_than\\_bed\\_rest\\_for\\_icu\\_patients](http://www.hopkinsmedicine.org/news/media/releases/get_moving_johns_hopkins_research_shows_early_mobility_better_than_bed_rest_for_icu_patients)
- International Mobilization Network and Listserve
  - [www.mobilization-network.org](http://www.mobilization-network.org)




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6. Morris et al. Early Intensive Care Unit Mobility Therapy in the treatment of Acute Respiratory Failure. *Crit Care Med*. 2008; 36(8):2238-2243
7. Schweickert WD et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial. *Lancet*. 2009; 373:1874-82.
8. Needham et al. Early Physical Medicine and Rehabilitation for Patients with Acute Respiratory Failure: A Quality Improvement Project. *Arch Phys Med Rehabil*. 2010; 91:536-542.
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