Early Mobilization

Yes, especially patients in the ICU

- Control of peripheral edema
- Preservation of range
- Participation in self-care
- Sitting at edge of bed
- Coming to stand at bedside
- transferring to a chair

Why Early Mobilization?

Improve overall status and discharge survival
reduce hospital length of stay and overall costs

- Decreased overall mortality
- Better quality of life, improved Pt status
- Reduced hospital readmissions

Contraindications

- Unstable airway
- Difficulty oxygenating
- Paralytics
- Unstable spine or pelvis
- Unable or unwilling to diminish sedation

Patients in the intensive care unit (ICU) have:

- Increased risk for developing physical and cognitive complications (50% to 87% of patients) that may persist for months to years after discharge
- Elevated risk for ICU-acquired weakness (55% of patients) when mechanical ventilation is required for at least 4 days

Rehabilitation in the ICU is associated with:

- Decreased duration of mechanical ventilation
- Shorter ICU and hospital lengths of stay
- Decreased mortality
- Improved physical and cognitive outcomes

Problems or Barriers

- Multiple invasive lines, drains, monitoring equipment, sedation, instability.
- Treatment limitations by therapists:

    1. Therapist's abilities to monitor vitals or work with monitoring equipment.
    2. Therapist's knowledge of the specific disease, injuries, precautions, contraindications, and potential affect of their treatment on vitals.
    3. Therapist's knowledge of how to maneuver lines, tubes, drains.

- Coordination / Collaboration / Planning requires teamwork and timing.

Solutions / Treatment Ideas

- Establishing criteria for initiating physical activity, progression of tasks, and/or terminating the activities

- Mobility Assessment Tools (combine Nursing + Therapy?)

  Physical Function Outcome Measure

  Functional Status Score for ICU

  ICU mobility Scale (+ RASS, CAM scores)

- More than 1-2 sessions per day to generate routine, and continuum of care across the day

- Tracking serious or adverse medical consequences

Research Implications

- Published papers reflect a small percentage of ICU Mobilization practice
- Level of expertise or experience required to safely work in a critical environment
- Intensity, Frequency, Dose of physical activity that lead to optimal patient outcomes
- Admission to ICU necessitating therapy referrals / orders
- Populations that would mostly benefit from early mobilization vs those that are contraindicated

Evidence-Based Guidelines

Responsive to verbal stimulation

FiO2 < 60% or 0.60

PEEP<10cmH2O

No orthostasis with sitting or standing

No catecholamine drips

Keep O2 sat > 90%

Monitor RR, HR, & BP

No excessive anxiety, diaphoresis

~~Bedrest!~~

- Cardiovascular effects:
    1. alterations in heart rate due to reduced plasma volume (3 days bedrest)
    2. orthostatic instability (2 days)
    3. coagulopathy (DVT risks) - lying down shifts 11% of total blood volume away from legs

- Pulmonary complications:
    1. atelectasis (<45 deg) and aspiration (<30 deg) are related to supine positioning
    2. Decreased A-P expansion = poor excursion & stasis of secretions

- Musculo-skeketal:
    1. reduced mechanical stress from gravity or muscle force causing muscle atrophy (10-12%/wk)
    2. absence of WB can result in bone demineralization & formation of urinary tract stones

- Metabolic: In healthy person, five days of bed rest result in insulin resistance and microvascular dysfunction, delayed wound healing

- Depression

Mobilization

Positioning - to improve ventilation, reduce WOB, airway clearance

* prone positioning improves short-term oxygenation for 57-92% of Pts with severe ARDS (Mure 1997, Jolliet 1998)

* HOB (45° head up) prevent pulmonary aspiration while decreasing (but not preventing) gastroesophageal reflux (Ibanez 1992)

Passive vs Active limb exercise - optimize oxygen transport (enhancing alveolar ventilation), stimulus to maintain or restore normal fluid distribution in the body, maintain joint range, decrease VTE

*PROME: increase in 02 consumption of ~15% (Norrenberg 1995)

*Ankle Pumps: 60 APs/hour reduced incidence of DVT by 50% (

Continuous rotational therapy

* lower incidence of PNA 9% vs 22% (Boisblanc 1993)

* lower duration of endotracheal intubation and LOS with oscillating beds (Fink 1990)

Chest PT - most frequently performed intervention, successful weaning from ventilation (Stiller 2000)

* Direct PT tx of percussions & vibrations resulted in reduction of VAP by 31% (Ntoumenopoulos 2002)

Muscle retraining

peripheral muscle training

* antigravity muscles of the calf and back appear to lose strength with bed rest at an accelerated rate compared to muscles involved with grip strength (Bloomfield 1997)

* Critical illness polyneuropathy and myopathy significantly correlated with ability to wean off ventilator (De Jonghe 2004)

electrical stimulation - ES delays the wasting of muscle mass during denervation/ immobilisation and optimises recovery of muscle strength during rehabilitation

* improved muscle strength & decreased the number of days needed to transfer the patients from bed to chair (Zanotti 2003)

Bailey et al. (2007) focused on the feasibility and safety of an early ambulation intervention in 103 patients on mechanical ventilation for > 4 days who were admitted to a Respiratory ICU.

Goal: >100 ft ambulation at RICU discharge

Began when Pt meets all criteria: 1. Responds to verbal stimulation (neurologic)
2. FiO2 <0.6, PEEP <10 (respiratory)
3. No catecholamine drips (circulatory)

Of 1,499 recorded activity events, > 50% were ambulation.

At RICU discharge, patients were able to walk 212 ±178 feet, (69%) of survivors were able to walk > 100 feet at discharge. (>400' to home vs 270' to SNF vs 140' LTAC)

- Providing mobility interventions in early stage of critical illness were feasible and safe.
- The study also conducted the mobility intervention without increase in costs.

Bailey, P., Thomsen, G. E., Spuhler, V. J., Blair, R., Jewkes, J., Bezdjian, L.,...Hopkins, R. O. (2007). Early activity is feasible and safe in respiratory failure patients. Critical Care Medicine, 35(1), 139-145. doi:10.1097/01.CCM.0000251130.69568.87

Schweickert and colleagues (2009) studied the benefits of early mobility in 104 mechanically ventilated critically ill patients (RCT, blinded PT/OT).

Goal: Return to independent functional status at hospital discharge (perform 6 ADLs & walk independently); secondarily included duration of delirium and ventilator-free days during the first 28 days of hospital stay

Subjects: 1. received mechanical ventilation for <72 hours
2. functionally independent prior to hospitalization
3. expected to continue for at least 24 hours after enrollment.

Randomized to:
- Intervention (n=49) exercise & mobilization during periods of daily interruption of sedation
- Control (n=55) daily interruption of sedation with therapy as ordered by the primary care team

29 (59%) of Pts (intervention) returned to Ind. functional status vs 19 (35%) in control group. Patients in the intervention group vs. control group had significantly shorter duration of delirium (median 2 days vs. 4 days; p=0.02) and more ventilator free days (23.5 days vs. 21.1 days; p=0.05)

- Of 498 sessions provided, 1 Adverse event: desat <80%, and discontinued 19 (4%) sessions due to Pt instability / Pt-ventilator asynchrony

Schweickert, W.D.,Pohlman, M.C., Pohlman, A.S., Nios, C., Pawlik, A.J., Esbrook, C.L.,...Kress, J.P. (2009). Early physical and occupational therapy in mechanically ventilated, critically ill patients: A randomized controlled trail. Lancet, 373(9678), 1874-82

Morris et al. (2008) conducted a prospective cohort study that assessed whether a mobility protocol increased the proportion of ICU patients receiving physical therapy vs. usual care and their effects on cost and LOS.

330 patients:

Protocol group (n=165) initiated within 48 hrs of mechanical ventilation

Usual Care group (n=165)

*Protocol =4 levels of increasing activity from PROM to functional mobility

- Protocol patients were out of bed several days earlier (5 vs. 11 days, p≤ .001)
- Pts spent fewer days in the ICU (length of stay 5.5 vs. 6.9 days for usual care, p=.025)
- Pts spent fewer days in the hospital (LOS 11.2 vs. 14.5 days for usual care; p=.006)

- The cost savings associated with shorter LOS in the ICU and the hospital more than paid for the entire cost of the mobility team.

Morris, P. E., Goad, A., Thompson, C., Taylor, K., Harry, B., Passmore, L.,...Haponik, E. (2008). Early intensive care unit mobility therapy in the treatment of acute respiratory failure. Critical Care Medicine, 36, 2238-2243. doi:10.1097/CCM.0b013e318180b90e

Morris et al. (2011) follow-up study assessed a cohort of 280 survivors, all of whom required mechanical ventilation for acute respiratory failure during their hospitalization, to determine if early mobility during an ICU admission was a predictor of improved outcomes.

Of the 280 survivors, status at one year following hospitalization was confirmed for 258.

Survivors of ARF who required mechanical ventilation were often readmitted to the hospital and had a one-year mortality rate of 17% (44/258) after hospital discharge.

Four variables predicted hospital readmission or death:

1. tracheostomy
2. female gender
3. lack of early ICU mobility
4. Charlson Comorbidity Index.

- Patients not in the early mobility therapy group had higher odds of readmission or death.
- The strengths of this study identified predictors of 12-month readmission or death.
- Conclusions indicated that early ICU mobility protocols represent a potentially modifiable in-patient variable that may improve outcomes.

Morris, P. E., Griffin, L., Berry, M., Thompson, C., Hite, D., Winkelman, C.,...Haponik, E. (2011). Receiving early mobility during and ICU admission is a predictor of improved outcomes in acute respiratory failure. American Journal of Medical Science, 341(5), 373-377. doi:10.1097

Engel, et al. (2013) implemented Early mobility programs in ICUs at 3 different medical centers (Wake Forest, John Hopkins, UCSF) to assess their impact on clinical outcomes.
ICU early mobilization: from recommendation to implementation at three medical centers.

- Interprofessional Team-based approach (RN, PT, RT champions identified)
- Planning: identify & address barriers > recommendations > structure > implementation

Results:
Reduced ICU and hospital length of stay at all three institutions and decreased rates of delirium and the need for sedation for the patients.

Engel HJ, Needham DM, Morris PE, Gropper MA. ICU early mobilization: from recommendation to implementation at three medical centers. Crit Care Med. 2013 Sep;41(9 Suppl 1):S69-80. doi: 10.1097/CCM.0b013e3182a240d5. PubMed PMID: 23989097.

Take-away

- Early mobilization is a safe and feasible treatment in the management of critical illness
- Patients with rehabilitative needs must be evaluated and treated soon as they are determined to be hemodynamically stable
- Teamwork is essential to create a standard of care and follow-up