Risks vs benefits of early mobilization with mechanical ventilation

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**PICO Question**
Do early mobilization protocol benefits outweigh the risks in ICU patients with mechanical ventilation devices?

**Benefits of early mobilization**
- Shorter periods of mechanical ventilation
- Decreased ICU and hospital stay
- Improved physical function at hospital discharge
- Improved exercise capacity and functional status
- Reduced duration of delirium
- Improved physical recovery
- Prevention of disuse atrophy and muscle weakness

**Levels of evidence provided**
1. Level IV: Case report: Non experimental. Looks at information derived from individual cases for safety and feasibility of early mobilization.
2. Level IIa: Systematic review: reviews and analyzes multiple studies including randomized controlled trials, but also includes some cohort studies and therefore cannot be labeled level Ia in the hierarchy of evidence.
3. Level IV: Case report: Non experimental. Involves observation and applying the outcome measure to one group. It’s being used to explore a new topic (the outcome measure) because there is little information on it thus far.
4. Level IV: Case report: Non experimental. Involves observation of one patient in the ICU being administered two modalities of exercise to determine if the recovery process of patient can be expedited.

**Traditional ICU mobilization**
- Example protocol:
  - 8 patients, 62 total sessions
  - Patients were given exercises based on current level of function while on ECMO and various settings of mechanical ventilation including:
    - Passive range of motion in supine
    - Sitting up in bed, head and neck upright
    - Strengthening with an elastic band in sitting
    - Standing and marching
    - Walking with assistance
  - Adverse events
    - Only three sessions total were stopped based on patient’s response to exercise
    - No clinically significant adverse events occurred

**Innovative ICU mobilization**
- Example protocol:
  - Mobile leg press designed for partial weight bearing
  - Adjusted level of resistance to patient’s ability
  - Treatment session was able to last longer due to ability to adjust resistance vs. using patient’s body weight
  - Increased cardiovascular benefits due to longer treatment sessions
  - Less assistance needed from PT
  - Increased self-efficacy of patient due to increased level of achievement in exercise

- Hydraulic-assisted platform walker
  - Reduced the ambulation intensity to a level where the patient could succeed
  - Patient was able to perform assisted sit-to-stand earlier and for longer periods of time
  - Patient was able to develop the capacity to ambulate greater distances as a faster pace

**Outcome measures used to determine mobility status in the ICU**
- The Perme Intensive Care Unit Mobility Score
  - A tool created specifically to measure mobility in the ICU in order to safely create an early mobilization treatment
  - Begins as early as listening to simple commands moving all the way to ambulation
  - Looks at mental status, potential mobility barriers, functional strength, bed mobility, transfers, gait, and endurance
  - Provides objective measures of mobility in these settings which will allow clinicians to mobilize in a much safer way with the correct amount of individuals to assist and with the right expectations of the patient’s abilities

**Summary**
- Early mobilization provides many benefits including decreased length of stay, improved functional status and physiological responses, and overall health of the patient.
- Today, there are more innovative ways developing on early mobilization in order for the patient to get the most out of each treatment session.
- Adverse events occur in a very small percentage of total patients being mobilized while on mechanical ventilation.
- Education before mobilization and preparation for all types of situations is the key to safety in the ICU.
- The fear of mobilizing a patient due to mechanical ventilation equipment is not necessary. As long as proper precautions are taken on how to handle each piece of equipment and the patient is determined to be stable enough, this is not a reason to keep from mobilization.

**Clinical bottom line**
When proper preparation and education takes place prior to mobilizing a patient in the ICU, there are far more benefits to early mobilization that outweigh the small percentage of the likelihood for adverse events.

**References**

**Areas for future study**
- Studies including randomized control trials involving innovative mobilization such as the hydraulic-assisted platform walker for improved strength and functional ability versus a control group including traditional rehabilitation protocols with mechanical ventilation.
- Larger, prospective, and randomized studies to compare the feasibility and safety of mobility and mechanical ventilation compared with a control group.
- Experimental studies implemented with an outcome such as the Perme ICU Score used specifically to determine early mobility status compared with a control group using a well-established outcome commonly used in the ICU.