AHRQ HEALTH CARE INNOVATIONS EXCHANGE

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Innovation Profile:

Four-Step Protocol Determines Therapy for Patients With Acute Respiratory Failure, Leading to Improved Mobility, Shorter Stays

Snapshot

Summary

Wake Forest University Baptist Medical Center employs a mobility team that uses a four-step protocol to regularly assess medical intensive care unit patients with acute respiratory failure to determine the appropriate level of therapy; the goal of the program is to encourage mobility as early as possible. Prior to the development of the protocol, intensive care unit patients received physical therapy infrequently and/or irregularly. A 24-month prospective cohort study involving 330 patients assigned either to protocol-based or usual care found that the program encouraged early ambulation, reduced length of stay, and did not increase costs.

Developing Organizations

Wake Forest University Baptist Medical Center

Winston-Salem, NC

Date First Implemented

2004

Patient Population

Geographic Location > City; Vulnerable Populations > Intensive care unit patients

What They Did

Problem Addressed

Intensive care unit (ICU) patients patients, particularly those with acute respiratory failure who can breathe only with the assistance of a ventilator, often suffer a loss of systemic physical conditioning as a result of immobility,[1] which can have very negative consequences for patients. Early mobility may ameliorate this deconditioning, yet most institutions do not provide physical

therapy consistently or at all to ICU patients on ventilators.

- **Negative consequences of deconditioning:** Deconditioning and weakness are common problems in mechanically ventilated patients[1]; in general, patients on ventilators may experience some degree of deconditioning. Immobility in ICU patients has been postulated as having a number of negative outcomes related to a decline in musculoskeletal functioning, nerve systems, and cardiovascular and other organ systems. For example, critical illness polymyoneuropathy is an extreme weakness or numbness in one or more extremity that is seen in as many as 25 percent of mechanically ventilated patients who require more than 7 days of ventilator support.[2] Physical deconditioning and weakness may contribute to extended stays in the ICU of 25 days or more.[3]
- **Unrealized benefits of early physical therapy:** Physical therapy can improve functional outcomes in ICU patients, but may not be used consistently or at all, particularly in medical ICU patients.[3] The failure to use physical therapy may be associated with concerns related to apparatus dislodgement; difficulties in incorporating physical therapy into ICU care given sedation use; the perceived high costs of providing such therapy; staffing constraints, particularly for critical care nurses; and lack of a uniform protocol for physical therapy in the ICU.[1]

Description of the Innovative Activity

Wake Forest University Baptist Medical Center employs a mobility team that uses a four-step protocol to regularly assess medical ICU patients with acute respiratory failure to determine the appropriate level of therapy; the goal of the program is to encourage mobility as early as possible. Prior to the development of the protocol, ICU patients received physical therapy infrequently and/or irregularly. Key elements of the program include the following:

- **Target population:** The mobility protocol is applied to medical ICU patients aged 18 or older with acute respiratory failure who are on mechanical ventilation. The protocol is not applied to patients who cannot walk without assistance or who had cognitive impairment prior to being admitted to the ICU; patients with neuromuscular disease that could impair ventilator weaning; and patients who suffered an acute stroke or hip fracture, or who have an unstable cervical spine or pathological fracture.
- **Regular assessments using four-step protocol:** A mobility team, consisting of a critical care nurse, physical therapist, and nursing assistant, regularly assesses patients; the team uses a four-step mobility protocol to determine the appropriate level of physical therapy. The protocol specifies that patients receive therapy 7 days a week, with therapy maintained, escalated, or discontinued according to standards of functional and clinical status. Under the protocol, patients initially receive passive range-of-motion therapy from nursing personnel, and move on to more advanced therapy from physical therapists as functional improvement occurs. The four levels are described below:
    - **Level 1:** Therapy begins on the first day of the patient's ICU stay, when the patient is typically unconscious (sedated). First, the critical care nurse assesses the patient to determine whether it is safe to provide physical therapy (see last bullet for termination/suspension criteria). When the nurse determines that physical therapy is safe, nursing assistants provide passive range-of-

motion therapy of upper and lower extremity joints three times a day. At a minimum, five repetitions of exercises are provided to each joint other than the neck.

- **Level 2:** Escalation to the second level is considered when the patient regains some degree of consciousness. The physical therapist evaluates the patient's level of consciousness using a system based on the patient's response to five commands[2]: “open/close your eyes,” “look at me,” “open your mouth/stick out your tongue,” “nod your head,” and “raise your eyebrows.” For those patients who can respond to three of the five commands, the physical therapist initiates physical therapy, even if the patient still requires mechanical ventilation. A goal of this stage is to facilitate the patient into a sitting position.
- **Levels 3 and 4:** Advancement to levels three and four is based on several criteria, including the ability of patients to move arms and legs against gravity (a measure of arm and leg strength). Physical therapy at this stage increasingly focuses on the patient's achievement of functional activities, such as sitting unsupported on the edge of the bed, seated balance activities, transfer to/from bed and chair or commode, pre-gait standing activities, and ambulation. Other physical therapy exercises such as forward/lateral weight shifting and marching in place are also conducted.

- **Termination and/or temporary suspension of protocol:** The protocol is continued until the patient is transferred out of the ICU. In some cases, use is temporarily suspended or limited. Each day, critical care nurses determine whether mobility interventions should be scaled back or withheld based on standardized safety criteria that include objective physiology parameters such as patient oxygen levels, blood pressure, and heart rate. Other conditions that could limit mobility interventions include (but are not limited to) administration of a new vasopressor agent, newly documented myocardial infarction, and an increase in positive end expiratory pressure on the ventilator.

References/Related Articles

Morris PE, Goad A, Thompson C, et al. Early intensive care unity mobility therapy in the treatment of acute respiratory failure. *Crit Care Med*. 2008 Aug;36(8):2238-43. [PubMed]

Morris PE. Moving our critically ill patients: mobility barriers and benefits. *Crit Care Clin*. 2007 Jan;23(1):1-20. [PubMed]

Morris PE, Herrige MS. Early intensive care unit mobility: future directions. *Crit Care Clin*. 2007 Jan;23(1):97-110. [PubMed]

Contact the Innovator

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Did It Work?

Results

A 24-month prospective cohort study that assigned 330 patients either to protocol-based or usual care (which involved some physical therapy just prior to discharge from regular floor nursing units, but not as early or as frequently as dictated by the protocol) found that use of the protocol encouraged early ambulation, reduced length of stay (LOS), and did not increase costs.

- **Earlier ambulation:** Patients whose therapy followed the protocol got out of bed in an average of 5.0 days, compared to 11.3 days in the usual care group.
- **Lower ICU and hospital LOS:** The average ICU length of stay for those covered by the protocol was 5.5 days, compared to 6.9 days in the usual care group. The average hospital LOS was 11.2 days for the protocol group, compared to 14.5 days for the usual care group.
- **No increase in costs:** The total direct inpatient costs (inclusive of mobility team salaries) were $6,805,082 for the protocol group and $7,309,871 for the usual care group; the average cost per patient was $41,142 for the protocol group and $44,302 for the usual care group. These differences, however, were not statistically significant. (While earlier discharge from the ICU is meaningful, most of the actual costs are incurred in the first few days of the patient's ICU stay.)
- **Potential for incremental revenues:** The lower LOS in the ICU and hospital as a whole creates the potential new hospital revenues, as beds are freed up for additional patients.

Evidence Rating *(What is this?)*

Moderate: The evidence consists of a prospective cohort study comparing patient mobility, LOS, and care costs in patients assigned to an intervention or control group. Patients were assigned using a block allocation design in which patients were admitted to seven separate ICU units based on bed availability; the mobility team rotated among the ICUs and provided the intervention to blocks of patients.

How They Did It

Context of the Innovation

Wake Forest University Baptist Medical Center is the parent organization of the 800-bed North Carolina Baptist Hospital and the Wake Forest School of Medicine. The hospital has seven ICUs, six with 11 beds each and one with 9 beds. Dr. Peter Morris, a pulmonologist and critical care physician at the hospital who serves as Medical Director of the hospital's 24-bed intermediate care ventilator unit and is Director of the Critical Care Clinical

Trials Group (http://www.criticalcaretrials.com), developed the protocol based on his research interest in physical deconditioning in ICU patients and his experience observing how early mobility therapy can improve functional outcomes. Hospital administration was very keen in its support for this project as a reflection of its commitment to improving the overall quality of inpatient care at North Carolina Baptist Hospital. The administrators remained active and supportive throughout the initiative.

Planning and Development Process

Key steps in the planning and development process included the following:

- **Winning senior management approval:** Researchers sought approval from hospital administrators to fund a 2-year trial of the protocol. Because most physical therapists only worked Monday through Friday, approval was needed to add weekend hours in order to apply the ICU intervention protocol 7 days a week.
- **Protocol development:** Nurses, physical therapists, and intensivist physicians developed the specific protocol interventions, with physical therapists designing the interventions and other representatives reviewing and approving them.
- **Integration with other protocols:** Critical care nurses ensured that the physical therapy protocol was integrated properly with other hospital protocols for ventilator weaning and sedation. Critical care nurses also wrote the safety criteria for continued protocol use.
- **Introducing protocol to staff:** Critical care nurses, physicians, physical therapists, physical therapy administrators, and ICU unit managers met to learn about the protocol and the potential interdisciplinary synergies that could lead to better patient outcomes.
- **Training:** Physical therapists trained nursing assistants to provide passive range-of-motion exercises to ICU patients.

Resources Used and Skills Needed

- **Staffing:** The protocol was implemented using existing staff members. The daily ICU team consists of a critical care nurse, physical therapist, and nursing assistant (who works during the day shift only). A physical therapist who is on call during weekends works with the mobility team on Saturdays and Sundays.
- **Costs:** The incremental cost of salary and benefits for members of the mobility team during the two-year study period was approximately $250,000; the teams served 165 patients in the protocol group.

Funding Sources

Wake Forest University Baptist Medical Center

NIH P60AG10484, Claude D. Pepper Older Americans Independence Center of Wake Forest University Center Grant

Tools and Other Resources

The mobility protocol is available at http://www.criticalcaretrials.com and within the following article:

Morris PE, Goad A, Thompson C, et al. Early intensive care unity mobility therapy in the treatment of acute respiratory failure. Crit Care Med. 2008 Aug;36(8):2238-43. [PubMed]

Adoption Considerations

Getting Started with This Innovation

- **Emphasize quality benefits to win buy-in from management:** Researchers obtained senior management approval by emphasizing that the protocol would improve quality for patients, and help differentiate the institution from its competitors based on quality. In addition, emphasize the benefits of mobility in sedentary patients. This simple, logical message also helped in convincing Wake Forest administrators of the project's value.
- **Let physical therapists and critical care nurses drive the initiative:** While a multidisciplinary team should be involved, give physical therapists and critical care nurses the authority to determine protocol content, timing, and interrelationships with other protocols. This type of personal engagement and responsibility will enhance their support of the project.
- **Assign dedicated staff when possible:** Create a team with a critical care nurse who is independent of direct bedside care responsibilities in order to facilitate application of the protocol.
- **Be sensitive in cultivating interdisciplinary relationships:** Nurses and physical therapists may feel threatened by the development of a new protocol. To overcome any resistance, emphasize the goal of blending their different areas of expertise in order to improve patient outcomes. In addition, emphasize that nurses and physical therapists retain flexibility in implementing the protocol, as they meet each day to assess the patient and determine whether the protocol can safely be implemented.
- **Consider financial implications:** Hospitals that operate at or near full capacity (either overall or in the ICU) and/or that are paid a fixed fee per admission (as occurs under Medicare and with other payers) are most likely to benefit financially from this initiative. By reducing LOS, these hospitals can minimize their costs of care without negatively affecting revenues. For capacity-constrained hospitals, shorter LOS allows them to handle more patients, thus potentially increasing revenues.

Sustaining This Innovation

Measure outcomes to gauge progress and promote sustainability: Track the program's impact on mobility and LOS on an ongoing basis in order to demonstrate the program's benefits and identify opportunities for further improvement. In addition, qualitative evidence of early patient mobility may be very noticeable to both families and staff, thus encouraging staff to support continued use of the protocol.

Comment on this innovation / Read other comments.

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[1] Morris PE, Goad A, Thompson C, et al. Early intensive care unity mobility therapy in the treatment of acute respiratory failure. *Crit Care Med*. 2008 Aug;36(8):2238-43. [PubMed]

[2] De Jonghe B, Sharshar T, Lefaucheur JP, et al. Paresis acquired in the intensive care unit: a prospective multicenter study. *JAMA*. 2002 Dec 11;288(22):2859-67. [PubMed]

[3] Herridge MS, Cheung AM, Tansey CM, et al. One-year outcomes in survivors of the acute respiratory distress syndrome. *N Engl J Med*. 2003 Feb 20;348(8):683-93. [PubMed]

[4] Interview with Dr. Peter E. Morris, October 2, 2008.