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ATRIUM Clinical Update

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Mobility in Critical Care

New research is examining early mobility programs in critical care patients – yes, even for patients requiring mechanical ventilatory support and left-ventricular assist devices (LVAD)[1,2,3].

Multisystem Risks of Immobility

Acute deconditioning describes organ system changes resulting from inactivity that can be reversed by resuming activity. Neuromuscular abnormalities are evident after just one week of critical care. However, with the focus on life-threatening conditions, loss of muscle mass and weakness are often undetected[4,5]. Without physical activity, muscles lose protein and the antigravity muscles responsible for supporting the body in an upright posture and allowing the patient to sit on the edge of the bed, stand, and transfer are particularly vulnerable. These muscles — in the trunk, neck, and legs — lose strength more rapidly than muscles associated with grip strength, which is more frequently assessed in critically ill persons. Not only are patients weakened by inactivity but also by cellular muscle damage resulting from systemic inflammation[4,5].

Atelectasis and pneumonia can occur from limited thoracic cage expansion and secretion stasis. Pulmonary emboli can arise from deep vein thromboses in the pelvis and legs caused by venous pooling related to the lack of skeletal muscle contraction. Pooling also decreases venous return. Patients supine for long periods experience relative hypovolemia and decreased response of the carotid baroreceptors that result in orthostatic hypotension. Without weight-bearing stress on the bones, demineralization occurs, which can increase risk of kidney stones. The advantages of feeding through the gut may be mitigated by decreased intestinal motility. And as the skin is subjected to shear and pressure forces, particularly in areas of poor perfusion, decubitus ulcers present yet another risk[4,6,7].

A Mobility Mindset

Bedrest is not therapeutic but is clearly the only option for unstable patients. The latest research emphasizes the need to view early activity as a key component of critical care, and to assess patients for mobility at least once a shift[7]. These assessments can also be incorporated into daily sedation awakening[5]. Early activity ranges from sitting without back support, weight shifting, transferring to a chair, standing with weight bearing, then ambulating with and without assistive devices[1,6,7].

Mobility actions should be automatic through protocols (noting contraindications), just as it is now routine to elevate the head of the bed for patients receiving mechanical ventilation to reduce the risk for ventilator-associated pneumonia. Mobility assessment and reasons for maintaining bedrest should be documented and monitored through quality audits.

Assessing for Mobility

It is important to differentiate absolute contraindications for mobility from safety concerns that have not been supported by research done on critical care mobility programs. Acute contraindications include: hypotension (SPB <90mmHg), tachycardia (HR > 130/min), unstable cardiac rhythm, need for vasopressors, intra-aortic balloon, temporary pacemaker, active bleeding, neurological instability, inability to follow commands purposefully, femoral sheath or arterial line, balanced skeletal traction, high-frequency ventilation, and FIO_2 > 0.60 and PEEP >10cmH_2O[1-3,7,8]. Chest tubes are not a contraindication to mobility.

Without contraindications, next evaluate the cardiorespiratory reserve to handle the physiological demands of mobility. Resting heart rate should be less than 50% age predicted maximal heart rate, blood pressure variability < 20%, SpO_2 > 90% with < 4% recent decrease, and hemoglobin levels should be stable to provide adequate oxygen carrying capacity[8]. Stiller urges clinicians to perform a comprehensive assessment and not just to rely on "the numbers" to determine the patient's readiness. Some will tolerate mobility well with poor objective findings, while others may meet those criteria, but might not do well because of fatigue, pain, fear, or significant work of breathing.

Early Activity is Safe

Mechanical ventilation should not impede an activity program in critical care. Stiller recommends using the most supportive level of ventilation during mobilization and even increasing support so patients can get active while maximizing pulmonary reserve. In fact, early activity helps ventilator weaning and if a choice is required, activity should be facilitated before weaning is begun[2,7].

Two recently published studies looked at early mobilization in critical care and show how safe activity is. One was a prospective study of patients with respiratory failure[2]. Of 1,449 activity episodes in 103 patients, there were only 14 adverse events in 9 patients: 5 falls to the knees without injury, 4 drops in systolic blood pressure, 3 episodes of oxygen desaturation, one feeding tube dislodged and one episode of hypertension. All were self-limiting and there were no airway extubations. By implementing an activity program, 69% of patients were able to walk more than 100 feet at time of ICU discharge.

The other study, just published in August, compared 165 patients with acute respiratory failure who were treated with a physical therapy mobility protocol to 165 who received usual care[1]. Outcomes were assessed in study patients who survived to hospital discharge. There were no reported adverse events during mobility activities. Protocol patients were out of bed 6 days earlier, received therapy 78% more often, had a 1.4 day shorter length of stay in the ICU and a 3.3 day shorter hospital length of stay.

The Future of Mobility in Critical Care

Reports on activity in critically ill patients show that with proper patient selection, mobility is beneficial and can be accomplished safely while patients are receiving mechanical ventilation and attached to physiologic monitors. Pulmonary support and monitoring actually increase the safety of getting patients moving to combat the multisystem risks of immobility. Devices and equipment that promote mobility such as portable monitoring devices, mobile chest drain devices, and portable ventilators will allow critical care practitioners to maximize patients' activity while providing safe and effective care.

Sources on page 2.

Clinical Update is an educational newsletter provided by Atrium Medical Corporation and is edited by Patricia Carroll, RN,BC, CEN, RRT, MS.

In The Literature

Quality Assessment 101

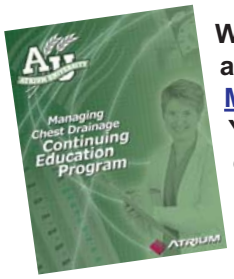
The current issue of *MEDSURG Nursing* contains a useful introductory article on evaluating quality in acute care. Not only does it provide helpful guidance, but it helps nurses better understand the publicly reported hospital quality measures used by the Centers for Medicare & Medicaid Services to determine reimbursement. The article reviews reliability and validity of monitored variables, choosing an appropriate database from which to derive data, and how to collect data that can provide the most useful feedback.

Source: Baldwin KB, Robertson JF: A primer in the evaluation of quality in acute care settings. *MEDSurg Nursing* 2008;17(4):241-246.

Is Shift Work Safe and Healthy?

A research study in the current issue of *Nursing Economic$* compared sleep disorders and health problems in nurses who worked daytime or rotating shifts. Shift work alone was not found to be a risk factor for poor health in nurses; females reported more health problems and sleep disturbances regardless of work schedule. There were fewer absences among shift workers, but they were statistically younger than the daytime nurses. These researchers did not find more errors reported by nurses with sleep disturbances.

Source: Admi H, Tzischinsky O, et al.: Shift work in nursing: is it really a risk factor for nurses' health and patients' safety? *Nursing Economic$* 2008;26(4):250-257.



BREAKING NEWS!
We have updated the fully illustrated and referenced online monograph Managing Chest Drainage for 2009. You can complete the post-test and evaluation online for continuing nursing education credit. On successful completion, you can print your certificate on the spot.

Sources from page 1:

1. Morris PE, et al.: Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Critical Care Medicine* 2008;36(8):2238-2243. PubMed Citation

2. Bailey P, et al.: Early activity is feasible and safe in respiratory failure patients. Critical Care Medicine 2007;35(1):139-145. PubMed Citation

3. Perme CS, et al: Early mobilization of LVAD recipients. *Texas Heart Institute Journal* 2006;33:130-133. PubMed Citation

4. Morris PE: Moving our critically ill patients: mobility barriers and benefits. *Critical Care Clinics* 2007;23:1-20. PubMed Citation

5. Morris PE, Herridge MS: Early intensive care unit mobility: future directions. *Critical Care Clinics* 2007;23:97-110. PubMed Citation

6. Hopkins RO, Spuhler VJ, Thomsen GE: Transforming ICU culture to facilitate early mobility. *Critical Care Clinics* 2007;23:81-96. PubMed Citation

7. Timmerman RA: A mobility protocol for critically ill adults. Dimensions of *Critical Care Nursing* 2007;26(5):175-179. PubMed Citation

8. Stiller K: Safety issues that should be considered when mobilizing critically ill patients. *Critical Care Clinics* 2007;23:35-53. PubMed Citation

New! Starting this issue – We will provide links to the available PubMed pages for all articles now that Clinical Update is electronic.

On the World Wide Web

More on Patient Safety

Tall Man Letters

The FDA and the Institute for Safe Medication Practices have released a list of look-alike drug name sets with recommended tall man letters, which are designed to draw attention to the differences in drug names. Examples include: ALPRAZolam / LORazepam and quiNINE / quiNIDine. For the full list, visit http://www.ismp.org/tools/tallmanletters.pdf

Safety is International

The World Health Organization hosts the World Alliance for Patient Safety. This comprehensive site puts an international spin on patient safety and provides resources in English, Spanish, French, Russian, Arabic, and Chinese. This is a particularly valuable resource for infection control and other patient safety information for patients and staff who do not speak or read English.

http://www.who.int/patientsafety/en

Joint Commission 2009 Patient Safety Goals

The Joint Commission has released the 2009 Patient Safety Goals, available at the Web link below. The Universal Protocol applies to surgery and other invasive procedures at the bedside. The key differences include: *Verification of correct person*, *site* and *procedure* occurs at the time of preadmission testing and assessment, a checklist is used to track an accurately completed consent form and any required blood products; *marking the procedure site* indicates flexor/extensor surfaces, the site is marked before the patient is moved to the location for the procedure (if possible), an *alternate process is in place* for sites that cannot be easily marked, including mucosal surfaces and perineum; *the time out* is conducted before anesthesia unless contraindicated, is initiated by a designated team member, any team member is able to express concerns about the verification, there is a defined procedure for reconciling differences, other activities are suspended to the extent possible so all team members focus on the time out, there is a separate time out for each procedure to be performed on a patient; consent, correct images displayed properly, the need for antibiotics or irrigation fluids, and special patient-specific precautions are verified in addition to other standard elements. Be sure to update your policies and procedures to reflect these new requirements. http://tinyurl.com/6ghop6

For a great "time out" case study and related discussion, visit the AHRQ Web M&M site at http://www.webmm.ahrq.gov/case.aspx?caseID=177