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ATRIUM Clinical Update

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Update on Chest Tube Insertion

Chest tubes are typically inserted during trauma resuscitation in the emergency department, in critical care units, and in the operating room. We will review research examining which practitioners should insert chest tubes and recommendations for reducing complications during the procedure and those resulting from errors in technique.

Who Should Perform Tube Thoracostomy?

A recent study in the *American Journal of Critical Care*[1] examined 51 trauma service patients who had tube thoracotomies performed by either an attending surgeon or an advanced practice practitioner (APP – advanced practice registered nurse or physician assistant). There was no statistically significant difference in patient characteristics between the practitioners. No insertion complications (bleeding at the insertion site, reexpansion pulmonary edema, loss of pulse, vasovagal episode or empyema) occurred in the study group. For placement quality indicators, 13% of patients had tube kinking, 10% had an extrapleural drainage port, 11% of patients' chest tubes were directed caudad instead of cephalad, and 34% of tubes abutted the mediastinum. Of these, only one had a statistical difference between surgeons and APPs — more surgeon-inserted tubes were caudad; surgeons inserted 7 of the 8 misdirected tubes. The researchers determined that APPs safely expanded trauma staffing and inserted chest tubes competently.

Another study, from the *Canadian Journal of Surgery*,[2] examined complications associated with tube thoracostomy performed by residents on trauma patients. General surgery residents had the fewest number of complications, and emergency medicine residents were more than twice as likely to have a patient complication; however, there were fewer complications when chest tubes were inserted in the trauma bay compared with the ICU or operating room. Complications in this study of 338 patients over 12 months included intercostal artery laceration, intraparenchymal lung placement, and other positional errors. Less than half of the complications were noted on traditional chest radiographs; the others were detected on CT scan. These researchers recommend CT scan after chest tube placement when possible, and they are examining their training program to identify variations that may explain the difference in complication rate between specialties.

Challenges in Trauma Settings

The Agency for Healthcare Research and Quality has published a 12-minute DVD, available free with a request from their Web site, that graphically shows problems associated with tube thoracostomies in the trauma setting[3]. In 50 videotaped chest tube insertions, sterile technique was breached 100% of the time in a variety of ways, from using non-sterile gloves to instrument sharing. The authors recommend the acronym UWET to guide proper procedure:

- **U**niversal precautions, including sterile cap, mask, gown and gloves
- **W**ider skin prep
- **E**xtensive draping
- **T**ray positioning on the operator's dominant side

In many cases, single procedure trays were used for multiple procedures on the same patient which resulted in certain contamination as operators reached to the same tray, sometimes on the opposite side of the patient. Such sharing also significantly increases the risk of sharp injury as two people reach toward the tray at the same time.

Inadequate analgesia not only resulted in patient discomfort, but also movement that contaminated the field and put clinicians in jeopardy for injury. If movements cannot be controlled with simple short-acting benzodiazepine and fentanyl, then an anesthesia clinician should be called in for deeper, monitored sedation.

Correct insertion techniques help avoid many complications. The authors stress the importance of exploring with a sterile gloved finger after the skin incision is made and the chest is entered. The operator should be able to rotate the finger through 360 degrees inside the chest wall to determine if there are adhesions, if abdominal contents have herniated into the chest or if the incision is grossly misplaced. Only pleura and lung should be palpable for safe tube placement.

The authors conclude by pointing out the critical importance of self-protection by clinicians. HIV is present in up to 10% of trauma patients, and hepatitis C in up to 15%. A sharp injury with blood contamination during tube thoracostomy can be a fatal injury for the clinician in the right circumstances and is a risk to which clinicians should not be exposed. Simple steps, as outlined in this superb video, can be implemented to protect clinicians and patients alike. Nurses can play a key role in seeing that these commonsense recommendations are followed and that all members of the team take 10 minutes to watch this important production.

Evidence or Tradition?

Trauma and surgical experts from Australia and Baltimore published a comprehensive review of pleural decompression during initial trauma resuscitation[4]. Of particular note is their strong recommendation against needle decompression of the chest. There is no evidence to support the procedure and the authors identify four potential problems: false positive when the needle is in subcutaneous air, false negative when the needle does not reach the pleural space, false positive when the needle goes into the lung or bronchial tree, and a false positive for hemothorax when the needle is placed into a major vessel. A needle length of less than 5cm (1.97in) would fail to reach the pleural space 18% to 33% of the time, but longer needles significantly increase the risk for cardiac placement. In addition, patients immobilized on backboards typically experience anteromedial displacement of the clavicle and shoulders; thus, a puncture thought to be in the mid-clavicular line is actually more medial, with greater risk for cardiac injury. These authors recommend needle decompression as only a last resort, and instead, use lateral thoracostomy for decompression with digital exploration and pleural puncture if necessary — with tube placement as a secondary priority. Digital exploration allows for clear identification of the pleura, reducing risk of false-positives and allowing for rapid identification of mediastinal displacement or herniated abdominal contents. A readily-accessible chest tube insertion kit will facilitate this process, and in the hands of a skilled clinician, can be as quick and much more reliable as needle decompression.

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

One-stop Summary of Respiratory Research

Respiratory Care, the official journal of the American Association for Respiratory Care, provides abstracts of original research presented at the annual International Respiratory Congress. This year, nearly 300 studies will be presented at the Congress in 18 Open Forum symposia. This format allows for an open discussion between investigators and observers and allows research to be presented publicly earlier than in traditional peer-reviewed publication. Categories of research for 2008 include: ventilators, humidification and nebulization, home care and transport, diagnostics, asthma and COPD, disaster response, case reports, management, education, and pediatrics. All abstracts are published in the November issue.

Source: International Respiratory Congress: 2008 Open Forum. *Respiratory Care* 2008;53(11):1503-1591.

Nurses' Challenge with Moral Distress

Moral distress, the knowledge of the ethically appropriate action but the inability to act on it, is common to nursing practice. The current issue of *Dimensions of Critical Care Nursing* reports on a project at Jewish Hospital in Cincinnati in which a workshop was presented to critical care nurses. Moral distress was defined, nurses were encouraged to share their stories, and participants learned about ways to cope with this practice challenge. A post-workshop survey showed staff felt less moral distress afterward and a more positive work environment, which contributes to the healthy work environment championed by AACN.

Source: Beumer CM: The effect of a workshop on reducing the experience of moral distress in an intensive care unit setting. *Dimensions of Critical Care Nursing* 2008;27(6):263-267. PubMed Citation

How Can We Enhance the Measurable Value of Nursing Care?

Researchers from UCLA publish a thought-provoking article in the current issue of *Nursing Economic$* probing the concept of value-added nursing services. It begins with the premise that enhancing and supporting nursing practice at an organizational level improves patient outcomes. Value-added activities are patient-centered activities that directly benefit the patient, but not all are direct patient care. They also include chart review, report for continuity of care, communication with team members and families, care conferences and medication reconciliation. The researchers examined workflow in 40 hospitals across the country to determine how processes and staffing mix refinements can allow nurses to spend the greatest amount of their time on the most value-added activities.

Source: Upenieks VV, Akhavan J, Kotlerman J: Value-added care: a paradigm shift in patient care delivery. *Nursing Economic$* 2008;26(5):294-300. PubMed Citation

On the World Wide Web

CMS Finalizes Never Events

The Center for Medicare and Medicaid Services has issued a final rule on the Hospital-Acquired Conditions classified as "never events," reflecting preventable errors in care. If any of the listed conditions occur during hospitalization, reimbursement will suffer. Of note, iatrogenic pneumothorax was initially recommended, but is not on the final list. While it is recognized as a commonly occurring adverse effect, there is not yet enough evidence about preventing this complication. The summary is here: http://tinyurl.com/6k5vyn. The full, 1700+ page report with complete rationales for all indicators chosen and rejected is available at: http://tinyurl.com/6oby4o

New Joint Commission Publications

The Joint Commission has recently published two new monographs, free for download. Guiding Principles for the Development of the Hospital of the Future is an expert panel report outlining 5 key aspects for future hospital development:

http://www.jointcommission.org/NewsRoom/NewsReleases/nr_11_20_08.htm

And, the annual report provides an update on quality measures monitored in accredited hospitals, available at: http://tinyurl.com/6ctd92

Sources from page 1:

1. Bevis LC, Berg-Copas GM, Thomas BW, et al: Outcomes of tube thoracostomies performed by advanced practice providers vs. trauma surgeons. *American Journal of Critical Care* 2008;17(4):357-363. PubMed Citation

2. Ball CG, Lord J, Laupland KB, et al: Chest tube complications: how well are we training our residents? *Canadian Journal of Surgery* 2007;50(6):450-458. PubMed Citation

3. Agency for Healthcare Research and Quality. Rockville, MD. http://www.ahrq.gov/qual/chesttubes.htm Problems and Prevention: Chest Tube Insertion. Patient Safety: Findings in Action. AHRQ Publication No.: 06-P024, September 2006.

4. Fitzgerald M, Mackenzie CF, Marasco S, Hoyle R, Kossmann T: Pleural decompression and drainage during trauma reception and resuscitation. *Injury* 2008;39:9-20. PubMed Citation

Your friends at Atrium wish you and yours a happy and healthy holiday season!