



Clinical Update

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Toward Evidence-Based Chest Drainage

At Clinical Update we monitor the literature to keep you up-to-date on research about chest drainage. During the 2004 AACN National Teaching Institute, we provided a session about reviewing research and the response was so positive, we're sharing the highlights here.

What Does the Study Study?

A study should clearly describe the research, particularly the hypothesis tested. For example: "...we evaluated the amount of pain associated with intracostal sutures (placed after drilling four small holes in the underlying rib) and compared that to the pain associated with pericostal sutures."¹ Or to state the study hypothesis more succinctly: "Do intracostal sutures cause less pain than pericostal sutures?"

Readers should also be able to readily determine the study population's composition. For whom might intracostal sutures be less painful? For patients who have lung resection to treat lung cancer? For trauma patients? In this study, patients were described as "...280 consecutive patients [who] underwent elective thoracotomy for pulmonary resection." Thus, the better statement of the hypothesis: "Do intracostal sutures cause less postoperative pain than pericostal sutures in patients undergoing elective thoracotomy for pulmonary resection?"

How Are Subjects Assigned?

The method of assigning subjects to the control or study group will affect the results. True randomization occurs only when patients are assigned a random number from a computer-generated list of numbers. Other methods randomly assign patients by using the last digit of a patient's date of birth or ID code, but some experts claim that clinicians can still steer patients to one group or another this way.²

The authors of the suture study state that initially patients were to be randomized intraoperatively (no method is described). But, because of logistical problems setting up the drill for the intracostal sutures, two groups of consecutive patients were treated: the first group of 140 had pericostal sutures, and the second group of 140 had intracostal sutures.

Controlling Confounding Variables

A confounding variable is a characteristic that makes the two study groups unequal. For example, one group may have more men than the other; one group may have older patients than the other; or in a study like this, patients in one group may have larger incisions.

In this study, all subjects were operated on by the same surgeon

and patients were excluded from the trial if they had chronic pain, used methadone, had psychiatric illness or previous ipsilateral thoracotomy — all factors that could significantly affect their perception of postoperative pain and skew the results. Surgical technique was standardized as to location of incision and muscles cut. At the end of the surgery, patients had one or two soft 28Fr. chest tubes and they all had identical pain regimens that included epidural analgesia, oxycodone, and acetaminophen.

There was no statistical difference between the two groups as to age, gender, race, type of operation, broken ribs (resulting from retraction during surgery), duration of chest tubes, number of chest tubes, or length of stay (LOS).

How Are Results Measured?

Since this study's hypothesis was to evaluate pain, and there are no objective measures that can be independently verified, the tool(s) used to evaluate pain is critical to the reliability of the research. The authors state they validated tools through a previous research study and chose a traditional numeric scale on which zero represented no pain and 10 represented excruciating pain. Interestingly, the authors decided not to use a visual analog scale because their previous research found it was confusing and not reproducible. In addition, their previous research led to the decision to measure pain at 2 weeks, 1 month, 2 months and 3 months postoperatively to measure the true effect of suture methods apart from immediate postoperative pain.

To P or Not to P?

The P value in a study is a statistical measurement that expresses the probability that outcomes result from the research intervention and not by chance. The lower the P value, the less likely the result is by chance; traditionally, the cutoff value has been a $p < 0.05$. Once the P value is determined, the reader needs to determine whether the values, although statistically significant, are clinically relevant.

In this study, the difference in pain ratings favored the study group that received intracostal sutures. Mean difference, also noted as P value, at 2 weeks was 2.2 points on the numeric pain scale ($p = 0.004$), at 1 month, 2.1 points ($p = 0.001$), at 2 months, 1.2 points ($p < 0.001$) and at 3 months, 1.0 points ($p < 0.001$).

These values clearly meet the criteria for statistical significance; that is, the reduction in pain scores did not occur by chance. The intracostal sutures resulted in less postoperative pain. However, as the authors noted, setting up the equipment to drill the 5mm holes in the ribs for the intracostal sutures was a challenge logistically. Depending on the volume of thoracotomies performed, it may or may not be realistic for an organization to adopt this method of closing the chest.

See sources on page two.

Check Your Knowledge...

Q. A study compared one group of patients whose chest tubes remained connected to wall vacuum with a group that did not use suction after they left the PACU. Results measured in days showed differences as follows: duration of chest tube, 1.1 days ($p=0.004$) and LOS 1.1 days ($p=0.004$). Interpret these results.

Answer on other side

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

Blood Conservation in Cardiac Surgery

The current issue of *Dimensions of Critical Care Nursing* contains a review article on blood conservation strategies in cardiovascular surgery. The authors describe a systems approach to conservation that includes a needs assessment of current expenditures for transfusions and perceptions of homologous blood use in cardiac surgical patients. Recommendations for committee formation follow, and then a discussion of blood conservation strategies including phlebotomy techniques, an analysis of how hemostasis and hemoglobin levels are managed through various pharmacologic agents, and the effects of platelet inhibitors administered preoperatively. The article wraps up with an overview of how to measure outcomes of a blood conservation program.

A glaring omission in this article, is its failure to mention the autologous transfusion of shed mediastinal blood. Chest drainage systems today offer three choices for reinfusing the patient's own blood: one is a continuous infusion system in which intravenous tubing is attached to the drain's collection chamber, creating a closed loop from the patient, through the drain and back to the patient. This system may be an acceptable option for some Jehovah's Witness patients. The second is a collection bag that can draw blood from the collection chamber and then be hung on an IV pole for infusion, and the third is an inline bag placed between the patient drainage tube and the drain. The bag hangs on the front of the drain, collecting blood, and is then removed and hung on the IV pole for reinfusion.

Source: Ehrman BLM, Moore HA: Blood conservation strategies in cardiovascular surgery. *Dimensions of Critical Care Nursing* 2004;23(6):244-254.

Note: for additional information about autotransfusion, contact your Atrium representative or 800-5-ATRIUM

A Titanium Rib

An article in a recent issue of *Orthopaedic Nursing* describes a device used to treat children with chest wall deformities that restrict lung growth. The Vertical Expandable Prosthetic Titanium Rib (VEPTR) is a prosthetic device that straightens the spine and supports the thoracic cage. Cradles on each end of the titanium support are attached to both an upper and lower rib or an upper rib and the iliac crest.

As the child grows, the prosthesis adjustment can be reached through a small incision and the device can be lengthened to match the child's bone growth. The device is currently under consideration by the FDA and is being used at seven sites approved to study the VEPTR's use. In addition to using it for thoracic insufficiency syndromes, VEPTR is also being explored as an alternative treatment for scoliosis — eliminating the need for spinal fusion.

Source: Chong H, Matz A, Pedicino MJ, Davis MM: The titanium rib: creating room to grow. *Orthopaedic Nursing* 2004;23(5):348-349.

The Manager Takes an Assignment?

Don't miss this article in *Nursing Economic\$* that describes an innovative program in which a co-manager model was implemented. Unlike conventional job sharing where each person works part-time, in this model each manager works 36 to 40 hours a week, covering all seven days, with overlapping hours into the off-shifts. In addition to managerial responsibilities, each manager also works a full 12-hour clinical shift every week.

This approach was initially designed to provide outstanding clinical practitioners with leadership skills to move into a management role without leaving the bedside. During the pilot period, staff turnover declined, and nursing labor costs decreased by \$60 per patient day. Thus, adding a managerial position actually increased efficiency and decreased costs.

Source: Carroll CA, Lacey SR, Cox KS: Comparing variations in labor costs for two vs. one full-time nurse manager. *Nursing Economic\$* 2004;22(5):254-257.

On the World Wide Web...



What Do Those Headlines Mean?

<http://www.nih.gov/news/WordonHealth/apr2004/risk.htm>

This article, from the National Institutes of Health, teaches consumers how to look beyond media headlines to investigate the science behind the hype.

Evaluating Medical Research Findings

http://caregiver.org/caregiver/jsp/content_node.jsp?nodeid=402

Here's another helpful article from the Family Caregiver's Alliance, an organization that addresses the needs of people providing long-term care at home. This comprehensive piece describes medical research studies, provides insights on being a smart consumer of Web information, and details about participating in clinical trials. A particularly inclusive aspect of this site is that they refer people to the "healthcare provider" — not exclusively to a doctor at the exclusion of nurses.

Orthopedic Journal at Harvard Medical School

<http://www.orthojournalhms.org/html/manuscripts/manuscript-06.htm>

This is the URL for a more detailed article describing the use of the VEPTR at Children's Hospital in Boston, including great radiographs and case summaries.



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



Sources from page one:

1. Cerfolio RJ et al: Intracostal sutures decrease the pain of thoracotomy. *Annals of Thoracic Surgery* 2003;76:407-12
 2. Health Care Communication Group: *Writing, speaking & communication skills for health professionals*. 2001 Yale University Press. New Haven, CT.
- Additional reading: Riegleman RK: *Studying a study and testing a test*. Ed. 4 2000 Lippincott Williams and Wilkins. Philadelphia.

Check Your Knowledge...

A. In this study, both the duration of chest tube placement and LOS were significantly shorter in patients on gravity drainage. This is confirmed by P values well below the 0.05 P value used to differentiate statistical significance from chance. What is the clinical relevance? The desire for a shorter chest tube duration is directed at achieving a shorter LOS. By itself, chest tube duration may not be clinically relevant. In this study, LOS was directly measured and it was significantly less in the gravity drainage group compared with the suction group. This is highly relevant since a shorter LOS significantly decreases surgical costs.