



# Clinical Update

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## Innovations in Chest Drainage—Mobile Chest Drainage Part 2

In the last issue of Clinical Update, we discussed a new mobile chest drain, the Atrium Express 1500™ Chest Drain Bag. It is designed to collect fluid drainage and allow air to leave the chest. This mobile device is ideal for use as a "step-down" drainage unit for the patient who's not ready to have chest tubes removed postoperatively, may have some residual serosanguineous drainage, and is able to get up and walk around to speed recovery and shorten length of stay. In this issue, we'll introduce you to Pneumostat™, a mobile device designed for patients with pneumothorax.

### History of Mobile Chest Drainage

The first device for mobile chest drainage was the Heimlich valve, invented by Dr. Harry Heimlich in the early 1960s and used widely during the conflict in Southeast Asia. The Heimlich valve consists of a flattened Penrose drain housed in a plastic cylinder that acts as a one-way valve. It was designed to provide chest decompression and to buy time for wounded servicemen to be transported to field hospitals for thoracic surgery. Back then, it didn't matter if the device left a puddle of blood on the evacuation helicopter floor or if it contained latex. It was a lifesaver. But that was 40 years ago, and we care for patients in a different environment today.

Now we need a lightweight, portable device that provides a one-way valve so air can leave the chest and not reenter. The unit needs to have some sort of fluid collection reservoir so that we don't violate standard precautions and spill drainage out of a jury-rigged collection system, and it should be latex-free.

### Introducing Pneumostat

The Pneumostat Chest Drain Valve is the newest mobile chest drain device. Like the Heimlich valve, it is lightweight and attaches to a traditional chest tube. But the similarities end there. The Pneumostat is latex free, has a one-way valve to allow air to leave the pleural space without reentering, and has a small collection chamber. A vent in the one-way valve makes up an air leak well; add 1ml of water, and bubbling in this indicator will tell you if there is an air leak from the lung.

The built-in collection chamber is not designed for patients with fluid drainage postoperatively or from a pleural effusion. Rather, it is designed to collect the physiologic watery pleural fluid normally produced by the body. The volume of pleural fluid is about 0.3ml/kg of body weight or about 25ml. The Pneumostat's collection chamber volume is 30ml. A Luer connection at the bottom of the chamber allows needleless drainage with a Luer-lock syringe. If the collection chamber fills and the fluid is watery, you can remove it with a syringe. If fibrin threads are visible, or the fluid is difficult to remove with a syringe, you can simply change the device. This feature is what makes the Pneumostat unique—the patient has a lightweight one-

way valve to treat pneumothorax without the risk of fluid leakage and the risks that accompany compromises in standard precautions and potential exposure to body fluids and bloodborne pathogens.

### Who Should Get a Pneumostat?

The Pneumostat is indicated for patients with simple pneumothorax who are breathing spontaneously and do not need suction to remove air from the pleural space. The American College of Chest Physicians (Baumann, 2001) published guidelines last year for treatment of pneumothorax and provided recommendations for patients who could be treated with one-way valves. The guidelines state that clinically stable patients with large pneumothoraces should be treated with tube thoracostomy, and that the tube can be attached to a one-way-valve device or a chest drain. A Pneumostat would be ideal for these patients.

Pneumostat is also indicated for patients who develop pneumothorax as a result of an interventional radiology procedure such as a fluoroscopic or computed tomography-guided needle aspiration biopsy of the lung. In these patients, pneumothorax occurs about 40% of the time; chest drainage is needed in 5% to 7% of all biopsies done. Since most people undergoing these procedures are ambulatory, mobile chest drainage makes perfect sense.

Mobile chest drainage with Pneumostat can also be used for patients who have pneumothorax and need to be transported within or between facilities.

### Nursing Responsibilities With Pneumostat

The Pneumostat requires no special set-up before use. You can add 1ml of water to the air vent to create an air leak indicator if desired. Take these nursing actions while Pneumostat is in use:

- Perform a targeted pulmonary assessment as you would for any patient with a chest tube
- Check the connection between the Pneumostat and the chest tube—tape the connection for security if necessary
- The device does not have to be taped to the chest as the Heimlich valve does—it may be allowed to hang free and move to a gravity-dependent position as the patient moves
- Assess the collection chamber for fluid accumulation. If drainage is more than ~20ml per day, consider changing to the Express 1500 Chest Drain Bag, which has a larger fluid drainage capacity
- If fluid needs to be removed from the device, wipe the needleless port on the bottom of the collection chamber with alcohol, then attach a Luer-lock syringe and withdraw fluid
- If it is difficult to withdraw fluid, simply replace the Pneumostat with another one; discard the filled device according to hospital policy and procedure

To learn more about the Pneumostat and the Express 1500 Chest Drain Bag and see this new generation of mobile chest drain devices in person, contact your local Atrium representative or call 1-800-5 ATRIUM. (528-7486)

## Check Your Knowledge...

**Q.** Describe the pattern of bubbling visible in the water seal chamber for a patient with an air leak from a pneumothorax who is receiving mechanical ventilation and requires +10cmH<sub>2</sub>O PEEP.

*Answer on other side*

## In The Literature

### *Tooing Your Own Horn: Developing a Nursing Portfolio*

What steps have you taken to maintain or increase your opportunities in today's nursing job market? More jobs are available than ever before, and if you have thought about changing your career's direction, now is a great time to develop a plan.

In the latest issue of *Orthopaedic Nursing*, Marilyn Oermann writes about developing a professional portfolio in nursing. While a carefully crafted resume will often get your foot in the door for an initial interview, your portfolio can clearly separate you from other candidates during the interview process. This article describes the two types of portfolios — best work, and growth and development. In a best work portfolio, the nurse collects evidence of competencies, skills, expertise and accomplishments. You may already have experience putting together this type of portfolio if your hospital uses a clinical ladder program. Growth and development portfolios, on the other hand, are designed so that nurses can monitor their progress meeting personal and professional goals.

This article is filled with practical tips on how to build a portfolio and how to make it work for you as a professional development tool.

Source: Oermann MH (2002). Developing a professional portfolio in nursing. *Orthopaedic Nursing*, 21(2), 73-78.

### *Hearing From the Preceptors*

Nursing preceptor programs are popular adjuncts to formal orientation programs and classes. A novice, inexperienced nurse is paired with an experienced nurse to learn the ropes. The experienced nurse acts as a role model, and his or her actions can have a tremendous impact on the novice nurse's knowledge and confidence even years later.

In a fascinating article in *Home Healthcare Nurse*, author Karen Pardue excerpted journal entries from a group of preceptors over a 15-week semester. She was able to categorize preceptors' experiences into six precepting insights:

- Opportunity to acknowledge self as expert
- Concern for personal inadequacy in structuring the experience
- Desire to champion the specialty
- Mediator for client self-determination
- Obstacles
- Opportunity for professional growth

Pardue's fieldwork was done with home care nurses. But once you read the article, I think you'll agree that these precepting insights are universal. By identifying these areas, Pardue has provided a tremendous service for those of us who prepare preceptors for their experiences.

Source: Pardue KT (2002). Illuminating the experience of student precepting: insights and narratives from home care nurses. *Home Healthcare Nurse*, 20(3), 163-167.

## On the World Wide Web...



Pneumothorax now has its own Web site, <http://www.pneumothorax.org>. This innovative site was developed by a young man who experienced two spontaneous pneumothoraces and thought more information needed to be available for those affected by pneumos. This site is well designed and provides a number of useful resources. Audio files from patients describe their experiences, and a terrific links page provides access to medical imaging, medical papers and related organizations.

The Yale School of Medicine has a great interactive radiograph of a tension pneumothorax at [http://info.med.yale.edu/intmed/cardio/imaging/cases/pneumothorax\\_tension/](http://info.med.yale.edu/intmed/cardio/imaging/cases/pneumothorax_tension/). You can zoom in and out of different parts of the radiograph and learn key aspects of radiographic interpretation. From this page, you can link to instructional films of other disorders as well.

Colorado State University provides another interesting view of tension pneumothorax, showing decompression from the superior view through a thoracic cross-section at <http://www.cvmbs.colostate.edu/clinsci/wing/trauma/tension.htm>

## Check Your Knowledge...

**A.** Since positive end-expiratory pressure (PEEP) maintains positive pressure in the lung throughout the respiratory cycle, air will be continually pushed out of an air leak. Therefore, bubbling will be continuous.

### References: New Innovations In Chest Drainage - Mobile Chest Drainage Part 2

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