Clinical Update for the Professional Nurse March 2000

Clinical Update

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Regulating Chest Drainage Suction

Suction control is one of the three main components of a chest drain. The drains themselves regulate suction in two ways: with water, or with a mechanical device built into the unit. In each case, the chest drain is connected to a vacuum source, either a wall vacuum regulator, or a free-standing vacuum pump (such as an Emerson pump).

Wet Suction Control

When the original three bottle chest drainage systems were used, a straw was submerged into a suction control bottle filled with water. The depth of the straw in the water determined the upper limit of the amount of negative pressure that could be transmitted through the chest drainage system to the patient's chest. In today's integrated plastic disposable units, water is poured into the suction control chamber to the desired level. This water level establishes the suction limit. The suction control chamber is a safety feature that allows the clinician to limit the highest amount of negative pressure that can get to the patient's pleural or mediastinal space, *regardless of the setting of the vacuum source.*

The level of negative pressure transmitted through wet suction control chambers is limited by the size of the chest drain. If the drain is "set" for -20cmH_2O pressure, the drain has to be at least 20 centimeters high. A drain set for -40cmH_2O pressure would require the drain to be at least 40 centimeters high. There aren't a lot of people who would be happy with that size chest drain at the bedside; in fact, the trend today is in the opposite direction, to have the smallest drains possible. So, one way to achieve higher suction pressures is to use a dry suction control system.

Dry Suction Control

There are two types of mechanical dry suction control chambers. One type consists of a self-regulating mechanism that responds to changes in both the patient's side of the system (such as an increasing or decreasing air leak) and in the suction side of the system (such as changes in vacuum source pressure). The clinician dials in the level of suction, and this self-regulating mechanism maintains suction levels within the desired clinical range, provided there is adequate vacuum source pressure. On the Atrium Oasis dry suction units, for example, a bellows indicates when the vacuum source is set properly. These units can provide suction levels up to -40cmH_2O, and the drain size does not have to increase to accommodate these higher suction levels.

Check Your Knowledge...

Q. You want to take your patient with a chest drain for a walk in the hall. You disconnect the suction tubing from the wall vacuum source. What should you do with the stopcock on the suction connection tubing?

Answer on other side

The other type of dry suction mechanism consists of a restricted orifice, pin-valve device. The clinician dials in the desired level of suction, and an orifice becomes smaller or larger to regulate the suction level. This mechanism has two clinical disadvantages. First, it does not respond to changes in the patient or vacuum source parameters during use; and second, the design of the system limits airflow through the drain to as low as 2.8 LPM at -20cmH_2O (compared with 30+ LPM with the Atrium Oasis dry suction regulator). A flow capability of less than 3 LPM may not be enough to evacuate a patient's pneumothorax. This type of dry suction system also offers higher suction levels than typical "wet suction" drains, but is seen less and less in clinical use today because of the severe limitation to air flow.

Achieving Higher Suction Levels With A Wet Suction Control System

Many clinicians prefer the traditional "wet suction" units because in some cases nurses are more familiar with them than with the newer dry technologies, and they often cost less. However, there may be times when the physician wants a higher level of negative pressure than is available considering the height of the water-filled chamber. You can achieve higher suction pressures with the Atrium Ocean drain. Here's how.

First, turn off the vacuum source. Be sure the gray vent plug is in place in the opening where water is added at the top of the suction control chamber. Occlude the two holes at the top of the vent plug with non-porous tape, or replace the gray vent plug with a special "pronged" vent plug you can get from your Atrium representative. When the vent plug is properly occluded, there will be no bubbling in the suction control chamber when the vacuum source is turned back on.

Turn the vacuum source on, and dial the vacuum regulator to the desired level. **Alert!** *The level of suction you dial in on the vacuum source is now being transmitted directly to the patient's chest!* By occluding the plug, you are bypassing the safety limit provided by the suction control chamber. *It is essential that all clinicians clearly understand this change when caring for these patients.* A pressure conversion chart is provided on the back to help you convert mmHg to cmH_2O.

Research has not examined the optimal level of negative pressure for pleural or mediastinal drainage. The -20cmH_2O level has been the traditional level used, but no research data support that one pressure results in better outcomes or a better safety margin than another. If all other factors remain the same, increasing the negative pressure applied to the chest will increase the flow of air and fluids out of the chest.

If you have any additional questions about how to achieve higher suction pressures with an Atrium Ocean drain, call your Atrium representative, or the toll-free Atrium clinical hotline at 800/528-7486.

In The Literature

Measuring ACNPs Impact

In this month's issue of *Nursing Management*, a group of nurses from the Miami Heart Institute and Medical Center in Miami Beach, FL publish an article about collecting data reflecting the value of ACNPs. The article contains a worksheet, an objective tool that allows ACNPs to specifically document how they positively impact patient and financial outcomes. These nurses wanted to carefully document all the things that ACNPs do, so they can be recognized for their positive contributions to care. In all hospitals where they're used, ACNPs are doing a lot of work. However, they may not be formally recognized for their accomplishments, because, without adequate documentation outside the patient's medical record, it isn't always clear to others what ACNPs do.

These nurses found the worksheet tool enabled them to prove the value of the ACNP and allowed them to expand their roles and responsibilities. As more ACNPs move into the clinical setting, these data will become even more valuable.

Source:
Measuring ACNPs Impact
Whitcomb R, Craig R, Welker C: Measure how ACNPs impact outcomes. *Nursing Management* 2000;31(3):49-50.

Is There A Hospitalist In Your Future?

Hospitalists are the hot new group of care providers – clinicians who specialize in in-patient hospital care. Many hospitals are now hiring these clinicians, and community-based physicians hand off their patients to these specialists when hospitalization is required. These care providers are more common in community hospitals, where house staff are not on-site to provide in-patient care.

Many community-hospital staff nurses love the concept. Instead of trying to track down a doctor in the office to get orders changed, or report changes in a patient's condition, they simply call the hospitalist, who's right there in the hospital. And, more good news for nurses – in some hospitals, this role is being filled by advanced practice registered nurses. APRNs provide the daily in-patient care with physician backup in case they need advice or assistance.

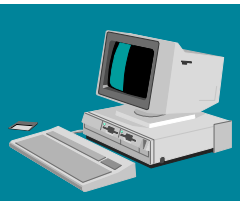
To learn more about this concept of hospital-based care, read this month's article in *RN* magazine.

Source:
Is There A Hospitalist In Your Future?
Wolfe S: Hospitalists: good or bad news for nurses? *RN* 2000;63(3):31-33.

Check Your Knowledge...

A. The stopcock should be left in the on or open position. This will allow any air or positive pressure to leave the drain while the patient is disconnected from suction. However, if the stopcock is inadvertently closed, the patient is still protected. A positive pressure relief valve, located on the top of the drain opens instantly to release any accumulated positive pressure.

On the World Wide Web...



Nursing publishers are using the Web more creatively to provide access to their publications. Some provide just abstracts, others full text to subscribers only, and others provide full text to anyone who stops by.

www.rnweb.com
This web site for *RN* magazine provides anyone who visits with a wealth of information. But perhaps the most valuable part of the site is that every CE feature from the journal is published on the web site. Anyone can read the articles for free, and if you need CE credit, you can complete the post-test on the spot. Articles are indexed for easy retrieval.

http://members.aol.com/suzannehj/hello.htm
Note that for this site, there is no www because technically, this is on the AOL network, not on the Web. This is Suzanne Hall Johnson's site. Many of you may recognize her as the founder and long-time editor of *Dimensions of Critical Care Nursing*. She is also editor and publisher of *Nurse Author and Editor*, a newsletter that provides timely information for nurses who wish to write articles and books for publication. She provides a comprehensive set of links to nursing sites, as well as great information about nursing journals and editors if you're thinking about submitting an article for publication.

www.nursingcenter.com/journals/
This site for Lippincott Williams and Wilkins provides access to each of the publisher's nursing journals. For some journals, visitors will have access to full-text articles, while other publications provide abstracts only.

Pressure Conversion Chart

If you bypass the wet suction control chamber by occluding the vent plug, you will typically be using a wall vacuum regulator that measures pressures in millimeters of mercury instead of the traditional centimeters of water that clinicians who care for patients with chest drainage are familiar with. Here is a conversion chart, so you can compare the readings of negative pressure on the vacuum regulator in mmHg to the more familiar cmH_2O.

cmH_2O desired	**mmHg** set on vacuum regulator
20	15
25	18
30	22
35	26
40	30
45	33
50	37
60	44

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