

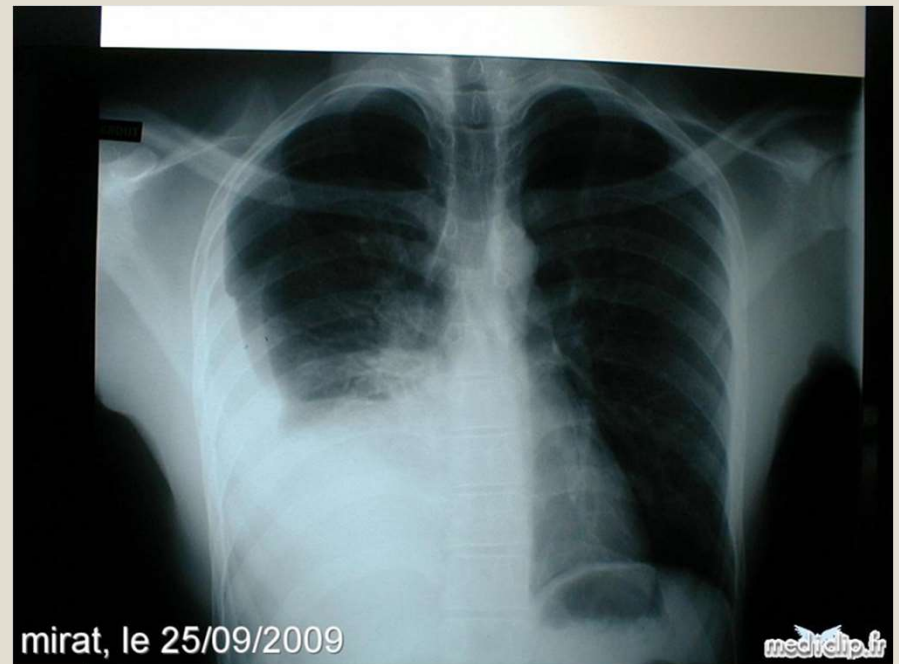


# CHEST TUBES

Ashley A. Fuller BSN, RN

# Reasons For Chest Tube

- Pneumothorax
  - Open vs. Closed Pneumo
- Hemothorax
- Pleural Effusion



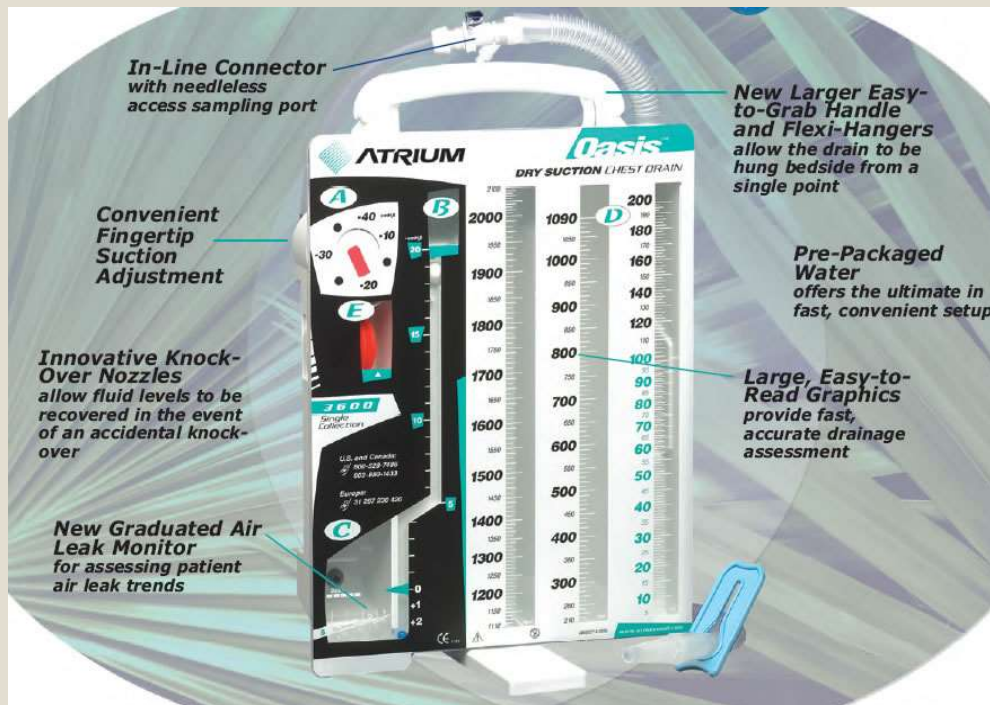
# Large Bore Vs. Small Bore Chest Tube

- Some literature states that a pigtail (small bore chest tube) works just as effectively as the large bore chest tubes, however this is debated.
- Evidence has shown that a pigtail is best used with pneumothorax since drainage may block the pigtail.



# THE ATRIUM

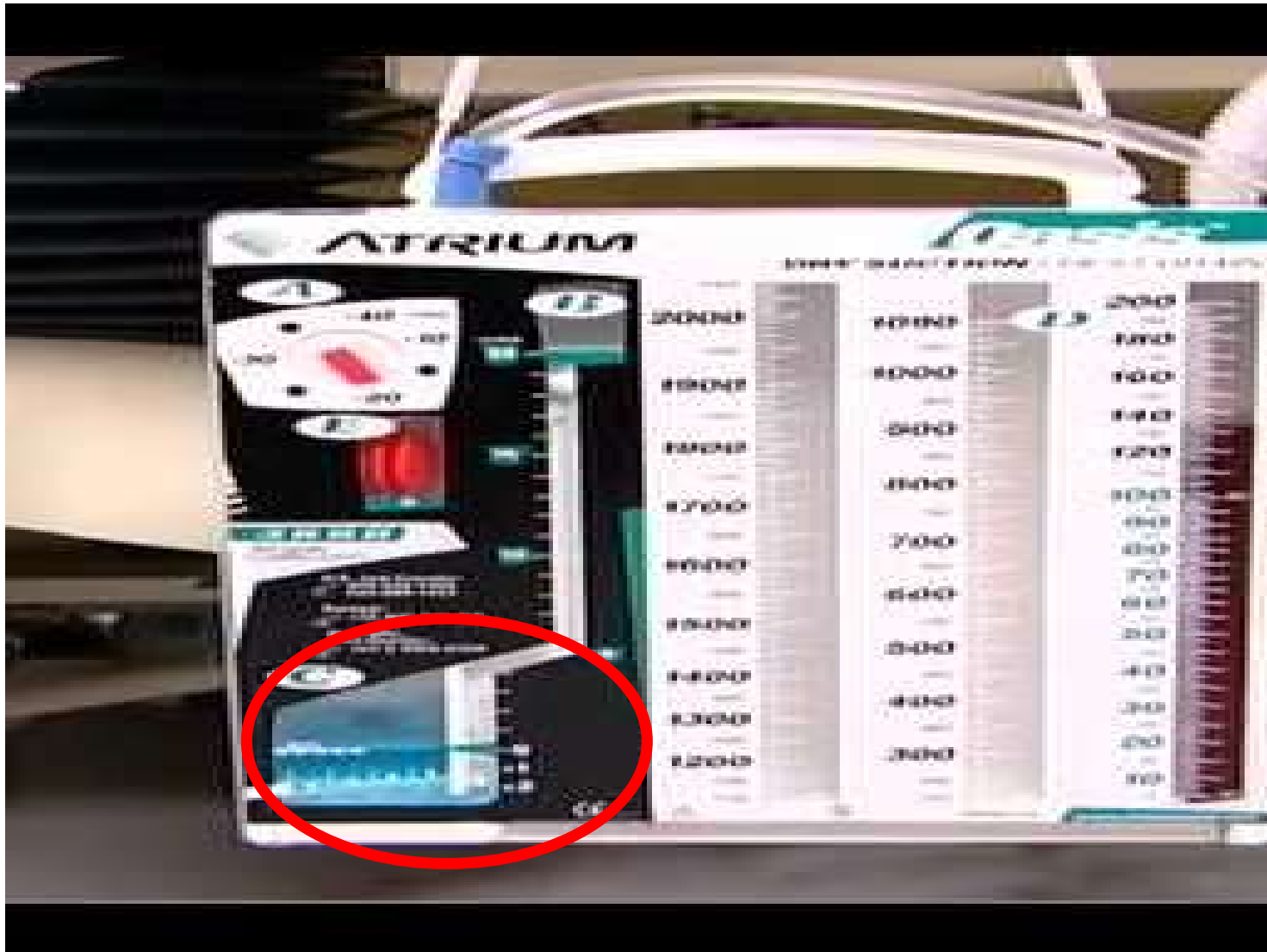
# How it Works



- Expiration causes positive pressure which helps push air and fluid out of the pleural cavity through the chest tube.
- Gravity drains the fluid from the chest cavity.
- Suction assists with faster evacuation of air and fluid.



The Atrium  
Chambers  
The  
Collection  
Chamber  
Tubing  
connects here  
and collects  
drainage.  
Measures are  
in cc.



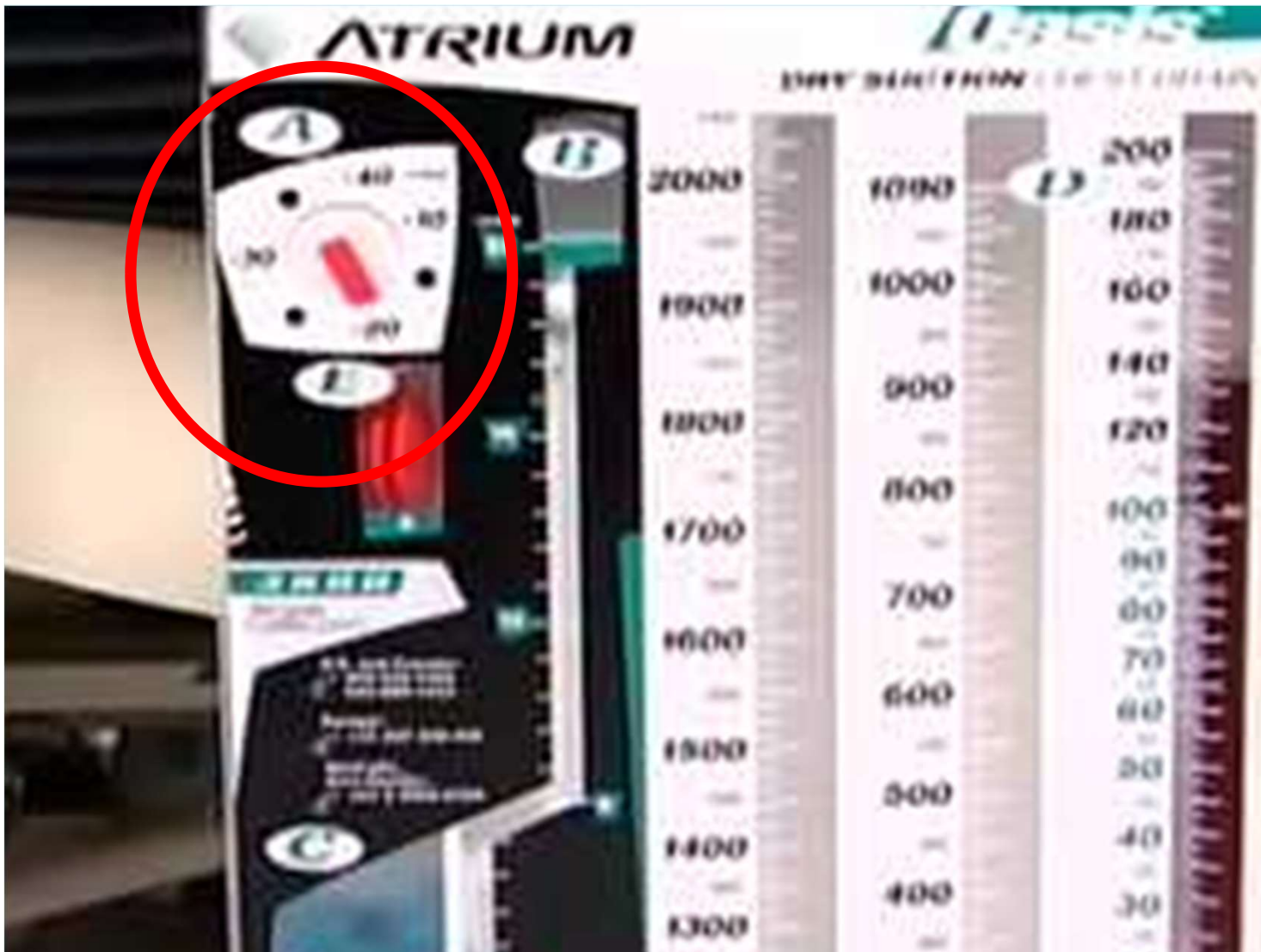
## The Atrium Chambers The Water Seal Chamber

Allows air to leave and prevents air from entering with one way valve.

Think about a straw in a glass of chocolate milk, you can blow bubbles into the glass, but you suck on the straw and milk comes up through the straw.

Same concept.





## The Atrium Chambers The Suction Control Chamber

Controls the amount of suction pressure applied to patient via wall suction.

We typically suction at  $-20\text{cmH}_2\text{O}$  as seen on the dial on the front of the atrium. Be sure to check the order.

There is some evidence showing that higher suction rates and cause damage to lung tissue.



# Atrium Setup

- With suctioning, turn dial up GENTLY, to 60-80 on the wall suction regulator.
- When placing patient on water seal, it is pertinent to leave the suction port (where the suction tubing connects to atrium) is left open. This acts as a vent for air to escape thus preventing a tension pneumo

# Keep in Mind

- If atrium is knocked over or full, the atrium **MUST** be replaced. To do this, have new atrium set up and ready, temporarily clamp the tubing close to patient to prevent air from escaping the chest. Remove tubing from old atrium and attach to new atrium. **REMEMBER TO UNCLAMP TUBING!**
- If tubing gets a hole in it, locate hole and cover with foam tape/tegaderm.
- Always ensure drain is 1-2ft below chest level. This causes a relatively higher pressure in the chest → Boyle's Law
  - Same principle as raising an IV bag to increase flow rate!



# PATIENT CARE

Assessment

# Dressing

- The dressing is to be changed every 24 hours to assess insertion site, subcutaneous emphysema, and drainage.
- To change dressing:
  - Wrap petroleum gauze around chest tube at insertion site.
  - Place 2-3 gauze under chest tube to protect skin and apply 3-4 gauze over insertion site.
  - Apply foam tape stretching slightly when applying over entire site.
- HOWEVER! according to Lillian Aguirre, Trauma Nurse Specialist, she states, "If you have a persistently wet dressing due to third spacing, you really may not want the foam. The foam may not let you see drainage. The continuous moisture may macerate the skin. It is acceptable to use gauze and an Exudry type of dressing over it."

# Insertion Site

- Assess for drainage and any signs or symptoms of infection.
- Assess skin around insertion site for breakdown from chest tube rubbing against skin and from drainage.
- Assess for subcutaneous emphysema (next slide)
- Check to make sure chest tube has not been partially dislodged by making sure no drainage holes in the chest tube are seen outside of the skin.
  - If the chest tube has been partially dislodged, and the chest tube's drainage holes are visible outside of the insertion site, wrap additional petroleum around the hole to occlude the hole and contact the doctor.

# Subcutaneous Emphysema

- Palpate near and around insertion site. If there is obvious crepitus or “crackling” on palpation, this indicates there is air in the subcutaneous tissue.
- Subcutaneous emphysema has a very distinctive feel, you will know when you feel it. It feels like something is popping under the skin
- Subcutaneous emphysema is, usually, by a malposition chest tube. Is not typically dangerous, but if it is new or increasing, report this to the doctor. However, severe subcutaneous emphysema can lead to airway compromise.
- If it occurs suddenly, causes can include increasing pneumo, partial dislodgement of chest tube/incomplete insertion of chest tube, and blockage of the chest tube itself.



# Drainage

- If treating pneumo, minimal to no drainage will be noted in the atrium.
- Every shift, at least, documentation should include amount and color of drainage in the collection chamber and/or from insertion site.
- More than 500cc of drainage in the atrium should be reported to the MD, but can have up to 500cc/12hr when chest tube is first inserted to treat a hemothorax

# Bubbling or “Air Leak”

- Air leak means there is residual air between the lung and chest wall.
- Check for leakage by having patient cough deeply several times which releases any air trapped in chest, leading to bubbles seen in the water seal chamber.
- Continuous bubbling = leak in thoracic cavity/leak in tubing. Bubbling noted going from right to left in the water seal chamber.
- If a patient has a new pneumo, an air leak is expected during expiration. However, a new air leak may indicate a recurrent pneumo OR there is a leak somewhere in the tubing. To determine the cause, TEMPORARILY clamp the tubing near the patient's chest.
  - If the leak stops, the leak is secondary to air exiting the patient's chest (a pneumo) and call the MD
  - If the air leak does not stop, the leak is likely somewhere within the tubing or connections.

# Tidaling

- Tidaling is seen in the water chamber, the water will be seen moving up and down with inspiration and expiration.
- Level can go up and down a few cm with breathing, this reflects changes in intrapleural pressures, this is normal.
- Once tidaling has stopped, the lung is fully inflated and normal negative pressure is reestablished.

# Tubing

- Make sure there are no dependent loops in the tubing.
- If a clot has formed in the tubing, causing a blockage, the tubing can be gently massaged to dislodge the clot. Do NOT forcefully strip the tubing. If the attempt to massage and dislodge the clot is not successful, change the tubing or contact the physician for further orders.



# REMOVAL OF CHEST TUBE

# Criteria for Removal

- Pneumo must be resolved on CXR with no air leak with forceful coughing
- If this is confirmed, chest tube is placed on water seal for 4-24 hours based on severity of original hemo/pneumo and another CXR is taken.
- If no renewed pneumo is noted on CXR and no new air leak is noted on forceful cough. Chest tube can be removed.



# What the Doctors Need

- Suture removal kit
- Biohazard bag
- Xeroform
- 4x4
- Foam tape

# Discharge Instructions

- Patient is not to fly in an airplane or scuba dive for 6 weeks (keep this in mind for our patients on vacation)
- Post removal dressing can be removed in 24 hours (although 48 hours is preferred). If still having drainage, may apply gauze and medipore tape.
- Signs and symptoms of respiratory distress and reoccurrence of pneumo.



# CHARTING ON CHEST TUBES

# Patient Assessment Flowsheet

- Chest tube output is charted EVERY SHIFT in the I&O flowsheet (be sure to add the “drainage” parameter.

List Set Description

Pleural Chest Tube Assessment

Chest Drainage System

- Single tubing
- Two combined - Y tubing connector to single drainage system
- Continuous suction cm H2O (neg):
  - 10
  - 15
  - 20
  - 30
  - 40
- Waterseal
- Clamped
- Intermittent suction
- Flutter valve (one way valve)
- (Check for free text)

Catheter Securement

- Skin glue
- Sutures
- Sterile tape
- (Check for free text)

Air Leak

- No air leak
- Continuous air leak
- Inspiration only air leak
- Expiration only air leak
- Intermittent air leak
- Air leak with cough
- Air leak quantify: (neg #)
  - 1
  - 2
  - 3
  - 4
  - 5
- (Check for free text)

Subcutaneous Emphysema

- None
- Present
  - Left
  - Right
    - Anterior
    - Posterior
    - Chest wall
    - Face
    - Neck
    - Scrotum
- (Check for free text)

Drainage Description

- None
- Scant
- Moderate
- Large
- Clots
- Serous
- Serosanguineous
- Tan
- Purulent
- Milky (chyle)
- (Check for free text)

Site Appearance

- WDL: Site
- Clean and dry
- Red
- Pink
- Swollen
- Ecchymosis
- Draining
- Draining
- Cool
- Purulent
- Extravasation
- (Check for free text)

Horizontal scroll bar with empty input fields.

Review selected items below.

OK Cancel

List Set Description

Pleural Chest Tube Assessment

subcutaneous Emphysema

- None
- Present
- Left
- Right
- Anterior
- Posterior
- Chest wall
- Face
- Neck
- Scrotum
- (Check for free text)

Drainage Description

- None
- Scant
- Moderate
- Large
- Clots
- Serous
- Serosanguineous
- Tan
- Purulent
- Milky (chyle)
- (Check for free text)

Site Appearance

- WDL: Site asymptomatic; patent; dressing dry and intact
- Clean and dry
- Red
- Pink
- Swollen
- Ecchymotic
- Draining, clear
- Draining, serous
- Draining, sanguineous
- Cool
- Purulent
- Extravasation
- (Check for free text)

Dressing

- Dry and intact
- No dressing
- Drainage marked
- (Check for free text)

Interventions

- Occlusive 4 x 4, occlusive gauze applied and taped
- Petrolatum gauze applied around tube
- (Check for free text)

Horizontal scroll bar with five empty input fields.

Review selected items below.

OK Cancel



# RESOURCES:

- “Critical Checks” on Swift
  - Swift>Clinical>Critical Checks>Chest Tube
- Atrium Website (link to the atrium that our hospital uses for inpatient)
  - [http://www.atriummed.com/EN/chest\\_drainage/education.asp](http://www.atriummed.com/EN/chest_drainage/education.asp)
- Lippincott Manual of Nursing Practice
  - Swift>Clinical>Library Services>Link in box below search box

# References

- Carrol, Patricia. (2010). Atrium Interactive Computer-Based Training. *Atrium Medical Corporation*. Retrieved from <http://www.atrimum.com>
- Briggs, Deborah. (2010). Nursing care and management of patients with intrapleural drains. *Nursing Standard*, 24(21), 47-55. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=2010550210&site=ehost-live&scope=site>
- Loiselle, A., Parish, J. M., Wilkins, J. A., & Jaroszewski, D.E. (2013). Managing Iatrogenic Pneumothorax and Chest Tubes. *Journal of Hospital Medicine*, 8(7), 402-408. doi: 10.1002/jhm.2053
- Frazer, Cynthia. (2012). Managing Chest Tubes. *MedSurg Matters!* 21(1) 1, 10-12. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=2011477481&site=ehost-live&scope=site>
- Kane, C. J., York, N. L., Minton, L. A. (2013). Chest Tubes in the Critically Ill Patient. *Dimens Crit Care Nurs.* 32(3), 111-117. doi: 10.1097/DCC.0b013e3182864721
- Aguirre, Lillian H. Personal communication. January 21, 2015.