CREATIVE TEACHING STRATEGIES FOR CHEST DRAINAGE

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Participant Objectives
At the end of this session, you should be able to...
...describe three interactive activities used to teach chest drainage content
...develop a plan for using any of these activities in your practice setting

Interactive Activities

Four Facts pages 3-5
Do You Remember? pages 6-9
Chest Drainage Tic Tac Toe pages 10-15
Pop! Goes The Case Study pages 16-24
Question Box pages 25-34
What’s My Problem? pages 35-40
New Product Introduction Worksheets pages 41-46
Resources pages 47-55
Interactive Teaching and Learning

Today’s Instructional Environment

- Limited resources
- Need to save time
- Tradition - Lectures are traditional
- Results-based education
- Helping learners remember
- Repetition is essential for learning

Keys to Success

- Don’t call these activities games! They are interactive activities for content reinforcement
- Make sure learners know the purpose of the activity
- Help learners see the connection to content
- Use teams to foster healthy competition
- Don’t force people to stand alone
- Help everyone participate
- Be concise, to the point, upbeat
- Use activities to energize
- Don’t forget to have fun!
Four Facts

Purpose
This exercise provides an opportunity to discuss stereotypes in a non-threatening way. Encourages learners to think about how they make judgements about others — patients, classmates, co-workers. Also a good icebreaker at the beginning of a course, new employment situation.

How to do it
Make a list of four facts about yourself — three should be true and one should be false. Choose items that are not always obvious, especially those that are different from typical stereotypes (i.e. a woman being a big sports fan, an unusual hobby, a special talent.) Share the four “facts” with the group. (Usually best to show the facts on an overhead projector.) Then, invite the group to share their own “facts”. You can pair group members, and have them share one-to-one, or, if you have more time, you can form teams and have each member of the team share facts with other team members.

Instructions to Group
Write four facts of your own. Remember, one is false, three are true. After you write the facts, you’ll share them with a partner [other members of your team]. You will then need to determine which of your partner’s facts is false.

Follow Up
See sample discussion sheet.
Apply the exercise to your practice setting. For example, can be used to emphasize that you can’t tell who is HIV positive just by looking at them. Can be used to discuss stereotypes about people who receive Medicare and Medicaid assistance. Can be used to launch discussion about racial and other cultural stereotypes.
Part I On this sheet please list four facts about yourself. Three of them should be true. One of them should be false.

1. 
2. 
3. 
4.

Part II Now as a group, do the following steps, in order, one at a time.

1. List below the name of each person in your group.
2. Each person reads their four statements aloud.
3. As each person reads the four statements, list next to his or her name the number of the statement you think is false about them and why.
4. Once each person has completed sharing the statements, take one person at a time and have each of the remaining people tell which statement is false and why. Then the person who shared the four statements originally can reveal which one was really false.
5. Do this for each of the people in your group.

1. Name_________________________ Statement # _________ is false because ____________________________
2. Name_________________________ Statement # _________ is false because ____________________________
3. Name_________________________ Statement # _________ is false because ____________________________
4. Name_________________________ Statement # _________ is false because ____________________________
5. Name_________________________ Statement # _________ is false because ____________________________
6. Name_________________________ Statement # _________ is false because ____________________________
Group Leader read:

1. Were you surprised at some of the “facts” that people shared? Which? Why?

2. How good were you as a group and individually at picking the false statement? What does this tell you about making assumptions and judgements about people?

3. Were some of the statements made by different people similar? What reasons could you give for this?

4. Were some of the “facts” quite different? What reasons could you give for this?
Do You Remember?

Purpose
This exercise makes it easier for learners to remember lists of information by linking content on the list to common, everyday items.

How to do it
Link a list of content to common, everyday items. Collect the items, and lay them out on a table top. Ask learners to come up and pick up one item each. In content order, stand beside each learner, describe what the learner is holding, and then explain how that item represents the content. After each item is described, review content in order. Next, ask the original participants to go back to the group, and give their item to another group member. Ask the new team to arrange themselves in the proper order. Ask the seated group to determine if the standing team is in the correct order. Then, review each step by linking the content to the common item one more time. Ask learners holding the items to put them back on the table and take a seat.

Instructions to Group
I need X people to come up to the front and pick up an item

Follow Up
For additional reinforcement, list the items on paper, and cut the paper so each item is on a separate strip of paper. Add in three or four items that are not a part of the content list as distractors. Put the sheets of paper in an envelope, mixed up. Break the group into teams, and tell them this is a timed exercise. One member is the timer. They are to take the pieces of paper out of the envelope and arrange them in order. DO NOT tell learners there are distractors mixed in. Once they have placed the items in the correct order, ask them to stand and cheer. Once all teams are done, ask them to check their work against their notes. During this activity, play loud music as a distraction.

After the exercise, learners will usually complain that there were extra items in the envelope and the music was distracting. The teaching point is that we learn information in the classroom where conditions are controlled. Then, when we apply that information in the clinical setting, there are often a number of
interfering factors. This helps learners experience distractions in a safe, otherwise controlled setting, to help prepare them for “real life” in the clinical setting.

When you do the entire exercise, the content list will be reviewed 6 times — which significantly enhances retention.

**Application to Chest Drainage Content**

<table>
<thead>
<tr>
<th>Steps to Assessing the Chest Drainage System (in order from patient to wall)</th>
<th>Represented by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the dressing</td>
<td>A large doll dress</td>
</tr>
<tr>
<td>Check tubing for dependent loops</td>
<td>A large, loopy straw</td>
</tr>
<tr>
<td>Do not strip or milk tubing</td>
<td>Playboy magazine with ☢️ on cover, or can of paint stripper</td>
</tr>
<tr>
<td>Check drainage</td>
<td>Sink drain</td>
</tr>
<tr>
<td>Check for bubbling in water seal</td>
<td>Bottle of bubbles; have participants blow bubbles</td>
</tr>
<tr>
<td>Check for tidalling in water seal</td>
<td>Play tape of waves from the ocean (tide)</td>
</tr>
<tr>
<td>Check the level of water (water seal and suction chambers)</td>
<td>Carpenter’s level</td>
</tr>
<tr>
<td>Adjust for gentle bubbling in suction chamber</td>
<td>Bubble bath</td>
</tr>
<tr>
<td>Make sure tubing is open</td>
<td>Open sign (such as you would see in a business window)</td>
</tr>
</tbody>
</table>
The key to this activity is to make it fun and interactive. Ask the participant to blow the bubbles; have another participant play the audio tape. By using different types of items, you’ll also involve more of the learner’s senses — tactile, auditory, visual. The more people are involved with the content, the more they will remember. Learners will also better remember a fun lesson.
Check the dressing

Avoid dependent loops

Do not strip or milk the tubing

Check the drainage

Look for bubbling in water seal

Look for tidalling in water seal

Check the water level in the suction chamber

Turn suction on until gentle bubbling appears

Make sure suction tubing remains open
Chest Drainage Tic Tac Toe

Purpose
This activity provides the opportunity to review content on any topic. Useful at the end of a unit to wrap up and summarize important content.

How to do it
Photocopy the tic tac toe board on page 10 to make an overhead transparency. Place the board on the overhead projector, with a plain, clear acetate on top of it.

Choose two teams. One will be X, the other O. Determine which team will go first. The team chooses a box, and must answer a question about the topic represented in the box in order to win the box. If the team answers the question correctly, write their letter on the clear acetate on the game board over the appropriate box. This will save your game board for future use. If the team answers incorrectly, the other team has a chance at the question. If the other team answers correctly, they win the box. (If you’re using true/false questions, choose another question for the opposing team.)

The first team to get three in a row is the winner. Award prizes to the winning team.

To make this more interactive, if all participants are not on the teams, have the “audience” be the judge to determine if the questions were answered correctly and if the team earned the square.

Instructions to Group
This activity will review the content about chest drainage. You will form teams. Each team will, in turn, choose a box and answer a question about the topic represented by the phrase in the box. If you answer correctly, you win the box. If you are incorrect, the other team has a chance to answer the question and win the box. If the question is true/false, another question will be chosen. The first team to win three boxes in a row will win the game.

Follow Up
Play as many games as needed to adequately review the content. At the end of the game, you may reveal what topics the phrases represent.
<table>
<thead>
<tr>
<th>Bubble, bubble, toil &amp; trouble</th>
<th>It’s a Hoover</th>
<th>... a window to the soul</th>
</tr>
</thead>
<tbody>
<tr>
<td>The beat goes on</td>
<td>AAA</td>
<td>That thing that you do</td>
</tr>
<tr>
<td>Pressure... it’s all about pressure</td>
<td>I’m all shook up</td>
<td>Vegetable salad</td>
</tr>
</tbody>
</table>

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**Chest Drainage Tic Tac Toe**

Bubble, bubble, toil & trouble
It’s a Hoover
... a window to the soul

The beat goes on
AAA
That thing that you do

Pressure... it’s all about pressure
I’m all shook up
Vegetable salad
Questions and Answers

**Bubble, bubble, toil & trouble**

Q. What does bubbling in the water seal chamber represent?
A. An air leak; air entering the system

Q. Describe the desired pattern of bubbling in a wet suction control chamber.
A. Gentle, not vigorous bubbling

Q. If a patient receiving mechanical ventilation has an air leak from the lung, during which part of the respiratory cycle would bubbling be evident?
A. Inspiration; when a patient is on a ventilator, inspiration creates positive pressure in the chest; this will push air out of the chest tube.

**It's a Hoover**

Q. How do you set the level of suction in a wet suction chest drain?
A. The water level determines the level of suction.

Q. How do you set the level of suction in a dry-suction chest drain?
A. Dial in the desired level with the regulator on the chest drain.

Q. What is the most common level of suction used for the average patient?
A. 20 cm H$_2$O

**... a window to the soul**

Q. What do the numbers on the water seal chamber mean?
A. They reflect pleural pressure; this is a true manometer

Q. What does it mean when the water level rises half way up the water seal chamber?
A. There is a condition of increased negative pressure in the chest

Q. Describe tidalling and what it reflects physiologically.
A. Tidalling is the rhythmic movement of the water level in the water seal that follows pressure changes in the chest seen with respirations.

**Bubbling in chest drain**

**Chest drainage suction**

**Water seal manometer**
Q. Define cardiac tamponade.
A. In cardiac tamponade, fluid or air collects between the pericardium and the heart. As the air or fluid becomes greater, pressure builds, and the heart is compressed. If the pressure is high enough, the heart cannot expand to accept venous return and cardiac output will fall.

Q. Name four signs of cardiac tamponade.
A. Muffled / distant heart tones, increased CVP, tachycardia, decreased BP, decreased cardiac output, jugular venous distension.

Q. Explain why it would be more unusual to see bubbling in the water seal chamber of the chest drain of a patient with a mediastinal chest tube compared with a pleural tube.
A. Bubbling in the water seal indicates air entering the system. There shouldn’t be an air leak from the heart; there can be from the lung.

Q. Why can blood drained from the chest through a chest tube be used for autologous transfusion?
A. Blood that comes into contact with the pericardium or pleurae is defibrinogenated and will not clot.

Q. According to American Association of Blood Banks guidelines, what is the maximum number of hours that can elapse from the beginning of blood collection to the end of the transfusion?
A. Six hours.

Q. Describe the difference between intermittent and continuous autotransfusion from a chest tube.
A. Intermittent ATS uses bags to collect blood. The bag is removed from the system and hung on the IV pole for reinfusion. In continuous ATS, IV tubing is connected to the collection chamber, and an infusion pump is used to pump blood from the collection chamber to an IV site. The system is not opened for reinfusion.
Q. Describe the function of the collection chamber.
A. The collection chamber collects fluid drainage from the chest.

Q. Describe the function of the water seal chamber.
A. The water seal chamber creates a one-way valve. Air is allowed to leave the system, but not re-enter.

Q. Describe the function of the suction control chamber.
A. The suction control chamber limits the amount of negative pressure that can be transmitted to the pleural or mediastinal space.

**Pressure... it's all about pressure**

Q. Define tension pneumothorax.
A. A tension pneumothorax describes air collected in the pleural space under pressure. As the tension increases, the lung collapses and the mediastinum can shift.

Q. List 3 signs of tension pneumothorax.
A. Decreased breath sounds on the affected side, hyperresonance to percussion on the affected side, tracheal shift away from the affected side, affected side does not move with respirations, sustained increase in pressure on the pressure manometer on a ventilator, difficulty compressing the manual resuscitation bag.

Q. What is the emergency treatment for tension pneumothorax when the patient’s condition is rapidly deteriorating?
A. Needle thoracotomy

**I’m all shook up**

Q. Describe the difference between an open and closed pneumothorax.
A. An open pneumothorax is a penetrating wound; the pneumothorax occurs because of a hole in the chest wall. A closed pneumothorax occurs when the chest wall is intact.
Q. For the three following conditions, identify whether it would cause a closed or open pneumothorax: A. rib fractures  B. knife stab wound  C. deceleration injury
A. rib fractures: closed; stab wound: open; deceleration: closed

Q. Explain why children are less likely to have rib fractures with chest trauma compared with adults.
A. Children’s ribs are more cartilaginous than adults’. They will bend, but not break as easily.

**Vegetable salad**

Q. When two chest tubes are used post-operatively in the mediastinum, where are they positioned in the chest?
A. Anterior and inferior to the heart.

Q. In which type of CABG surgery is the surgeon more likely to enter the pleural space?
A. Internal mammary artery grafts.

Q. Name two indications mediastinal chest tubes can be removed following CABG.
A. Drainage < 100 ml in previous 8 hours; no air leak; patient is weaned from the ventilator; chest x-ray is normal; coagulation studies are normal.
POP! Goes the Case Study

Purpose
This activity provides an interactive opportunity for participants to answer questions about case studies. This activity tests/reviews a higher level of knowledge than the Tic Tac Toe game in this kit because these questions require the participant to apply content knowledge to patient situations.

How to do it
Photocopy the questions that appear on pages 21, 22 & 23. Cut them into individual squares. Each question is assigned a point value; the lower the point value, the easier the question.

Collect 12 balloons — four each in three different colors. Stuff one question into each balloon. Choose all of the same color balloons for the same point value (100 point questions pink, 200 point questions blue, 300 point questions yellow, for example.) Blow up the balloons with the questions inside.

Divide participants into teams. A team will choose the point value they desire, then pop the proper color balloon and read the question. If they answer the question correctly, they earn the points. If they answer incorrectly, the other team can try — if they get it right, they earn the points. Alternate questions back and forth between teams until all the balloons have been popped. Whichever team has the most points wins. Award prizes to the winning team.

Instructions to Group
This activity will help you apply the content you’ve learned about chest drainage. [break group into teams]

Each balloon has a question in it. The balloon colors represent the point value of the question [explain which point value is assigned to each color.] Your team will choose a balloon, pop it, and ask the question contained inside. If you get it right, you earn the points. If you get it wrong, the other team can try the question. Whichever team has the most points when the balloons are gone is the winner.
Follow Up
At the end of the activity, answer any questions from the participants about applying their knowledge of chest drainage to patient situations. Provide remediation if there are content areas that need reinforcement.
Questions and Answers

100 Point Questions

Q. The patient has had coronary artery bypass surgery. Drainage collection for autotransfusion was begun at 2 pm, when the patient was admitted to the ICU from the OR. An intermittent ATS system is being used. According to AABB guidelines, the transfusion should be completed by what time?
A. 8 pm

Q. At the beginning of your shift, you’re caring for a patient with a spontaneous pneumothorax. You walk into the patient’s room, and you can hear the suction control chamber’s bubbling sound from the doorway. When you look at the chamber, you see vigorous bubbling. What would you do next?
A. Assess the patient; turn vacuum regulator (wall) down until there is only gentle bubbling in the chamber.

Q. You’re caring for a patient breathing spontaneously following lung volume reduction surgery. While you’re assessing the water seal chamber, the patient coughs. You see bubbling in the chamber only during the cough. What does this mean, and what nursing actions are required?
A. It is common to see bubbling with a cough. A cough generates high intrapleural pressures, and can push air out through the chest tube and into the water seal chamber. No nursing actions are required except for regular assessment of the patient and chest drainage system.

Q. Your patient had a thoracotomy 36 hours ago; a lobectomy was performed. You turn the patient from supine into a side-lying position, and approximately 200 cc of dark blood spills into the collection chamber of the chest drain. What does this mean, and what nursing actions are required?
A. Since blood coming in contact with the pleurae is defibrinogenated, it does not clot within the chest. It’s not uncommon for drainage to be inaccessible to the chest tube until the patient is turned. As long as it is dark in color, there is no indication of fresh bleeding, and no nursing actions are required other than regular assessment of the patient and chest drainage system.
200 Point Questions

Q. A patient was in an auto accident. His car struck a telephone pole. He is admitted to the ICU because of neurological injuries. On physical exam, the patient has a reddened area the size of a fist over his sternum, and marks from the seat belt on his chest. Four hours post injury, you make the following assessment:
BP 90/60; HR 128 ST; JVD; CVP changed from 7 to 15.
What is your next action? What do you think is going on?
A. Listen to heart tones, notify physician; possible cardiac tamponade from deceleration injury.

Q. A patient has had a thoracotomy after being stabbed in the chest. He is on a ventilator and has two pleural chest tubes in place. During the night, the patient becomes disoriented and pulls out the chest tubes. What key pieces of information do you need to guide your emergency actions? Besides calling for help and notifying the physician, what would you do next?
A. The nurse must know whether there was an air leak. If an air leak was present, a DSD should be applied to the chest, but only secured on three sides so air can leave the chest through the dressing. If there was no air leak, an occlusive dressing can be applied.

Q. A patient has had a CABG with the internal mammary artery. During your assessment of the chest drain, you note new bubbling in the water seal chamber. Describe what you would do to determine where this air leak is from.
A. Clamp the chest tube momentarily, beginning at the patient, where the chest tube leaves the chest. Clamp and look at the chamber to see whether the bubbling has stopped. If you clamp at the chest and the bubbling goes away, the leak is coming from the chest. If you clamp at the chest and the bubbling persists, the leak is between the clamp and the water seal chamber. Move the clamp down the tubing toward the chest drain — clamp and reassess. When the bubbling goes away, the clamp is below the site of the leak.
Q. A multiple trauma patient is on a ventilator post op without PEEP. She is unconscious, and has a left chest tube. You are alerted to the bedside by the high pressure alarm on the ventilator. When you look at the ventilator’s manometer, the needle does not go to zero. You disconnect the patient from the ventilator to bag her, and have a very difficult time squeezing the bag between your hands. You call for help. What do you think the problem is, and what should be done next?

A. Tension pneumothorax. Assess to see if the problem is on the side with the chest tube or the other side. Listen to breath sounds, look at water seal chamber of chest tube, follow tubing to make sure the tubing is not occluded. Prepare for needle thoracotomy and possible chest tube placement.

300 Point Questions

Q. A patient has severe ARDS. She is on a ventilator with maximal support, including 20 cm H₂O of PEEP. She has a chest tube to treat a pneumothorax that occurred as a result of barotrauma. When you assess the water seal chamber, you see continuous bubbling. Explain this assessment finding; how do you explain it, and do you need to do anything about it?

A. This is to be expected. The PEEP creates positive pressure within the chest, and pushes air out through the hole in the lung and the chest tube. When PEEP is that high, the leak can be continuous. No nursing intervention is required except to carefully monitor the patient.

Q. A trauma patient comes into the Emergency Department. He has been shot and is bleeding from the chest. The bullet entrance wound is in the right lower quadrant of the abdomen; the exit wound is from the chest under the left arm. Is this patient an ideal candidate for autotransfusion from the chest tube? Why or why not?

A. With that bullet path, bacteria from the bowel could have been carried into the chest. Bacterial contamination is a contraindication to autotransfusion. But, it is a relative contraindication. If the patient will bleed to death without the transfusion, the risk of bacterial contamination may be worth taking. There’s always antibiotics...
Q. A patient has had a lung volume reduction surgery. The surgeon wants the suction level in the suction chamber of the chest drain set at 10 cm H₂O. There is minimal bubbling in the water seal chamber. On chest x-ray, the lung is not completely expanded. What can be done with the chest drainage system to enhance evacuation of the chest?
A. The setting on the vacuum regulator can be increased to increase flow rate through the system without increasing imposed negative pressure. This may help evacuate the chest and re-expand the lung.

Q. At the beginning of your shift, you assess your patient’s chest drain. The water level in the water seal chamber is all the way at the top of the chamber. What does this mean, and what should you do about it?
A. It means a condition of high negativity has occurred in the chest. This can mean the chest tube was stripped. This can be due to respiratory distress, in the case of a pleural tube, or it can mean the chest tube was stripped. Vent the pressure by pressing the manual negative pressure release valve. The water level should then return to baseline. Continue to monitor the patient, assessing for conditions that could have caused the high negativity.
### 100 Points

The patient has had coronary artery bypass surgery. Drainage collection for autotransfusion was begun at 2 pm, when the patient was admitted to the ICU from the OR. An intermittent ATS system is being used. According to AABB guidelines, the transfusion should be completed by what time?

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At the beginning of your shift, you’re caring for a patient with a spontaneous pneumothorax. You walk into the patient’s room, and you can hear the suction control chamber’s bubbling sound from the doorway. When you look at the chamber, you see vigorous bubbling. What would you do next?

### 100 Points

Your patient had a thoracotomy 36 hours ago; a lobectomy was performed. You turn the patient from supine into a side-lying position, and approximately 200 cc of dark blood spills into the collection chamber of the chest drain. What does this mean, and what nursing actions are required?

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You’re caring for a patient breathing spontaneously following lung volume reduction surgery. While you’re assessing the water seal chamber, the patient coughs. You see bubbling in the chamber only during the cough. What does this mean, and what nursing actions are required?
200 Points
A patient was in an auto accident. His car struck a telephone pole. He is admitted to the ICU because of neurological injuries. On physical exam, the patient has a reddened area the size of a fist over his sternum, and marks from the seat belt on his chest. Four hours post injury, you make the following assessment:
BP 90/60; HR 128 ST; JVD; CVP changed from 7 to 15
What is your next action? What do you think is going on?

200 Points
A patient has had a thoracotomy after being stabbed in the chest. He is on a ventilator and has two pleural chest tubes in place. During the night, the patient becomes disoriented and pulls out the chest tubes. What key piece of information do you need to guide your emergency actions? Besides calling for help and notifying the physician, what would you do next?

200 Points
A patient has had a CABG with the internal mammary artery. During your assessment of the chest drain, you note new bubbling in the water seal chamber. Describe what you would do to determine where this air leak is from.

200 Points
A multiple trauma patient is on a ventilator post op without PEEP. She is unconscious, and has a left chest tube. You are alerted to the bedside by the high pressure alarm on the ventilator. When you look at the ventilator’s manometer, the needle does not go to zero. You disconnect the patient from the ventilator to bag her, and have a very difficult time squeezing the bag between your hands. You call for help. What do you think the problem is, and what should be done next?
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At the beginning of your shift, you assess your patient’s chest drain. The water level in the water seal chamber is all the way at the top of the chamber. What does this mean, and what should you do about it?

A patient has severe ARDS. She is on a ventilator with maximal support, including 20 cm H₂O of PEEP. She has a chest tube to treat a pneumothorax that occurred as a result of barotrauma. When you assess the water seal chamber, you see continuous bubbling. Explain this assessment finding; how do you explain it, and do you need to do anything about it?

A trauma patient comes into the Emergency Department. He has been shot and is bleeding from the chest. The bullet entrance wound is in the right lower quadrant of the abdomen; the exit wound is from the chest under the left arm. Is this patient an ideal candidate for autotransfusion from the chest tube? Why or why not?
Purpose
This activity provides learners with an interactive opportunity to answer questions and earn points while reviewing their knowledge of chest drainage and related conditions. This activity is designed as an end-of-course, comprehensive review.

How to do it
Photocopy the game board on page 33 on an acetate so it can be used as an overhead transparency. Place the transparency on the overhead projector.

Divide learners into teams. The number of teams and the number of learners per team will depend on the total number of learners. Have a member of each team draw a numbered piece of paper (from a box or paper bag) to determine the order in which the teams will ask and answer questions.

The team that chose the number one will go first; number two will go second and so on. The first team will choose a category and point value. The facilitator asks the question (questions and answers listed by category and point value begin on page 26.) If the team answers correctly, they are awarded the points assigned to the question. If the team answers incorrectly, the next team in order has the chance to answer the question. This continues until the correct answer is given. If none of the teams answers correctly, the facilitator provides the correct answer, discusses the rationale, and no points are awarded. The first team then starts over, selecting another question. Once a correct answer is given, the next team chooses a category and point value and another question is asked.

Teaching Tip
Once a question has been asked and correctly answered, the facilitator covers the game board box corresponding to that question with a 2" x 1.5" self-stick note. This will black out the box on the overhead, indicating the question is "gone." The game board is specially designed to accommodate the notes of this size.

The game continues until all questions are asked and answered. The team with the most points at the end of the game wins. Award small prizes to the winning team.
**Instructions to Group**
This activity will allow you to review your knowledge of chest drainage and related conditions.
[break group into teams]

You will draw lots to determine the order in which your teams will be able to choose questions and answer them. If your team answers correctly, your team will win the corresponding number of points. If you answer incorrectly, the next team will get the chance to answer the question. The lower the point value, the easier the question. At the end of the game, the team with the most points will win a prize.

**Follow Up**
Provide rationales for answers when learners have trouble mastering a subject. Provide any remediation for content as indicated by learners' responses to questions. Relate questions and answers to hospital policy / procedure / competencies whenever possible.
Questions and Answers

Mediastinal Drainage

100 Points

Q. Chest tubes placed after coronary artery bypass surgery are positioned in this sac.
A. Pericardial

200 Points

Q. This complication is characterized by muffled heart tones, decreased cardiac output and increased right atrial pressure.
A. Pericardial / cardiac tamponade

300 Points

Q. This action can create negative pressures as high as -400 cm H₂O in the chest and is no longer recommended for routine postoperative nursing care of patients with mediastinal chest tubes.
A. Stripping the tubing

400 Points

Q. This type of coronary artery bypass surgery grafting may require a pleural chest tube postoperatively if the pleural space is entered.
A. Left internal mammary artery graft (LIMA)

500 Points

Q. This substance, covalently bonded to some chest tubes, decreases the incidence of catheter thrombosis.
A. Heparin.
Pleural Drainage

100 Points

Q. This condition is characterized by an accumulation of air between the visceral and parietal pleurae.
A. Pneumothorax

200 Points

Q. This condition is characterized by diminished or absent breath sounds on the affected side, a shift of the trachea away from the affected side, and hyperresonance to percussion.
A. Tension pneumothorax.

300 Points

Q. Using anatomical directional terms, describe the position a chest tube is ideally located in when placed in the chest to drain fluid alone.
A. Inferior and posterior

400 Points

Q. Using anatomical directional terms, describe the position a chest tube is ideally located in when placed in the chest to evacuate air alone.
A. Anterior and superior

500 Points

Q. This amount of fluid (in cc or mL) is required for a pleural effusion to be seen on an upright chest radiograph.
A. 300 to 500
**Water Seal Chamber**

*100 Points*

Q. Seeing these in the water seal chamber indicates an air leak in the chest drainage system.
A. Bubbles

*200 Points*

Q. This is the name for the up and down motion of the water in the water seal chamber that corresponds to the intrathoracic pressure changes associated with a patient's respirations.
A. Tidalling

*300 Points*

Q. When a patient takes in a very deep breath before a cough, and creates high negative intrathoracic pressure, what will happen to the water level in the water seal chamber?
A. It will rise.

*400 Points*

Q. Describe what the numbers on the long arm of the water seal chamber mean.
A. The water seal chamber is a U-tube manometer. The numbers are measurements of negative pressure in cm H₂O

*500 Points*

Q. If the level of water in the water seal chamber is halfway up the long arm of the chamber, the nurse should perform this action to return the water back down to the baseline level in the chamber after the patient's condition has been assessed.
A. Depress the manual high negativity vent on the top of the chest drain.
Managing Chest Tubes

100 Points

Q. What is the time interval for routinely changing a chest tube dressing?
A. A chest tube dressing should not be changed routinely; only when it is soiled, loose or otherwise compromised.

200 Points

Q. A patient with a chest tube is scheduled to go to the radiology department for a chest radiograph. What would you do with the drain and the tubing when the patient is on the stretcher, ready for transport?
A. Disconnect from suction; if stopcock is present on suction tubing, check to see that the stopcock is in the completely open position; assure that the drain remains below the patient's chest level to allow for gravity drainage; check to see that there are no dependent loops in the tubing [Teaching point: key aspect is that the chest tube should NOT be clamped for transport]

300 Points

Q. Describe how the wall vacuum regulator should be adjusted for a patient with routine chest drainage with a water-filled suction control chamber.
A. Turn suction regulator down until bubbling just stops. Then, increase the wall vacuum source until gentle bubbling just begins in the suction control chamber.

400 Points

Q. There has been no evidence of an air leak in the water seal chamber, the lung is fully re-expanded on a chest radiograph, and fluid drainage has been less than 50 cc in the past 24 hours. What procedure can you expect to prepare the patient for?
A. Chest tube removal.
500 Points

Q. A mechanically ventilated patient's chest tube has become disconnected from the tubing leading to the drain, and the drain is cracked. Prior to this event, there was bubbling in the water seal chamber. While a colleague is getting another drain, what immediate nursing action would be best for this patient?

A. Stick the end of the chest tube into a bottle of sterile saline or sterile water to a depth of approximately 2 cm. [the bubbling in the water seal indicates an air leak. DO NOT clamp the tube, because a tension pneumothorax could result. Placing the chest tube under water creates a water seal, allowing air to leave and not re-enter the chest. This action will best protect the patient until a new chest drain is set up and available to be connected to the chest tube.]
Potpourri

100 Points

Q. Describe, specifically, the emergency treatment for a patient with a tension pneumothorax whose condition is rapidly deteriorating while equipment is being set up for chest tube insertion.
A. Needle decompression in the second intercostal space, in the mid-clavicular line.

200 Points

Q. What is the difference between an open pneumothorax and a closed pneumothorax?
A. In an open pneumothorax, the chest wall is penetrated (such as a stab wound or gunshot); this is often called a sucking chest wound. In a closed pneumothorax, the chest wall is intact (such as injury to the lung from a broken rib, or barotrauma during mechanical ventilation.)
[Teaching point: a closed pneumothorax is potentially more dangerous because it can lead to tension pneumothorax. An open pneumothorax naturally vents pressure through the opening in the chest, so tension pneumothorax will not occur unless a pressure / occlusive dressing is applied. A dressing should only be taped on three sides to allow pressure to be relieved through the open side of the dressing for safety until a chest tube can be inserted.]

300 Points

Q. Describe how you would check for the source of an air leak in a chest drainage system when bubbles are present in the water seal chamber.
A. Momentarily clamp the chest tube, with a padded clamp or special flat tubing clamp (without teeth that could damage the tubing) starting at the place where the tube leaves the chest. When the tube is clamped, look at the water seal chamber. When the clamp is placed distal to the leak, the bubbling will stop. Work your way down the tubing with the clamp to determine the location of the leak. [Teaching point: if the chest tube is clamped as it leaves the chest and the bubbling stops immediately, the leak is from the lung. If the tubing is clamped as it enters the drain, and the bubbling continues, the leak is in the drain itself.]
**400 Points**

Q. What would you do if you inadvertently overfilled the water seal chamber above the 2 cm AFill to here@ line?
A. Use a needle and syringe and withdraw the extra fluid through the rubber grommet on the front of the drain.

**500 Points**

Q. How does PEEP on a ventilator affect bubbling in the water seal chamber when a patient has an air leak from a pneumothorax?
A. Bubbling will be continuous when PEEP is used. [The positive pressure from the PEEP during exhalation will continue to push the air through the hole in the lung.]
<table>
<thead>
<tr>
<th>Potpourri</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Chest Tubes</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Water Seal Chamber</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Pleural Drainage</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Mediastinal Drainage</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
</tbody>
</table>
What's My Problem?

Purpose
This activity provides an interactive opportunity for learners to review the assessment findings of patients with a variety of conditions related to chest drainage.

How to do it
Photocopy the list of thoracic disorders on page 37. Cut the copy into sections, so that each section contains a single disorder.

Tape a different disorder on each learner's back. Each learner's task is to determine what disorder is taped on his or her back by asking other learners questions related to how he or she would assess a patient with a disorder related to chest drainage.

This activity can be carried out in a number of ways to vary the level of difficulty and evaluate learning at different cognitive levels. For example:
• You may copy the list of disorders on acetate to make an overhead learners can refer to as they are trying to determine which disorder is "theirs" to make the exercise a bit easier
• You can provide a list of assessment questions to direct learners, such as: breath sounds, percussion findings, degree of dyspnea, assessment of chest drain, heart sounds, and so on.

This is a particularly effective learning activity because not only do the people with the disorders on their backs have to determine what "their" disorder is, based on the assessment data they collect, but they must know about other disorders in order to answer other learners' questions.

Instructions to Group
This activity will allow you to review your knowledge of the assessment of patients with a variety of conditions relating to chest drainage and pleural disorders.
Each of you will have a disorder taped to your back. You will ask other members of the group to look at your back to see "what your problem is," and then you will ask one assessment question of each of your colleagues. You might ask about breath sounds, heart tones, vital signs, the chest drainage system and so forth. You should be collecting assessment data to answer the question "What's my Problem?"

[Note: if the group is small, people may ask multiple questions of other learners, or the facilitator may choose to pair up learners to ask each other questions.] When you wish to name your problem, tell another learner of your diagnosis, and the other learner will tell you whether you are correct. If you are incorrect, continue to collect assessment data until you reach the correct answer.

[The facilitator may provide the list of disorders or sample assessment questions as noted above; the use of these tools should also be explained to the learners.]

An abbreviated listing of assessment findings related to the eight conditions listed on page 37 is on pages 38-39.

**Teaching Tip**
This technique can be applied to many different aspects of content in a critical care nursing course.

**Blood Gas Interpretation**
Names of blood gas interpretations are taped to learners' backs; for example:
- Compensated metabolic acidosis
- Partially compensated respiratory alkalosis
Instruct learners to ask questions that can only be answered yes or no, such as "Is my pH high?" Instead of using numerical values, yes and no questions that refer to high, normal or low values reinforce the concept of how the different values change in different conditions; specific numbers are not as important as knowing, for example, that the PaCO2 level would be high, low or normal for a given condition.

**ECG Interpretation**
Learners' understanding of concepts relating to rhythm strip interpretation can be tested on two cognitive levels. At the lower level, the name of the rhythm in words is used, such as atrial fibrillation, sinus bradycardia and so forth.
To evaluate at a higher level, simply tape rhythm strips on the learners' backs. Then, the other learners must be able to interpret the rhythm in order to provide accurate information as they are asked questions.

In this case, questions would relate to ECG configuration such as: Is my PR interval prolonged? Does a P wave come before every QRS complex? Is my rate above 60? and so forth.
My Chest Drainage Problems

Tension pneumothorax without a chest tube

15% pneumothorax
patient came to the ER with pleuritic chest pain
no intervention yet

1000cc right sided pleural effusion
no intervention yet

Routine postoperative thoracotomy patient
mechanical ventilation without PEEP
air leak from the lung through the chest tube

Postoperative trauma patient with flail chest and pneumothorax
ARDS
mechanical ventilation with 12 cm H₂O PEEP

Postoperative coronary artery bypass graft
median sternotomy
left internal mammary artery graft
pleural space entered during surgery; pleural tube in place

Postoperative coronary artery bypass graft
median sternotomy, saphenous vein graft
cardiac tamponade

Postoperative coronary artery bypass graft
median sternotomy, saphenous vein graft
routine
<table>
<thead>
<tr>
<th>Condition</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tension pneumothorax without a chest tube</strong></td>
<td>Decreased or absent breath sounds on affected side</td>
</tr>
<tr>
<td></td>
<td>Trachea deviated away from affected side</td>
</tr>
<tr>
<td></td>
<td>Hyperresonance to percussion</td>
</tr>
<tr>
<td></td>
<td>Decreased blood pressure</td>
</tr>
<tr>
<td></td>
<td>Increased heart rate</td>
</tr>
<tr>
<td></td>
<td>Increased right sided heart pressures</td>
</tr>
<tr>
<td></td>
<td>Jugular venous distension</td>
</tr>
<tr>
<td><strong>15% pneumothorax patient came to the ER with pleuritic chest pain</strong></td>
<td>May or may not have decreased breath sounds</td>
</tr>
<tr>
<td>no intervention yet</td>
<td>No tracheal shift</td>
</tr>
<tr>
<td></td>
<td>Pleuritic chest pain on affected side</td>
</tr>
<tr>
<td></td>
<td>Vital signs normal; may have slightly increased respiratory rate</td>
</tr>
<tr>
<td></td>
<td>Typically adolescent male, may have had this before</td>
</tr>
<tr>
<td></td>
<td>Typically treated with watchful waiting &amp; repeat chest radiograph; perhaps 23 hour admission for observation</td>
</tr>
<tr>
<td><strong>1000 cc right sided pleural effusion</strong></td>
<td>Diminished breath sounds on affected side</td>
</tr>
<tr>
<td>no intervention yet</td>
<td>May have pleuritic chest pain on affected side</td>
</tr>
<tr>
<td></td>
<td>Dyspnea due to lung compression</td>
</tr>
<tr>
<td></td>
<td>Increased respiratory rate</td>
</tr>
<tr>
<td></td>
<td>Dullness to percussion</td>
</tr>
<tr>
<td></td>
<td>History of CHF, cancer or other condition that could lead to pleural effusion</td>
</tr>
<tr>
<td><strong>Routine postop thoracotomy patient mechanical ventilation without PEEP</strong></td>
<td>Should have normal vital signs</td>
</tr>
<tr>
<td>air leak from lung through chest tube</td>
<td>One or two chest tubes in place</td>
</tr>
<tr>
<td></td>
<td>Bubbling in water seal chamber with ventilator breath</td>
</tr>
<tr>
<td></td>
<td>Chest drain on suction</td>
</tr>
<tr>
<td>Procedure</td>
<td>Signs and Symptoms</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Postoperative trauma patient with flail chest and pneumothorax</strong></td>
<td>May have decreased breath sounds on affected side</td>
</tr>
<tr>
<td>ARDS</td>
<td>May have one or multiple chest tubes</td>
</tr>
<tr>
<td>Mechanical ventilation with 12 cmH2O PEEP</td>
<td>Poor oxygenation</td>
</tr>
<tr>
<td></td>
<td>High levels of mechanical ventilatory support</td>
</tr>
<tr>
<td></td>
<td>Continuous bubbling in water seal chamber due to PEEP</td>
</tr>
<tr>
<td></td>
<td>Chest drain on suction</td>
</tr>
<tr>
<td><strong>Postoperative coronary artery bypass graft via median sternotomy</strong></td>
<td>Vital signs should be stable</td>
</tr>
<tr>
<td>Left internal mammary artery graft</td>
<td>Patient’s condition overall should be stable</td>
</tr>
<tr>
<td>Pleural space entered during surgery</td>
<td>Mediastinal chest tubes in place</td>
</tr>
<tr>
<td>Pleural chest tubes in place</td>
<td>Pleural chest tube in place</td>
</tr>
<tr>
<td></td>
<td>May have more than one chest drain</td>
</tr>
<tr>
<td></td>
<td>May or may not have bubbling in water seal, depending if there is an air leak from</td>
</tr>
<tr>
<td></td>
<td>the lung where the pleural space was entered</td>
</tr>
<tr>
<td></td>
<td>Bloody to serosanguinous drainage in collection chamber</td>
</tr>
<tr>
<td><strong>Postoperative coronary artery bypass graft</strong></td>
<td>Vital signs should be stable</td>
</tr>
<tr>
<td><strong>Median sternotomy, saphenous vein graft</strong></td>
<td>Patient’s condition overall should be stable</td>
</tr>
<tr>
<td><strong>Routine postoperative course</strong></td>
<td>Mediastinal chest tubes in place</td>
</tr>
<tr>
<td></td>
<td>Should not have bubbling in water seal</td>
</tr>
<tr>
<td></td>
<td>Bloody to serosanguinous drainage in collection chamber</td>
</tr>
<tr>
<td><strong>Cardiac tamponade</strong></td>
<td>Muffled heart tones</td>
</tr>
<tr>
<td></td>
<td>Reduced drainage from mediastinal chest tubes</td>
</tr>
<tr>
<td></td>
<td>Decreased BP, increased HR, decreased cardiac output, increased right heart pressure</td>
</tr>
<tr>
<td></td>
<td>Jugular venous distention</td>
</tr>
</tbody>
</table>
### New Product Introduction Worksheet

<p>| 1. Specifically, what is being introduced? | <strong>Pneumostat chest drain valve</strong> |
| 2. Why is this product being introduced? Innovation, regulatory requirement, better product, standardization? | <strong>Innovation, better product than current one-way valve</strong> |
| 3. What does the learner already know that can be used as a foundation for learning about this product? (It's similar to X) | <strong>Relate to water seal of chest drain system, relate to current one-way valve used for pneumothorax</strong> |
| 4. How can learners &quot;play&quot; with the new product to validate it based on past experience? | <strong>Product inexpensive, able to unwrap sterile units for handling for teaching purposes, learners can hold</strong> |
| 5. What information is the &quot;need to know&quot; that will be immediately useful to the learners in their &quot;real world&quot;? | <strong>How to hook up, how to assess air leak, how to drain fluid, when to change device, not to tape to chest, use clip to attach to clothing</strong> |
| 6. How will this product solve a problem or fill a need the learner has? Make their job easier? | <strong>No need to jury-rig one-way valve for fluid drainage, self-contained, no risk of spillage &amp; violating standard precautions, lighter for patient</strong> |
| 7. How can learners be actively involved in learning about this new product? | <strong>Let them handle device, refer to Creative Training Strategies Handbook for ideas</strong> |
| 8. How will the information you provide apply to everyday practice? (Relate content to practice) | <strong>One-way valve already in use, no theory needed - purely practical info on how device works &amp; how to monitor</strong> |
| 9. What are the likely perceptions of patients/families the nurse should be ready for? | <strong>Patients should be pleased, device much lighter than drainage tubing, allows mobility</strong> |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Does the nurses need to know a lot of information to use the product safely, or does the nurse need to know about the product, but the primary user will be someone else?</td>
<td>Nurses will need to be experts, monitor the device and perform pulmonary assessments as with any patient with a chest tube</td>
</tr>
<tr>
<td>11. What support is available to nurses using the product? (24 hour telephone support, learning guides, internal support)</td>
<td>24/7 toll free number from manufacturer</td>
</tr>
<tr>
<td>12. How will this product affect the nursing role? Simplify or make more complex?</td>
<td>Should make nursing role easier - self-contained unit eliminates need to rig up drainage collection - no risk of spillage</td>
</tr>
<tr>
<td>13. Is this product introduction an organization priority? Can it be delayed? Who benefits from successful introduction?</td>
<td>Priority for fast-track program, do not want to delay, benefits: patient, hospital with reduced LOS, surgeons, pulmonary physicians, interventional radiologists, ER, nurses</td>
</tr>
</tbody>
</table>

**Notes to Users:**

Items 2 - 8 focus on adult learning principles
Items 1, 9 - 13 focus on product introduction principles

**References:**


## New Product Introduction Worksheet

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Specifically, what is being introduced?</td>
<td>Express Mini 500 Chest Drain</td>
</tr>
<tr>
<td><strong>2.</strong> Why is this product being introduced? Innovation, regulatory requirement, better product, standardization?</td>
<td>Innovation, key to fast-track program to facilitate early ambulation in effort to reduce LOS</td>
</tr>
<tr>
<td><strong>3.</strong> What does the learner already know that can be used as a foundation for learning about this product? (It's similar to X)</td>
<td>Same principles as traditional chest drain: collection chamber, mechanical one-way valve instead of water seal, preset suction level -20cmH2O</td>
</tr>
<tr>
<td><strong>4.</strong> How can learners &quot;play&quot; with the new product to validate it based on past experience?</td>
<td>Small compact drain, able to unwrap sterile units - can demo negative pressure indicator by inhaling through patient tube</td>
</tr>
<tr>
<td><strong>5.</strong> What information is the &quot;need to know&quot; that will be immediately useful to the learners in their &quot;real world&quot;?</td>
<td>How to hook up, how to assess air leak or negative intrapleural pressure, how to apply straps so patient can ambulate easily</td>
</tr>
<tr>
<td><strong>6.</strong> How will this product solve a problem or fill a need the learner has? Make their job easier?</td>
<td>Lighter weight, less pain for patient, much easier for patient to get out of bed; patient can walk independently</td>
</tr>
<tr>
<td><strong>7.</strong> How can learners be actively involved in learning about this new product?</td>
<td>Handle device, refer to strategies in Creative Training Strategies Handbook</td>
</tr>
<tr>
<td><strong>8.</strong> How will the information you provide apply to everyday practice? (Relate content to practice)</td>
<td>Chest drains already standard practice, emphasize organizational goals of early ambulation and shorter LOS</td>
</tr>
<tr>
<td><strong>9.</strong> What are the likely perceptions of patients/families the nurse should be ready for?</td>
<td>Patients should be pleased, device is much lighter than traditional drain, less pulling on chest tube; may be apprehensive about walking soon after surgery</td>
</tr>
<tr>
<td>10. Does the nurses need to know a lot of information to use the product safely, or does the nurse need to know about the product, but the primary user will be someone else?</td>
<td>Nurses will be the experts, monitor the device and perform assessments as with any patient with a chest tube</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>11. What support is available to nurses using the product? (24 hour telephone support, learning guides, internal support)</td>
<td>24/7 toll-free support from manufacturer, self-study CE program from manufacturer</td>
</tr>
<tr>
<td>12. How will this product affect the nursing role? Simplify or make more complex?</td>
<td>Should simplify nursing care because patients will be able to walk more independently</td>
</tr>
<tr>
<td>13. Is this product introduction an organization priority? Can it be delayed? Who benefits from successful introduction?</td>
<td>Priority for fast-track programs in cardio-thoracic surgery and to enhance safety for transportation on LifeFlight; want to implement ASAP, patients, staff and organization all benefit</td>
</tr>
</tbody>
</table>

**Notes to Users:**

Items 2 - 8 focus on adult learning principles
Items 1, 9 - 13 focus on product introduction principles

**References:**


# New Product Introduction Worksheet

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Specifically, what is being introduced?</td>
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<tr>
<td>2. Why is this product being introduced? Innovation, regulatory requirement, better product, standardization?</td>
<td></td>
</tr>
<tr>
<td>3. What does the learner already know that can be used as a foundation for learning about this product? (It's similar to X)</td>
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<td>4. How can learners &quot;play&quot; with the new product to validate it based on past experience?</td>
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</tr>
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**References:**


Creative Teaching


Chest Drainage


Capps JS, Tyler ML, Rusch VW, Pierson DL: Potential of chest drainage units to evacuate broncho-pleural air leaks. *Chest* 1985;88S.


University of Arkansas for Medical Sciences Medical Center: Procedure for proper usage of the Heimlich valve 1996. Available at: http://www.uams.edu/nursingmanual/Procedures/procedure48.htm


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