



# **Clinical Skills Lab Manual**

**NRS 476**

**Lab Manual**

## ADULT INTENSIVE CARE NURSING (NRS 476)

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## 1. HEMODYNAMIC MONITORING

Hemodynamic monitoring is the assessment of the patient's circulatory status; it includes measurements of heart rate (HR), intra-arterial pressure, CO, central venous pressure (CVP), PAP, pulmonary artery wedge pressure and blood volume.

The primary purpose is the early detection, identification, and treatment of lifethreatening conditions, such as heart failure, cardiac tamponade, and all types of shock (septic, cardiogenic, neurogenic, anaphylactic).

Cardiac Output CO is the amount (volume) of blood ejected by the left ventricle into the aorta in 1 minute. Normal CO is 4 to 8 L/minute.

### Central Venous Pressure (CVP) Monitoring Equipments

- Venous pressure tray
- Cut down tray
- Infusion solution/infusion set with CVP manometer (Electronic CVP monitoring does not use a manometer.)
- I.V. pole
- Arm board (for antecubital insertion)
- Sterile dressing and tape
- Gowns, masks, caps, and sterile gloves
- Heparin flush system and pressure bag (if transducer to be used)
- ECG monitor
- Carpenter's level (for establishing zero point)

### Preparatory phase (By nurse)

1. Assemble equipment according to the manufacturer's directions. Evaluate the patient's prothrombin time, partial thromboplastin time, and complete blood count.

2. Explain the procedure to the patient and ensure that informed consent is obtained.

a. Explain to patient how to perform the Valsalva maneuver.

b. NPO 6 hours before insertion.

3. Position patient appropriately. a. Place in supine position.

i. Arm vein—extend arm and secure on arm board.

ii. Jugular veins—place patient in Trendelenburg's position. Place a small rolled towel under shoulders (subclavian approach).

4. Flush I.V. infusion set and manometer (measuring device) or prepare heparin flush for use with transducer. Secure all connections to prevent air emboli and bleeding.

- a. Attach manometer to I.V. pole. The zero point of the manometer should be on a level with the patient's right atrium.
- b. Calibrate/zero transducer and level port with patient's right atrium.
5. Institute electrocardiogram monitoring.

#### **Insertion Phase (By physician)**

1. Physician puts on gown, cap, and mask.
2. The CVP site is surgically cleaned. The physician introduces the CVP catheter percutaneously or by direct venous cutdown.
3. Assist the patient in remaining motionless during insertion.
4. Monitor for dysrhythmias, tachypnea, and tachycardia as catheter is threaded to great vein or right atrium.
5. Connect primed I.V. tubing/heparin flush system to catheter and allow I.V. solution to flow at a minimum rate to keep vein open (25 mL maximum).
6. The catheter should be sutured in place.
7. Place a sterile occlusive dressing over site. 8. Obtain a chest X-ray.

#### **To Measure CVP**

1. Place the patient in a comfortable position.
2. Position the zero point of the manometer at the level of the right atrium
3. Turn the stopcock so the I.V. solution flows into the manometer, filling to about the 0- to 25-cm level. Then turn stopcock so solution in manometer flows into patient.
4. Observe the fall in the height of the column of fluid in manometer. Record the level at which the solution stabilizes or stops moving downward. This is CVP. Record CVP and the position of the patient.
5. CVP catheter may be connected to a transducer and an electrical monitor with either digital or calibrated CVP wave readout.
6. CVP may range from 5 to 12 cm H<sub>2</sub>O (absolute numeric values have not been agreed on) or 2 to 6 mm Hg. All values should be determined at the end of expiration.
7. Assess the patient's clinical condition. Frequent changes in measurements (interpreted within the context of the clinical situation) will serve as a guide to detect whether the heart can handle its fluid load and whether hypovolemia or hypervolemia is present.
8. Turn the stopcock again to allow I.V. solution to flow from solution bottle into the patient's veins. Use an I.V. pump, and monitor the infusion at least hourly.

## **Follow-up Phase**

1. Prevent and observe for complications.
  - a. From catheter insertion: Pneumothorax, hemothorax, air embolism, hematoma, and cardiac tamponade
  - b. From indwelling catheter: Infection, air embolism, central venous thrombosis
2. Make sure the cap is secure on the end of the CVP monitor and all clamps are closed when not in use.
3. If air embolism is suspected, immediately place patient in left lateral Trendelenburg's position and administer oxygen.
4. Carry out ongoing nursing surveillance of the insertion site and maintain aseptic technique.
  - a. Inspect entry site twice daily for signs of local inflammation and phlebitis. Remove the catheter immediately if there are signs of infection.
  - b. Make sure sutures are intact.
  - c. Change dressings as prescribed.
  - d. Label to show date and time of change.
  - e. Send the catheter tip for bacteriologic culture when it is removed.
5. When discontinued, remove central line.
  - a. Position patient flat with head down.
  - b. Remove dressing and sutures.
  - c. Have patient take a deep breath and hold it while catheter is gently pulled out.
  - d. Apply pressure at catheter site and apply dressing.
  - e. Monitor site and vital signs for signs of bleeding or hematoma formation.

## **Pulmonary artery pressure monitoring**

### **Purposes**

1. To monitor pressures in the right atrium (CVP), right ventricle, pulmonary artery, and distal branches of the pulmonary artery (pulmonary capillary wedge pressure [PCWP]). The latter reflects the level of the pressure in the left atrium (or filling pressure in the left ventricle); thus, pressures on the left side of the heart are inferred from pressure measurement obtained on the right side of the circulation.
2. To measure CO through thermodilution.
3. To obtain blood for central venous oxygen saturation.
4. To continuously monitor mixed venous oxygen saturation (SvO<sub>2</sub>); available on special catheters.

5. To provide for temporary atrial/ventricular pacing and intra-atrial ECG (available only on special catheters). **Equipments**

- Swan-Ganz catheter set
- ECG, monitor, and display unit with paper recorder
- For mixed venous oxygen saturations (SvO<sub>2</sub>) monitoring, fiber-optic pulmonary artery catheter, optical module, and microprocessor unit
- Defibrillator
- Pressure transducer (disposable/reusable)
- Cutdown tray
- Sterile saline solution
- Pressurized bag
- Heparin infusion in plastic bag
- Continuous flush device
- Local anesthetic
- Skin antiseptic
- Transparent/gauze dressing
- Tape

**Preparatory phase (By nurse)**

1. Explain procedure to patient and family/significant other. Make sure that informed consent has been obtained.
2. Check vital signs and apply electrocardiogram (ECG) electrodes.
3. Place patient in a comfortable position; this is the baseline position.
4. Set up equipment according to manufacturer's directions:
  - a. The pulmonary artery catheter requires a transducer and recording, amplifying, and flush systems.
  - b. Flush system according to manufacturer's directions.
5. Adjust transducer to level of patient's right atrium (phlebostatic axis fourth intercostal space, midaxillary line).
6. Calibrate pressure equipment (especially important when reusable transducers are employed).
7. Clip excess hair. Prepare skin over insertion site.

**Performance phase (By physician)**

1. Physician puts on sterile gown and gloves and places sterile drapes over patient.

2. The balloon is inflated with air under sterile water or saline to test for leakage (bubbles). The catheter may be flushed with saline at this time.
3. The Swan-Ganz catheter is inserted through the internal jugular, subclavian, or any easily accessible vein by either percutaneous puncture or venotomy.
4. The catheter is advanced to the superior vena cava. Oscillations of the pressure waveforms will indicate when the tip of the catheter is within the thoracic cavity. The patient may be asked to cough.
5. The catheter is then advanced gently into the right atrium, and the balloon is inflated with air.
6. The inflated balloon at the tip of the catheter will be guided by the flowing stream of blood through the right atrium and tricuspid valve into the right ventricle. From this position, it finds its way into the main pulmonary artery. The catheter tip pressures are recorded continuously by specific pressure waveforms as the catheter advances through the various chambers of the heart.
7. The flowing blood will continue to direct the catheter more distally into the pulmonary tree. When the catheter reaches a pulmonary vessel that is approximately the same size or slightly smaller in diameter than the inflated balloon, it cannot be advanced further. This is the wedge position, called PCWP or pulmonary capillary wedge pressure.
8. The balloon is deflated, causing the catheter to retract spontaneously into a larger pulmonary artery. This gives a continuous pulmonary artery systolic, diastolic, and mean pressure.
9. The catheter is then attached to a continuous heparin flush and transducer.
10. The catheter is sutured in place and covered with a sterile dressing.
11. A chest X-ray is obtained after Swan-Ganz insertion if fluoroscopy was not used to guide insertion.

**To obtain wedge pressure reading (by nurse)**

1. Note amount of air to be injected into balloon, usually no more than 1.5 mL. Do not introduce more air into balloon than specified.
2. Inflate the balloon slowly until the contour of PAP changes to that of PCWP. As soon as a wedge pattern is observed, no more air is introduced.
  - a. Note the digital pressure recordings on the monitor (an average of pressure waves is displayed, but these waves are not taken at end expiration).
  - b. Obtain a strip of the pressure tracing.

c. Determine PCWP from strip at end expiration.

3. Deflate the balloon as soon as the pressure reading is obtained. Do not draw back with force on the syringe because too forceful a deflation may damage the balloon. 4. Record PCWP reading and amount of air needed to obtain wedge reading.

Document recorded waveform by placing a strip of the waveform in patient's chart showing wedge tracing reverting to pulmonary artery waveform.

### **Follow-up phase**

1. Inspect the insertion site daily. Look for signs of infection, swelling, and bleeding.

2. Record date and time of dressing change and I.V. tubing change. Note centimeter mark on catheter as it leaves the cordis.

3. Assess contour of waveform frequently and compare with previously documented waveforms.

4. Assess for complications: pulmonary embolism, dysrhythmias, heart block, damage to tricuspid valve, intracardiac knotting of catheter, thrombophlebitis, infection, balloon rupture, rupture of pulmonary artery.

5. When indicated, the catheter is removed without excessive force of traction; pressure dressing is applied over the site. The site should be checked periodically for bleeding.

## CVP Monitoring

Name of the student:

Date:

Id No:

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	Assemble equipments <ul style="list-style-type: none"> <li>• Venous pressure tray</li> <li>• Cut down tray</li> <li>• Infusion solution/infusion set with CVP manometer (Electronic CVP monitoring does not use a manometer.)</li> <li>• I.V. pole</li> <li>• Arm board (for antecubital insertion)</li> <li>• Sterile dressing and tape</li> <li>• Gowns, masks, caps, and sterile gloves <input type="checkbox"/></li> <li>• Heparin flush system and pressure bag (if transducer to be used)</li> <li>• ECG monitor</li> <li>• Carpenter's level (for establishing zero point)</li> </ul>			C3.1
2	Explain the procedure to the patient			C3.1
3	Explain to patient how to perform the Valsalva maneuver			C3.1
4	Ensure NPO 6 hours before insertion			C3.1
5	Position patient appropriately <ol style="list-style-type: none"> <li>i. Arm vein—extend arm and secure on arm board.</li> <li>ii. Jugular veins—place patient in Trendelenburg's position. Place a small rolled towel under shoulders (subclavian approach)</li> </ol>			C3.1
6	Flush I.V. infusion set and manometer (measuring device) or prepare heparin flush for use with transducer			C3.1
7	Attach manometer to I.V. pole. The zero point of the manometer should be on a level with the patient's right atrium.			C3.1
8	Institute electrocardiogram monitoring			C3.1
<b>To Measure CVP</b>				
9	Place the patient in a comfortable position			C3.1
10	Position the zero point of the manometer at the level of the right atrium			C3.1

11	Turn the stopcock so the I.V. solution flows into the manometer, filling to about the 0- to 25-cm level. Then turn stopcock so solution in manometer flows into patient.			C3.1
12	Observe the fall in the height of the column of			C3.1
	fluid in manometer. Record the level at which the solution stabilizes or stops moving downward.			C3.1
13	Record CVP and the position of the patient. CVP may range from 5 to 12 cm H <sub>2</sub> O			C3.1
14	Assess the patient's clinical condition			C3.1
15	Turn the stopcock again to allow I.V. solution to flow from solution bottle into the patient's veins			C3.1
<b>Follow-up Phase</b>				
16	Observe for complications			C3.1
17	Maintain aseptic technique. a. Inspect entry site twice daily for signs of local inflammation and phlebitis. Remove the catheter immediately if there are signs of infection. b. Make sure sutures are intact. c. Change dressings as prescribed. d. Label to show date and time of change. e. Send the catheter tip for bacteriologic culture when it is removed			C3.1
18	When discontinued, remove central line. a. Position patient flat with head down. b. Remove dressing and sutures. c. Have patient take a deep breath and hold it while catheter is gently pulled out. d. Apply pressure at catheter site and apply dressing. e. Monitor site and vital signs for signs of bleeding or hematoma formation			C3.1

**Result:**

CLO	Student Performance
C3.1	...../18

**Name and Signature of Evaluator:** .....

## Pulmonary Artery Pressure Monitoring

Name of the student:

Date:

Id No:

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	Assemble equipments <ul style="list-style-type: none"> <li>• Swan-Ganz catheter set</li> <li>• ECG, monitor, and display unit with paper recorder</li> <li>• For mixed venous oxygen saturations (SvO<sub>2</sub>) monitoring, fiber-optic pulmonary artery catheter, optical module, and microprocessor unit</li> <li>• Defibrillator</li> <li>• Pressure transducer (disposable/reusable)</li> <li>• Cutdown tray</li> <li>• Sterile saline solution</li> <li>• Pressurized bag</li> <li>• Heparin infusion in plastic bag</li> <li>• Continuous flush device</li> <li>• Local anesthetic</li> <li>• Skin antiseptic</li> <li>• Transparent/gauze dressing</li> <li>• Tape</li> </ul>			5.1.1
2	Explain the procedure to the patient			5.1.1
3	Check vital signs			5.1.1
4	Apply electrocardiogram (ECG) electrodes			5.1.1
5	Place patient in a comfortable position			5.1.1
6	Set up equipment according to manufacturer's directions: <ol style="list-style-type: none"> <li>a. The pulmonary artery catheter requires a transducer and recording, amplifying, and flush systems.</li> <li>b. Flush system according to manufacturer's directions</li> </ol>			5.1.1
7	Adjust transducer to level of patient's right atrium (phlebostatic axis fourth intercostal space, midaxillary line)			5.1.1
8	Calibrate pressure equipment			5.1.1
9	Clip excess hair. Prepare skin over insertion site			5.1.1
<b>To obtain wedge pressure reading</b>				

10	Note amount of air to be injected into balloon			5.1.1
11	Inflate the balloon slowly until the contour of PAP changes to that of PCWP			5.1.1
12	a. Note the digital pressure recordings on the monitor (an average of pressure waves is displayed, but these waves are not taken at end expiration). b. Obtain a strip of the pressure tracing. c. Determine PCWP from strip at end expiration.			5.1.1
13	3. Deflate the balloon as soon as the pressure reading is obtained.			5.1.1
14	Record PCWP reading and amount of air needed to obtain wedge reading			5.1.1
15	Document recorded waveform by placing a strip of the waveform in patient's chart			5.1.1
<b>Follow-up Phase</b>				
16	Inspect the insertion site daily			5.1.1
17	Record date and time of dressing change and I.V. tubing change			5.1.1
18	Assess contour of waveform frequently and compare with previously documented waveforms			5.1.1
19	Assess for complications			5.1.1
20	When the catheter is removed apply pressure dressing over the site and check periodically for bleeding			5.1.1

**Result:**

CLO	Student Performance
5.1.1	...../20

**Name and Signature of Evaluator:** .....

## **2. DEFIBRILLATION**

1. Assess responsiveness. If the patient is not responsive, call for help and pull call bell, and call the facility emergency response number. Call for the AED. Put on gloves, if available. Perform cardiopulmonary resuscitation (CPR) until the defibrillator and other emergency equipment arrive.
2. Turn on the defibrillator.
3. If the defibrillator has “quick-look” capability, place the paddles on the patient’s chest. Otherwise, connect the monitoring leads of the defibrillator to the patient and assess the cardiac rhythm.
4. Expose the patient’s chest, and apply conductive pads at the paddle placement positions. For anterolateral placement, place one pad to the right of the upper sternum, just below the right clavicle, and the other over the fifth or sixth intercostal space at the left anterior axillary line. ‘Hands-free’ defibrillator pads can be used with the same placement positions, if available. For anteroposterior placement, place the anterior paddle directly over the heart at the precordium, to the left of the lower sternal border.

Place the flat posterior paddle under the patient’s body beneath the heart and immediately below the scapulae (but not on the vertebral column).

5. Set the energy level for 360 J (joules) for an adult patient when using a monophasic defibrillator. Use clinically appropriate energy levels for biphasic defibrillators, beginning with 150 to 200 J (AHA, 2005b).
6. Charge the paddles by pressing the charge buttons, which are located either on the machine or on the paddles themselves.
7. Place the paddles over the conductive pads and press firmly against the patient’s chest, using 25 pound (11 kg) of pressure. If using hands-off pads, do not touch the paddles.
8. Reassess the cardiac rhythm.
9. If the patient remains in VF or pulseless VT, instruct all personnel to stand clear of the patient and the bed, including the operator.

10. Discharge the current by pressing both paddle charge buttons simultaneously. If using remote defibrillator pads, press the discharge or shock button on the machine.
11. After the shock, immediately resume CPR, beginning with chest compressions. After five cycles (about 2 minutes), reassess the cardiac rhythm. Continue until advanced care providers take over, the patient starts to move, you are too exhausted to continue, or a physician discontinues CPR. Advanced care providers will indicate when a pulse check or other therapies are appropriate.
12. If necessary, prepare to defibrillate a second time. Energy level on the monophasic defibrillator should remain at 360 J for subsequent shocks.
13. Announce that you are preparing to defibrillate and follow the procedure described above.
14. If defibrillation restores a normal rhythm:
  - a. Check for signs of circulation; check the central and peripheral pulses, and obtain a blood pressure reading, heart rate, and respiratory rate.
  - b. If signs of circulation are present, check breathing. If breathing is inadequate, assist breathing. Start rescue breathing (one breath every 5 seconds).
  - c. If breathing is adequate, place the patient in the recovery position. Continue to assess the patient.
  - d. Assess the patient's level of consciousness, cardiac rhythm, breath sounds, and skin color and temperature.
  - e. Obtain baseline ABG levels and a 12-lead ECG, if ordered.
  - f. Provide supplemental oxygen, ventilation, and medications, as needed.
15. Check the chest for electrical burns and treat them, as ordered, with corticosteroid- or lanolin-based creams. If using 'hands-free' pads, keep pads on in case of recurrent ventricular tachycardia or ventricular fibrillation.
16. Remove gloves, if used. Perform hand hygiene.
17. Prepare the defibrillator for immediate reuse.

## Defibrillation

**Name of the student:**

**Date:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	Assemble equipments <ul style="list-style-type: none"> <li>• Defibrillator (Mono or diphasic)</li> <li>• Gel</li> <li>• Conductive pads (if needed)</li> <li>• Cotton</li> </ul>			C3.1
2	Assess responsiveness			C3.1
3	Turn on the defibrillator			C3.1
4	Expose the patient's chest, and apply conductive pads at the paddle placement positions. For anterolateral placement, place one pad to the right of the upper sternum, just below the right clavicle, and the other over the fifth or sixth intercostal space at the left anterior axillary line. For anteroposterior placement, place the anterior paddle directly over the heart at the precordium, to the left of the lower sternal border. Place the flat posterior paddle under the patient's body beneath the heart and immediately below the scapulae (but not on the vertebral column)			C3.1
5	Set clinically appropriate energy level			C3.1
6	Charge the paddles by pressing the charge buttons			C3.1
7	Place the paddles over the conductive pads and press firmly against the patient's chest			C3.1
8	Reassess the cardiac rhythm			C3.1
<b>To administer shock</b>				
9	If the patient remains in VF or pulseless VT, instruct all personnel to stand clear of the patient and the bed			C3.1
10	Discharge the current by pressing both paddle charge buttons simultaneously			C3.1
11	After the shock, immediately resume CPR, beginning with chest compressions			C3.1
12	After five cycles (about 2 minutes), reassess the cardiac rhythm. Continue until advanced care providers take over, the patient starts to move			C3.1
13	If necessary, prepare to defibrillate a second time			C3.1

14	<b>If defibrillation restores a normal rhythm:</b> a. Check for signs of circulation. b. If signs of circulation are present, check breathing. c. If breathing is adequate, place the patient in the			C3.1
	recovery position. d. Assess the patient's level of consciousness e. Obtain baseline ABG levels and a 12-lead ECG, if ordered. f. Provide supplemental oxygen, ventilation, and medications, as needed.			C3.1
<b>Follow-up Phase</b>				
15	Check the chest for electrical burns and treat them, as ordered			C3.1
16	Remove gloves, if used			C3.1
17	Perform hand hygiene			C3.1
18	Document patient condition			C3.1
19	Prepare the defibrillator for immediate reuse			C3.1

**Result:**

CLO	Student Performance
C3.1	...../19

**Name and Signature of Evaluator:** .....

### 3. ARTERIAL BLOOD GAS ANALYSIS

**Definition:** - It is a diagnostic procedure in which a blood is obtained from an artery directly by an arterial puncture or accessed by a way of indwelling arterial catheter.

**Indications:**

- To obtain information about patient ventilation (PCO<sub>2</sub>), oxygenation (PO<sub>2</sub>) and acid base balance
- Monitor gas exchange and acid base abnormalities for patient on mechanical ventilator or not
- To evaluate response to clinical intervention and diagnostic evaluation (oxygen therapy)
- An ABG test may be most useful when a person's breathing rate is increased or decreased or when the person has very high blood sugar levels, a severe infection, or heart failure

**ABG component**

- PH: measures hydrogen ion concentration in the blood, it shows blood' acidity or alkalinity
- PCO<sub>2</sub> : It is the partial pressure of CO<sub>2</sub> that is carried by the blood for excretion by the lungs, known as respiratory parameter
- PO<sub>2</sub>: It is the partial pressure of O<sub>2</sub> that is dissolved in the blood , it reflects the body ability to pick up oxygen from the lungs
- HCO<sub>3</sub> : known as the metabolic parameter, it reflects the kidney's ability to retain and excrete bicarbonate

**Normal values:**

- PH = 7.35 – 7.45
- PCO<sub>2</sub> = 35 – 45 mmhg
- PO<sub>2</sub> = 80 – 100 mmhg
- HCO<sub>3</sub> = 22 – 28 meq/L

**PROCEDURE**

**EQUIPMENT**

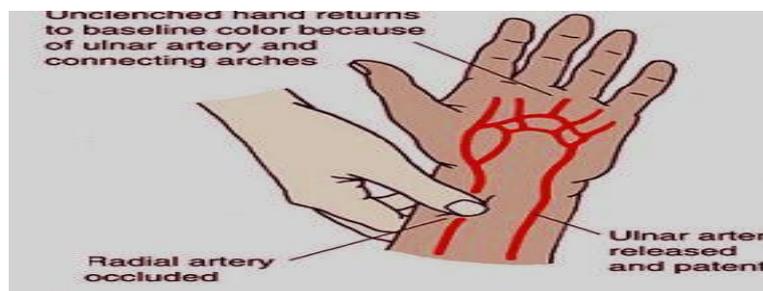
Blood gas kit OR

- 1ml syringe
- 23-26 gauge needle
- Stopper or cap

- Alcohol swab
- Disposable gloves
- Plastic bag & crushed ice
- Lidocaine (optional)
- Vial of heparin (1:1000)
- Par code or label

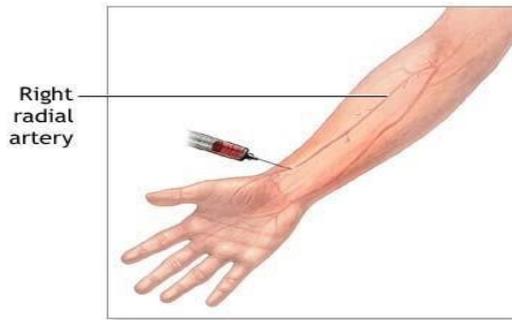
**Preparatory phase:**

- Record patient inspired oxygen concentration
- Check patient temperature
- Explain the procedure to the patient
- Provide privacy for client
- If not using heparinized syringe, heparinize the needle
- Perform Allen's test
- Wait at least 20 minutes before drawing blood for ABG after initiating, changing, or discontinuing oxygen therapy, or settings of mechanical ventilation, after suctioning the patient or after extubation.
- **Allen's test**
- It is a test done to determine that collateral circulation is present from the ulnar artery in case thrombosis occur in the radial

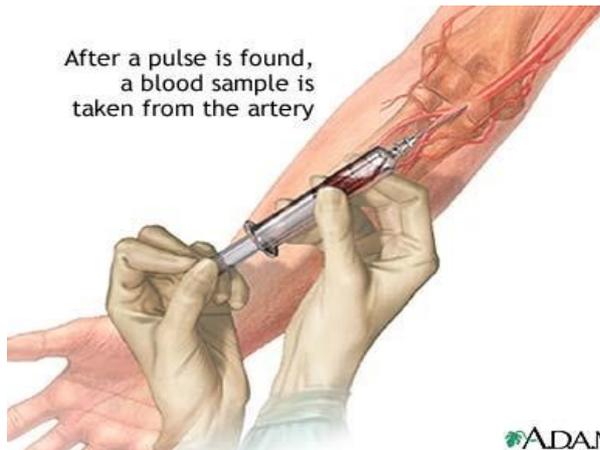


**Sites for obtaining ABG**

- Radial artery ( most common )



ADAM.



ADAM.

- Brachial artery
- Femoral artery

Radial is the most preferable site used because:

- It is easy to access
- It is not a deep artery which facilitate palpation, stabilization and puncturing
- The artery has a collateral blood circulation

**Performance phase:**

- Wash hands
- Put on gloves
- Palpate the artery for maximum pulsation
- If radial, perform Allen's test
- Place a small towel roll under the patient wrist
- Instruct the patient to breath normally during the test and warn him that he may feel brief cramping or throbbing pain at the puncture site
- Clean with alcohol swab in circular motion
- Skin and subcutaneous tissue may be infiltrated with local anesthetic agent if needed
- Insert needle at 45 radial ,60 brachial and 90 femoral

- Withdraw the needle and apply digital pressure
- Check bubbles in syringe
- Place the capped syringe in the container of ice immediately
- Maintain firm pressure on the puncture site for 5 minutes, if patient has coagulation abnormalities apply pressure for 10 – 15 minutes

**Follow up phase:**

- Send labeled, iced specimen to the lab immediately
- Palpate the pulse distal to the puncture site
- Assess for cold hands, numbness, tingling or discoloration
- Documentation include: results of Allen's test, time the sample was drawn, temperature, puncture site, time pressure was applied and if O2 therapy is there
- Make sure it's noted on the slip whether the patient is breathing room air or oxygen. If oxygen, document the number of liters. If the patient is receiving mechanical ventilation, FIO2 should be documented

**Complication**

- Arteriospasm
- Hematoma
- Hemorrhage
- Distal ischemia
- Infection
- Numbness

## ARTERIAL BLOOD SAMPLE

**Name of the student:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	C2.1
<b>Preparation</b>				
1 □	Prepare equipment: <ul style="list-style-type: none"> <li>• Gloves</li> <li>• Syringe</li> </ul> Gauze <ul style="list-style-type: none"> <li>• Antiseptic swap</li> <li>• Rubber stopper</li> <li>• Heparin</li> <li>• Adhesive bandage</li> </ul>			
<b>Procedure</b>				
2	Explain the procedure for the client.			C2.1
3	Wash hands and put on gloves.			C2.1
4	Provide privacy for the client.			C2.1
5	Help patient to lie supine, with his arms at his sides. He can be in a chair and support his arm securely on an armrest or a table.			C2.1
6	Determine the site of puncture by index and middle fingers (determine radial and ulnar).			C2.1
7	Clean the site in circular motion.			C2.1
8	Palpate the radial artery by index and middle fingers while holding the syringe with other hand.			C2.1
9	Aspirate the plunger of the syringe about 1cc.			C2.1
10	Hold the needle bevel up at a 30- to 45-degree angle.			C2.1
11	Puncture the skin and arterial wall in one motion, following the path of the artery.			C2.1
12	Watch for blood backflow in the syringe (Don't pull back on the plunger, arterial blood should enter the syringe automatically).			C2.1
13	Withdraw the needle and then press a gauze pad firmly over the puncture site until the bleeding stops (at least 5 minutes).			C2.1
14	Ask a coworker to hold the gauze pad in place while you prepare the sample for transport to the laboratory.			C2.1

15	Check the syringe for air bubbles, if any appear, remove them by holding the syringe upright and slowly ejects some of the blood onto a gauze pad.			C2.1
16	Insert the needle into a rubber stopper. (Prevents the sample from leakage and keeps air out of the syringe).			C2.1
17	Put the labeled sample in the ice filled plastic bag			C2.1
	and Attach laboratory request form and send the sample to the laboratory immediately.			C2.1
18	When bleeding stops, apply a small adhesive bandage to the site.			C2.1
19	Record the date, time, name of the test.			C2.1

**Result:**

CLO	Student Performance
C2.1	...../19

**Name and Signature of Evaluator:** .....

#### **4. ASSISTING THE PATIENT UNDERGOING THORACENTESIS**

A thoracentesis (aspiration of fluid or air from the pleural space) is performed on patients with various clinical problems. A diagnostic or therapeutic procedure.

**Indications**

- Removal of fluid and air from the pleural cavity
- Aspiration of pleural fluid for analysis
- Pleural biopsy
- Instillation of medication into the pleural space **Equipment's**
  - ▶ Thoracentesis tray (if available) *or*
  - ▶ Syringes: 5-, 20-, 50-mL
  - ▶ Needles: 22G, 26G, or 16G (3 inches long)
  - ▶ Three-way stopcock and tubing
  - ▶ Hemostat
  - ▶ Biopsy needle
  - ▶ Germicide solution

- ▶ Local anesthetic (such as lidocaine 1%)
- ▶ Sterile gauze pads (4" 4" and 2" 2")
- ▶ Sterile towels and drape
- ▶ Sterile specimen containers
- ▶ Sterile gloves
- ▶ Overhead table and chair

### **Preparatory Phase**

- ▶ Determine in advance if chest X-ray or other tests have been prescribed and completed. These should be available at the bedside.
- ▶ Check if consent form has been explained and signed.
- ▶ Determine if the patient is allergic to the local anesthetic agent to be used. Give sedation if prescribed.
- ▶ Inform the patient about the procedure and indicate how the patient can be helpful. Explain:
  - a. The nature of the procedure.
  - b. The importance of remaining immobile and of not talking or coughing.
  - c. Pressure sensations to be experienced.
  - d. That no discomfort is anticipated after the procedure
- ▶ Assist the patient to obtain comfortable position with adequate supports. If possible, place the patient upright (see accompanying figure) and help the patient maintain this position during the procedure.
- ▶ Support and reassure the patient during the procedure.
  - a. Prepare the patient for sensations of cold from skin germicide and for pressure and sting from infiltration of local anesthetic agent.
  - b. Encourage the patient to refrain from coughing, talking, or moving.
  - c. Be prepared to monitor the patient's condition throughout the procedure

### **Performance Phase**

- ▶ Expose the site to be aspirated. If fluid is in the pleural cavity, the thoracentesis site is determined by study of the chest X-ray and physical findings, with attention to the site of maximal dullness on percussion. If air is in the pleural cavity, the thoracentesis site is usually in the second or third intercostal space in the midclavicular line.
- ▶ Perform hand hygiene and put on personal protective equipment.

- ▶ The procedure is done under aseptic conditions. After the skin is cleaned, the health care provider slowly injects a local anesthetic with a small-gauge needle into the intercostal space
- ▶ Ultrasound or direct physical examination is used to guide needle placement.
- ▶ The thoracentesis needle is advanced with the syringe attached. When the pleural space is reached, suction may be applied with the syringe.
  - a. A 20-mL or 50-mL syringe with a three-way adapter (stopcock) is attached to the needle. (One end of the adapter is attached to the needle and the other to the tubing leading to a receptacle that receives the fluid being aspirated.)
  - b. If a considerable quantity of fluid is to be removed, the needle is held in place on the chest wall with a small hemostat.
  - c. A pleural biopsy may be performed.
- ▶ 6. After the needle is withdrawn, pressure is applied over the puncture site and a small sterile dressing is fixed in place

### **Follow up Phase**

1. Place the patient on bed rest. A chest X-ray is usually obtained after thoracentesis.
2. Record vital signs every 15 minutes for 1 hour.
3. Administer oxygen, as directed, if the patient has cardiorespiratory disease Record the total amount of fluid withdrawn and the nature of the fluid, its color, and viscosity. If prescribed, prepare samples of fluid for laboratory evaluation (usually bacteriology, cell count and differential, determinations of protein, glucose, lactate dehydrogenase, specific gravity).

A small amount of heparin may be needed for several of the specimen containers to prevent coagulation. A specimen container with preservative may be needed if a pleural biopsy is obtained

Evaluate the patient at intervals for increasing respirations, faintness, vertigo, tightness in the chest, uncontrollable cough, blood-tinged mucus, and rapid pulse and signs of hypoxemia.

Encourage deep breaths to expand the lungs

**Assisting Patient undergoing Thoracentesis**

**Name of the student:**

**Date:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	<b>Equipment</b> <ul style="list-style-type: none"> <li>• Sterile thoracentesis set</li> <li>• Sterile dressing pack</li> <li>• Sterile specimen container</li> <li>• Tincture benzoin</li> <li>• Inj. Xylocaine 2%</li> <li>• Disposable needle and syringe</li> <li>• Sterile Gloves</li> <li>• Disposable plastic apron</li> <li>• Mask</li> <li>• Mackintosh</li> <li>• Appropriate antiseptic solution (Betadine)</li> </ul> Under pad / disposable clean pad			C3.1
2	Explain the procedure to the patient			C3.1

3	Tell the patient to empty his / her bladder before the procedure.			C3.1
4	Arrange all the needed articles near the bed side.			C3.1
5	Place the mackintosh under the patient back and hip.			C3.1
6	Assess the respiratory rate and depth, symmetry of chest on inspiration and expiration cough and sputum.			C3.1
7	Place patient in sitting position with head leaning forward on the cardiac table or lateral decubites or supine with head elevated 45°. Select and mark a position on the chest wall for puncture.			C3.1
8	Drape the patient appropriately and expose the chest puncture site.			C3.1
9	Wear sterile gown, gloves, and mask			C3.1
10	Use skin preparation solution to cleanse skin over the proposed puncture site, and drape to define a sterile field			C3.1
	<b>The following procedure will be done by the doctor. The nurse will assist</b>			C3.1
11	Anesthetize the skin over the proposed puncture site with the Xylocaine drawn up in the 5 cc syringe with the attached 25 gauge needle.			C3.1
12	Insert the 18 gauge needle / Trocar through the anesthetized chest wall.			C3.1
13	Connect the 3-way adapter with the trocar and collect the required quantity of pleural fluid in the specimen container.			C3.1
14	If for therapeutic purpose a large volume of fluid has to be drained in the drainage bottle.			C3.1
	<b>Nurse's responsibilities</b>			C3.1
15	Check the vital status of the patient ( BP, Pulse, respiration, Temperature)			C3.1
16	Observe for sudden shortness of breath, tracheal deviation and decreased oxygen saturation.			C3.1
17	Once the thoracentesis is done, simply remove needle from chest wall. Place a small pressure dressing on puncture site. Instruct the patient to remain supine for 2-4 hours			C3.1
18	Remove the mackintosh from the patient side.			C3.1
19	Wash and replace the equipments. Send the specimen to the lab with all patient details.			C3.1

**Result:**

<b>CLO</b>	<b>Student Performance</b>
C3.1	...../19

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**Name and Signature of Evaluator:** .....

## **5. CARE OF THE PATIENT WITH A TRACHEOSTOMY TUBE**

### **Indications**

- ▶ To facilitate weaning from positive pressure ventilation in acute respiratory failure or prolonged ventilation.
- ▶ To secure and clear an airway in the upper respiratory tract where obstruction is a risk.
- ▶ To facilitate the removal of respiratory secretions.
- ▶ To protect/minimise risk of aspiration in the patient with poor or absent cough reflex.
- ▶ To obtain an airway in patients with injuries or surgery to the head and neck area.

### **Other Indications**

- ▶ Improved oral hygiene for the intubated patient
- ▶ Decreased requirement for sedation in the intubated patient

- ▶ Oral movement for communication, nutrition and hydration (with manipulation)
- ▶ Reduction in damage to the larynx, mouth or nose from prolonged endotracheal intubation
- ▶ Vocalisation (with manipulation)
- ▶ Improved patient comfort

### **Equipments**

Assemble the following equipment or obtain a prepackaged tracheostomy care kit:

- ▶ Sterile towel
- ▶ Sterile gauze pads (10)
- ▶ Sterile cotton swabs
- ▶ Sterile gloves
- ▶ Hydrogen peroxide
- ▶ Sterile water
- ▶ Antiseptic solution and ointment (optional)
- ▶ Tracheostomy tie tapes or commercially available tracheostomy securing device
- ▶ Face shield

### **Preparatory Phase**

- ▶ Assess the condition of the stoma before tracheostomy care (redness, swelling, character of secretions, presence of purulence or bleeding).
- ▶ Examine the neck for subcutaneous emphysema **Performance Phase**

1. Suction the trachea and pharynx thoroughly before tracheostomy care
2. Explain the procedure to the patient
3. Wash hands thoroughly
4. Assemble equipment
  - a. Place sterile towel on patient's chest under tracheostomy site.
  - b. Open 4 gauze pads and pour hydrogen peroxide on them.
  - c. Open 2 gauze pads and pour antiseptic solution on them.
  - d. Open 2 gauze pads; keep dry.
  - e. Open 2 gauze pads and pour sterile water on them.
  - f. Place tracheostomy tube tapes on field.
  - g. Put on face shield and sterile gloves.

5. Clean the external end of the tracheostomy tube with 2 gauze pads with hydrogen peroxide; discard pads.
6. Unlock and remove inner cannula, if present.
7. If disposable inner cannula is used, replace with new cannula (with your clean hand), touching only external portion, and lock it securely in place
8. If inner cannula is reusable, remove it with your contaminated hand and clean it in hydrogen peroxide solution, using brush or pipe cleaners with your sterile hand. When clean, drop it into sterile saline solution and agitate it to rinse thoroughly with your sterile hand. Tap it gently to dry it and replace it with your sterile hand.
9. Clean the stoma area with 2 peroxide-soaked gauze pads. Make only a single sweep with each gauze pad before discarding
10. Loosen and remove crust with sterile cotton swabs.
11. Repeat step 9 using the sterile water-soaked gauze pads
12. Repeat step 9 using dry pads.
13. (optional) An infected wound may be cleaned with gauze saturated with an antiseptic solution, then dried. A thin layer of antibiotic ointment may be applied to the stoma with a cotton swab
14. Change the tracheostomy tie tapes:
  - a. Cut soiled tape while holding tube securely with other hand. Use care not to cut the pilot balloon tubing
  - b. Remove old tapes carefully.
  - c. Grasp slit end of clean tape and pull it through opening on side of the tracheostomy tube.
  - d. Pull other end of tape securely through the slit end of the tape.
  - e. Repeat on the other side.
  - f. Tie the tapes at the side of the neck in a square knot. Alternate knot from side to side each time tapes are changed.
  - g. Ties should be tight enough to keep tube securely in the stoma, but loose enough to permit two fingers to fit between the tapes and the neck.
15. Place a gauze pad between the stoma site and the tracheostomy tube per facility policy

### **Follow-up Phase**

1. Document procedure performance, observations of stoma (irritation, redness, edema, subcutaneous air), and character of secretions (color, purulence). Report changes in stoma appearance or secretions.
2. Clean the fresh stoma every 8 hours or more frequently if indicated by accumulation of secretions. Ties should be changed every 24 hours, or more frequently if soiled or wet

### **Care of Patient with a Tracheostomy tube**

**Name of the student:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				

1	<ul style="list-style-type: none"> <li>• Bedside table</li> <li>• Towel</li> <li>• Tracheostomy suction supplies</li> <li>• Sterile tracheostomy care kit, if available (collect supplies not available in kit), or two sterile 4 × 4-inch gauze pads <ul style="list-style-type: none"> <li>○ Sterile cotton-tipped applicators</li> <li>○ Sterile tracheostomy dressing (precut and sewn surgical dressing)</li> <li>○ Sterile basin</li> <li>○ Normal saline solution</li> <li>○ Small sterile brush (or disposable inner cannula) <ul style="list-style-type: none"> <li>○ tracheostomy ties, or tracheostomy holder</li> <li>○ Scissors</li> </ul> </li> </ul> </li> </ul> <p>PPE (gloves, sterile gloves, mask, eye protection, face shield)</p>			C2.1
2	Performed hand hygiene and donned gloves, mask, and eye protection or face shield, as appropriate.			C2.1
3	Removed the soiled dressing from around the stoma and discarded in an appropriate receptacle.			C2.1
4	Observed the skin surrounding the tracheostomy for evidence of irritation or infection.			C2.1
5	Performed hand hygiene.			C2.1
6	Prepared the sterile field on the bedside table and arranged the equipment.			C2.1
7	If the patient's oxygen saturation level was below 90% performed hand hygiene, donned gloves, and hyperoxygenated the patient. If desaturation occurred during the procedure, applied an oxygen source loosely over the tracheostomy. Performed hand hygiene, donned gloves, and positioned the tracheostomy collar, T tube, or ventilator oxygen source loosely over tracheostomy for ease of reattaching if needed.			C2.1
8	Removed gloves.			C2.1
9	Performed hand hygiene and donned sterile gloves. Kept the dominant hand sterile throughout the procedure.			C2.1
10	Cleaned or replaced the inner cannula.			C2.1
11	Cleaned the exposed outer cannula surfaces and stoma under the faceplate.			C2.1

12	Dried the skin and exposed outer cannula surfaces by patting lightly with a dry 4 × 4-inch (10.1 × 10.1-cm) gauze pad.			C2.1
13	Secured the T tube.			C2.1
14	Positioned the patient comfortably and assessed respiratory status.			C2.1
15	Replaced any oxygen delivery sources.			C2.1
16	Assessed, treated, and reassessed pain.			C2.1
17	Discarded supplies, removed PPE, and performed hand hygiene.			C2.1
18	Documented the procedure in the patient's record.			C2.1

**Result:**

CLO	Student Performance
C2.1	...../18

**Name and Signature of Evaluator:** .....

## **6. PERFORMING ENDO TRACHEAL SUCTION**

1. Bring necessary equipment to the bedside stand or over bed table.
2. Perform hand hygiene and put on PPE, if indicated.

3. Identify the patient.
4. Close curtains around bed and close the door to the room, if possible.
5. Determine the need for suctioning. Verify the suction order in the patient's chart. Assess for pain or the potential to cause pain. Administer pain medication, as prescribed, before suctioning.
6. Explain what you are going to do and the reason for doing it to the patient, even if the patient does not appear to be alert. Reassure the patient you will interrupt the procedure if he or she indicates respiratory difficulty.
7. Adjust bed to comfortable working position, usually elbow height of the caregiver (VISN 8 Patient Safety Center, 2009). Lower side rail closest to you. If patient is conscious, place him or her in a semi-Fowler's position. If patient is unconscious, place him or her in the lateral position, facing you. Move the overbed table close to your work area and raise to waist height.
8. Turn suction to appropriate pressure. For a wall unit for an adult: 100–120 mm Hg (Roman, 2005); neonates: 60–80 mm Hg; infants: 80–100 mm Hg; children: 80–100 mm Hg; adolescents: 80–120 mm Hg (Ireton, 2007). For a portable unit for an adult: 10–15 cm Hg; neonates: 6–8 cm Hg; infants 8–10 cm Hg; children 8–10 cm Hg; adolescents: 8–10 cm Hg.
9. Open the package of the closed suction device using aseptic technique. Make sure that the device remains sterile.
10. Put on sterile gloves.
11. Using nondominant hand, disconnect ventilator from endotracheal tube. Place ventilator tubing in a convenient location so that the inside of the tubing remains sterile or continue to hold the tubing in your nondominant hand.
12. Using dominant hand and keeping device sterile, connect the closed suctioning device so that the suctioning catheter is in line with the endotracheal tube.
13. Keeping the inside of the ventilator tubing sterile, attach ventilator tubing to port perpendicular to the endotracheal tube. Attach suction tubing to suction catheter.
14. Pop top off sterile normal saline dosette. Open plug to port by suction catheter and insert saline dosette or syringe.
15. Hyperventilate the patient by using the sigh button on the ventilator before suctioning. Turn safety cap on suction button of catheter so that button is depressed easily.

16. Grasp suction catheter through protective sheath, about 6 inches (15 cm) from the endotracheal tube. Gently insert the catheter into the endotracheal tube. Release the catheter while holding on to the protective sheath. Move hand farther back on catheter. Grasp catheter through sheath and repeat movement, advancing the catheter to the predetermined length. Do not occlude Y-port when inserting the catheter.
17. Apply intermittent suction by depressing the suction button with thumb of non dominant hand. Gently rotate the catheter with thumb and index finger of dominant hand as catheter is being withdrawn. Do not suction for more than 10 to 15 seconds at a time. Hyper oxygenate or hyperventilate with sigh button on ventilator, as ordered.
18. Once catheter is withdrawn back into sheath, depress the suction button while gently squeezing the normal saline dosette until the catheter is clean. Allow at least a 30second to 1-minute interval if additional suctioning is needed. No more than three suction passes should be made per suctioning episode.
19. When procedure is completed, ensure that the catheter is withdrawn into the sheath, and turn the safety button. Remove normal saline dosette and apply cap to port.
20. Suction the oral cavity with a separate single-use, disposable catheter and perform oral hygiene. Remove gloves. Turn off suction.
21. Assist patient to a comfortable position. Raise the bed rail and place the bed in the lowest position.
22. Reassess patient's respiratory status, including respiratory rate, effort, oxygen saturation, and lung sounds.
23. Remove additional PPE, if used. Perform hand hygiene.

### **Endotracheal Suctioning**

**Name of the student:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	

1	<b>Equipment</b> <ul style="list-style-type: none"> <li>• Appropriate size of suction catheters</li> <li>• Sterile water for rinsing catheter.</li> <li>• 0.9% Normal Saline.</li> <li>• Suction apparatus (portable or wall suction) with tubing.</li> <li>• A pair of sterile gloves.</li> <li>• Kidney tray.</li> <li>• Disposable face mask.</li> <li>• Goggles.</li> <li>• Clean gloves.</li> <li>• Disposable apron.</li> <li>• Syringe to instill normal saline.</li> </ul>			C2.1
2	Confirm the patient's identity, explain the procedure, and obtain cooperation.			C2.1
3	Assess the patient to ensure that suction is necessary (including the effectiveness of their cough)			C2.1
4	Collect the needed equipment on a trolley and take to the bed side.			C2.1
5	Assist the patient into an upright position (if possible).			C2.1
6	Check the saturation level (SpO2) of the patient by using pulse oximeter			C2.1
7	Wash hands.			C2.1
8	Put on disposable apron and protective visor/eye wear, according to institutional policy.			C2.1
9	Connect suction catheter to suction tubing and turn suction machine on.			C2.1
10	Use sterile/clean non-sterile glove			C2.1
11	Withdraw suction catheter from sleeve with clean gloved hand and grasp catheter with sterile gloved hand away from catheter tip.			C2.1
12	Advance catheter gently until a cough is stimulated or resistance is felt. Do not apply suction during catheter insertion			C2.1
13	When a cough is initiated or resistance is felt, withdraw the catheter approximately 1 cm and apply suction by occluding suction control port on catheter with thumb. Withdraw gently. Procedure should last no more than 15 seconds.			C2.1
14	Rinse the suction tubing by dipping its end into			C2.1
	the sterile water bottle and applying suction until the solution has rinsed the tubing through.			C2.1

15	Dispose of suction catheter and gloves in clinical waste disposable bin. As per institutional policy			C2.1
16	Clear patient's oral secretions if required.			C2.1
17	wash hands with soap and water			C2.1
18	Record the procedure in the nurse's record.			C2.1

**Result:**

CLO	Student Performance
C2.1	...../18

**Name and Signature of Evaluator:** .....

## **7. PERFORMING NASOTRACHEAL SUCTION**

**Equipment's**

Assemble the following equipment or obtain a prepackaged kit:

- Disposable suction catheter (preferably soft rubber)
- Sterile towel
- Sterile disposable gloves
- Sterile water
- Anesthetic water-soluble lubricant jelly
- Suction source at 80 to 120 mm Hg □ Resuscitation bag with face mask.
- Connect 100% O2 source with flow of 10 L/minute
- Oximeter

**Preparatory Phase**

1. Verify correct patient. Auscultate breath sounds, monitor heart rate, respiratory rate, color, ease of respirations. If the patient is on monitor, continue monitoring heart rate

or arterial BP. Discontinue the suctioning and apply oxygen if heart rate decreases by 20 beats/minute or increases by 40 beats/minute, if BP increases, or if cardiac dysrhythmia is noted

### **Performance Phase**

1. Make sure that the suction apparatus is functional. Place suction tubing within easy reach.
2. Inform and instruct the patient about the procedure.
  - a. At a certain interval, the patient will be requested to cough to open the lung passage so the catheter will go into the lungs and not into the stomach. The patient will also be encouraged to try not to swallow because this will also cause the catheter to enter the stomach.
  - b. The postoperative patient can splint the wound to make the coughing produced by NT suctioning less painful
3. Place the patient in a semi-Fowler's or sitting position if possible.
4. Monitor oxygen saturation via oximetry and heart rate during suctioning.
5. Place a sterile towel across the patient's chest. Squeeze a small amount of sterile anesthetic water-soluble lubricant jelly onto the towel.
6. Open the sterile pack containing curved-tipped suction catheter.
7. Aseptically glove both hands. Designate one hand (usually the dominant one) as "sterile" and the other hand as "contaminated."
8. Grasp the sterile catheter with the sterile hand
9. Lubricate catheter with the anesthetic jelly and pass the catheter into the nostril and back into the pharynx.
10. Pass the catheter into the trachea. To do this, ask the patient to cough or say "ahh." If the patient is incapable of either, try to advance the catheter on inspiration. (Asking the patient to stick out tongue, or hold tongue extended with a gauze pad, may also help to open the airway. If a protracted amount of time is needed to position the catheter in the trachea, stop and oxygenate the patient with face mask or the resuscitation bag-mask unit at intervals. If three attempts to place the catheter are unsuccessful, request assistance.)
11. Specific positioning of catheter for deep bronchial suctioning:
  - a. For left bronchial suctioning, turn the patient's head to the extreme right, chin up.

b. For right bronchial suctioning, turn the patient's head to the extreme left, chin up.

*Note: The value of turning the head as an aid to entering the right or left mainstem bronchi is not accepted by all clinicians*

12. Never apply suction until catheter is in the trachea. Once the correct position is ascertained, apply suction and gently rotate catheter while pulling it slightly upward. Do not remove catheter from the trachea.

13. Disconnect the catheter from the suctioning source after 5 to 10 seconds. Apply oxygen by placing a face mask over the patient's nose, mouth, and catheter, and instruct the patient to breathe deeply.

14. Reconnect the suction source. Repeat as necessary.

15. During the last suction pass, remove the catheter completely while applying suction and rotating the catheter gently. Apply oxygen when the catheter is removed

**Follow up Phase**

1. Dispose of disposable equipment. Auscultate breath sounds.
2. Measure heart rate, BP, respiratory rate, and oxygen saturation. Record the patient's tolerance of procedure, type and amount of secretions removed, and complications.
3. Report any patient intolerance of procedure (changes in vital signs, bleeding, laryngospasm, upper airway noise)

**Nasotracheal Suctioning**

**Name of the student:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				

1	<p><b>Equipment</b></p> <p>Assemble the following equipment or obtain a prepackaged kit:</p> <ul style="list-style-type: none"> <li>• Disposable suction catheter (preferably soft rubber)</li> <li>• Sterile towel</li> <li>• Sterile disposable gloves</li> <li>• Sterile water</li> <li>• Anesthetic water-soluble lubricant jelly</li> </ul> <p>Suction source at 80 to 120 mmHg Resuscitation bag with face mask.</p> <ul style="list-style-type: none"> <li>• Connect 100% O<sub>2</sub> source with flow of 10 L/minute</li> <li>• Oximeter</li> </ul>			C2.1
2	Verify correct patient			C2.1
3	Auscultate breath sounds, monitor heart rate, respiratory rate, color, ease of respirations			C2.1
4	If the patient is on monitor, continue monitoring heart rate or arterial BP			C2.1
<b>Performance</b>				
5	Make sure that the suction apparatus is functional			C2.1
6	Inform and instruct the patient about the procedure			C2.1
7	At a certain interval, the patient will be requested to cough to open the lung passage			C2.1
8	The postoperative patient can splint the wound to make the coughing produced by NT suctioning less painful			C2.1
9	Place the patient in a semi-Fowler's or sitting position if possible			C2.1
10	Monitor oxygen saturation via oximetry and heart rate during suctioning			C2.1
11	Place a sterile towel across the patient's chest. Squeeze a small amount of sterile anesthetic water-soluble lubricant jelly onto the towel			C2.1
12	Open the sterile pack containing curved-tipped suction catheter			C2.1
13	Aseptically glove both hands			C2.1
14	Grasp the sterile catheter with the sterile hand			C2.1
15	Lubricate catheter with the anesthetic jelly and			C2.1
	pass the catheter into the nostril and back into the pharynx			C2.1

16	Pass the catheter into the trachea. To do this, ask the patient to cough or say “ahh.” If the patient is incapable of either, try to advance the catheter on inspiration			C2.1
17	Specific positioning of catheter for deep bronchial suctioning: a. For left bronchial suctioning, turn the patient’s head to the extreme right, chin up. b. For right bronchial suctioning, turn the patient’s head to the extreme left, chin up			C2.1
18	Never apply suction until catheter is in the trachea. Once the correct position is ascertained, apply suction and gently rotate catheter while pulling it slightly upward			C2.1
19	Do not remove catheter from the trachea			C2.1
20	Disconnect the catheter from the suctioning source after 5 to 10 seconds			C2.1
21	Apply oxygen by placing a face mask over the patient’s nose, mouth, and catheter, and instruct the patient to breathe deeply			C2.1
22	Reconnect the suction source. Repeat as necessary			C2.1
23	During the last suction pass, remove the catheter completely while applying suction and rotating the catheter gently			C2.1
24	Apply oxygen when the catheter is removed			C2.1
<b>Follow up Phase</b>				
25	Dispose of disposable equipment. Auscultate breath sounds			C2.1
26	Record the procedure in the nurse’s record.			C2.1
27	Report any patient intolerance of procedure			C2.1

**Result:**

CLO	Student Performance
C2.1	...../27

**Name and Signature of Evaluator:** .....

## 8. INTRACRANIAL PRESSURE MONITORING

### Definition:-

Intracranial monitoring, including ICP monitoring, is a technology that helps the nurse assess, plan, intervene, and evaluate patient responses to care. ICP monitoring is widely used.

1. Intraventricular catheter inserted into lateral ventricle (right is preferred) through a drilled burr hole opening; connected to fluid-filled transducer, which converts mechanical pressure to electrical impulses and waveform; allows ventricular drainage.
2. Subarachnoid (bolt) hollow screw inserted into SAS beneath skull and dura through drill hole; also connected to pressure transducer system.
3. Epidural sensor inserted beneath skull but not through dura, so does not measure pressure directly; fiber-optic cable is connected directly to monitor.
4. Parenchymal device is inserted directly into brain tissue.

### ICP Waveforms

1. ICP fluctuates, creating three distinct waveforms.
  - a. Plateau or A waves are characterized by rapid increases and decreases of pressure with recurring elevations of 15 to 50 mm Hg or higher and may last 2 to 15 minutes. Clinically significant as elevation in ICP is related to compromise in autoregulation secondary to increased cerebral blood volume and decreased cerebral blood flow. Commonly associated with compromise in neurologic function.
  - b. B waves are of shorter duration and smaller amplitude than A waves and are not clinically significant unless they occur frequently; then they may precede A waves.
  - c. C waves are small, rhythmic oscillations that are not clinically significant but fluctuate with changes in BP.

### 2. Other Monitoring Systems

LICOX Monitoring System—placed in the brain tissue through a burr hole and monitors brain tissue partial pressure of oxygen (PbtO<sub>2</sub>), cerebral temperature, and indirect ICP. Continual monitoring of the cerebral temperature and oxygenation levels

provides direct information on the acute changes in the intracranial tissue that can potentiate secondary brain injury.

1. Microdialysis—catheter is placed into the brain tissue through a burr hole for monitoring of cerebral oxygen, glucose, lactate, lactate-pyruvate, glutamate, and glycerol. The catheter is connected to a 2.5-ml syringe and into a microinfusion pump. The pump is perfused with Ringer's solution. Samples are obtained periodically for analysis.
2. Jugular venous oximetry—A fiber-optic oximetric catheter is placed into the jugular bulb of the internal jugular vein for measurement of jugular venous oxygen saturation (SjvO<sub>2</sub>). SjvO<sub>2</sub> is helpful in evaluating arterial saturation, cerebral metabolic rate for oxygen, and cerebral blood flow. The normal range is between 54% and 75%. A low SjvO<sub>2</sub> is suggestive of increased brain extraction of oxygen related to systemic arterial hypoxia, decreased cerebral blood flow from hypotension or vasospasm, or an elevated ICP with a low CPP. Desaturation is thought to be associated with ischemic events and directly related to increased morbidity.

### **Nursing Interventions**

1. Note the pattern of waveforms and any sustained elevation of pressure above 15 mm Hg.
2. Avoid overstimulation of the patient.
  - a. Note the stimuli that cause increased pressure, such as bathing, suctioning, repositioning, or visitors. Adjust care as indicated.
  - b. Premedicate as indicated.
  - c. Provide rest periods between periods of care.
  - d. Limit visitors as status indicates.
  - e. Limit unnecessary conversation at patient's bedside.
  - f. Eliminate external environmental stimuli. Close doors, turn off suction equipment when not in use, limit television or radio as status indicates.
3. Watch for developing or increasing frequency of plateau wave

## **INTRACRANIAL PRESSURE MONITORING**

**Name of the student:**

**Date:**

**Id No:**

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	<b>Equipments</b> <ul style="list-style-type: none"> <li>➤ Sterile gloves, mask, and surgical cap</li> <li>➤ Monitoring system (intraventricular, subarachnoid, epidural)</li> <li>➤ I.V. pole or stand on which to mount the system</li> <li>➤ I.V. solutions as ordered</li> <li>➤ I.V. high-pressure tubing</li> <li>➤ Burr hole tray for insertion or as needed</li> <li>➤ Topical anesthetic</li> <li>➤ Vital sign records</li> </ul>			C3.1
<b>Procedure</b>				
2	Explain the need for extensive, continuous assessment and appropriate nursing intervention to the family and patient, if possible.			C3.1
3	Gather and assemble equipment. Flush lines with ordered solution according to manufacturer's directions			C3.1
4	Calibrate equipment according to directions.			C3.1
5	Perform neurologic assessment			C3.1
6	Administer light sedation or analgesia if patient is agitated			C3.1
7	Performance phase Establish head of bed at 30 degrees			C3.1
8	Don mask and surgical cap			C3.1
9	Shave and cleanse the operative site			C3.1
10	Establish the sterile field			C3.1
11	Assist with burr hole and placement of intracranial monitoring system.			C3.1
12	Connect monitoring catheter to transducer/monitoring equipment according to directions.			C3.1
13	Observe numeric readings and wave patterns. Adjust characteristics to obtain optimal visual reading.			C3.1
14	Cover the catheter insertion site with a sterile dressing. Observe for possible cerebrospinal fluid (CSF) drainage depending on the placement of the catheter.			C3.1

15	Adjust alarm system according to ordered parameters			C3.1
<b>Follow up Phase</b>				
16	Frequently assess the patient and the system to ascertain neurologic status, assessing ICP and CPP, and patency of the system.			C3.1
17	Irrigate the system using sterile technique according to policy or as needed to maintain patency			C3.1
18	Report dampened waveforms, and have 1 ml of normal saline (without preservatives) available for irrigation if indicated			C3.1
19	Assess head dressing for CSF drainage. Change dressing according to facility policy.			C3.1
20	Adjust the height of the transducer of the system to the level of the patient's ventricles (inner canthus of eye and tip of ear) with every position change for accurate readings and per orders.			C3.1

**Result:**

CLO	Student Performance
C3.1	...../20

**Name and Signature of Evaluator:** .....

## 9. ASSISTING WITH PERCUTANEOUS LIVER BIOPSY

### Definition

Liver Biopsy is the removal of small sample of tissue from the liver.

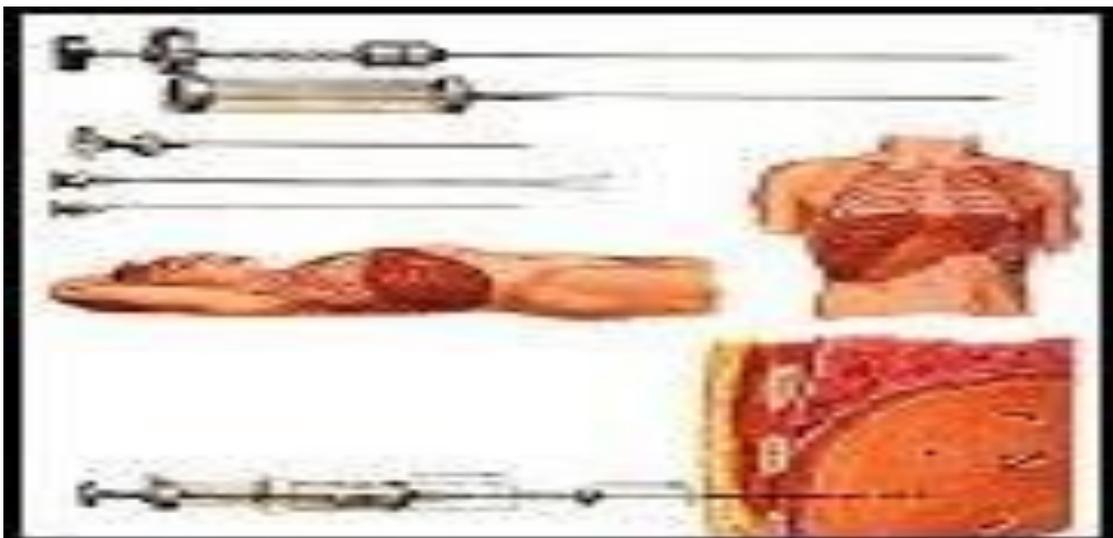
### METHODS

- ⊙ Percutaneous needle biopsy
  - ⊙ Laparoscopic or Open surgical biopsy
- #### Indications
- ⊙ Investigation of suspected diffuse liver disease
  - ⊙ Investigation of focal liver disease eg: hepatoblastoma, sarcoma
  - ⊙ Management of liver transplant
- #### Contraindications
- ⊙ A patient who is too unstable or critically ill to undergo this procedure
  - ⊙ Significant coagulopathy
  - ⊙ Significant thrombocytopenia
  - ⊙ Ascites

### Preoperative preparation

- ⊙ Explain the procedure to the patient and obtain consent
- ⊙ Instruct to maintain 6 hours fasting
- ⊙ Check the coagulation studies and blood sugar levels (Prothrombin time activated Partial thrombo plastin time, CBC, platelets)
- ⊙ Administer premedication if ordered

### Liver Biopsy needles



### Post-procedure care

- ⊙ Check vital signs every 15 min for first two hours
- ⊙ Every 30 min for 2 hours thereafter

- ⦿ Hourly thereafter until 8 hours post biopsy
- ⦿ Any rise in PR and fall in BP or respiratory distress should be notified immediately.

- ⦿ Observe the site for any signs of bleeding
- ⦿ IV fluids must be administered for the 24 hours period of post biopsy.
- ⦿ Patient must be on bed rest for 8 hours **Complications**
- ⦿ Intraperitoneal Haemorrhage
- ⦿ Biliary peritonitis
- ⦿ Injury to the duodenum, colon or lung

### ASSISTING WITH LIVER BIOPSY

**Name of the student:**

**Date:**

**Id No:**

S.No	Procedure	Performed	CLO
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		Yes	No	
<b>Preparation</b>				
1	<b>Equipments</b> <ul style="list-style-type: none"> <li>• PPE (sterile gloves, caps, masks with eye shield, and gowns)</li> <li>• Sterile drapes</li> <li>• Sterile gauze pads</li> <li>• Povidone-iodine</li> <li>• Fenestrated drape</li> <li>• 1% to 2% lidocaine (without epinephrine)</li> <li>• 3- to 5-ml syringe</li> <li>• 20-, 22-, and 25-gauge needles</li> <li>• Vims silvermans liver biopsy needle / split needle</li> <li>• Sterile specimen container with normal saline</li> <li>• Adhesive strip or sterile dressing supplies</li> <li>• Specimen labels</li> <li>• Laboratory forms or electronic order entry</li> </ul>			C3.1
2	Explain the procedure to the patient. Obtain informed consent from the patient.			C3.1
3	Make sure whether the patient has completed 6 hours fasting.			C3.1
4	Obtain and check the coagulation studies and blood glucose levels.			C3.1
5	Arrange all the needed articles near the bed side.			C3.1
6	Tell the patient to empty his / her bladder before the procedure.			C3.1
7	Obtain a premedication order and give sedation.			C3.1
8	Place the patient in a supine position.			C3.1
9	Use skin preparation solution to cleanse skin over the liver biopsy site, and drape to define a sterile field.			C3.1
10	Wear sterile gown, gloves, and mask			C3.1
<b>The procedure will be done by the doctor. The nurse will assist</b>				
11	Anesthetize the skin over the proposed biopsy site with the Xylocaine drawn up in the 5 cc syringe with the attached 25 gauge needle.			C3.1
12	Ask the patient to hold the breath and insert the liver biopsy needle through the anesthetized abdominal wall.			C3.1
13	Biopsy is taken as per the requirement.			C3.1
14	Once the biopsy is taken, place it in the			C3.1

	appropriate medium. Normally it is a very small amount of sterile normal saline in a sterile specimen container.			C3.1
15	<b>Nurse's responsibilities</b> Check the vital status of the patient ( BP, Pulse, respiration, Temperature)			C3.1
16	Once the biopsy is done, simply remove needle from abdominal wall. Place a several layers of pressure dressing on puncture site. Instruct the patient to roll onto the Right side and advise him to remain in the same position for 1-2 hours to prevent bleeding and bile leakage complications.			C3.1
17	Remove the mackintosh from the patient side.			C3.1
18	Wash and replace the equipments.			C3.1
19	Send the specimen to the lab with all patient details.			C3.1
20	Document the procedure and patient parameters (during and after the procedure) in the nurse's record.			C3.1

**Result:**

CLO	Student Performance
C3.1	...../20

**Name and Signature of Evaluator:** .....

## 10. ASSISTING WITH PARACENTESIS

**Definition:** Aspiration of fluid from peritoneal cavity through a needle, trocar or cannula inserted into the abdominal wall. The procedure must be performed cautiously in pregnant woman and in those with bleeding tendencies or unstable vital signs

### Purposes

1. To obtain the specimen of peritoneal fluid for bacteriological/cytological examinations.
2. To administer drugs e.g. cytotoxic drugs.
3. To relieve abdominal pressure in ascites.
4. Check for certain types of cancer, such as liver cancer.

### Equipments

Measuring tape

Sterile gloves

Gown

Clean gloves

Goggles

Linen

Four vacutainer laboratory tubes

Two large glass vacutainer bottles (1000 ml or larger)

Dry,sterile pressure dressing

Laboratory request forms

Povidone-iodine solution

Local anesthetic (multidose vial of 1% or 2% lidocaine with epinephrine)

4” \* 4” sterile gauze pads

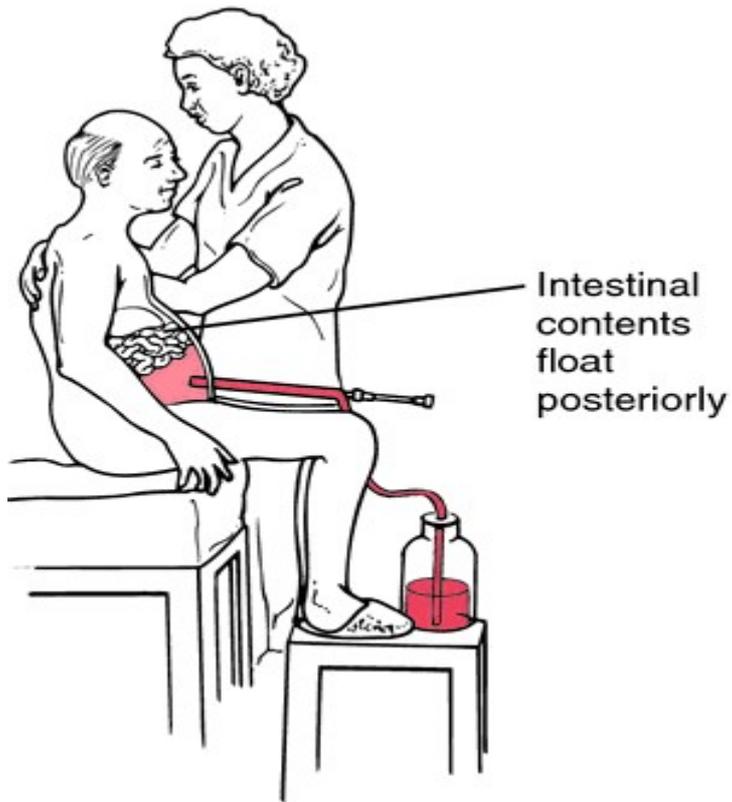
Sterile paracentesis tray ( containing needle,trocar,cannula,three way stopcock)

Disposable sterile drapes

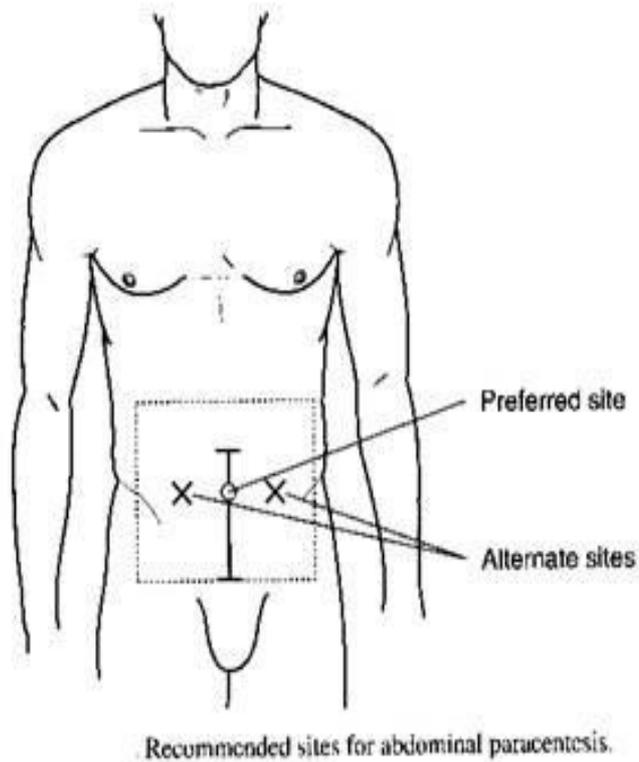
Marking pen

5 ml syringe with 22 G or 25 G needle

Position



Sites



]

**Pre-procedure nursing interventions:**

1. Check for signed consent form.
2. Prepare the patient by providing the necessary information and instructions and by offering reassurance.
3. Instruct the patient to void.
4. Gather appropriate sterile equipments and collection receptacles.
5. Place the patient in upright position on the edge of the bed or in a chair with feet supported on a stool. Fowlers position should be used by the patient confined to bed.
6. Place the sphygmomanometer cuff around patients arm **Procedure:**

The physician using aseptic technique inserts the trocar through a puncture below the umbilicus. The trocar or needle is connected to the drainage tube, the end of which is inserted into a collecting receptable.

Help the patient maintain position throughout the procedure.

When the procedure ends and the doctor removes the needle or trocar and cannula, he may suture the incision. Wearing sterile gloves apply the dry, sterile pressure dressing and povidone-iodine ointment to the site. Help the patient assume a comfortable position.

### **Post-Procedure**

1. Return the patient to bed or to a comfortable sitting position.
2. Measure, describe and record the fluid collected.
3. Label samples of fluid and send to laboratory.
4. Monitor vital signs every 15 min for 1 hr, every hr for 2 hr, and then every 4 hr.
5. Measure the patient's temperature.
6. Assess for hypovolemia, electrolyte shifts changes in mental status, and encephalopathy.
7. When taking vital signs, check puncture site for leakage or bleeding.
8. Provide patient teaching regarding need to monitor for bleeding or excessive drainage from puncture site, importance of avoiding heavy lifting or straining, the need to change position slowly, and frequency of monitoring for fever.

### **DOCUMENTATION**

Record the date and time of the procedure, the puncture site, location and whether the wound was sutured.

Document the amount of colour , viscosity and odour of aspirated fluid in your notes and in the fluid intake and output record.

Record the patients vital signs, weight & abdominal girth measurement before and after the procedure.

Note the patients tolerance of the procedure vital signs and any signs and symptoms of complication during the procedure. Document the number of specimens sent to the laboratory

### **Complications**

Hypotension

Oliguria

Hyponatremia

## ASSISTING WITH PARACENTESIS

Name of the student:

Date:

Id No:

S.No	Procedure	Performed		CLO
		Yes	No	
<b>Preparation</b>				
1	<p><b>Equipments</b></p> <ul style="list-style-type: none"> <li>• 5- or 10-ml syringe with 25-G needle for anesthetic</li> <li>• 8-Fr catheter over an 18-G needle with a three-way stopcock, self-sealing valve, and 5-ml Luer-Lok™ syringe</li> <li>• Paracentesis needle</li> <li>• 20 to 60-ml syringe for obtaining a diagnostic sample</li> <li>• Four sterile tubes for specimens</li> <li>• Four to six sterile 4 × 4-inch (10.1 × 10.1cm) gauze pads</li> <li>• PPE (gloves, gown, mask, eye protection)</li> <li>• Local anesthetic for injection: 1% or 2% lidocaine with epinephrine</li> <li>• Mayo scissors and straight scissors</li> <li>• Nylon skin suture material on cutting needle (4-0 or 5-0) and needle holder</li> <li>• Ostomy bag</li> <li>• Scalpel and No. 11 knife blade</li> <li>• Skin cleansing solution (e.g., povidoneiodine, chlorhexidine)</li> <li>• Sterile 1-L collection bottles with connecting tubing</li> <li>• Sterile gauze dressing with tape or adhesive strip</li> <li>• Sterile gloves</li> <li>• Sterile marking pen</li> <li>• Sterile towels or sterile drape</li> </ul>			C3.1
2	Explain the procedure to the patient			C3.1
3	Before starting the procedure, Check whether the patient is on anticoagulant therapy.			C3.1
4	Arrange all the needed articles near the bed side.			C3.1
5	Tell the patient to empty his / her bladder before the procedure.			C3.1
6	Place the mackintosh under the patient back and hip.			C3.1
7	Check abdominal girth and weigh patient before and after the procedure and record.			C3.1

8	Place patient in supine position, with head elevated 20-30°. Select and mark a position on the abdominal wall for puncture			C3.1
9	Drape the patient appropriately and expose the abdomen puncture site.			C3.1
10	Wear sterile gown, gloves, and mask			C3.1
11	Use skin preparation solution to cleanse skin over the proposed puncture site, and drape to define a sterile field			C3.1
<b>The following procedure will be done by the doctor. The nurse will assist</b>				
12	Anesthetize the skin over the proposed puncture site with the Xylocaine drawn up in the 5 cc syringe with the attached 25 gauge needle. Anesthetize down to the peritoneum. Aspirate periodically; if ascitic fluid returns, withdraw the needle slightly to re-enter tissue before further anesthetic is infiltrated			C3.1
13	Insert the 18 gauge needle / Trocar perpendicularly through the anesthetized abdominal wall, and advance until hub of needle is 5mm-1cm from the skin surface.			C3.1
14	Ascitic fluid is collected (20 – 200ml as per the requirement therapeutic/diagnostic purpose/ both).			C3.1
15	Once the fluid is withdrawn, collect in appropriate labeled specimen container			C3.1
16	If for therapeutic purpose a large volume of fluid has to be drained in the drainage bottle.			C3.1
<b>Nurse's responsibilities</b>				
17	Check the vital status of the patient ( BP, Pulse, respiration, Temperature)			C3.1
18	To change vacuum bottles as they become full, close the clamp on the tubing gently, and remove full bottle, and re-insert into empty bottle. Reopen clamp to start fluid flowing again			C3.1
19	Once the paracentesis is done, simply remove needle from abdominal wall. Place a small pressure dressing on puncture site. Instruct the patient to remain supine for 2-4 hours			C3.1
20	Remove the mackintosh from the patient side.			C3.1
21	Wash and replace the equipments.			C3.1
22	Send the specimen to the lab with all patient details.			C3.1

23	Document the procedure and patient parameters (during and after the procedure) in the nurse's record.			C3.1
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**Result:**

CLO	Student Performance
C3.1	...../23

**Name and Signature of Evaluator:** .....