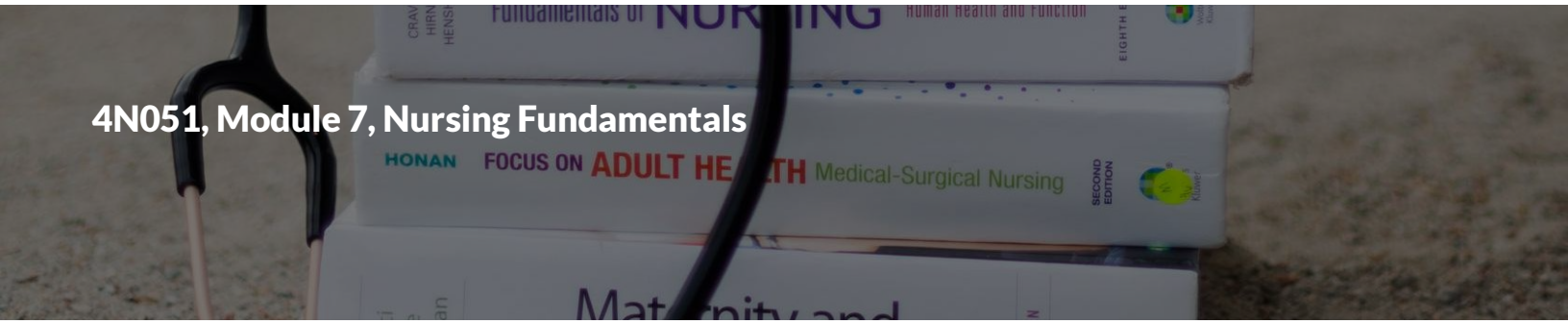


4N051, Module 7, Nursing Fundamentals

- Lesson 1- Infection Control
- Lesson 2- Medical Examinations and Special Procedures
- Lesson 3- Nutrition and Elimination Procedures
- Lesson 4- Measure and Record Parameters
- Lesson 5- Speciman Collection
- Lesson 6- Cardiovascular Procedures
- Lesson 7- Pulmonary Procedures
- Lesson 8- Musculoskeletal Procedures
- Lesson 9- Pre & Post Operative Procedures
- Lesson 10- Patient Transfer Techniques

Lesson 1- Infection Control

After completing this lesson, the student will be able to apply infection control procedures in accordance with prescribed guidance and publications.

High Level Disinfection/Prepare Supplies for Sterilization

In order to determine the proper level of cleaning or preparing items for sterilization, it all depends on the intended use of the medical equipment. Items that are categorized as critical, equipment that comes into contact with skin and tissue, will need to be sterilized. If categorized as semi critical, equipment that comes into contact with mucous membranes, will need high level disinfection, and equipment that is noninvasive which is categorized as non-critical, will just need to be cleaned. However, before an item is either sterilized or needs high level disinfection, prior cleaning needs to be done.

NON-CRITICAL EQUIPMENT | SEMI-CRITICAL EQUIPMENT | CRITICAL EQUIPMENT

Examples of non-critical equipment are blood pressure cuffs, beds and bed rails, monitors, stethoscopes, linen, floors, countertops and wheelchairs. These items will come into contact with a patient's skin and have risk of transmitting diseases.
These types of items will require low-level disinfection or proper cleaning techniques.

NON-CRITICAL EQUIPMENT | SEMI-CRITICAL EQUIPMENT | CRITICAL EQUIPMENT

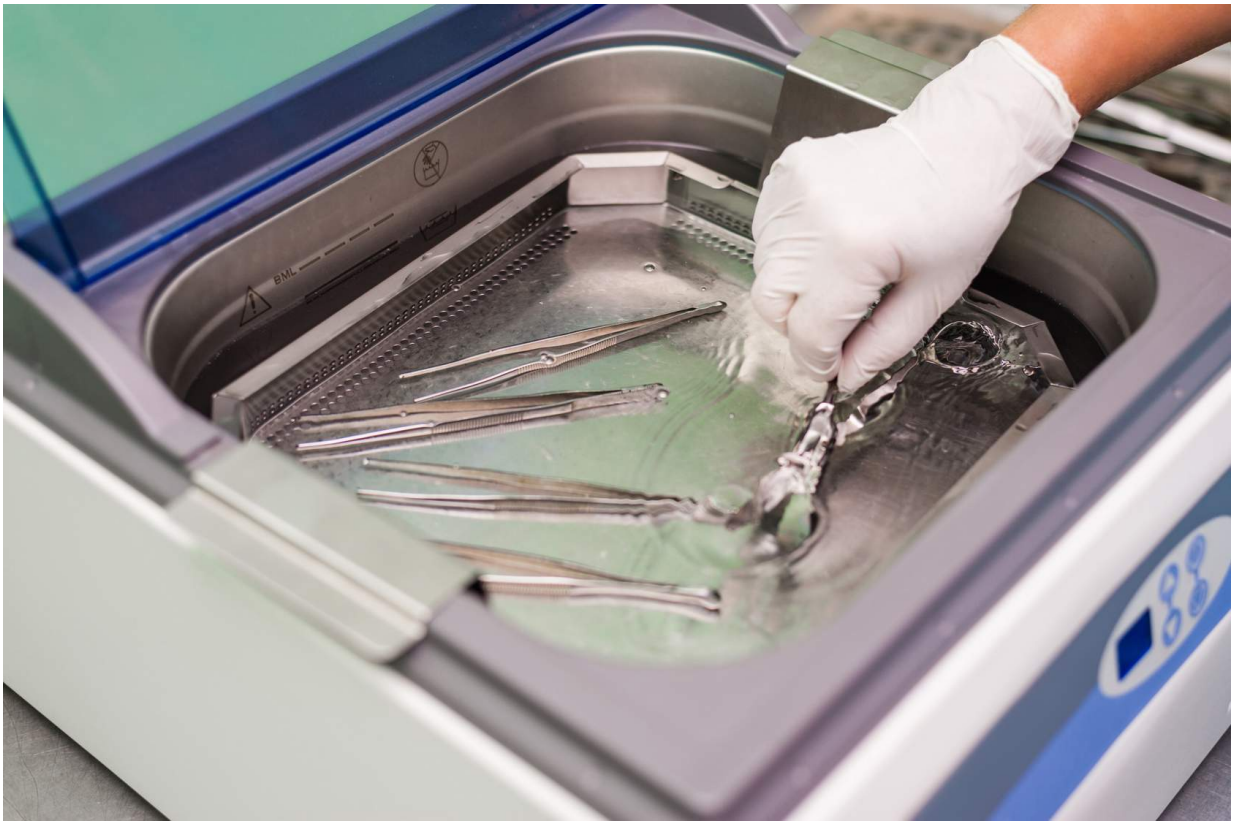
Equipment that is deemed semi-critical are items that come into contact with patient's mucous membranes. Items include, rectal and vaginal probes, intubation equipment, endotracheal scopes, prostate biopsy probes, bronchoscopes, and gastrointestinal scopes.

Because these items have been categorized as semi-critical, they should be free of any bacteria, fungi, spores or viruses. In order to ensure proper cleanliness of the equipment high level disinfection is required. Keep in mind that these items should properly be cleaned and free of all tissue, debris and mucous prior to disinfection.

NON-CRITICAL EQUIPMENT | SEMI-CRITICAL EQUIPMENT | CRITICAL EQUIPMENT

Equipment that is categorized as critical have a high risk of transmitting diseases or infections and must be completely sterile. These items consist of surgical equipment, implants and either heart or urinary catheters. Probes used in vascular procedures or in body cavities will also be classified as critical.

Because these items come into contact with sterile bodily tissues and cavities, they need to be properly cleaned and then processed for sterilization. Proper training is required to ensure equipment has been sterilized and free of any bacteria, spores, viruses and fungi. Once sterilized, all medical equipment will be documented, packaged and stored properly to ensure and validate that equipment is sterile prior to use.



Cleaning

To ensure equipment is free of any tissue or foreign material, items need to be cleaned using water and the proper detergent recommended by the instruction manual. Thorough cleaning is required prior to high level disinfection and sterilization since material could be “baked on” or could interfere with the functionality of the item. Surgical equipment should be presoaked, this will help soften and loosen any tissue or blood still on the item.

If mechanical equipment is not used to help assist with cleaning, items will be cleaned manually. Scrubbing with a brush or rag is the preferred method as this will ensure all foreign material and debris has been removed. Equipment like scissors or forceps should be opened fully to allow proper cleaning. Assess the items to ensure they have been cleaned appropriately.

High Level Disinfection and Sterilization

Since surgical equipment has become more complex, the expectation and determination of cleanliness is constantly under scrutiny. Discussions are re-occurring in determining whether local reprocessing areas are just as effective as central sterile supply processing areas for high level disinfection. There are advantages to both areas, the personnel in central supply are thoroughly trained and use equipment that has been validated to ensure equipment has been processed properly and ready for use by certified technicians. With local processing, equipment processing is faster for turnover and fewer equipment items are lost.

Endoscopes are essential for the physician to diagnose many medical conditions; however, outbreaks have been identified and traced back to contaminated endoscopes, which is why high-level disinfection is so important to destroy all microorganisms. This will help stop the spread of healthcare associated infections.

There are constant improvements to the technology and processes of sterilization. Currently some technologies that include self-disinfecting processes which utilize heavy metals and cleaning solutions. Surgical trays consist of complex configurations and intricate equipment that causes extended sterilization cycles, and potentially exceed the weight limit. But when equipment is properly cleaned and either sterilized or disinfected, healthcare facilities can ensure all equipment is deemed safe for patient care. Strict guidance and adherence help prevent transmissions of infectious diseases and exposure to agents.

Multiple Response

What is an example of a piece of non-critical equipment? Mark all that apply.

- [ ] Stethoscopes
- [ ] Intubation equipment
- [ ] Blood pressure cuffs
- [ ] Bronchoscopes

SUBMIT

Complete the content above before moving on.

Disposing Contaminated Material

Waste Management Fundamentals - The fundamentals of waste management are the techniques and physical barriers that block disease transmission. The way the different techniques are used remains constant, but the need for the different techniques varies with each type of infection.

Bagging Procedures - Used articles may need to be enclosed in a bag before they are removed from an isolation unit. Since these articles are probably contaminated, they are bagged or placed in a container to prevent contamination of the general environment and other people. If there is no possibility an item is contaminated, it may be removed without bagging. A single bag is adequate if the bag is sturdy and the article can be placed in the bag without contaminating the outside of the bag. If there is any doubt, the article should be double bagged. In any case, the bag should be sealed, labeled appropriately, and disposed of promptly.

You learned the double-bagging technique in tech school, but let's refresh your memory. This procedure requires two technicians—one inside the isolation unit and one outside. The technician in the unit places contaminated items in a bag and seals it tightly. The technician inside the room then takes the bag to the door where another technician is standing outside the room. The technician outside should be holding another impervious bag open with their hands under a cuff made by rolling back the top of the bag. The technician inside the isolation room then places the bag containing contaminated items into the other bag, being careful not to touch the outside. The technician on the outside of the room seals and labels the bag and disposes of it promptly.

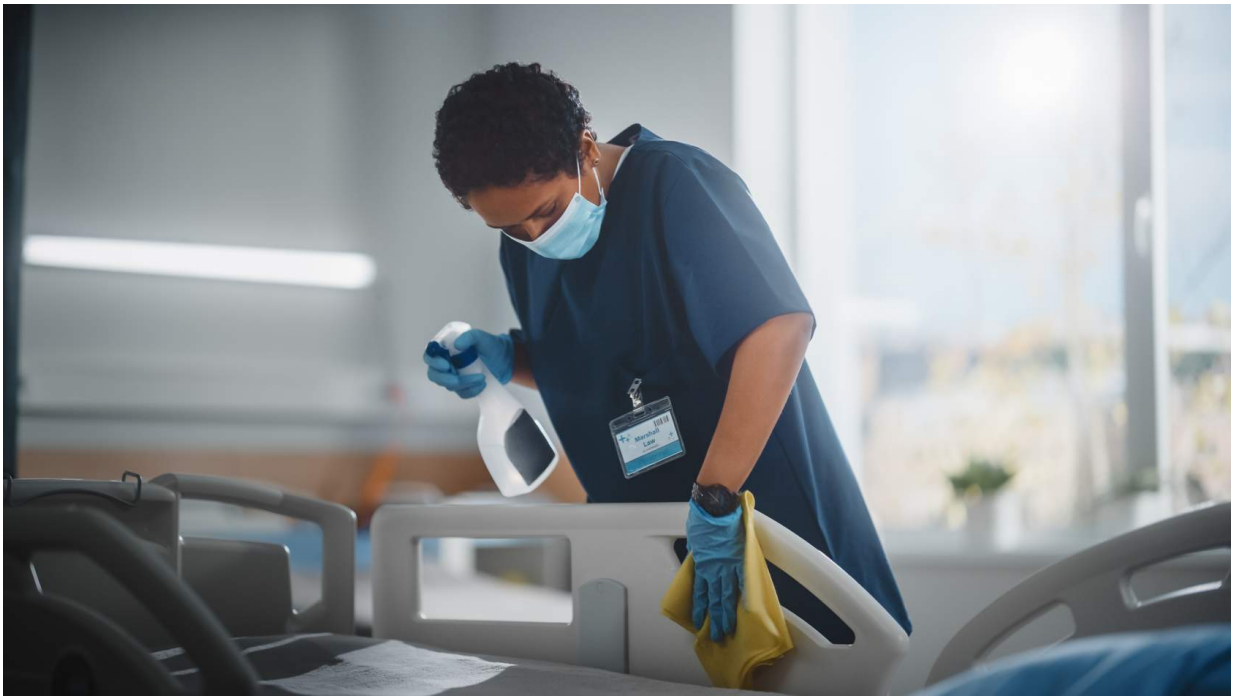
Infectious Waste

Any waste that poses a threat to either the patient or hospital staff needs to be properly packaged and disposed of. Infectious waste must be properly marked or identified as biohazardous. Accrediting agencies require that all material be placed in red bags labeled bio-hazard. Bio-hazard bags may require to be placed in a stronger secondary container to ensure the integrity of the bag. Bio-hazardous material typically requires that it be sent to another location for proper disposal.

CONTINUE

Clean Patient Unit

Unfortunately, you cannot always rely on the availability of housekeeping personnel to clean and maintain the isolation units. If they are not there, guess who gets to do it? Right! You do! Cleaning may be either routine or terminal. Routine cleaning is done every day. It is usually performed the same as in other areas of the hospital (wiping up spills, bed rails, all horizontal surfaces, etc.). If the patient's disease is such that they require a private room, cleaning equipment should be conducted using an approved disinfectant before going to another room (discard water; launder and dry mop heads and cloths; disinfect buckets; etc.). If the cleaning cloths and mop heads are grossly contaminated, bag and label them appropriately before sending them to be laundered.



Prior to cleaning, conduct a visual assessment of the area that needs to be cleaned. Ensure that you are wearing the appropriate personal protective equipment (PPE) and have gathered all the supplies needed to move or adjust any possible obstacles. Once all the surfaces have dried, you can reuse the equipment and use the room.

TERMINAL CLEANING | REGULAR CLEANING

This type of cleaning is directed primarily toward objects the patient has actually been in contact with (e.g., the patient is unlikely to come in contact with the ceiling so you do not have to worry much about cleaning it). Prepare fresh disinfectant or detergent solution for terminal cleaning. The solution you use is selected by your local infection control committee according to Environmental Protection Agency (EPA) standards. Use the same protective precautions (gowns, mask, gloves, etc.) used when the patient was in the room. Clean (as necessary), bag, and label any reusable items (bedpans, instruments, etc.), and send them to central supply (CS) for disinfection and processing.

Discard disposable items. If these items are contaminated, bag, label, and dispose of them according to your infection control committee's guidelines. Clean any equipment that was not sent to CS or discarded with the appropriate disinfectant-detergent solution. This would include all horizontal surfaces of furniture, mattress covers, and floors. Wash walls, blinds, and curtains only if they are visibly contaminated. (NOTE: Do not worry about using disinfectant fogging or airing the room; the former is ineffective and the latter is unnecessary.) Once all the surfaces have dried, you can resupply and use the room.

Examples of Terminal Cleaning – Same scenarios as regular cleaning but may be required to wear N95 mask. Room might be designated as a negative pressure room or an isolation room which is indicated by placards or signs.

TERMINAL CLEANING | REGULAR CLEANING

Examples of Regular Cleaning:

- High touched/frequency contaminated (Ensure individual has all appropriate PPE – gown, gloves, googles, and mask).
- Handrails, bedrails, call lights, light switches, countertops, medical equipment, bedside tables, intravenous (IV) poles, patient monitors, patient bathrooms, patient care floors, and transport equipment.
- Any spill, blood or body fluids.

Multiple Choice

What type of cleaning would you use for handrails, bedrails, call lights, and light switches??

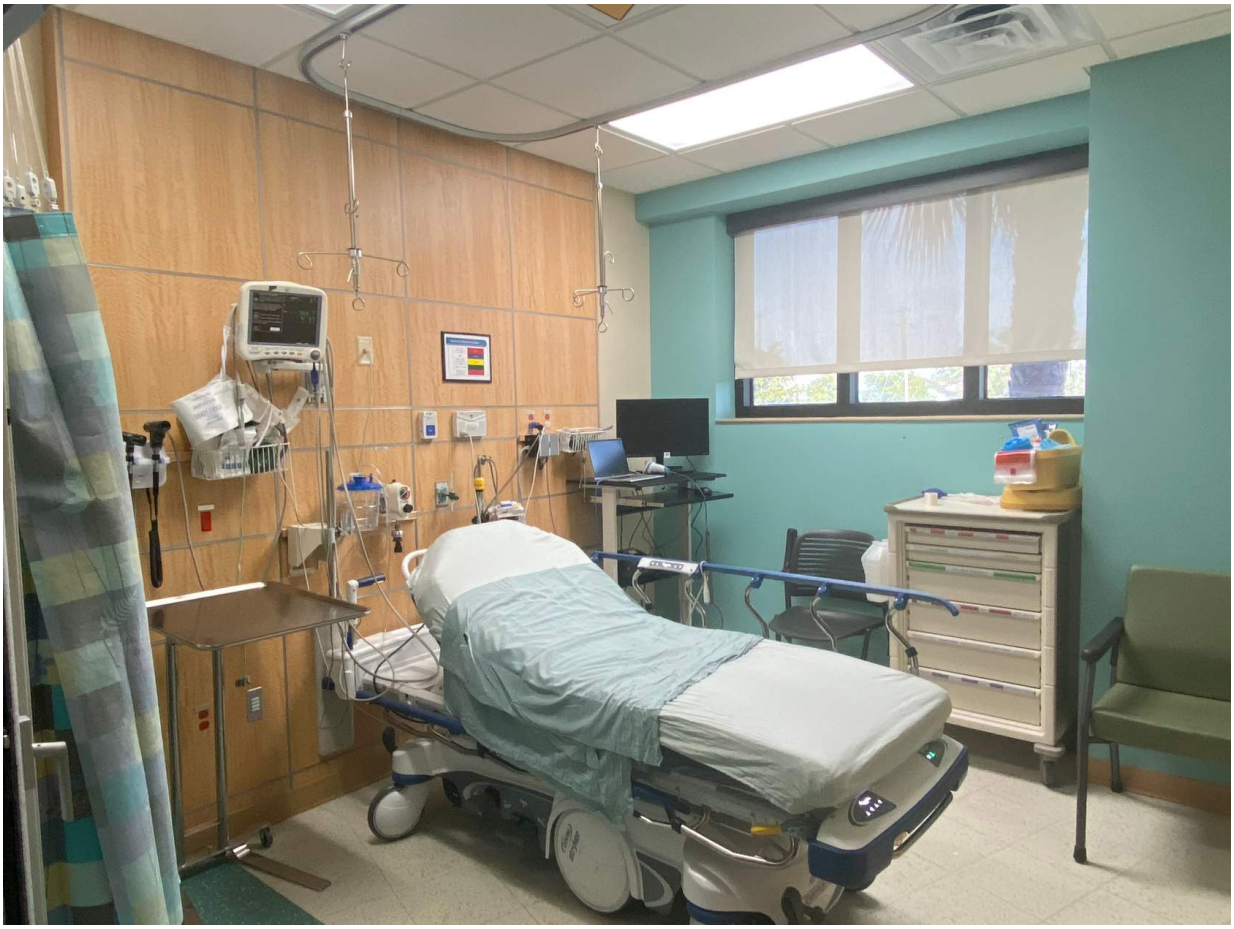
- ◯ Terminal
- ◯ Regular
- ◯ Disease
- ◯ Transitional

SUBMIT

Complete the content above before moving on.

Perform Isolation Precautions

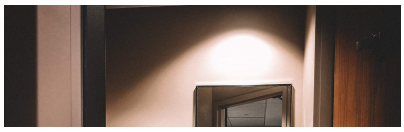
Isolation Precautions - The physical barriers of isolation fundamentals include the unit itself, masks, gowns, gloves, equipment, linen, trays, and the patient's personal belongings.



Patient Unit

The most effective type of isolation unit is a private room. Here, the patient is physically separated from other patients and personnel are more apt to remember to wash their hands, etc., before going on to the other patients. A private room is not a requirement, but should be used for patients who are affected by highly infectious or virulent disorders. It should also be used for patients who have poor hygiene habits and will likely contaminate the environment, or who share contaminated items (e.g., pediatric or confused patients). In addition, patients who have clinically significant microorganisms (resistant bacteria) or infectious blood disorders will be placed in a private room.

Private rooms should be equipped with handwashing, toilet, and bathing facilities. An anteroom (waiting room) is useful for storage and creating a space barrier to prevent airborne transmission, but is not essential. The room should also have a trash container lined with an impervious bag and a linen hamper. In some instances (e.g., patients with infectious airborne pathogens), a room with negative pressure ventilation is recommended. This ventilation creates a pressure difference between the room and the outside so that air is drawn into the room rather than expelled when the door is opened. This system should provide at least six air changes per hour and should be discharged outdoors.



As an alternative to an anteroom, you can place an isolation cart just outside the door to the isolation unit. This cart should have all the supplies (barriers) that are needed for isolation precautions. You should restock the cart as needed and keep it outside the room. As a final note, there should be a sign on the door specifying the type of isolation and precautions to take.

Masks

Masks are used to prevent transmission of airborne infectious agents. They protect the wearer from inhaling large particle aerosols (droplets) that are transmitted by close contact (with infected patients), and generally travel only short distances (three feet). They also protect against small particle aerosols (droplet nuclei) that remain suspended in air and travel longer distances. Masks might also prevent transmission of some infections that are spread by direct contact with mucous membranes, because masks may discourage personnel from touching the mucous membranes of their eyes, nose, and mouth.

The high-efficiency disposable masks are more effective than cotton gauze or paper tissue masks. Place the mask on before entering the room and remove it before exiting. If the infection is transmitted by large-particle aerosols, you need a mask only if you are working close to the patient. If the infection is transmitted over longer distances, you should wear a mask when you enter the room for any reason.

Gowns

Gowns are used to prevent contamination of your uniform when caring for patients and to protect your skin from blood and body fluid exposures. You will most likely need a gown if you are going to have extensive contact with the patient, or if the patient's disorder could cause an outbreak in the hospital. When gowns are worn to prevent the spread of infection they are worn only once and discarded before leaving the unit.

Gloves

Gloves are worn: (1) to provide a protective barrier and prevent gross contamination of the hands when touching blood, body fluids, secretions, excretions, mucous membranes, and non-intact skin; (2) to reduce the likelihood that microorganisms present on the hands will be transmitted to patients during invasive or other patient care procedures that involve touching a patient's mucous membranes and non-intact skin; and (3) to reduce the likelihood that hands contaminated with microorganisms from a patient or fomites can transmit these organisms to another patient.

Eye Protection

Wearing goggles or face shields in certain circumstances is mandated by the Occupational Safety and Health Administration (OSHA) to prevent the transmission of blood borne pathogens. The purpose of wearing such protective equipment is to protect your eyes and the mucous membranes of your mouth when the possibility of splattering or splashing of blood or body fluids is possible.

Food Trays

There are no special precautions needed for dishes, glasses, cups, or eating utensils. Your facility will use either disposable or reusable dishes for patients in isolation. The Center for Disease Control (CDC) has determined the use of hot water and detergents in hospital dishwashers is sufficient to decontaminate the reusable tray items.

Linens

You should handle linen carefully, and as little as possible, to avoid contamination. Do not shake linen out to unfold it or drop it on the floor when you are changing the bed. Most linen used in isolation rooms are contaminated with pathogenic microorganisms, but the risk of transmission is insignificant if it is handled, transported, and laundered in a manner that avoids transfer of microorganisms. All handling of linen, whether or not it is isolation linen, is determined by local policy.

Laundered linen helps prevent exposure to staff and the surrounding area. The utilization of two dirty linen bags is not needed as a single bag is adequate. Do not overfill the linen bag and ensure that it is sealed tightly and appropriately. Dirty linen hampers or carts should be disinfected quarterly.

Patients' Belongings

Patients often bring several personal items with them when they come into the hospital. There is nothing wrong with this in most instances, because these items improve a patient's morale. However, isolation patients must be advised any item in the room that becomes contaminated must be disinfected or destroyed.

This can create problems, particularly when personally significant items cannot withstand the disinfection process. To avoid having to destroy such items, explain the isolation policy to the patient, family and friends and ask them to send home any valuable items that could become contaminated.

Waste Products

Waste products were mentioned earlier when you learned about terminal cleaning. However, you should not wait for the patient to leave to take care of contaminated dressings, urine, feces, and other waste products. Urine and feces should be flushed, and bedpans and other containers should be cleaned and disinfected immediately after they are used.

All waste products (contaminated dressings, disposable dishes, etc.) should be bagged, labeled, and disposed of according to local policy and EPA standards. This should be done at least daily or more often to prevent accumulation.

When working with a **patient in isolation**, the gloves you wear may be either sterile or nonsterile, depending on the type of isolation or the procedure being done. If you are doing a sterile procedure or working with an immunosuppressed patient, for example, you should wear sterile gloves.

Sterile Gloves

Non-Sterile Gloves

For **routine care**, you can wear nonsterile gloves. Gloves, however, do not **eliminate** the need for **handwashing**. You will still accumulate microorganisms beneath the gloves, and there is always a possibility that the gloves could be torn or punctured.

Equipment

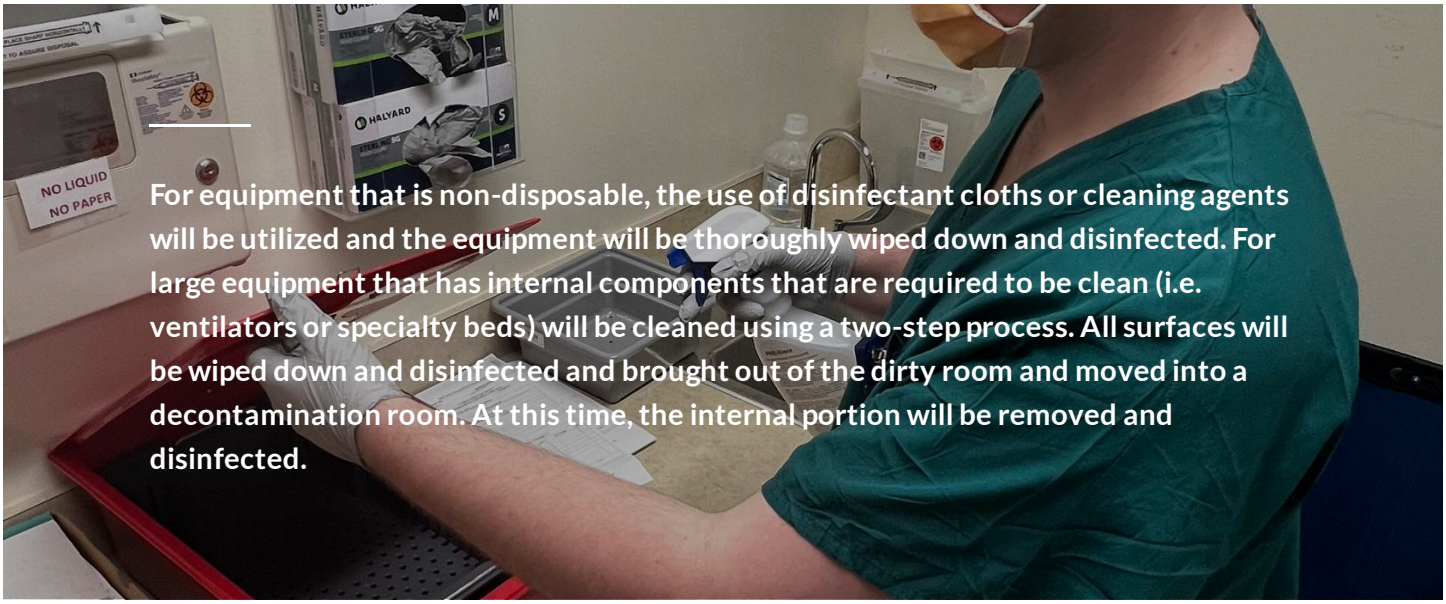
If disposable equipment becomes contaminated, it should be bagged, labeled, and disposed of according to local policy. When non-disposable equipment becomes contaminated, it should be cleaned, bagged, and sent to CS for disinfection and processing. No special precautions are needed for sphygmomanometers and stethoscopes, unless they become contaminated. If so, they are dealt with in the same manner as other contaminated equipment. All equipment should be wiped down with an approved disinfectant. Thermometers should be sterilized before being reused.

Sharps Container

Biohazard Bin

Sani-Wipes

Take special care with needles, syringes, scalpel blades, and other items that may be contaminated with the patient's blood. Place such items in an appropriate biohazard storage device. This device should be maintained in the isolation unit. When it is full or when the patient leaves, the device should be bagged, labeled, and disposed of according to infection control and EPA guidelines.



For equipment that is non-disposable, the use of disinfectant cloths or cleaning agents will be utilized and the equipment will be thoroughly wiped down and disinfected. For large equipment that has internal components that are required to be clean (i.e. ventilators or specialty beds) will be cleaned using a two-step process. All surfaces will be wiped down and disinfected and brought out of the dirty room and moved into a decontamination room. At this time, the internal portion will be removed and disinfected.

True or False: For large equipment that has internal components that are required to be clean, they will use the two-step process.

True

False

SUBMIT

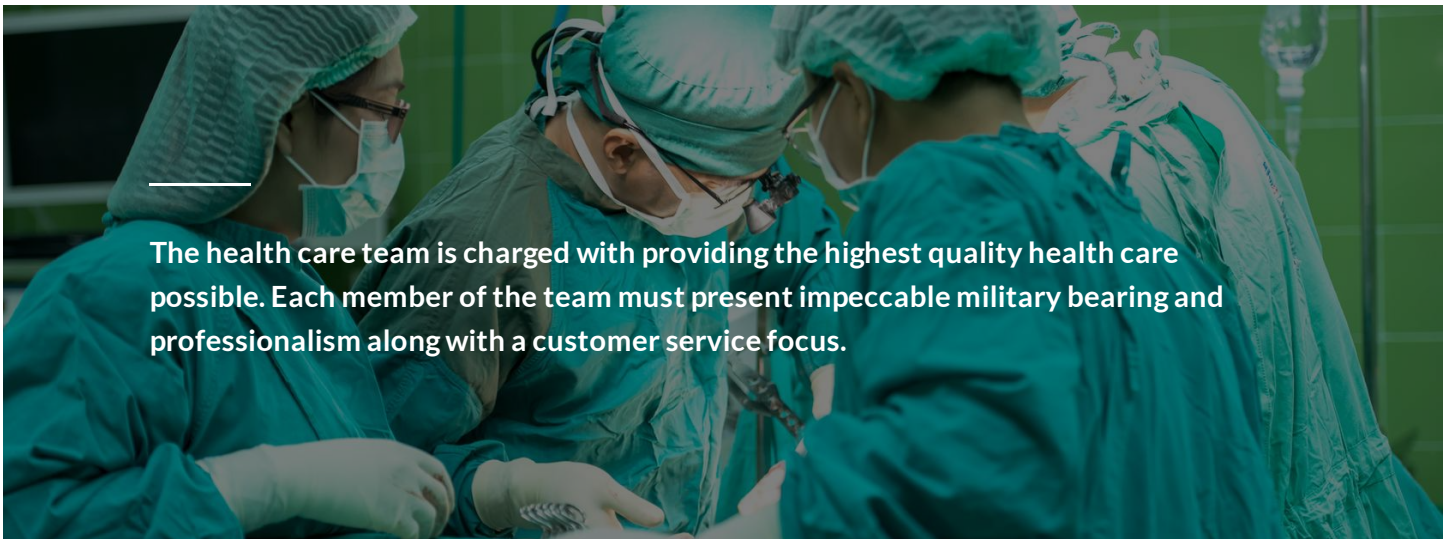
END OF LESSON

Lesson 2- Medical Examinations and Special Procedures

After completing this lesson, the student will be able to identify medical examinations and special operating procedures with prescribed guidance and publications.

Physical Examinations

Routine physical examinations are performed to determine the patient's state of health and detect any physical or mental deficiencies that may impact job performance. This is also an opportunity to educate patients on ways to improve health behaviors and live healthier lifestyles. The goal is to maintain a physically fit force, capable of performing at the highest possible level.



Some of the **common** examinations you will assist with may be: periodic health assessments (PHA), initial flying class (IFC) physicals, pelvic exams, separation history and physical exams (SHPE), sports physicals and so on.

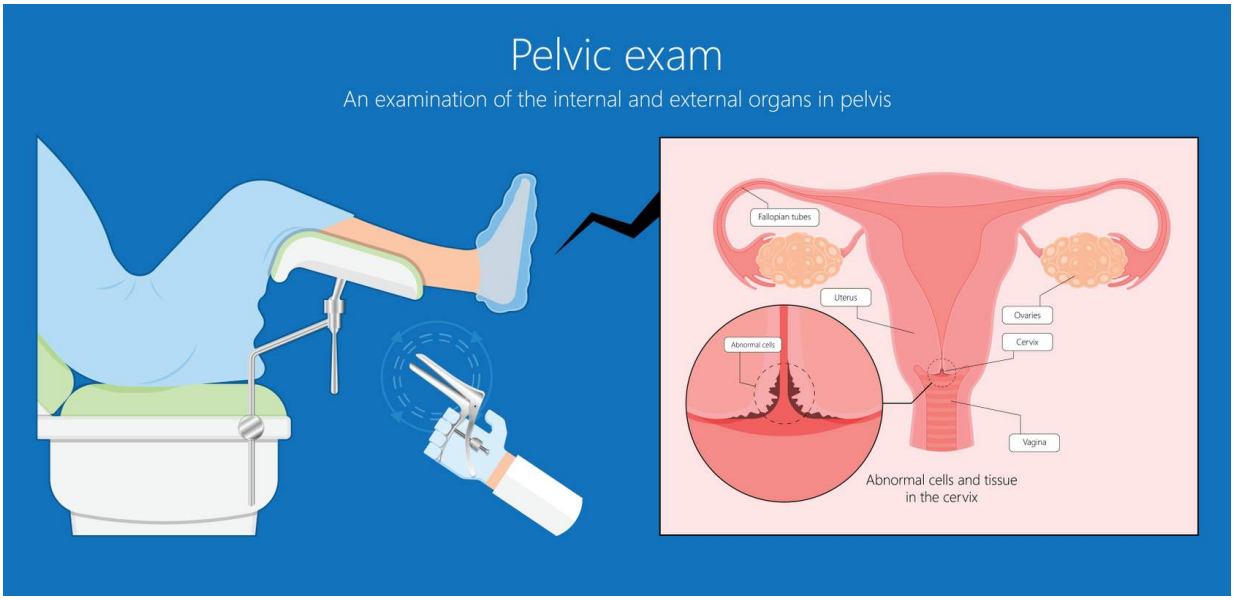
Your **role** will vary based on **local policies and procedures** but some of the general tasks you will be responsible for are:

- Stock exam rooms with supplies, equipment, and linens. Be sure to place the needed supplies or equipment out when you escort the patient to the room. This will expedite the exam or procedure for the provider and decrease anxiety for patient.
- Take and document the patient's vital signs.
- Assist the patient onto the exam table and give instructions on proper gowning for the exam.
- When assisting or chaperoning for the provider, hand supplies or equipment to the provider as needed.
- Assist the patient in sitting up or lying down as required, and adjust the exam table position and leg extension as needed. Assist the patient down from the exam table, using the built-in step.

CONTINUE

Pelvic Examination

Let's begin by first learning about the pelvic examination. For patients who have both a cervix and uterus present, a pelvic exam is recommended every year. Additionally, a Pap (Papanicolaou) smear (a screening test that tests for precancerous or cancerous cells in the cervix) is recommended every three years for average-risk persons 21-29 years of age and every 5 years for patients 30-65 (or two normal smears in a row after any abnormal). If the results come back negative, refer to GYN for the dysplasia program. Some patients could be embarrassed about being examined. This can result from the exposure of their body and also from the actions of attending medical personnel. As an aerospace medical technician journeyman, make every effort to remove the fright and embarrassment of these patients by explaining the procedure and ensuring proper and adequate draping. This helps to relieve some anxiety for your patients.



You will first need to gather the equipment needed for the gynecological (GYN) exam before positioning and draping the patient.

The following picture is the equipment that should be available for use during any gynecological examination. Equipment needed depends on the type of exam, what your facility carries, and what your provider wants. Click on the hotspots to learn what each item is.

Vaginal Speculum

Chlamydia and Gonorrhea Test

Examination Table with Stirrups

Examination Light

Absorbent Pad

Sterile Gloves for the Provider

ThinPrep Specimen Container

Saline Solution

Water Soluble Lubricant

Pen

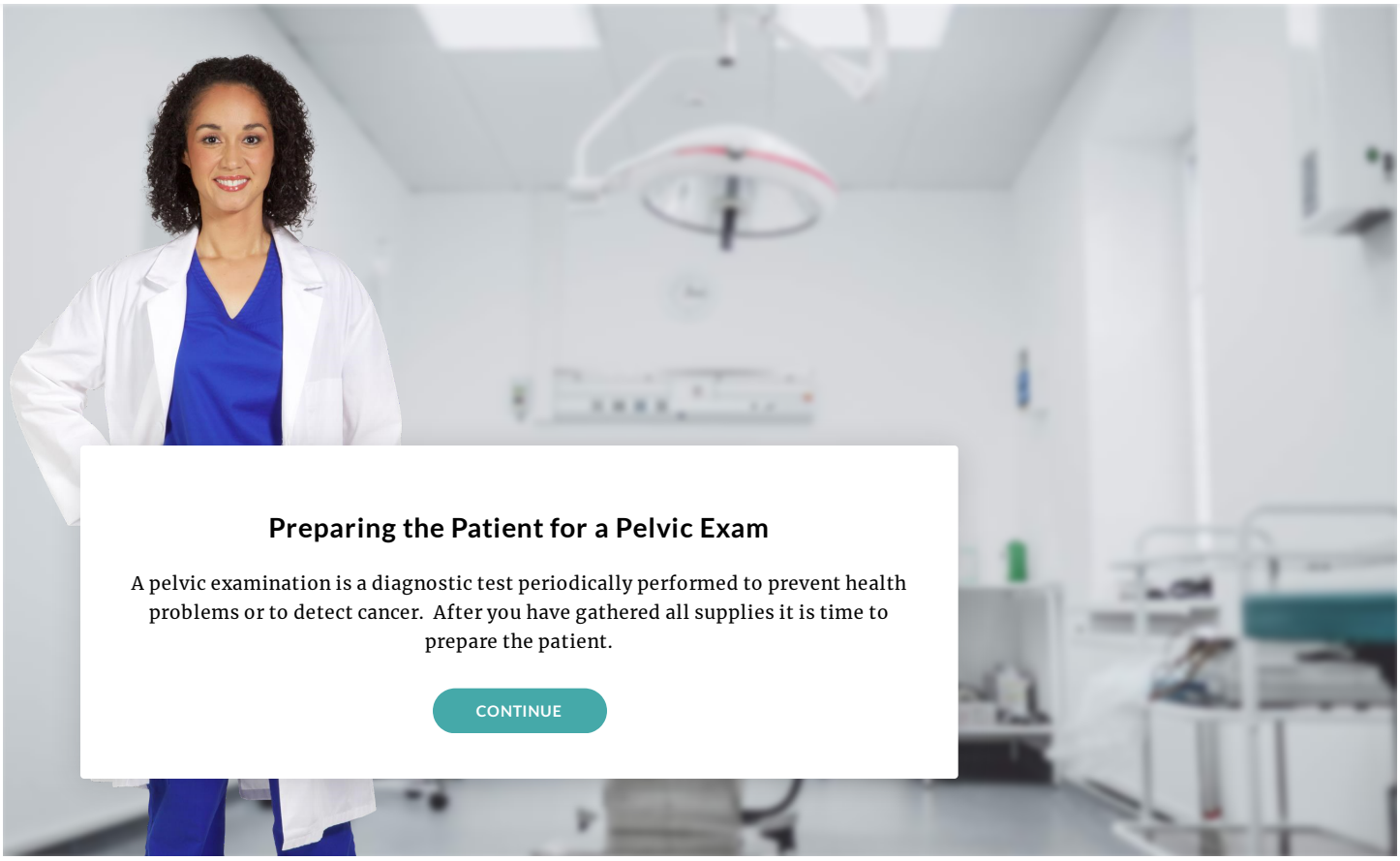
This may be used to mark any specimen's that are taken during the time of the exam.

Wipes

Gloves

Plastic Spatula

Large Cotton-tipped Swabs



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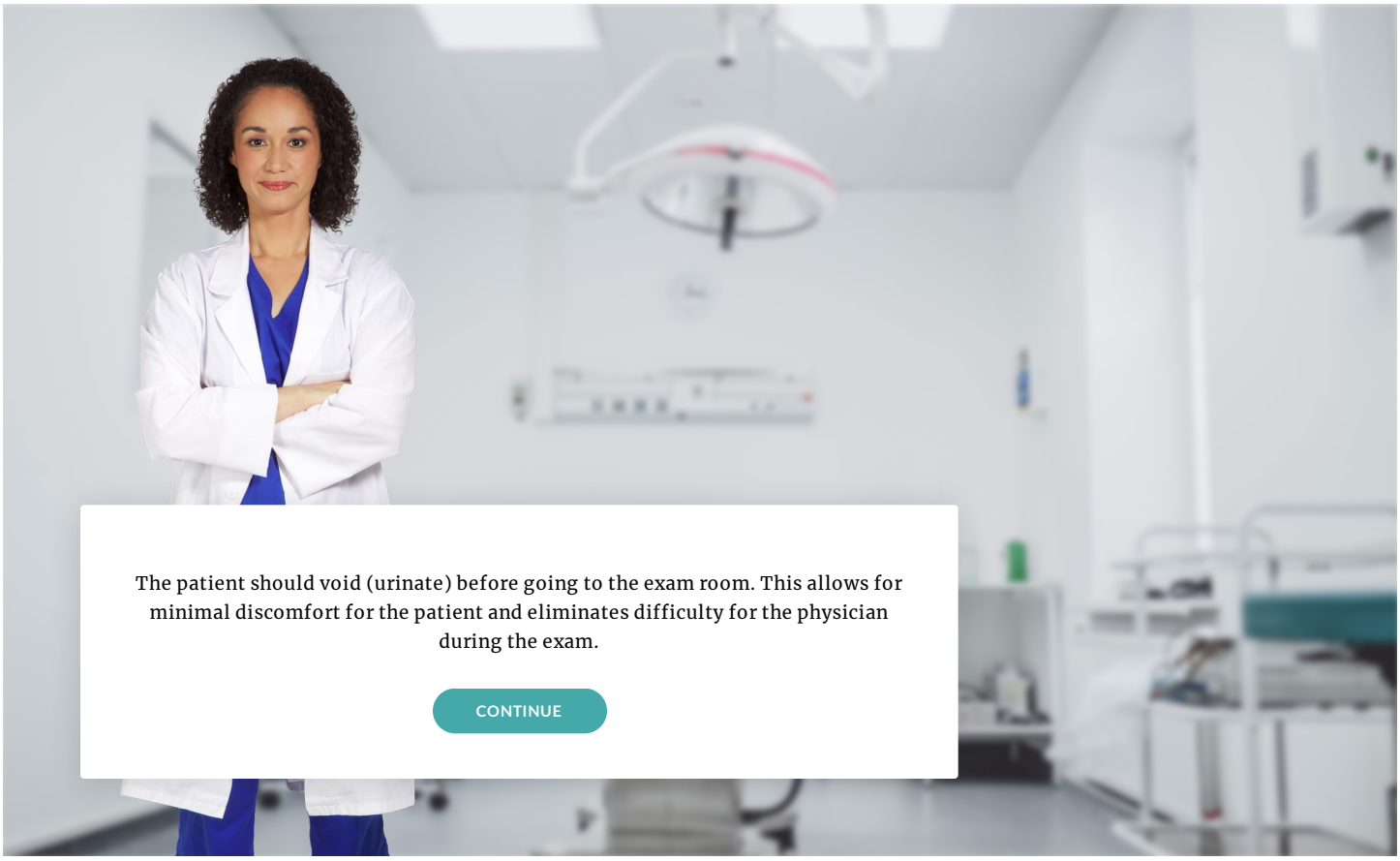

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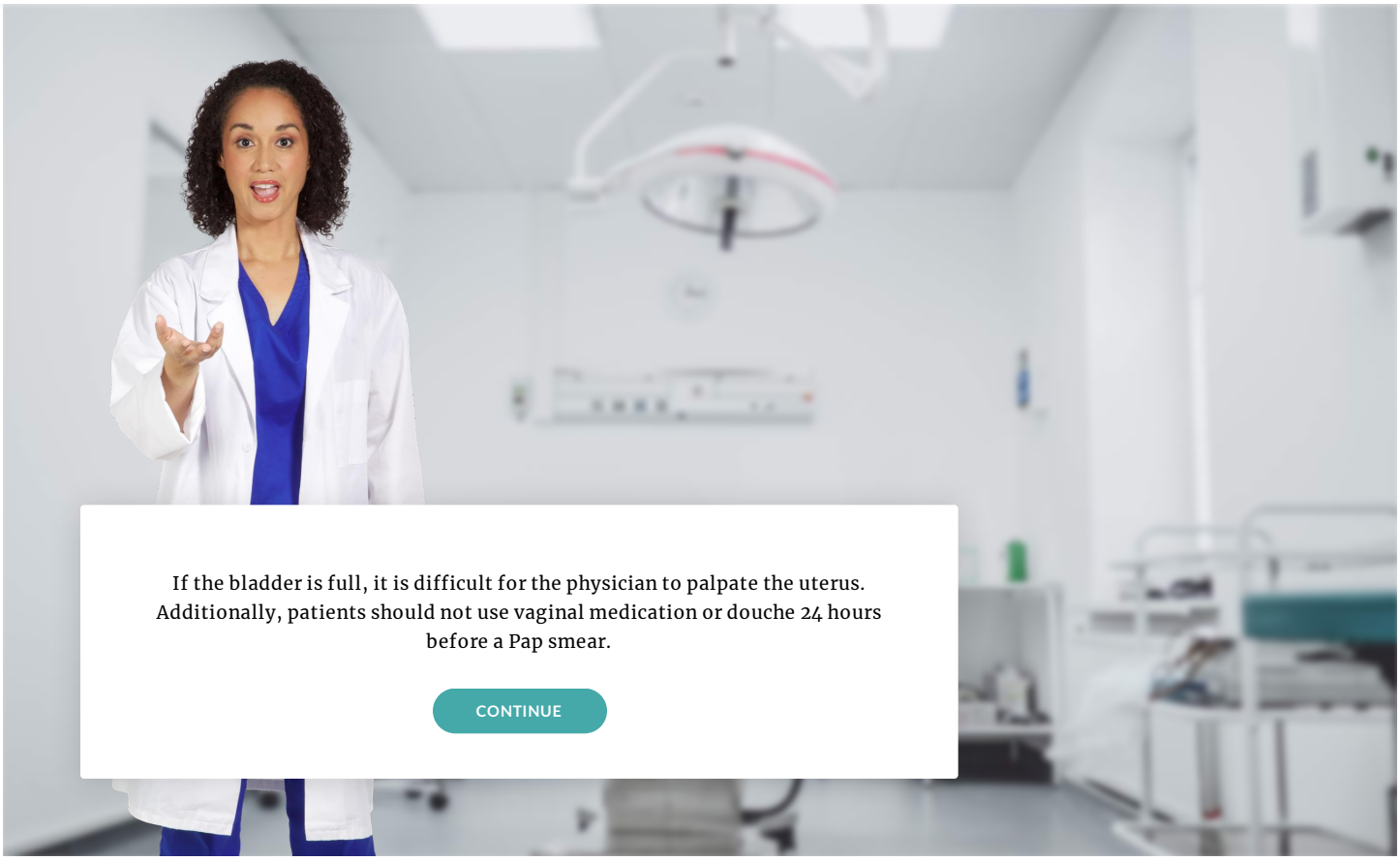

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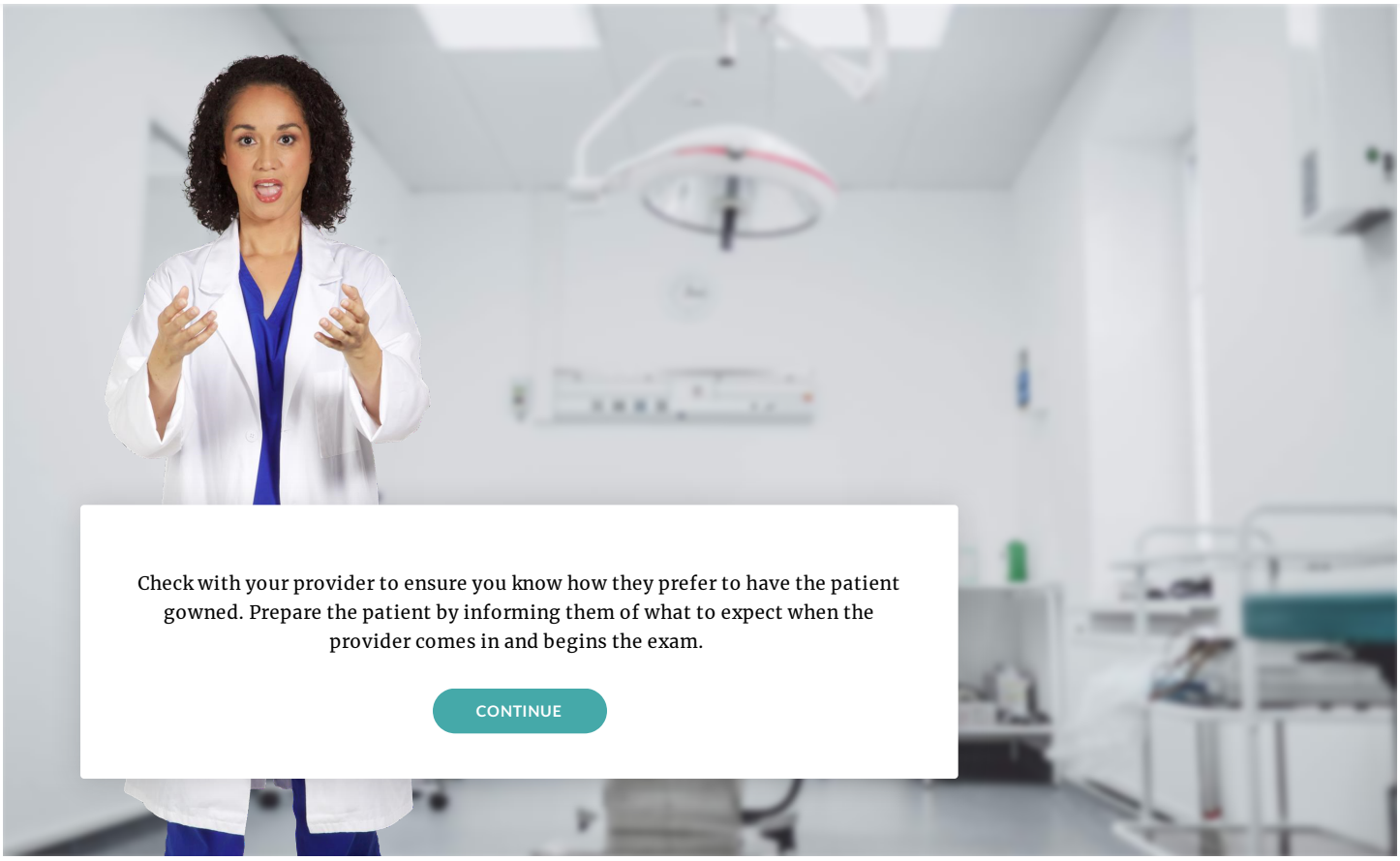

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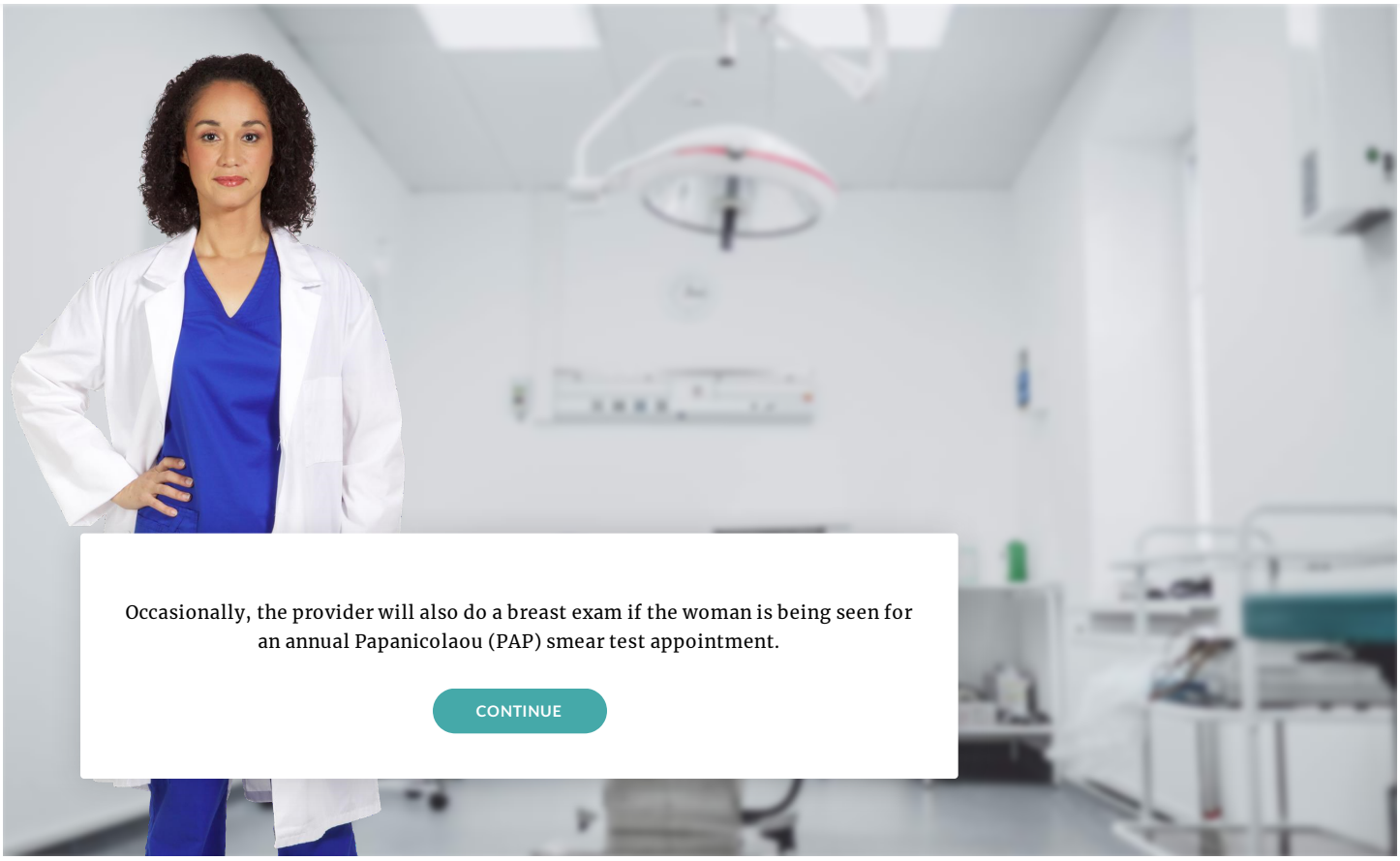

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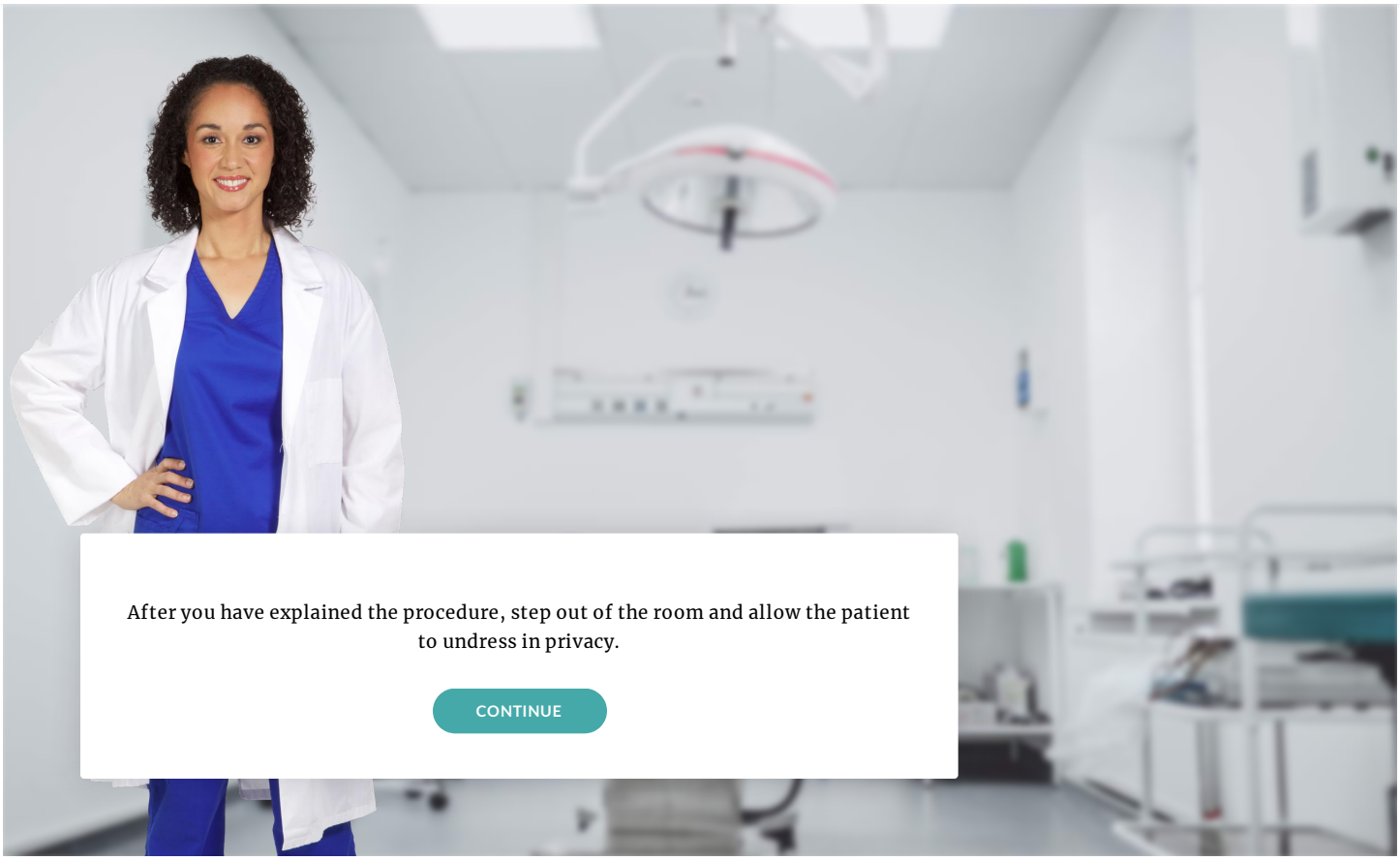

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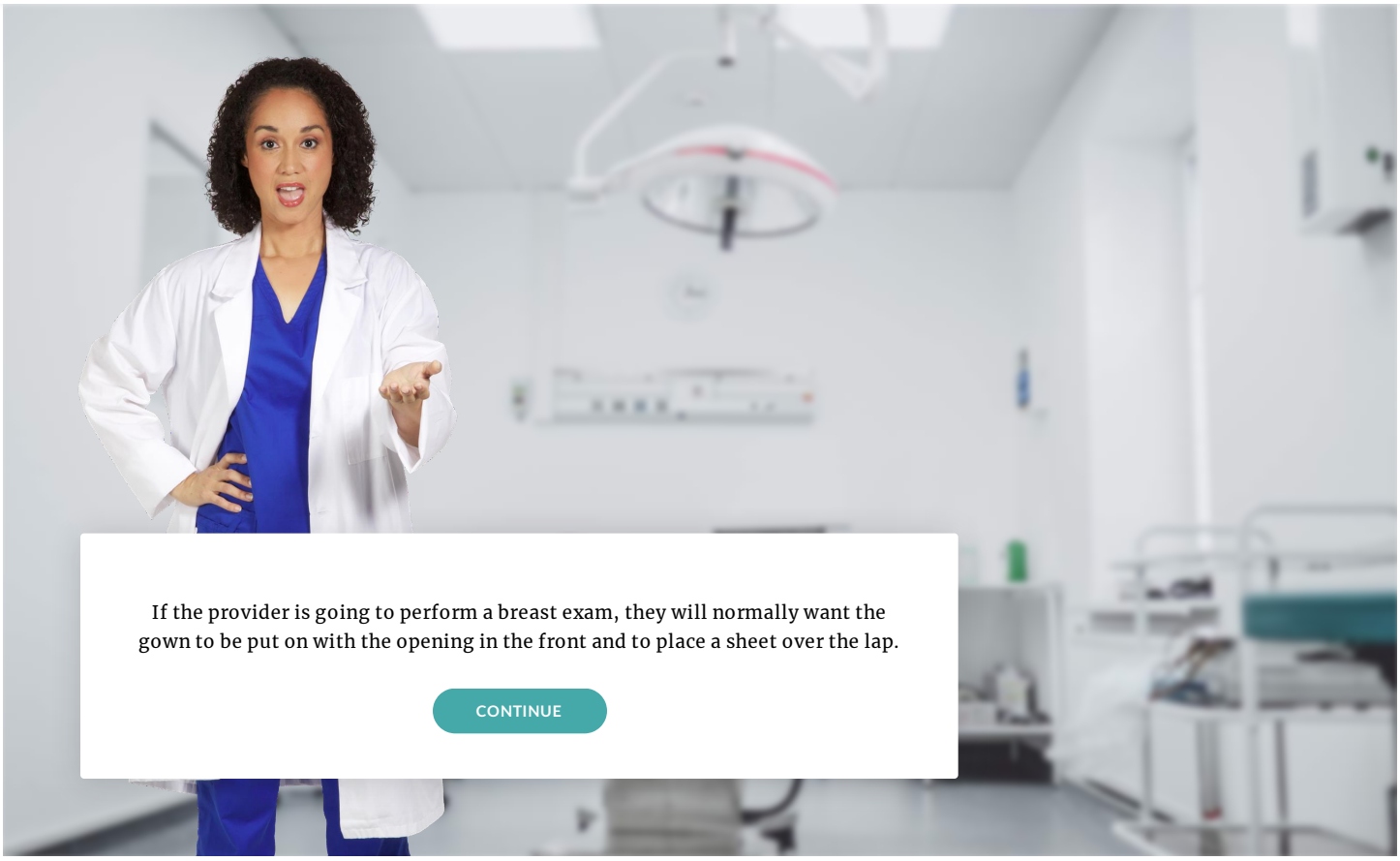

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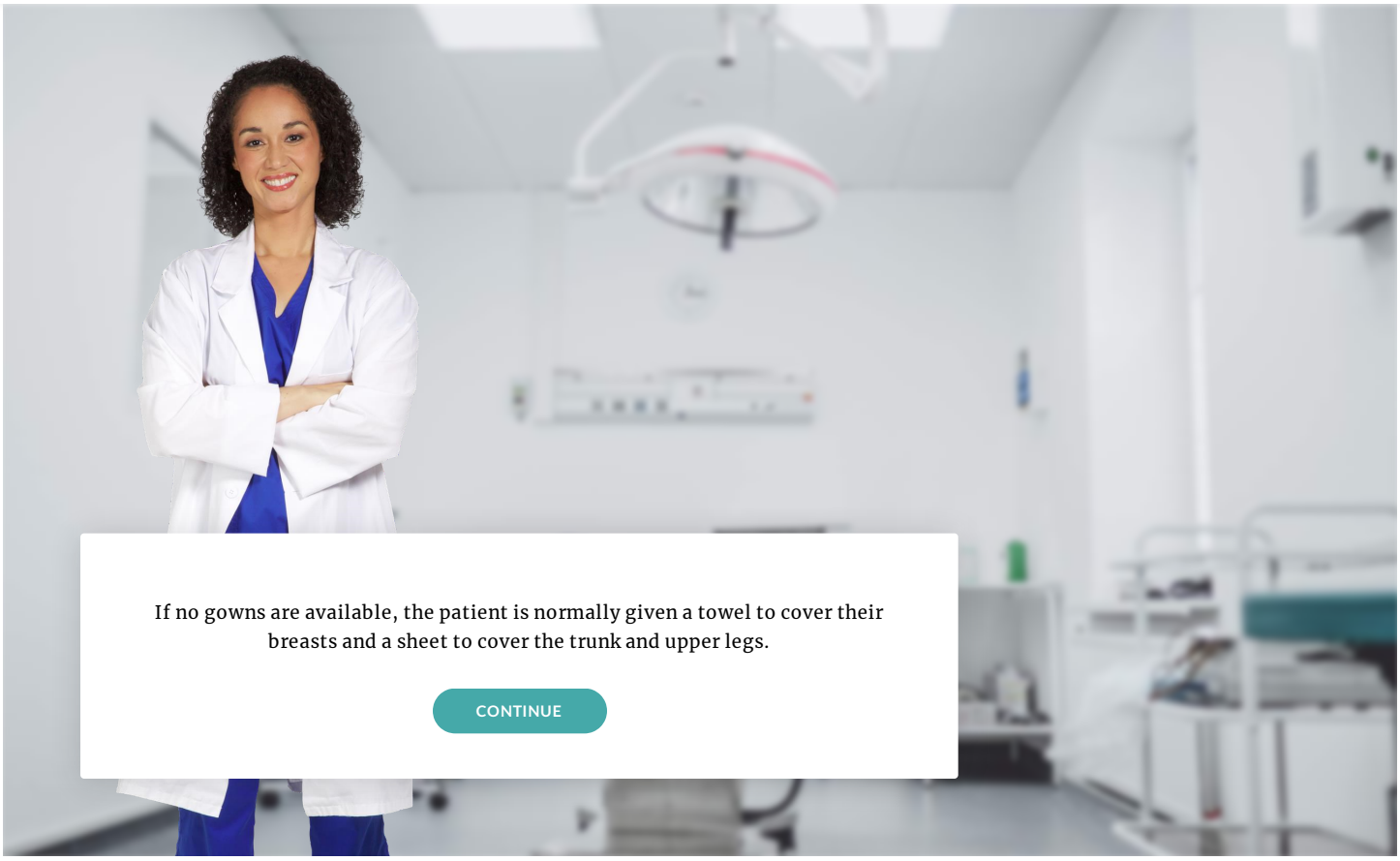

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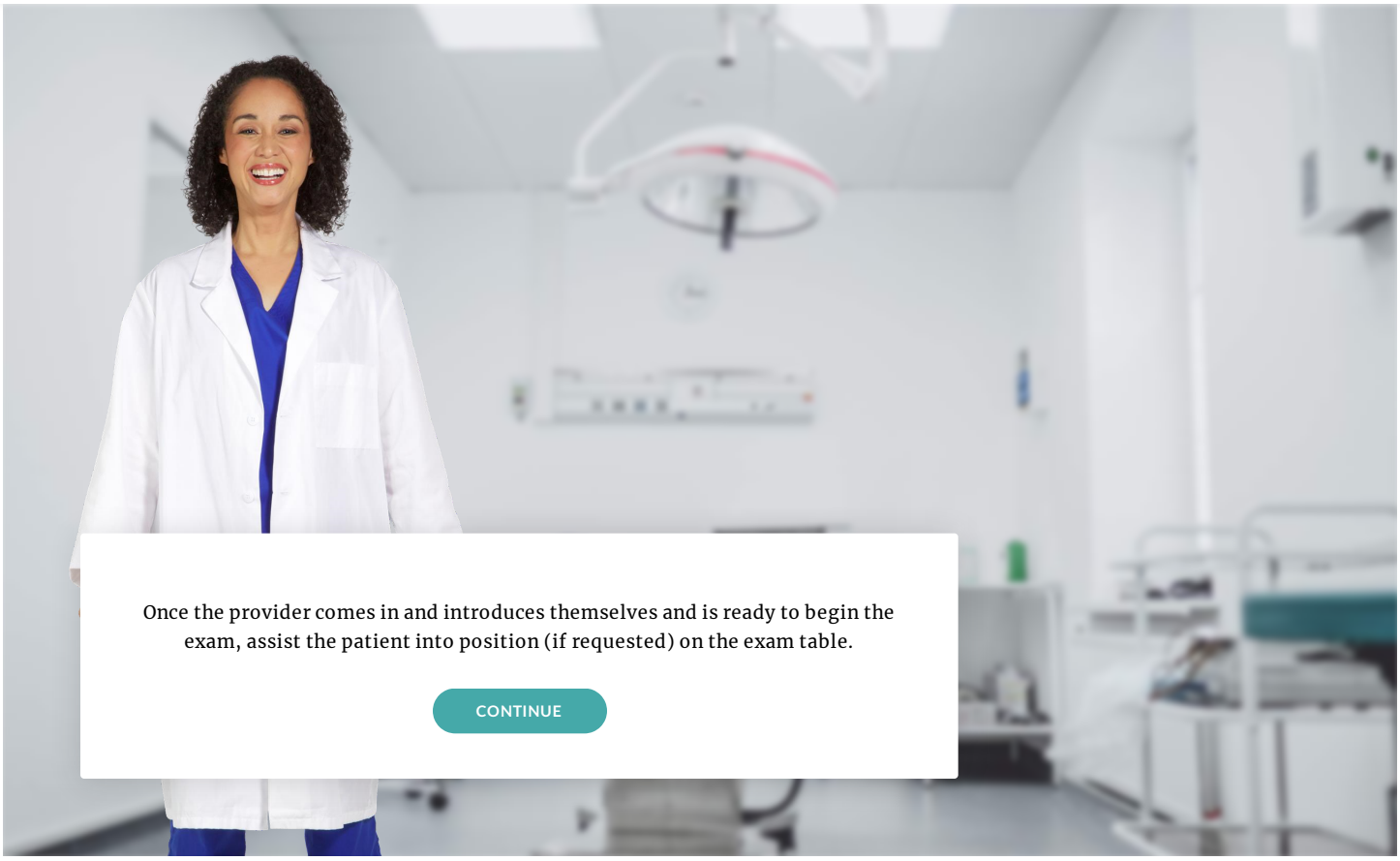

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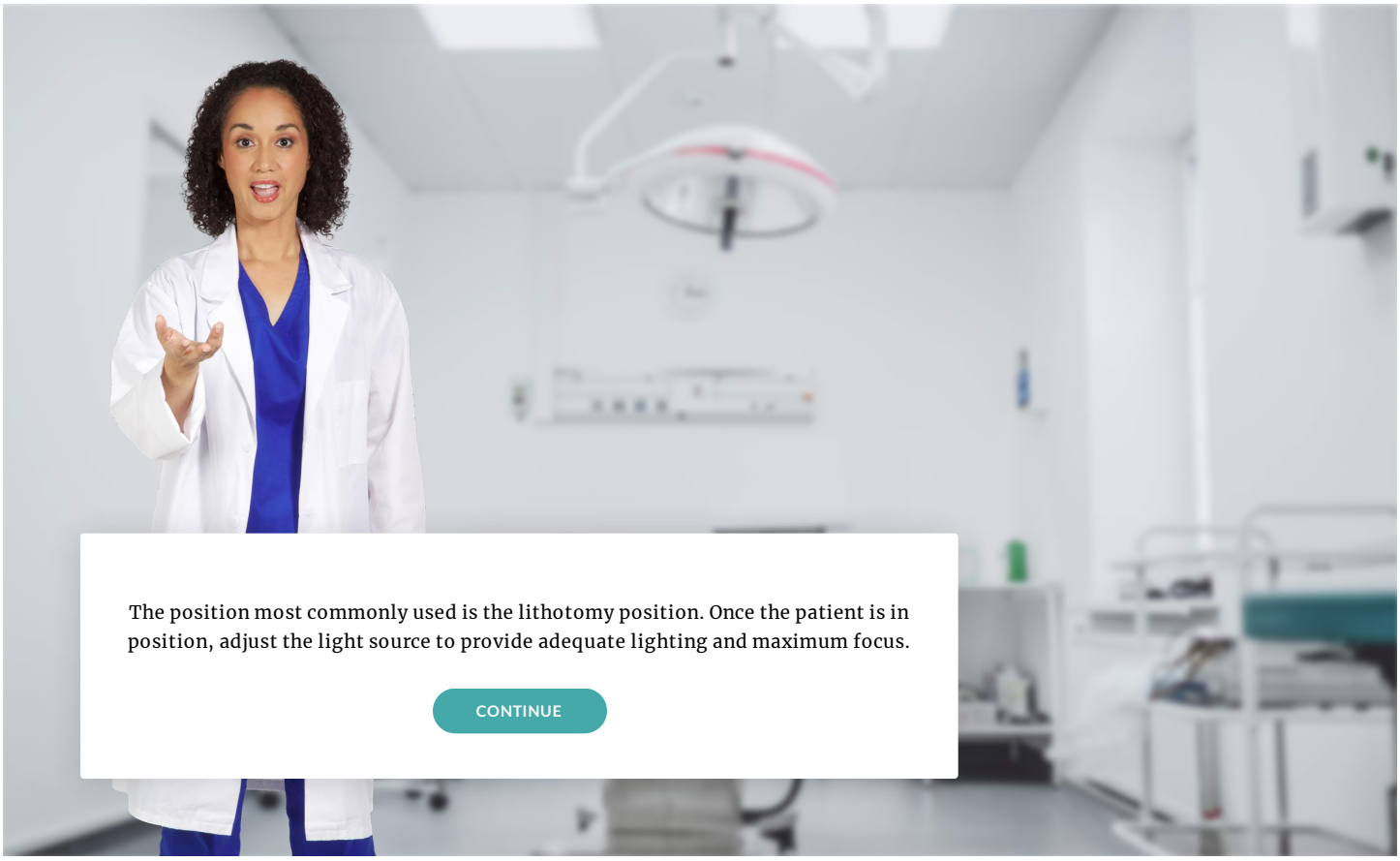

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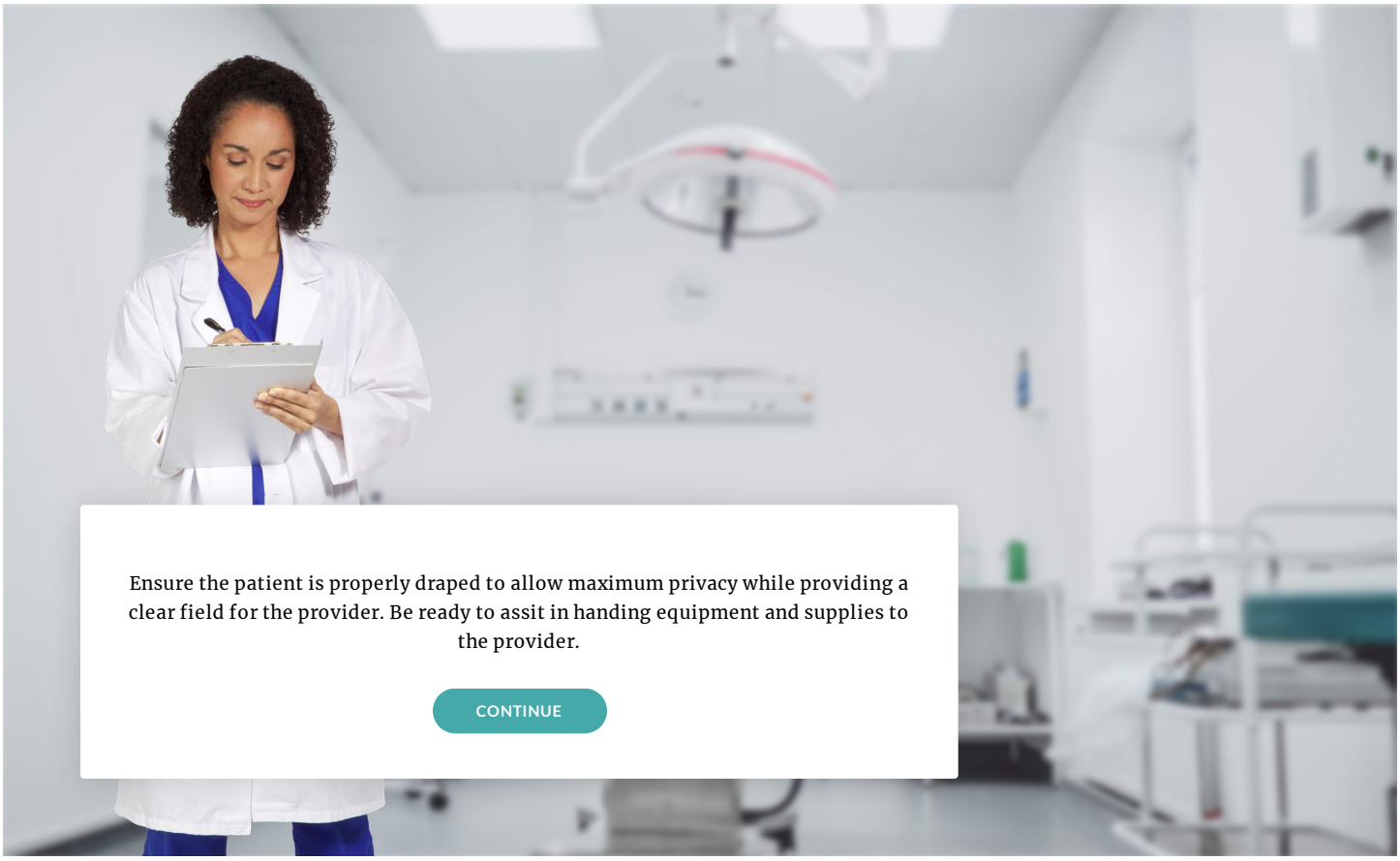

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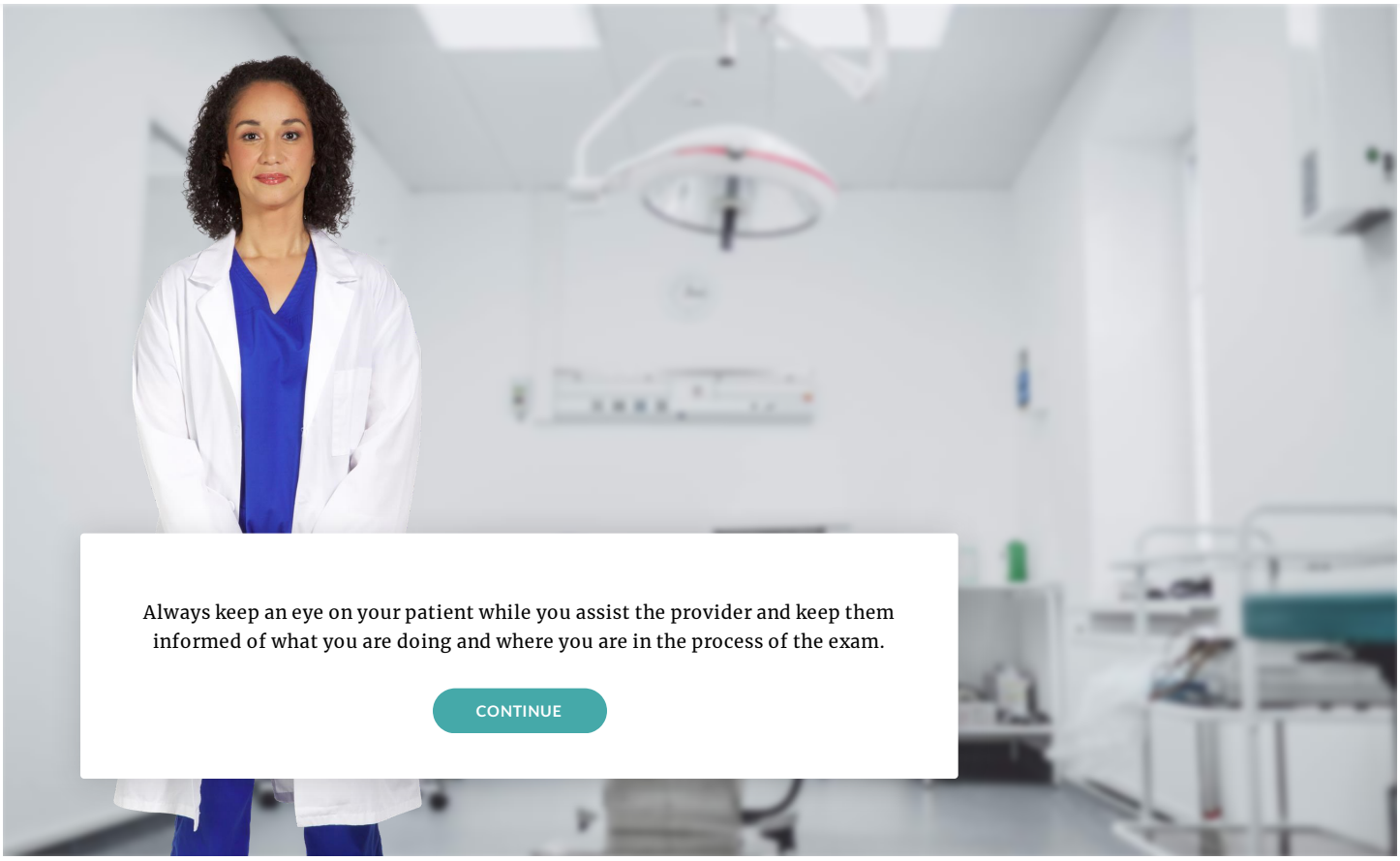

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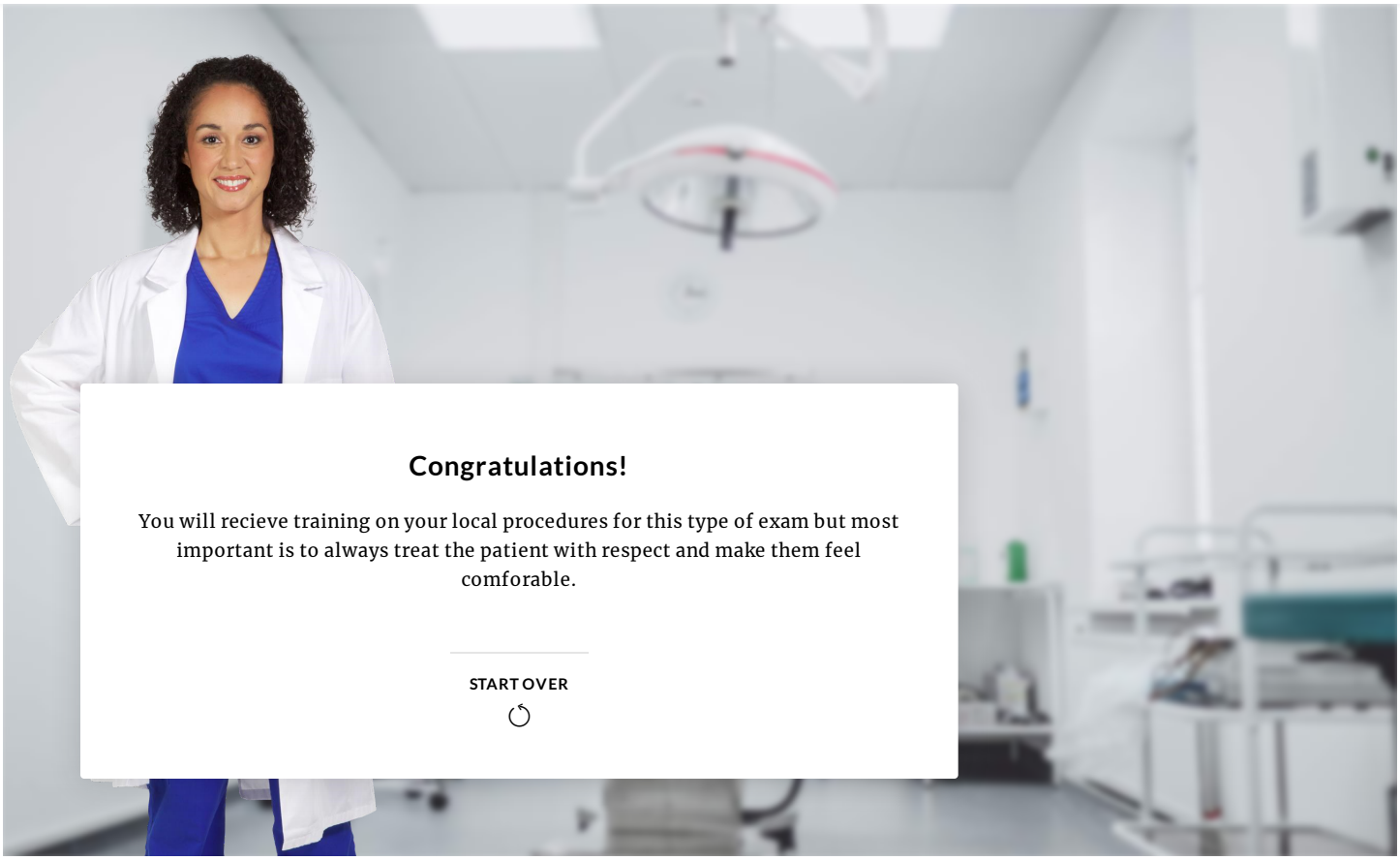


Scene 1 Slide 13

Continue → End of Scenario

Multiple Choice

What is the common position for a patient who is having a pap exam?

- ◯ lateral
- ◯ lithotomy
- ◯ Prone
- ◯ Semi-fowler

SUBMIT

Complete the content above before moving on.

The Papanicolaou Test

The Pap smear is a test used to detect early cancer of the cervix. To perform the Pap, the physician uses a spatula, swab, or brush to obtain cells from the cervical opening (os). The cells are then placed into a solution or gently smeared on a glass slide, then sprayed with a fixative. Another smear is also taken of the floor of the vagina below the cervix and also placed on a glass slide and sprayed with fixative. The aerospace medical service journeyman ensures proper labeling of the specimen with the date, time, patient's full name and date of birth, DoD ID, and the type of collection.

The Exam

It is important to follow your local procedures to ensure all information has been gathered so that the patient will not have to return pre-maturely for another exam due to a mistake. Click through the slides for a general overview of a pelvic examination.

Step 1

Step 1

To start the procedure since you have already gathered supplies you first need to perform hand hygiene, verify correct identification of the patient and label the specimen container at the patient's bedside.

Step 2

Step 2

Identify whether patient is familiar with the procedure or not.

If not, explain in plain language what is about to take place and what your role will be.

If familiar, describe what your role for the procedure entails and answer any lingering questions or concerns.

Step 3

Step 3

Set up the tray table and equipment based on the provider's preference.

Step 4

Step 4

Give the patient a gown and instruct to remove all clothing from below the waist if no breast exam is being performed. If a breast exam will be included, then instruct the patient to get fully undressed and wear the gown with the opening to the front.

Next, provide a drape for covering and pull the privacy curtain and return when the patient is ready.

Step 5

Step 5

Don gloves and assist the provider by passing equipment as necessary.

Step 6

Step 6

Once the procedure is complete (and if a ThinPrep container was used), close the labeled container and place in a biohazard bag.

If using a slide, prepare it by generously spraying with 95% ethyl alcohol or spraying with a cytology fixative in accordiance with (IAW) the directions on the manufacturers' label.

Fixative spray must be applied to the slide smear within 10 seconds post collection in order to maintain normal appearance of cells and to prevent exposure and/or contamination.

Spray lightly from left to right and then right to left.

Allow the slide to dry for at least 5 minutes before packaging to send to lab.

Step 7

Step 7

Once the exam is over, ensure the patient has a paper towel or wipe to remove excess secretions and lubricant; as well as an absorbent pad to help with any residual spotting or bleeding. Assist the patient, if necessary, in removing their feet from the stirrups and getting off the exam table.

Step 8

Step 8

Take the labeled specimen(s) to the lab or whatever unit policy and procedures dictate.

Step 9

Step 9

Document and/or report any significant observations.

CONTINUE

Paracentesis

Paracentesis is the withdrawal of excess fluid from the abdominal or peritoneal cavity. This procedure is performed by a physician to obtain fluid for diagnostic examination, to remove excess fluid, or to prepare the patient for other procedures (e.g., surgery or peritoneal dialysis).

Your job will be to prepare the patient for the procedure and assist the physician throughout the procedure.

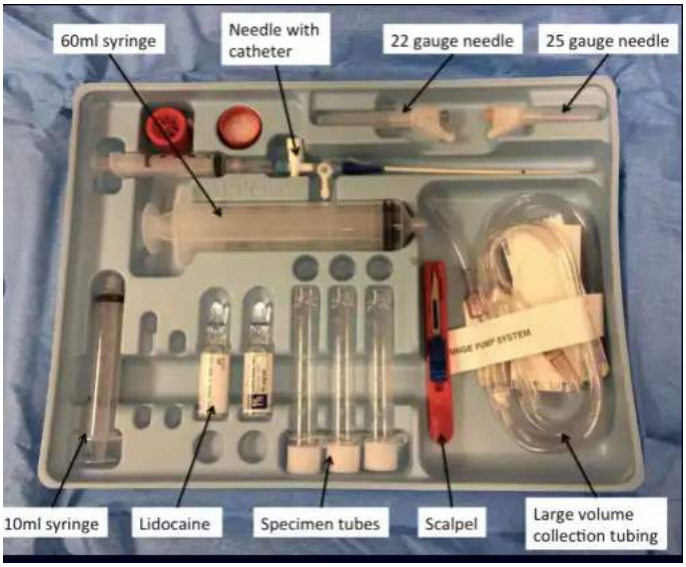
Prior to the procedure, ensure a consent form has been signed, the patient has voided, and vital signs are taken. The patient will be placed in a Fowler's position, but some physicians

may prefer to have the patient sit on the side of the bed.

The **items** needed for the **procedure** will include: paracentesis tray, anesthetic injectable medication (which may be included in the kit), and skin preparation solution.

Most kits will have collection bottles or bags and specimen bottles.

If not, ensure you **provide** these supplies **prior** to the start of the procedure.



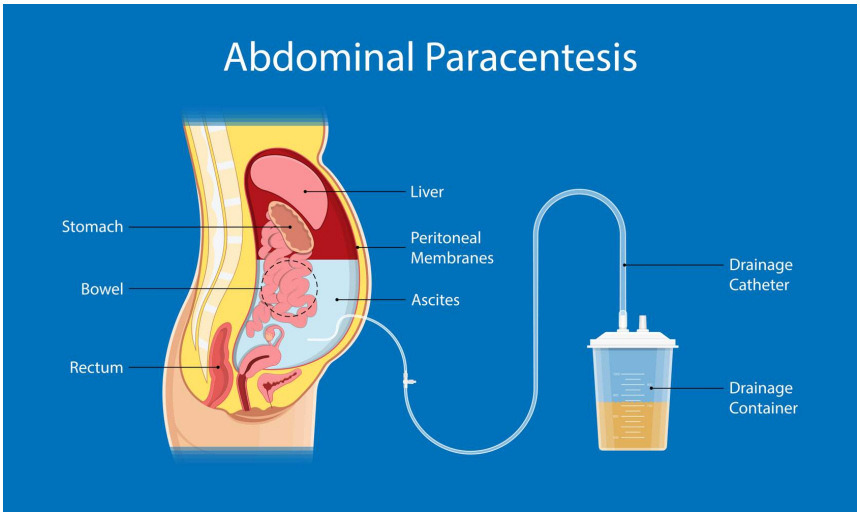
Here are the tools needed to complete Thoracentesis/Paracentesis.

Equipment Needed to Perform A Paracentesis

- Sterile paracentesis tray and gloves
- Local anesthetic
- Drape or cotton blankets
- Collection bottle (vacuum bottle)
- Skin prep tray with antiseptic
- Speciman bottles, laboratory forms, and labels

PRE-PROCEDURE PHASE | PERFORMANCE PHASE | RECOVERY PHASE

1. Verify patient's full name, date of birth (DOB), and provider's orders.
2. Identify any patient allergies prior to the procedure.
3. Ensure collection bottle and tubing is available and ready with supplies for labeling. Be prepared to provide the labeled collection bottle and tubing upon request from the provider.
4. Explain the procedure, step-by-step, to the patient and ensure all questions are answered.
5. Ensure the witnessed and informed consent has been administered and signed.
6. Take and record patient's vital signs.
7. Ensure the patient empties their bladder and/or bowels before the procedure starts.
8. Instruct the patient to get into the Fowler's position with back, arms, and feet supported.
9. Drape the patient with the sheet, while leaving the appropriate area exposed (lateral lower abdominal quadrant).



PRE-PROCEDURE PHASE | PERFORMANCE PHASE | RECOVERY PHASE

1. Assist the provider in skin preparation, using an antiseptic solution.
2. Open the sterile tray and package of sterile items included while maintaining the sterile field.
3. Ensure collection bottle and tubing is available and ready with supplies for labeling.
4. Monitor the patient's pulse and respiratory status throughout the procedure; observe for pallor, cyanosis, or syncope.
5. Be prepared to assist the provider at any moment while he or she is conducting the procedure.

PRE-PROCEDURE PHASE | PERFORMANCE PHASE | RECOVERY PHASE

1. Assist the patient to a comfortable position after the procedure.
2. Continue to monitor the patient's vital signs every half hour for two hours, and then every four hours for 24 hrs. Frequency may vary with each physician.
3. Document the amount of fluid removed, along with the characteristics of the fluid.
4. Document number of specimens sent to lab and the patient's condition during the procedure.
5. Observe the puncture site for leakage or scrotal edema (indicates a complication and must be reported immediately); acknowledging that there may be minor pain at the incision site.

CONTINUE

Thoracentesis is the surgical puncture or tapping of the chest wall to remove fluid or air from the pleural space. The physician may perform this procedure as part of the treatment for pneumothorax (i.e., air in the pleural space), hemothorax (i.e., blood in the pleural space), or emphysema (i.e., pus in the pleural space).

It may be done to confirm the diagnosis of fluid in the pleural space, to obtain a culture of organisms present, or to relieve respiratory symptoms. The procedure is performed with a surgical aseptic technique.

Equipment Needed to Perform A Thoracentesis

- Thoracentesis tray – if available
- 5, 20, 50-mL syringes
- Needles: 22 G, 26 G, or 16 G (3 inches long)
- Sterile gloves
- Sterile specimen container
- Sterile towels and drape
- Sterile guaze pads
- Local anesthetic
- Germicide solution
- Biopsy needle
- Hemostat
- Three-way stopcock or tubing

PRE-PROCEDURE PHASE | PERFORMANCE PHASE | RECOVERY PHASE

It's important to engage with the provider prior to the procedure to identify what he or she expects before, during, and after the procedure. This is a good time to determine ahead of time if the provider ordered chest x-rays or any other tests. If tests were ordered and completed in advance, ensure those are made available to the provider as necessary.

1. Verify patient's full name, DOB, procedure, and label containers at bedside.
2. Ensure the witnessed and informed consent has been completed and signed.
3. Identify any patient allergies prior to the procedure.
4. Explain the procedure step-by-step to the patient.
5. Position the patient as directed by the provider and help the patient to maintain this position for the duration of the procedure.

PRE-PROCEDURE PHASE | PERFORMANCE PHASE | RECOVERY PHASE

First, expose aspiration site.

- Affected side, midaxillary line if the procedure is being performed in the supine position
- Affected side, posterior midscapular line if being performed in the upright or seated position

Perform hand hygiene and don PPE. Next, actively support and reassure the patient throughout the procedure. Finally, be prepared to assist the provider at any moment while he or she is conducting the procedure.

PRE-PROCEDURE PHASE	PERFORMANCE PHASE	RECOVERY PHASE

1. Ensure the patient remains on bed rest (a chest x-ray is commonly taken after a thoracentesis in order to confirm no evidence of pneumothorax).
2. Obtain and document vital signs every 15 minutes for 1 hour.
3. If directed by the provider, administer oxygen.
4. Document the total amount of fluid withdrawn – include type of fluid, color, viscosity.
5. If ordered, prep fluid samples for lab and send when appropriate.
6. Monitor the patient for any signs of increasing respirations, faintness, vertigo, tightness in the chest, uncontrollable cough, blood-tinged mucus, and rapid pulse or signs of hypoxemia.
7. Encourage the patient to take deep breaths.

PDF **Thoracentesis Video Transcript.pdf**
137.5 KB

Multiple Choice

What is the main difference between paracentesis and thoracentesis?

- ○ Paracentesis is the withdrawal of excess fluid from the abdominal or peritoneal cavity whereas abdomencentesis is the surgical puncture or tapping of the chest wall to remove fluid or air from the pleural space.
- ○ Thoracentesis is the withdrawal of excess fluid from the abdominal or peritoneal cavity whereas paracentesis is the surgical puncture or tapping of the chest wall to remove fluid or air from the pleural space.
- ○ Paracentesis is the withdrawal of excess fluid from the abdominal or peritoneal cavity whereas thoracentesis is the surgical puncture or tapping of the chest wall to remove fluid or air from the pleural space.
- ○ Hemothorax is the withdrawal of excess fluid from the abdominal or peritoneal cavity whereas thoracentesis is the surgical puncture or tapping of the chest wall to remove fluid or air from the pleural space.

SUBMIT

Complete the content above before moving on.

Lumbar Puncture/Spinal Tap

The lumbar puncture (LP) is the insertion of a needle into the subarachnoid space, usually between the third and fourth lumbar vertebrae, to aspirate cerebrospinal fluid (CSF). This procedure is also referred to as a spinal tap or spinal puncture. The spinal tap provides important information about intracranial pressure and the composition of the CSF. It is widely used in the diagnosis of bacterial and viral infections, such as spinal meningitis, along with the evaluation of seizure disorders.

Keep in mind, the physician does this procedure. Your responsibility involves room and patient preparation and to assist the provider with collection and labeling of specimen tubes or as otherwise needed. Ensure each collection tube is sealed and labeled with correct information.

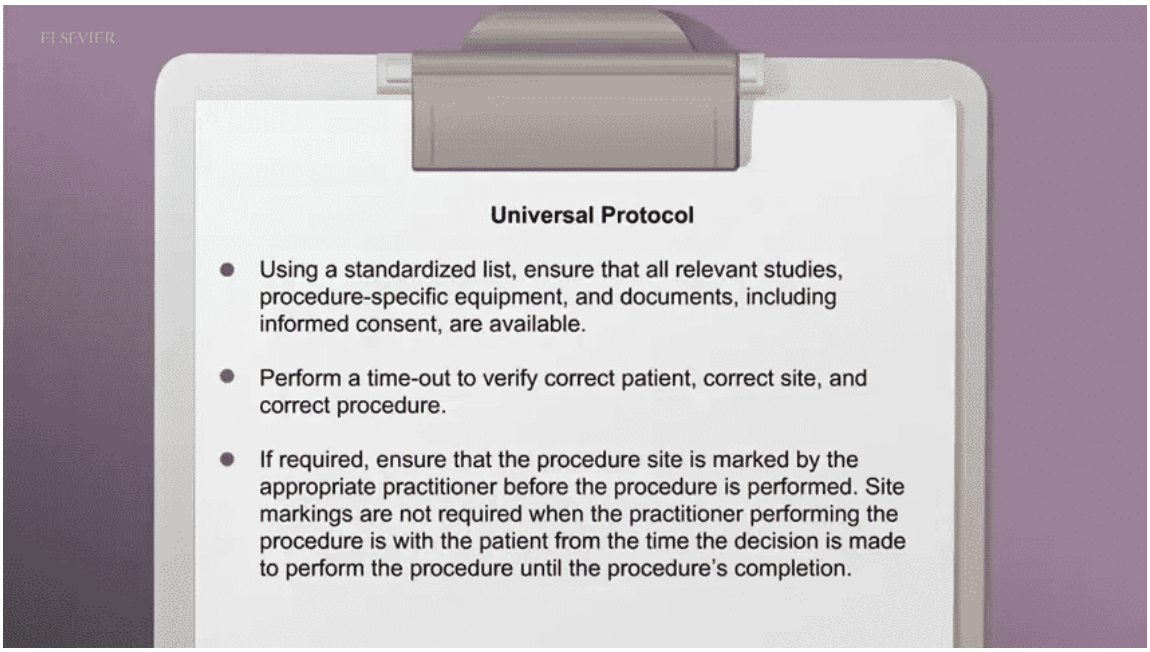
A spinal tap is normally performed for analysis of CSF or to measure CSF pressure to aid in the evaluation of some underlying condition. If an aircrew or special operational member requires a LP for diagnosis, the flight surgeon will likely ground the individual from flying or operational duty for 24 hours or until a diagnosis is made.

The equipment needed for this procedure are:

- Sterile lumbar puncture set
- Skin antiseptic (avoid the use of chlorhexidine)
- Sterile gloves
- Adhesive bandage
- Xylocaine 1% to 2%

PROCEDURAL PHASE | RECOVERY PHASE

1. Ensure patient empties bladder and/or bowels prior to the procedure. Explain the procedure to the patient step-by-step.
2. Position the patient on their side with a small pillow both under their head and between the legs. Patient needs to be lying on a firm surface.
3. You or the provider should instruct the patient to arch the lumbar segment of their back and draw their knees up to their abdomen, chin to chest, clasping both knees with their hands.
4. You will assist the patient in keeping this position for the duration of the procedure by supporting behind the knees, upper back, and neck areas.
5. If the provider decides on a sitting position, you will instruct the patient to straddle a straight back chair, rest head against the arms, which should be folded on the back of the chair.



PROCEDURAL PHASE

RECOVERY PHASE

1. Once the procedure is over, instruct the patient to remain flat for approximately two hours.
2. Ensure the patient is adequately hydrated, either with oral or parenteral fluids (this assists in replacing the patient's CSF and prevents a spinal headache).

PDF

Skills Lumbar Puncture Assisting Video Transcript.pdf
134.5 KB

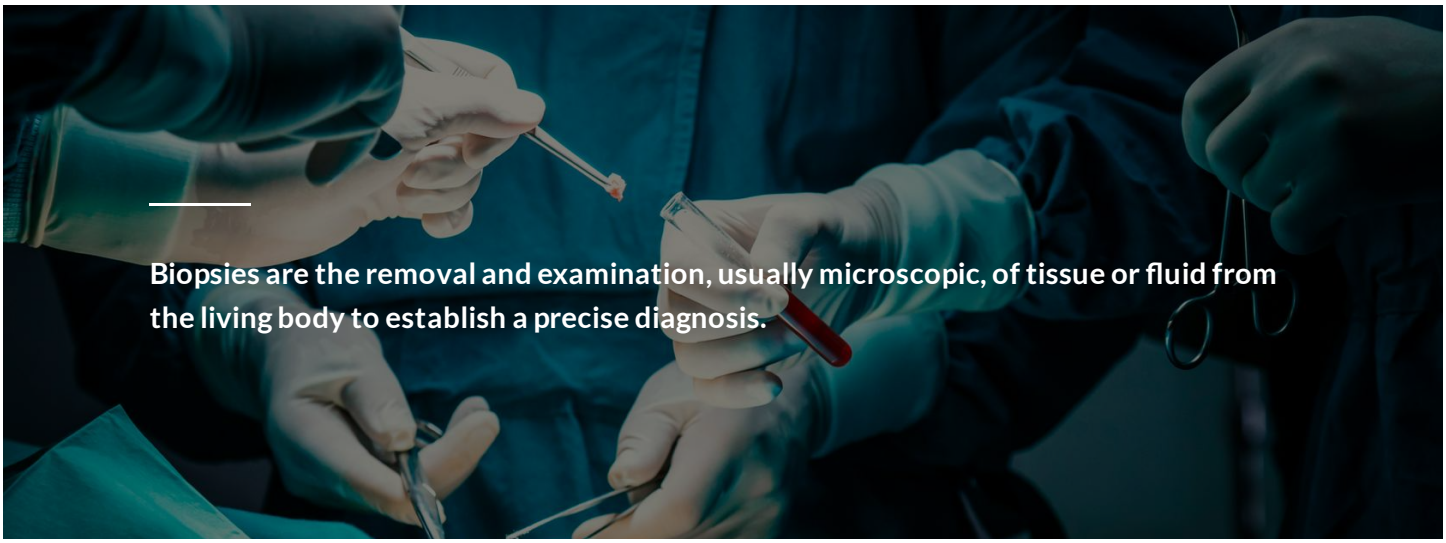
True or False: The spinal tap provides important information about intracranial pressure and the composition of the CSF. It is widely used in the diagnosis of bacterial and viral infections, such as spinal meningitis, along with the evaluation of seizure disorders.

- True
- False

SUBMIT

Complete the content above before moving on.

Biopsy



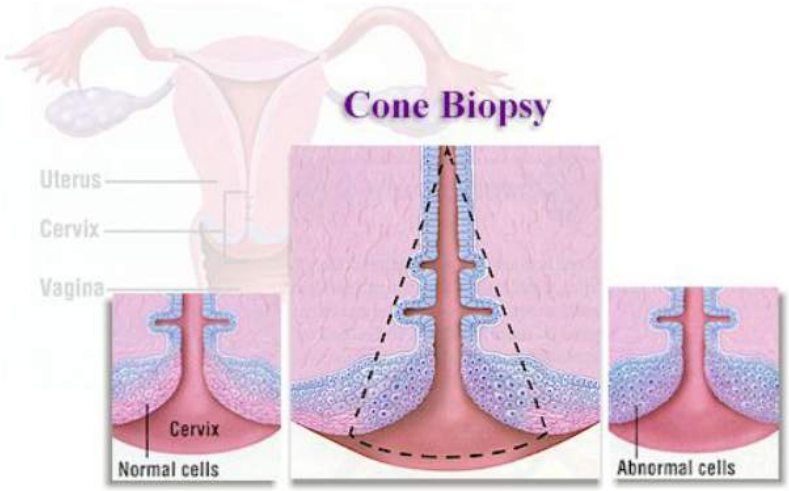
Types of Biopsies

There are several different types of biopsies, but let's take a closer look at a few of the more common ones where you may be asked to assist.

The physician is responsible for obtaining the tissue sample for the biopsy. Your job is to assist as needed, and you will likely be responsible for ensuring specimen bottles are readily available and properly labeled. Again, these tests are performed as a diagnostic procedure and must be sent to the pathologist in the laboratory for final diagnosis.

1

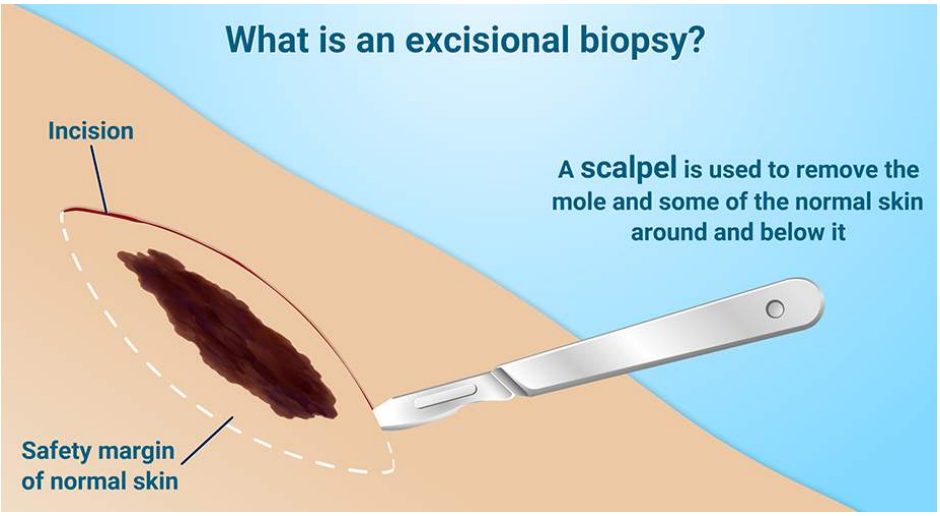
Cone Biopsy



Inverted cone of tissue is excised, as from the uterine cervix.

2

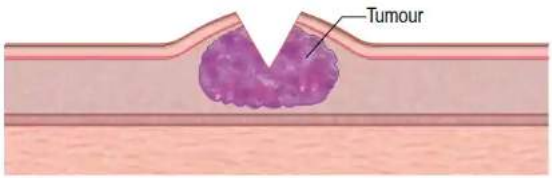
Excisional Biopsy



Tissue is removed by surgical cutting.

3

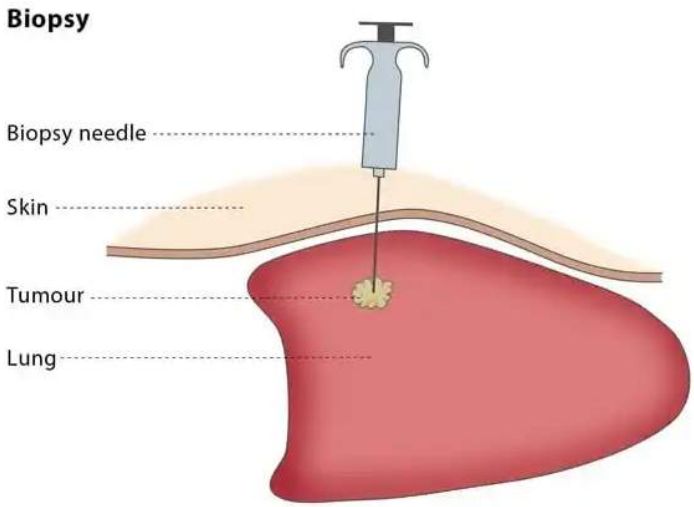
Incisional Biopsy



A biopsy of a selected portion of a lesion.

4

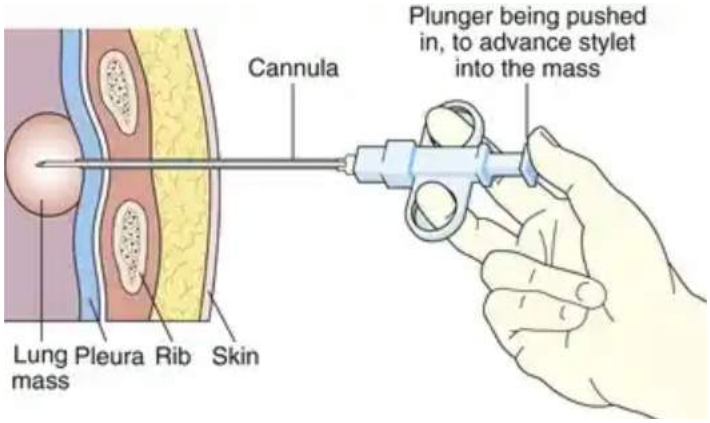
Needle Biopsy



Tissue is obtained by puncture of a tumor, the tissue within the lumen of the needle being detached by rotation, and the needle withdrawn.

5

Percutaneous Biopsy



Tissue is obtained by simply inserting a needle through the skin.

6

Punch Biopsy

Tissue is obtained by a punch, such as in a bone marrow biopsy.

Which type of biopsy is tissue obtained by simply inserting a needle through the skin?

- Percutaneous biopsy
- Punch biopsy
- Needle biopsy
- Cone biospy

SUBMIT

Complete the content above before moving on.

Tympanometry

Tympanometry is a test used to assess the mobility of the tympanic membrane in a quick and simple method. It can detect disorders of the middle ear such as fluid (serous otitis media or, acute otitis media), perforated ear drum, cerumen (ear wax) impaction, tympanic membrane scarring, improperly functioning bone conduction or a possible tumor. A tympanogram (the graph the results are recorded on) measures the response to sound and different pressures within the ear as the eardrum moves back and forth.

PREPARATION | PERFORMING THE TEST

First, ensure the ear canal is clean. The test will be inaccurate if the ear canal is full of wax, so check with the provider and get permission to clean the ear before completing the test.

When preparing the patient for the test, ensure you explain the procedure and what the patient can expect to see and hear. Also realize that some of the sounds may be loud or startling, so they should do their best to remain relaxed. You should advise the patient to sit quietly, avoid speaking or swallowing during the test as it can change the pressure of the middle ear and invalidate the results.

This can be a challenge with young children. Have the parent assist you in keeping the child quiet and still while the test is being run. The specific tympanometry machine you use may differ slightly from what is explained here, so ensure you have read about your particular machine, have been trained on it and feel comfortable using it.

PREPARATION | PERFORMING THE TEST

You will use a probe that looks similar to many of the tympanic thermometer probes. Attach a clean probe to the earpiece and gently secure it in the ear canal. Push the button and wait for the sign that the test is done. The probe will occlude the ear canal while the machine changes pressures and the test is competed. A graphic will be displayed that shows the mobility of the tympanic membranes response to various air pressures.

A normal tympanogram will peak at zero on the "Air Pressure," displaying a low level reading with a flat graph or one without a peak; the third type may show a distinct peak, but it will be shifted to a negative pressure, thus signaling an estuation tube dysfunction.
Make sure you show the graph to the provider before you let the patients leave. Ensure the tympanogram is properly labeled and the patient knows when to return for a follow up appointment if required.

Multiple Choice

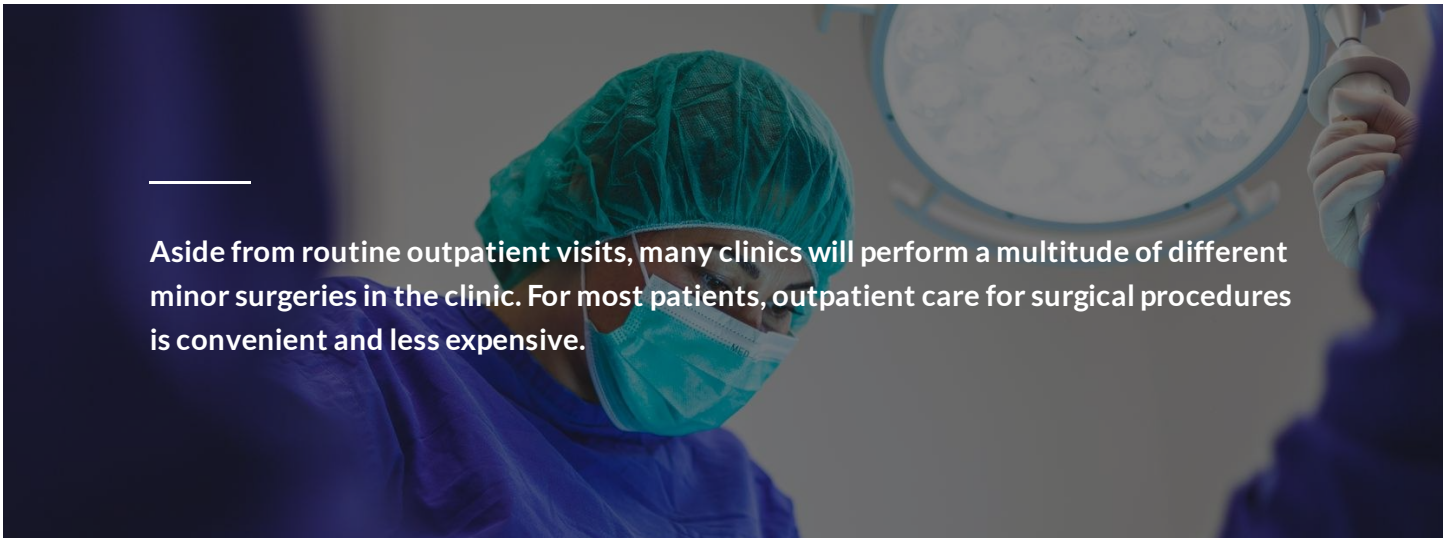
A normal tympanogram will peak at _____on the "Air Pressure," displaying a low level reading with a flat graph or one without a peak; the third type may show a distinct peak, but it will be shifted to a negative pressure, thus signaling an estuation tube dysfunction.

- ○ zero
- ○ one
- ○ two
- ○ three

SUBMIT

Complete the content above before moving on.

Minor Surgery



This section covers important information on preparation and care of the patient along with your responsibilities as a medical technician. We will also discuss information on technician responsibilities before and postsurgical procedure and some common surgical procedures performed on an outpatient basis, as well as some common actions you will take while preparing and assisting procedures.

Minor surgery is a surgical procedure for minor problems or injuries that are not considered life-threatening or hazardous. Some common surgical procedures you may assist with are:

- **Vasectomy**—male sterilization that consists of bilateral removal of a part of the vas deferens.
- **Cyst removal**—removal of an inflamed closed sac in or under the skin lined with epithelium and containing fluid or semisolid material.
- **Laceration repair**—surgical repair of jagged or smooth skin tissue by sutures, surgical staples, or medical glue. Lacerations can occur either by surgical means or traumatic injury.
- **Biopsies** – removal and examination, usually microscopic, of tissue or fluid from the living body to establish a precise diagnosis.

For some patients, minor surgery is a possibility or necessity. To prepare the patient for any type of surgery, there are multitudes of preoperative tasks that must be done.

These tasks are taught throughout your five-level upgrade training. As you continue to gain knowledge as a 4N0X1, you will need to comprehend the fundamental reasons why each step is important.

As an apprentice, you were taught six basic patient care tasks that are done before performing a procedure:

1. Verify the provider order.
2. Gather all of your equipment.
3. Identify the patient.
4. Explain the procedure to the patient.
5. Use proper body substance isolation (BSI) precautions with personal protective equipment (PPE).
6. Always provide privacy.

Whether the surgery is inpatient or outpatient, there are many variables that must be controlled. For most patients, their basic needs must be met for them to be confident and comfortable to sign consent for surgery.

PRE-PROCEDURE | POST-PROCEDURE

Appropriate surgical consent must be signed by a member not participating in the procedure. This would be a witness. Complete the consent form; escort the patient to the proper procedure room and educate the patient if needed on the procedure. Once the consent is signed, the minor surgery procedure can begin.

Informed consent is a process whereby the surgeon or provider explains the surgical procedure to the patient, including all the risks and possible complications of the procedure and/or any anesthetic involved. Obtaining consent is a legal requirement and is the responsibility of the surgeon or provider. The purposes of informed consents are:

- To ensure the patient understands what's about to happen, to include any potential negative outcomes, as well as any alternative treatments or procedures
- To confirm that the patient's decision was made voluntarily and without pressure
- To protect the patient against unauthorized procedures
- To ensure the procedure is performed on the correct body part
- To protect the surgeon and facility against legal action by patients claiming an unauthorized or incorrect procedure was performed.

Each provider normally has a specific way and specific equipment that he or she likes to have set up for various procedures. Talk with the provider before the procedure and ask how he or she prefers to perform the procedure and what supplies and equipment you should

ensure are available. It is a good idea to become familiar with all clinic providers equipment requirements; it will help ensure the procedures are performed smoothly and timely.

Have all supplies needed in the room. Leaving the room could compromise patient care if an emergency developed. The following items are a list of commonly used supplies and equipment; ensure you familiarize yourself with each one: formalin jars; lidocaine (Xylocaine) 1 percent with or without epinephrine; 1-, 3-, 5-, and 10-cc syringes; 18 and 25 gauge needles; blades; Betadine (check allergies); sterile biopsy procedure kit/suture kit; gauze; alcohol pads; silver nitrate sticks or a disposable cauterizer; sutures or sterile stripes; labels; antibiotic ointment; bandages; and tincture of benzoin.

As a part of your responsibilities, you must maintain a good working knowledge of the principles of aseptic techniques, the instruments used in minor surgery, and the procedures for submitting specimens for pathological testing.

PRE-PROCEDURE | **POST-PROCEDURE**

Be sure to assist the provider during the procedure and in dressing the wound after surgery, if required, and dispose of all sharps into the designated biohazard container. Repeat the patient's vital signs, and then assist the patient in sitting up and getting down from exam/procedure table.

Be available to assist the patient in getting dressed as necessary, and then escort the patient to the waiting room if required. Ensure the patient has wound care instructions, and make any follow-up appointment as necessary. Once this is completed, clean and restock the procedure room so it will be ready for the next procedure.

Assisting with Surgical Instruments

When assisting a health care provider with minor surgical procedures, you will need to know the various instruments used. There are particular instrument sets packaged and sterilized for many different procedures. All instruments used for minor surgery must be of suitable size, shape, strength, and function based on the procedure being performed.

Four basic classifications of instruments you will use for a minor surgery are cutting or dissecting, grasping or holding, clamping or occluding, and exposing or retracting instruments. Let's further break down each classification of each instrument by clicking on the hotspots in the graphic below.

Cutting or Dissecting

There are two divisions of these instruments, knives and scissors. The knives further divide into two types: knives with detachable blades and knives with fixed blades (disposable). The knives with detachable blades are most commonly used during minor surgical procedures. This allows the health care provider a wider range of blade types to perform the necessary cut for the procedure. Disposable knives are readily available through supply channels.

There are also different types and sizes of scissors. Scissors used for cutting tissue are curved or straight, blunt or sharp, depending on the type of tissue to be cut. This is when a determination will need to be made whether the scissors you are going to use are of suitable size, shape, and strength for the tissue being cut. For example, you would not use a pair of iris scissors to cut thick subcutaneous tissue but may prefer a pair of long curved Mayo scissors.

Grasping or Holding

As their name implies, these instruments are used for holding, grasping, or pulling tissue or vessels. Examples of these instruments are tissue forceps, which have teeth for a firm grasp, and dressing forceps, which have serrations instead of teeth to grasp delicate tissue.

Clamping or Occluding

Again, the name of the instrument tells its purpose. These instruments clamp blood vessels and certain types of tissue. If necessary, you also may completely stop the flow of blood from a vein or artery with this type of instrument. An excellent example of this category of instrument is the hemostat.

Exposing or Retracting

Exposing or retracting instruments are used to hold back the edges of a wound or cavity to expose an area. Not only do they expose an operative area, but they also hold back superficial tissue to give access and exposure to deeper tissue. The most common examples of these instruments are rake retractors, nasal, and vaginal speculums.

Even with the nursing challenges of assisting with minor surgery, treatment and release of the patient does not conclude the duties of the medical technician. Many minor surgeries are performed to make a diagnosis of the tissue taken from the patient.

This is not something you as the technician can perform, but it is your responsibility to ensure the specimen is labeled appropriately, recorded, transported to the pathology department, and turned over for processing.

Multiple Choice

What two types of knives are there to use in the surgery room?

- ◯ Exposing and Extracting
- ◯ Curved and Straight
- ◯ Detached and Fixed
- ◯ Rake and Fixed

SUBMIT

Complete the content above before moving on.

Pathology

When biopsies or specimens are taken during a minor surgical procedure, you will need to turn them in to the laboratory or, in larger facilities, the pathology department. These two areas process a large number and type of specimens daily and the only identification to the patient they have is through the label on the container. These departments do not have direct contact with minor surgery patients. As the medical technician assisting with the minor procedure, it is your responsibility to ensure proper labeling of the specimens before the patient is released from your care.

On each specimen label, you should have the patient's name, DoD ID number, date of the minor surgery, the type specimen and location from which the tissue was taken, the health care provider's name, and your initials. If multiple specimens are taken from the same patient, make sure all tissue specimens are labeled with the correct anatomical location. If you are unsure of the specific location, do not hesitate to ask the health care provider. All pathological specimens are logged into a specimen-tracking log, and then transported and turned into the lab for processing.

The minor surgery process is not complete until the specimen is read and the pathologist gives a diagnosis patient follow-up and results of the pathology report are given to the patient per local protocol.

PRE-PROCEDURAL	PERFORMANCE STAGE	POST-PROCEDURE

1. Verify provider's orders and correct patient.
2. Obtain baseline vital signs, to include oxygen saturation and their current pain score.
    1. If the patient is diabetic, ensure to follow glucose control measures.
    2. Observe the patient for their cardiovascular and respiratory status – report any abnormal findings to the provider.

3. Ensure there is a witnessed and informed consent on file; if not, obtain one
4. Determine laterality, if there's any necessary lab work, and/or history and physical based on provider instruction.
5. Verify correct patient, correct site, and correct procedure.
    - Consider appropriate marking of any incisions with a skin marker.
    - This is the time to execute a "time out" if warranted.
    - A time out involves the immediate members of the procedure team.
    - During a time-out, the team members agree, at a minimum, on the following: correct patient identity, correct site, and correct procedure to be done.
    - When the same patient has two or more procedures, If the person performing the procedure changes, another time-out will be conducted prior to the start of each procedure.
    - It's important to document the completion of the time-out, which is determined by the organization you work for.

6. If required, ensure patient has followed all food and fluid restrictions, has removed any jewelry, and is appropriately dressed for the procedure.
7. Perform a medication reconciliation.

8. Administer preprocedural medication, if indicated by the provider.
9. Gather supplies and equipment, set up as necessary, and prepare to assist.

PRE-PROCEDURAL	PERFORMANCE STAGE	POST-PROCEDURE

Some medical/nursing competencies that you may be expected to assist with are BLS and the recognition of signs and symptoms of adverse reactions, to include seizures and abnormal heart rhythms. You should have a basic pharmacological understanding of local anesthetic agents used and neurological checks.

Additionally, you should be familiar with the type of nerve block performed (if any), its therapeutic effects, side effects, associated adverse reactions, and what to do in case of an emergency resulting from the procedure itself or any of its components.

You may be expected to assist with the following:

- Maintaining an aseptic/sterile field
- Handing the provider supplies/tools upon request
- Keeping the procedure site clear of blood/secretions
- Conducting/monitoring vital signs

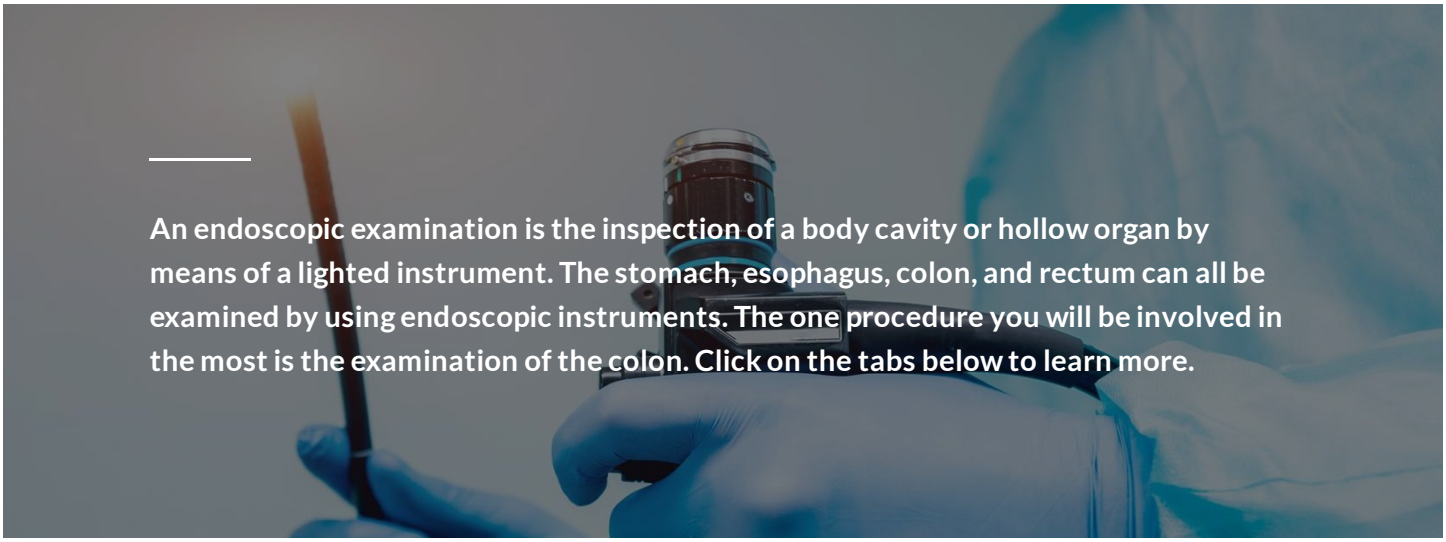
PRE-PROCEDURAL	PERFORMANCE STAGE	POST-PROCEDURE

1. Obtain vital signs, including oxygen saturation, temperature, and pain score.
2. Administer oxygen if warranted and directed to.
3. Determine if the patient has recovered adequately for discharge by using the following criteria:

- Stable vital signs
- Can stand without dizziness and is able to walk
- Pain score is at a tolerable level (usually less than three is required)
- Can tolerate fluids
- Oriented to time, place, person
- No indication of respiratory distress
- Has a responsible, adult escort who can take the patient home and remain with them
- Understands post-op instructions and takes a copy home

CONTINUE

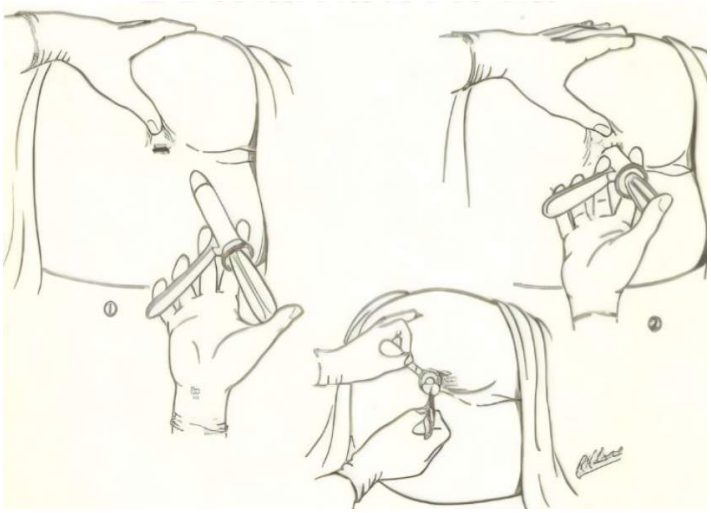
Sigmoidoscopy, Proctoscopy, and Colonoscopy



An endoscopic examination is the inspection of a body cavity or hollow organ by means of a lighted instrument. The stomach, esophagus, colon, and rectum can all be examined by using endoscopic instruments. The one procedure you will be involved in the most is the examination of the colon. Click on the tabs below to learn more.

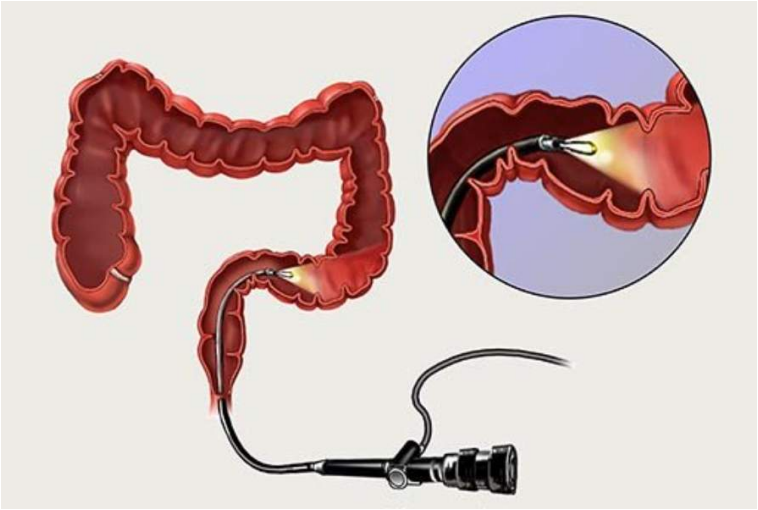
PROCTOSCOPY | SIGMOIDOSCOPY | COLONOSCOPY

An endoscopic medical procedure used to examine the anal canal, rectum, and the sigmoid colon. It plays a key role in the treatment and management of rectal and anal diseases and is considered one of the simplest and most commonly performed diagnostic procedures, along with proctosigmoidoscopy and lower intestinal endoscopy. Commonly done for conditions such as hemorrhoids, anal fissures, and rectal polyps.



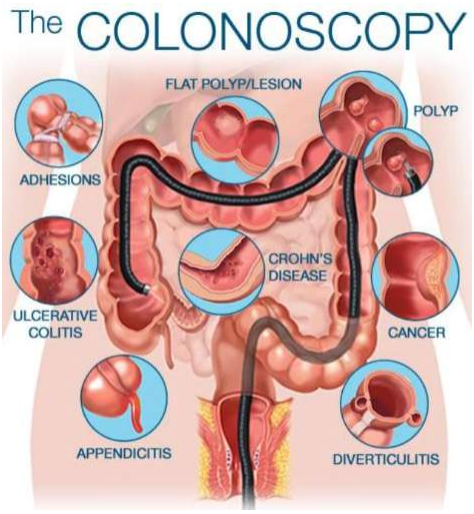
PROCTOSCOPY | SIGMOIDOSCOPY | COLONOSCOPY

An exam used to evaluate the lower part of the large intestine (colon). During a flexible sigmoidoscopy exam, a thin, flexible tube (sigmoidoscope) is inserted into the rectum.
A tiny video camera at the tip of the tube allows the doctor to view the inside of the rectum, the sigmoid colon and most of the descending colon — just under the last two feet (about 50 centimeters) of the large intestine. If necessary, tissue samples (biopsies) can be taken through the scope during a flexible sigmoidoscopy exam. Flexible sigmoidoscopy doesn't allow the doctor to see the entire colon. As a result, flexible sigmoidoscopy alone can't detect cancer or small clumps of cells that could develop into cancer (polyps) farther into the colon.



PROCTOSCOPY | SIGMOIDOSCOPY | COLONOSCOPY

An exam used to inspect the entire large intestine for changes — such as swollen, irritated tissues, polyps or cancer — in the large intestine (colon) and rectum. During a colonoscopy, a long, flexible tube (colonoscope) is inserted into the rectum. A tiny video camera at the tip of the tube allows the doctor to view the inside of the entire colon. If necessary, polyps or other types of abnormal tissue can be removed through the scope during a colonoscopy. Tissue samples (biopsies) can be taken during a colonoscopy as well.



A **fiber optic scope** enables the provider to see the inside of the colon on a display screen by moving the head of the fiber optic scope around.

Watch the video below to learn more about a sigmoidoscopy procedure.

PDF

What is a flexible sigmoidoscopy Video Transcript.pdf

134 KB

Patient Preparation

Patients who require a proctoscopy can be performed without a clear liquid prep, although a more thorough exam can be obtained if the patient's lower bowel is clear of feces. You may be responsible for assisting the patient with an enema if the provider needs the lower bowel to be clear for an exam the same day.

Patients undergoing a sigmoidoscopy or colonoscopy must have the bowel clear of fecal material. This is done by providing the patient a cathartic (stool softener), enema, or both the night before the procedure. Patient scheduled for a sigmoidoscopy will normally have a diet restricted to clear liquid the day before the test.

Patients scheduled for a colonoscopy are normally placed on a clear liquid diet for 24 hours before the procedure, along with a laxative tablet for three nights before the test. Patients should be told to avoid red or purple liquids and are normally instructed not to have anything to eat or drink at least eight hours before the procedures. Bowel cleansing with laxatives, cathartics, and enemas should be performed within 24 hours before the test. As you can see, these tests need the intestines to be as clean as possible for the provider to adequately view the mucous membranes.

If you are assisting, you will be responsible for positioning the patient, preparing the equipment, and helping the physician. You should explain the procedure to patients to lessen their fear and anxiety. These are uncomfortable and tiring procedures for the patients, and they should be allowed to rest before other tests, examinations, or treatments are performed. It is also important to make sure the patient signs a consent form before the procedure.

Sigmoidoscopies and colonoscopies are normally performed in a special lab or in a surgical suite. Proctoscopies can be performed in an exam room.

PROCTOSCOPIES | SIGMOIDOSCOPY | COLONOSCOPY

- Have the patient undress from the waist down.
- Place patient in a side-lying or Sims position.
- Ensure all supplies and equipment are ready (gloves, drapes, proctoscope, water soluble lubricant, hand towels, chux and a light source such as the one used for pelvic exams).
- Be prepared to assist the provider with supplies as needed.
- Hand the patient tissue to wipe excess lubricant or don gloves and assist if needed.
- Help the patient to a sitting position after the examination, taking care to ensure the patient has a moment to rest so he or she does not become dizzy and fall.
- Schedule any required follow up.

PROCTOSCOPIES | SIGMOIDOSCOPY | COLONOSCOPY

- Encourage the patient to empty his or her bladder just before the test and remove all clothing from the waist down. A signed consent form is required before the examination. Be sure to obtain baseline vital signs.
- Patients are positioned in a side-lying or Sims position. Drape the patient so that only the anus is exposed. (Provide as much privacy as possible.)
- Ensure all equipment is working and all required supplies are available.
- Be prepared to assist provider with supplies as needed.
- Remind the patient to breathe slowly and try to relax the lower abdominal and rectal muscles as the fiber optic scope is inserted into the anus and slowly introduced into the lower intestine. As you can imagine, this can be uncomfortable for the patient. The provider may also inflate the lower bowel with air to provide a better view of the surrounding tissue. Some abdominal cramping will normally be experienced.
- Hand the patient tissue to wipe excess lubricant or don gloves and assist if needed.
- Help the patient to a sitting position after the examination, taking care to ensure the patient has a moment to rest so he or she does not become dizzy and fall.
- Check vital signs before allowing the patient to leave.
- Schedule any required follow up.

PROCTOSCOPIES	SIGMOIDOSCOPY	COLONOSCOPY

Patients will be instructed to remove clothing from the waist down and are normally given a gown, open at the back. Once changed, patients will be placed on a gurney or bed with rails up as they will be given sedation to help with relaxation and decrease awareness during the procedure. A long flexible fiber optic scope will be inserted anally and advanced through the large intestine. The same steps are performed as with the sigmoidoscopy, except the procedure will take anywhere from 30–90 minutes and the scope is inserted much farther. Most patients would not be able to tolerate the discomfort from this procedure without sedation. After you explain the procedure to the patient, ensure he or she signs the required consent form. Any iron medication, aspirin, and most anti-inflammatory drugs must be withheld for three days. As before, make sure you obtain baseline vital signs before the procedure.

- Patients are positioned in a side-lying or Sims position.
- Drape the patient so that only the anus is exposed. (Provide as much privacy as possible.)
- Ensure all equipment, to include the fiber optic light, biopsy forceps, suction, water, and air are all working.
- Ensure all required supplies are available (drape, water soluble lubricant, hand towels, gloves).
- Be prepared to assist the provider with supplies as needed. The provider may also inflate the lower bowel with air to provide a better view of the surrounding tissue. Some abdominal cramping will normally be experienced during and after the procedure.
- Monitor vital signs every half-hour for two hours, or as directed by the provider or local protocol.
- Monitor for rectal bleeding (there may be a small amount of bleeding if polyps or biopsies were taken).
- Patients will usually be placed on bed rest for six to eight hours after the procedure.
- Monitor vital signs every half hour for 2 hours and then IAW facility protocols.
- Monitor for rectal bleeding (slight bleeding is expected if polyps were biopsied and/or removed).
- Keep patient on bed rest IAW doctors' orders.
- Someone must drive patient home.

Flexible Sigmoidoscopy

Follow the below steps when assisting with a flexible sigmoidoscopy. You will need to first gather all supplies and equipment.

Next, perform hand hygiene and verify correct identification of the patient. You will set up the sigmoidoscopy equipment; perform function checks on light and suction unit.

Ask the patient if they completed the bowel preparation as instructed. Then ensure patient empties his or her bladder prior to the procedure.

Instruct patient to remove all clothing from the waist down and don gown with the ties in the back. Assist patient onto the exam table, and into the left lateral or Sims position. Then drape patient so that only the anus is exposed (when the provider is ready).

After the procedure, don gloves and clean the patient's anal region using tissues and/or wipes. Allow patient to relax before getting up from the table. Remove gloves and perform hand hygiene.

Help patient get off the exam table and allow privacy to get dressed. Place any biopsy specimens in fixative and label the containers at the bedside. Send specimens to lab.

Once patient leaves the room, prepare for the next patient by cleaning the room and disinfecting the equipment.

This is an inspection of the sigmoid colon by means of an endoscope called a sigmoidoscope.

- ◯ Proctoscopies

- Sigmoidoscopies
- Colonoscopies
- Bronchoscopy

SUBMIT

Complete the content above before moving on.

Bronchoscopy

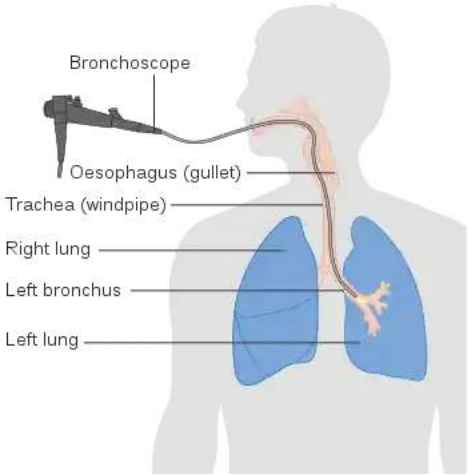
A bronchoscopy is a diagnostic procedure in which a fiber optic tube is inserted through the nose or mouth into the lungs. The procedure provides a view of the airways of the lung and allows doctors to collect lung secretions and to biopsy for tissue specimens. If the bronchoscopy is performed through the nose, an anesthetic jelly will first be inserted into one nostril. When it is numb, the scope will be inserted through the nostril until it passes through the throat into the trachea and bronchi.

Usually, a flexible bronchoscope is used. The flexible tube is less than ½-inch wide and about two-feet long. As the bronchoscope is used to examine the airways of the lungs, your doctor can obtain samples of your lung secretions to send for laboratory analysis.

PROCEDURE SET-UP	DURING THE PROCEDURE	AFTER THE PROCEDURE

1. Verify correct patient, date of birth, providers' orders.
2. Verify that a witnessed and informed consent has been completed.
3. Ensure IV access is present and patency confirmed.
4. Verify that the patient has none of the contraindications that would otherwise halt the procedure:
   - Uncorrectable coagulopathy
   - Severe refractory hypoxemia
   - Unstable hemodynamic status
   - Facial trauma
   - Unstable cervical spine
   - Patients with increased risk are those that had a myocardial infarction within the past six weeks, head injuries, and known or suspected pregnancy.
5. Be prepared to assist in the administration of anesthesia and/or sedation in accordance with unit policies.

6. Prior to the procedure, ensure fluids and food is restricted in accordance with the provider's orders in order to reduce the risk of aspiration.
7. Ensure patient removes dentures, contact lenses, and any other prostheses before the procedure.



PROCEDURE SET-UP | DURING THE PROCEDURE | AFTER THE PROCEDURE

1. Monitor patient's heart rate, rhythm, blood pressure, respirations, respiratory effort, and level of consciousness.
2. Monitor pulse oximetry.
3. Ensure patient remains NPO until patient regains their gag reflex.
4. Observe patient's perceptions of pain, discomfort, and dyspnea.
5. Immediately report signs of cyanosis, hypoventilation, hypotension, tachycardia or dysrhythmia, hemoptysis, dyspnea, or decreased breath sounds.

PROCEDURE SET-UP | DURING THE PROCEDURE | AFTER THE PROCEDURE

Ensure out-patients are given post-op instructions and know what to do if/when complications arise.

CONTINUE

Incentive Spirometer

The incentive spirometer is used to promote voluntary deep breathing. This expands the lungs capacity, allowing them to fill fully with air. The goal is to increase the amount of air inhaled and expelled to improve profusion.

This exercise is used to prevent or treat atelectasis in postoperative patients. The most common being patients who have undergone thoracic or abdominal surgery, patients who are on bed rest, and those who have neuromuscular disease or spinal injuries.

To start, place the patient in the sitting position and explain to the patient to exhale fully. Have the patient place the mouthpiece in his or her mouth. Inhale slowly until the desired goal is reached; hold for three seconds and ensure each ball is raised to the same level. Relax and slowly exhale and explain to the patient this should only be done one time in a minute to allow the patient to relax.

The patient should perform 5-10 breaths per session every hour while awake.

CONTINUE

Diabetic Foot Exam

A very important part of your job will be to inspect the condition of the patient's skin surface, especially pressure points and the feet on a daily basis for admitted patients and routinely for clinical patients. Because of circulatory and healing problems, diabetic patients must be monitored closely for bruises and wound healing.

It is very easy for a diabetic to have an injury or wound without knowing it, and they are at high risk for dangerous infections of the lower extremities; severe cases often lead to amputations of the toes, foot, or limb. Nerve damage, known as neuropathy, and poor circulation are the most common causes of diabetic foot problems.

The diabetic foot assessment is a key component in the care of a patient with diabetes. The assessment includes risk factor identification in both the diabetic patient's history and physical examination, foot care education, treatment, and referrals as needed. The foot complications related to diabetes such as peripheral neuropathy, foot ulceration, and amputation can be life altering. The American Diabetes Association recommends a diabetic foot examination annually for patients with diabetes with foot care education. Diabetic foot assessment may be recommended more frequently for individuals with risk factors contributing to ulceration, peripheral arterial disease, and peripheral neuropathy.

A diabetic foot exam is used to check for foot health problems in people with diabetes. When ulcers or other foot problems are found and treated early, it can prevent serious complications.

Monofilament testing is an inexpensive, easy-to-use, and portable test for assessing the loss of protective sensation, and it is recommended by several practice guidelines to detect peripheral neuropathy in otherwise normal feet.

The feet should be cleaned at least daily or according to the provider's orders. You should first look for any damaged skin (report if found) and then press on with hygiene care. Foot care, to include nail care, is explained; however, technicians should not perform nail trimming/care due to the high risk of complications. Most providers will perform nail care themselves because of the high risk.

Here are a few tips so you know what to expect when you assist:

- Inspect the condition of the skin, with a focus between the toes and on the heel.
- Inspections will be daily for inpatient and routinely for outpatient appointments.
- Look for any damaged skin, to include: cuts, scrapes or cracks.
- Look for any bruising or discoloration to the skin.
- Nail care includes regular trimming, cleaning and cuticle care.
- Wash feet in warm water; do not soak- this could cause drying.
- Push cuticles back gently on nails with plastic applicator to prevent hangnails.
- Toenails are clipped straight across to prevent ingrown nails.
- Toenail clippings of a diabetic, or one with circulatory disease requires a doctor’s order and is performed by a nurse or physician.
- Brush a soft nylon fiber called a monofilament over the toes and foot to test the foot's sensitivity to touch.
- If a problem is found, more frequent testing will likely be recommended, antibiotics to treat infections, and/or surgery to help with bone deformities.

Test your knowledge of the pressure points of the feet by using the drag and drop interaction below.

Screening of the Diabetic Foot

Monofilament Test

Monofilament sensory testing uses a 10 g monofilament to assess a patient's ability to feel light pressure at a number of separate sites on the foot. The New Zealand Society for the Study of Diabetes guidelines suggest the examination of 12 sites in total – six on each foot which represent the most common sites of ulcer formation.

CONTINUE

Endotracheal Care

The endotracheal tube is a flexible tube that is inserted through the mouth or nose and into the trachea. This acts as an artificial airway. These are often used for trauma patients, medical emergencies and at times short term for complex patients. This artificial airway provides and maintains a patient airway, it allows for deep tracheal suctioning and removal of secretions, and permits mechanical ventilations.

The endotracheal tubes inflated balloon seals off the trachea to prevent aspiration from the gastrointestinal (GI) tract. It is easier to insert in an emergency, however maintaining placement is difficult, therefore it is not recommended for long term use.

To start the procedure, verify provider's orders, verify patient with two patient identifiers. Perform hand hygiene and prior to care, ensure that the patient has equal, bilateral breath sounds throughout the lung fields. Check the marked points on the tube at the insertion level to determine if the tube has moved. Check breath sounds every two hours, suction when needed. Annotate when suctioned, and the color and characteristics of secretions.

When the natural humidifying pathway of the oropharynx is bypassed, ensure to provide adequate humidity. Inspect the nose and mouth for any ulcers or pressure areas. Provide oral and nasal care. Oral care will be performed every two to four hours, or by provider orders. Use a soft toothbrush or swab and a prepackaged oral care kit. Prevention of ventilator- associated pneumonia beings with frequent oral care. Ensure to keep the patient's lips moisturized, preventing them from cracking or becoming sore.

Inspect the positioning and stabilization of the tube. Position changes can obstruct the airway and potentially cause tissue erosion and necrosis. Reposition and tape the oral endotracheal tube (ETT) care to the opposite side on a daily basis. Note the tube depth each time.

CONTINUE

Tracheostomy Care

Tracheostomy care is vital to establishing and keeping a patent airway. Remember to always keep an eye on your patient to ensure that the tracheostomy has not become blocked with secretions or fluids used for cleaning, or that it has become dislodged. You are working on the patient's airway, it is vital to ensure you have all the required supplies and equipment prior to starting the performance phase of the maintenance procedure.

Never leave. Talk to the patient before the procedure to give him or her an overview of what you will be doing, talk the patient through the procedure as you perform it. Reassess the patient's airway and respirations upon task completion.

PREPARATORY PHASE	PERFORMANCE PHASE
You will first need to verify provider's orders and two patient identifiers. Gather supplies, to include the following: • Sterile towel, sterile gauze pads (10), sterile cotton swabs, sterile gloves, hydrogen peroxide, pipe cleaners or brush, sterile water, antiseptic solution and ointment, face shield, tracheostomy tie tapes or tach securing device, oxygen, french suctioning catheter and suction unit. Explain the procedure to the patient. Asses the condition of the stoma. Examine the patients neck, looking for any subcutaneous crepitus. Suction the trachea and pharynx thoroughly prior to care. Wash your hands thoroughly when finished.	

PREPARATORY PHASE	PERFORMANCE PHASE

- Assemble equipment: place on sterile towel.
- Open four gauze pads and pour hydrogen peroxide on them.
- Open two gauze and pour the antiseptic solution on them.
- Open two gauze and keep dry.
- Open the last two gauze and pour sterile water on them.
- Place the tracheostomy tube tapes onto the field.
- Put on face shield.
- Don sterile gloves.
- Clean the external end of the tracheostomy tube with two hydrogen peroxide saturated gauze. Discard when done.
- If present, unlock and remove the inner cannula.
- If a disposable inner cannula is used, using your clean hand replace with a new cannula, touching only the external portion, locking it securely into place.
- Designate the hand you clean with as contaminated and reserve the opposite hand as sterile for handling sterile equipment. If inner cannula is reusable, remove it with your contaminated hand.
- Clean with hydrogen peroxide using a brush or pipe cleaners with your sterile hand.
- When clean, with your sterile hand, drop the brush or pipe cleaners into sterile solution and agitate to rinse thoroughly. Tap gently to dry. Replace with your sterile hand.
- Clean the stoma Q4-8 hours with gauze soaked in saline. Use a semicircular motion, moving inward to outward. Note you may use diluted hydrogen peroxide to loosen any crusted secretions.
- Loosen and remove any crust with sterile cotton swabs or cotton tip applicators.
- Repeat cleaning using sterile, water soaked gauze pads.
- Repeat using dry pads.
- When soiled, change the securement device, per local policy.
- With assistance to avoid dislodgment, one person will hold the tube, and the second person performs the exchange/ replacement.
- Carefully remove soiled securement device.
- Grasp the slit end of the clean tape pulling (threading) through the opening on the side of the tracheostomy tube.
- Pull the other end of the tape securely through the slit end of the tape.
- Repeat steps on the opposite side.
- Tie tapes at the side of the neck in a square knot. You will alternate the knot from side to side, each time the tapes are changed, or secure the securement device.
- The ties should be tight enough to keep the tube securely in the stoma, but allow two fingers to fit between the tapes and the neck.
- Place a gauze pad between the stoma site and trach tube, per your local policy.
- Document procedure and current condition on the stoma and site, to include skin condition, secretions, and any changes.

CONTINUE

Contact Lens Removal

It is not uncommon for someone to splash a chemical or have a foreign object blow into an eye. If this happens, the patient will likely go to the emergency room or may show up at the clinic you are working in. You need to know what to do and how to take care of the problem quickly. Delay in care could risk the patient losing eyesight!

First, you need to determine whether the patient is wearing contact lenses and if so, which type. If the patient has a chemical in the eye, the provider will most likely want you to remove the contact lens immediately. Leaving a contact lens in place when there is an infection or injury to the eye can compound the damage.

You should have the patient sit in a wheel chair and take the patient to a room as he or she probably will not be able to see due to the burning, pain in the injured eye, and both eyes will tear up preventing good vision. If a chemical or foreign object is in the eye, notify the provider immediately and follow his or her directions to splint the object, remove contacts or begin irrigation. You may have the patient remove the contact lenses if he or she is able to or you may need to remove them.

The steps are the same whether the patient removes the lenses or you do it.

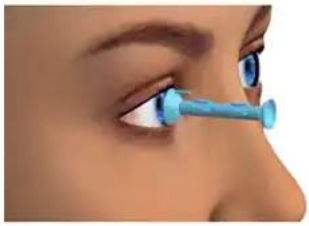
Removal of a Hard Contact Lens

1. Don clean gloves.
2. Cup your nondominant hand below the patient's eye.
3. Move the lens directly over the cornea.
4. Pull the upper eyelid up above the edge of the lens.
5. Pull the lower lid down to the lower edge of the lens.
6. Press slightly onto the lower lid, at the edge of the contact lens; the hard lens should slide out between the upper and lower eyelid.
7. Place each contact lens into separate containers with sterile water and label each container with which eye the lens was removed from.

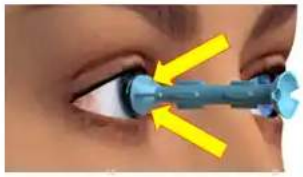
Removal of a Soft Contact Lens

1. Don clean gloves.
2. Place a drop of wetting solution or sterile saline in each eye to moisten the contact surface.
3. Using your non dominant hand, open the eye with your middle finger and thumb.
4. Use the index finger of your dominant hand and place it gently on the lower edge of the contact lens.
5. Slide the lens down toward the lower lid.
6. Gently pinch the lens between your index finger and your thumb, and lift the lens out.
7. If you are unable to remove the contact lens with this technique, get a contact lens suction cup to remove the lens.
8. Place each lens into separate containers with sterile water, and label which eye the lens was removed from.

Focus On The CENTER HOLE
To Serve As A Guide



PINCH Very High On Base
To Remove The Lens



Twist the wand to help release the contact lens

Inserting & Removing a Contact Lens in a Clinical Setting

When able or available, use a soft contact lens tool to put in and take out contact lenses by focusing on the center of the eye.

Place the suction device over the lens and squeeze the wand to help release the contact lens.

> **Know your patients! Ask them if they wear glasses or contacts. Never allow them to wear their contacts overnight and make sure they have a pair of eye glasses for extended stays.**

CONTINUE

Fluorescein Eye Stain

First you will need to verify the provider's orders.

Then apply a drop of sterile normal saline to the fluorescein strip; gently pull the lower eyelid down, and gently touch the tip of the strip to the inner aspect of the eyelid.

Note: moistening the strip will enhance the release of the dye.

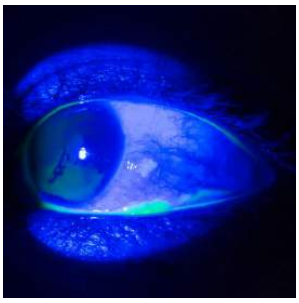
Ask the patient to blink several times, allowing for the dye to be distributed. Dye is dispersed over the conjunctiva and cornea. The cornea is viewed through a woods lamp, or other blue light filter in order to illuminate the area of abrasion or ulceration.

Apply antibiotic ointment, as directed by the provider and finally, apply a patch if indicated.

Apply saline

Touch inner eye

Utilize woods lamp for viewing



Look for abrasion or ulceration

CONTINUE

Ear Irrigation

Ear Irrigation Syringe with needle catheter

Ear irrigations are used to remove cerumen (ear wax) or any foreign body that occlude the ear canal, thus preventing sound from reaching the tympanic membrane. Ear irrigations are ordered by the primary care provider and should not be performed if there is a chance the tympanic membrane is perforated. S/S to look for prior to ear irrigation include but are not limited to reddening of the tissue, tenderness or white pustules/ secretions.

The steps for performing an ear irrigation are listed below.

1. The first step is to verify the provider's orders.
2. Next, gather supplies: one large basin, one kidney basin, sterile 2x2, one 20cc syringe, one 20 gauge IV needle, (remove needle, place in sharps, keep catheter.) hydrogen peroxide, two chux pads, towel, ear curette with light or otoscope, and debrox if ordered.
3. Then you will fill the large basin with warm water and hydrogen peroxide. – DO NOT USE cold water; may cause nausea and dizziness. Fill the 20cc syringe and place the 20 gauge needle onto syringe, remove needle and leave catheter.
4. Now you will place the patient in the sitting position and drape chux pad and towel over shoulder. Have the patient place kidney basin flush to the jaw under the ear and you will gently pull the pinna up and out for adults, down and back for pediatrics, straightening the ear canal. This will allow for irrigation.
5. Place the tip of the syringe at the opening of the ear. Use the otoscope or ear curette w/light to guide the progress off irrigation. Carefully remove any large chunks of cerumen with sterile 2x2 and continue irrigation for prescribed time (or how many ml/ccs provider ordered). Repeat as needed. Have the patient lie on the irrigated side to allow the ear to drain. Inform the provider once irrigation is finished.
6. Document procedure.

What the video below and watch how an ear irrigation is performed so you have an idea of what to expect if you have to use this procedure.

Ear Irrigation Training Video Transcript.docx
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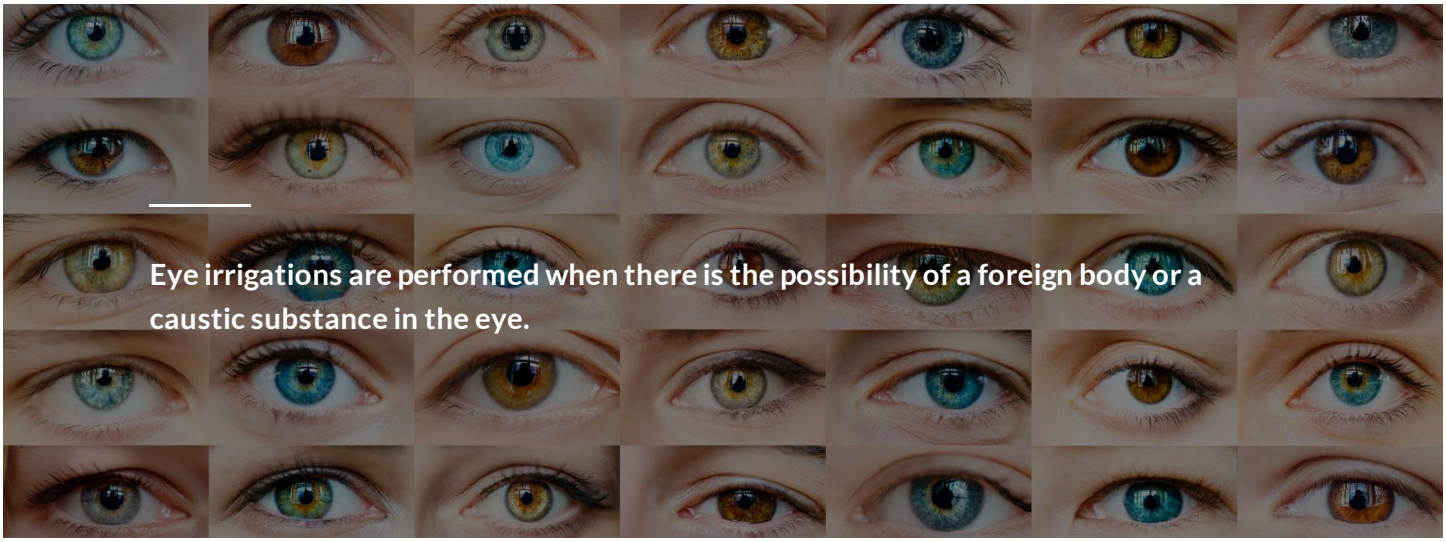
True or False: When performing an ear irrigation, you will fill the large basin with warm water and hydrogen peroxide. DO NOT USE cold water; may cause nausea and dizziness. Fill the 20cc syringe and place the 20 gauge needle onto syringe, remove needle and leave catheter.

- ◯ True
- ◯ False

SUBMIT

Complete the content above before moving on.

Eye Irrigation



Some examples may range from an eyelash to a scrap of metal or jet fuel. It is an uncomfortable experience for most people and they may be very anxious about future eye damage or loss of eyesight. It is very important you are careful but thorough when irrigating the eye. In some instances, you may go to a scene of a patient with a chemical in the eye. Most areas on base that deal with fuels or chemicals have an emergency eyewash station. If it is available, the patient should use it immediately and then be transported to the hospital for further treatment.

You may also have a patient who splashed chemical into their eye walk into your ER or clinic. You should ask if the patient used an emergency eye wash station or running tap water prior to their arrival. Report that information to the provider and they will normally want immediate and thorough flushing with sterile saline or water for 10-30 minutes. In a controlled situation, the provider will normally have you irrigate the eye with an irrigation set. A quick set up is an IV bag with normal saline and IV tubing.

Procedure

Verify the provider's orders. Verify patient. Verify correct eye(s) to be flushed. Place patient in a supine position – head should be angled in the direction of the affected eye to prevent runoff into unaffected eye.

Position the exam light so that it illuminates the affected eye. Place a chux pad and/or towel on the bed in order to protect the patient's bedding and clothes. Place an emesis basin close to the patient's face in order to catch the irrigation solution.

Prepare the irrigation set and fluid – fluid should be at room temperature; ensure only sterile normal saline or tap water is used.

Don gloves. Remove any crusty discharge from patient's eyelid with moistened gauze or cotton ball. Moisten with sterile normal saline. Stroke from the inner canthus to the outer edge of the affected eye.

Fill the irrigation syringe with the appropriate amount of fluid. With your nondominant hand, gently pull the upper eyelid up and pull the lower eyelid down, which will expose the conjunctival sac.

Ask the patient to look down. Hold the irrigation tubing ½ to 1 inch above the eye. Gently depress the plunger of the syringe as to irrigate the eye. Direct the stream from the nasal edge of the eye across the outer edge.

You should repeat the irrigation until the desired effect has been reached or the total amount of solution ordered has been administered. If a large amount is prescribed by the provider, allow the patient to rest their eye between washings.

Too much fluid pressure may damage the cornea. Allowing the patient to close the eye from time to time can help remove the foreign object by moving it from the upper to lower conjunctival sac. Once complete, dry the eyelid with a sterile gauze or cotton ball. Allow patient to dry off their face by providing a towel. Document the procedure. Include what kind of solution is used and the amount, the appearance of the eye and surrounding tissues, patient's response to the procedure.

CONTINUE

Complicated Wounds

Types of Wounds

Wounds can be accidental or intentional. An intentional wound is created for therapeutic reasons, such as during an operation.

The different types of accidental wounds include:

CONTUSION	HEMATOMA	ABRASION	AMPUTATION

This is commonly referred to as a bruise. This type of injury involves the skin and subcutaneous tissue. The skin remains intact, but the underlying tissues are damaged. The extent of the damage depends on the amount of force that was applied to cause the injury.

The damage usually includes cell damage and torn blood vessels in the dermis, and leakage of tissue fluid and blood into the damaged tissues. This leakage causes edema and pain and produces a characteristic black and blue discoloration called ecchymosis.

CONTUSION | HEMATOMA | ABRASION | AMPUTATION

This is a pool of blood that forms beneath the skin when large amounts of tissue are damaged and large blood vessels are ruptured. Hematomas also occur with fractures or when organs are damaged. The extent of the bleeding depends on the force of the injury, size of the damaged blood vessel, and the location of the injury. The femur, for example, is surrounded by large blood vessels. When the femur is fractured, these vessels are usually damaged causing pooling of large amounts of blood. In some cases, this pooling may be enough to cause hypovolemic shock. By contrast, a hematoma can form when you pinch the skin on your finger, but it is so small that it may only be a minor inconvenience.

Another common type of hematoma is the subungual hematoma. After a blow or crushing injury to the fingernail, the patient experiences severe and sometimes excruciating pain that persists for hours and may even be associated with a vaso-vagal (sudden loss of consciousness) response. The fingernail has an underlying deep blue-black discoloration which may be localized to the proximal portion of the nail or extend beneath its entire surface.

Many times you will assist the physician in performing a trephination (excision) at the base of the nail, using an electric cauterizing lance, or drill. When performed quickly, patients do not feel the heat, just relief from pain. The cautery or drill is rapidly tapped a few times in the same spot at the base of the hematoma until the hole is through the nail. When resistance from the nail gives way, stop further downward pressure to avoid damaging the nail bed. Apply pressure to stop the bleeding and apply antibacterial ointment and bandage accordingly.

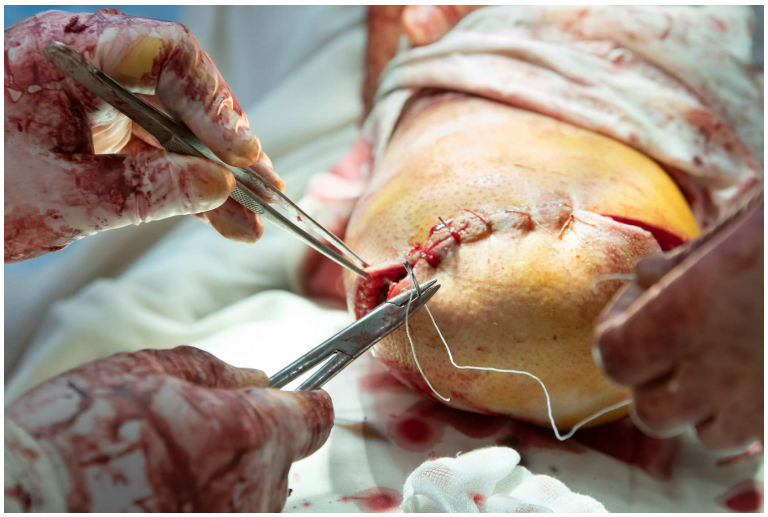
CONTUSION | HEMATOMA | ABRASION | AMPUTATION

This is the loss of a portion of the epidermis as the result of the skin being rubbed or scraped across a rough surface. There may be some bleeding from the capillary vessels in the dermis, but the abrasion usually does not penetrate completely through the dermis.

Abrasions are usually extremely painful because multiple pain sensors are normally found in the damaged area. Abrasions are also known as road burns, a strawberry, and rug burn.

CONTUSION | HEMATOMA | ABRASION | AMPUTATION

This is the surgical removal or traumatic severing of a part of the body. Extremities and its attachments are most subject to amputations. Amputations can be partial or complete.



CONTUSION	HEMATOMA	ABRASION	AMPUTATION

This is an injury in which a piece of skin is either torn completely loose from all attachments or left hanging as a flap. Avulsed tissues ordinarily separate at normal anatomical planes, usually between the subcutaneous tissue and the muscle fascia. Usually, there is significant bleeding from the bed of the wound. If the avulsed part remains attached by a small pedicle of skin, circulation to the flap may be in jeopardy.

CONTUSION	HEMATOMA	ABRASION	AMPUTATION

This is a cut produced by a sharp object. The cutting object may leave a torn or jagged wound through the skin and may penetrate into the subcutaneous tissue, underlying muscles, and associated nerves and blood vessels.

CONTUSION	HEMATOMA	ABRASION	AMPUTATION

This is a smooth cut produced by a sharp object. The sharp object in most cases is a knife or surgical scalpel.

CONTUSION	HEMATOMA	ABRASION	AMPUTATION

This is an injury caused by a stab with a knife, ice pick, splinter, or any other pointed object, including a bullet. External bleeding is not normally severe because the entrance wound is small, but the penetrating object may injure structures deep within the body causing rapid, fatal bleeding if structures such as the large blood vessels within the chest are involved.
Puncture wounds are also highly susceptible to infection because of the depth of the penetration. In some cases, the wound actually penetrates all the way through the body or extremity. Such wounds are called perforating wounds.

Regardless the **cause** of the wound, there are **three** distinct **phases** in the healing process, and **three** basic ways in which a wound **heals**. We will first go over the three phases.

The Healing Process

Inflammation Phase

The inflammation phase takes place immediately after the injury occurs and typically lasts three to four days. During this phase, blood vessels constrict, platelet aggregation occurs (clumping together) and the formation of fibrin from the action of thrombin on fibrinogen as well as epithelial migration. This is known as hemostasis. From here a scab will begin to form to protect against pathogens, while epithelial cells being to migrate from the margins of the wound to the base of the scab. After roughly 48 hours, you'll see a thin layer or epithelial tissue forming over the wound.
Chemical reactions then occur, releasing histamine and prostaglandin, while small blood vessels then dilate, becoming more permeable. This will cause serous fluid to leak into the traumatized area. Edema, also known as swelling, occurs from the leaking of plasma and electrolytes into the interstitial space. The wound now becomes swollen, red and tender to the touch.

Clinical signs of the inflammatory process include:

Edema/swelling of the injured area, erythema (redness), heat, warm or increased temperature at the site, pain from pressure on nerve receptors, and lastly, possible loss of function.

The Healing Process

Proliferation Phase

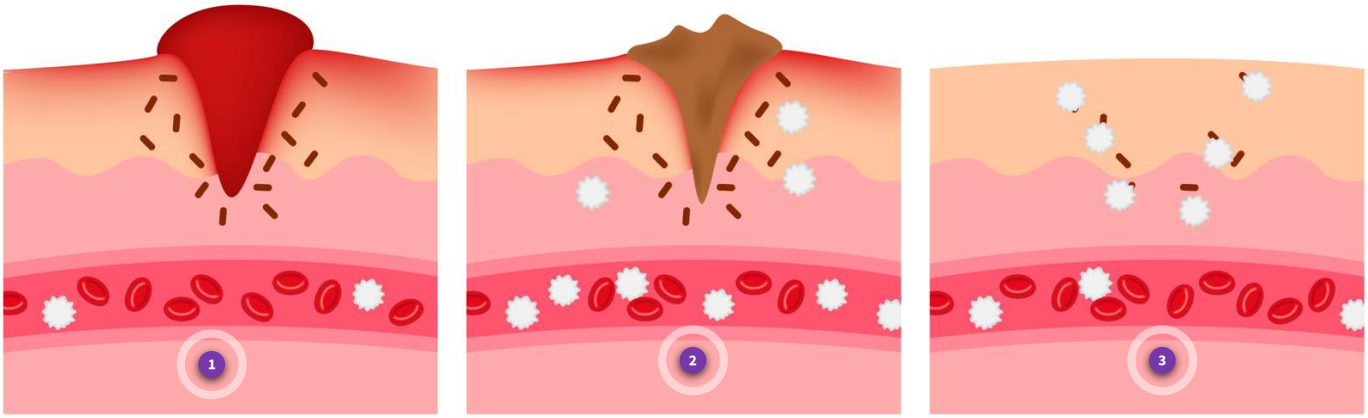
This stage begins on the third or fourth day post injury and can often take two to three weeks. During this phase the wound is filled with new connective tissue, while new epithelium covers the wound.

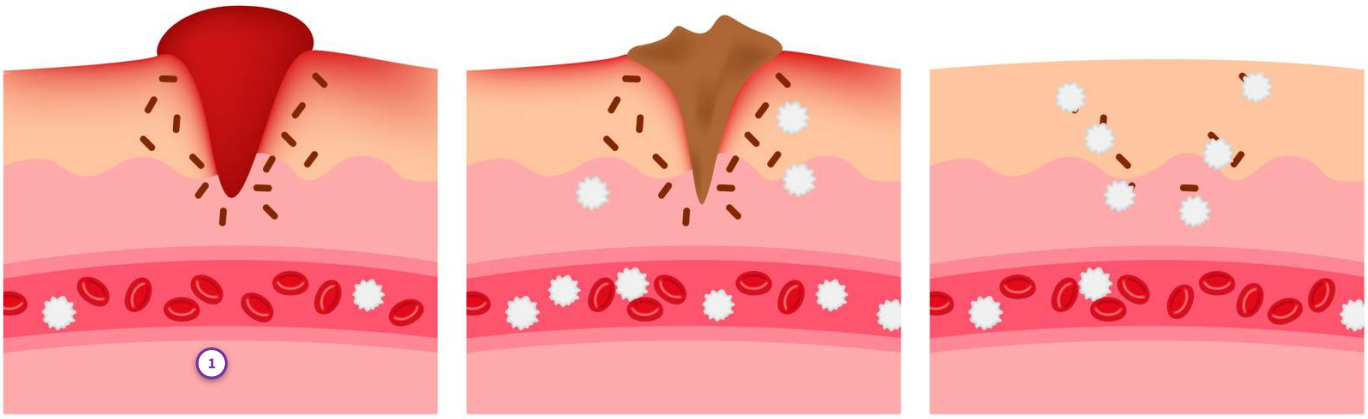
The Healing Process

Maturation Phase

The final stage of healing, which beings approximately three weeks after the injury. This is the process of collagen lysis (breakdown) and synthesis by the macrophages, producing the strongest possible scar tissue.

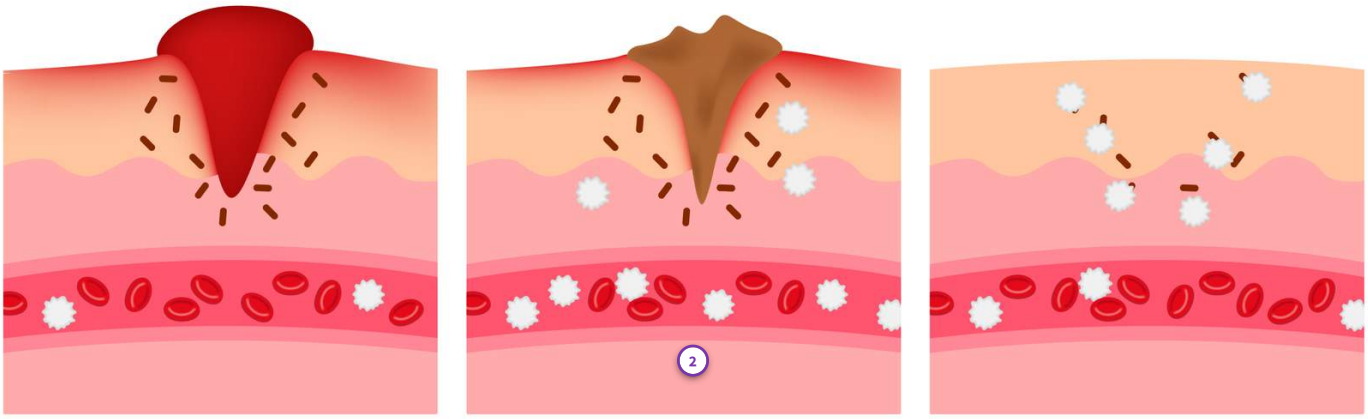
Stages of Healing





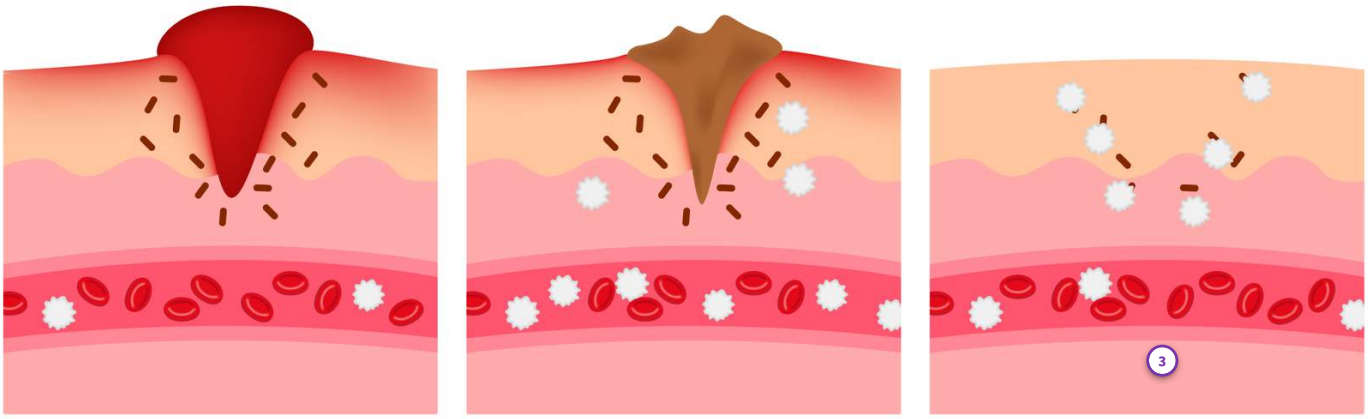
1st Intention Healing

It is also referred to as primary union. An excellent example of first intention healing is a surgical closure. There is a minimum of tissue damage, inflammation, or scarring. Of course, closing a wound can only be done when no infection is present; therefore, some few accidental wounds cannot be sutured and healed in this manner.



2nd Intention Healing

It is also referred to as granulation. When there is a danger of infection, or when there is an infection already present, the wound is left open to heal from the deeper layers of tissue to the epidermis. This filling in of new pink tissue is called granulation.



3rd Intention Healing

It is also referred to as secondary closure. There may be times when the physician may want to delay wound closure due to repeated debridement, irrigations, and excessive drainage. Once the physician ensures that the wound is free of infection, the granulated tissues are approximated (brought together) and then sutured.

Another example is when the initial closure breaks open, which is referred to as a wound dehiscence, and is then resutured. Whichever healing process is used, you are responsible for daily dressing changes.

Multiple Choice

What type of wound is shown in the photo below?

- Amputation
- Laceration
- Incision

Avulsion

SUBMIT

Complete the content above before moving on.

WET-TO-DRY DRESSING

WET-TO-WET DRESSING

Dressings serve multiple purposes. They prevent microorganisms from freely entering or escaping the wound while also absorbing any drainage. These dressings help debride wounds and encourage cellular growth from the base of the wound to the surface. The frequency of dressing changes depends on the provider's orders, and amount of necrotic debris that is removed with each dressing change.

- Verify the providers orders.
- Asses the old dressing if already in place.
- Prepare space and supplies.
- Open dressing package and sterile container (sterile water/solution per Dr. orders).
- Perform hand hygiene and don gloves.
- Gently and steadily pull the gauze away from the wound to help debride the necrotic tissue. Do not remoisten prior to removal.
- Discard soiled dressing and gloves.
- Perform hand hygiene and pour sterile solution into basin.
- Don sterile gloves.
- Place new dressing into the basin with the sterile solution, or moisten the dressing by pouring the solution over it. The dressing should be thoroughly soaked.
- Wring out each dressing and lightly press the fluffed gauze in the wound, ensure the entire wound is covered. Additional dry dressings may be added as needed to keep the outside surface dry.
- Remove gloves and discard. Tape edges of dressing and perform hand hygiene and document time of dressing change, type of dressing, appearance of wound and what type of dressing was placed.

WET-TO-DRY DRESSING

WET-TO-WET DRESSING

Dressings serve multiple purposes. Wet to wet dressing are used to keep a wound moist and promote healing. The main purpose of this dressing is to reduce inflammation; cleanse the skin of the thick exudates, crusts or scales; and to maintain drainage of the affected area. This provides an environment that is warm and moist which can help improve wound healing and increase patient comfort.

- Verify the providers orders.
- Asses the old dressing if already in place.
- Prepare space and supplies.
- Open dressing package and sterile container (sterile water/solution per Dr. orders).
- Perform hand hygiene and don gloves.
- Slowly and carefully remove the gauze. If the dressing is stuck to the wound, add normal saline to loosen it.
- Discard soiled dressing and gloves.
- Perform hand hygiene and pour sterile solution into basin.
- Don sterile gloves.
- Place new dressing into the basin with the sterile solution, or moisten the dressing by pouring the solution over it. The dressing should be thoroughly soaked.
- Wring out each dressing and lightly press the fluffed gauze in the wound, ensure the entire wound is covered and cover with a second moist dressing and then a dry sterile 4x8 combined dressing in a single layer on top of the wet dressing.
- Remove gloves and discard. Tape edges of dressing and perform hand hygiene and document time of dressing change, type of dressing, appearance of wound and what type of dressing was placed.

CONTINUE

Postmortem Care

Postmortem Care Procedures

Postmortem care is given after the patient is deceased. These procedures occur after the physician pronounces the patient dead. The patient is not legally dead until the physician makes a physical determination. All treatments and procedures continue until the physician makes his assessment and pronounces the patient as “dead.” You will follow local policy in performing postmortem care.

Step 1

Final Goodbyes

Ask the family if they would like to be alone with the body, to say their last goodbyes. Provide privacy whenever possible, and accommodate any cultural and religious beliefs.

Step 2

Begin Gathering Supplies and Prep the Room

Gather supplies needed, to include:

- shroud (sheet used to wrap body) or body bag
- death care kit
- gloves
- bag for personal belongings
- bathing supplies
- comb and brush
- tape and large safety pins
- body tags or labels
- valuables list
- gurney or morgue cart (cookie sheet)

Next, verify patient identification. Determine whether an autopsy will be performed or not. Then gather equipment, and prepare working space. Raise the bed to the proper height for you and your partner, and position the over-the-bed table for use. Close the door/pull curtains for privacy and dignity.

Step 3

Prepare the Body

- Perform hand hygiene and don gloves. Position the patient in the supine position, place a pillow under the head, and elevate the head of the bed 15-20 degrees.
- Close the eyelids. If necessary, grasp the eyelashes and gently pull lids down over the cornea.
- Replace dentures if applicable. Close the mouth. A small rolled towel may be placed under the chin to keep the mouth closed. Closing the mouth and eyes keeps the face in the most natural position during rigor mortis.
- Remove any jewelry and clothing. List all items on the patient's valuables list. These will be placed in a bag and returned to the family.
- Wash all areas of the body that are soiled with blood, feces, urine or any drainage. Place protective pads under rectum, vagina or urethra. After death, the sphincter muscles relax, allowing for loss of bladder and bowl.
- Comb hair.
- Deflate any balloons (Foleys etc.) and remove all tubes, to include IVs, catheters, NGs unless otherwise specified.
- If leaving in place, convert IV catheters to intermittent locks. Secure tubes, remove drainage bag or IV fluid container, cut the tubing and fold over twice. Leaving the IV catheter in place prevents leakage during the coroners embalming process.
- Change any soiled dressings and remove adhesive from skin. Place small dressing over wounds, securing with paper tape.

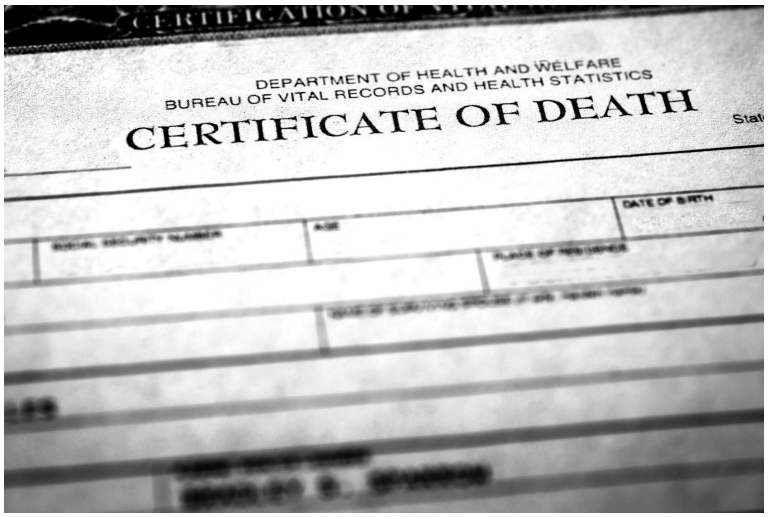
Step 4

Prepare for Transfer

- Dress the body in a clean gown.
- After the family leaves, attach ID tags on the big toe, ankle and wrist.
- Placed padded ties around the ankles; crisscross the wrists over the abdomen and secure.
- Place gauze tie or chin strap under the jaw to keep the mouth closed.
- Place the body on the shroud or in the body bag, while checking placement of drainage bags.
- Fold the shroud according to instructions. (Follow the numerical order.)
- Secure the shroud at the chest, waist, and knees and place an ID tag on the outside.
- Transfer the body to the cart/stretcher.
- Secure the body with straps. Be careful they are secure but not too tight as to leave marks on the body.
- Transfer the body to the morgue using the service elevator.

Step 5

Document



Document the care provided into the patients' medical record/chart.

CONTINUE

FAST Exam

Focused Assessment with Sonography in Trauma, more commonly known as a FAST exam, is performed on trauma patients. It is a rapid ultrasound assessment as a screening tool used to test or look for blood around the heart or free fluid in the abdominal organs after trauma has happened. Previous studies focused on identifying pericardial fluid (fluid around the heart) in blunt trauma patients, however with the advancement of technology comes advanced screening. FAST is now used to also screen or detect for hemothorax, pneumothorax and other cardiac related traumas.

Some of the indications for performing the FAST exam include, but not limited to:

1. Chest trauma
2. Blunt or penetrating cardiac trauma
3. Trauma in pregnancy

You will need to use a low frequency transducer- ultrasound machine- or a small foot print phased-array (cardiac) probe.

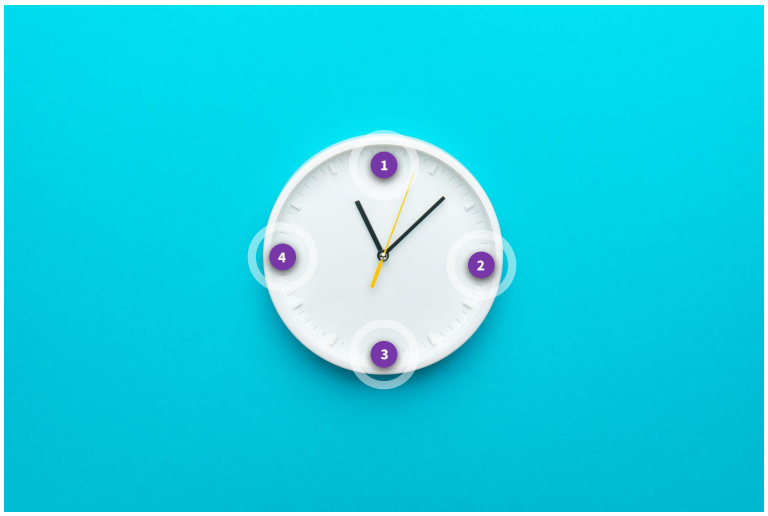
There are 10 structures or spaces that are typically viewed/imaged, via the four windows.

The patient will be positioned in the supine position, if awake and alert, have the patients place their hands behind their head. Note that placing the patient in the Trendelenburg position can improve the sensitivity of the exam for the patient.

You will begin your exam with one of the four regions, depending on the mechanism of injury, and then work through the areas clockwise.

Report all findings to the provider, and document in the patient's chart.

These four regions are listed below.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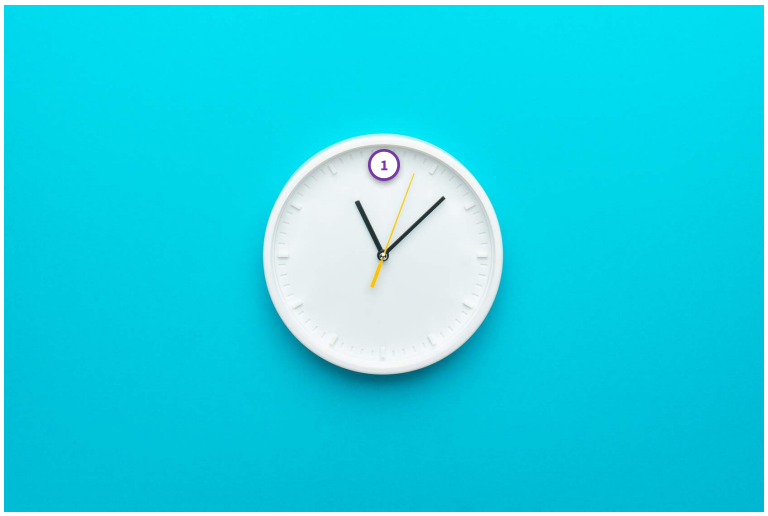
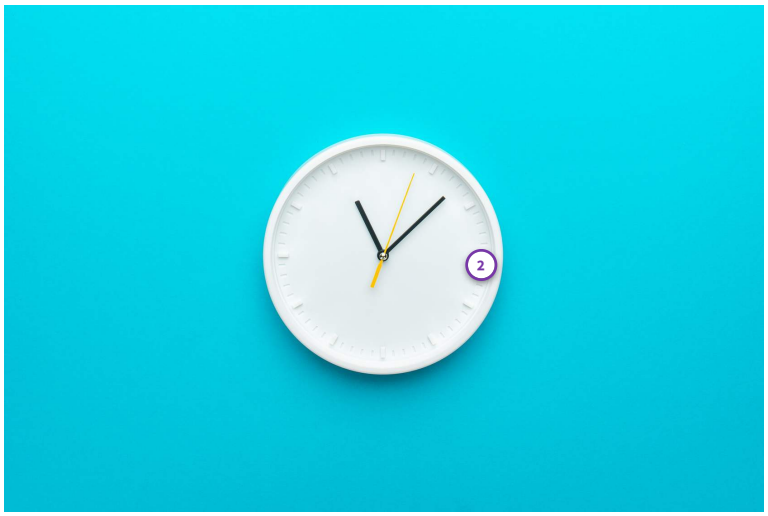
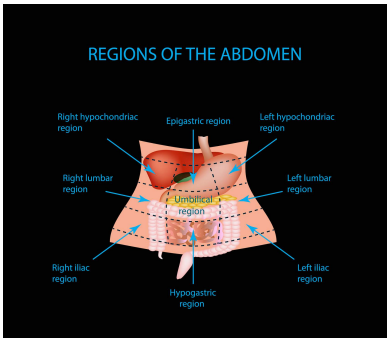


Cardiac

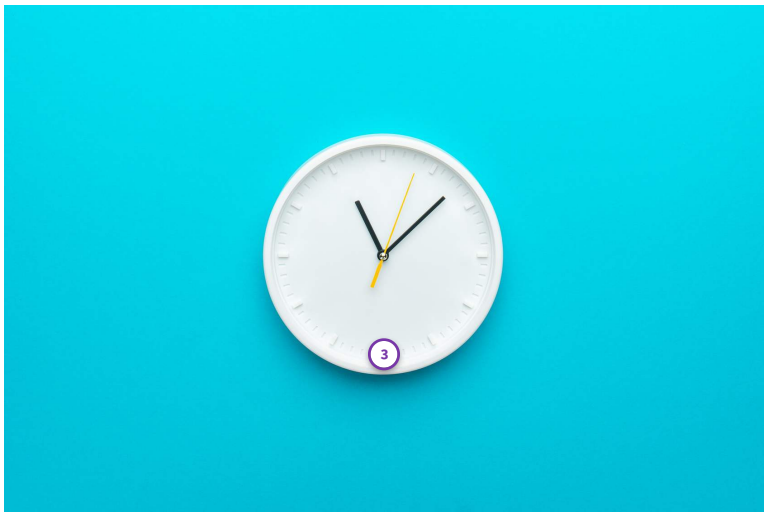
This area consists of the pericardium and the heart chambers, especially the right ventricle.



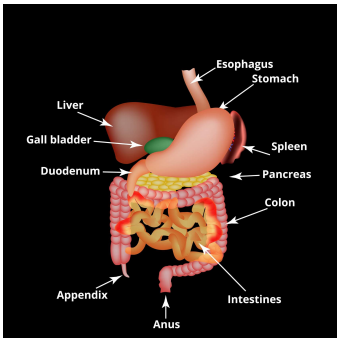
The RUQ- Right Upper Quadrant



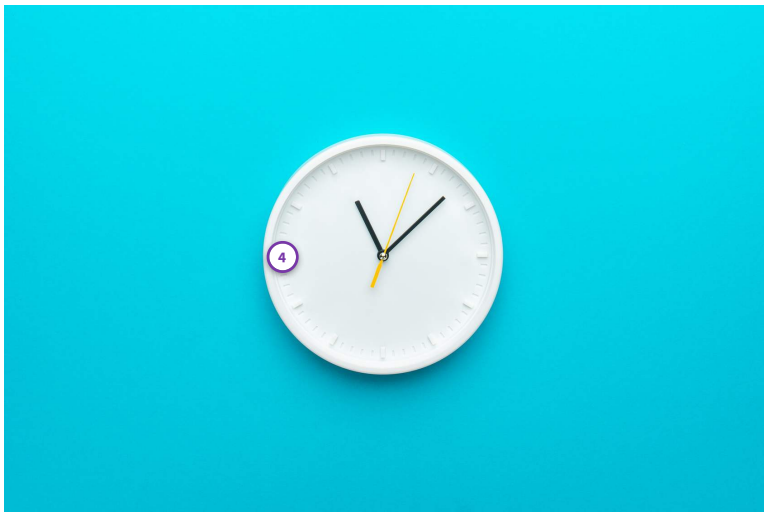
This area consists of the Morrison's pouch (hepatorenal recess), liver tip (right paracolic gutter) and the lower right thorax.



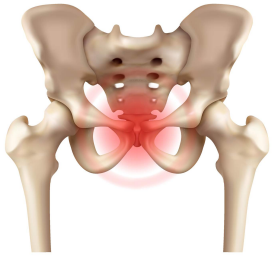
LUQ- Left Upper Quadrant



This area consists of the subphrenic space,
splenorenal recess, spleen tip (left paracolic gutter), lower left thorax.



Pelvic



This area consisits of the rectovesical pouch (male patients) and the rectouterine/pouch of Douglas (female patients).

Multiple Choice

During a FAST exam, what area will you inspect first?

- ◯ Cardiac
- ◯ Right Upper Quadrant
- ◯ Left Upper Quadrant
- ◯ Pelvic

SUBMIT

END OF LESSON

Lesson 3- Nutrition and Elimination Procedures

After completing this lesson, the student will be able to apply nutrition and elimination procedures in accordance with prescribed guidance and publications.

Patient Dietary Considerations

As a medical technician, it is important to know what dietary order each of our patients requires, and why. We must know the level of consciousness, swallow study results as well as the level of assistance they may need, to include any special precautions.

Clear Liquids Diet

These consist of fat-free broth, bouillon, coffee, tea, carbonated beverages, clear fruit juices (like apple juice), gelatin, fruit ices (ie: Italian ice) and popsicles. The term clear means you are able to see through it. An example of a non-clear juice would be orange juice. Considerations: patients with potential GI issues, or post-surgical patients, avoid clear liquids that are red/pink, orange or purple, as these can give a false " bleed" in the patients output. Always ensure the patient is in the sitting position, or elevated head of bed for aspiration precautions.

Full Liquid

While keeping clear liquid in mind, this is a step up. Full liquid has the addition of smooth textured dairy such as ice cream, strained or blended cream soups, and custards, refined cook cereals such as cream of wheat, vegetable juice, pureed vegetables, all fruit juices, sherbets, puddings and frozen yogurt.

Considerations: Always ensure the patient is in the sitting position, or elevated head of bed for aspiration precautions.

Dysphagia Stages

Thickened Liquids, Pureed: This dietary order combines both clear liquid and full liquid dietary orders, with the addition of scrambled eggs; pureed meats, vegetables, and fruits: mashed potatoes and gravy.

Considerations: These patients may not have the ability to chew, possibly have dentures, weak facial muscles, or a simply short attention span likely seen in elderly or pediatric patients.

Mechanical Soft

Combining the three above, with the addition of all cream soups, ground or finely diced meats, flaked fish (white fish), cottage cheese, cheese, rice, potatoes, pancakes, light breads, cooked vegetables, cooked or canned fruits, bananas, soups, peanut butter and eggs (not fried).

Soft/Low Residue

Addition of low fiber, easily digested foods such as pasta, casseroles, moist tender meats, canned cooked fruits, vegetables, desserts such as cake and cookies without nuts or coconut.

High Fiber

Addition of fresh, uncooked fruits, steam cooked vegetables, bran, oatmeal and dried fruits.

Low Cholesterol

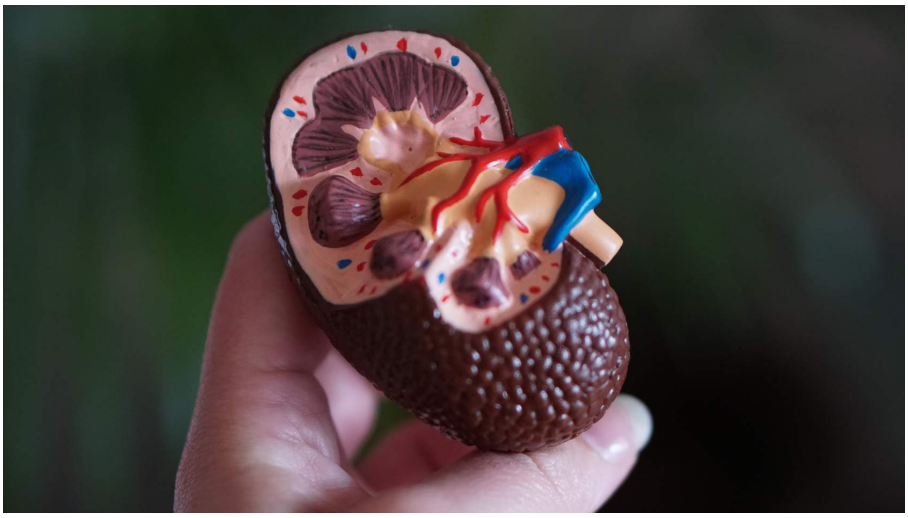
300 milligrams (mg) a day of cholesterol in accordance with the American Heart Association guidelines.

Bland Diet

These are ordered for patients who suffer from ulcers or any irritants to the GI tract. These diets are designed to eliminate chemical, mechanical and thermal irritants. This diet consists of foods cooked without oils and seasoning/spices.

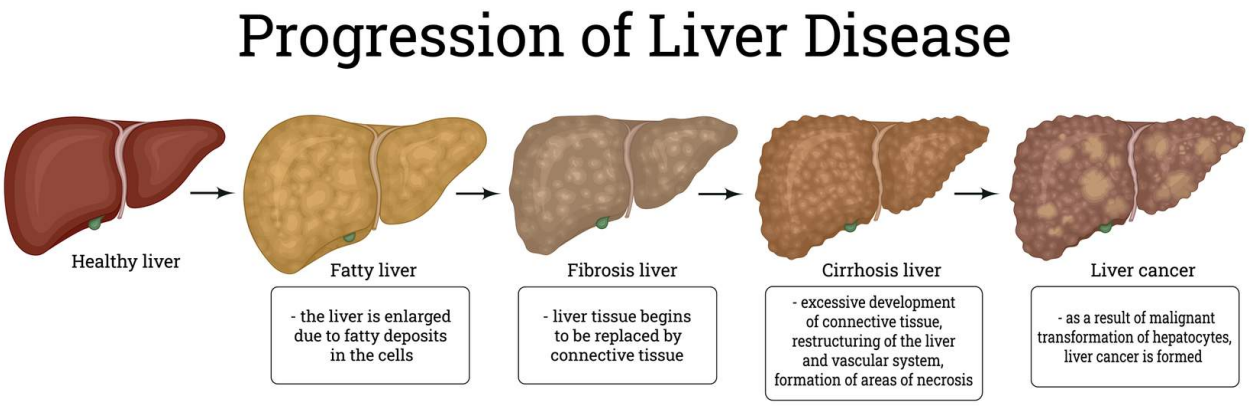
Fat Restricted

These are ordered for patients with gallbladder disease, malabsorption syndrome, and hyperlipidemia.



Protein Restricted

These are ordered for patients who have an impaired ability to excrete waste products of protein due to kidney or liver disease. These vary from total elimination of protein to diets around 80 grams per day.

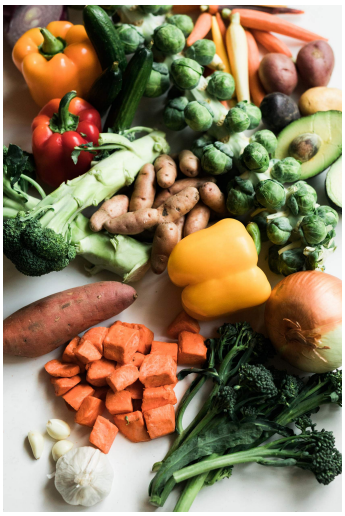


Gluten Free

Eliminates wheat, oats, rye, barley and their derivatives.

Calorie Restricted

This diet is designed to either lose weight or maintain a desirable weight. The diets contain fewer calories than the patient normally metabolizes. Foods allowed on a calorie restricted diet include foods that are low in fats and carbs, such as lean meats, fruits, vegetables, while avoiding foods that are high in fat or carbs such as butter, pastas, pastries or potato chips.



Mineral Restricted

These diets are ordered to treat certain diseases and conditions for test purposes. This includes: sodium (Na), potassium (K), calcium (Ca), phosphorus, (P), copper (Cu) and oxalate (OX).

Low Sodium

These consist of 4 gram (no added salt), 2 and 1 gram, or 500-mg sodium diets. These can vary from no salt, to sever sodium restrictions.

Sodium Restricted

Sodium Restricted: Sodium is a mineral commonly found in almost all food and even water. The most common form is sodium chloride or salt. The average daily intake is between 6-18 grams. This diet is ordered for patients who are subject to edema, hypertension, congestive heart failure, renal disease and cirrhosis of the liver.

Potassium Restricted

These are ordered for patients with kidney disease. Damaged kidneys have difficulty eliminating potassium. On occasion, some patients have a potassium depletion and require a high-potassium diet. Conditions that require high potassium include pro-longed IV feedings, severe diarrhea, diuretic therapy, diabetic acidosis or renal disease.

Calcium Restricted

This diet is ordered for patients who have recurrent renal calculi or hypercalcemia. The average daily intake of calcium is 800 mg. A 400 mg reduction in calcium intake will lower the renal load. Cranberry juice has a strong acidifying effect on urine, and may be effective in increasing urinary calcium excretion.

Regular Diet

No restrictions unless specified in the providers orders.

CONTINUE

Procedures to Assist Patients with Feeding

Some patients will require assistance during meals. Whether that is setting up their tray, cutting up their food or feeding them at bedside. We need to ensure we are providing patient safety and are aware of the indications and contraindications for each of our patients to include their specific meal orders. The goal is to properly prepare the patient and do everything we can to stimulate their appetite.

Step 1

Step One

Verify providers orders, and the meal matches the orders listed on Air Force Form 1094.

- Deliver tray to patient's bedside
- Set up overbed table

Step 2

Step Two

Remove tray lid and open any packages/cartons.

Step 3

Step Three

Cut up food according to meal orders, patient size and preference.

Step 4

Step Four

Allow food to cool and ensure napkins, utensils and call bell are within the patient’s reach.

Step 5

Step Five

Place patient in the sitting position in a chair, or raise the head of the bed to 90 degrees and have oral suction available.

Step 6

Step Six

Encourage the patient to do as much as possible for themselves. Promote independence and dignity.

Step 7

Step Seven

Place the tray in a visible and convenient position. Do not show signs of being in a hurry, take your time assisting.

Step 8

Step Eight

Offer small amounts of various foods, and fluids during the meal.

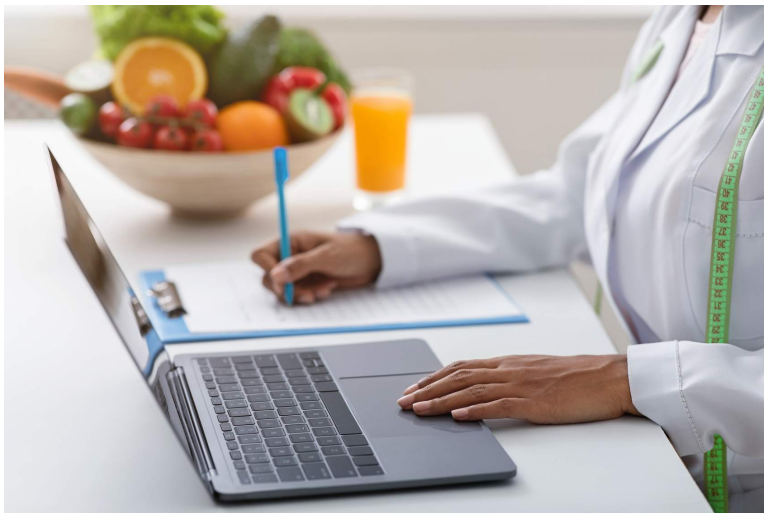
Step 9

Step Nine

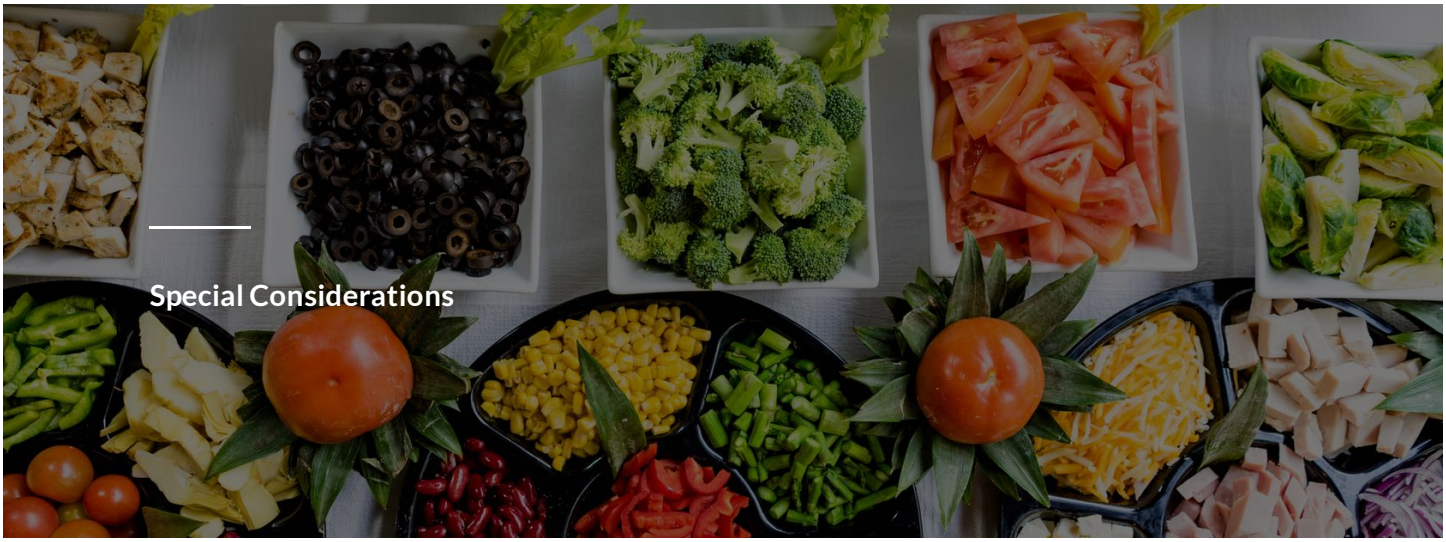
After the meal, provide post oral hygiene.

Step 10

Step Ten



Record intake of solids and liquids.



Blind patients may be very aware of food aromas, however you may still need to inform the patient what is being served and where it is located on the plate.

- Use the clock method to describe where foods are located.

- Set up the table/tray and assist the patient where you placed items (if they are right handed, place items on the right side).

Patients with unilateral (one sided) weakness will require monitoring during feeding. Place the food into the stronger side of the mouth.

Contraindication of oral feeding are absent gag reflex, dysphagia (difficulty swallowing) or decreased level of alertness. These patients are high risk for aspiration.

DO NOT lower the head of the bed directly after eating.

CONTINUE

Assist/Monitor with Tube Feeding

Gastric gavage is the procedure of feeding a patient through a tube inserted through the mouth or nose and into the stomach. The tube may be left in place for several days, or it may be inserted before each feeding. Accurate recording of the patient's intake and output is important. Ensure you provide oral care according to the provider's orders.

Step 1

Step One

Verify provider's orders and gather the below equipment:

- Feeding solution
- Irrigation syringe or funnel
- Graduated measuring device
- Water

Step 2

Step Two

Prior to the procedure, ensure the nasogastric (NG) tube placement is correct. This can be done by auscultation of the abdomen. Ensure the NG tube is secured within the patient's nose.

Step 3

Step Three

Place the patient in the Semi- Fowler's position. This will prevent aspiration as well as promote digestion.

Step 4

Step Four

Place a drape across the patient's chest.

Step 5

Step Five

Keeping the NG tube clamped, connect the irrigation syringe to the end of the tube.

- Pour the room temperature feeding solution into the funnel.
- Remove/release the clamp.
- When the syringe is ¾ empty, pour in additional solution. **DO NOT ALLOW AIR INTO THE TUBE.**
- Continue to administer the feeding solution slowly over the next 10- 20 minutes. Slow administration is important to ensure proper digestion, as well as reduce nausea and gaseous air for the patient. The patient may have a full feeling before all nutrients are administered if you pour too much too quickly.
- When the patient has received the prescribed amount of feeding solution, flush the NG tube with 50mL water.
- Clamp the tube and keep the patient in the semi-fowlers position.
- Report and document the procedure.

CONTINUE

Administer Retention Enema

One of the main purposes of a retention enema, is to lubricate the feces in the rectum and colon. Often, these are called oil-retention enemas. These are typically for patients who are experiencing constant constipation. The oil needs to be retained in the rectum to soften and coat the hardened feces. Enemas are given to evacuate the bowel. You may use tap water, soapsuds, or saline solution, using either an enema buckets or bag.

Step 1

Step

Verify provider's orders, and right patient using two patient identifiers. Plan enough time to either give the oil retention solution, or a large volume enema.

Step 2

Step Two

Gather the following supplies. Enema container and tubing with clamp, solution or disposable enema, bedpan or bedside commode, chux pad, lubricant, gloves, bath blanket, paper towel and toilet tissue.

Step 3

Step Three

Place the patient in the left Sims position and drape the patient with a bath blanket.

- Place the chux pad under the patients buttocks. (The solution will travel up the colon when the patient is laying on their left side.
- Open your supplies.
- If the tip of the enema bottle is not lubricated, or seem insufficient, add extra lubricant.
- Inset the tip into the anal opening.
- Gently and slowly squeeze the bottle, while rolling it up from the bottom as the solution enters the bowel. Try to squeeze as much of the solution into the patient as you can.
- Remove the tip slowly, and hold the buttocks together.

Step 4

Step Four

The oil or solution for a retention enema should be retained for at least 20 minutes and no more than two hours.

- Assist the patient to the bedpan or commode. Make sure to check for output prior to flushing or disposing of the waste.
- If a bedpan is used, ensure to raise the head of the bed to a sitting position.

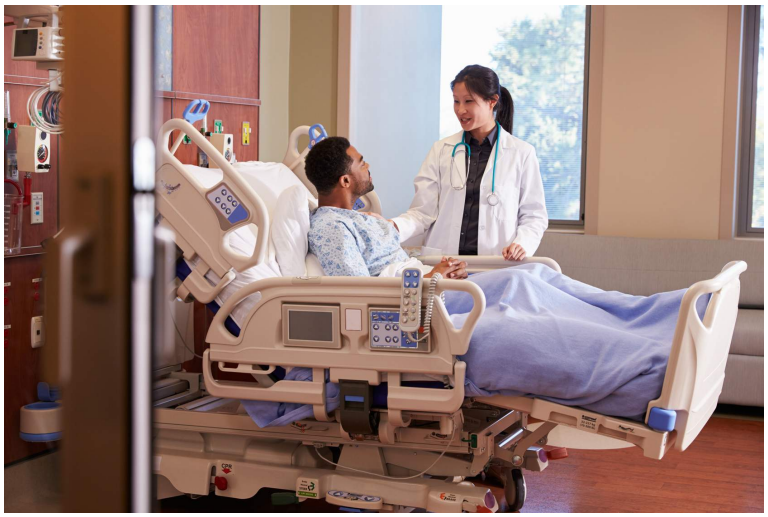
Step 5

Step Five

Assist the patient in cleaning of the anal area, take note of color, amount and consistency of the fecal matter, or liquid.

Step 6

Step Six



Lower the bed, raise side rails and place the patient in the position of comfort.

Step 7

Step Seven

Document all input and output, as well as color, size or amount, and any abnormalities.

CONTINUE

Assist with Continuous/Intermittent Bladder Irrigations

Irrigation of the bladder is done to remove and flush out any blood, bacteria and waste products that may remain post-surgery. Continuous irrigation is performed after prostate or bladder surgery via the three-way, also known as foley, catheter system. The irrigation solution is hooked up to the irrigation part of the catheter. The solution container is hung onto the IV pole. Using the sterile technique, the solution is run throughout the tubing. This primes the tubing, removing any air. As we know, too much air can cause bladder damage, or bladder lining spasms.

The tubing is then connected to the port of the catheter. Always consult the packaging for instructions when using the three-way catheter. Verify with the instructions, as well as provider's orders for the appropriate flow rate. The return fluid should be light red to pink in color. Irrigation solution container must be changed every 24 hours. You will subtract the amount of irrigation fluid used from your output prior to documentation.

There are **two** types of intermittent bladder irrigations; **closed and open**. Verify provider's orders to determine which of the two you will need to complete. The process is listed below for **both** types of irrigations.

Closed Intermittent Bladder Irrigations

Verify and Educate the Patient

Verify provider's orders, verify patient

- Gather the following supplies: sterile irrigation set, basin, clean and sterile gloves, absorbent pad, antiseptic swabs, sterile normal saline or ordered irrigation solution, sterile 30 to 50 ml syringe with a sterile insertion connector, tubing clamp, bath blanket.

Educate patient on the procedure.

- Set up work space.
- Close the room door, and or pull the curtains for privacy.
- Raise the bed to a comfortable working height.
- Perform hand hygiene and don gloves.
- Instruct patient to assume the dorsal recumbent position.
- Fan-fold the linen to expose the catheter.
- Use a bath blanket to cover the trunk of the body.

Closed Intermittent Bladder Irrigations

Check the Bladder

Palpate the bladder for any distention. This ensures the fluid will not over distend the bladder.

Closed Intermittent Bladder Irrigations

Get Your Tools Set

- Open the sterile irrigation set.
- Place beside the patient's thigh or between the legs.

- Ensure to maintain sterility to prevent any infection.
- Handling only the corners of the absorbent pad, place the pad under the catheter drainage tubing connection.
- Don sterile gloves.

Closed Intermittent Bladder Irrigations

Bladder Irrigation or Instillation

- Clamp the drainage tubing distal to the catheter connection. This directs the solution towards the bladder and prevents solution from draining into the collection bag.
- Measure amount of urine in drainage bag prior to irrigation.

Closed Intermittent Bladder Irrigations

Prepare the Irrigating Solution

- Using aseptic technique, pour 100-200 ml of irrigating solution into the sterile container. Verify amount from provider order, and local policy.
- While maintaining sterility, draw up approximately 30-40 ml of sterile solution into your syringe.
- Expel excess air from syringe and attach insertion catheter.

Closed Intermittent Bladder Irrigations

Attaching the Connector

- Before attaching the connector, scrub the port on the drainage tubing with an antiseptic swab.
- Attach the sterile connector into the port.
- Gently instill solution. Slow and steady. ***NOTE:*** Too much pressure can cause bladder spasms.
- Remove the insertion connector from the port.
- Cleanse the port with an antiseptic swab.
- Place the cap on the connector to maintain sterility.

Closed Intermittent Bladder Irrigations

Irrigation

Immediately unclamp the tubing and lower the catheter to allow fluid to run into the drainage tubing. You must allow fluid and debris to flow out through the catheter.

Closed Intermittent Bladder Irrigations

Instillation

- Leave tubing clamped according to provider's orders.
- Unclamp and allow fluid to drain into drainage container.
- Medicine must contact the bladder prior to draining.

Closed Intermittent Bladder Irrigations

Repeat

Repeat process until:

- All of the order solution is used.
- Catheter is clear and bladder is draining clear urine.

Closed Intermittent Bladder Irrigations

Empty the Drainage Bag

- Empty the urine in the drainage bag.
- Measure output.
- Annotate the color and characteristics.
- Chart intake and output into patients chart. ***NOTE***: Irrigation solution must be deducted from the total output.

Closed Intermittent Bladder Irrigations

Dispose of Supplies and Equipment

- Dispose of any supplies and equipment.
- Doff gloves.
- Make the patient comfortable, lower the bed, raise the side rails, place call bell within reach, ensure clamp is open.
- Perform hand hygiene.

Closed Intermittent Bladder Irrigations

Access and Document

- Assess the patient for discomfort.
- Document the following; date and time, irrigation method, amount and type of solution used, amount of solution used each time, appearance of return fluid, if the patient tolerated the procedure, and if the catheter is patent.

The bladder

Multiple Choice

What are the types of intermittent bladder irrigations?

- ◯ Irrigation and Closed
- ◯ Open and Clutched
- ◯ Open and Closed
- ◯ Closed and Continuous

SUBMIT

Complete the content above before moving on.

CONTINUE

Open Irrigations

Verify and Educate the Patient

Verify provider's orders, verify patient

- Gather the following supplies: sterile irrigation set, basin, clean and sterile gloves, absorbent pad, antiseptic swabs, sterile normal saline or ordered irrigation solution, sterile 30 to 50 ml syringe with a sterile insertion connector, tubing clamp, bath blanket.

Educate patient on the procedure.

- Set up work space.
- Close the room door, and or pull the curtains for privacy.
- Raise the bed to a comfortable working height.
- Perform hand hygiene and don gloves.
- Instruct patient to assume the dorsal recumbent position.
- Fan-fold the linen to expose the catheter.
- Use a bath blanket to cover the trunk of the body.

Open Irrigations

Check the Bladder

Palpate the bladder for any distention. This ensures the fluid will not over distend the bladder.

Open Irrigations

Get Your Tools Set

- Open the sterile irrigation set.
- Place beside the patient's thigh or between the legs.
- Ensure to maintain sterility to prevent any infection.
- Handling only the corners of the absorbent pad, place the pad under the catheter drainage tubing connection.
- Don sterile gloves.

Open Irrigations

Bladder Irrigation or Instillation

- Clamp the drainage tubing distal to the catheter connection. This directs the solution towards the bladder and prevents solution from draining into the collection bag.
- Measure amount of urine in drainage bag prior to irrigation.
- Obtain sterile connector cap.

Open Irrigations

Disinfect

- Perform hand hygiene.
- Don sterile gloves.
- Disinfect the junction of the catheter and drainage tubing with an antiseptic swab.
- Place your fingers at least one inch from the junction, and separate the catheter and tubing.
- Place sterile tube cap over the drainage tubing end.

Open Irrigations

Attaching the Connector

- Draw up 30-40 ml of solution into your sterile irrigation system
  Carefully fit the tip into the catheter.

- Pressing the plunger, gently instill the solution into the catheter.

Open Irrigations

Removal

- Remove and disconnect the syringe.
- Allow the fluid to run from the catheter into the sterile drainage container.
- Repeat until the fluid is running freely or until the irrigation is complete.
- A clogged catheter may take multiple irrigations to unclog.
- Remove the cap on the drainage tubing and reattach it to the catheter. Ensure both ends remain sterile.
- Swab the connection with an antiseptic swab.

Open Irrigations

Discard and Document

- Discard supplies and equipment.
- Doff gloves and perform hand hygiene.
- Document procedure, subtracting solution from output.

END OF LESSON

Lesson 4- Measure and Record Parameters

After completing this lesson, the student will be able to measure and record parameters in accordance with prescribed guidance and publications.

Perform Orthostatic Vital Signs

Blood pressure will fall in relation to the patient's position. It will change from when the patient is lying, sitting, or standing. The normal difference in systolic pressure tends to be no greater than 15 mmHg lower than it was in a reclining position. The diastolic pressure may fall 10 mmHg from the lying position. This change is not noticeable in most individuals. Internal receptors make rapid adjustments to compensate for the changes in blood volume distribution. For some individuals, the pressure may drop more rapidly. This is known as postural hypotension or orthostatic hypotension. This could be a result of several factors such as circulatory problems, dehydration, or medication effects.

When the provider suspects the patient has a low blood volume or possible dehydration, he or she may ask for orthostatic vital signs to be taken. Orthostatic vital signs are done by taking the blood pressure and pulse with the patient in the lying, sitting, and standing positions (in this order), and waiting three minutes between the positions. Signs and symptoms to immediately report to the nurse or provider are: decrease in blood pressure, significant increase in pulse rate, fainting, blurred vision, and/or lightheadedness. Treatment for postural/orthostatic hypotension may include intravenous therapy or blood transfusion therapy.

1. Place patient in supine position

A. Record patient's pulse.

B. Record patient's blood pressure.

C. Record patient's position.

D. Wait 3 minutes.

2. Place patient in sitting position

A. Record patient's pulse.

B. Record patient's blood pressure.

C. Record patient's position.

D. Wait 3 minutes.

3. **Place patient in standing position**

   A. Record patient's pulse.

   B. Record patient's blood pressure.

   C. Record patient's position.

4. **Present patient's orthostatic vital signs to the provider.**

Ensure the patients legs remain uncrossed for each position.

CONTINUE

Neurologic Checks

There will be times when you have to perform a **neurologic exam** in the field, clinic, or inpatient unit. Neurological checks are commonly performed on any patient who has had a head injury, a neurological problem such as a seizure, or complains of neurological symptoms such as weakness, numbness, or tingling in a particular area of the body.

The **following steps** are completed:

1. Identify the patient's mental orientation to person, place, and time. This is generally completed by asking the patient to state his or her full name; the month, day or year; name the current President or a relevant question the patient should be able to answer. Keep the patient's age in mind when doing this. A 3 year old probably won't be able to tell you who the president is but can probably point to or name an appropriate toy or parent.

2. Check the pupils and determine if they are of equal size. This should be done with lights dimmed to allow the pupils to dilate. It is easier to identify difference in pupil size if they are dilated instead of pinpointed. Measuring the size will help to identify an increase in intracranial pressure which, when extreme, will cause one or both pupils to dilate.

3. Check pupil response to light by using a pen light and slowly bring the light from the lateral side of the head and shine it in one eye. The lights dimmed here as well. Quickly remove the light and repeat the action on the other eye. You should see the pupil constrict quickly when the light is shined in the eye, and then it should return to its former size when the light is removed.

4. Using the same procedure as above, shine the light in one eye and watch the other eye. You should see pupillary reaction and consensual reflex. This means that both eyes' neurological functions are working together and can be seen when both pupils react and become smaller when light stimulates either eye (one eye at a time). Let the pupil return to its former size and repeat the process with the other eye. It should only take a few seconds for the pupil to return to its former size. Both pupils should

react quickly and simultaneously regardless of which eye the light is shined into. Sluggish or unequal responses should be reported to the provider immediately, as this may be an indication of rising intracranial pressure.

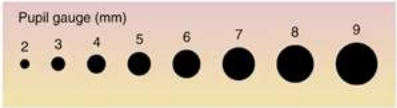
5. Check extraocular movements strength of the eye muscles by having the patient follow an object or your finger as you move your hand from side to side, up and down, and diagonally. Watch to see if the patient's eyes move together with smooth movements. Report lack of synchronous movement or nystagmus (jerking or bouncing movement of the eye).

6. Ensure the patient can follow simple commands, such as touching his or her nose with the left index finger or rotating his or her foot counterclockwise. The ability to appropriately follow commands lets you know that the patient's cognition and motor pathways are intact.

7. Test upper and lower extremity strength by performing the following movements. Have the patient squeeze your fingers (index and middle fingers) with both hands (ensure you have your fingers crossed or it may hurt!). Push his or her feet against your hands. With his or her arms straight in front, have the patient push down on your hands and then resist as you push down on his or her forearms. Weakness may signal a brain or spinal cord injury.

8. For an unconscious patient, you may need to use painful stimuli in order to identify their cognitive state. Press on the area near the base of a fingernail with a hard object and observe whether the patient withdraws from the stimulus or displays flexion or extension posture. You may also apply pressure with two fingers in a grasp position on the patient's trapezius muscle and look for the same patient responses previously mentioned. Additionally, The Glasgow Coma Scale is a great tool to rank their condition.

9. Report and document all findings. Describe and report any abnormal findings.



Pupil gauge (mm)

CONTINUE

Perform Pulse Oximetry/Oxygen Saturation

Pulse Oximetry/Oxygen Saturation - A noninvasive method commonly used today to rapidly determine pulse and oxygen profusion is the pulse oximetry/oxygen saturation device. This is another method used to monitor the function of the respiratory system. The oximetry machine measures the amount of arterial blood that is saturated with oxygen in the body by measuring the percentage of hemoglobin (blood) that is bound with oxygen.

A sensor or probe is attached to the patient in an area where the red light and infrared on the sensor can reach a capillary bed. Oxyhemoglobin will absorb more infrared than red light, and a microprocessor will use this information to compute an oxygen concentration value. This value can then be read on the monitor screen. The sensor can be placed in areas such as a fingertip, earlobe, toe, or even the bridge of the nose. Depending on the type of pulse oximetry you are using, you may need to turn the unit on or it may start as soon as you place it on the patient. Because ulcers can develop from consistent use, turn the sensor every two hours.

Always make sure that you check the patient when you are taking any reading from a monitor. Some people with chronic lung disease have adapted to pulse oxygen concentrations that would have most of us gasping for breath. Report any readings below 95% or observation of a patient who appears to be in any respiratory or circulatory distress immediately. A clinical emergency is identified when an oxygen saturation level is less than 90%.

CONTINUE

Performing Intake and Output

RECORDING INTAKE | INTRAVENOUS FLUID | RECORDING OUTPUT

Any liquid must be recorded in the patient's chart under the intake category. The correct measurement for liquids is milliliters. Many healthcare facilities will list dietary amounts for certain dishes that may not have labeling provided.

RECORDING INTAKE | INTRAVENOUS FLUID | RECORDING OUTPUT

Any fluid that is given to the patient is also recorded as fluid intake. During shift change over, ensure to discuss if any IV fluids are currently being infused and how much has been infused. Another bag of fluid may be needed during the shift which will require you to include the amount infused from the previous bag.

For example, if at shift change 400 mL was left in the old bag and during the course of the shift 200 mL was infused from the new bag. Then a total amount that was infused during the work shift was 600 mL. Keep in mind, this is only for fluids that are infused intravenously, any type of blood productions will be documented in a different category.

RECORDING INTAKE | INTRAVENOUS FLUID | RECORDING OUTPUT

Urine is considered fluid output which is recorded. To measure urine, pour fluid into a measuring container, place on a flat surface and read at eye level. For patients that have a urine bag, empty prior to being full or at least once per shift. If a patient is ambulatory, inform them about saving the urine by providing a collection container. All amounts will be documented in the output section.

- Other types of output – Drainage from other sources such as chest tubes, wounds or nasogastric tubes are also considered output, which will need to be recorded as well. If the patient is sweating profusely, make a note in the output record. If a patient is experiencing diarrhea, the liquid stool can be measured in a process similar to measuring urine. Emesis will be measured the same way.
- Monitoring and documenting intake's and output's is the responsibility of the aerospace medical technician and the registered nurse, you do not need a doctor's order to initiate the process.

Daily Totals – The daily average adult will have a urine output of 1000 mL to 1500 mL, however, if the urine output is less than 720 mL in 24 hours or less than 30 mL per hour either the charge nurse or provider should be notified. (Williams, P.A., 2017)

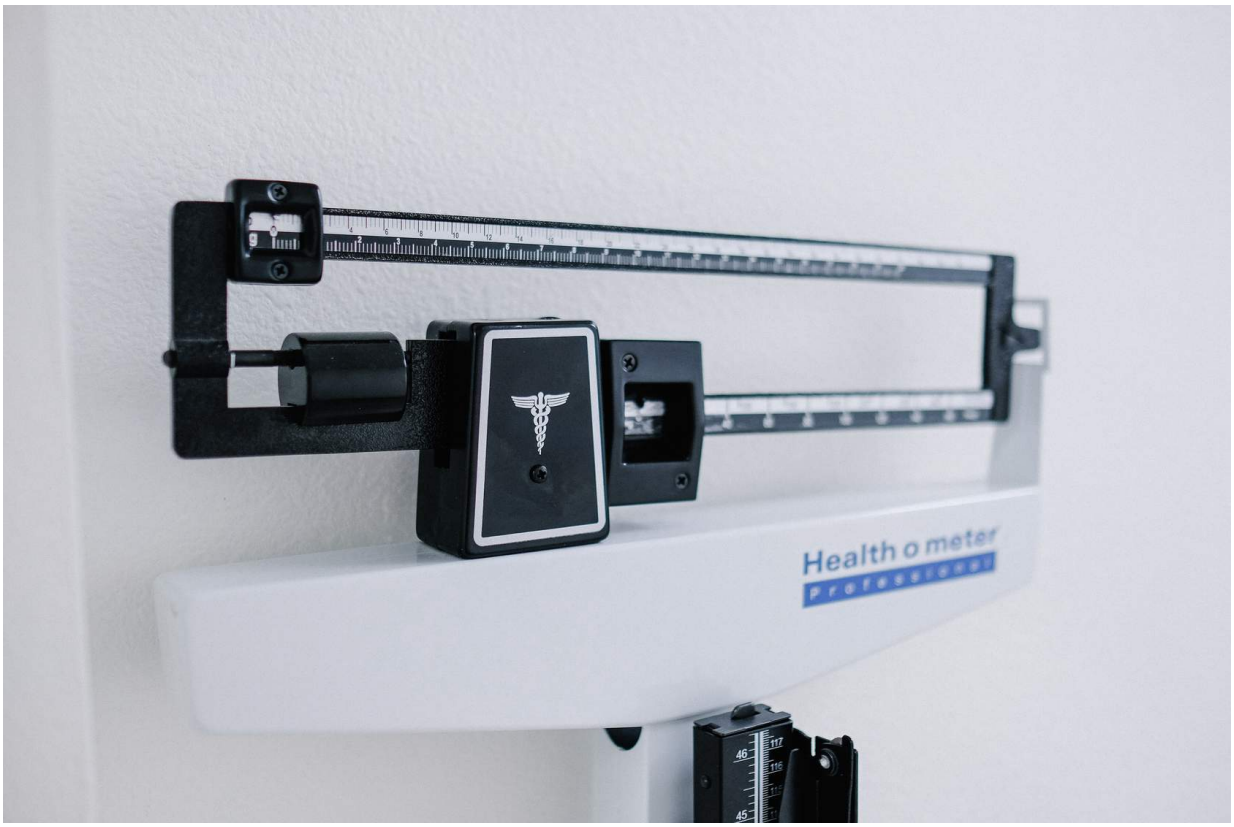
Multiple Choice

A clinical emergency is identified when an oxygen saturation level is less than _____%.

- 70%
- 80%
- 90%
- 100%

SUBMIT

Complete the content above before moving on.



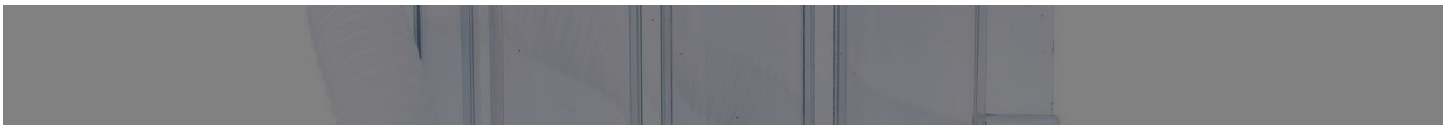
Body Weight and Abdominal Circumference

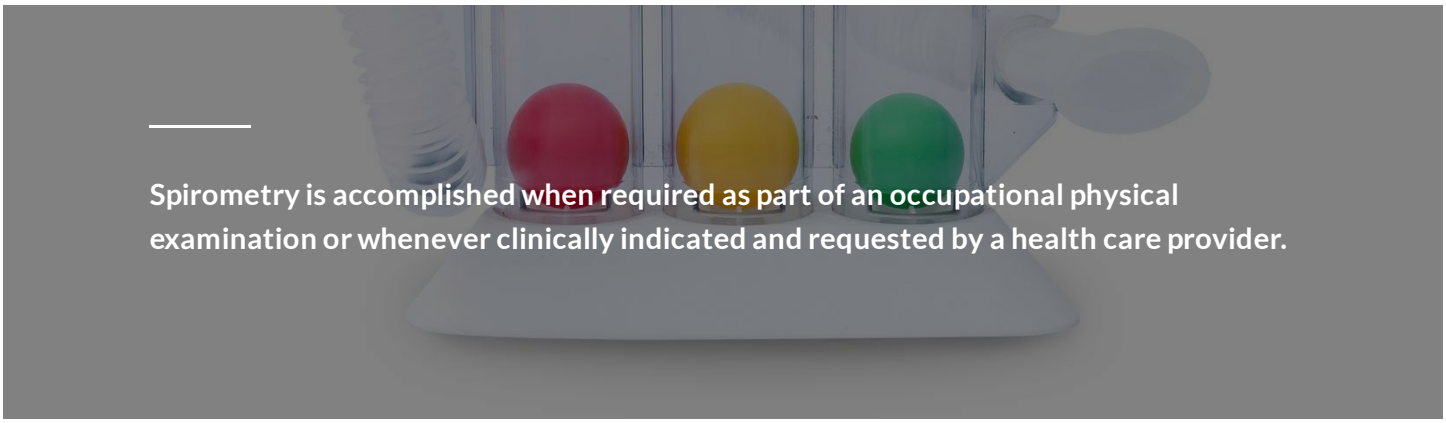
For an accurate body weight measurement, the individual must be weighed on scales that are calibrated properly. The frequency for calibration varies, depending on the manufacturer's recommendations and current Air Force guidance. The individual's weight is determined with his or her shoes off and dressed in any standard duty uniform. Have the individual remove all contents from pockets and any extraneous equipment or outer clothing. When reading the measurement, stand either directly in front of or behind the scale. Reading the scale from either side rather than straight on reduces accuracy. Subtract three pounds for clothing and record the result to the nearest quarter pound. As you know, many medications are calculated and administered based on the patient's weight in kilograms (kg); therefore, you must be able to convert pounds to kilograms. When converting pounds to kilograms, remember, 1 kg = 2.2 lbs.

When measuring the abdominal circumference during a physical exam, medical providers will utilize a body mass index to determine if the patient is at risk. A body mass index (BMI) is based off the individual's height and weight. However, at times, a waist circumference can be used as another determining factor calculating risk. For example if a woman's waist is greater than 35 inches and a man's waist is greater than 40, they are at greater risk for disease.

CONTINUE

Perform Spirometry/Pulmonary Function Testing





Spirometry is accomplished when required as part of an occupational physical examination or whenever clinically indicated and requested by a health care provider.

It is most useful for evaluating losses in respiratory function and following the course of certain respiratory diseases. Although spirometry cannot provide a specific diagnosis, it can distinguish between obstructive pulmonary disease involving increased airway resistance (such as chronic bronchitis or asthma) and restrictive disorders involving a decrease in total lung capacity due to structural or functional changes in the lungs such as tuberculosis or polio).

To help you understand the calculations of spirometry, you will first study the respiratory volume of the lungs, followed by an explanation of the procedures for calculating the PFT and, finally, the actual testing procedures.

From studying anatomy and physiology in this course, you should already have a **fairly good** idea of what the respiratory organs are and how they function. In this section you will learn how to **identify abnormalities** in the respiratory system using spirometry.

First, take a look at the **principles** behind spirometry by studying the **volume** of air that **circulates** through the **respiratory system**. This will help you understand exactly what you should be looking for during spirometry.

Respiratory Volumes and Capacities

The amount of air that travels in and out of the lungs varies substantially depending on the conditions of inspiration and expiration. Consequently, several different respiratory volumes can be described. Specific combinations of these respiratory volumes, called respiratory capacities, are measured to gain information about a person's respiratory status. The volumes are measured with a device called a spirometer.

RESPIRATORY VOLUMES	RESPIRATORY CAPACITIES	DEAD SPACE

The respiratory, or lung volumes include tidal reserve, inspiratory reserve, expiratory reserve, and residual volumes. During normal quiet breathing, about 500 ml of air moves into and out of the lungs with each breath. This respiratory volume is referred to as the tidal volume (TV). The amount of air that can be inspired forcibly beyond the tidal volume (about 3,100 ml) is called the inspiratory reserve volume (IRV).

The expiratory reserve volume (ERV) is the amount of air, normally 1,200 ml, which can be evacuated from the lungs after a tidal expiration. Even after the most strenuous expiration, about 1,200 ml of air still remains in the lungs; this is the residual volume (RV). Residual volume air helps to maintain alveolar patency and prevent lung collapse.

RESPIRATORY VOLUMES | RESPIRATORY CAPACITIES | DEAD SPACE

The respiratory capacities include inspiration capacity, functional residual capacity, vital capacity, and total lung capacity. As noted in the following paragraphs, the respiratory capacities always consist of two or more lung volumes—inspiratory and vital capacities.

- Inspiratory Capacity - Inspiratory capacity (IC) is the total amount of air that can be inspired after a tidal expiration; thus, it is the sum of the tidal and inspiratory reserve volumes.
- Functional Residual Capacity - Functional residual capacity (FRC) is the combined residual and expiratory reserve volumes and represents the amount of air remaining in the lungs after a tidal expiration.
- Vital Capacity - Vital capacity (VC) is the total amount of exchangeable air. It represents the sum of the tidal, inspiratory reserve, and the expiratory reserve volumes. In healthy young males, the VC is approximately 4,800 ml.

Total Lung Capacity - Total lung capacity (TLC) is the sum of all lung volumes and is normally around 6,000 ml in males. Average lung volumes and capacities (with the possible exception of vital volume) tend to be slightly less in women than in men because of their smaller size. Total lung capacity (TLC) is the sum of all air in the lungs after maximal inhalation.

RESPIRATORY VOLUMES | RESPIRATORY CAPACITIES | DEAD SPACE

Some of the inspired air fills the conducting respiratory passageways and never contributes to gas exchange in the alveoli. The volume of these conduits (area in and around the nose, pharynx, larynx, trachea, and bronchial tree), which make up the anatomical dead space, typically amounts to about 150 ml. A general rule of thumb is that the anatomical dead space volume in milliliters in a healthy young adult is equal to the person's weight in pounds.

With a tidal volume of 500 ml, only 350 ml of this is involved in alveolar ventilation. The remaining 150 ml of the tidal breath is in the anatomical dead space. If some of the alveoli cease to act in gas exchange (due to alveolar collapse or obstruction, for example) the alveolar dead space is added to the anatomical dead space, and the sum of the non-useful volumes is referred to as total dead space.

Calculating the Pulmonary Function Test

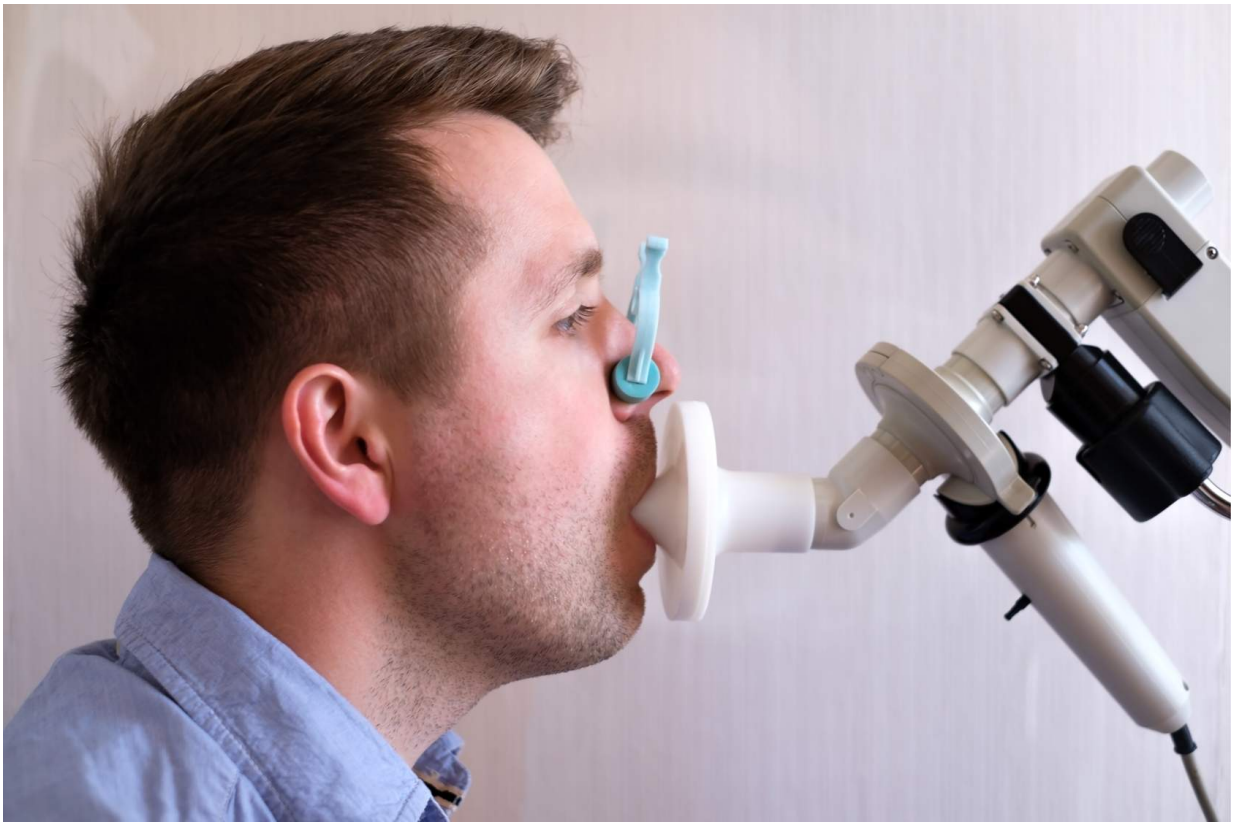
Since spirometry illustrates the various respiratory volumes and capacities, examiners can readily identify potential disease processes. For example, increases in TLC, FRC, and RV could occur as a result of hyperinflation of the lungs in obstructive disease, whereas VC, TLC, FRC, and RV are reduced in restrictive diseases that limit lung expansion. Much more information can be obtained about a patient's ventilation status when the rate of air movement in and out of the lungs is assessed.

The two primary tests measured in the physical exam arena are the forced vital capacity (FVC) and forced expiratory volume (FEV). The measured values are then compared against

predicted normals based on the individual's sex, height, and age.

FVC measures the amount of air expelled when a patient takes a deep breath and then forcefully exhales maximally and as rapidly as possible. FEV determines the amount of air expelled during specific time intervals of the FVC test; for example, the volume exhaled during the first second is forced expiratory volume at one second (FEV1). Those with healthy lungs can exhale about 80 percent of the FVC within one second. Those with obstructive pulmonary disease have a low FEV1, while restrictive disease produces a low FVC. According to AF standards, abnormal functions are present when the FEV1 or FVC is less than 80 percent of the predicted or the FEV1/FVC percent is less than 70 percent.

The examinee must make a full inspiration before the forced expiration, put forth a maximal effort, and continue expiration for at least five seconds or until an obvious plateau in the volume-time curve has occurred for the tracing to be acceptable. Have the examinee make two practice attempts before three further tracings are recorded and assessed for acceptability. In assessing for acceptability, reject any attempts marred by coughing, or if the variation between the two largest FVCs of the three satisfactory tracings exceeds 10 percent. Annotate the results on the Air Force Form 1226, Pulmonary Function Studies.



Testing Procedures

There are various spirometers available, but each must meet the general guidelines outlined in DAFMAN 48–123, *Medical Examinations and Standards*, to constitute an acceptable spirometer. However, the procedures for accomplishing the test are basically the same. The procedure must be explained to the examinee in simple terms. A statement that the examinees will be tested on "how hard and how fast they can breathe" may not be physiologically precise, but it may be the only explanation necessary. The procedure should be described on how deep a breath to take and how hard and fast to exhale. Meanwhile the proctor should also demonstrate the instructions.

Before administering the test, find out if your patient has smoked, eaten, or has recently had a respiratory tract infection. At least one hour must have passed since the examinee has either smoked or administered a bronchodilator and at least two hours since his or her last meal. If the examinee is acutely ill or has experienced an upper or lower respiratory tract infection during the previous three weeks, postpone the test. To properly accomplish this test, instruct the examinee to do the following tasks:

1. Remove any constrictive clothing or dentures and stand in front of the spirometer.
2. Place a nose clip on his or her nose, keeping it firmly there (this is very important).
3. Take the deepest possible inspiration from a normal breathing pattern to close his or her mouth firmly around the mouthpiece (i.e., maintain an air-tight seal around the mouthpiece) and blow into the apparatus as hard, fast, and completely as possible.

Predicted Values

To determine predicted values, use the formulas in DAFMAN 48–123. There you will notice four spirometric standards: one for Caucasian females, one for Caucasian males, one for females of other races, and one for males of other races. Make sure you are using the correct one! After ensuring you are about to use the correct nomogram, align a straight edge across the two known factors of height and age. The points where the straight edge crosses FEV1 and FVC will give you the predicted normals for each category. It must be pointed out that the FVC and FEV1 of non-Caucasians is about 15 percent lower than in Caucasians of the same age and height; differences in the FEV1/FVC percent are not significant.

Make allowances for these ethnic differences during evaluations to avoid serious errors in interpretation.

In **non-Caucasians**, multiply the predicted FEV1 and FVC for any given person by 0.85 to adjust for this **15** percent difference. You do not have to make this adjustment or correction for the FEV1/FVC calculation. Once you have determined the **predicted value**, record it on AF Form 1226.

Multiple Choice

The volumes are measured with a device called a _____.

- pulmonary
- spirometer
- forced vital capacity

forced expiratory spirometer

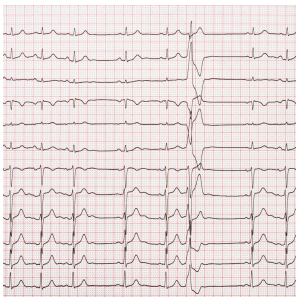
SUBMIT

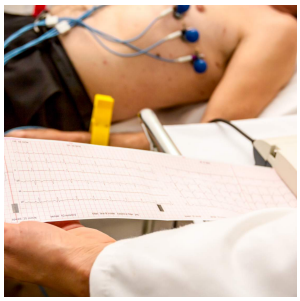
Complete the content above before moving on.

Perform 12-lead Electrocardiogram (ECG)

You should be familiar with the anatomy of the cardiovascular system from the previous study where you learned how the electrical impulses stimulate the heart. Now you will review the electrophysiology briefly, and learn about the tracing and how to prepare your patient for his or her electrocardiogram.

The crescent-shaped sinoatrial (SA) node, a small cell mass with an enormous job, is also known as the pacemaker. The SA node initiates the stimulation of the heart muscle to contract with electrical stimulation. Located in the right atrial wall, just inferior to the entrance of the superior vena cava, the SA node typically depolarizes spontaneously at the rate of 70–80 times every minute. However, its inherent rate - in the absence of hormonal and neural factors - is around 100 times per minute. Because no other region of the conduction system or the myocardium has a faster depolarization rate, the SA sets the pace for the heart as a whole, determines its characteristic and sinus rhythms, and determines our heart rate.





The cells in the heart are negatively charged, or polarized, in the resting state. When the heart muscle is stimulated electrically by the SA node, both atria contract (depolarization). Think of this depolarization as an advancing wave of positive charges. The stimulating progressive wave continues until it reaches the atrioventricular (AV) node located in the inferior portion of the interatrial septum immediately above the tricuspid valve in approximately 0.04 seconds. The impulse is delayed momentarily (for about 0.1 seconds) at the AV node, allowing the atria to respond and complete their contraction. At this time the cells in the atria regain their negative charge, or repolarize.

The electrical impulse passes from the AV node down the AV bundle (Bundle of His) to the left and right bundle branches, and then to the Purkinje fibers, which complete the pathway through the interventricular septum and penetrate into the heart apex and turn superiorly into the ventricular walls. The cells within will become charged positively (i.e., depolarized) once stimulated, causing simultaneous contraction of the ventricles. Because the left ventricle is much larger than the right, the Purkinje network is more elaborate in that side of the heart.

Electrophysiology of the Heart

The electrical currents generated and transmitted through the heart also spread throughout the body and can be monitored with an instrument called an electrocardiograph. The graphic recording of electrical changes during heart activity is called an electrocardiogram, or simply an ECG or EKG. Twelve standard leads are used to record an ECG. Three of these are bipolar leads that measure the voltage difference between the arms, or an arm and a leg, and nine are unipolar leads. Together the 12 leads provide a fairly comprehensive picture of the electrical activity of the heart.

Although it's referred to as the 12 lead placement, an ECG only uses ten electrodes for reading. Some electrodes form a pair, which provides this tool with two leads. The electrodes are self-sticking pads containing a conducting gel at their centers. On the other side, the electrodes snap onto the ECG's or heart monitor's connected cables. The ECG shows a glimpse of the electrical activity taking place inside the heart and does this from a particular angle. Therefore, the ten electrodes in the 12 lead ECG give 12 perspectives of the heart's electrical activity at a given time, using various angles.

A typical ECG consists of a series of three distinguishable waves called deflection waves. The first wave, the small P wave, lasting about 0.08 seconds, results from movement of the depolarization wave from the SA node through the atria. Approximately 0.1 seconds after the P wave begins, the atria contract.

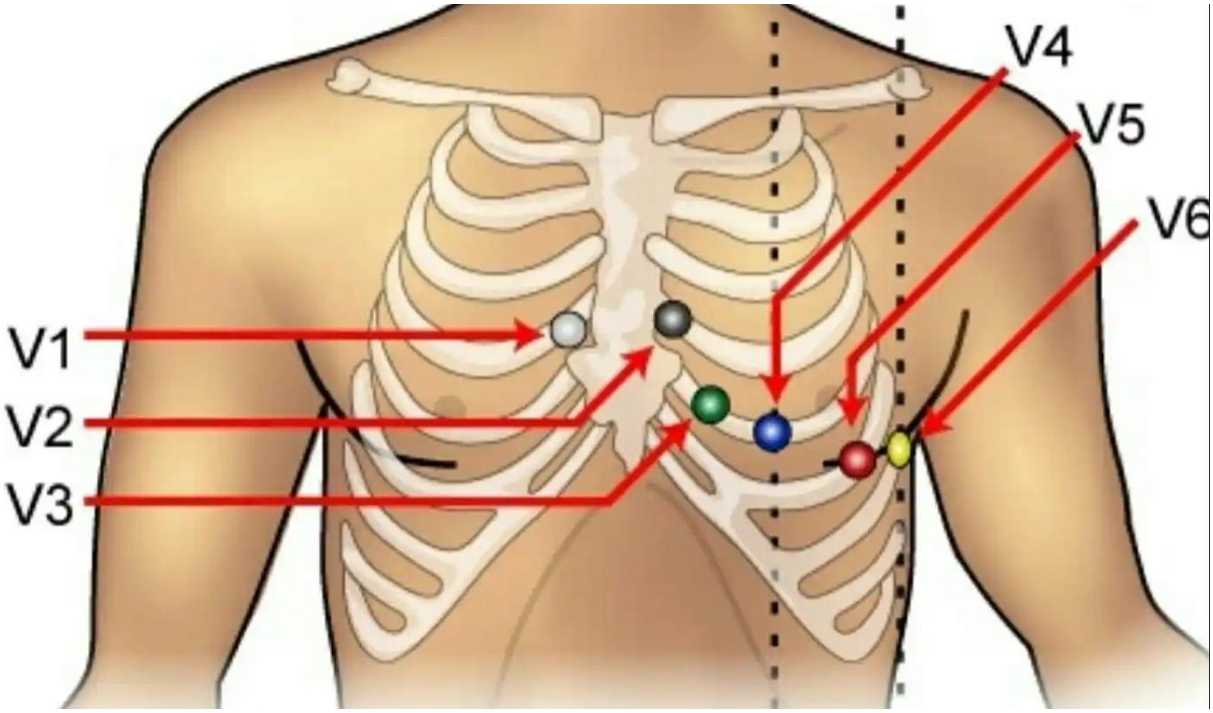
Once the patient has been prepared properly, you are ready to run the ECG. Ask the patient to lie still and breathe normally until the end of the procedure. Ask the patient to withhold speaking or crossing the legs or arms until the test is finished. (Speaking or crossing the legs or arms may cause artifact or an improper reading).

Be sure to tell the patient when you are done running the test so he or she will feel free to talk or ask questions. It is normally a good idea to have a provider look at the ECG tracking before you remove all the equipment in the possible event it needs to be repeated.

By measuring the various waves, complexes, interval, and electrical voltage, a trained person can determine the rate, rhythm, and axis of the heart, along with any evidence of myocardial hypertrophy or infarction. These determinations, along with other portions of the cardiovascular examinations (blood pressure and auscultation, for example), will give an overall picture of the person's cardiovascular status. However, although the ECG presents an accurate picture of the electrical activity of the heart, it should not be used as a final determining factor as to a person's cardiovascular status. Rather, it is used as a starting point for further evaluation and testing if any abnormalities are discovered.

Whenever you accomplish an ECG on rated personnel, send an original copy to the United States Air Force (USAF) Central Electrocardiographic Library. (This holds true for any cardiac study done on a rated flyer.)

What is the difference between an ECG and EKG? There is no difference; both refer to the same procedure, however one is in English (electrocardiogram – ECG) and the other is based on the German spelling (elektrokardiogramm – EKG).



V1: 4th intercostal space, right sternal border

V2: 4th intercostal space, left sternal border

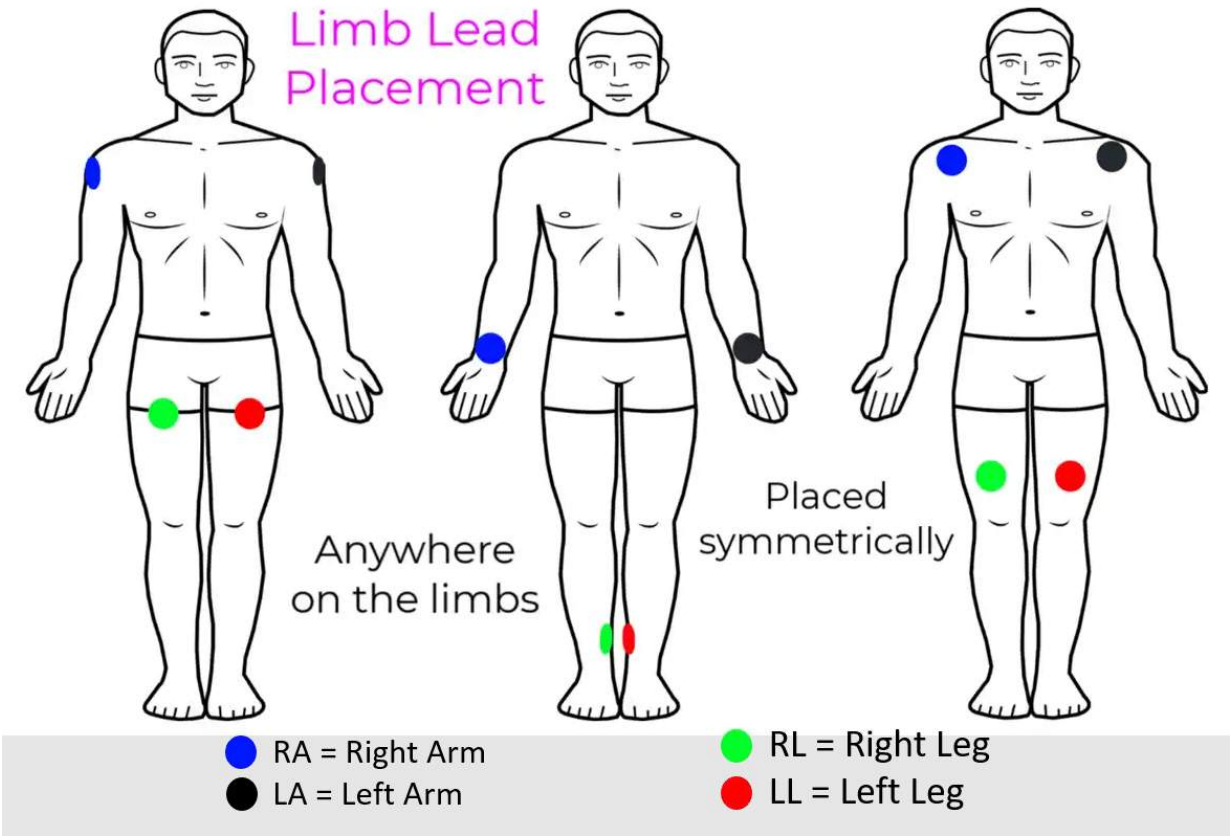
V3: Midway between leads V2 and V4

V4: 5th intercostal space, midclavicular line

V5: 5th intercostal space, anterior axillary line

V6: 5th intercostal space, mid axillary line

Chest Lead Placement



Limb Lead Placement Options

Below are the steps to follow when performing an ECG.

1. Prepare the chest and place electrodes in the correct sequence.
2. Connect wires (leads) from the machine to the electrodes.
3. Ask patient to hold still and maintain normal breathing; press the run button.
4. Allow enough paper to run through the machine to allow the patient's tracing to be torn off cleanly.
5. Verify that ECG tracing has no artifact (electrical interference).
6. If tracing is not clear, troubleshoot IAW the manual.
7. Retake the ECG tracing.
8. Turn off the machine.
9. Remove lead wires from the electrodes.

10. Stabilize the skin, and gently remove electrodes from the patient's skin.
11. Verify all electrodes have been removed.
12. Allow patient to redress, assist if necessary.
13. Route ECG for interpretation.

When sending ECGs to the library, remember to comply with the following rules:

- Complete the patient identification area on the tracing.
- Affix the tracing firmly to a properly completed optional form (OF) 520, Medical Record- Electrocardiograph Record cover sheet.
- Send only original tracings. Duplicated copies are unacceptable, as they cannot be placed on microfilm for future reference.

Multiple Choice

A typical ECG consists of a series of _____ distinguishable waves called deflection waves.

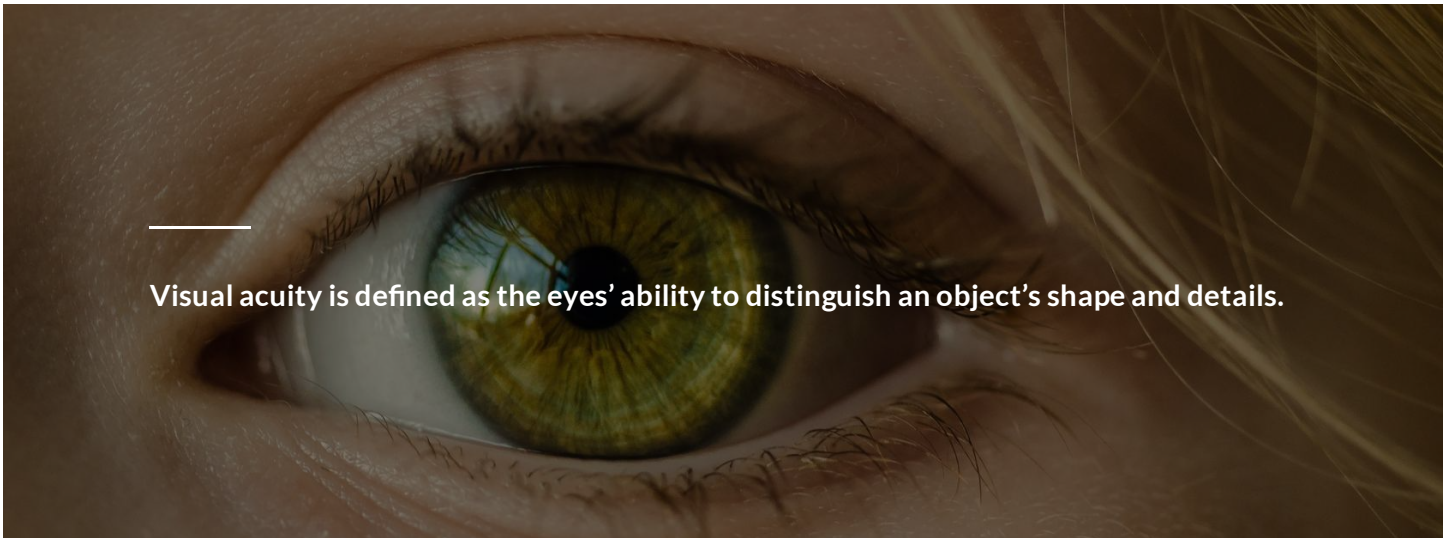
- three
- four
- five

six

SUBMIT

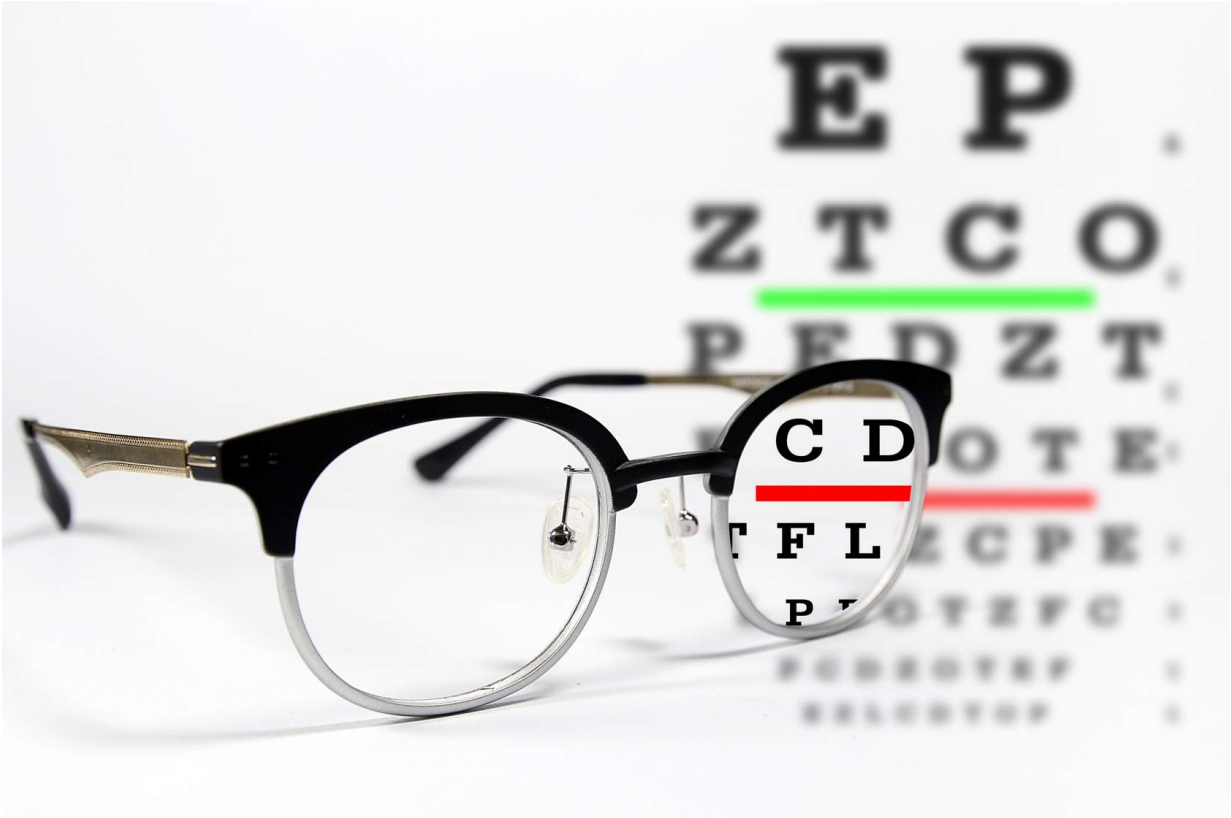
Complete the content above before moving on.

Perform Visual Acuity Test



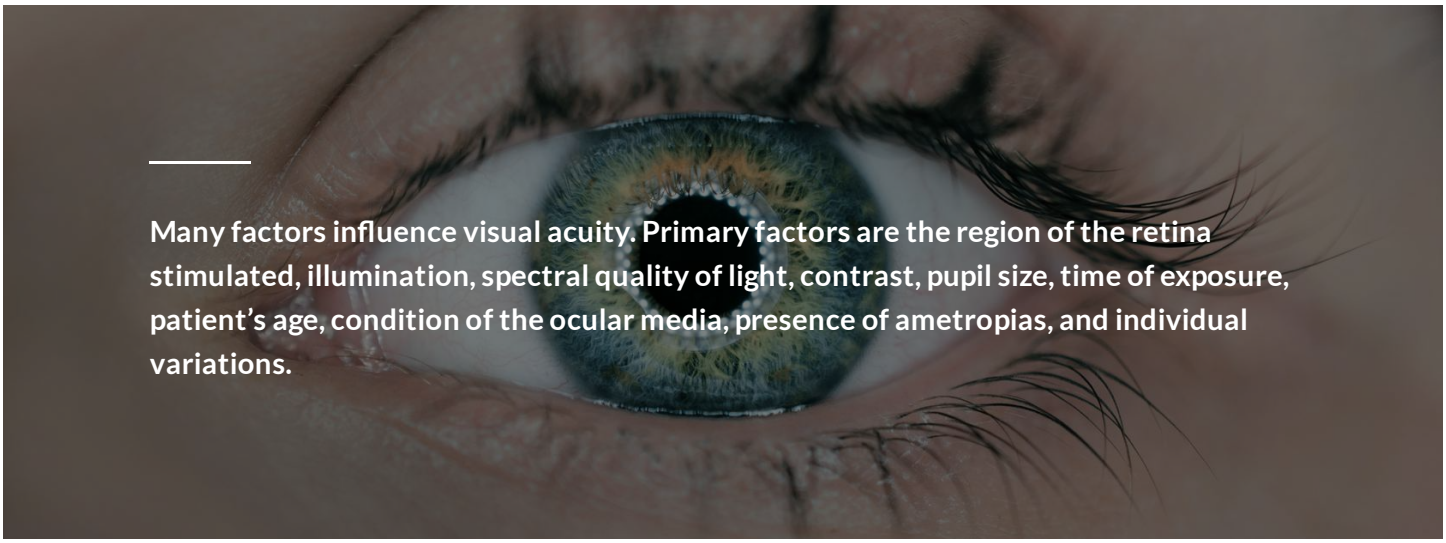
One of the basic functions of medical technicians is to measure patients' visual acuity. You must perform this task with a high degree of accuracy and professionalism. Accurate measurements are extremely important for proper patient treatment, medical, and legal reasons. You hear some people's vision is 20/20 or 20/40. What does all this mean and why do some people see better than others? Why do people need glasses or contacts? When should visual acuities be checked? Let's find out!

It is assessed by the smallest identifiable object seen at a specified distance (usually 20 feet for distance acuity and 16 inches for near acuity). Think of it as a measure of the resolving power of the visual system. It is the ability of the visual system to receive light from images and transmit light to the retina where it is converted to an electrochemical message, transmitted through the visual pathway, and then interpreted by the brain as a visual image.



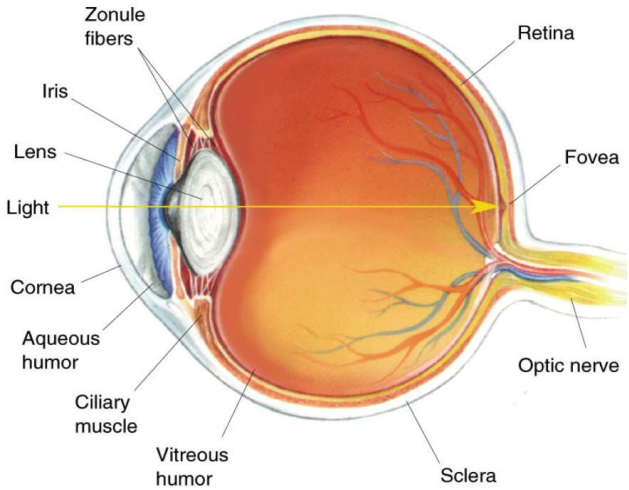
Visual acuity is often confused with visual efficiency. Visual efficiency refers not necessarily to how well one sees but rather how comfortably one sees. Many patients may be able to see the 20/20 line of your eye chart but are reluctant to read it because they may not be seeing it with a great deal of visual efficiency. Some even refuse to read the actual line on the eye chart they can see, figuring if they see too well, nothing will be done about their visual complaint.

It may be wise to encourage your patients to read the smallest line they can, even if it is not as comfortable and clear as they would like. Reassure them the provider will still work on helping them achieve better visual efficiency, even if their visual acuity doesn't seem to indicate a problem. There are refractive errors not necessarily diminishing visual acuity but affecting the patient's visual comfort.



Region of the Retina Stimulated

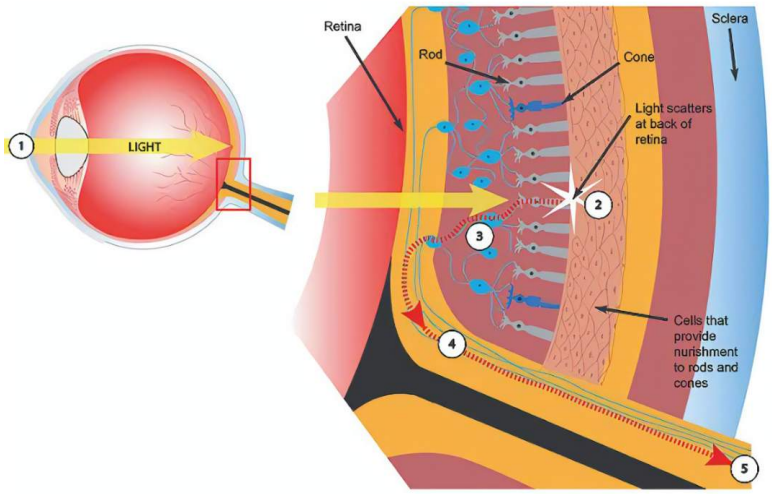
The fovea centralis is the area where best vision (under photopic conditions) occurs. The fovea contains only cones, which produce the clearest images. Visual acuity progressively decreases the farther an image strikes the retina from the fovea. This is because the concentration of cones is greatest in the fovea and decreases toward the retina's periphery.



Illumination

Good illumination (photopic) conditions allow the visual system to use the cones in the fovea to process light stimuli. Dim light (mesopic) conditions force people to use a mixture of rods and cones to see adequately. This causes a loss of clarity, as rods do not provide images as sharp as cones. When illumination is very poor (scotopic), the visual system becomes almost completely dependent on the rods for any vision. Rods, while very good at picking up visual images under low light conditions, do not produce very sharp and clear vision. Under scotopic conditions, vision is best when images are placed just outside the fovea.

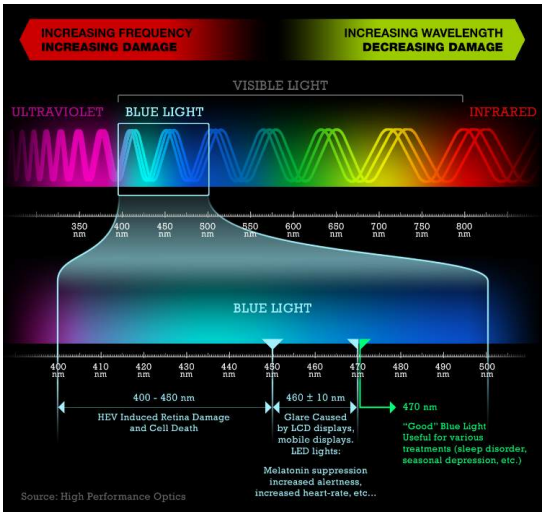
This allows a mixture of rods and cones to process what visual images can be seen. (It's interesting to note the greatest number of rods per area of retina exists just outside of the fovea.) For example, a very dim star in the night sky may only be seen when you look slightly away from it. This allows the rods to pick up its image. If you look straight at it, it disappears, as the cones are not sensitive enough to process the minute amount of light coming from the galaxy far, far away.



Spectral Quality of the Light

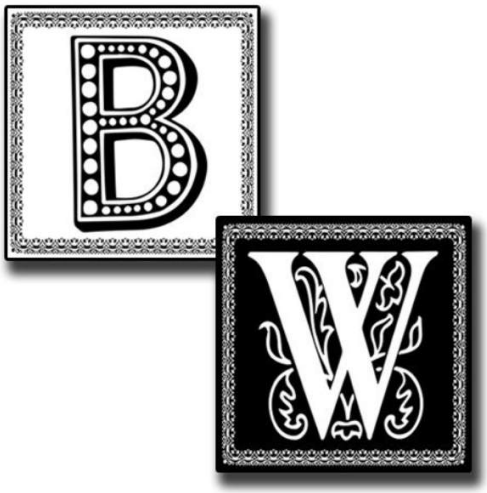
The spectral quality of light refers to its color or wavelength. The eye can generally see wavelengths between 400 and 750 nanometers (nm). White light contains all the colors of the rainbow. Some lights are white but have a reddish or bluish tinge to them. Look at the fluorescent lights in your building and you may notice this. Some of the lights will look different from others.

The clarity of vision can change due to variations in the spectral quality of the light being seen. Some light has more blue in it; some has more red and so on. This variation, though subtle, does have an effect on visual acuity and efficiency. Some people are sensitive to fluorescent lighting but do fine under incandescent lighting. This is most likely related to their sensitivity to changes in the spectral quality of the light.



Contrast

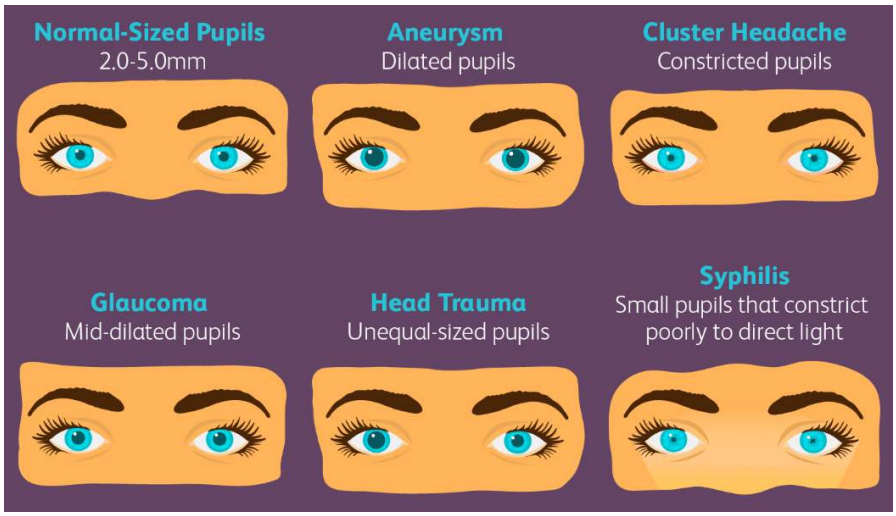
A black letter on a white background is easier to see than a black letter on a gray background. Assuming the same intensity of illumination, visual acuity decreases as contrast decreases. Ever try to read an orange sign with yellow letters on it? It's tough because the contrast is poor.
The two colors are close to each other on the visible spectrum. Now imagine an orange sign with violet letters. The contrast is much better as they are on opposite ends of the visible spectrum, so reading the sign is much easier.



Pupil Size

The eye produces aberrations similar to those found in spectacle lenses. Aberrations is the deviation of light rays through lenses, causing images of objects to be blurred. When the pupils are dilated (large), the divergent peripheral light rays previously blocked by the iris are now entering the eye and creating a focusing dilemma for the optics of the eye. A blurred image triggers the brain to signal the eyes to accommodate (focus). One effect of the accommodative response is for the pupils to constrict. The constricted pupils only allow light rays going relatively straight to enter the eye.

This reduces the number of deviant light rays striking the retina to improve visual acuity. When you perform the pinhole test, you are using this principle. The pupil's main job is to regulate the amount of light entering the eye. If it allows too much light in, the photoreceptors (rods and cones) are washed out by light and a poor image is sent to the visual cortex of the brain. If the pupil is too small and not enough light gets in, the cones in the fovea are not adequately stimulated, and the visual cortex must rely on stimulus sent by the less precise rods, again reducing visual acuity.

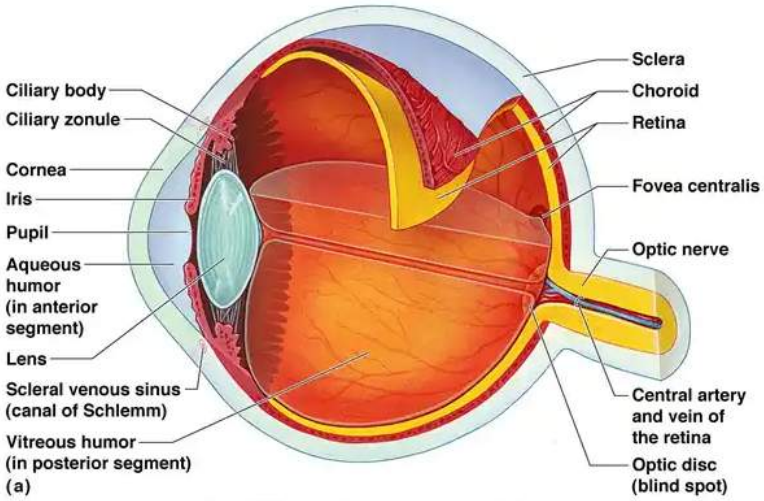


Time of Exposure

If a person is given a long time to analyze an object, more details are assessed as more rods and cones are stimulated. The result is usually good visual acuity. If the time of exposure is short, there is less information being sent to the brain for analysis. The result is generally poor visual acuity.

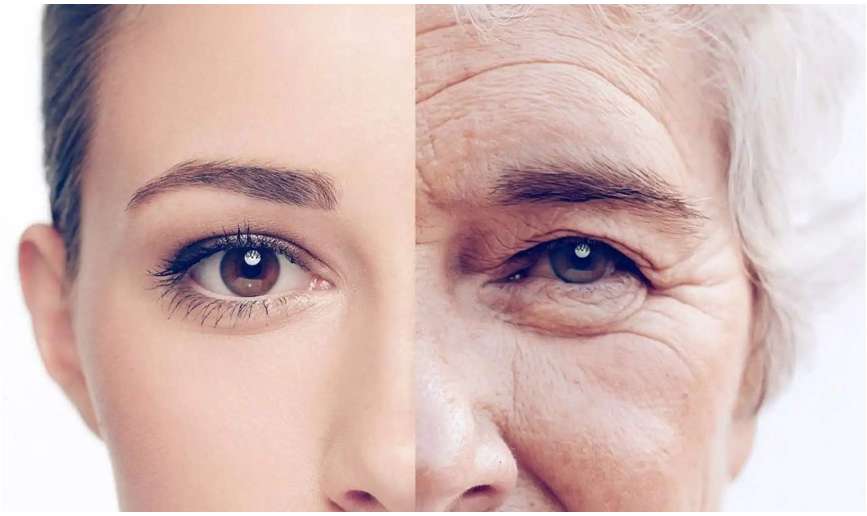
Condition of the Ocular Media

Any abnormality of the ocular media (cornea, aqueous humor, crystalline lens, or vitreous humor) tends to reduce visual acuity. Corneal scars, cells, and flares in the aqueous, cataracts, and neo-vascularization in the vitreous are a few examples of the many conditions degrading one's ocular media.



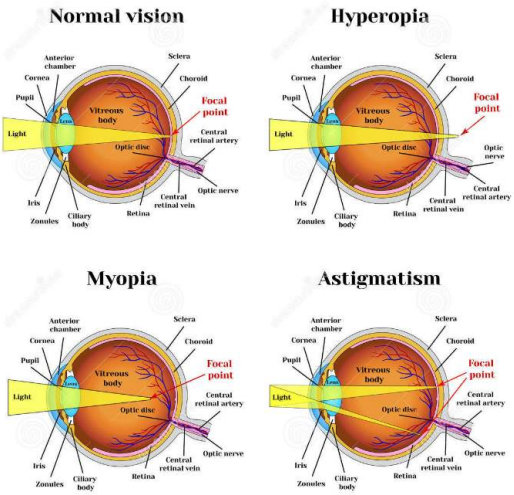
Age

When you were born, your vision was around the 20/400 level. Your visual acuity progressively improves as you develop. As you continue to age, time and ultraviolet (UV) light take its toll on the cornea, crystalline lens, and retina, causing your visual acuity to diminish. Typically, healthy eyes and good vision are between the ages of 19 and 40.



Presence of Ametropias (correctable refractive errors)

Any refractive condition preventing light rays from focusing clearly on the fovea reduces visual acuity. Ametropia is a refractive error (e.g., hyperopia, myopia, and astigmatism). If these refractive errors are not corrected, visual acuity decreases or, at a minimum, visual efficiency suffers.



Individual Variations

People are different. Some people have better vision than others for a variety of reasons (e.g., genetics, visual stimulus experienced as a child, personality type, etc.). Not all people see the same even with all other factors being equal.
This is due to individual variations. There are many factors involved with the physiology of visual acuity. One of the main factors is ametropias, or refractive problems, of the eyes.

Refractive Status of the Eye

AMETROPIA | EMMETROPIA

Ametropias are refractive conditions that are correctable and prevents the eye's ability to focus light rays on the retina for a clear image, reducing visual acuity. Examples are hyperopia, myopia, and astigmatism. If these refractive errors are not corrected, visual acuity decreases or, at a minimum, visual efficiency suffers.

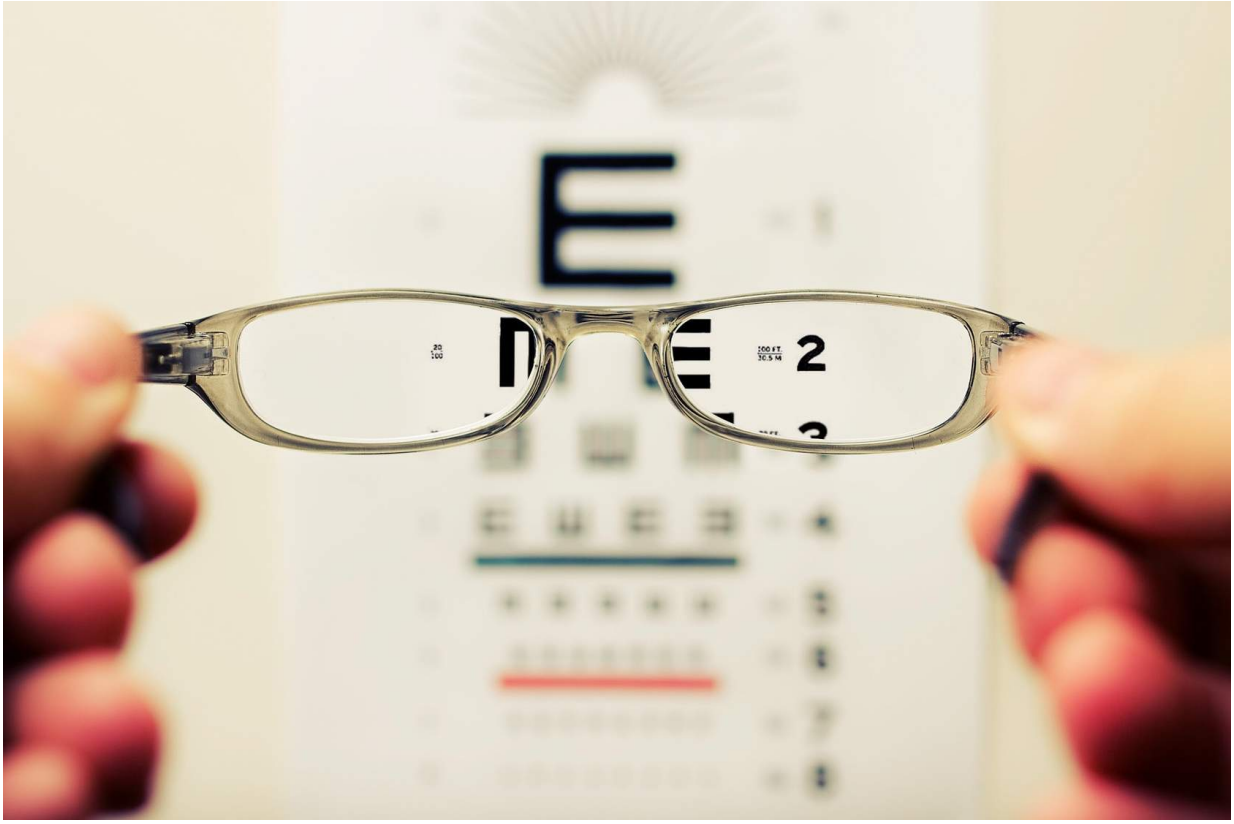
Normally these errors could be corrected by glasses or contact lenses. If they cannot be corrected, the patient may be experiencing blindness. A person with good vision and no refractive error is considered to be an emmetrope or have emmetropia.

AMETROPIA	EMMETROPIA

Emmetropia is a refractive condition in which no refractive error is present and the eye is able to focus light rays on the retina for a clear and crisp image. Distant images are focused sharply on the retina without the need for accommodation or corrective lenses. This is the desired state.

The emmetrope may need to accommodate to see near objects. This is normal as it does not cause undue eyestrain. Remember it this way: winning an Emmy is good, so being an emmetropic is good.

Testing Visual Acuity



Begin by using a Snellen eye chart. Perform during a physical exam and/or perform when there's an issue with vision. Testing may be done without glasses, followed by testing with (based on provider's orders).

1. Patient should be placed 20 feet from the Snellen chart. Accuracy of the test is reliant on maintaining the correct distance from the chart.
2. Patients with corrective lenses should keep them on (except reading glasses). Test each eye individually. Cover one eye with an eye shield or an opaque card.
3. Instruct patient to read the smallest line of print possible, reading from left to right. Record the fraction at the end of the last line. Record number of letters missed. Record whether corrective lenses were worn (i.e. 20/50 -2 with contact lenses).
4. Test and record the other eye's visual acuity. Conduct the test with both eyes uncovered; record the score.
5. If patient cannot read any of the lines even with glasses, position them closer to the chart. The score will be altered to correlate with how far the patient is from the chart. Document results of the tests.

Multiple Choice

How far away should a patient stand from the Snellen Chart?

- ○ 5 feet
- ○ 10 feet
- ○ 15 feet
- ○ 20 feet

SUBMIT

END OF LESSON

Lesson 5- Speciman Collection

After completing this lesson, the student will be able to assist with specimen collection in accordance with prescribed guidance and publications.

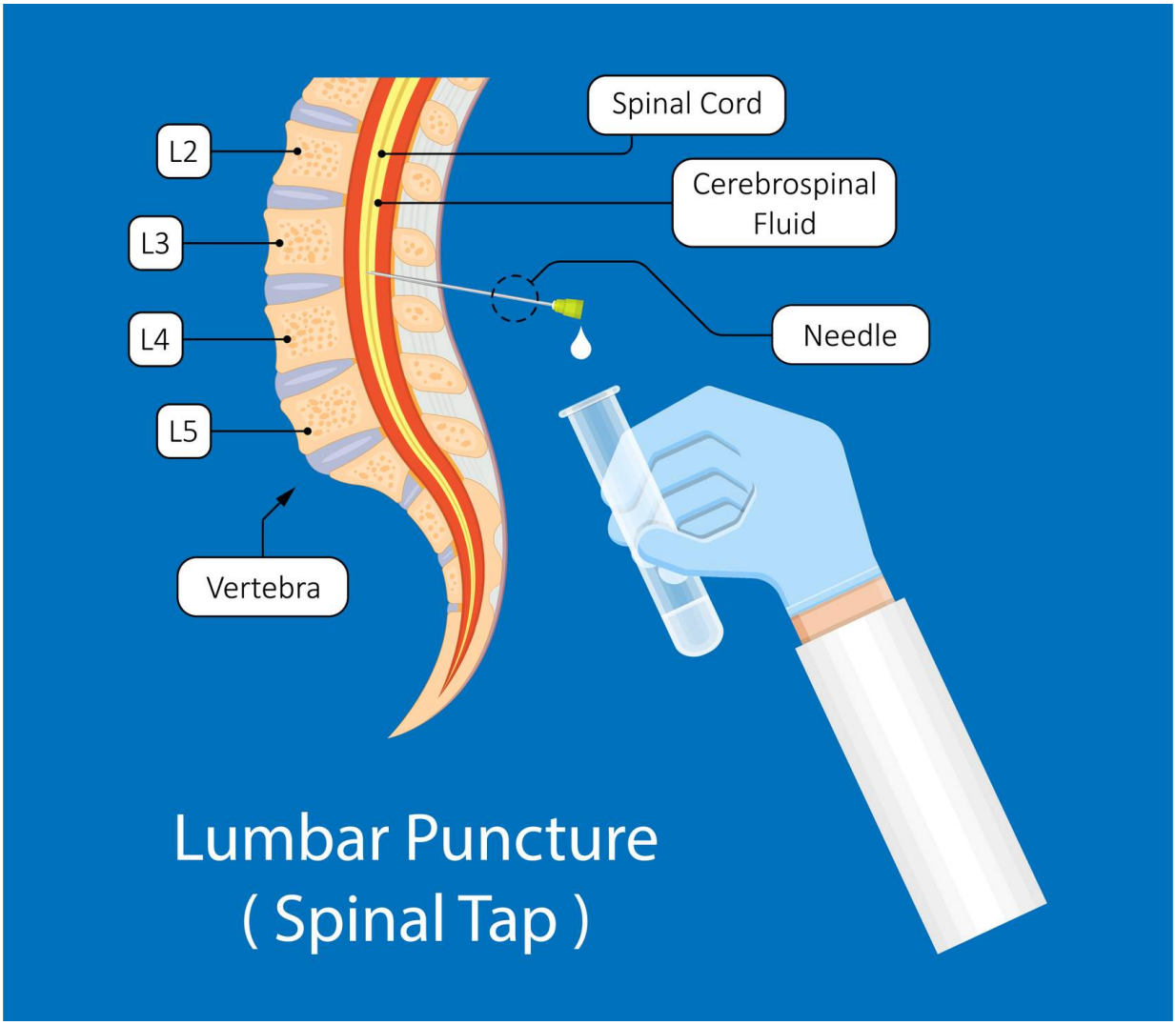
Specimen Collection: Cerebrospinal Fluid (CSF)

This lesson covers an **important task** you will perform as an aerospace medical service journeyman—the **collection of specimens.** No matter whether you work in an inpatient unit, the emergency room, or an outpatient clinic, **accurate** performance of this task is a **must**.

You are probably sitting there saying, "Another repeated topic from tech school." That's true, but the importance of these tasks bears **repeating**. In this lesson, you will learn several types of collection and the specifics associated with each one.

As mentioned in the previous lesson, special tests and procedures can help diagnose and treat medical problems. We will continue on with lumbar puncture.

Lumbar puncture, also referred to as a spinal tap or spinal puncture, is the insertion of a needle into the subarachnoid space, usually between the third and fourth lumbar vertebrae. This procedure is performed to aspirate cerebrospinal fluid (CSF). It provides important information about intracranial pressure and the composition of the CSF to aid in the evaluation of some underlying condition. Lumbar punctures are widely used in the diagnosis of bacterial and viral infections, such as spinal meningitis. It is also used in the evaluation of seizure disorders.



Keep in mind, the **provider will do** the procedure. You are responsible for **preparing the room** and the **patient**, and **assisting** the provider with **collection and labeling** of specimen tubes. Ensure each collection tube is sealed and labeled with the **correct** information. The procedural steps are below:

1. Take baseline vital signs before the procedure.
2. Obtain equipment needed.
3. Open sterile supplies as requested.
4. Position and drape the patient.
5. Assist the provider.

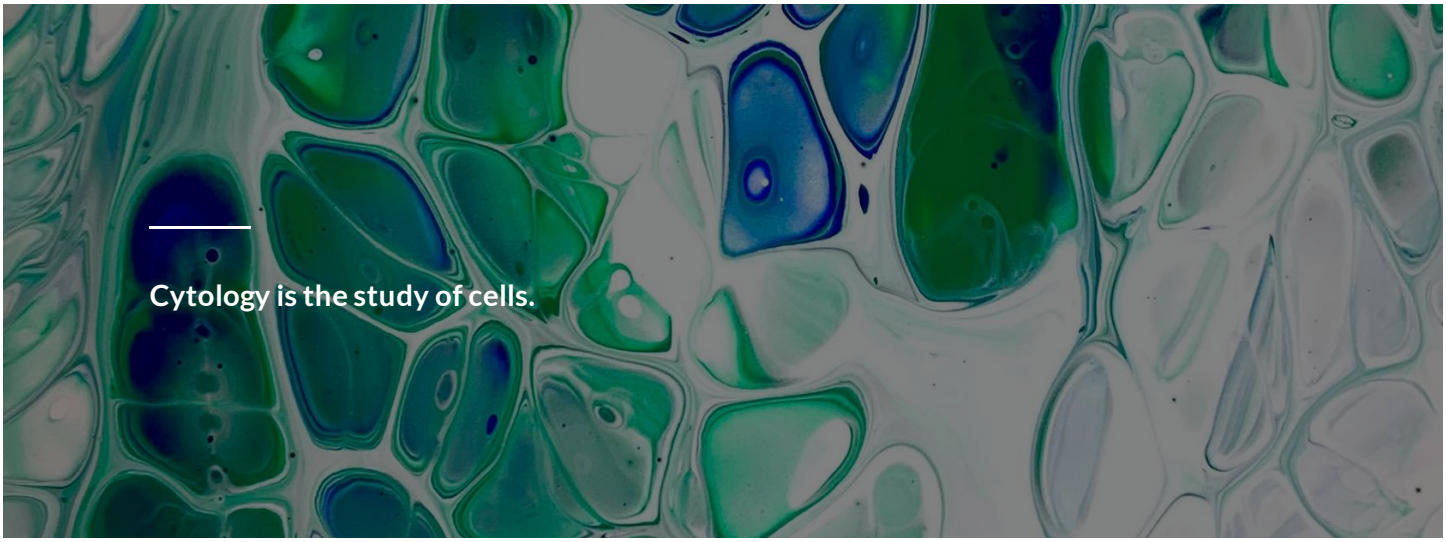
NOTE: Flight surgeon will likely ground aircrew or special operational members requiring a lumbar puncture for diagnosis, from flying or operational duty for 24 hours or until a diagnosis is made.

CONTINUE

Specimen Collection: Cytology

As a medical technician, specimen collection is one of many important tasks you will perform. Accurate performance of this task is a must no matter where you work (inpatient unit, outpatient unit, or emergency room). In this lesson, you will learn several types of collection and the specifics associated with each one.

Specimen collection can help diagnose and treat medical problems by performing special tests and procedures. In this section, we will discuss the special tests and procedures you will be involved in, starting with cytology.



A variety of procedures can be used to obtain tissue for a cytological examination. Venipuncture, bone marrow aspiration, urine catheters, and lumbar puncture are just a few of the types of procedures used. The samples are viewed under a microscope, normally to confirm a diagnosis. Studies of the tissues are performed to detect carcinogenic, metabolic, vascular, and other changes. Always remember to use standard precautions and aseptic technique to guard against infection or contamination of the specimen. Your involvement will be to assist in the preparation, procedure and post care of the patient.

There are basic procedural steps that apply to all specimen collection procedures, before, during, and after. However, some collection procedures will have more specific steps and you will learn about those specific procedures below under each different collection or test.

During the Procedure

- Use standard precautions and aseptic techniques.
- Don the appropriate PPE.
- Dispose of sharp instruments and needles appropriately IAW unit policy.

After the Procedure

- Remove PPE.
- Throw away used supplies. Remove protective equipment and discard or store appropriately.
- Perform hand hygiene immediately.
- Restore the unit.
- Gather used equipment; dispose of, clean, or store items back in their proper location.
- Ensure patient is clean, dry, and comfortable.
- Ensure call light and personal items are within reach, lower bed to its lowest level.
- Remove soiled linens.
- Remove unsightly, odorous, or potentially infectious

CONTINUE

Collect and Label: Emesis

A patient's emesis is collected to determine the presence of blood or in the case of poisoning, to determine what had been consumed. An emesis basin is usually the easiest container to use. After collecting the specimen, be sure to label it correctly. Information required on the label includes

the type of specimen, date and time, patient's name, DoD ID number, patient registration number (for inpatient) and ordering physician's name.

An Emesis basin

NOTE: Label all specimens in this manner.

Procedural Steps

Emesis

1. Adhere to the rules for medical asepsis.
2. Follow standard precautions, as well as bloodborne pathogen standards.
3. Ensure you have the correct container for the specimen.
4. Ensure you use a clean container for each specimen – evaluate the insides for loose dirt, debris, etc. Do not touch inside of the lid and/or inside of the container itself. Attempt to discard foreign debris from the inside lid/container without human touch.
5. Verify that you have the correct patient. Use two approved patient identifiers (i.e. full name and DoD ID number). Match patient info with patient identification bracelet, specimen label, etc.
6. Label the specimen container at the patient's bedside – do not leave the room until all specimens are correctly labeled.
7. Collect the specimen at the correct time.
8. Secure the specimen container lid tightly.
9. Place the specimen into an approved (and labeled) biohazard bag. Ensure the bag is sealed.
10. Doff gloves before leaving the patient's room.
11. Carry the specimen (labeled and bagged) to lab or designated location.

12. Perform hand hygiene.

CONTINUE

Collect and Label: Urine

Urine Sample

Urine samples can be used to complete various tests. One of these tests is a sugar and acetone test. This is done to detect the presence of sugar or acetone bodies (glucose) in the urine. The method used is determined by each facility and universal precautions are implemented.

Urine can be collected using several devices such as a urinal, collection bottle, commode hat, bed pan, fracture pan, and more. Once you obtain the sample from the patient, transfer the required amount of urine to a urine specimen container, then take the sample to the utility room (or designated location).

Most facilities use a test strip method to examine the urine. You simply dip the test strip into the urine and wait a specific amount of time for the results. Check your unit's policy for the method used in your facility.

Before conducting any urine test, consider the following information:

- What test has been ordered

- What equipment do you need
- When to test urine
- Instructions for the test ordered
- What observations to document and/or report
- The time of collection
- Test results
- Any problems with collection
- Color, clarity, and odor of specimen
- Blood in the urine
- Particles in the urine
- Any patient complaints, such as pain, burning, difficulty voiding, etc.
- How to report test results and when
- What patient concerns to report immediately

URINE SPECIMEN COLLECTION	TESTING URINE - REAGENT STRIPS	STRAINED SPECIMEN

First, gather all supplies and equipment and perform hand hygiene.
Verify correct identification of the patient and label the specimen container at the patient's bedside. Finally, don gloves.

Instruct the patient to void into a clean bedpan, urinal, collection bottle, or other device.
Ensure privacy for the patient. Explain to the female patient how to hold the urine cup so that it surrounds the urethra.

Explain to both men and women patients that only 1.5 inches of urine is necessary.
Transfer the urine into a proper specimen container by pouring about 120 mL into the container. Send to the lab within 5-10 minutes.

URINE SPECIMEN COLLECTION | TESTING URINE - REAGENT STRIPS | STRAINED SPECIMEN

1. Gather all supplies and equipment.
    A. Check the expiration date on the bottle. If expired, do not use.
    B. Check the color of the strips. If discolored, do not use.
    C. Do not touch the test area on the strips.
    D. Follow the manufacturer's label to ensure accuracy.
2. Perform hand hygiene.
3. Verify correct identification of the patient.
4. Don gloves.
5. Gather equipment for the urine specimen.
6. Ensure privacy for the patient.
7. Collect the urine specimen.
8. Remove a strip from the reagent bottle and immediately secure the lid.
9. Dip the strip test area into the urine.
10. After the correct amount of time has passed, remove the strip. See manufacturer's label.
11. Remove excess urine from the strip by tapping it gently against the urine container.
12. Wait the necessary amount of time, per the manufacturer's guidance.
13. Compare the strip with the color chart on the bottle.
14. Doff gloves. Perform hand hygiene.
15. Document and/or report test results and any other significant observations.

URINE SPECIMEN COLLECTION | TESTING URINE - REAGENT STRIPS | STRAINED SPECIMEN

1. Gather all supplies and equipment.
2. Perform hand hygiene.
3. Verify correct identification of the patient.
4. Don gloves.
5. Gather urine strainer for the urine specimen.
6. Strain urine over toilet bowl.
7. If stone is found, save and send to the lab for analysis.
8. Doff gloves. Perform hand hygiene.

Urine left standing for 15 minutes or more will not provide an accurate test result.

Multiple Choice

Which test is used if a patient has been poisoned and you need to find out what the poison is.

- Emesis
- Urine
- Cytology
- Lumbar Puncture

SUBMIT

Complete the content above before moving on.

Collect and Label Sputum

Patient must cough to collect the sputum.

Sputum collection is a special test that is helpful in diagnosing medical problems. Sputum specimens are examined for numerous types of microorganisms. In fact, the causative agents for many pulmonary disorders are often discovered in a microscopic examination of the sputum. Tuberculosis is frequently discovered in this manner. For this reason, it is a valuable diagnostic aid to the provider.

When you are collecting the specimen, remember, the causative agent may be in it; therefore, you must exercise caution when collecting it. Be sure to follow universal precautions to decrease the chance of spreading the disease to yourself, other patients, and coworkers. Handle the specimen carefully, touch only the outside of the container, close the container tightly to prevent spillage and further contamination, and be sure to wash your hands after you have handled it.

If the laboratory wants to grow the causative organism in a culture, the specimen must be collected in a sterile container and handled with a sterile technique; otherwise, you will contaminate the specimen.

Normally, the specimen is collected in a wide-mouthed bottle or sputum cup. It should be as free of saliva as possible and obtained by a deep cough. For best results, have the patients rinse their mouth with hot water before they attempt to cough up the specimen. This rinse gets rid of excess saliva. Stay with the patients while they are coughing. Try to get at least a teaspoonful of sputum for the examination. Prepare the appropriate laboratory form indicating the examination requested and take it to the laboratory immediately. If there is any delay, place the specimen in a refrigerator, but not in one used for food.

Before conducting any sputum test, consider the following information:

- When to collect the specimen.
- The right amount needed, which is usually 1-2 teaspoons.
- Can the patient hold the sputum container.

IMPORTANT OBSERVATIONS	SPUTUM COLLECTION

What observations to document and/or report:

1. The time of collection
2. The amount collected
3. How easy it was for the patient to expectorate the sputum
4. Sputum color
5. Sputum odor
6. Sputum consistency
7. Whether there was blood in the sputum or not
8. If patient could not expectorate
9. How to report observations and when
10. What patient concerns to report immediately

IMPORTANT OBSERVATIONS	SPUTUM COLLECTION

1. Gather all supplies and equipment.
    A. Sputum specimen container and lid
    B. Specimen label
    C. Biohazard bag
2. Perform hand hygiene.
3. Verify correct identification of the patient.
4. Label the specimen container at the patient's bedside.
5. Don gloves; collect tissues.
6. Ensure privacy for the patient.
7. Instruct patient to rinse their mouth out with water.
8. Instruct patient to hold the specimen container, careful that only the outside is touched.
9. Instruct patient to cover their mouth and nose with tissues while coughing.
10. Instruct patient to take 2-3 deep breaths and cough up the sputum.

Repeat this action until approximately one teaspoon of sputum is in the cup (or the desired amount per the provider).

11. Instruct patient to spit directly into the specimen container, careful that sputum not touch the outside of the container.
12. Tightly secure the lid on the specimen container.
13. Place container in the biohazard bag.
14. Doff gloves before leaving the room; perform hand hygiene.
15. Take specimen to the lab.
16. Document and/or report any significant observations.

CONTINUE

Stool

Stool Samples

Stool samples are obtained for many reasons (i.e., occult blood, parasites, fat, and other abnormalities). To obtain a stool sample, give the patient a commode hat to defecate into. Once they have defecated, using gloves and a wooden tongue blade, place two tablespoons of feces into the specimen container. The specimen must be taken to the laboratory while it is warm.

Urine must NOT be included in the stool sample. Patients should use one device for voiding and another device for a bowel movement. Additionally, some stool tests require a warm sample. This means the specimen must be taken to the laboratory immediately following collection.

Before collecting a stool sample, consider the following information:

- When to collect the sample
- What equipment is needed, to include any special measures

- What observations to document and/or report:
- The time of collection
- Problems encountered during collection
- Color, amount, consistency, and odor of stool sample
- Any patient complaints such as, pain or discomfort
- How to report significant findings and when
- What patient concerns to report immediately

Collection Procedures

1. Gather all supplies and equipment and perform hand hygiene and verify correct identification of the patient. Label the specimen container at the patient's bedside. Don gloves and ensure patient privacy.
2. Instruct the patient to void first, if they need to do so. Place stool pan on the toilet, if the patient is physically capable of walking to the bathroom. Place stool pan at the back half of the toilet. If patient cannot go to the bathroom, assist with a bedside commode or bedpan. Instruct patient not to put toilet paper into the bedpan, bedside commode, or stool pan.
3. Doff gloves, perform hand hygiene, and leave the room if the patient is allowed to be left alone. Return when the patient calls you or check back every 5 minutes.
4. Perform hand hygiene; don clean gloves. If necessary, assist patient with removing the bedpan; off the toilet or commode. Observe the stools for color, amount, consistency, and odor. Collect the sample.
5. Using a tongue blade, transfer approximately two tablespoons of stool to the specimen jar. Ensure you take the sample from: The center of a solid (and formed) stool, areas of stool with pus, mucus, or blood; watery areas, and middle and both ends of a solidly formed stool.
6. Tightly secure the lid on the specimen jar. Place jar in a biohazard bag and appropriately discard used supplies. Doff gloves before leaving the room. Perform hand hygiene. Finally , take stool sample to lab. Document and/or report any significant observations.

CONTINUE

Collect and Label: Drainage

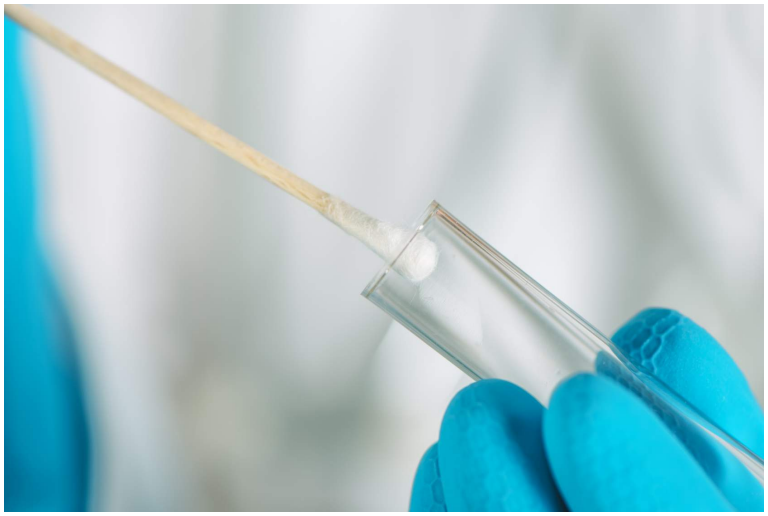
There may be times when an incision becomes infected. If the physician suspects this, he or she will order a culture and sensitivity (C&S) of the wound drainage. The culture is to determine the type of organism, and the sensitivity is to determine what type of antibiotic will stop the growth.

To perform a C&S, obtain a culturette. Before performing the cleaning of the wound, open the culturette, roll the cotton tipped applicator in the exudate (wound drainage), place the tip back into the holder, then break the medium. Be sure to label the culture with the patient's name and source of culture.

Collection Procedures

1. Confirm doctor's orders; verify the specific culture.
2. Gather all supplies and equipment.
3. Verify correct identification of the patient.
4. Ensure you have adequate lighting.
5. Explain to the patient everything you are about to do.
6. Label the culture tube in front of the patient.
   A. Label should have the correct patient info
   B. Label should specify date, time, type of specimen culture, and location of the wound.
7. Perform hand hygiene; don gloves.
8. Remove wound dressing by folding the soiled sides together; discard.
9. Clean the area around the wound edges by using an antiseptic swab.
10. Doff gloves and discard.
11. Open sterile gloves, as well as dressing supplies.
12. Don gloves.
    A. Remove sterile swab from the culture tube and insert the tip into the wound wherever there's drainage.
    B. Rotate swab gently.
    C. Transfer the swab from the wound to the culture tube, careful not to touch any other surface.
13. Using a sterile technique, redress the wound with the sterile dressing supplies.
14. Squeeze the ampule in the bottom of the tube, which will release the preservative.

15. Insert the swab into the solution and wet it thoroughly.
16. Doff gloves and perform hand hygiene.
17. Place tube in a biohazard bag and take to lab.
18. Document and/or report observations and any other significant patient concerns.



Multiple Choice

If you have a patient that you suspect of having a pulmonary disorder, which test should be ordered that you could help you diagnose the patient.

- ◯ Drainage
- ◯ Stool
- ◯ Sputum
- ◯ Urine

SUBMIT

Complete the content above before moving on.

Perform and Label: Venipuncture

As an aerospace medical service journeyman, there may be many occasions to perform a venipuncture. If you work the evening or night shift, either you or the nurse may be responsible for drawing all admission lab work.

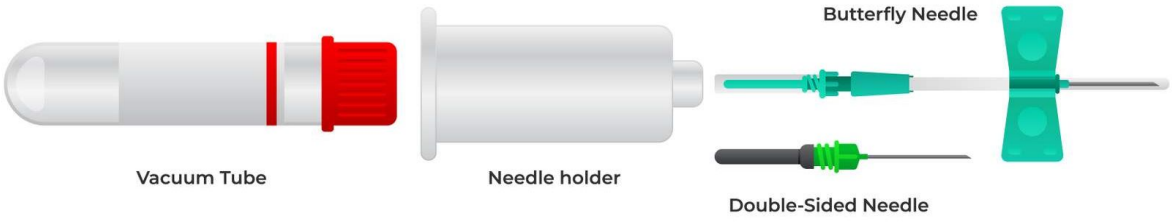
To perform venipuncture, gather all equipment you will need, including: a needle (20 gauge or larger), syringe (size depends on amount of blood needed), antiseptic, 2x2 gauze sponges, vacutainer and vacutainer needle (if using vacutainer system), test tubes (with proper color for tests ordered by the physician), tourniquet, and nonsterile gloves.

Your unit may have a venipuncture tray that includes the equipment you will need. Watch the video below to learn how to perform a safe and effective blood draw.

[redacted]

Safe and Effective Blood Draw Video Transcript.pdf
163.7 KB

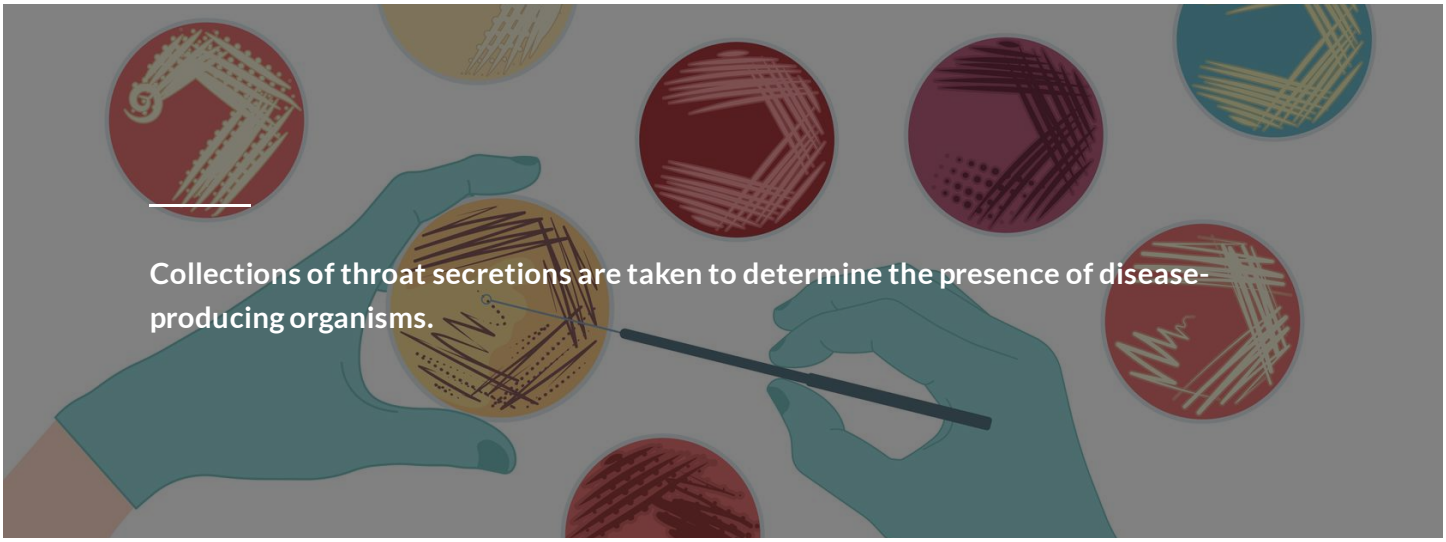
As previously discussed in the lesson on IV therapy, determine the site to use by applying the tourniquet above the elbow. The tourniquet will distend the veins and allow you to visualize and palpate the vein. (NOTE: The tourniquet should not stop the arterial flow of blood; and the radial pulse should still be palpable.) Remove the tourniquet. Next, cleanse the area with an antiseptic solution and allow the area to dry. Reapply the tourniquet and put on gloves. Insert the needle, bevel up into the vein. Obtain the blood sample, remove the tourniquet, and apply a gauze sponge over the site and withdraw the needle. Have the patient maintain pressure over the site for two to three minutes. Using local policies, transfer the blood into a test tube, ensure proper labeling, and send it to the laboratory.



CONTINUE

Perform and Label: Throat Swab

If you have ever been to a doctor for a sore throat, you will probably remember one of the first things the technician did was to stick a cotton-tipped applicator into your mouth. You probably did not care much for the procedure, in fact, you most likely gagged. However, it was done for a reason. Since the mouth is the portal of entry for many organisms, the taking of a throat culture may reveal the type of "bug" giving you the sore throat. When physicians know the organism, they can effectively treat the sore throat.



Collect the specimen with a sterile, cotton-tipped applicator from a sterile test tube. The cotton-tipped applicator is placed in the affected area of the mouth or throat. Carry out the procedure using aseptic technique. After the throat is swabbed, replace the cotton-tipped applicator in the test tube, properly identify the specimen with the patient's social security number, and carry it to the laboratory.

The results of the culture take two to three days. The rapid strep test (there are several different types used) can produce results within minutes to hours. It can only detect the presence of "Group A" strep, the one most likely to cause serious throat infections; it does not detect other kinds of strep or other bacteria.

Supplies Needed:

- Tongue blade
- Culture tube
- Biohazard bag
- Patient label

- Gloves
- Pen light

Watch the video below to learn how to properly perform a throat swab.

PDF

How to Collect a Throat Swab Specimen Video Transcript.pdf
131.3 KB

CONTINUE

Strain Urine for Calculi

STRAINED SPECIMEN

For some patients, you may strain the urine for calculi. As you learned previously, another term for stones is calculi. These stones may develop anywhere in the urinary tract system. If the physician thinks a patient may have a stone, he or she orders straining of all of the patient's urine.

Most facilities have paper funnels with fine mesh gauze in the end, called a strainer. As you strain the urine, look for stones. If you find a stone, save it, place in a sterile urine cup, apply correct labeling, notify the nurse and send it to the laboratory for analysis.

STRAINED SPECIMEN

1. Gather all supplies and equipment.
2. Perform hand hygiene.
3. Verify correct identification of the patient.
4. Don gloves.
5. Gather urine strainer for the urine specimen.
6. Strain urine over toilet bowl.
7. If stone is found, save and send to the lab for analysis.
8. Doff gloves and perform hand hygiene.

CONTINUE

Urine Reagent Stick

There are several different tests that you may complete on urine samples. One of these tests is a sugar and acetone test (S&A). This is done to detect the presence of sugar or acetone bodies in the urine. The method used is determined by each facility. In most cases, you will obtain a urine specimen from the patient using a commode hat, while implementing universal precautions. Place the urine to be sampled in a urine specimen container and take the sample to the utility room. Most facilities use a test strip method; you simply dip the test strip into the urine and wait a specific amount of time for the results. Please check your unit operating instructions for the method used in your facility.

Another test you may complete is a hematest. This is a test for occult blood in the urine. Once again, a urine sample is obtained. Then, using a test strip, place it into the urine and wait the amount of time specified in the test strip instructions for the results.

COLLECTING AND TESTING URINE

TESTING URINE - REAGENT STRIPS

There are several different tests that you may complete on urine samples. One of these tests is a sugar and acetone test (S&A). This is done to detect the presence of sugar or acetone bodies in the urine. The method used is determined by each facility. In most cases, you will obtain a urine specimen from the patient using a commode hat, while implementing universal precautions. Place the urine to be sampled in a urine specimen container and take the sample to the utility room. Most facilities use a test strip method; you simply dip the test strip into the urine and wait a specific amount of time for the results. Please check your unit operating instructions for the method used in your facility.

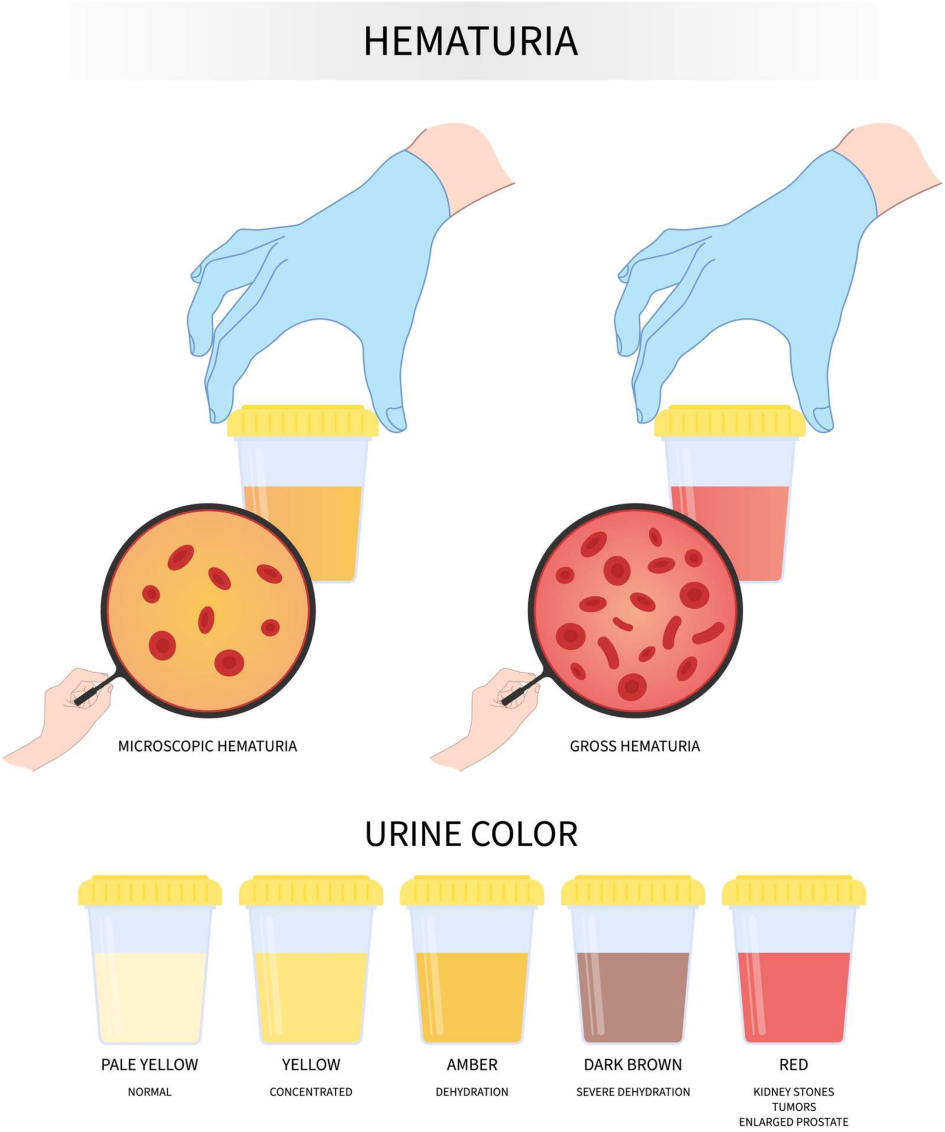
Another test you may complete is a hematest. This is a test for occult blood in the urine. Once again, a urine sample is obtained. Then, using a test strip, place it into the urine and wait the amount of time specified in the test strip instructions for the results.

COLLECTING AND TESTING URINE

TESTING URINE - REAGENT STRIPS

1. Gather all supplies and equipment.
    A. Check the expiration date on the bottle. If expired, do not use.
    B. Check the color of the strips. If discolored, do not use.
    C. Do not touch the test area on the strips.
    D. Follow the manufacturer's label to ensure accuracy.
2. Perform hand hygiene.
3. Verify correct identification of the patient.
4. Don gloves.
5. Gather equipment for the urine specimen.

6. Ensure privacy for the patient.
7. Collect the urine specimen.
8. Remove a strip from the reagent bottle and immediately secure the lid.
9. Dip the strip test area into the urine.
10. After the correct amount of time has passed, remove the strip. See manufacturer's label.
11. Remove excess urine from the strip by tapping it gently against the urine container.
12. Wait the necessary amount of time, per the manufacturer's guidance.
13. Compare the strip with the color chart on the bottle.
14. Doff gloves. Perform hand hygiene.
15. Document and/or report test results and any other significant observations.



CONTINUE

Capillary Stick

A skin puncture is performed when only a small amount of blood is needed to perform a test. Different sites can be used to obtain this sample (e.g., fingertips, earlobes, or heels of neonates). To perform a skin puncture, obtain the required equipment—lancet, pipette, slides, micro hematocrit tube, alcohol, sterile gauze sponges, or any other equipment needed for that particular test. Now you are ready to perform the test.

Identify the patient, cleanse the selected site with alcohol, and then dry the site to prevent any alterations in test results from the alcohol. Apply gloves and press or squeeze above the site to allow the blood to infiltrate the area.

To minimize pain, quickly prick the skin with your sterile lancet. Release the pressure and wipe off the first drop of blood. This first drop of blood contains epithelial cells, which can interfere with the test results. Obtain the sample needed, and then apply pressure over the site with a sterile gauze sponge until the bleeding stops.

CONTINUE

Using a Blood Glucose Meter

A glucose meter is an instrument used by diabetics to quickly obtain blood glucose levels. Normal fasting blood glucose levels range from 70 to 115 mg/dl. Many facilities have several different types of glucose monitoring equipment; therefore, each of them will not be discussed in this

text. Operating instructions are provided for each unit. Before operating the equipment you will need to read and become familiar with the instructions for each unit you are required to use.

Also, your trainer will give you preoperational training before using the glucose meter on a patient.

It is imperative to read the manufacturer's manual for the specific glucose testing device you have on-hand. This is the best way to ensure accurate test results; and the best way to prevent repeat testing on the patient. There are a variety of machines on the market, all with their own specifications. Make sure you know how to use what you have.

Collection Procedures

1. Gather all supplies and equipment and verify correct identification of the patient.
2. Explain to the patient what you are about to do in plain language. Identify which finger you plan on using and instruct patient to hang their hand down. If hand is cold, instruct patient to warm it up with warm water or passively warm it using your own hands.
3. Perform hand hygiene and don gloves.
4. Cleanse the site with an alcohol swab – ensure finger does not touch anything else, to include other fingers. Allow alcohol to dry.
5. Turn on the glucose machine. Place lancet in the lancet holder and remove the needle cover. Cock the lancet device.
6. Cross-check the control number on the screen with the control number on the bottle of test strips – they should be the same.
7. Remove test strip from the bottle and insert the end (should have metal strips) into the machine. Place fingerstick device firmly against the skin and hit the release button.
8. If necessary, wipe away the first drop of blood with a gauze pad or cotton ball. You'll need to have read the manufacturer's manual prior to use.
9. Gently squeeze the finger, milking downward to the tip until an appropriate drop of blood has formed. Carefully place the drop of blood onto the test strip.
10. Apply pressure to the puncture site with a clean cotton ball or gauze pad; instruct patient to then hold it firmly in place.
11. Document the glucose reading on the machine. Turn off machine. Discard used supplies appropriately. Doff gloves and perform hand hygiene.

Multiple Choice

A _____ is performed when only a small amount of blood is needed to perform a test.

- ◯ skin puncture
- ◯ skin prick
- ◯ finger puncture
- ◯ finger prick

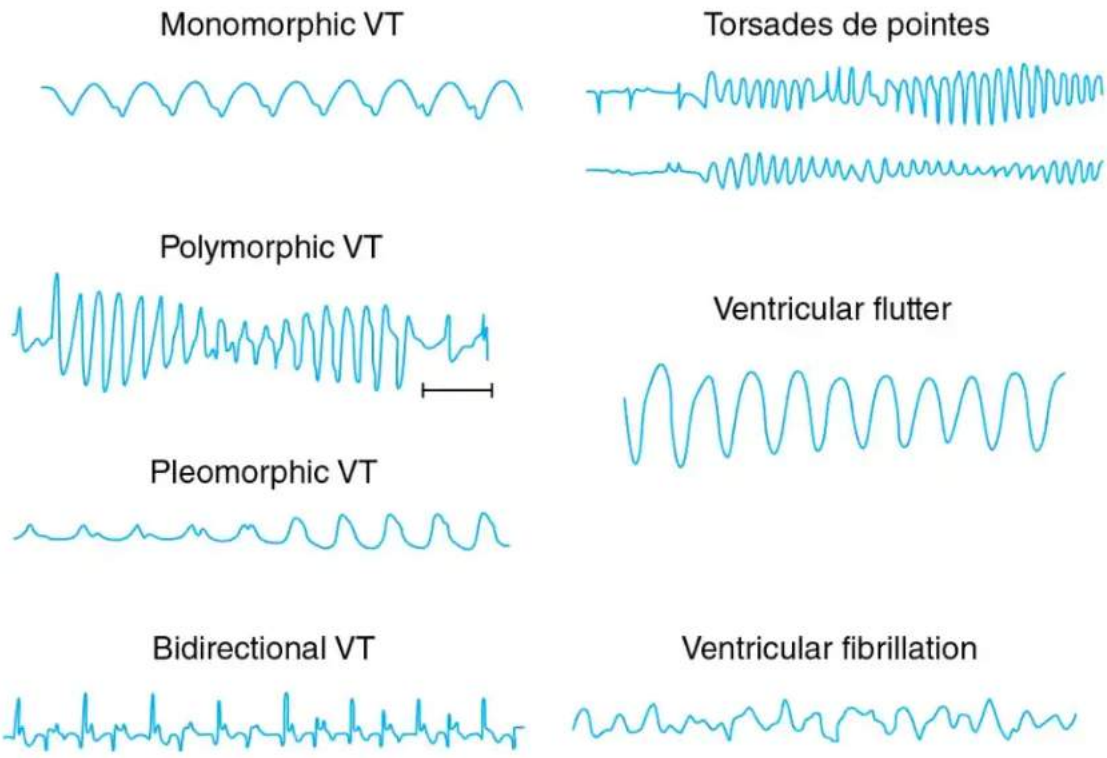
SUBMIT

END OF LESSON

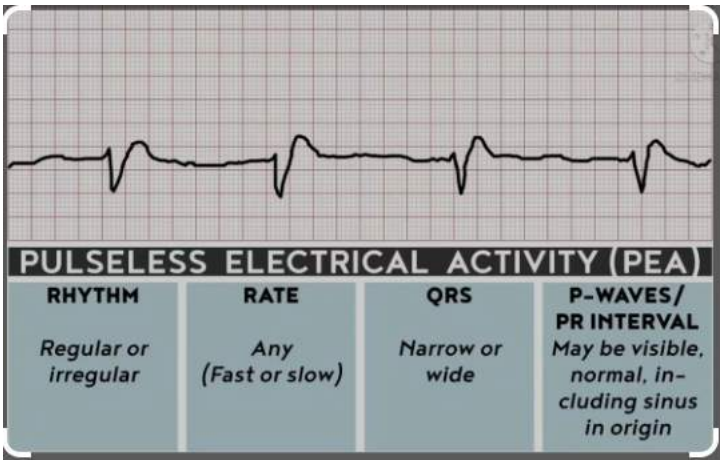
Lesson 6- Cardiovascular Procedures

After completing this lesson, the student will be able to identify cardiovascular operating procedures in accordance with prescribed guidance and publications.

We need to begin by going over some common terms you will come across when dealing with rhythms of the heart. Click through the photos below to learn about these terms.



V and T waves

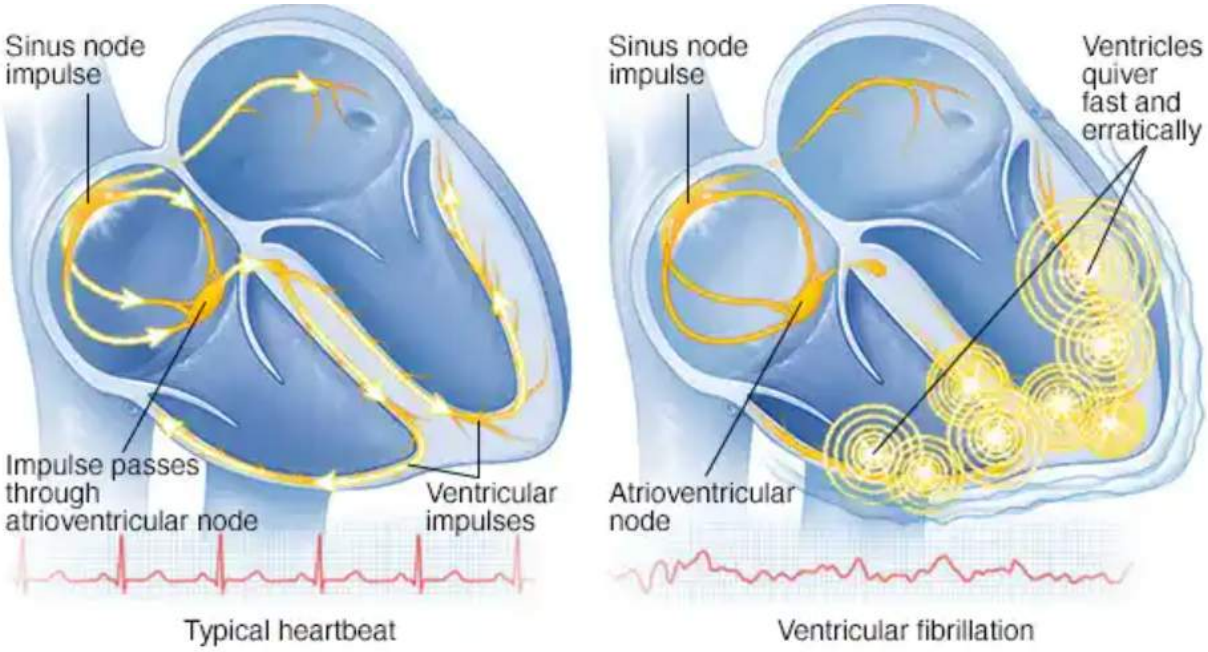


Pulseless electrical activity definitions

Pulseless Electrical Activity (PEA) Causes

The 6 H's	The 6 T's
Hyperkalemia	Tamponade (cardiac)
Hypoxia	Tension pneumothorax
Hypothermia	Thrombosis (pulmonary embolus)
Hydrogen ion access (acidosis)	Thrombosis (myocardial infarction)
Hypovolemia	Toxins
Hypoglycemia	Trauma

Pulseless electrical activity causes



Recognize and Report Normal Sinus Rhythm

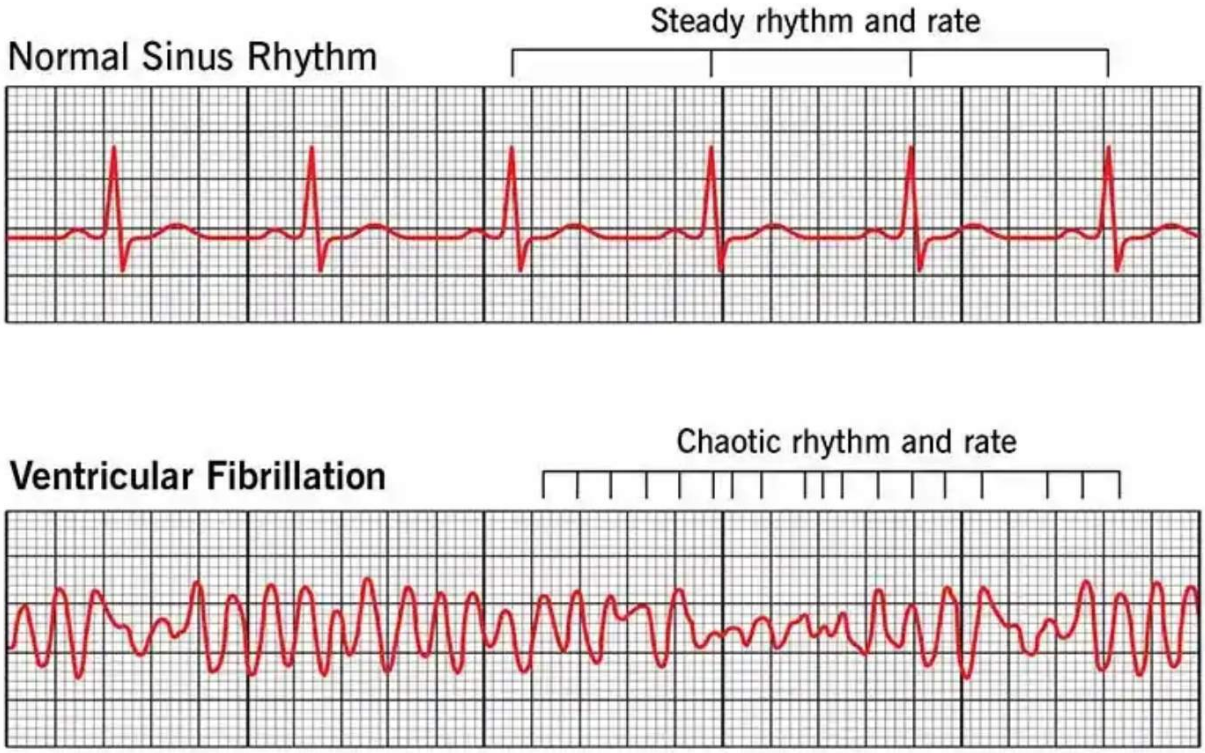
Normal Sinus Rhythm (NSR)

Normal Sinus Rhythm (NSR) is the rhythm that originates from the sinus node and describes the characteristic rhythm of the healthy heart. This means, the electrical pulse from the sinus node is being properly transmitted throughout the heart muscle.

To recognize and report Normal Sinus Rhythm, follow the below steps.

1. Verify provider orders.
2. Rate: 60-100 beats per minute.
3. Rhythm: regular.
4. P Waves: normal, upright and only before each QRS complex.
5. PR Interval: 0.12-0.20 seconds.
6. QRS Complex: <.12 seconds with a clear baseline and absence of artifacts.
7. Morphology: Normal.
8. Duration: <0.12 seconds.
9. Obtain a rhythm strip on admission, at intervals dictated by your local policy, when there is any rhythm change or as provider orders.
10. Evaluate the ECG patterns continually for any dysrhythmias and asses the patient's tolerance to any changes.

11 Notify the registered nurse or provider of any changes, or for any interventions.



NSR vs VFib

Multiple Choice

What kind of heart rhythm is shown in the picture below?

- Normal sinus rhythm
- Ventricular fibrillation
- Ventricular flutter
- Polymorphic ventricular fibrillation

SUBMIT

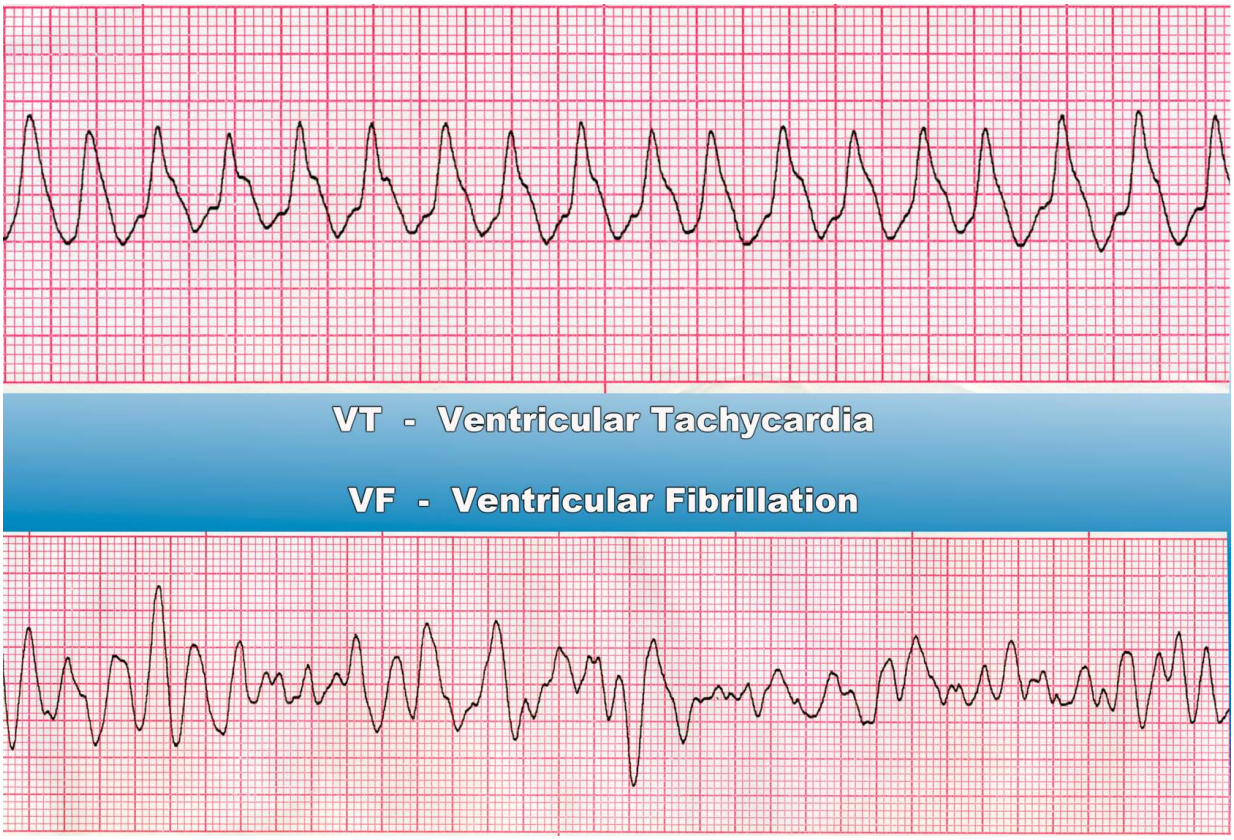
Complete the content above before moving on.

Recognize and Report Ventricular Tachycardia

Ventricular tachycardia occurs due to a problem with the heart's electrical impulses. The condition may develop as a complication of a heart attack or may occur in people with certain conditions, such as valvular heart disease. Symptoms include chest pain, fainting, dizziness, and shortness of breath.

To recognize and report ventricular tachycardia, follow the below steps.

1. Rate: 100-125.
2. Rhythm: Usually irregular, to slightly irregular.
3. Pace Maker Site: Ventricle.
4. P waves: If or when P waves are present, not associated with the QRS complexes.
5. PR Interval: None.
6. QRS Complex: Greater than 0.12 seconds and bizarre in morphology.
7. T wave: Deflected opposite to the QES complex.
8. Obtain rhythm strip on admission, at intervals and per local policy or provider order.
9. Evaluate the ECG pattern continually for dysrhythmias, and asses the patient's tolerance to the change.
10. Notify the RN or provider for interventions. V-tach may eventually deteriorate into ventricular fibrillation (V-Fib).



This photos shows the difference

Recognize and Report Ventricular Fibrillation

Ventricular Fibrillation is a chaotic ventricular rhythm that typically results from many reentry circuits within the ventricles. There is no ventricular depolarization or contraction. There are a wide variety of causes associated with V-Fib, while most cases result from advanced coronary artery disease. V-Fib is a lethal arrhythmia. The absence of cardiac output or an organized electrical pattern leads to cardiac arrest.

To recognize and report ventricular fibrillation, see the below steps:

1. Rate: No organized rhythm. Immeasurable due to the absence of QRS complexes
2. Rhythm: Chaotic, with no organized rhythm
3. Pacemaker sit: Numerous ectopic foci throughout the ventricles
4. P wave: Usually absent
5. QRS Complex: Absent
6. T wave: Not apparent

Signs and symptoms will include no response from the patient when assessing, level of consciousness (LOC), and no normal breathing when assessing the airway, with the look, listen and feel method.

Treatment: If you witnessed the patient go into V-Fib, or lose their pulse, LOC and/or airway, begin CPR immediately. Call for help by either pressing the code blue button/call bell, or identify a person to initiate code blue protocols and get the AED/code cart.

Start CPR, with the **30:2** ratio (15:2 if alone). 30 chest compressions and 2 breaths. Ensure the patient is on a flat, firm surface. If this was NOT witnessed, begin CPR with the 30:2 ratio, call for help, and get an **AED**.

Watch the video below for procedures and information on using an AED.

PDF **AED in Action Video Transcript.pdf**
137.7 KB

CONTINUE

Recognize and Report Pulseless Electrical Activity (PEA)

Pulseless Electrical Activity, known as PEA, has present electrical complexes, with no accompanying mechanical contractions of the heart. The EKG/monitor may show a perfect normal sinus rhythm, organized or spontaneous cardiac activity, yet the patient may be pulseless, or unable to obtain a pulse on palpation. This is due to a lack of sufficient blood flow throughout the heart, caused by the lack of mechanical contractions. It is very important to asses and treat the patient, not just the monitor.

Causes of PEA include, but are not limited to:

1. Hypovolemia
2. Cardiac Tamponade
3. Hypoxemia
4. Tension Pneumothorax
5. Massive Pulmonary Embolism
6. Acidosis
7. Ventricular Wall Rupture

Treatment: Notify RN or provider as soon as possible (ASAP). Medications are required to treat PEA. **Early treatment** can potentially reverse some of the above conditions.

Prompt recognition of PEA and therapy initiation are essential. Patient outcomes of PEA are generally **very** poor.

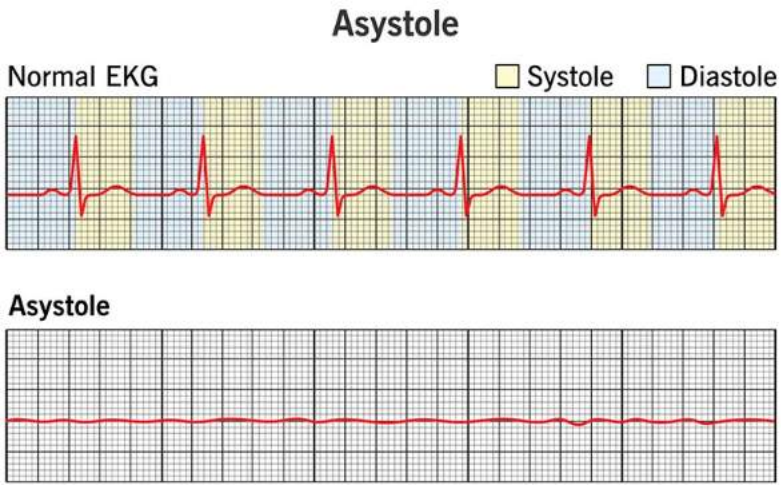
CONTINUE

Recognize/Report Asystole

The absence of all cardiac electrical activity. Also known as the "cardiac standstill." Asystole is usually associated with MI (myocardial infarction), ischemia, and necrosis, and is often the final outcome of ventricular fibrillation when no escape pacemaker takes over.

To recognize and report asystole, note the following:

1. Rate: No electrical activity
2. Rhythm: No electrical activity
3. Pacemaker site: No electrical activity
4. P waves: Usually absent, but in certain cases only the P wave will be seen
5. QRS complexes: Absent
6. PR Interval: Absent



Asystole

Treatment: Treat like all other types of cardiac arrest and **notify** RN or provider.

1. Call for help/initiate code blue.
2. Check for a pulse for no longer than 10 seconds. Ensure you check the carotid.
3. Check for breathing with the look, listen and feel method for no longer than 10 seconds.
4. Begin chest compressions at a ratio of 30 compressions to 2 breaths.

Chest compressions should be hard and fast, at 120 beats per minute. Depth is equal to 2 to 2.5 inches. Lock elbows and ensure you bend at the waist. Allow for full recoil of the chest in between each compression. After 30 compressions, provide 2 breaths with either a pocket mask, or BVM.

Once help arrives, they will place AED or defibrillation pads onto the patient. The AED/Defibrillation looks for a shockable rhythm, if it says shock advised, clear the patient ensuring nothing and no one is touching the patient. Push the "Shock" button. If you do not hear "shock advised," keep performing CPR.

Rotate positions every 2 minutes or 5 cycles of CPR.

Watch the video below for a demonstration of how CPR works.

PDF

CPR in Action Video Transcript.pdf

138.5 KB

Multiple Choice

When preforming CPR, you should complete_____ chest compressions accompanied with _____ breaths.

- ◯ 20/5
- ◯ 5/20
- ◯ 30/2
- ◯ 2/30

SUBMIT

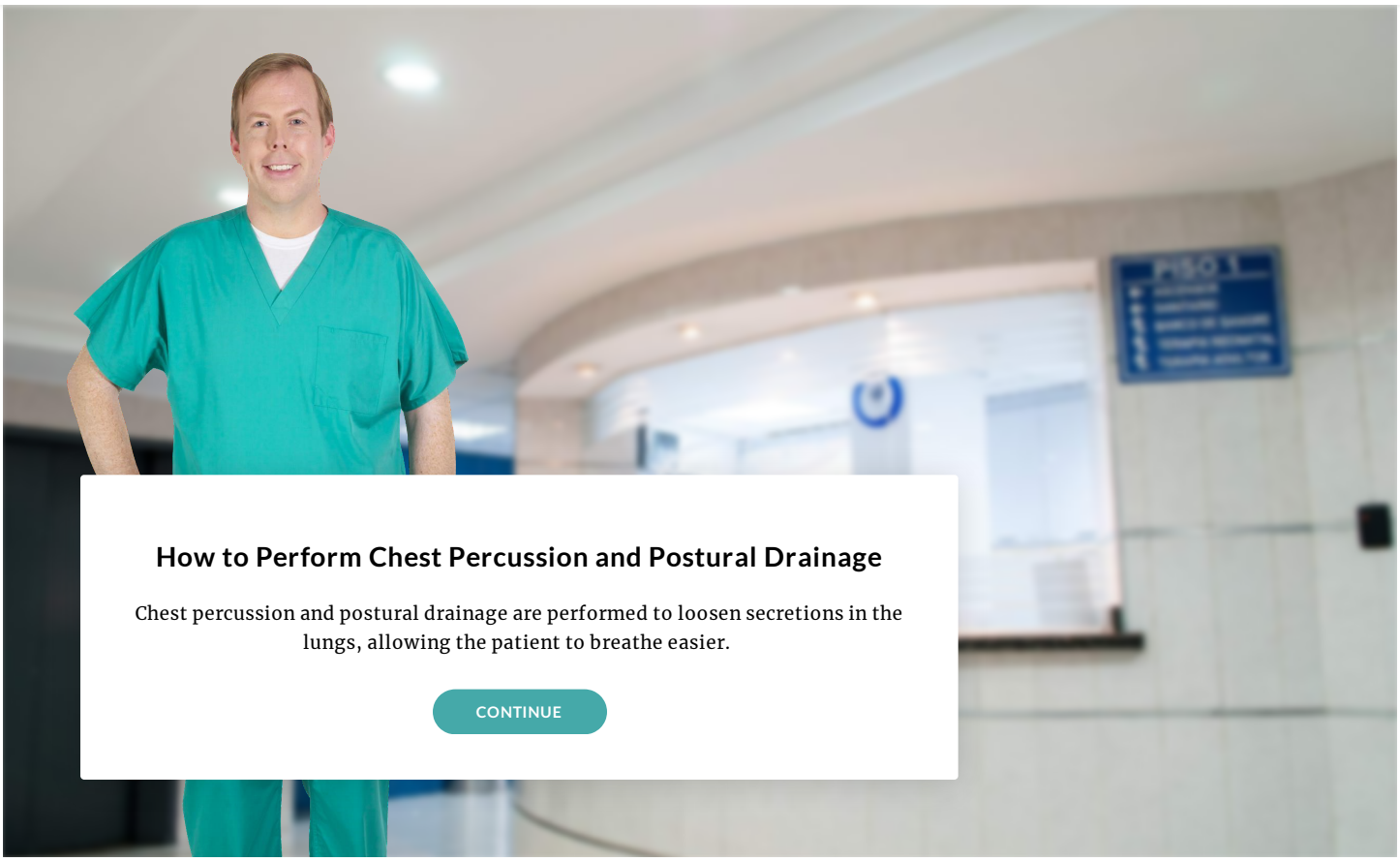
END OF LESSON

Lesson 7- Pulmonary Procedures

After completing this lesson, the student will be able to apply pulmonary procedures in accordance with prescribed guidance and publications.

Perform Chest Percussion and Postural Drainage

Different positions are used to drain different segments of the lungs allowing secretions to clear. As segments of the lungs drain into the bronchi, the patients is able to cough more effectively and expectorate secretions. Indications include, but not limited to lung conditions that cause increased productions of secretion such as cystic fibrosis, chronic bronchitis, emphysema and bronchiectasis.



Scene 1 Slide 1

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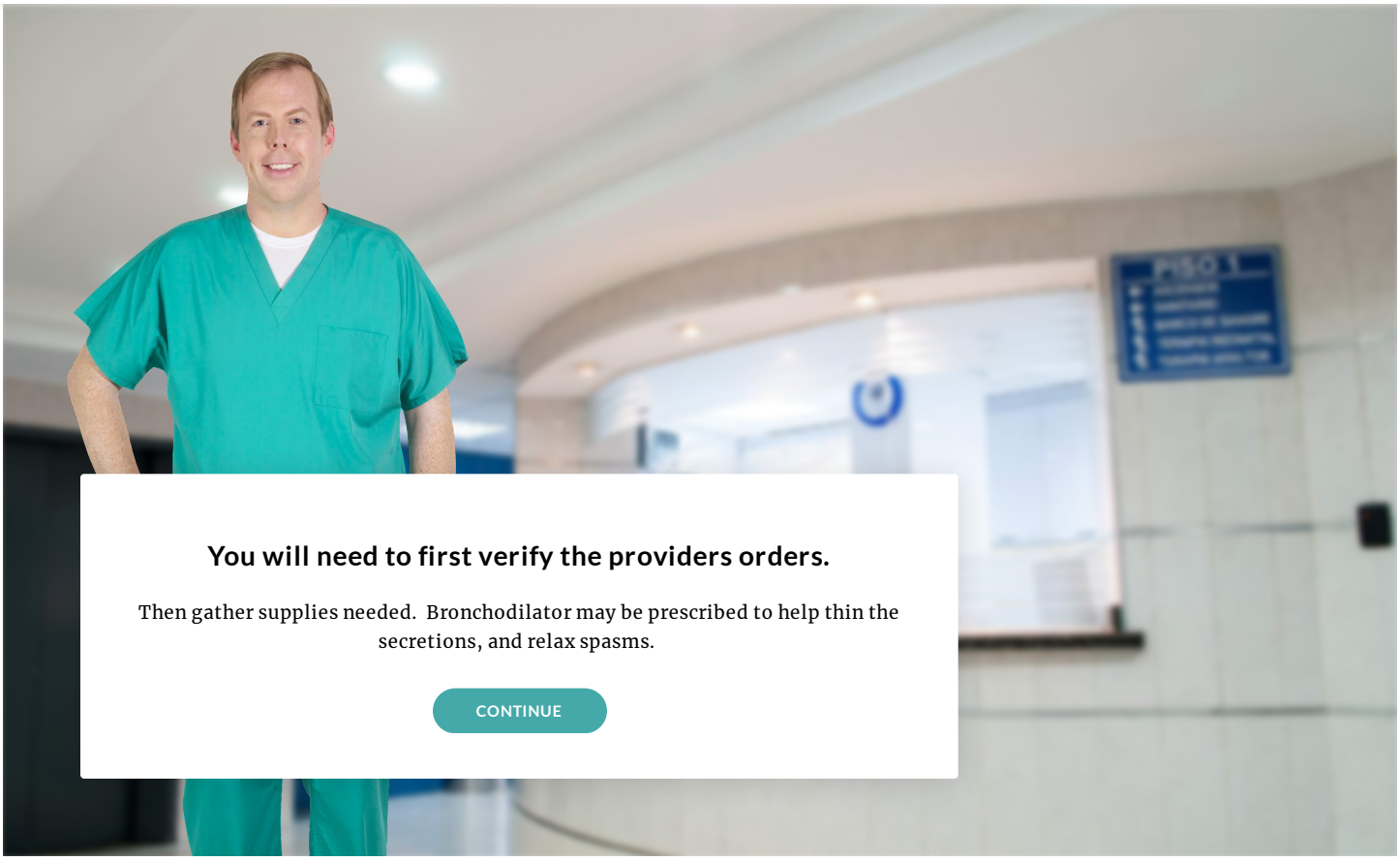


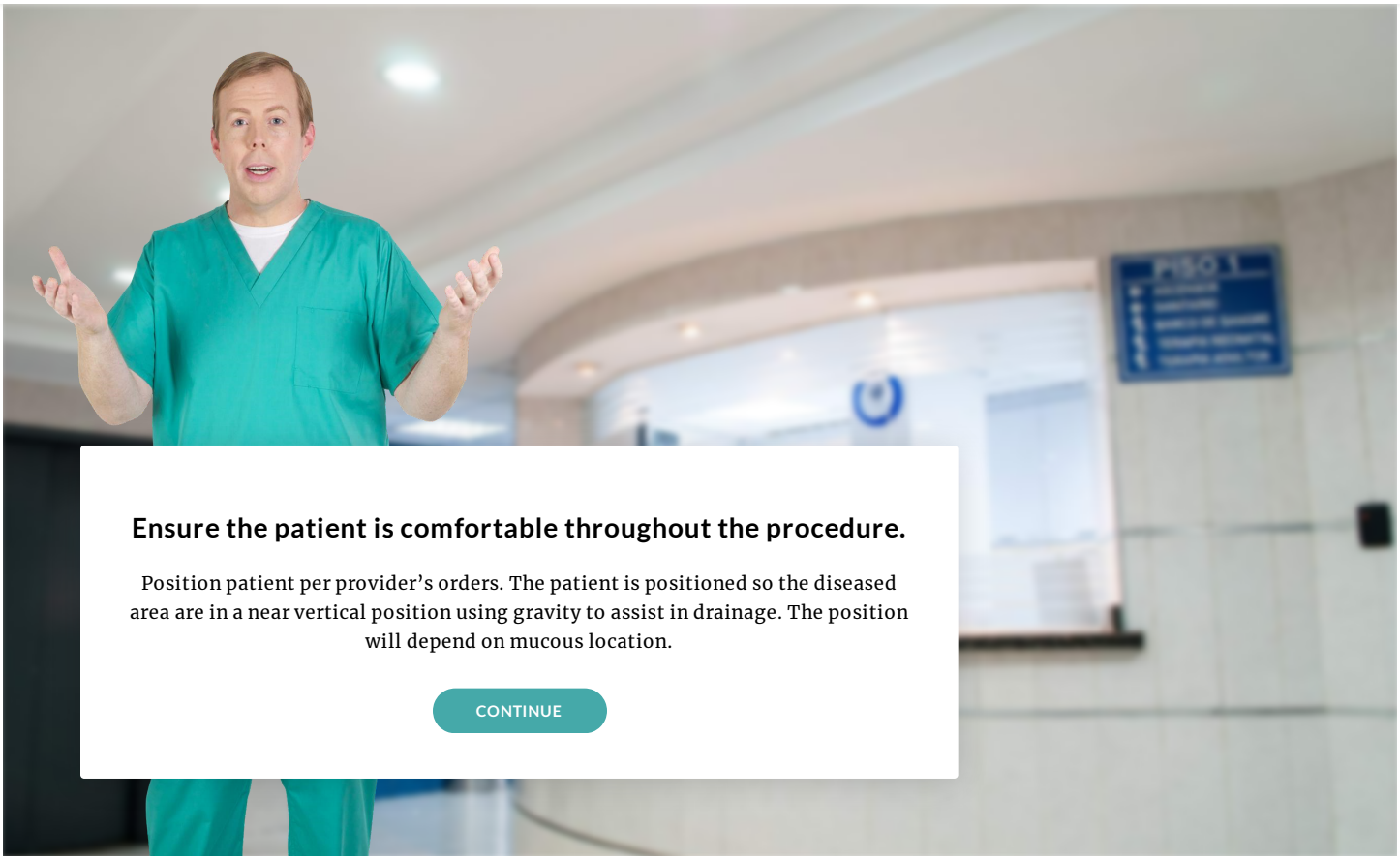
You will need to first verify the providers orders.

Then gather supplies needed. Bronchodilator may be prescribed to help thin the secretions, and relax spasms.

CONTINUE

Scene 1 Slide 2

Continue → Next Slide



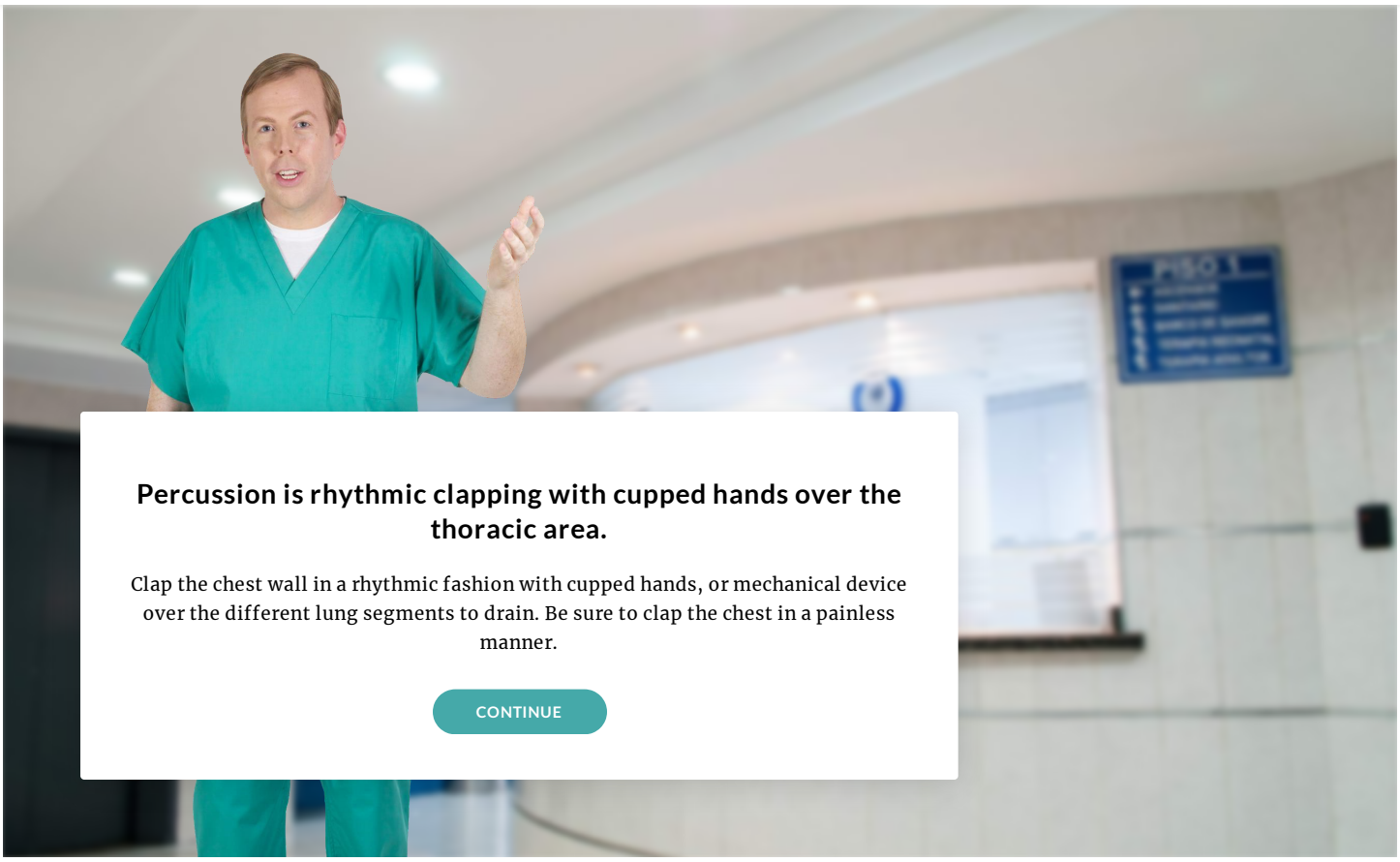
Ensure the patient is comfortable throughout the procedure.

Position patient per provider's orders. The patient is positioned so the diseased area are in a near vertical position using gravity to assist in drainage. The position will depend on mucous location.

CONTINUE

Scene 1 Slide 3

Continue → Next Slide



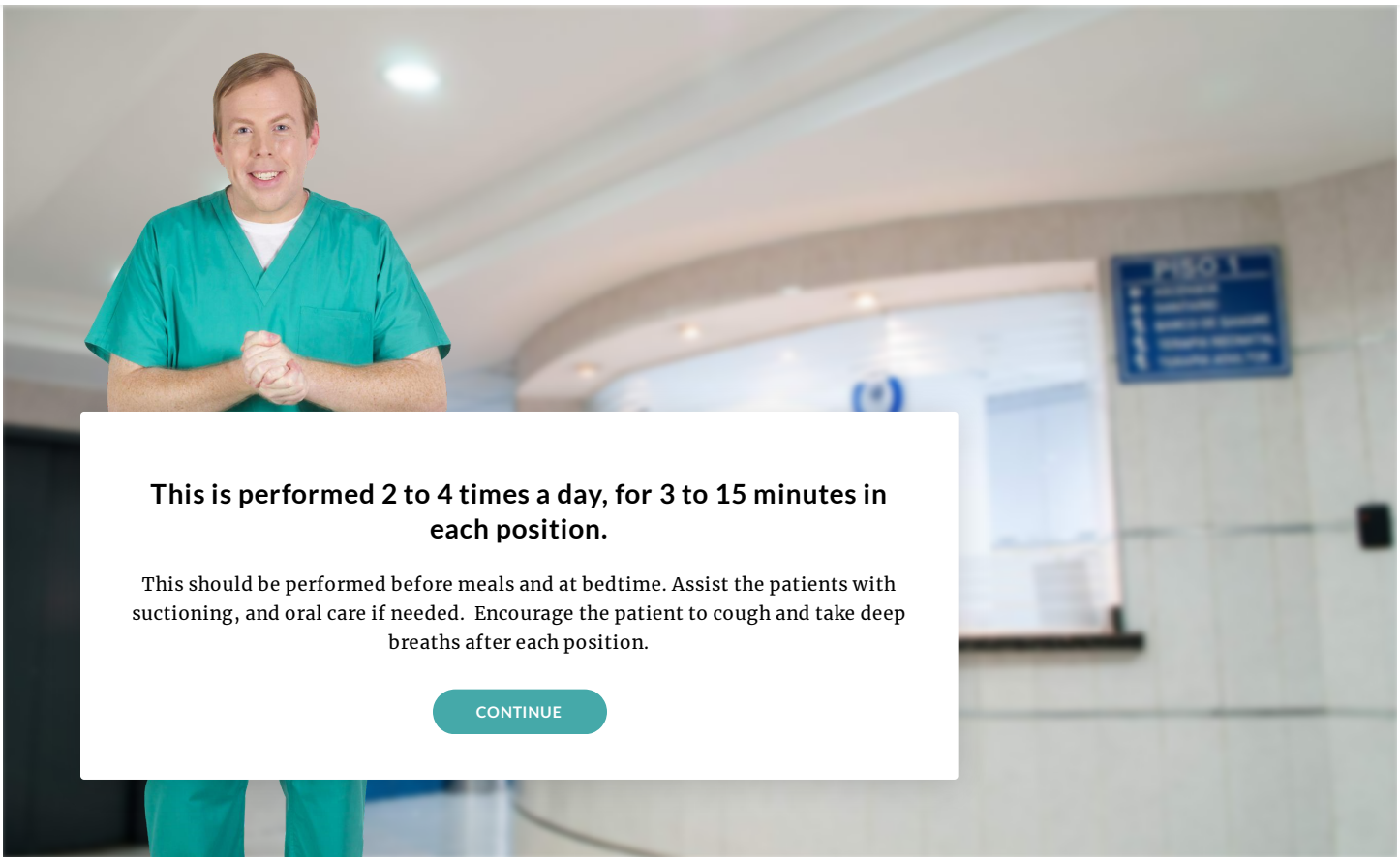
Percussion is rhythmic clapping with cupped hands over the thoracic area.

Clap the chest wall in a rhythmic fashion with cupped hands, or mechanical device over the different lung segments to drain. Be sure to clap the chest in a painless manner.

CONTINUE

Scene 1 Slide 4

Continue → Next Slide



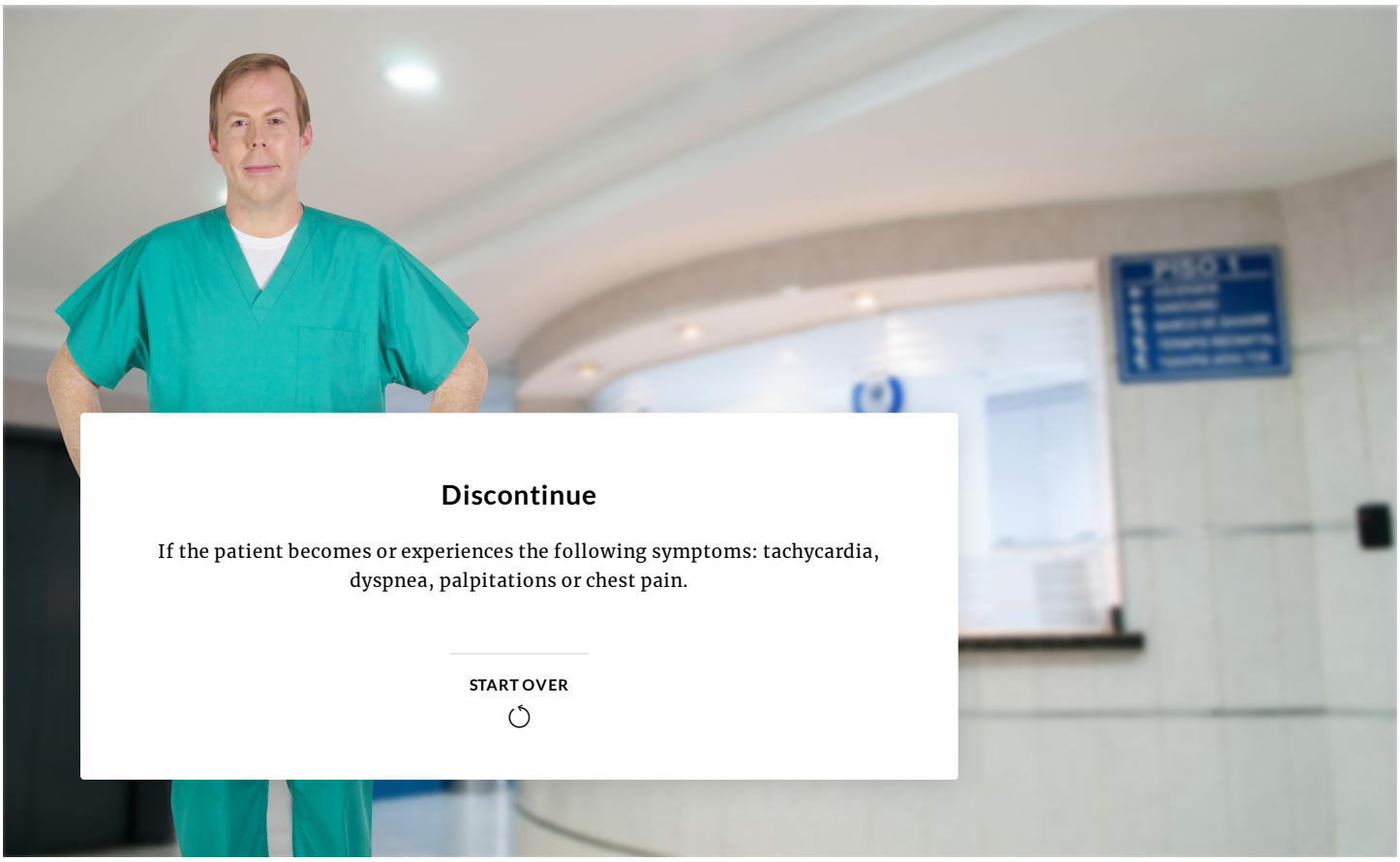
This is performed 2 to 4 times a day, for 3 to 15 minutes in each position.

This should be performed before meals and at bedtime. Assist the patients with suctioning, and oral care if needed. Encourage the patient to cough and take deep breaths after each position.

CONTINUE

Scene 1 Slide 5

Continue → Next Slide



Scene 1 Slide 6

Continue → End of Scenario

CONTINUE

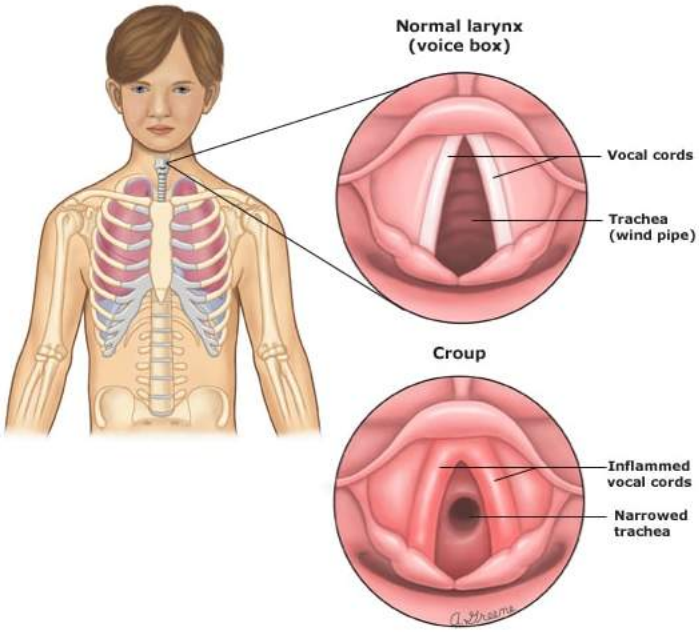
Croup Tent/Oxygen Hood

The **croup tent** is used to promote effective air way clearance as well as improving breathing patterns. This is primarily used for pediatric patients, however not limited to them. You may use this method of oxygen delivery if the patient is being given specific aerosol medications, or requires a negative pressure room due to their diagnosis. This type of oxygen therapy also uses humidified oxygen to assist in liquefying secretions as well as combat hypoxia.

An **oxygen hood**, which is a plastic container that fits over the patient's head, is usually seen in neonatal units. The plastic hood is filled with warm, humidified, and highly concentrated oxygen. The oxygen is warmed to 31–34°C (87.8–93.2°F) to prevent cold stress to the infant. The oxygen concentrations, along with the temperature and humidity, are continuously monitored by an oxygen analyzer .

Croup is an upper airway infection, common in infants and children that obstructs breathing and in result causes a bark like cough. This cough is due to swelling around the vocal cords, windpipe and bronchial tubes. Croup is typically caused by viruses.

A croup tent is a thin, flexible plastic tent that is placed over the patient to allow for continuous oxygenation, or even medication delivery in severe cases, to include inhaled medications to open the bronchi. You may use a nebulizer treatment, as well as a cool mist humidifier to help keep the patient comfortable.



Croup larynx

Multiple Choice

What is an upper airway infection, common in infants and children that obstructs breathing and as a result causes a bark like cough?

- Croup
- Strep Throat
- Bronchitis
- COVID -19

SUBMIT

Complete the content above before moving on.

Humidified Oxygen

Humidified oxygen is used for patients who are likely to be on an oxygen source for an extended period of time, for some medical conditions, and for comfort. When you think about oxygen blowing across the mucus membranes, you should also think about oxygen drying out the mouth and nose rather quickly. Humidified oxygen helps keep secretions from becoming thick and dry.

The humidifier setup generally consists of a bottle of sterile water with a top that can be hooked to a flowmeter (to the wall or tank) and an outlet to connect oxygen tubing. Turn the flowmeter on to the directed liters per minute, ranging from 2–12 liters per minute, and ensure that the oxygen is flowing well prior to placing the mask or cannula on the patient. Humidified oxygen is also used with other oxygen delivery methods, such as oxygen tents/croup tents, hoods, masks, cannulas, and ventilators.

PPE, oxygen deliver method, tubing exposed to moisture, NO SMOKING signs, no flammable materials near the patient

To set up humidified oxygen you will first check the doctor's orders and then gather your equipment (compressed air source and flowmeter, humidifier with distilled water, and large-bore tubing). Many places require **NO SMOKING** signs to be posted where oxygen is being used, so check your local policy. Next, connect a bottle of distilled water to the oxygen tank or the oxygen apparatus on the wall and then connect oxygen tubing for whichever oxygen delivery method was ordered. Then you will turn on the oxygen flowmeter, adjust to the ordered flow rate, and ensure oxygen is flowing through the apparatus. Finally, document the procedure.

Some cues for you to look for to ensure set up is complete are:

1. Bubbles forming in sterile water bottle.
2. Ball in flow meter gauge is floating at desired number for rate.
3. Slight mist coming from oxygen apparatus indicates humidified air is flowing through the mask.

Fill in the Blank

_____oxygen is used for patients who are likely to be on an oxygen source for an extended period of time, for some medical conditions, and for comfort.

Type your answer here

SUBMIT

END OF LESSON

Lesson 8- Musculoskeletal Procedures

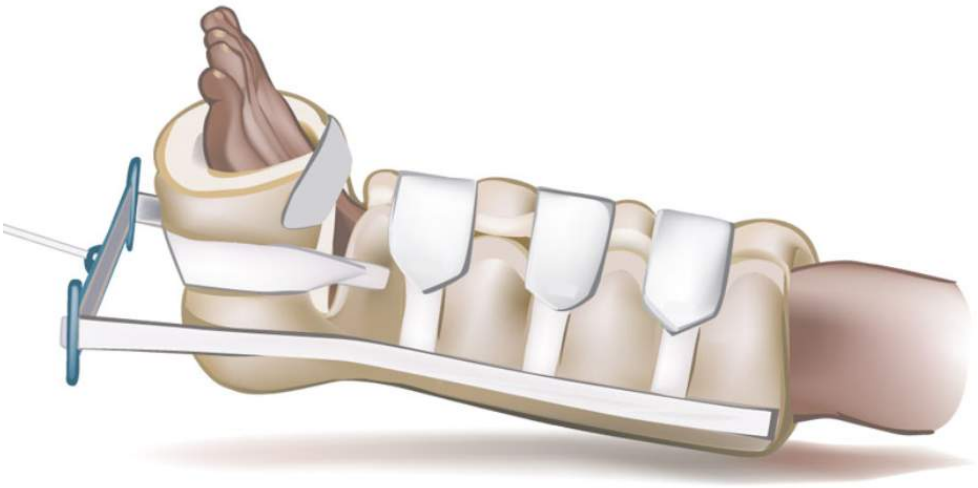
After completing this lesson, the student will be able to identify musculoskeletal operating procedures in accordance with prescribed guidance and publications.

Apply Skin Traction

Skin traction is applied to the skin by heavy adhesive tape, moleskin, or halters connected to weights and pulleys. It is mainly used to relieve pain from muscle spasms and to correct mild deformities. Keep in mind that traction application in the United States is well standardized. In deployed settings, field litters and cots are normally used when treating patients and are not made for traction devices. Pay close attention to the provider's directions in these situations as they often have to be creative with creating a traction system that will work well for the patient.

Types of Skin Traction

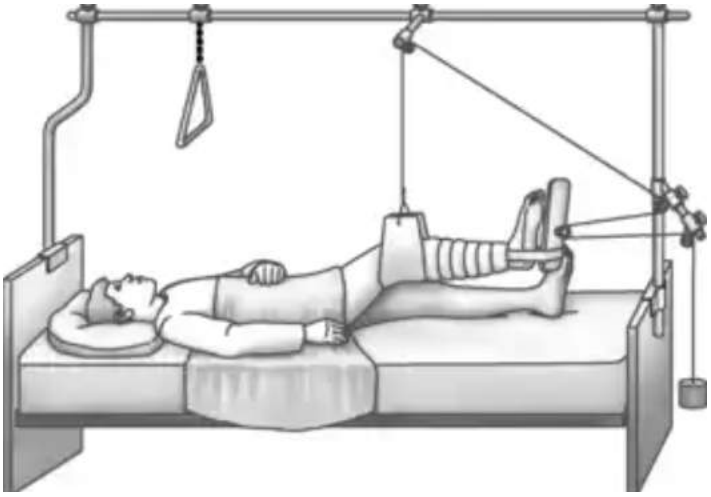
BUCK'S EXTENSION	RUSSELL'S TRACTION
Applied to the leg as temporary treatment for fractures of the upper portion of the shaft or neck of the femur. It is also used for hip fractures and applied to the hip prior to surgery.	



BUCK'S EXTENSION

RUSSELL'S TRACTION

Treats some fractures of the shaft and neck of the femur or hip. May also be used to treat specific types of knee injuries or contractures.



To get prepared for using these types of traction, you will begin by setting up the Balkan frame and trapeze if needed. A Balkan frame is used for the placement of pulleys. An overhead trapeze can be attached to the Balkan frame to encourage self-help on the part of the patient. If the mattress is not made of hard-foam rubber or cotton, place a bed board under it to stop patient or devices from sinking into the bed. After you set up the traction unit, be sure to:

Balkan frame

- [ ] Pay close attention to the condition of the skin under the traction site.
- [ ] Check pressure points.
- [ ] Ensure tape does not bunch up or wrinkle, causing skin irritation or causing the traction device to slip.
- [ ] Encourage patient to do bed exercises unless contraindicated. Report any abnormal findings immediately.

CONTINUE

Care for External Fixation Device and Pin

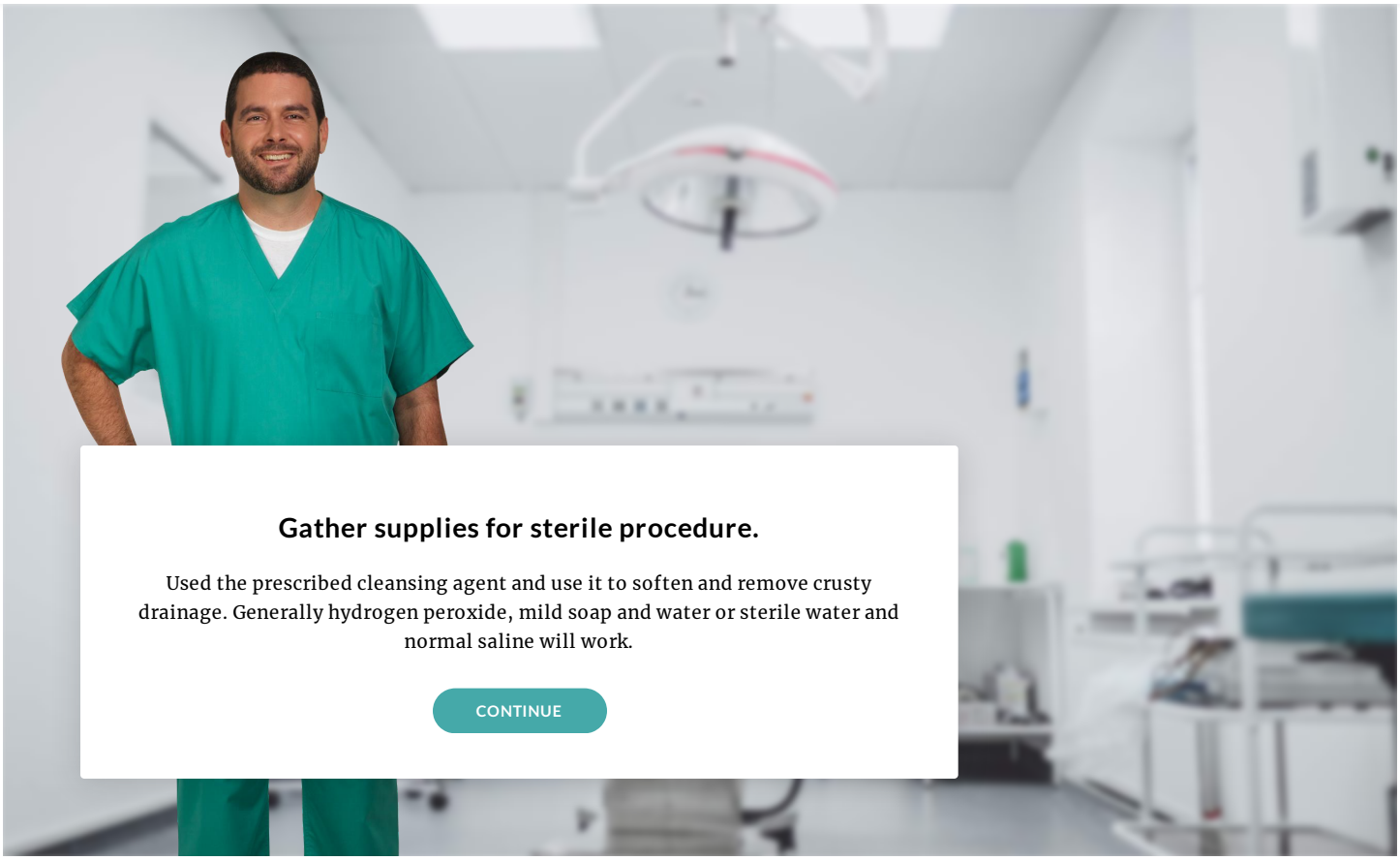
External fixation is a form of reduction and immobilization used for the management of open, complicated fractures with severe soft-tissue damage. Reduction in layman's terms means setting the bone. For a broken bone to heal properly, it must be placed back into a normal anatomical position. An open fracture is a break in a bone that connects with a wound in the exterior surface of the skin. With external fixation,

pins attached to bone, protrude through the skin and are attached to an external metal frame. The wound may be left open to heal. Some advantages include easier access to wound care, soft tissue reconstruction, and early function of muscles and patient comfort.

Repairing bone fracture with external fixation

Pin care is indicated for patients in skeletal traction with an external fixation device. It is very important to prevent infection and should be performed two to three times daily. If there is a local policy on pin care, be sure to follow that guidance.

Here are some general rules and steps to follow:



Scene 1 Slide 1

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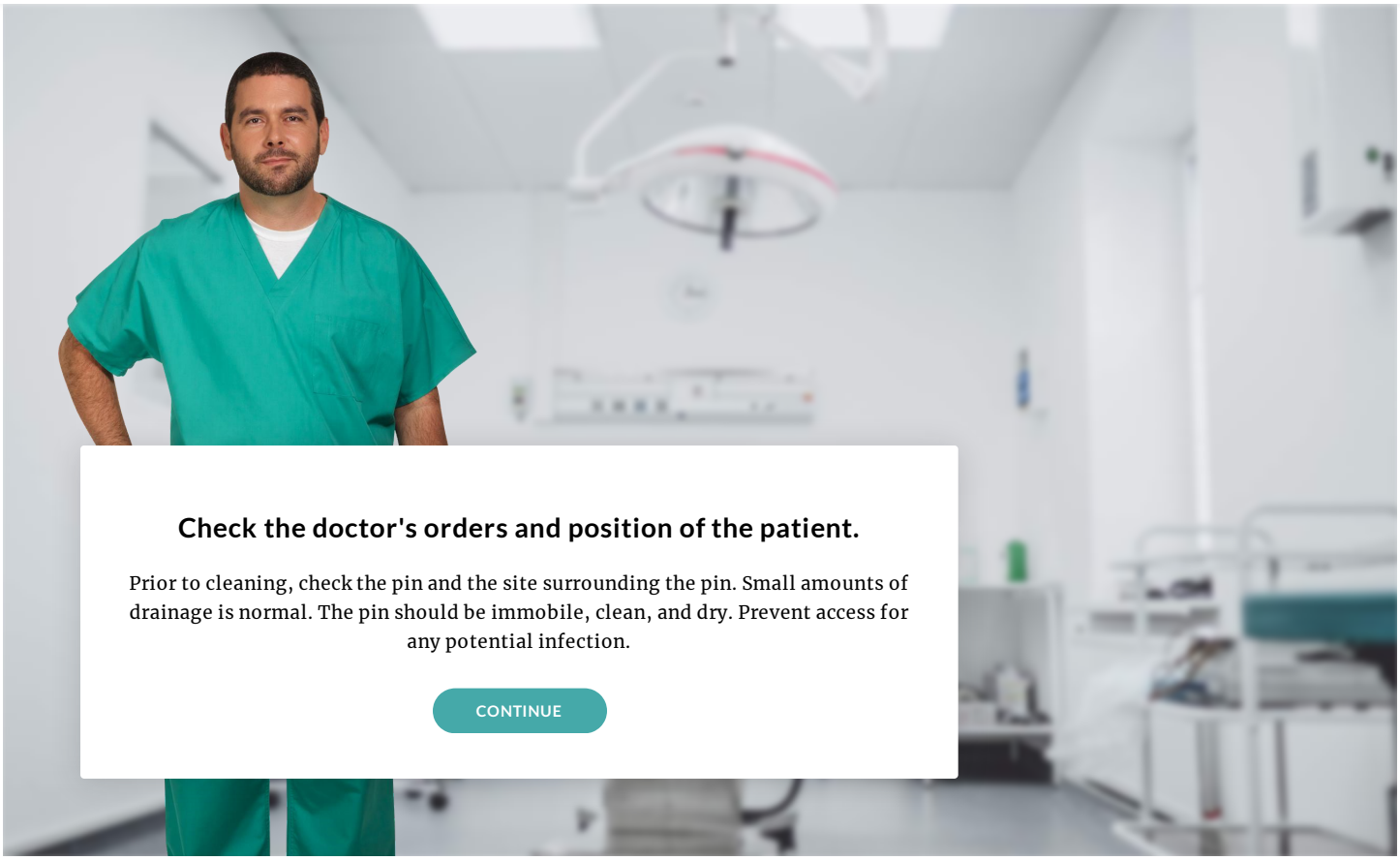

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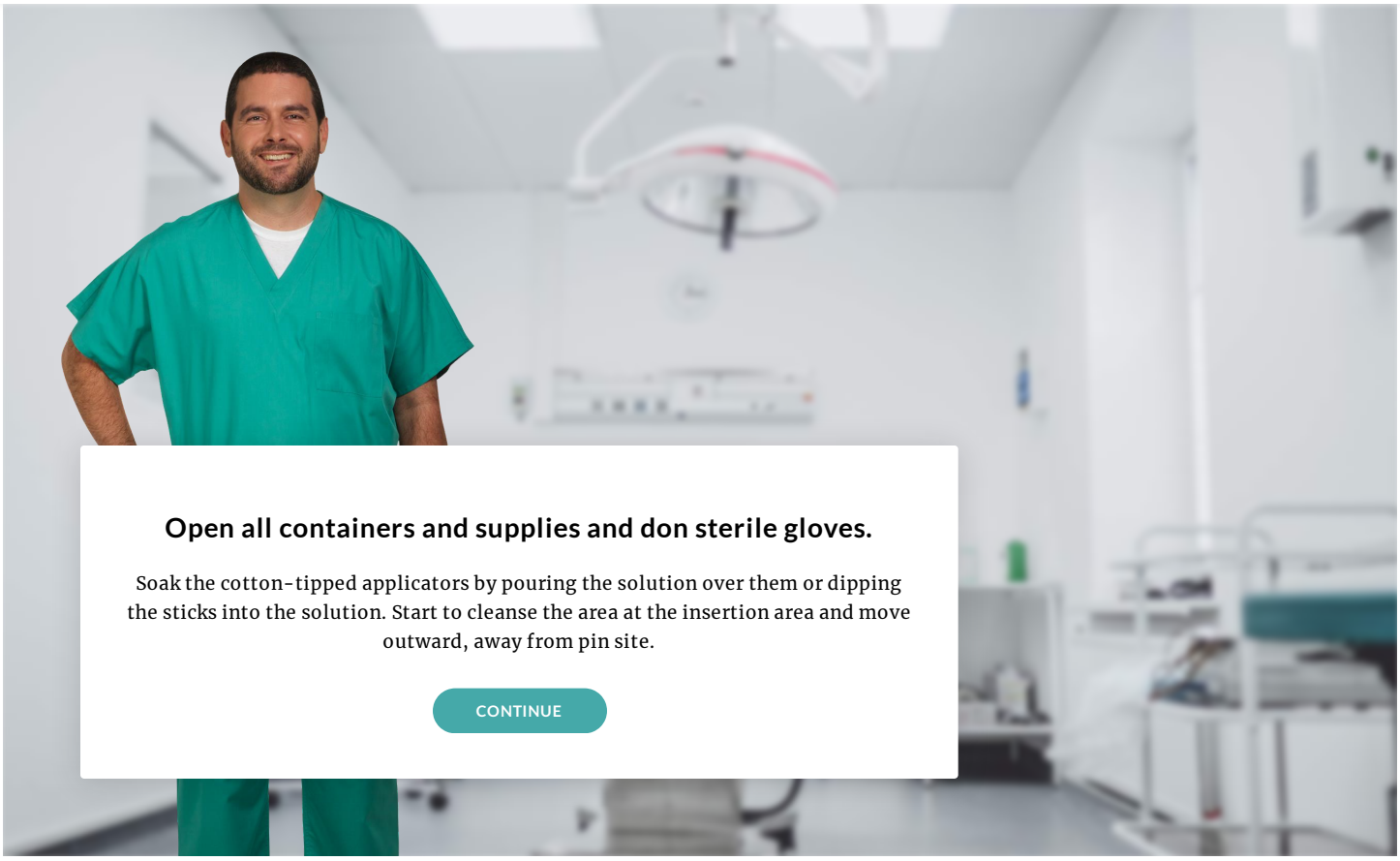

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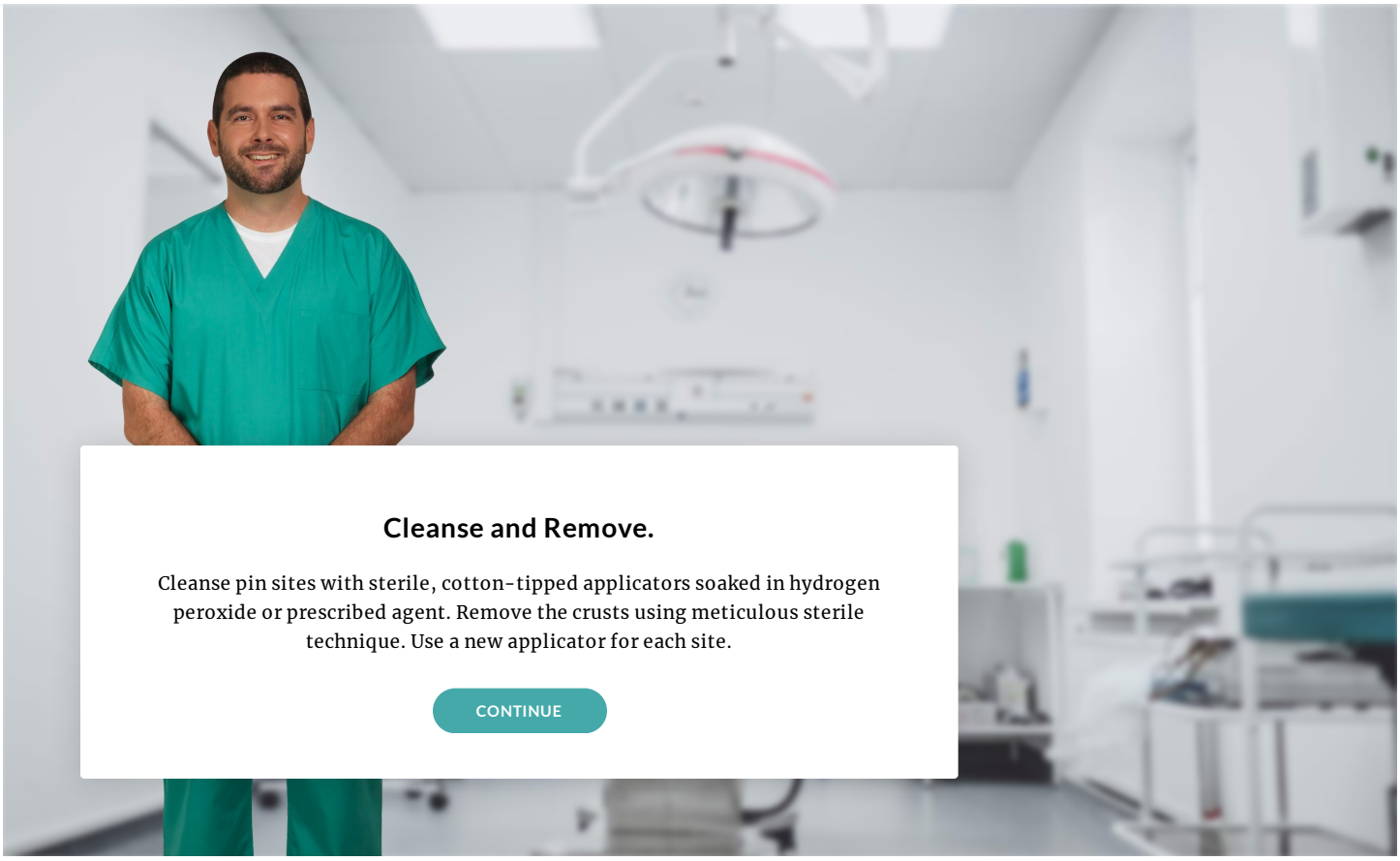

Scene 1 Slide 4

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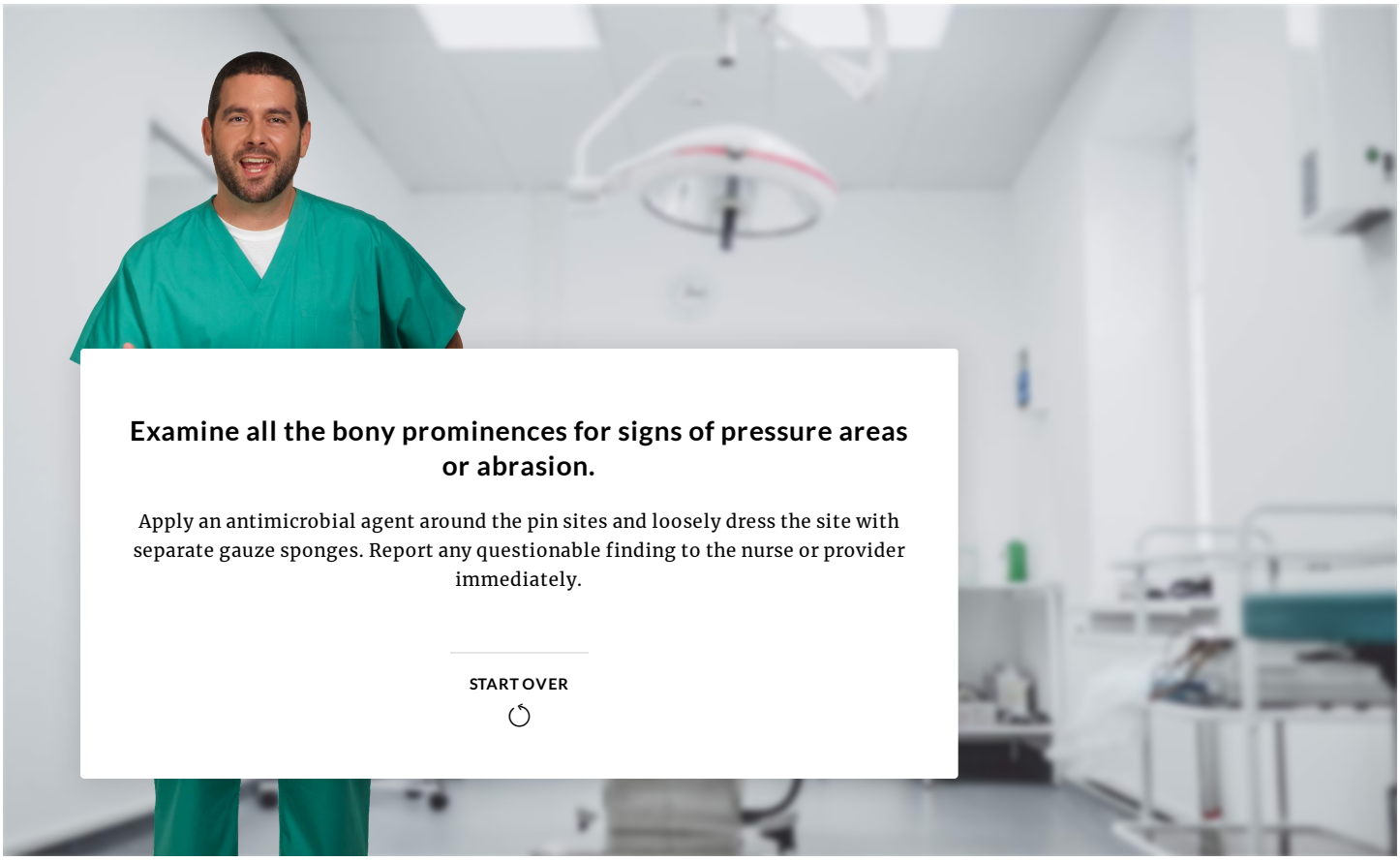


Examine all the bony prominences for signs of pressure areas or abrasion.

Apply an antimicrobial agent around the pin sites and loosely dress the site with separate gauze sponges. Report any questionable finding to the nurse or provider immediately.

START OVER

Scene 1 Slide 5

Continue → End of Scenario

CONTINUE

Position Patient with Head Halter/Cervical Tongs

Cervical spine injuries are managed by immobilization, early reduction, and stabilization of the vertebral column. This is accomplished with two different forms of cervical traction: skin traction with a head halter or through skeletal traction by using tongs or a halo apparatus. As you learned in EMT training, correct alignment and positioning of the spinal column is of utmost importance for patients with spinal trauma.

The same principles apply to the patient who requires cervical traction. Be sure to check traction equipment/set up and that the patient is placed on a firm mattress. Ensure all ropes/pulleys are in alignment; the pull should be aligned with the long axis of the bone. Finally, clear the area of anything that could touch or obstruct the apparatus.

Click on the flip cards below to learn more about the difference types of tractions.

Cervical Tongs

Holes are drilled in the patient's skull and the tongs will be affixed to or screwed to the skull. This device can connect to bed traction. Care for the tongs is the same as pin care for external fixation devices.

Halo-vest Device

Four pins are fixed to the skull with a halo ring and connected to a removable vest by a metal frame. This device can connect to bed traction, but is used for patients who are able to be mobile. Inspect the skin under the vest, especially for patients who are using this device while connected to bed traction.

The primary means of positioning a patient in cervical traction is supine; however, the provider can order for the patient to be in a seated position. It is important to be

Patient Positioning for Cervical Traction

careful when controlling cervical alignment throughout the process of positioning. Safe positioning is reliant on stable head control with tongs or other devices. In most cases, patients who require in-hospital cervical traction will be in a bed designed specifically for this use.

CONTINUE

Instruct Patients Regarding Isometric, Active Exercises, or Passive-Assisted Exercises

As mentioned in the previous unit, exercise is one of the most basic and essential rehabilitative measures necessary for proper body function and muscle tone, that will improve or prevent most conditions related to mobility and immobility. Review the provider's orders for the patient's exercises and quantity.

As helpful as exercises are, they can also be painful and even dangerous for patients who have heart problems and some musculoskeletal conditions, such as arthritis, fractures, sprains, strains, torn ligaments, and joint dislocations. The provider will specify the type and amount of exercise the patient needs. Of course, a provider's order for treatment is no guarantee that the patient will not have problems. Stop the exercise and notify the provider or nurse if the patient begins to show signs of pain, resistance, or fatigue.

ACTIVE EXERCISES | ROM EXERCISES | ISOMETRIC EXERCISES | PASSIVE EXERCISES

Active exercises are activities done by the patient. They include active range of motion (ROM) exercises and isometric exercises.

ACTIVE EXERCISES | ROM EXERCISES | ISOMETRIC EXERCISES | PASSIVE EXERCISES

ROM exercises are movements permitted by each joint. Active ROM exercises are done without assistance. If able, encourage patients to do them at least two to five times a day, exercising each joint five times per session.

ACTIVE EXERCISES | ROM EXERCISES | ISOMETRIC EXERCISES | PASSIVE EXERCISES

Isometric exercises are activities that involve muscle contraction without moving body parts; they do not require any equipment and can be done from any position. For example, you can contract placing your palms together in front of your chest and pushing as hard as you can for the time prescribed. These exercises help increase the patient's strength and endurance for other activities. They are potentially dangerous if done incorrectly.

Instruct patients not to hold their breath. Such straining will affect the heartbeat and may cause a heart attack. Also instruct patients not to contract a muscle for a prolonged period. It is recommended for the patient to tighten or contract a muscle group for 10 seconds then release for several seconds; gradually increasing repetitions until the exercise is repeated 8 to 10 times.

Another method of isometric exercises is resistive isometric exercises. Resistive isometric exercises require the patient to contract their muscles as they push against a fixed object or resist movement of an object. For example, the patient sits in a chair, places their hands on the seat, and then straightens their arms to lift their hips.

ACTIVE EXERCISES | ROM EXERCISES | ISOMETRIC EXERCISES | PASSIVE EXERCISES

Passive exercises are activities performed by a technician for patients who are unable or not allowed to exercise on their own (e.g. a patient paralyzed from the neck down). These exercises will help maintain muscle tone and joint flexibility, and decrease complications such as decubitus ulcers and contractures.

Another method of passive exercise is active-assisted exercise. Active-assisted exercises require some participation from a technician, but only when the patient need assistance. For example, patients recovering from a serious illness or surgery may begin with passive exercises, then progress into doing them on their own, with assistance. Unless contraindicated by the provider's orders or patient's condition, encourage patients to do as many exercises as possible on their own.

The passive exercises you will be involved with most are range of motion (ROM) exercises. As you may recall from anatomy and physiology, each body joint is capable of certain types of activity. For example, the elbow is a hinge joint, capable of flexion and extension. ROM exercises are movements permitted by each joint. These movements depend on the structure of the joint and differ from one joint to the other. Make sure you move the body parts smoothly and carefully, especially the neck.

Some descriptive terms and images are listed for review. Flip the cards to learn more.

Adduction

Movement toward the center of the body.

Extension

Straightening a joint or increasing the angle between the body parts that are connected.

Flexion

Bending a joint or decreasing the angle between body parts.

Dorsiflexion

Flexing the foot at the ankle by lifting the toes toward the knee.

Plantar Flexion

Extending the foot at the ankle by pointing the toes downward.

Hyperextension

Excessive straightening of a joint almost to the point where it is angled backwards.

Rotation

Circular movement of a body part around a joint.

Internal Rotation

Rotating a joint toward the midline.

External Rotation

Rotating a joint away form the midline.

Supination

Rotating the hand at the wrist so that the palm is facing up.

Pronation	Rotating the hand at the wrist so that the palm is facing down.

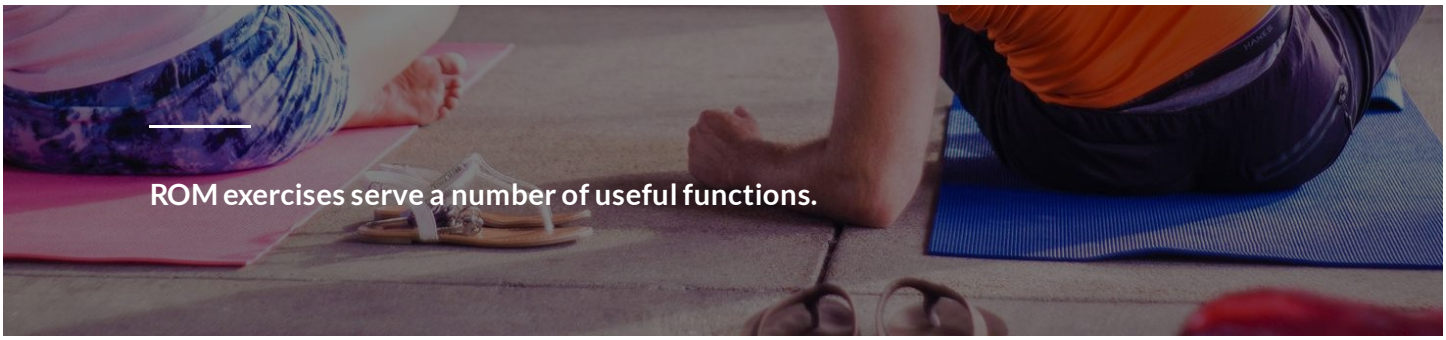
Watch the video below to learn some tips on how to remember these common movement terms.

PDF

Easiest Way to Remember Movement Terms Video Transcript.pdf

157.7 KB

Range of Motion (ROM) Exercises



1. Prevent shortening of muscles, tendons, ligaments, and joint capsules, to decrease the onset of joint stiffness and fixation (ankylosis), and contractures.
2. Prevent adaptive stretching or lengthening of connective tissue around joints.
3. Prevent deformities that limit function.
4. Stimulate circulation and sensory nerve endings.
5. Restore loss of joint function.
6. Maintain or increase muscle strength.
7. Increase endurance.

It is **recommended** to perform ROM exercises two to five times a day, exercising each joint **five** times per session. Ideally, a physical therapy technician will help the patient with these exercises, but if one is not available, you will assist the patient.

There are **basic** guidelines for you to follow when assisting patients with ROM exercises to help ensure the patient receives full benefit from them, and neither you nor the patient gets injured.

The **guidelines** are as follows:

1. Be familiar with the provider's orders and the patient's diagnosis and capabilities. This information will help you decide what exercises are needed and how much the patient can participate.
2. Explain to the patient what you are doing. This is a must for any procedure. Patients will be more likely to relax and participate in activities if they understand what is going on.
3. Use good body mechanics, such as a wide base of support and large muscle groups, when performing these activities. This will conserve your energy and prevent injury and strain.
4. Avoid overexerting the patient or performing exercises to the point of pain. Fatigue and pain will not help the patient and may cause the patient to stop participating.

5. Begin gradually and work slowly. All movements should be smooth and rhythmic. Irregular, jerky movements are uncomfortable for the patient. Move each joint through its normal ROM until you begin to meet resistance. Stop immediately if the patient experiences pain or muscle spasms.

6. Report such reactions to the nurse or provider, and delay further exercises until the patient can be examined. Excessive stretching of joints can cause injuries and even bleeding into joints. If the patient cannot talk, observe the patient's face for signs of pain as you do the exercise.

7. Support the body part you are moving above and below the joint you are exercising. Cradle or cup the body part and avoid grasping at muscles or tendons.

8. Begin each exercise with the joint in its normal anatomical position and return it to that position at the end of the exercise.

9. Move each joint through its complete ROM, five or six times, slowly, rhythmically, and with control. Repetition is important for joint flexibility, and slow, controlled movements prevent injury.

10. Combine exercises with other activities, such as hygiene and positioning. This will save you time and increase the activity level of the patient.

11. Unless contraindicated, encourage the patient to participate in the exercises. Begin with passive exercises and gradually increase to active-assisted exercises until the patient can do the exercises without help. Recovery will accelerate as the patient becomes more and more independent.

Matching

Match the following descriptive definitions with the correct term.

Movement away from the center of the body.	Abduction
Movement toward the center of the body.	Adduction
Straightening a joint or increasing the angle between the body parts that are connected.	Extension

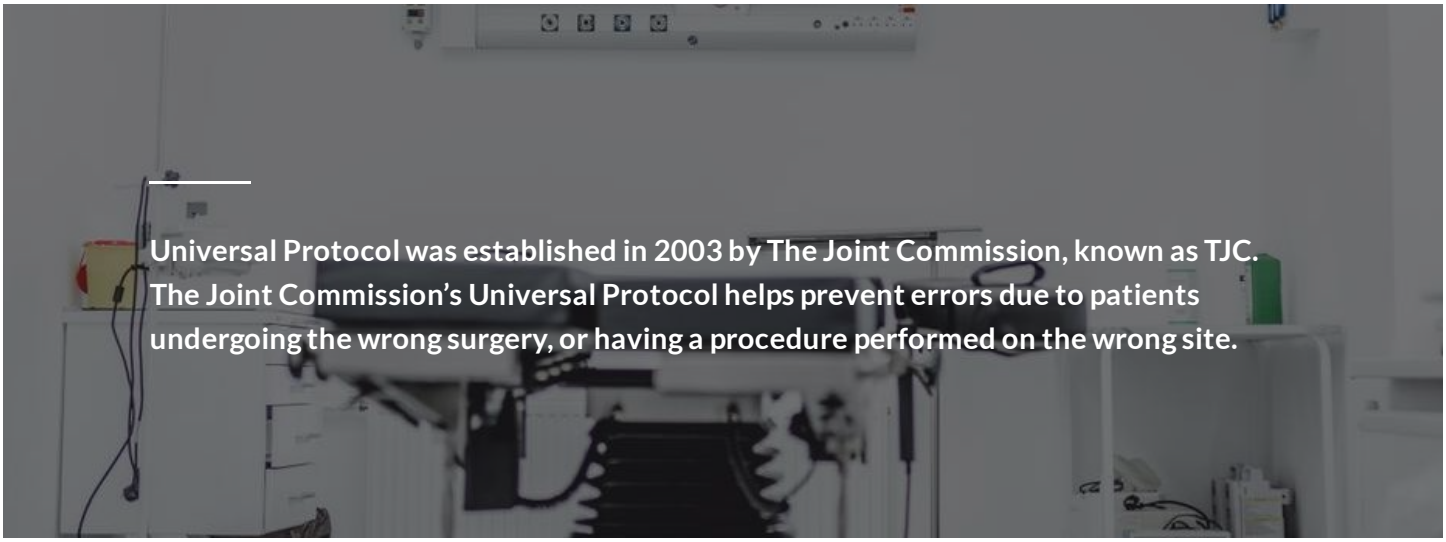
SUBMIT

END OF LESSON

Lesson 9- Pre & Post Operative Procedures

After completing this lesson, the student will be able to apply pre and post-operative procedures in accordance with prescribed guidance and publications.

Universal Protocol (UP) Concept



Nurses and technicians are responsible for implementing this protocol anytime an invasive surgical procedure is involved, regardless of the clinic, ward or surgical unit the procedure is being performed.

This process has multiple steps and principles to include but not limited to the following:

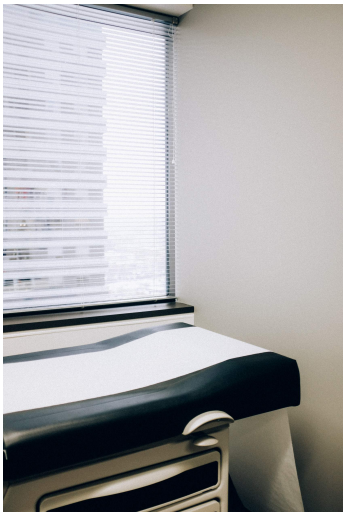
1. Conduct a pre-op verification. All relevant documents and studies are available prior to the start of the procedure, and align with the patients expectations.
2. Marking the site with indelible ink (skin marker) to mark left and right distinction, and multiple structures.
3. Perform a "Time out" and patient consent. Just before you start the procedure, you will perform a time out to verify right patient, right procedure, and right procedure site. The provider, the patient

or patient's legal guardian and a witness will then sign and date. This will be uploaded into the patients' medical chart.

All MTF's will adhere to the National Patient Safety Guidelines (NPSGs) for UP. These NPSGs are listed on TJC's website, as well as the knowledge exchange (Kx). Universal Protocol applies to all surgical and nonsurgical invasive procedures as determined by the MTF. Each MTF will ensure compliance by developing facility-specific processes that use the UP surgical checklist, and incorporate elements of the non-operating room procedure verification checklists into established processes. These checklists are located within the Patient Safety Handbook on the Kx.

NON-OPERATING ROOM | OPERATING ROOM

This checklist, Defense Health Agency (DHA) 229 UP procedures, applies to procedures done in non-operating room, such as non-invasive or clinical procedures that are often done in a clinical exam room. Staff must use the checklist to verify the right patient, right procedure and obtain consent from the patient. You will obtain the provider's signature as well as a witness stating the procedure, the risks, expected recovery and symptoms were explained to the patient. At this time you will also perform and annotate prep of supplies, equipment and the surgery site.



NON-OPERATING ROOM | OPERATING ROOM

This form, DHA 228 UP *Operating Procedures*, is used by operating-room staff prior to the start of the surgery. This is one last check to ensure verification of all resources used before, during and after the surgery. This form provides a more thorough verification of the patient, but also the completion of any and all documents used in assessing the patient throughout the process.

Multiple Choice

Universal Protocol was established in 2003 by _____. This protocol helps prevent errors due to patients undergoing the wrong surgery, or having a procedure performed on the wrong site.

- ◯ The Medical Flight
- ◯ The Joint Chief of Staff
- ◯ The Joint Commission
- ◯ National Patient Safety Guidelines

SUBMIT

Complete the content above before moving on.

Blood Pressure

The blood pressure reading tells whether the blood is flowing through the vessels with enough force to reach all areas of the body. A change in this force is caused, among other things, by a lowered volume of blood or inadequate pumping action of the heart.

When a patient has just returned from the operating room (OR) and you notice that his or her blood pressure begins to drop, consider several possibilities:

- [ ] Is the patient losing blood from a severed blood vessel?
- [ ] Are drugs or the anesthetic agent depressing the action of the heart?
- [ ] Is the patient in shock?
- [ ] Rhythm and rate of heartbeat—When the body tries to compensate for a reduced volume of blood in the circulation, the heart beats faster, thus sending the heart rate up, but each beat is harder to detect because less blood is pressing against the vessel walls. This phenomenon produces a "thready" pulse.
- [ ] Rate and depth of respirations—Respiratory rate can increase because of signals sent out by the brain when its cells are not receiving enough oxygen. Note that many medications used for anesthesia directly depress the respiratory system, resulting in the inability of the patient to breathe on his or her own. This is why the anesthetist must often "bag" the patient by forcing air into the lungs from the breathing bag attached to the gas machine. Sometimes this process is carried out automatically by a ventilator. In some cases, a ventilator is used in the recovery room to assist patients whose chest muscles are not contracting properly or patients who are too depressed to take the deep breaths that fully expand the lungs. In addition to the relaxation produced in chest muscles, general anesthesia can also affect the muscles that control the jaw.

  When these muscles are relaxed, the lower jaw drops and the tongue falls back in the throat, obstructing the air passage. For this reason, the anesthetist inserts an airway into the mouth after an endotracheal tube is removed. The patient's lower jaw can be supported by the anesthetist's hand, or the anesthetist can turn the patient's head to one side so the lower jaw won't drop. By maintaining one of these head positions and by a careful suctioning of any foreign body, mucus, vomitus, or blood from the throat, you can usually prevent respiratory obstruction. An open airway is always a necessity, even when oxygen is given because all the oxygen on earth is of no value to a person if the route to the lungs is blocked.

Oxygen therapy may be prescribed by the surgeon or anesthetist at the time a patient is brought to the recovery room, or the need for it may develop later. Depression caused by the anesthetic agent or drugs, hemorrhage, shock, or a combination of these, as well as the operative procedure and many other factors can produce hypoxia. By increasing the amount of oxygen taken in with each breath, the body's needs are supplied until the causative agent or condition either wears off or is corrected.

- Cardiorespiratory emergencies—Recovery room and unit personnel must be familiar with the treatment of cardiorespiratory emergencies. Intubation material, tracheostomy tray, cardiac arrest tray, defibrillator, pacemaker, and ECG/EKG machine should be easily available.

  Not only must you locate and set up these items but recognize the symptoms of cardiorespiratory problems and know the initial steps of treatment. For instance, if you suddenly discover that a patient's vital signs have disappeared, notify anyone who is nearby; then start administering artificial respiration and external cardiac massage. When other team members arrive, stand by and assist them with the form of treatment decided upon by the physician.

- Temperature and color of the skin—Body temperature and capillary refill are direct indicators of shock. This is due to poor or lack of proper profusion and circulation. If the patient exhibits cold, clammy, and pale skin, this needs to be reported to the nurse or physician immediately.

- Patient's level of consciousness (LOC)—to determine the LOC, ask the patient questions. A common practice is to ask his or her name, date, and where he or she is (location). This is considered a fair test of orientation.

You also need to **check the IV** for proper solution and flow rate, drainage of urine, wound drainage tubes, or any other special equipment. **Check the dressing** that was applied in surgery for any apparent bleeding. It is also important to maintain the patient's comfort.

The administration of **pain medication** is sometimes necessary in the recovery room. All of the following checks are performed **every 15 minutes.** Once vital signs are stable and responsiveness has returned, the anesthetist **discharges** the patient to a nursing unit.

Special Precautions

Safety measures must be observed in the recovery room to protect patients from falls or injuries. Patients in the recovery room are able to control many body functions and may actually be capable of inflicting self-harm because of disorientation during the recovery process. If patients had a spinal anesthetic, they may be able to move about just enough to place themselves in a position where they could fall. It is important that spinal patients have side rails in place, and careful checks kept on their vital signs.

Blood pressure can drop because of the anesthetic drug used or because of lowered spinal pressure, and patients can suddenly go into shock. Do not ignore patients just because they seem to feel well and can talk to you. This is also true of patients with regional blocks. They usually remain in the recovery room until vital signs are stable and cleared by a physician for transfer. Patients may be transferred to an inpatient unit before sensation has returned to an anesthetized area but will be monitored closely for return of full neurovascular function.

The precautions observed in the presence of oxygen must be practiced when oxygen therapy is used in the recovery room. This means, of course, that no open flames are allowed. Since smoking is not permitted in the hospital, there should be little need to remind you of this fact, but oxygen tanks should be handled and stored with the same careful consideration used in other areas of the hospital.

Septic cases (patient suffering from septicemia) brought to the recovery room should be handled just as any isolation cases throughout the hospital. In many hospitals, however, these patients are returned directly to their units, so there is no danger of the sepsis being transferred to the fresh wounds of the surgical patients. Such cross-contamination is particularly serious for a patient whose body defenses were already lowered by a surgical procedure.

Report any abnormal findings of vital signs, airway and breathing to your RN or provider upon recognition, document findings and time in the patient's chart.

Multiple Choice

What reading tells whether the blood is flowing through the vessels with enough force to reach all areas of the body?

- ◯ Blood pressure

- Heart rate
- Blood oxygen level
- Incentive spirometer

SUBMIT

Complete the content above before moving on.

Post Op Exercises

In many hospitals, surgical patients are introduced to certain postoperative exercises before surgery. This is particularly true of the turning, coughing, and deep-breathing exercises (TC&DB). They are expected to practice to prevent hypostatic pneumonia following anesthesia.

Other common postoperative exercises are diaphragmatic breathing and leg and foot exercises. It is very important that you turn or change the patients' position every two hours. This is vital to improving circulation and relieving pressure areas.

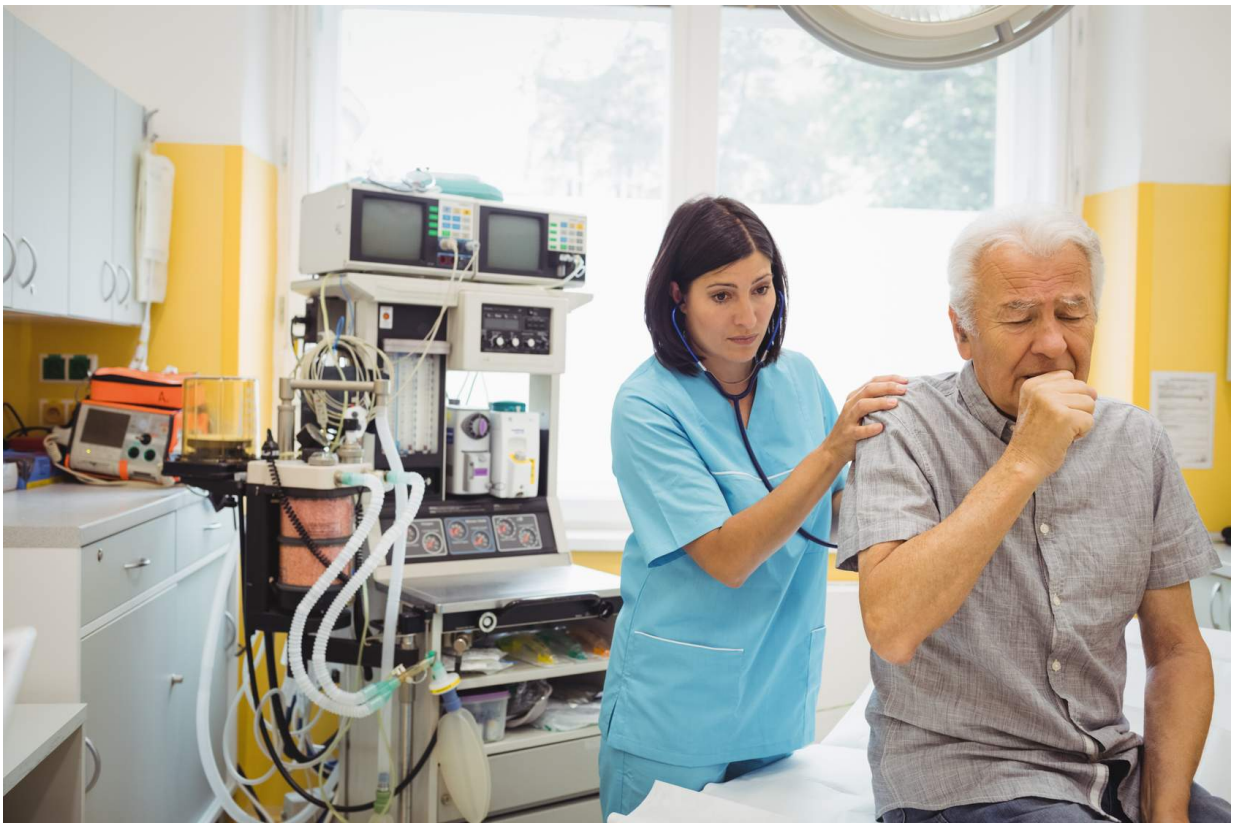
Breathing Exercises

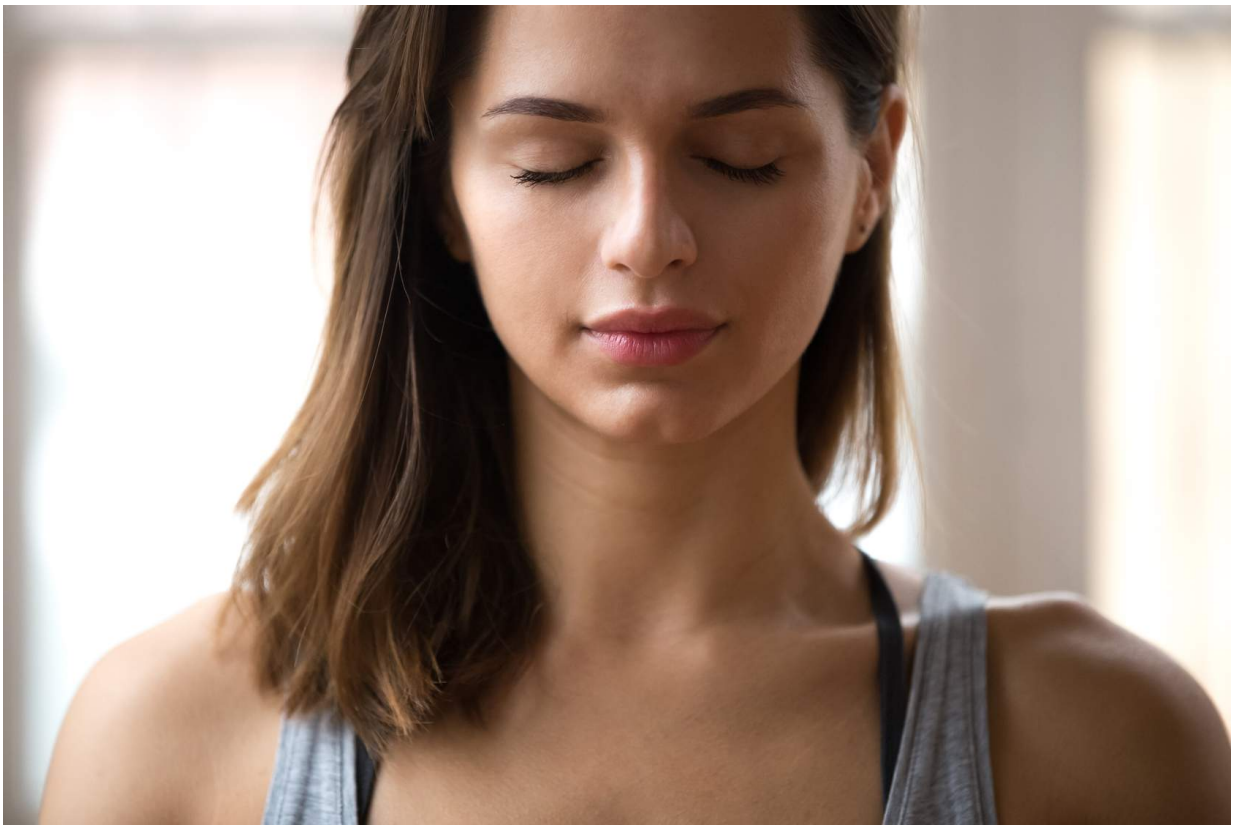
The chief objective of breathing exercises is to increase or develop the expiratory phase of breathing and to develop the muscles concerned with respiration. Deep-breathing exercises also maintain and cleanse the airway, improve vital capacity, and help to prevent such conditions as atelectasis and postoperative pneumonia. Blow bottles and incentive spirometry are often used in the postoperative or prolonged bed-rest exercise program.

The incentive spirometer is an excellent tool for preventing postoperative pneumonia and atelectasis. The incentive spirometer is a piece of equipment that encourages total sustained inhalation of the patient. To use the spirometer, the patient should be in a sitting position. Explain to the patient to first exhale fully, place the mouthpiece in his or her mouth, inhale slowly until the desired goal is reached, hold for three seconds, then relax and slowly exhale. Only one per minute should be performed, allowing the patient to relax. Explain to the patient that the spirometer should be attempted at least 10 times each hour while awake.

Coughing

Coughing promotes the removal of chest secretions and prevents pneumonia or other possible airway obstructions. Teach the patient to cough by interlacing his or her fingers over a pillow, which is placed over the incision site. Ask the patient to lean forward in a Fowler's position, inhale with his or her mouth slightly open, and let out three or four sharp hacks. Then, inhale deeply again and give one or two sharp coughs. Have tissues readily available, or a suctioning apparatus, if needed





Diaphragmatic Breathing

Diaphragmatic or deep breathing is also a useful tool in preventing postoperative complications. Deep breathing is accomplished by inhaling deeply, holding for a five count, then exhaling through pursed lips to a count of 12 to 15. Repeat this 15 times, resting between each set of five.

Leg and Foot Exercises

Other important preoperative teaching includes leg and foot exercises. Leg and foot exercises can be performed in bed and are very important for maintaining circulation and muscle tone. Tell the patient to practice these exercises prior to surgery:

1. While lying on your back, bend your knee and raise your foot, hold it for a few seconds, and then lower.

2. Lie on your side and move your legs as if riding a bike.

3. Make circles with your big toe.

Have the patient perform these exercises **five times** every **three to five hours** or as the physician ordered.

Multiple Choice

It is very important that you turn or change the patients' position every _____ hours. This is vital to improving circulation and relieving pressure areas.

- ◯ 30 minutes

- 1 hour
- 2 hours
- 2.5 hours

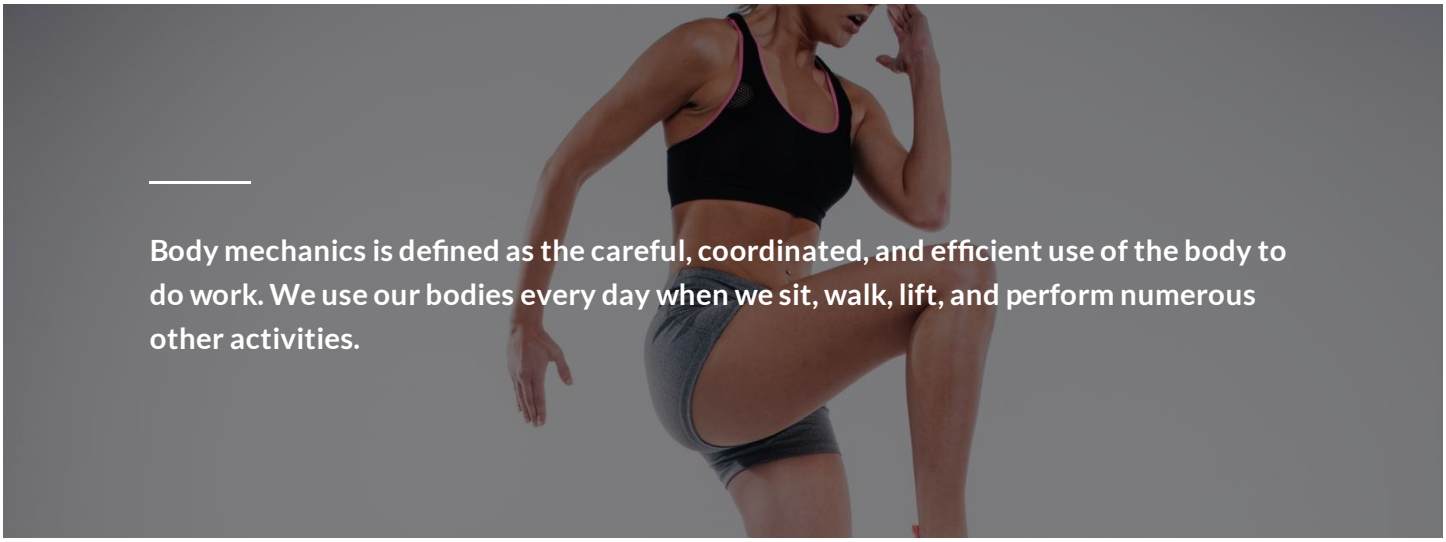
SUBMIT

END OF LESSON

Lesson 10- Patient Transfer Techniques

After completing this lesson, the student will be able to identify patient transfer techniques in accordance with prescribed guidance and publications.

Principles of Proper Body Mechanics



Body mechanics is defined as the careful, coordinated, and efficient use of the body to do work. We use our bodies every day when we sit, walk, lift, and perform numerous other activities.

As medical service technicians, we use our bodies as "machines" when we lift, pull, push, and otherwise manipulate patients. Unfortunately, a lot of us injure ourselves because we don't use our bodies properly. In this lesson, we are going to look at some basic principles of body mechanics. If you follow these principles, you should be able to perform nursing procedures without injuring yourself.

It's **important** for you to remember that the procedures we describe here are usually used on **long-term, seriously ill** patients whose chances for complete **recovery range** from slight to nonexistent.

With patients like this, setbacks are common and advances are usually slow and painful. Under conditions like this, many nursing personnel become discouraged and demotivated. It sometimes helps if you go back to your basic goal, which is to restore your patients to the optimum possible health, considering their problems and conditions. In other words, you can't cure them all, but you can treat all of them with dignity and make them feel cared for and as comfortable as possible.

The techniques described throughout this lesson are not the absolute only way of doing any given procedure. We selected methods most commonly described in various nursing texts.

The final authority is and must be local policy as prescribed by senior medical technicians and nurses. Have no qualms about asking them for help if you become confused.

CONTINUE

Principals of Effective Body Mechanics

Good body mechanics is a combination of good posture and the effective use of body muscles to perform various activities. Good body mechanics is a combination of good posture, balance, and using the strongest and largest muscles for work. Good body mechanics are as important for you as they are for your patients. As we mentioned in the last section, if patients do not use good body mechanics, they'll develop

backaches, contractures, and other problems. In fact, you can develop permanent problems from using poor body mechanics. One of the most common injuries for health care workers is lower back strain.

In this section we'll first discuss the different aspects of good posture. After that, we'll talk about the best way to use your body muscles to perform different activities.

Posture, or body alignment, is the proper relationship of body parts to one another. Correct body alignment reduces strain, helps **maintain balance**, and improves overall body functioning. **Good** posture requires energy to overcome the pull of gravity. Posture should be maintained in **each** of the body positions (standing, sitting, lying). We'll briefly discuss proper body alignment in each of these positions.

Posture

Standing

When you are standing, your body should be much like it is when you are in the parade-rest position. To stand correctly, keep your back straight without any of the exaggerated spinal curves you have when you are slouching. When you slouch or lean one way or the other, you stretch the muscles on one side and contract the muscles on the other. Over a period of time, a slouched or leaning position will cause the affected muscles to feel strained. Hold your shoulders up and back, and keep your chest up and slightly forward. This position will help maintain good spinal alignment and give your lungs more room to expand. Pull your buttocks in and hold your abdomen up and in. This will help keep your back straight by supporting the abdominal organs and reducing the pull on the lower back.

Keep your head erect and in line with your back. Hold your chin in slightly but not so that it is uncomfortably close to your chest. Avoid any sort of exaggerated leaning position. Your back muscles are also involved in maintaining your head position. Any unusual position will cause back and neck strain.

When you are standing, your feet are your base of support. You should stand so that your weight is centered over your feet. The point at which your body mass is centered is called the center of gravity. Your feet should be roughly parallel and approximately 4–12 inches apart. It isn't necessary for your feet to be exactly parallel, so long as your toes are pointing in the same general direction. If one foot is pointing one way and one the other way, your entire body will be thrown out of balance and you'll develop back, hip, and leg strain. Your feet should be at right angles to the lower legs (no high-heeled sneakers) and your body weight should be distributed equally between both feet. Bend your knees slightly so that they do not become locked.
Locking your knees interferes with the circulation to your lower legs and reduces the effectiveness of your legs as shock absorbers. Do not twist your body, but instead, turn your whole body when changing directions – this will prevent injuries.

When you stand as we have described, you'll have a firm base of support and your body will be aligned so that your center of gravity is centered over the base of support. You'll feel balanced and you should be able to maintain that position for long periods of time.

Posture

Sitting

Since you don't spend all your time on your feet, you should also be concerned about posture in other positions. When you sit, your base of support shifts from your feet to your seat. What we just said about upper body positioning for the standing position also applies to the sitting position (head erect, back straight, chest out, shoulders back, stomach and buttocks in).

Your feet should be flat on the floor and your popliteal area (area behind your knees) should be free of the edge of the chair. Crossing your legs or sitting so that the edge of the chair is pressed against the back of your legs will interfere with your circulation and may eventually cause nerve damage.

Posture

Lying

When you are lying down, your muscles are usually relaxed. When you are standing or sitting, your body alignment is maintained by various muscle groups; when you are lying down, you rely on your bed to provide that support. You can help if you make sure that your bed is firm enough to provide the necessary support and you are not lying in an abnormal position.

Multiple Choice

_____is defined as the careful, coordinated, and efficient use of the body to do work.

- ◯ Body mechanics
- ◯ Body movements
- ◯ Body posture
- ◯ Body muscles

SUBMIT

Complete the content above before moving on.

Effective Use of Body Muscles

Your body is covered with muscles of varying sizes and strengths. Your goal should be to use the largest muscles and muscle groups to do the most work. When positioning or transferring patients, use the large muscles in the legs as much as possible.

Unfortunately, in the name of convenience, many of us use smaller muscles to do most of the work, or we perform tasks with our bodies contorted into abnormal positions. In either case, we are not using good body mechanics. Experts have developed guidelines for making the most efficient use of our body muscles.

These guidelines are as follows:

Plan Your Movements

When you are standing with a patient half in and half out of bed, it is too late to figure out that you probably should have had help moving the patient. Consider how you'll perform the task, what equipment you'll need to perform the task, and how much help, if any, you'll need.

Be Realistic About Your Capabilities

Most of us are not built like Arnold Schwarzenegger, and we can't lift patients single-handedly. If you do not accept your limitations and work with them, you may injure a patient, and you'll almost certainly injure yourself.

Assess The Amount of Assistance That The Individual Helping You Can Provide

For example, if you weigh 90 pounds dripping wet and the person assisting you is about the same size, you'll probably have some difficulty lifting a 300-pound patient. Of course, you can't always go by size. The best way to learn the capabilities of your fellow technicians is to work with and get to know them.

Maintain a Broad Base of Support

Your base of support is determined by how far apart your feet are, and your base of support determines how well you are balanced. If your feet are close together, your base of support will be small and your balance a little shaky. To illustrate this, place your feet together and try to reach over and pick something up off the floor. If you try it again, with your feet about 15 to 20 inches apart, you should see the difference a broad base of support will make. When you are working with patients, plan your base of support according to the amount of stability you need. If you are trying to support a falling patient, for example, keep your feet relatively far apart for a firm base of support.

Keep Your Center of Gravity Low

As we mentioned, your center of gravity is the point at which your body mass is centered. Your stability increases as your center of gravity moves closer to your base of support. Your stability is much greater when you squat to do something than it is when you stoop to perform the same task.

Position yourself so that the line of gravity passes through your base of support.
The line of gravity is an imaginary vertical line extending straight down through the center of gravity. It is just another way of saying the gravitational pull. If you lean or stoop so that your line of gravity is not over your base of support, your balance will be poor. This is why you move objects within reach so that you can stand erect to work on them or squat to work on objects that are too low for you to reach without bending. An erect posture also helps to protect your back muscles.

Use Smooth and Rhythmic Movements

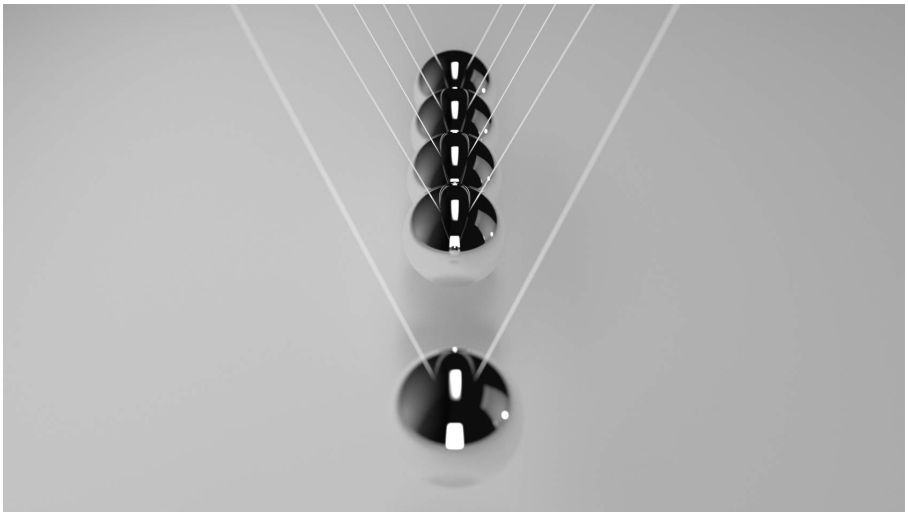
You'll understand this principle better if you first understand the principle of momentum. Once an object is moving, it gathers a certain force, or momentum, which helps to keep it moving. Each time the object stops moving, the momentum is lost and friction or gravity must be overcome to start it moving again. In other words, because you lose the force of momentum each time you hesitate, it is much easier to lift a patient with a smooth, steady motion than it is with a series of jerky motions. Smooth, rhythmical motions also make more efficient use of muscles by providing more time for muscle contraction and allowing the muscle to contract completely. Last but not least, smooth motions are more reassuring for patients because they feel less like a puppet on the end of a string.

Use Leverage to Help Move or Lift Heavy Objects

Leverage increases the efficiency of your muscle power. You are using leverage when you brace your body against the side of the bed and use your body weight to help pull the patient towards you. In this example, the bed and your body weight provide leverage, increasing the force provided by your muscles. There are numerous other examples of leverage. The trick is to use your whole body rather than trying to work with muscle power alone.

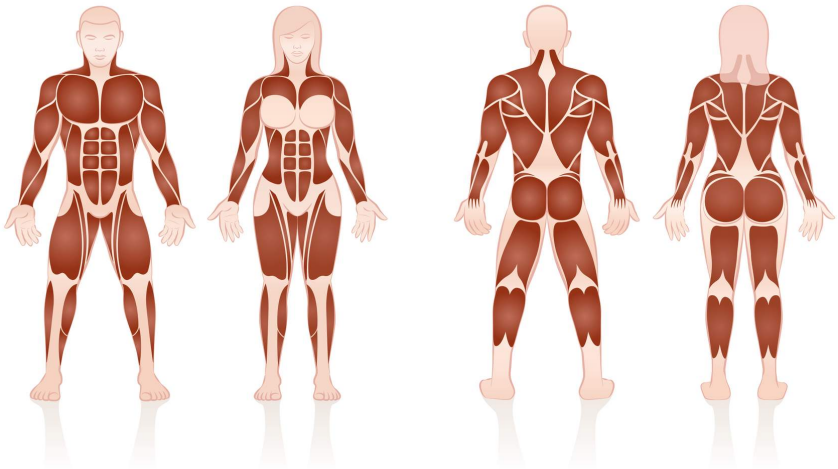
Move In a Straight Direction

This principle relates back to our earlier discussion of momentum. The force of momentum acts along a straight line. If you change directions when you are moving an object, you'll lose your momentum. Also, face the direction of your motion. For example, if you are trying to slide a patient up in bed, face the head of the bed. This will prevent twisting motions that can cause painful back injuries.



Use Large Muscle Groups

This is one of the most commonly violated principles of good body mechanics. Your largest muscles are located in your shoulders, upper arms, thighs, and hips. The muscles in your lower back are much smaller and less powerful. Yet, most people bend over to pick up objects rather than squatting and using the muscles of the legs and thighs. When you bend over, you place a tremendous amount of pressure on your vertebral column. When you pick something up from that position, you increase that pressure and risk injuring your back. Along the same line, you should use as many muscles as possible to avoid strain. If you are helping a patient move, for example, use both arms, rather than just one.



Use The Internal Girdle of Support

When you simultaneously contract your abdominal muscles and your buttocks muscles, you create a muscular barrier around the intervertebral discs of your lower back. This barrier, or “girdle,” helps protect your lower back when you strain to lift or move objects.

Use Pulling or Pushing Rather Than Lifting Movements Whenever Possible

The resistance of friction is less than the resistance of gravity. Thus, it is easier, and safer for your back, to slide a patient to the side of the bed than it is to lift the patient. Pulling motions are less strenuous compared to pushing or lifting. Additionally, this motion is easier because it brings the work load (patient) closer to your center of gravity. Perform pulling actions whenever possible.

Keep Your Work Close to Your Center of Gravity

If you keep your work close, you'll be able to use of your large muscle groups and avoid straining smaller arm and back muscles. Work at the same level or height as the object to be moved. For example, when making a patient's bed, temporarily raise the bed to waist level. This ensures you are keeping the load near the center of gravity. The farther away the work load is from the center of gravity, the more likely an injury is to occur.

There are other principles or guidelines you can apply to **good** body mechanics, but those we have covered are the most important. If you plan your work so that you make **safe and effective** use of your **whole** body, rather than just your muscles, you will be using good body mechanics.

Multiple Choice

Which body mechanic guideline is one of the most commonly violated principles?

- Move in a straight direction.
- Keep your center of gravity low.
- Use large muscle groups.
- Plan your movements.

SUBMIT

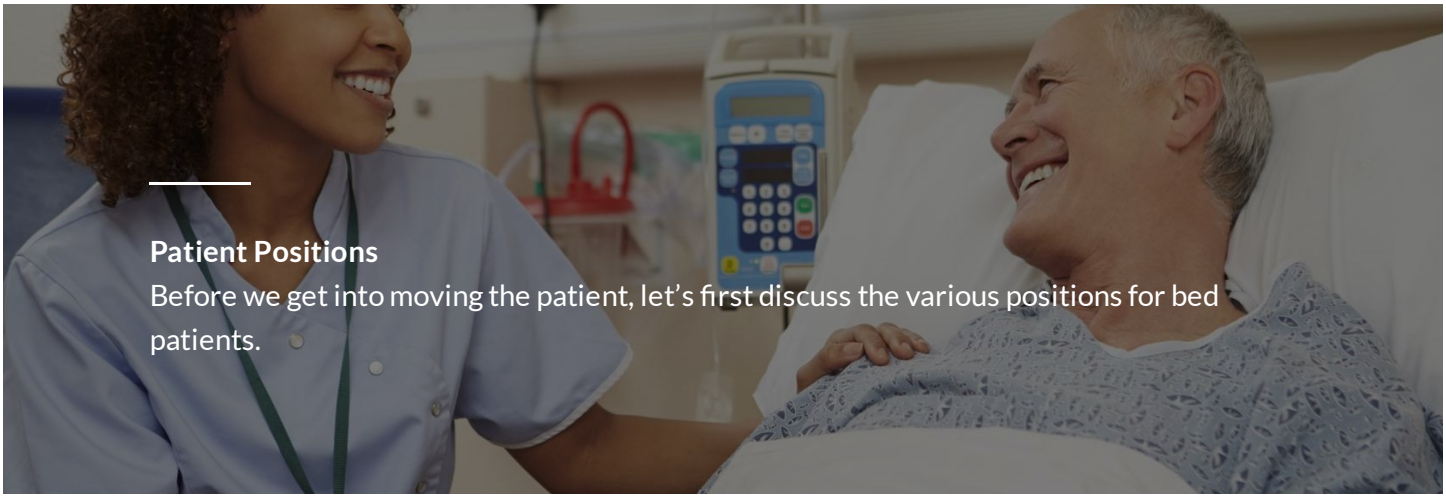
Complete the content above before moving on.

Mechanical Aids for Lifting and Moving

Procedures and Equipment Used to Move Bed Patients

Now that you understand the possible consequences of immobility as well as principles of body mechanics, we'll move on into the actual patient activities. We begin by talking about the different techniques and equipment we use to move helpless and near-helpless patients. Following that, we'll talk about different exercises that we can help the patients do and that the patients can do themselves. Finally, we'll talk about transfer techniques and equipment used to ambulate patients. Throughout the discussion, we'll refer to the information we've covered on hazards of immobility and proper body mechanics to help illustrate the points we are trying to make.

In this section, we discuss techniques used to move and adjust the patient's position. As you know, if bedridden patients do not change their position frequently, they'll develop complications like decubitus ulcers and contractures. Whenever possible, encourage patients to move themselves. There will be many times when a patient either cannot move at all or cannot move without help, and you'll become involved in the movement. Follow the principles of body mechanics we discussed, and move each patient in a safe, careful manner.



Patient Positions

Before we get into moving the patient, let's first discuss the various positions for bed patients.

Supine Position

Supine Position

A patient in the supine position is lying on his or her back. The patient's arms are at his or her sides with hands pronate. This position is also referred to as the dorsal recumbent position. To place the patient in this position, adjust the bed so that it is flat. Use pillows, sandbags, and similar devices to maintain the patient's alignment and prevent contractures.

Prone Position

Prone Position

A patient in the prone position is lying on his or her abdomen with head turned to the side. The patient's elbows are normally flexed so that the hands are up near the head. The bed is flat and alignment is again maintained with pillows and sandbags. Also, place a pillow beneath the patient's lower legs to prevent foot drop. If your patient is very tall, you can hang his or her feet over the end of the mattress.

Fowler's Position

Fowler's Position

Place a patient in the Fowler’s position by elevating the head of the bed to a 45–60° angle. This puts the patient in the semi-sitting position. Maintain the patient’s alignment with pillows and hand rolls.

Semi-Fowler's Position

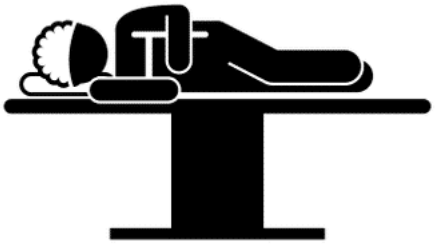
Semi-Fowler's Position

The semi-Fowler’s position is similar to the Fowler’s position except that the head is not usually elevated quite as high and the knees are bent at about a 15° angle. This knee elevation helps prevent the patient from sliding down in bed.

Trendelenburg Position

Trendelenburg Position

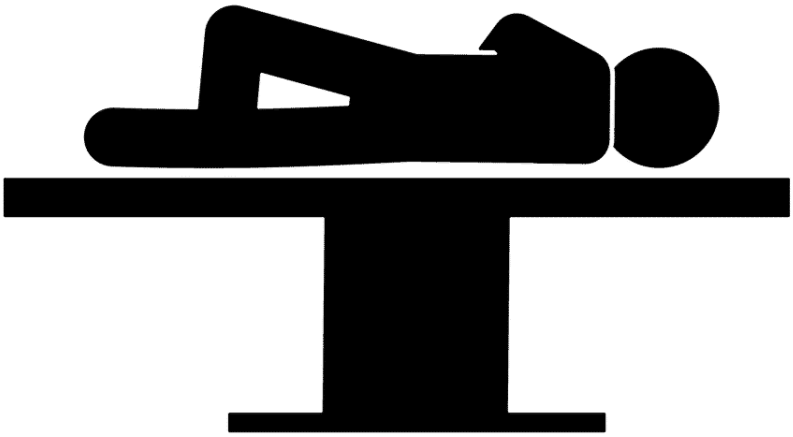
In this position, the mattress is flat, but the bed itself is tilted so that the head is lower than the feet. This is a specialized position and can be used to help provide traction or to treat patients who are in shock.



Sim's Position

Sim's Position

A patient in the Sim’s position is lying on his or her side with the head turned to the side. The patient’s lower arm is positioned down behind him or her, and the upper arm is flexed so that the hand is up near the patient’s head. The patient’s lower leg is bent very slightly and the upper leg is bent and extended so that it is not on top of the lower leg.



Side-Lying or Lateral Position

Side-Lying or Lateral Position

The side-lying position is much like the Sim's position except that the patient is on his or her side rather than partially towards the prone position. The mattress is flat as before. Both the upper and lower arms are flexed so that the patient's hands are near the head. Both legs are also bent, with the upper leg bent slightly more than the lower leg. The pillows are positioned as before except that there is a pillow between the patient's legs rather than just beneath the upper leg.

Multiple Choice

Which position has the patients head elevated to a 45–60° angle at the head of the bed which puts the patient in the semi-sitting position.

- ◯ Lateral
- ◯ Prone

Fowler

Semi-Fowler

SUBMIT

Complete the content above before moving on.

The procedures we'll now discuss include **moving** a patient **up** in bed; turning a patient to the **side**, **back**, and **abdomen**; moving a patient to the side of the bed; and turning a patient in a turning **frame and circular** bed. In each procedure, we specify what assistance, if any, the patient can provide.

Moving a Patient up In Bed

Many patients are placed in bed positions that elevate either the head or the foot of the bed. Over a period of time, gravity causes these patients to slide down in the direction that the bed is angled. Once they slide down, you will need to help them back to their original position to maintain proper body alignment and promote comfort.

Using the person's weight as a guide to plan a safe move, coordinate how much help and what equipment you will need prior to moving the patient. If the patient is fully able to assist, staff assistance is not needed – but will stand by for safety. The patient is partially able to assist:

- If weight is less than 200 lbs; 2-3 staff members and a friction-reducing device are needed.
- If weight is more than 200 lbs; at least 3 staff members and a friction-reducing device are needed.

If the patient is unable to assist at all, at least 2 staff members and a mechanical lift are needed. You begin this procedure as you would any other: wash your hands, greet the patient, ask the patient his or her name and date of birth, check the patient's ID band, and explain what you are going to do.

There are **three** basic techniques, depending on the patient's size and capabilities.

- One-person technique
- Two-person technique

- Two-person technique with a draw sheet

ONE-PERSON | TWO-PERSON | TWO-PERSON WITH DRAW SHEET

The one-person technique is actually a coordinated effort involving both the patient and technician. As a technician lifts and slides the patient up in bed, the patient uses his or her arms and legs to pull and push him or her toward the head of the bed. The one-person technique only works if the patient is not extremely large and is capable of assisting with the move. If either or both of those do not apply, use a different technique. Some patients may be able to use only their arms or their legs. You can still use the one-person technique if the amount of assistance is enough to move the patient.

Ensure the patient is in the supine position. Prepare the bed for the move by raising it to a waist- height working level, and lock the wheels to prevent it from moving as you shift the patient. Lower the head of the bed, if permissible by the patient's condition, to reduce resistance to the move. Lower the side rail on your side of the bed so that you can reach the patient comfortably, but **MAKE SURE** that the other side rail is up so that the patient can't accidentally fall out. Remove the pillow from beneath the patient's head and place it against the headboard to protect the patient's head.

Instruct the patient to reach back and grasp the headboard with legs bent and feet flat on the mattress. Instruct the patient to pull with his or her arms and push his or her legs when you give the signal, such as at the count of three. Position yourself so that you are facing the head of the bed at about a 40° angle, place one arm beneath the patient's hips, and the other arm beneath the patient's shoulders. Spread your feet to provide a wide base of support, and bend your knees slightly so you can use your leg muscles to lift. Stand so that most of your body weight is on the leg nearest the foot of the bed.

When you are ready, give the signal. Lift the patient slightly and slide the patient toward the head of the bed. With luck, the patient will pull and push at the same time, and the move will be relatively easy. As you move the patient, shift your weight from your back foot to the foot closest to the head of the bed. This will allow you to use your body weight as leverage. When you complete the move, realign the patient's body, and make sure the sheet is as smooth as possible. Place the pillow back beneath the patient's head, and raise the side rail. Raise the head of the bed, and return the bed back to its original position.

ONE-PERSON | TWO-PERSON | TWO-PERSON WITH DRAW SHEET

The two-person technique is similar to the one-person technique except that there are at least two technicians involved and the patient may or may not assist. This technique is for patients who are not capable of assisting or are too heavy for one person to handle safely. The initial steps of this technique are the same as for the one-person move. The bed is raised to a working level, the wheels are locked, and the head is lowered. The side rails are lowered so that both technicians can reach the patient, and the patient's arms are usually crossed over his or her chest rather than extended over his or her head.

There are several different ways you can move a patient, depending on the capabilities of the patient and your preference. One common technique is simply a modified approach to the one-person technique. The technicians stand on either side of the patient and position themselves so they are facing the head of the bed at about a 40° angle. They then link arms under the patient's shoulders and buttocks, and on signal, lift and slide the patient up in bed. Although it is not essential, the patient should be allowed to assist by pushing with his or her feet, if the patient is capable of doing so. After the move, realign and make the patient comfortable, and return the bed to its original position.

The shoulder-lift is a modified version of the two-person technique. It is used to move patients who are capable of sitting up and using their hands and arms. The technicians stand beside and slightly behind the patient. They each place the arm closest to the foot of the bed beneath the patient's thighs and grasp each other's wrists. The patient drapes an arm over the back of each technician, and the technicians place their free hand on the bed or headboard for support. When the technicians are ready to move, they simply shift their weight and slide the patient along his or her buttocks. The shoulder- lift technique cannot be used for patients who have back, shoulder, or chest injuries. It can be used for other patients and is especially useful for moving patients when the bed cannot be raised to the proper working level. Because patients are sitting up, they are higher than they would be if they were in the lying position.

Another variation of the two-person technique is the modified shoulder-drag, which is simply a modification of the way the technicians grasp the patient. Instead of sliding their hands underneath the patient and grasping each other's wrists, they each slide a forearm under one of the patient's upper arms near the axilla. The other hand is placed beneath the shoulder for support and lift. When they are ready to move, the technicians slide the patient toward the head of the bed. Although fast and relatively simple to perform, this technique has certain disadvantages—the technicians' hand position does not provide much lift, the patient is dragged up in bed rather than lifted and

slid, it places a lot of pressure on the upper arms and axillary areas of the patient and can be extremely painful to the patient if the technicians are not careful. Obviously, this technique should not be used for very heavy patients or patients who have back, shoulder, and chest injuries. It is useful for moving patients who are small and not seriously disabled. It also adds an element of speed which the other techniques lack.

ONE-PERSON | TWO-PERSON | TWO-PERSON WITH DRAW SHEET

A drawsheet is one of the most useful mechanical aids you'll find. It is really nothing more than a specially constructed, short, heavy sheet or a regular sheet that has been folded in half lengthwise. The draw sheet is placed beneath the patient so that it supports the patient from the head level to below the buttocks.

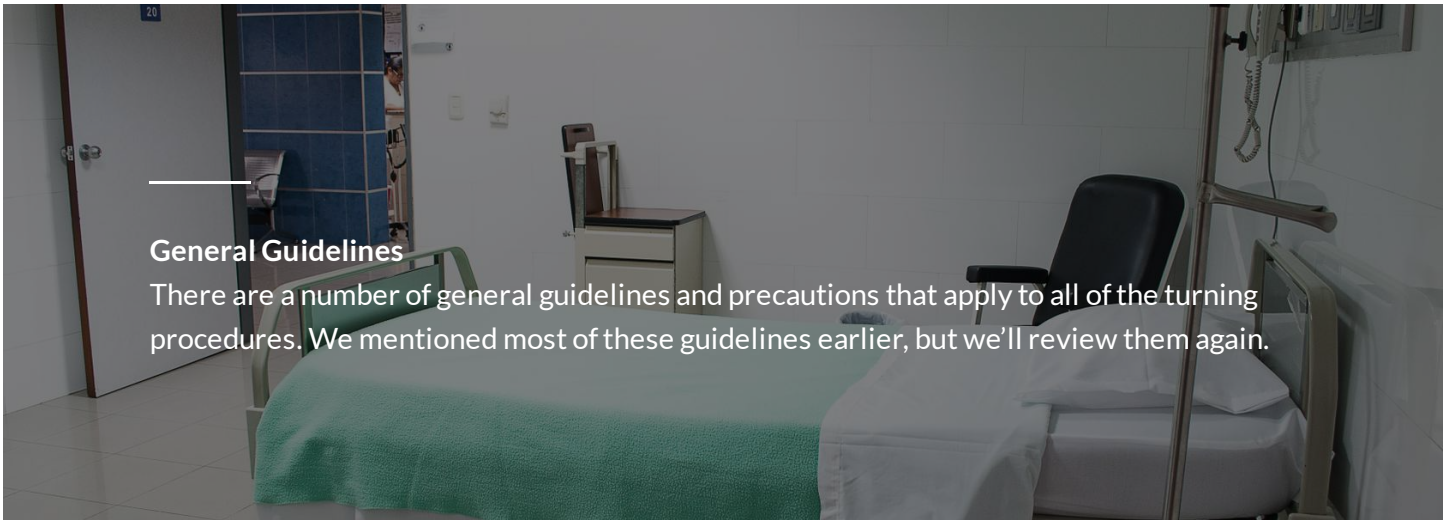
When the technicians are ready to move the patient, they prepare the bed as in previous examples. After they lower the side rails, they untuck the drawsheet and roll up the sides so they are as close as possible to the patient. The rolled sheet then becomes a handle that the technicians grasp to lift and slide the patient. If two technicians are working together to move the patient, they position themselves on either side and grasp the rolled sheet at the hip and neck level. They then use their body weight and shoulder muscles to lift and slide the patient up in bed. On completion of the move, the technicians simply tuck the sides of the draw sheet under the mattress and ensure that the patient is properly aligned in the bed.

Draw sheets offer numerous advantages over other manual procedures. Because they provide full back support, they can be used to move patients with back injuries. They are also useful for moving very obese patients because more technicians can get involved. Draw sheets eliminate awkward bending positions. Technicians are able to work in an erect position and run less risk of injuring their backs. Draw sheets also eliminate painful holds and friction (shearing forces) between the patient's body and the bed.

Turning the Patient

One of the most effective ways to prevent decubitus ulcers and other complications is to turn immobilized patients from one position to another. Doctors will usually specify how often they want patients to be turned, but the normal routine is at least once every two hours for completely immobilized patients. If you are managing such a patient's care, use a schedule to ensure the patient is turned regularly and spends an equal amount of time in each position.

CONTINUE



General Guidelines

There are a number of general guidelines and precautions that apply to all of the turning procedures. We mentioned most of these guidelines earlier, but we'll review them again.

Always introduce yourself, check the patient's ID, explain what you are going to do, and what the patient can do to help. Patients respond to treatment better if they understand how the treatment is going to help them. Provide privacy during the procedure. Most patients do not want other patients watching them as they are being dragged around. Also, patients are sometimes inadvertently exposed during a moving procedure. In any case, always respect the patient's right to privacy.

Plan your work before beginning. Make sure you know what you are going to do and have the right equipment and enough help. Raise the bed to a working level before beginning the procedure. This precaution will keep your work closer to your center of gravity and help prevent back strain. About the only time you would not follow this rule is when you are positioning a patient to sit on the side of the bed or get out of bed.

In either case, you do not want the patient jumping down from a bed that has been raised. Lock the wheels before beginning a procedure. Technicians and patients have been injured because the bed moved at a crucial moment. Lower the head of the bed before moving a patient. It is much easier to move a patient if the bed is in a flat position.

Ensure that any tubes, wires, or other devices attached to the patient are placed so they'll not be pulled loose when you begin the move. Use the side rails to keep the patient from falling out of bed during a procedure. Patients frequently move further and faster than you expect. Protect them by keeping the side rail up on the far side of the bed and putting it back up on your side before you move away. Always use good body mechanics. Use a wide base of support, large muscle groups, and so forth. Before you leave a patient, make sure the patient's body is aligned properly and that the patient is comfortable.

Multiple Response

Before moving a patient, what should you do? Mark all that apply.

- [ ] Plan out how you are going to move the patient before moving them.
- [ ] Ensure that any tubes, wires, or other devices attached to the patient are placed so they'll not be pulled loose when you begin the move.
- [ ] Introduce yourself, check the patient's ID, explain what you are going to do, and what the patient can do to help.
- [ ] Always use good body mechanics. Use a wide base of support, large muscle groups, and so forth.

SUBMIT

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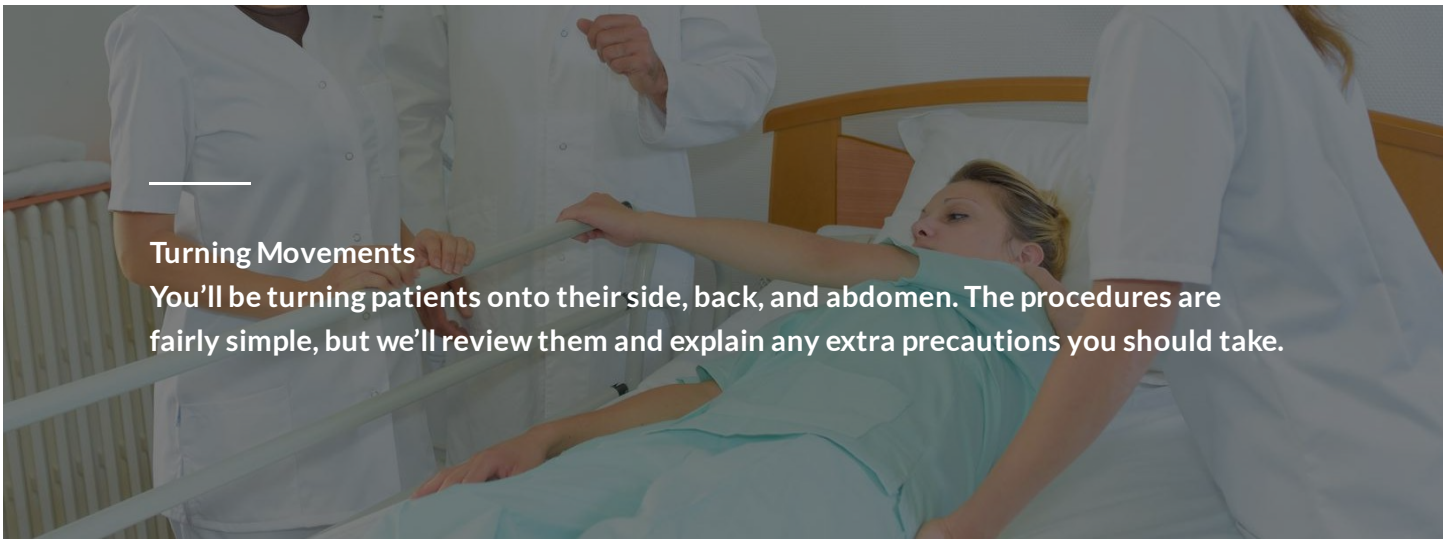


Before you turn a patient from a supine position to a side-lying position, cross the patient's arms on his or her chest so the patient won't roll on them. Bend the patient's legs or cross the far leg over the near leg. Either technique will partially shift the patient's weight so the patient is easier to move and will prevent the patient from rolling back into the original position. Assume a wide base of support with one leg braced against the bedframe and the other slightly back and 12–15 inches to the side. This position will allow you to use your body weight as leverage to move the patient. Place your hands on the patient's far hip and shoulder and roll the patient towards you. As you move the patient, bend your knees slightly and shift your weight back to help pull the patient toward you. Position the patient as we discussed under side-lying position, bending the upper leg and using pillows to maintain the patient's position and support the legs, arms, and head.

Turning a patient from a supine to a prone position is simply a continuation of the supine to side-lying move. However, instead of the patient's arms being crossed on the chest, the technicians are positioned so their near arm is extended over the patient's head and their far arm is kept alongside the patient's body. That will keep the patient from rolling over and possibly injuring his or her arm. When the move is completed, you simply adjust the patient's arms to a position that is comfortable for him or her.

The patient may request a pillow be placed under his or her head. Make sure the patient's lower ear is not crimped before you leave, and place a pillow under the ankles to prevent hyperextension of the feet.

Moving the Patient to The Side of the Bed

Your patient will need to be moved to the side of the bed to be repositioned for various procedures or in preparation for getting out of bed. The patient can be moved from either the supine (the preferred position) or prone position by one, two, or three technicians. You can also use the draw sheet procedure, which can involve four or more technicians. That procedure is covered when we discuss patient transfers.

The initial procedure is the same as with the previous patient moves—greet your patient, check the patient's ID, and explain what you are going to do. Raise the bed to a working level, lock the wheels, and lower the head so the bed is flat. Line yourself and your assistants on the side of the bed to which you'll move the patient. Designate one person, usually the most experienced technician, to control the move. That technician

should have a clear view of the patient's face and see what the other technicians are doing. The best position for this is usually at the head of the patient. For this procedure, we'll assume that you are the most experienced technician.

Begin by crossing the patient's arms over the chest. Then, you and the other technicians slide your arms as far as possible under the patient. As the senior person, you'll be at the head and place your arms under the patient's shoulders and upper back; the next technician will slide his or her arms under the patient's lower back and hips; and the technician closest to the patient's feet will place his or her arms under the patient's thighs and calves. All of you should have a good base of support with one leg braced against the bedframe for leverage. At a prearranged signal, the three of you will step back, pulling the patient to your side of the bed.

Obviously, you'll not need or have three technicians to move all patients. If the patient is small and you have one assistant, position yourself and your assistant so that the weight is equally divided and follow the same procedure. If you are working alone, move the patient in stages; move the head and shoulders first, then the hips, and finally the legs and feet. Do not use this technique if your patient has any sort of back problem or is very large. GET HELP! If your patient is in the prone position, place your arms in the same relative positions. Take care not to trap the patient's near arm beneath his or her body when you make the move. In either case, make sure that the patient is properly aligned before you leave.

CONTINUE

Procedures and Mechanical Aids Used to Transfer Patients

The procedures used to move patients from one place to another are called transfer techniques. These techniques are actually just extensions of the lifting and moving techniques discussed earlier. Transfer techniques are used to move patients back and forth from their beds to stretchers, wheelchairs, and bedside chairs. These techniques are also used to transfer patients from bedside chairs to wheelchairs, or from wheelchairs to commodes, and so forth.

All of the safety precautions and principles of body mechanics discussed earlier also apply to transfer techniques. In fact, they are more applicable because there is more lifting and movement involved and a much greater chance of injury for both the technician and the patient.

Transfer Techniques

The procedure you will use for each type of transfer depends on the size and condition of the patient and the number of technicians and equipment involved in the transfer. The

procedure used to transfer a young, healthy preoperative patient from a bed to a stretcher, for example, is totally different from the procedure used to transfer an obese back-injury patient.

You should already be somewhat familiar with transfer techniques from technical school, so we won't repeat all the step-by-step procedures. We'll limit our discussion to the specific mechanical principles, safety precautions, and patient comfort measures for each type of transfer.

Transfer Techniques

Bed-to-Stretcher Transfers

Stretchers (gurneys, litters) are frequently used to transport patients to various locations throughout the hospital. Patients transported in this manner include helpless and nearly helpless patients, such as patients with spinal injuries, stroke victims, pre- and postoperative patients, and other patients who must remain in a lying position. These patients are either physically lifted or slid by physical or mechanical means from the bed to the stretcher.

Bed-to-stretcher transfers are particularly risky for patients because both the bed and stretcher are at waist height and on wheels. Either the bed or the stretcher could be shoved out of place allowing the patient to fall to the floor. At that height, if a patient falls or is dropped, his or her chance for injury are fairly high. Bed-to-stretcher transfers are also hard on technicians because they require more lifting and reaching than other types of moves.

If the technicians are careful to lock the bed and stretcher wheels and position both to minimize chances of their bed being accidentally moved, much of the risk can be eliminated from these transfers. Technicians can reduce the chances of injury to themselves if they use good teamwork and follow the principles of body mechanics discussed earlier. The most senior technician should be in charge of the move and should be positioned at the head of the bed on the stretcher side. This will enable that technician to see both the patient's face and what the other technicians are doing. This senior technician should control the move with prearranged verbal signals. For example, one person controls a move by saying, "One, two, three, GO!" or "Ready, MOVE!" It doesn't really matter what words are used, as long as everybody knows what they mean.

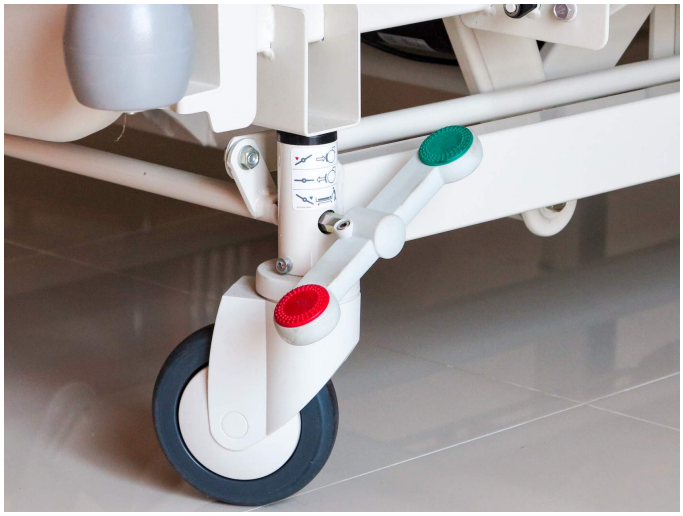
The first step in the bed-to-stretcher transfer is to prepare the stretcher. Cover it with a clean, dry sheet and tuck it in around the edges to remove the wrinkles. Have another sheet and a blanket available to cover the patient on the stretcher. Also, have a pillow available for the patient that is permitted to raise his or her head. Make provisions to support any IV tubing, catheters, or oxygen tubing the patient may have. Finally, include safety straps to prevent the patient from falling off the stretcher.

If the patient is to be lifted to the stretcher, position the stretcher at a 90° angle to the foot of the bed. At least three technicians should position themselves along the same side of the bed as they did to move the patient to the edge of the bed. In fact, begin the move by moving the patient as close as possible to the edge of the bed. The technicians should maintain the same arm positions and on command, lift and curl the patient into their bodies. Holding the patient in this manner keeps the patient close to the technicians' center of gravity and reduces strain. If the patient is very heavy, has a spinal injury, or an extremity in a cast, it may be necessary to have a fourth technician to provide additional support. If the patient has a spinal injury, the fourth technician should be positioned at the patient's head and ensure that the head maintains proper alignment with the rest of the body.

Once the technicians lift the patient, they move together to the side of the stretcher, and on signal, lower the patient to the stretcher. You can see that there might be a slight problem if the stretcher moved before the technicians could finish lowering the patient. Don't forget to lock the wheels! When the technicians are ready to put the patient on the stretcher, they assume a wide base of support with one foot slightly forward. They lower the patient by uncurling their arms and bending slightly at the knees. They should not lower the patient by bending forward while keeping their legs straight.
Once on the stretcher, check the patient's body alignment and correct it as needed. Cover the patient and secure in place with safety straps at the chest and thigh levels. If the stretcher has side rails, raise them for additional safety.

This technique will also work to transfer the patient from the stretcher to an operating table, x-ray table, or back to the bed. When the patient is returned to bed, the technicians should go to the far side, use the three-person technique to move the patient to the center of the bed, and reposition him or her. Always raise the side rail, before moving to the other side of the bed! In most cases, it is easier to just slide the patient from the bed to the stretcher. If you are doing so without mechanical aids, such as a draw sheet or roller board, begin by lowering the side rail and positioning the patient as close as possible to the edge of the bed. One technician goes to the far side and holds the patient so the patient doesn't fall out of bed. Keep the side rail on the near side down while the stretcher is being positioned. The other two technicians place the stretcher alongside the bed and then position themselves on the far side of the stretcher. Once they are positioned, the third technician on the far side raises the side rail and joins them. Patients capable of sliding will slide over to the stretcher. You'll help by making sure that the patient is covered during the move and providing physical assistance as needed. If a patient can't move, you and the other technicians will reach across the stretcher and pull the patient the same way you repositioned the patient. If you have enough help, you can also have technicians stand at the patient's head and feet to help lift and slide him or her.

As you can see, neither of these procedures is entirely satisfactory. The first involves too much lifting and the second involves too much reaching. The preferred method of transferring helpless patients is to use a draw sheet, also called a turning sheet, to pull them over. We'll talk more about this when we discuss the mechanical aids for lifting and moving.



However, here are a few safety practices regarding stretchers:

- Never leave a patient alone on a stretcher. Such a patient is entirely helpless and can easily be knocked off or pushed into something.
- Always use safety straps. Even if the stretcher does have siderails, they won't help much if you have to stop suddenly. In a sudden stop, the patient will just slide out the end of the stretcher.
- Transport patients feet first with one technician at the head and one alongside.

- Back patients on stretchers head-first into elevators so they can be taken off feet-first.

Transfer Techniques

Bed-to-Wheelchair/Bedside-Chair Transfers

Since the bed plays such an important role in the patient's recovery, it may seem like a contradiction to say that one of your first goals should be to get that patient up and moving as soon as possible. The bed is an important place for the patient to rest and begin the healing process. However, once that process begins, the patient must also begin to move around to restore muscle strength and function. As soon as the patient's condition permits, and the doctor's orders allow you to do so, work toward getting the patient out of bed. Moving the patient from the bed to a wheelchair or bedside chair is the first step in this direction.

Moving a patient from the bed to a chair is a lengthy process. First, allow the patient to sit up in bed. When the patient can tolerate sitting in bed, allow the patient to sit on the side of the bed and "dangle." Finally, transfer the patient from the bed to the chair. Of course, you don't go through all this every time you want to put a patient in a chair; but, since we are describing rehabilitative measures, we should include the steps that lead up to the transfer.

Transfer Techniques

Sitting a Patient up in Bed

With our adjustable hospital beds, sitting the patient up is a very simple task. Begin by placing the patient in the center of the bed in the supine position. Place a footboard at the base of the mattress to keep the patient's feet at a 90° angle to the rest of his or her body. Raise the head of the bed to the Fowler's position. Make sure the patient is far enough up in bed so that the bend of the bed is at the base of the patient's buttocks. Support the patient with pillows under the head and arms.

Transfer Techniques

Dangling the Patient

"Dangling" means positioning the patient on the side of the bed with the patient's feet resting on a footstool or the floor. In spite of the name, do not allow the patient's legs to dangle unsupported from the edge of the bed. Doing so would put pressure on the back of the legs and interfere with circulation.

Begin the dangling procedure by moving the patient to the edge of the bed as we described earlier. Raise the side rail, and raise the head of the bed to a high Fowler's position. It will be much easier for you to dangle the patient from that position than it will be for you to first sit the patient up and then turn the patient to a dangling position. Before you sit the patient on the edge of the bed, make sure the bed is in the low position so that the patient's feet will be able to reach the floor. This and actually helping the patient out of bed are two of the few times you'll work with a patient while the bed is in the low position.

When deciding which side of the bed to move the patient, consider the patient's condition. If your patient has had a stroke or another problem that has left him or her weaker on one side, move the patient in the direction of the stronger side so the patient will be able to help with the move. Place the patient's arms

across his or her chest so they won't get in the way while you are turning the patient. Also make the patient comfortable for dangling by helping him or her put on a robe and slippers.

Turn the patient to the dangling position by positioning yourself beside the patient, placing one hand and arm under the patient's thighs and one arm behind the patient's shoulders. Lift the patient's legs slightly and pivot the patient outward on the buttocks. Use your body weight as leverage by shifting yourself around as you turn the patient. Once the patient is turned, place the patient's feet on the floor, or footstool if the patient's legs are too short to reach the floor. Patients frequently feel faint the first few times they dangle. Do not leave the patient's side until you are sure the patient is not going to collapse! If the patient is going to dangle for awhile, position the overbed table so the patient can rest on it. Remain in the area until the patient is back in the bed. The dangling position is relatively unstable, and the patient can easily fall if you are not around to support him or her.

When the patient has dangled for as long as the patient's condition or the doctor's orders will allow, help the patient back to bed. Move the overbed table and footstool out of the way, and pivot the patient back to the sitting position in the bed. Help the patient remove his or her robe and slippers, and raise the side rails. Lower the head of the bed, raise the bed to a working level, and place the patient in the center of the bed in a comfortable position. Sitting up and dangling are preliminary steps to ambulating the patient.

Transfer Techniques

Moving a Patient to a Chair

Moving a patient from the bed to a bedside chair or wheelchair is simply a continuation of the dangling procedure. Place the chair parallel to the bed and on the patient's strong side, if the patient has one. If you are using a wheelchair, make sure that the wheels are locked and the footrests are out of the way before moving the patient. Because patients frequently knock the chair backwards as they begin to sit, be sure the chair or wheelchair is placed against some solid object before you begin the move. Sit the patient on the side of the bed as we just described. Help the patient put on a pair of hard-soled, well- fitting shoes. Shoes will prevent the patient from slipping while being moved; patient slippers do not work well for this purpose. You can also help the patient put on a robe so he or she will be comfortable while he or she is sitting. You may want to put a transfer belt on a patient who is very unsteady. Such a device will give you something stable to hold on to as you are trying to move the patient.

There are several ways to move the patient from the sitting position on the edge of the bed to the standing position. Select the technique you are most comfortable with; the technique that allows you to maintain the most control over the patient's movements and still permits you to use good body mechanics.

With this first technique, assume a wide base of support with one foot between the patient's feet and your knee braced up against the bedframe. This position allows you to use the bed and your body for leverage while controlling the patient's movements. Place the patient's hands on your shoulders and place your hands under the patient's axilla or on the transfer belt, if you are using one. Instruct the patient to stand as you lift. Flex your knees and keep your back straight so that you will use your large muscle groups to do the lifting. Use your body weight to counter the patient's weight and pull the patient toward you as you stand.

Allow the patient to stand for a few moments before you move the patient to the chair. As with dangling, the patient may be unsteady for the first few times. Once the patient is stable, pivot yourself and the patient until the patient's legs are touching the edge of the seat of the chair. Have the patient glance back at the chair for reassurance that the chair is actually there. Position yourself again so that you have one foot between the patient's feet and your knee braced against the edge of the seat. Flex your knees and use your weight to counteract the patient's weight as you lower the patient into the chair. Use pillows and other devices to make the patient comfortable and to make sure the patient is properly aligned. If your patient is at all unstable, use a safety belt to secure the patient to the chair. Make sure the call bell is within easy reach of the patient before you leave.

The second technique is just a modification of your body position when you raise patients to the standing position. Instead of placing one foot between the patient's feet, stand so that your feet are braced against the patient's feet. In this position, you will be able to keep the patient's feet from sliding out from under him or her. As before, balance your weight against the patient's weight as you pull the patient to his or her feet. Pivot the patient, and brace your feet against the patient's feet as you lower the patient to the sitting position.

To return the patient to the bed, simply reverse the procedure you used to put the patient into the chair. If you want to move the patient from a bedside chair to a wheelchair or from a wheelchair to a commode, position the equipment so that the patient can be pivoted from one position to the other. If wheelchairs are involved, make sure that the wheels are locked and the footrests are out of the way before you begin the transfer. Use the same techniques as before to actually move the patient.

The techniques we just covered assume that your patient has some degree of body control and can help you with the move. You may also want to put the patient who cannot participate in the move in a chair or wheelchair. A chair offers a welcome change for a patient who has been on prolonged bed rest, and wheelchairs are much more maneuverable than stretchers if you need to transport a patient who can tolerate the sitting position. Depending on the patient's size and your own strength, you can make such a transfer by yourself or with the assistance of one or two other technicians.

If you are working by yourself, position the chair or wheelchair by the bed as before. If you are moving to a wheelchair, remove the armrest closest to the bed. Assist the patient to the side of the bed nearest the wheelchair. Raise the patient to a sitting position by placing one of your arms under the patient's near arm and shoulder and the other behind the patient's neck and far shoulder. Use your body weight and shoulder muscles to pull the patient to a sitting position. Once the patient is sitting, shift your position so that you are behind him or her. Slide your arms beneath the patient's arms and grasp his or her forearms. Lift the patient's upper body slightly and slide it back onto the wheelchair or chair seat. Placing one arm behind the patient's back and one under the thighs, swing the patient's legs off the bed so that his or her feet are resting on the floor. Replace the armrest on the wheelchair, put the patient's shoes on his or her feet, use pillows, as needed, to ensure good body alignment, and use a safety strap to secure the patient in the wheelchair. Do not use this technique if the patient is large or if the patient can be injured by compressing the upper body.

If you have an assistant, your assistant can help with this procedure by lifting and moving the patient's legs as you lift the upper body. Even with two people, this technique is not the preferred method for patient movement because it places a great deal of pressure on the back of the person lifting the patient's upper body. Also, it can be painful for the patient because you are supporting the patient's weight on his or her axillary areas, and most technicians tend to increase pressure on the patient's forearms as they lift. If your hands are moderately strong, you can possibly damage the patient's arms.

A third alternative is to use three technicians to move the patient to a chair. Two of the technicians will support the patient's upper body while the third supports the patient's legs. The two technicians will assist the patient to a sitting position and position themselves so that they are behind the patient. They may need to turn the patient so the patient's back is angled toward the edge of the bed. From that position, they each place one arm behind the patient's shoulders and one arm under the patient's thighs. The third technician slides his or her arms under the patient's legs. All three flex their legs and, on signal, lift the patient slightly and move the patient onto the chair. It is very important that the technicians remember to keep their backs as straight as possible and use their legs and shoulders to lift.

The patient can be returned to the bed by reversing these techniques. If you are working alone, place the patient's feet on the bed first, then lift or slide the patient's upper body onto the bed. Once the patient is in bed, reposition the patient's body and make him or her comfortable.
None of these techniques are very effective with very large or very helpless patients or very large and helpless patients. As we'll discuss shortly, a mechanical hoist is the best way to move such patients. If a hoist is not available, we strongly suggest that you use a stretcher and multiple assistants to transport the patient.

The transfer techniques discussed here will suffice for most situations you'll encounter in a patient- care environment. We'll discuss loading patients onto field stretchers and into ambulances when we talk about emergency medicine. Other situations you might encounter include assisting a patient into an automobile or transferring a patient from a wheelchair, examining table, or bathtub. If you are helping a patient into a tub, use no-slip devices and rails to help steady the patient. In any case, if you use common sense and good body mechanics, you shouldn't have any trouble.

Safety Factors

Last and not least, safety factors related to the transfer techniques we discussed are essential! Wheelchair and stretcher/gurney safety are very similar:

- Never leave a patient unattended in a wheelchair.
- Use a safety strap to prevent the patient from falling out of the stretcher.
- Always transport the patient feet first unless you are entering an elevator or going through a doorway; then you should back in.

CONTINUE

Mechanical Aids

In the previous section, we mentioned a number of mechanical aids that can be used to help transfer a patient from one position to another. Such devices are designed to provide a smooth transfer and reduce the possibility of injury for either you or the patient. Using such devices does

not mean that you are not “macho,” but it does mean that you are a lot smarter than someone who tries to show off by not using these aids.

There are a wide variety of mechanical aids. We’ll talk about the following four examples:

DRAW SHEET | TRAPEZE | ROLLER BOARD | HYDRAULIC LIFT

As we mentioned earlier, a draw sheet or turning sheet, is a specially constructed sheet that is placed on top of the bottom sheet so that it supports the patient from the neck to the calves. If a regular draw sheet is not available, you can make a reasonably good copy by folding a regular sheet in half from top to bottom and placing that beneath the patient. If you do that, be sure the single fold is toward the head of the patient’s bed.

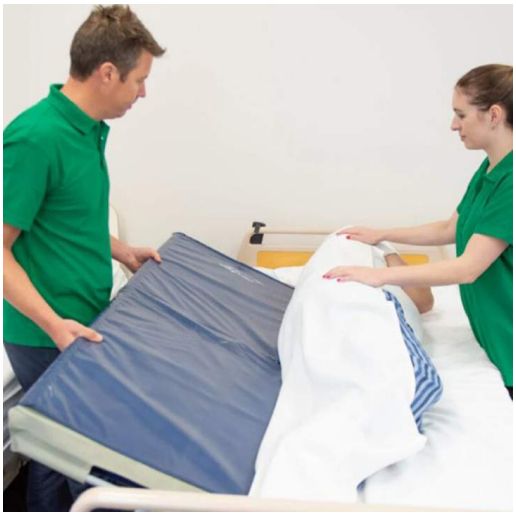
A draw sheet can be used to protect the bed or help move the patient around on the bed or from the bed to a stretcher. When you are using the drawsheet to move the patient, untuck the edges and roll them up as close as possible to the patient. Then, use the rolled portion of the sheet as a handle.

DRAW SHEET | TRAPEZE | ROLLER BOARD | HYDRAULIC LIFT

The trapeze is simply a bar hanging from an overhead brace. Its primary function is to allow the patient to change position in the bed. It can also be used for pull-ups by the patient. The trapeze is also useful for patient transfers. Patients can use it to pull themselves into a sitting position and to swing themselves back into bed from a wheelchair or stretcher.

DRAW SHEET	TRAPEZE	ROLLER BOARD	HYDRAULIC LIFT

The roller board is made up of a row of round poles mounted in a rigid frame and covered by vinyl or canvas. Although the frame is rigid, the poles can roll or turn in place. The board acts as sort of a conveyor belt. The board is placed across the gap between the stretcher and the bed. The rollers turn as the patient is pulled over the board, so less effort is required to move the patient. Since the roller board bridges the gap, it also keeps the patient from falling down between the stretcher and bed.



DRAW SHEET	TRAPEZE	ROLLER BOARD	HYDRAULIC LIFT

A hydraulic hoist or lift consists of a canvas sling supported by a metal frame on wheels. The lift has several pivot points, which can be adjusted by a hydraulic cylinder. Without attempting to teach you principles of hydraulics, suffice it to say that hydraulic pressure provides the leverage required to lift the patient. This pressure can then be adjusted to lower the patient to another position. The lift is usually on wheels, allowing you to pick up and move a patient to another location before lowering.

Hydraulic hoists can be used to transfer patients safely, and with very little effort, from their beds to stretchers, wheelchairs, toilets, tubs, or other locations. When using these lifts, explain the procedure to the patient and follow the manufacturer's instructions carefully. Do not exceed the hoist's weight limitations. Test the hoist by raising and lowering the patient over the bed before attempting to move the patient to another location.

This will also help to reassure the patient. Finally, be sure that the condition of the patient is not such that the patient will be harmed by the lift. As you can see from the illustration, the sling does not immobilize the patient's back and neck. Therefore, it should not be used for patients with spine and neck injuries. As with everything else, make sure you have a doctor's order before moving the patient.

Multiple Choice

The_____ is made up of a row of round poles mounted in a rigid frame and covered by vinyl or canvas.

- rollerboard
- trapeze
- drawsheet
- harness

SUBMIT

Complete the content above before moving on.

Techniques and Equipment Used to Ambulate Patients

Ambulation, or walking, is the last type of patient movement we'll discuss in this lesson. The goal of all the rehabilitative techniques we have discussed is to improve the condition of patients to the point where they can function independently. Ambulation is a major step in that direction. A patient who is able to ambulate alone is well along the road to recovery. Some patients have disabilities, such as fractures and degenerative disorders, which interfere with ambulation. These patients can still achieve some measure of mobility and independence through the use of ambulation aids.

In this section, we discuss **techniques** for helping the patient to walk and for **protecting** a patient against a fall. We'll also describe selection and use of the different **ambulation aids**.

Patients who have been bedridden for any length of time will not be able to just spring out of bed and run around the room. During the time that they have been lying in bed, their muscles have atrophied and weakened. They are often very unsteady when they first try to stand. You can prevent much of that unsteadiness by helping patients exercise, allowing them to remain as active as possible during the time they are bedridden, and moving them out of bed gradually.

As we discussed in the last section, patients should first sit up in bed. When they are able to tolerate that well, patients should be allowed to dangle. Finally, patients should be encouraged to sit in a bedside chair for increasing lengths of time. If you do all that, your patients shouldn't have any problems when the time comes to actually ambulate.

You should always take precautions to prevent injury or to prevent the patient from falling the first couple of times you help your patient walk. These precautions include using a transfer belt, positioning yourself to support the patient, and encouraging the patient to use hand rails and other stationary objects for support.

In the last section, we talked about using the transfer belt to help move a patient to a chair. These belts can also be used to help the patient walk or just stand up. A transfer belt gives you something firm to hang onto when you are trying to move or support the patient. Without such a device, you'll find yourself trying to support a patient by holding on to the patient's pajamas or various anatomical parts. As I am sure you have already discovered, hospital pajamas are not the most durable garments in the world. If you try to support a falling patient by grabbing the patient's pajamas, you may find yourself with an irate, injured, and naked patient on your hands! Grabbing the patient's body is not much of an improvement. You may be able to support the patient, but you will probably also bruise the patient and possibly even fracture some of the patient's bones.

If you don't have a transfer belt, you can improvise with a stretcher strap or even the patient's own belt. All you need is a sturdy belt that will fit around the patient's waist and give you something to hold onto.

Positioning is also very important when you are helping a patient ambulate. Some textbooks recommend that you walk arm-in-arm beside the patient. If the patient does become faint, you assume a wide base of support and slide your arm up into the patient's axillary region. You then rest the patient against your hip until the patient recovers or help arrives. The arm-in-arm position may provide enough support to hold up a patient who becomes a little unsteady, but it is ineffective for a patient who becomes unconscious or just falls. In either case, the patient will probably pull you down, too.

Stand beside and a little behind the patient. If you have a transfer belt, either place both of your hands on the belt or place one hand on the patient's waist and one hand under the patient's near arm. If the patient begins to fall, you simply step back and assume a wide base of support with one leg between the patient's legs and one leg to the rear for support. You then slide both hands up into the patient's axillary area and pull the patient back towards you. The patient's buttocks should be resting on your extended leg to allow the patient to slide down your leg to the floor. When the patient is on the floor, ease him or her into a lying position, protecting the head and other vital parts as you do so. When you have completed the move, the patient will be in a safe position and you'll have your hands free to examine the patient for injuries.

Instruct and encourage your patients to use any solid object for additional support. Most medical facilities have handrails in bathrooms and similar areas. Some also have rails in hallways and common areas. If handrails are not available, patients can use the wall, sofas, desks, or other large solid objects. Caution your patients not to try to hold themselves up with light, unstable objects like ordinary chairs or overbed tables. These items provide support when properly used but can easily be pulled over. Objects with wheels are also dangerous because they will roll out from underneath falling patients.

CONTINUE

Ambulation Aids

Ambulation aids include devices such as crutches, canes, braces, and walkers. Such devices provide additional support for patients whose legs are injured or otherwise too disabled to support them. Without ambulation aids, many of these patients would be forced to remain in bed or to depend on others for their personal needs. Ambulation aids allow patients to function independently.

The specific type of ambulation aid used for each patient depends on that individual's physical condition, support needed, type of disability, and doctor's orders. Although a physical therapist or physical therapy technician will normally be responsible for fitting and instructing the patient on the proper use of ambulation aids, you may have to perform these functions when they are not available.

CRUTCHES | CANES | WALKERS

Crutches are wooden or metal devices designed to provide support and balance during ambulation for patients with both long- and short-term disabilities. There are three basic types of crutches—each designed to meet different patient requirements for support and strength. Regardless of the type that is used, the crutch must be adjusted to fit the patient, and the patient must be taught how to use the crutch properly.

Axillary crutches, are designed to fit under the arm into the axillary area and provide axillary and hand support for the patient. They are the type most commonly used for short-term disabilities (e.g., fractures) and the type you will most likely help the patient use. When axillary crutches are properly fitted, the top piece does not dig into the patient's axilla during use. The crutches can be measured with the

patient in either the lying or the standing position. With the patient in the lying position, the crutch length is estimated by measuring the distance from the patient's axillary fold and adding two inches or by measuring the distance from the axillary fold to a point 6 – 8 inches out to the side of the patient's heel. The patient should be wearing sturdy, well-fitting shoes during these measurements. Standing measurements are simpler and more accurate. Have the patient stand up straight and place the crutch tip 6 – 8 inches out from the side of the patient's heel. Adjust the crutch so the top piece is two to three fingerbreadths from the axillary fold. You can do the same thing with a tape measure, but who has one when you need it? Adjust the handgrips so that the patient's elbows are bent at about a 30° angle and the patient's wrists are slightly hyperextended when holding the grips. Make sure that the wood is not split or cracked, all fasteners are properly secured, and the crutch tips are flexible and not worn, split, or loose.

Using crutches requires a certain amount of upper body and hand strength. Encourage the patient to do some of the strengthening exercises to prepare for crutch walking. Also, prepare for teaching the patient by becoming thoroughly familiar with the crutches. You'll find your teaching more effective if you demonstrate how to use the crutches than if you just try to tell the patient how it is done. Demonstration will also increase your appreciation of the patient's difficulties.

Begin the instruction by teaching the patient how to balance and handle the crutches. When standing, the patient should have a wide base of support with the crutch tips positioned 6 – 8 inches to the side and in front of the patient. Emphasize that the patient should support his or her weight on the hands, not the axilla. The blood vessels and nerves that supply the hands and arms run through the axillary area. When a patient leans on the crutches, it interferes with this blood supply. The patient may be a little unsteady at first, so start out gradually. You might also want to use a transfer belt to help support the patient until the patient becomes comfortable.

Patients who have learned to balance are ready to learn how to ambulate with the crutches. There are a number of different strides or gaits that patients can use, depending on their physical limitations, preferences, and physician recommendations. The four-point gait is used by patients who can bear some weight on both legs. It is a comparatively slow, safe, stable gait. The patient moves only one support at a time so that three points are in contact with the ground at all times. The patient alternates movement of crutch and foot. First the right crutch is moved forward; then the left foot; then the left crutch; and finally the right foot. Illustrates gait movements.

The three-point gait is used by patients who can bear full body weight on one foot and partial or no weight on the other. This gait is faster than the four-point gait. The patient moves both crutches and the affected foot forward at the same time, then the patient brings up the uninjured foot.

The two-point gait is used by patients who can bear weight on both feet. A crutch and opposite foot are moved forward at the same time, for example, right crutch, left foot. The crutches are used more for balance than for support purposes. This gait is very much like normal walking movements.

The swing-through gait is used by patients who can bear weight on one foot but some or none on the other. It is a gait you will see frequently because it is simple and fast. Patients move both crutches up together, and then swing their bodies up to or past the crutches. The gait requires considerable balance and upper body strength. It is frequently used by patients who have permanent disabilities, such as amputations.

In addition to one or more gaits, also teach the patient how to go up and down stairs and move from sitting to standing positions. If there is a railing or banister, instruct the patient to use it for support on one side. The rule for going up stairs is "body first, then crutches," and "crutches first, then body" for going down stairs. Provide plenty of support and practice until the patient becomes comfortable with stairs. The patient can move from sitting to standing position by using the crutches as leverage on the affected side.

Canadian crutches are also fairly common. They do not have any axillary support. Instead, they have metal bands that fit around the patient's forearms. Patients support themselves on their hands like the axillary crutches. Canadian crutches offer less support and balance for the uninitiated than the axillary crutches and are usually used by long-term patients.

Platform crutches are the third type. They also have no axillary support and are designed so that the patient's forearms rest on the weight-bearing surface. Platform crutches are used by long-term patients who have little hand and wrist strength.

CRUTCHES | CANES | WALKERS

Canes are wood or metal devices used for additional support by people who are unable to bear full body weight on one side. Some canes are single-tipped, others may have three or four tips. Metal canes are usually adjustable, but wood canes are not. A cane is properly fitted when the patient's elbow is slightly bent when supported by the cane. As with the crutches, the tip(s) should be flexible and in good shape.

When using a single-tipped cane, the patient should hold the cane on the unaffected side. To ambulate, the patient should move the cane first, then move the affected foot up to the cane, and finally, the good foot should be moved 10 inches or so past the cane. Three and four-tipped canes are usually held on the affected side. They are heavier and more awkward than the single-tip cane but also offer more support.

CRUTCHES | CANES | WALKERS

A walker is a metal device used as a four-point walking aid. Walkers are used by patients who are unsteady and/or unable to bear their full weight on their feet. Walker height is adjusted to about the same height as the cane and handgrip for the crutch. Some walkers have been adapted with wheels; others have attachments to carry things. When using a walker, the patient should use a gait similar to the three-point gait discussed earlier. The patient lifts or slides the walker forward and then shuffles along behind it.

Each of the ambulation aids we discussed has numerous advantages and disadvantages. You should be familiar with each type of aid so that you can provide the necessary help to your patient.

Watch the video below to learn more about crutches, canes, and walkers.

Crutches, Canes, and Walkers Video Transcript.pdf
174.9 KB

Multiple Choice

What type of ambulation aid is shown in the photo below?

- Walker
- Crutches
- Cane
- Wheelchair

SUBMIT

Complete the content above before moving on.

Different Types of Patient Exercises

Exercise is one of the most basic and essential rehabilitative measures that we can provide. It is necessary for proper body function and muscle tone, and will prevent or improve most

of the conditions we discussed earlier. Exercise is not limited to weight lifting, jogging, and other activities.

Any type of activity involves a certain amount of exercise. The two types we are most concerned with are passive and active exercise.

Before we begin our discussion of these exercises, we should mention a word of caution. As helpful as exercises are, they can also be painful and even dangerous for patients who have heart problems and conditions, such as arthritis, fractures, sprains, strains, torn ligaments, and joint dislocations. The doctor will specify the type and amount of exercise the patient is to have, and if you are uncertain, ask the doctor. Of course, a doctor's order for treatment is no guarantee that the patient will not have problems. Stop the exercise and notify the doctor or nurse if the patient begins to show signs of pain, resistance, or fatigue.

PASSIVE EXERCISE	ACTIVE EXERCISE	ISOMETRIC EXERCISE

Patients who are either unable or not allowed to exercise actively are provided passive exercise by a technician. A good example of such a patient would be one who has been paralyzed from the neck down. Although such patients are incapable of doing exercises, they will have the same complications, such as decubitus ulcers and contractures that any other inactive person will have. Passive exercise help to maintain muscle tone and joint flexibility.

PASSIVE EXERCISE	ACTIVE EXERCISE	ISOMETRIC EXERCISE

Active exercises are activities done by the patient. Such activities include active ROM exercises, isometric exercises, bed exercises, such as push-ups and pull-ups, dangling, and ambulation.

Active ROM exercises are simply ROM exercises that are done without assistance. If patients are capable, encourage them to do such exercises at least two or three times a day. Most patients will be eager to do so if they know the exercise will speed their recovery.

PASSIVE EXERCISE	ACTIVE EXERCISE	ISOMETRIC EXERCISE

These are activities that involve muscle contraction without any body movement. If you place your palms together in front of your chest, for example, and push as hard as you can, you are doing an isometric exercise. Isometric exercises are useful because they do not require any equipment and can be done from any position. A bed patient can do isometric exercises by contracting the various muscle groups.

Isometric exercises help to increase the patient's strength and endurance for other activities. Isometric exercises are potentially dangerous if done incorrectly. Instruct patients not to hold their breath. Such straining will affect the heartbeat and may cause a heart attack. Also instruct patients not to contract a muscle for a prolonged period. Isometric exercises are most beneficial, if muscles are contracted several times for a few seconds each time.

CONTINUE

ROM Exercises

ROM exercises should be performed several times each day, and each joint should be exercised five or six times during each session. Ideally, a physical therapy technician will help the patient with these exercises, but if one is not available, you'll assist the patient.

ROM exercises serve a number of useful functions and they are the following:

- Help to maintain joint mobility, prevent shortening of muscles, tendons, ligaments, and joint capsules, which leads to joint stiffness and fixation (ankylosis), and contractures.
- Prevent adaptive stretching or lengthening of connective tissue around joints; prevent deformities that limit function; stimulate circulation and sensory nerve endings.
- Restore loss of joint function.
- Maintain or increase muscle strength.
- Increase endurance.

There are a number of basic guidelines for you to follow when assisting patients with ROM exercises. These guidelines will help ensure the patient receives full benefit from the exercises, and neither you nor the patient is injured.

The basic guidelines for assisting patients are as follows:

Steps	Guidelines
1	Be familiar with the doctor's orders and the patient's diagnosis and capabilities. This information will help you decide what exercises are needed and how much the patient can participate.
2	Explain to the patient what you are doing. This is a must for any procedure. Patients will be much more likely to relax and participate in activities if they understand what is going on.
3	Use good body mechanics, such as a wide base of support and large muscle groups, when performing these activities. This will conserve your energy and prevent injury and strain.

Steps	Guidelines
4	Avoid overexerting the patient or performing exercises to the point of pain. Fatigue and pain will not help the patient and may cause the patient to stop participating.
5	Begin gradually and work slowly. All movements should be smooth and rhythmic. Irregular, jerky movements are uncomfortable for the patient.
6	Move each joint through its normal ROM until you begin to meet resistance. Stop immediately if the patient experiences pain or muscle spasms. Report such reactions to the nurse or doctor, and delay further exercises until the patient can be examined. Excessive stretching of joints can cause injuries and even bleeding into joints. If the patient can't talk, observe the patient's face for signs of pain as you do the exercise.
7	Support the body part you are moving above and below the joint you are exercising. Cradle or cup the body part and avoid grasping at muscles or tendons.
8	Begin each exercise with the joint in its normal anatomical position and return it to that position at the end of the exercise.
10	Move each joint through its complete ROM, five or six times, slowly, rhythmically, and with control. Repetition is important for joint flexibility, and slow, controlled movements prevent injury.
11	Unless contraindicated, encourage the patient to participate in the exercises. Begin with passive exercises and gradually increase patient participation until the patients can do the exercises without help. Recovery will accelerate as the patient becomes more and more independent.

Bed patients can also do exercises, such as pull-ups and push-ups, while they are still in bed. These exercises increase upper body strength and can be done by those patients who can control their upper body.

There are several different types of push-ups. In the most basic type, patients use their hands and arms to sit up and remain upright in bed. From that position, patients can lift their hips off the bed by pushing down on the mattress. The second type is the classic push-up we all know and love. The patient turns over on the abdomen, places the palms flat on the mattress, and straightens the arms and lifts the upper body off the mattress. Your role during these activities is to encourage the patient, make sure the patient does not overdo the activity, and ensure that the patient does not fall out of bed.

Pull-ups can be done with either the headboard or an overhead trapeze. The patient grasps either object and pulls toward it. Your role during this activity is the same as it is when the patient is doing push-ups.

END OF LESSON