

Mosby's Pocket Guide to Nursing Skills & Procedures



PERRY ♦ POTTER

**NINTH
EDITION**

ELSEVIER

The Joint Commission Official “Do Not Use” List^{*} of Abbreviations

ABBREVIATION	PREFERRED TERM
U (unit)	Write “unit”
IU (international unit)	Write “international unit”
Q.D., QD, q.d., qd (daily)	Write “daily”
Q.O.D., QOD, q.o.d. qod (every other day)	Write “every other day”
Trailing zero (X.0 mg) [†]	Write “X mg”
Lack of leading zero (.X mg)	Write “0.X mg”
MS	Write “morphine sulfate”
MSO4 and MgSO4	Write “magnesium sulfate”

Additional Abbreviations, Acronyms, and Symbols

(for possible future inclusion in the Official “Do Not Use” List)

> (greater than)	Write “greater than”
< (less than)	Write “less than”
Abbreviations for drug names	Write drug names in full
Apothecary units	Use metric units
@	Write “at”
cc	Write “mL”
µg	Write “mcg” or “micrograms”

In 2004, The Joint Commission created its “do not use” list of abbreviations as part of the requirements for meeting a National Patient Safety Goal. In 2010, NPSG.02.02.01 was integrated into the Information Management standards as elements of performance 2 and 3 under IM.02.02.01.

http://www.jointcommission.org/assets/1/18/Do_Not_Use_List.pdf

^{*}Applies to all orders and all medication-related documentation that is handwritten (including free-text computer entry) or on preprinted forms.

[†]**Exception:** A “trailing zero” may be used only where required to demonstrate the level of precision of the value being reported, such as for laboratory results, imaging studies that report size of lesions, or catheter/tube sizes. It may not be used in medication orders or other medication-related documentation.

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NINTH EDITION

Anne Griffin Perry, RN, MSN, EdD, FAAN

Professor Emerita

School of Nursing

Southern Illinois University Edwardsville

Edwardsville, Illinois

Patricia A. Potter, RN, MSN, PhD, FAAN

Director of Research

Patient Care Services

Barnes-Jewish Hospital

St. Louis, Missouri

Subject Matter Expert

Paul L. Desmarais, PhD, RN, CCRN

Lecturer

College of Nursing

University of Central Florida

Orlando, Florida

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Content Development Manager: Lisa Newton
Content Development Specialist: Melissa Rawe
Publishing Services Manager: Deepthi Unni
Senior Project Manager: Kamatchi Madhavan
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Mosby's Pocket Guide to Nursing Skills and Procedures, ninth edition, is a practical, portable reference for students and practitioners in the clinical setting. Grouped alphabetically, 86 commonly performed skills are presented in a clear, step-by-step format that includes:

- Purpose for performing each skill
- Guidelines to help students in delegating tasks to assistive personnel
- Lists of equipment required
- Rationales to explain why specific techniques are used
- Full-color photographs and drawings to provide visual reinforcement

In addition, Safety Alerts are included in the skills to highlight important information about patient safety and effective performance. Current Standard Precautions guidelines from the Centers for Disease Control and Prevention are incorporated throughout. Preprocedure and postprocedure protocols are conveniently located on the inside back cover.

Features of This Edition

- Information is completely updated for every skill and procedure.
- Unexpected Outcomes and Related Interventions present commonly occurring complications and the appropriate responses for patient care.
- Completely updated, full-color illustrations appear throughout.

This pocket guide is also available in formats compatible with handheld electronic devices. For a more complete discussion of information presented in this book, refer to Perry and Potter: *Clinical Nursing Skills and Techniques*, ninth edition.

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Acapella Device

The Acapella device is a handheld airway clearance device that uses positive expiratory pressure (PEP) to stabilize airways and improve aeration of the distal lung areas. There are two types: the blue device for patients who cannot maintain their expiratory flow above 15 L/min for greater than 3 seconds, and a green device for patients who can maintain expiratory flow above or equal to 15 L/min for at least 3 seconds. PEP stabilizes airways and improves aeration of the distal lung areas. During exhalation, pressure from the airways is transmitted to the Acapella device, which helps mucus dislodge from the airway walls and as a result prevents airway collapse, accelerates expiratory flow, and moves mucus toward the trachea (Strickland et al., 2013). Some patients with cystic fibrosis may benefit more from this device than from standard chest physiotherapy. However, cystic fibrosis patients must receive some type of routine airway clearance therapy daily.

Delegation Considerations

The skill of using an Acapella device can be delegated to nursing assistive personnel (NAP). The nurse is responsible for performing respiratory assessment, determining that the procedure is appropriate and that a patient can tolerate it, and evaluating a patient's response to the procedure. The nurse directs the NAP to do the following:

- Be alert for the patient's tolerance of the procedure, such as comfort level and changes in breathing pattern, and to immediately report changes to the nurse.
- Use specific patient precautions, such as positioning restrictions related to disease or treatment.

Equipment

- Stethoscope
- Pulse oximeter
- Water and glass
- Chair
- Tissues and paper bag
- Clear, graduated, screw-top container
- Suction equipment (if patient cannot cough and clear own secretions)
- Acapella device
- Clean gloves
- Patient education materials

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Prepare Acapella device (Fig. 1.1). Verify that the correct device is used to match the patient’s expiratory flow rate. a Turn Acapella frequency adjustment dial counterclockwise to lowest resistance setting. As patient improves or is more proficient, adjust proper resistance level upward by turning dial clockwise. b If aerosol drug therapy is ordered, attach a nebulizer to the end of the Acapella valve. 3 Instruct patient to: a Sit comfortably. b Take in breath that is larger than normal but not to fill lungs completely. c Place mouthpiece into the mouth, maintaining tight seal. d Hold breath for 2 to 3 seconds. e Try not to cough and to exhale slowly for 3 to 4 seconds through the device while it vibrates. f Repeat cycle for 5 to 10 breaths as tolerated. g Remove mouthpiece and perform one or two “huff” coughs. h Repeat Steps a through g as ordered.	This initial setting helps patient adjust to device and benefit from treatment.



Fig. 1.1 Acapella device.
(Used with permission,
Smithmedical.com.)

STEP	RATIONALE
4 Auscultate lung fields; obtain vital signs and pulse oximetry. Inspect color, character, and amount of sputum. Help patient with oral hygiene. 5 Complete postprocedure protocol.	

Recording and Reporting

- Record level of resistance and patient’s tolerance.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient cannot maintain exhalation for 3 to 4 seconds.	Adjust dial clockwise to allow patient to exhale at a lower flow rate.

Aquathermia and Heating Pads

A water-flow pad such as an aquathermia pad, electric heating pads, and commercial heat packs are common forms of dry heat therapy. The aquathermia pad (water-flow pad) used in health care settings comprises a waterproof rubber or plastic pad connected by two hoses to an electrical control unit that has a heating element and motor. Distilled water circulates through hollowed channels in the pad to the control unit where water is heated (or cooled).

Dry heat devices are applied directly to the surface of the skin. For this reason, extra precautions need to be taken to prevent burns and skin and tissue injury (Igaki et al., 2014). A conventional heating pad uses dry heat and is often used in the home care setting, but not in health care settings. A cotton or flannel cloth must cover the heating pad. The pad has a temperature-regulating unit for high, medium, or low settings. Because it is easy to readjust temperature settings on heating pads, instruct patients not to turn the setting higher once they have adapted to the temperature.

Delegation Considerations

The skill of applying aquathermia and dry heat can be delegated to nursing assistive personnel (NAP; see agency policy). The nurse must assess and evaluate the condition of the skin and tissues in the area that is treated and explain the purpose of the treatment. *If there are risks or expected complications, this skill cannot be delegated.* The nurse directs the NAP about the following:

- Specific positioning and time requirements to keep the application in place based on health care provider order or agency policy.
- What to observe and report immediately, such as excessive redness and pain during application.
- Reporting when treatment is complete so the patient's response can be evaluated.

Equipment

- Aquathermia or commercial heat pack
- Distilled water (for aquathermia pad)
- Bath towel or pillowcase
- Tape ties or gauze roll

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check electric plugs and cords for obvious fraying or cracking. 3 Determine patient's or family members' knowledge of procedure, including steps for application and safety precautions. 4 Apply dry heat device: - a For aquathermia (1) Cover or wrap area to be treated with bath towel or enclose the pad with pillowcase. (2) Place pad over affected area (Fig. 2.1), and secure with tape, tie, or gauze as needed. (3) Turn on aquathermia unit and check temperature setting.	Prevents injury from accidental electric shock. Determines extent of health teaching required. Prevents heated surface from touching patient's skin directly and increasing risk for injury to patient's skin. Pad delivers dry, warm heat to injured tissues. Pad should not slip onto different body part. Prevents exposure of patient to temperature extremes.

SAFETY ALERT Do not pin the wrap to the pad, because this may cause a leak in the device.

Continued



Fig. 2.1 Aquathermia pad applied.

STEP	RATIONALE
b For commercially prepared heat pack, break pouch inside larger pack (follow manufacturer's guidelines). 5 Monitor condition of skin every 5 minutes during application, and question patient regarding sensation of burning. 6 After no more than 20 minutes (or time ordered by health care provider), remove pad and store. 7 Complete postprocedure protocol. 8 Teach Back: To determine the patient and family's understanding about safely using a heating pad. State: "I want to be sure I explained how to safely use a heating pad at home. Can you explain to me why you want a layer of cloth between the heating pad and your skin?" Revise your instruction now or develop a plan for revised patient teaching if patient is not able to teach back correctly.	Activates chemicals within pack to warm outer surface. Pad delivers dry, warm heat to injured tissues. Pad should not slip onto different body part. Determines if heat exposure is causing burn, blistering, or injury to underlying skin. Heat therapy may reduce pain and spasm and increase blood flow and compliance of soft-tissue structures (Brooks et al., 2015). Determines patient and family caregiver level of understanding of instructional topic.

Recording and Reporting

- Record type of application, temperature and duration of therapy, and patient's response on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Describe any instruction given and patient's/family caregiver's success in demonstrating procedure.
- Report pain level, range of motion (ROM) of body part, skin integrity, color, temperature, sensitivity to touch, blistering and dryness.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin is reddened and sensitive to touch. Extreme warmth caused burning of skin layer.	• Discontinue application immediately. • Verify proper temperature, or check device for proper functioning. • Notify health care provider and, if there is a burn, complete an incident report.
2 Patient complains of burning and discomfort.	• Reduce temperature. • Assess for skin breakdown. • Notify health care provider.
3 Body part is painful to move. Movement stretches burn-sensitive nerve fibers in skin.	• Discontinue aquathermia pad or heat pack use. • Observe for localized swelling. • Notify health care provider.
4 Patient or family caregiver applies heat incorrectly or cannot explain precautions.	• Reinstruct patient or family caregiver as necessary. Consider possible home health referral.

Aspiration Precautions

Aspiration is the misdirection of oropharyngeal secretions or gastric contents into the larynx and lower respiratory tract (Metheny, 2012). You should suspect dysphagia if a patient has frequent drooling, loss of food from the mouth during eating, pocketing food (holding food in the cheek), and spitting pieces of food out. In addition, a patient might experience choking or coughing when swallowing, a gurgling or wet-sounding voice quality (e.g., hoarseness), and having the sensation of food getting stuck in the throat after multiple attempts to swallow (Kyle, 2011; Mayo Clinic, 2014).

Silent or asymptomatic aspiration refers to passage of foods or liquids into the trachea and lungs without producing a productive cough or other signs consistent with aspiration (Garon et al., 2009). The more subtle signs associated with silent aspiration include lack of speech, depressed alertness, wet quality to voice, drooling, difficulty controlling secretions, and absence of gag reflex.

The single most important measure to prevent aspiration is to place the patient on nothing by mouth (NPO) until a dysphagia evaluation by a certified speech language therapist (SLP) can be performed, then a safe diet can resume. Early screening and intervention are crucial in the prevention of aspiration and pneumonia.

Dysphagia management includes dietary modification by altering the consistency of foods and liquids and is most effective when implemented using an interprofessional approach. The SLP and registered dietitian (RD) are central to dysphagia management.

The National Dysphagia Diet comprises four levels: dysphagia puree, dysphagia mechanically altered, dysphagia advanced, and regular (Table 3.1). Thickened liquids are commonly prescribed to prevent aspiration pneumonia (Frey and Ramsberger, 2011). Always read the label directions when modifying liquids to prepare the desired thickness correctly. Appropriate food choices and consistency of liquids are individualized and based on which phase of swallowing is dysfunctional (Sura, 2012).

Delegation Considerations

The skill of following aspiration precautions while feeding a patient can be delegated to nursing assistive personnel (NAP). However, the nurse is responsible for the ongoing assessment of a patient's risk for aspiration and determination of positioning and any special feeding techniques. The nurse directs the NAP to do the following:

- Position patient upright (45 to 90 degrees preferred) or according to medical restrictions during and after feeding.

TABLE 3.1 Stages of National Dysphagia Diet

Stage	Description	Examples
NDD 1: Dysphagia pureed	Uniform, pureed, cohesive, pudding-like texture	Smooth, hot cereals cooked to a “pudding” consistency; mashed potatoes; pureed meat and vegetables; pureed pasta or rice; yogurt
NDD 2: Dysphagia mechanically altered	Moist, soft-textured; easily forms a bolus	Cooked cereals; dry cereals moistened with milk; canned fruit (except pineapple); moist ground meat; well-cooked noodles in sauce/gravy; well- cooked, diced vegetables
NDD 3: Dysphagia advanced	Regular foods (except very hard, sticky, or crunchy foods)	Moist breads (e.g., butter, jelly); well-moistened cereals, peeled soft fruits (peach, plum, kiwi); tender, thin-sliced meats; baked potato (without skin); tender, cooked vegetables
Regular	All foods	No restrictions

NDD, National Dysphagia Diet.

Data from National Dysphagia Diet Task Force: *National dysphagia diet: standardization for optimal care*, Chicago, 2002, American Dietetic Association.

- Use aspiration precautions while feeding patients who need assistance, and explain feeding techniques that are successful for specific patients.
- Immediately report any onset coughing, gagging, or a wet voice or pocketing of food to the nurse.

Equipment

- Upright chair or bed in high-Fowler position
- Thickening agents as designated by SLP (rice, cereal, yogurt, gelatin, commercial thickener)
- Tongue blade
- Penlight
- Oral hygiene supplies
- Suction equipment

10 SKILL 3 **Aspiration Precautions**

- Clean gloves
- Pulse oximeter (optional)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Perform a nutritional assessment.	Patients with dysphagia alter their eating patterns or choose foods that do not provide adequate nutrition (see Table 3.1).
3 Assess mental status, including alertness, orientation, and ability to follow simple commands.	If orientation and command-following are impaired, risk for aspiration is higher.
4 Determine if patient has an increased risk for aspiration, and assess for signs and symptoms of dysphagia (Box 3.1). Use a dysphagia screening tool if available.	Performing an assessment before feeding determines when referral to SLP is necessary. Interventions to minimize aspiration and possible pneumonia can be implemented.
5 Apply clean gloves. Provide thorough oral hygiene, including brushing of tongue, before meal.	Risk for aspiration pneumonia has been associated with poor oral hygiene (Eisenstadt, 2010).
6 Observe patient during mealtime for signs of dysphagia such as coughing, dyspnea, or drooling. Note during and at end of meal if patient tires.	Indicates swallowing impairment and possible aspiration. Chewing and sitting up for feeding accelerate onset of fatigue. Fatigue increases risk for aspiration.
7 Indicate on patient's chart and Kardex that dysphagia/aspiration risk is present.	Identifying patient as dysphagic reduces risk for his or her receiving oral nutrients without supervision.

BOX 3.1 Criteria for Dysphagia Referral (Box 31.7 from main text)

Before Referral:

If the answer is “yes” to either of the following two questions, referral at this time is not appropriate:

- Is patient unconscious or drowsy?
- Is patient unable to sit in an upright position for a reasonable length of time?

Consider the Next Two Questions Before Making the Referral:

- Is patient near the end of life?
- Does patient have an esophageal problem that will require surgical intervention?

When Observing the Patient or Giving Mouth Care, Look for the Following:

- Open mouth (weak lip closure)
- Drooling liquids or solids
- Poor oral hygiene/thrush
- Facial weakness
- Tongue weakness
- Difficulty with secretions
- Slurred, indistinct speech
- Change in voice quality
- Poor posture or head control
- Weak involuntary cough
- Delayed cough (up to 2 minutes after swallow)
- General frailty
- Confusion/dementia
- No spontaneous swallowing movements

If any of the above is present, the patient may have swallowing problems and need referral to an SLP.

STEP

- 8 Position patient upright (90 degrees) in a chair or elevate head of patient’s bed to a 45- to 90-degree angle or to the highest position allowed by medical condition during meal, or position in chair.

RATIONALE

Position facilitates safe swallowing and enhances esophageal motility (Grodner et al., 2012; Ney et al., 2009). Side-lying position is an option if patient cannot have head elevated.

Continued

STEP	RATIONALE
9 Using penlight and tongue blade, gently inspect mouth for pockets of food.	Pockets of food in the mouth indicate difficulty swallowing.
10 Optional: Apply pulse oximeter to patient's finger; monitor during feeding.	Pulse oximetry may be a reliable method of diagnosis of aspiration in most dysphagic stroke patients (Lancaster, 2015).
11 Add thickener to thin liquids to create desired consistency per SLP evaluation.	Thin liquids are difficult to control in the mouth and pharynx and are more easily aspirated (Garcia et al., 2010).
12 Have patient assume a chin-tuck position. Have patient swallow twice or repeatedly, and monitor for swallowing and respiratory difficulty.	Chin-tuck or chin-down position has traditionally been used to help reduce aspiration (Eisenstadt, 2010). However, a study of 47 patients with a video fluoroscopic diagnosis of aspiration found only 55% avoided aspiration during the chin-down posture (Terre & Mearin, 2012). More research is needed. Hyperextension of neck makes it easier for food to enter airway.
13 If patient cannot feed self, place $\frac{1}{2}$ to 1 teaspoon of food on unaffected side of mouth, allowing utensils to touch the mouth or tongue.	Small bites help patient's ability to swallow (Grodner et al., 2012). Provides a tactile cue to begin eating, avoids pocketing of food on weaker side.
14 Provide verbal cueing while feeding. Remind patient to chew and think about swallowing. Avoid mixing food of different textures in same mouthful. Alternate liquids and bites of food.	Verbal cueing keeps patient focused on normal swallowing (Metheny, 2012). Positive reinforcement enhances patient's confidence in ability to swallow (Garcia and Chambers, 2010).

STEP

Minimize distractions, and do not rush patient. Use sauces, condiments, and gravies to facilitate cohesive food bolus formation.

- 15 Ask patient to remain sitting upright for at least 30 to 60 minutes after the meal.

- 16 Complete postprocedure protocol.

RATIONALE

Single textures are easier to swallow than multiple textures. Alternating solids with liquids removes food residue in mouth (Ney et al., 2009).

Environmental distractions and conversations during mealtime increase risk for aspiration (Chang and Roberts, 2011).

Cohesive food bolus helps to prevent pocketing or small food particles from entering the airway (Ney et al., 2009).

Remaining upright after meals or snack reduces chance of aspiration by allowing food particles remaining in pharynx to clear (Frey and Ramsberger, 2011).

Recording and Reporting

- Document in patient's electronic health record (EHR) or chart: assessment findings, patient's tolerance of liquids and food textures, amount of assistance required, position during meal, absence or presence of any symptoms of dysphagia during feeding, fluid intake, and amount eaten.
- Report any coughing, gagging, choking, or other swallowing difficulties to health care provider.
- Communicate with other health care staff that patient has dysphagia during hand-off communication.
- Document evaluation of family caregiver learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient coughs, gags, complains of food “stuck in throat,” or has a wet quality to voice when eating.	• Stop feeding immediately and place patient on NPO (nothing by mouth). Notify health care provider, and suction as needed. • Anticipate consultation with SLP for swallowing exercises and techniques to improve swallowing.
2 Patient experiences weight loss over next several days/weeks.	• Discuss findings with health care provider and RD. Determine if increasing frequency or quality of foods is needed. • Nutritional supplements may be needed.

Assistive Device Ambulation (Use of Crutches, Cane, and Walker)

An assistive device increases stability during ambulation; supports weak extremities; or reduces the load on weight-bearing structures such as hips, knees, or ankles. These devices range from standard canes, which provide balance and minimal physical support, to crutches and walkers, which are used by patients with weight-bearing limitations on one or more of their legs.

A licensed physical therapist (PT) should be consulted to help choose the proper assistive device, fit the device, and instruct the patient on the correct technique for use. When helping a patient with an assistive device ambulate, always have a gait belt on the patient and stand slightly behind and to the side of the patient (on his or her weak side).

Delegation Considerations

The skill of assisting patients with ambulation can be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Have a patient dangle following lying in bed before ambulation.
- Immediately return a patient to the bed or chair if he or she is nauseated, dizzy, pale, or diaphoretic, and report these signs and symptoms to the nurse immediately.
- Apply safe, nonskid shoes on patient, and ensure that the environment is free of clutter and there is no moisture on the floor before ambulating patient.

Equipment

- Ambulation device (crutch, walker, cane)
- Safety device (gait belt)
- Well-fitting, flat, nonskid shoes for patient
- Goniometer (optional)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Assess degree of assistance patient needs. PT will also make this recommendation. 3 Prepare patient for procedure: - a Explain reasons for exercise, and demonstrate specific gait technique. 4 Check for appropriate height and fit of assist device. If PT has seen patient, the device should be at appropriate height. NOTE: <i>this is usually done when patient is standing at side of bed and is stable.</i> - a Cane measurement: Cane should extend from greater trochanter of the hip to floor while cane is held 15 cm (6 inches) from foot. Allow 15- to 30-degree elbow flexion. Cane handle should fit comfortably in palm of hand. - b Crutch measurement: Includes three areas: patient's height, distance between crutch pad and axilla, and angle of elbow flexion. Use one of two methods:	For safety, another person may be needed initially to assist with patient ambulation. Teaching and demonstration enhance learning, reduce anxiety, and encourage cooperation. Ensures that patient is able to ambulate successfully without injury using device. If cane is too short, patient has difficulty supporting weight and is bent over and uncomfortable. As weight is taken on by hands and affected leg is lifted off floor, complete extension of elbow is needed. Promotes optimal support and stability.

STEP

- (1) *Standing*: Position crutches with crutch tips at 15 cm (6 inches) to side and 15 cm in front of patient's feet (tripod position). Crutch pads should be 3.75 to 5 cm ($1\frac{1}{2}$ to 2 inches) or two to three finger widths under axilla. (American College of Foot and Ankle Surgeons, 2016) (Fig. 4.1).
- (2) *Supine*: Crutch pad is approximately 5 cm (2 inches) or two to three finger widths under axilla with crutch tips positioned 15 cm (6 inches) lateral to patient's heel (Fig. 4.2).

RATIONALE

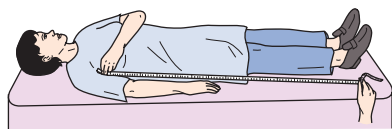
Radial nerve passes under axillary area superficially. If crutch is too long, it places pressure on axilla and radial nerve. Injury to radial nerve causes paralysis of elbow and wrist extensors, commonly called *crutch palsy*. In addition, if crutch is too long, shoulders are forced upward, and patient cannot push body off the ground. If ambulation device is too short, patient is bent over and uncomfortable.

Continued



Fig. 4.1 Top of crutch.

Fig. 4.2 Supine method.



STEP	RATIONALE
(3) Height of handgrip must be adjusted so patient's elbow is flexed 15 to 30 degrees or it sits at approximately height of wrist crease. Both height of crutch and handgrip dimensions are adjustable on a well-made crutch. c Walker measurement: When patient relaxes arms at side of body and stands up straight, top of walker should line up with crease on inside of wrist (American Academy of Orthopaedist Surgeons [AAOS], 2015). Elbows should flex about 15 to 30 degrees when standing inside walker with hands on handgrips. 5 Make sure that ambulation device has rubber tips. 6 Help patient from lying position to side of bed or up from chair.	Low handgrips cause radial nerve damage. High handgrips cause elbow to be sharply flexed, decreasing strength and stability of arms. This allows patient to fully extend the elbow when taking a step. Walker should be at proper height so patient does not bend forward. Patient must have sufficient strength to be able to move walker. Prevents device from slipping. Ensures that patient is stable and ready to ambulate.

STEP

- 7 Allow patient to sit on edge of bed for a few minutes. Have patient alternately flex and extend feet, move lower legs. Ask if he or she feels dizzy. Have patient relax and take a few deep breaths until dizziness subsides and balance is gained (Fig. 4.3).
- 8 Apply gait belt around patient's waist. Be sure that it completely circles patient's waist. Place belt low and be sure that it is snug. You may need to adjust belt once patient stands. You hold belt along patient's back with your palms facing up as patient walks.
- 9 Help patient stand at bedside. Reassess height of device to make sure that it is correct size. Have patient stand fully erect with shoulders back and looking ahead (not at floor). At this time assess patient's ability to bear weight (e.g., does patient have discomfort, unsteady stance?) and balance.

RATIONALE

Determines ability to tolerate standing. If dizziness lasts more than 60 seconds, may indicate orthostatic hypotension; return patient to bed. Recheck blood pressure.

Belt controls patient's center of mass during mobility, controls descent if a fall occurs, and reduces chance of grabbing patient's upper extremities.

Ensures that patient begins ambulation with correct posture and position.

Continued



Fig. 4.3 Assisting patient to side of bed.

STEP	RATIONALE
10 If patient is unsteady, seat him or her in chair or return to bed immediately.	Patient may require strengthening exercises or evaluation of balance by PT. Determines mutual goal.
11 Decide with patient how far to ambulate.	
12 Schedule ambulation around patient's other activities.	Scheduled rest periods between activities reduce patient fatigue.

SAFETY ALERT Remove obstacles, including throw rugs, from pathways, and wipe up any spills immediately. Avoid crowds. Crowds increase the risk for the crutch, cane, or walker being kicked or jarred and patient losing balance.

Help patient walk with cane (steps are the same with standard, tripod, or quad cane): 1 Have patient hold cane on strong side. Allow approximately 15- to 30-degree elbow flexion. 2 To begin, have patient move cane forward about 15 to 25 cm (6 to 10 inches), keeping body weight on both legs. 3 Instruct patient to advance involved leg forward, even with the cane so that the cane and affected leg swing and strike the ground at the same time. 4 Have patient advance strong leg 15 to 25 cm (6 to 10 inches) past cane. 5 Have patient move involved leg forward, even with strong leg or slightly past it. 6 Repeat sequences as patient tolerates. Once comfortable, have patient advance cane and weak leg together.	Offers most support when on stronger side of body. Cane and weaker leg work together with each step. Distributes body weight equally. Body weight is supported by cane and strong leg. Aligns patient's center of gravity. Returns patient body weight to equal distribution.

STEP

Help patient crutch walk by using appropriate crutch gait:

1 Four-point gait

- a Begin in tripod position (Fig. 4.4). Have patient place the crutch tips about 4 to 6 inches (10 to 15 cm) to the side and in front of each foot (American College of Foot and Ankle Surgeons, 2016). Have patient place weight on handgrips, not under arms.
- b Move right crutch forward 10 to 15 cm (4 to 6 inches) (Fig. 4.5, A).

RATIONALE

To use crutches, patient supports self with hands and arms; therefore ability to balance body in upright position and stamina are necessary. Type of crutch gait depends on patient's weight-bearing status. This is most stable crutch gait. It provides at least three points of support at all times. Patient must be able to bear weight on both legs. Patient moves each leg alternately with each opposing crutch so three points of support are on floor all the time. Often used when patient has some form of paralysis, (e.g., children with spastic cerebral palsy; Hockenberry and Wilson, 2015). May also be used for arthritic patients.

Continued

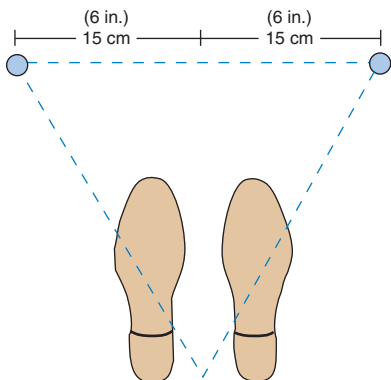


Fig. 4.4 Tripod position.

STEP

RATIONALE

- c Move left foot forward to level of left crutch (Fig. 4.5, B).
- d Move left crutch forward 10 to 15 cm (4 to 6 inches) (Fig. 4.5, C).
- e Move right foot forward to level of right crutch (Fig. 4.5, D).
- f Repeat above sequence.

2 Three-point gait:

- a Begin in tripod position (Fig. 4.6, A), with patient standing on weight-bearing foot.
- b Advance both crutches and involved leg, keeping foot of involved leg off floor (Fig. 4.6, B).
- c Move weight-bearing leg forward, stepping on floor (Fig. 4.6, C).
- d Repeat sequence.

3 Two-point gait:

- a Begin in tripod position (Fig. 4.7, A).
- b Move left crutch and right foot forward (Fig. 4.7, B).
- c Move right crutch and left foot forward (Fig. 4.7, C).
- d Repeat sequence.

Improves balance by providing wide base of support. Patient should have posture of erect head and neck, straight vertebrae, and extended hips and knees.

Crutch and foot position is similar to arm and foot position during normal walking.

Requires patient to bear all weight on one foot. Weight is borne on strong leg and then on both crutches. Affected leg does not touch ground during early phase of three-point gait. May be useful for patient with broken leg or sprained ankle.

Improves patient's balance by providing wide base of support.

Requires at least partial weight bearing on each foot. Is faster than four-point gait. Requires more balance because only two points support body at one time.

Improves patient's balance by providing wide base of support. Crutch movements are similar to arm movement during normal walking; patient moves crutch at same time as opposing leg.

Continued

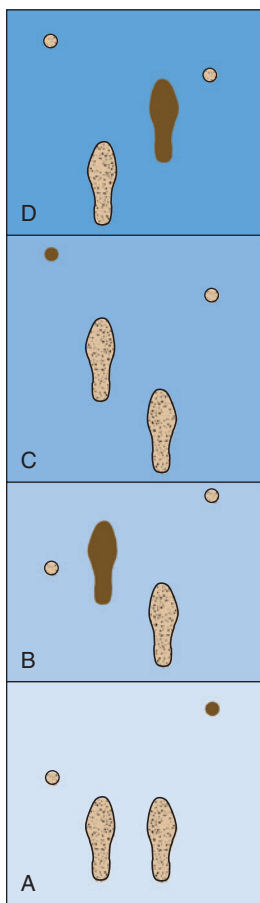


Fig. 4.5 Four-point gait. Solid feet and crutch tips show foot and crutch tip movement in each of the four phases. **A**, Right tip moves forward. **B**, Left foot moves toward left crutch. **C**, Left crutch tip moves forward. **D**, Right foot moves toward right crutch.

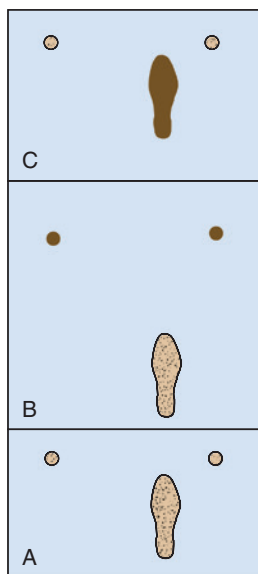
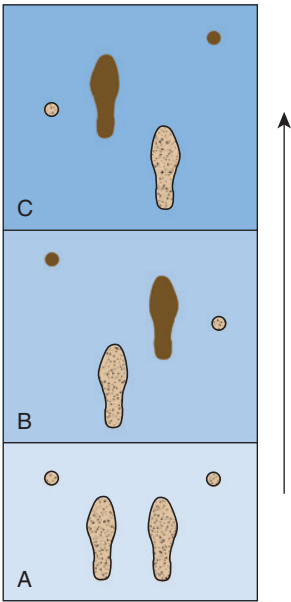


Fig. 4.6 Three-point gait with weight borne on unaffected right leg. Solid foot and crutch tips show weight bearing in each phase.

Fig. 4.7 Two-point gait. Solid areas indicate weight-bearing leg and crutch tips.



STEP	RATIONALE
4 Swing-to gait: - a Begin in tripod position. - b Move both crutches forward. - c Lift and swing legs to crutches, letting crutches support body weight. - d Repeat two previous steps.	Frequently used by patients whose lower extremities are paralyzed or who wear weight-supporting braces on their legs. This is the easier of the two swinging gaits. It requires ability to partially bear body weight on both legs.
5 Swing-through gait: - a Begin in tripod position. b. Move both crutches forward. - c Lift and swing legs through and beyond crutches. - d Repeat previous steps.	Requires that patient has ability to bear partial weight on both feet. Improves patient's balance by providing wide base of support. Initial placement of crutches is to increase patient's base of support so that when

STEP	RATIONALE
Helping patient climb up stairs with a railing with crutches (partial weight bearing, one leg):	body swings forward, patient is moving center of gravity toward additional support provided by crutches. Climbing stairs with use of a railing is safest way for patient with crutches to ascend stairs.
SAFETY ALERT There is a risk for falling using this technique. Monitor patient's balance carefully.	
1 Begin in tripod position. 2 Patient transfers body weight to crutch. 3 Have patient hold handrail with one hand (strong leg next to railing). As the nurse, you carry crutch positioned next to handrail. Patient holds other crutch. 4 Have patient support his or her weight evenly between the handrail and crutch. 5 Patient next places some weight on crutches and then steps up with first step with weight-bearing foot. Have patient get his or her balance. 6 Patient then straightens uninvolved knee and lifts his or her body weight, bringing crutches and affected leg up the stair. 7 Repeat sequence until patient reaches top of stairs.	Improves patient's balance by providing wide base of support. Prepares patient to transfer weight to unaffected leg when ascending first stair. Ensures patient safety. Achieves balance.

Continued

STEP	RATIONALE
8 Option: Have patient sit on the lower stair. If distance and reach allow, place the crutches at the top of the staircase. If this isn't possible, have patient place crutches as far up the stairs as he or she can. Then patient will move them to the top as he or she progresses up the stairs (American College of Foot and Ankle Surgeons, 2016). - a In the seated position, have patient reach behind with both arms. - b Then have patient use arms and weight-bearing foot/leg to lift up one step. - c Repeat this process one step at a time Helping patient descend stairs with a railing with crutch (partial weight bearing, one leg):	Reaching for inaccessible crutches could lead to a fall. Moving up by seat avoids risks of losing balance and tripping on stairs.
SAFETY ALERT There is a risk for falling using this technique. Monitor patient's balance carefully.	
1 Begin in tripod position. 2 Patient transfers body weight to unaffected leg and aligns with crutches. 3. Have patient hold handrail with one hand (strong leg next to railing). As the nurse, you carry crutch positioned next to handrail. Patient holds other crutch.	Improves patient's balance by providing wide base of support. Prepares patient to release support of body weight maintained by crutches. Ensures patient safety.

STEP**RATIONALE**

4 Have patient bend his or her strong knee while moving crutch and involved leg down a step.

5 Have patient support his or her weight evenly between the handrail and crutch.

6 Have patient slowly bring involved leg down step. Caution patient not to hop.

Option: Have patient sit on the top step. Place crutches down the stairs by sliding them to the lowest possible point on the stairway. Then continue to move them down as patient progresses down the stairs (American College of Foot and Ankle Surgeons, 2016).

- a In the seated position, have patient reach behind with both arms.
- b Have patient use arms and weight-bearing foot/leg to lift self down one step.
- c Repeat this process one step at a time.

Helping patient ambulate with walker:

1 Have patient stand in center of walker and grasp handgrips on upper bars.

2 Have patient lift walker, move it 15 to 20 cm (6 to 8 inches) forward, and then set it down, making sure all four feet of walker stay on floor. Take step forward with involved leg first, then follow through with

Achieves balance.

Hopping could injure leg and create risk for fall.

Reaching for inaccessible crutches could lead to a fall. Moving down by seat avoids risk of losing balance and falling down stairs.

Patient needs sufficient strength to be able to pick up walker. Patient balances self before attempting to walk.

Provides broad base of support between walker and patient. Patient then moves center of gravity toward walker. Keeping all four feet of walker on floor is necessary to prevent tipping of walker.

Continued

STEP	RATIONALE
other leg. Instruct patient not to advance leg past the front bar of walker. If patient has equal strength in both legs, it makes no difference which leg advances first. 3 If patient is unable to bear weight on involved leg, have him or her slowly hop to center of walker using strong leg, supporting weight on hands. 4 Instruct patient not to try to climb stairs with walker unless he or she has specific walker for steps. 5 After patient ambulates, help him or her back to bed or chair and help assume comfortable position. 6 Complete postprocedure protocol.	Patient should use handrails as alternative. Using walker could cause a fall.

Recording and Reporting

- Record in the medical record assessment findings the type of assist device and gait patient used, amount of help required, distance walked, and activity tolerance in the electronic health record (EHR) or chart.
- Document your evaluation of patient learning.
- Immediately report any injury sustained during attempts to ambulate, alteration in vital signs, or inability to ambulate to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient is unable to ambulate because of fear of falling, physical discomfort, upper body muscles that are too weak to use ambulation device, or lower extremities that are too weak to support body.	• Consult with PT about possible exercise program to strengthen muscles or other alternative methods that patient can use for ambulation. • Provide analgesic for discomfort. • Discuss with patient fears or concerns about walking using assist device.
2 Patient sustains an injury.	• Notify health care provider. • Return patient to bed if injury stable. • Document per institution/agency policy.
3 When using cane or walker, patient bends forward and does not stand straight.	• Reinforce correct posture.

Automated External Defibrillator

Defibrillation is the electrical attempt to stop a lethal dysrhythmia such as ventricular fibrillation. An automated external defibrillator (AED) allows for individuals trained only in basic life support to defibrillate. The AED is a defibrillator that incorporates a rhythm analysis system. The device attaches to a patient by two adhesive pads and connecting cables. Most AEDs are stand-alone boxes with a very simple three-step function and verbal prompts to guide the responder. After rhythm identification, some AEDs automatically provide a verbal warning, followed by an electrical shock. Other AEDs recommend a shock, if needed, and then prompt the responder to press the shock button.

Delegation Considerations

Basic life support certification provides hands-on training with an AED for laypersons, nursing assistive personnel (NAP), and licensed health care professionals. Most hospitals using AEDs have given the authority to use an AED to all cardiopulmonary resuscitation (CPR)–certified personnel, including NAP. Refer to specific hospital policies for use of the AED.

Equipment

- AED
- Pair of AED adhesive pads

Implementation

STEP

- 1 Establish unresponsiveness, and call for help.

RATIONALE

This information assists in determining if patient is unresponsive rather than asleep, intoxicated, hearing impaired, or postictal. Rapid response by qualified professionals ensures ongoing resuscitation support.

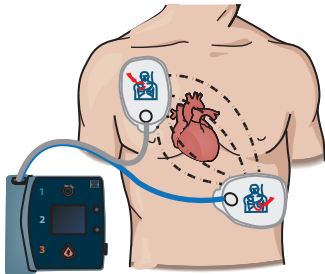
STEP	RATIONALE
2 Establish absence of respirations and lack of circulation within 10 seconds: no pulse, no respirations, no movement.	Indicates need for emergency measures, including AED.
SAFETY ALERT An AED should be applied only to a patient who is unconscious, not breathing, and pulseless. For children younger than age 8, AED pads designed for children should be used. If child pads are not available, use adult AED pads (Atkins, 2015).	
3 Activate code team in accordance with hospital policy and procedure.	First available person to bring resuscitation cart and AED.
4 Start chest compressions, and continue until AED is attached to patient and verbal prompt of device advises you, “Do not touch the patient.”	To minimize interruption time of chest compressions, continue CPR while AED is being applied and turned on.
5 Place AED next to patient near chest or head.	Ensures easy access to device.
SAFETY ALERT If the AED is immediately available, attach it to patient as soon as possible. The faster defibrillation is delivered, the better the survival rate (Kleinman, et al, 2015).	
6 Turn on power (Fig. 5.1).	Turning on power begins verbal prompts to guide you through next steps.
7 Attach device. Place the first AED pad on the upper right sternal border directly below the clavicle. Place the second AED pad lateral to the left nipple with the top of the pad a few inches below the axilla. Ensure that cables are connected to the AED (Fig. 5.2).	Alternative pad placement of AED pads is not recommended. AEDs analyze most heart rhythms using lead II.

Continued

Fig. 5.1 AED power panel with prompts. (Courtesy Philips Medical Systems.)



Fig. 5.2 Placement of AED pads.



STEP

RATIONALE

SAFETY ALERT Do not attach pads to a wet surface, over a medication patch, or over a pacemaker or implanted defibrillator. Wet surfaces, implanted defibrillators, and medication patches reduce the effectiveness of the defibrillation attempt and result in complications.

8 When AED prompts you, stop touching patient. Do <i>not</i> touch patient after this prompt. Direct rescuers and bystanders to avoid touching patient by announcing “Clear!” Allow the AED to analyze the rhythm. Some devices require that an analysis button be pressed. The AED takes approximately 5 to 15 seconds to analyze the rhythm.	Each brand of AED is different, so familiarity with model is important. Not touching the victim prevents artifact errors, avoids all movement during analysis (Kleinman et al., 2015), and prevents shock from being delivered to bystanders.
9 Before pressing the shock button, announce loudly to clear the victim and perform a visual check to ensure that no one is in contact with victim.	Clearing the patient ensures safety for those involved in rescue efforts.
10 Immediately begin chest compression after the shock, and continue for 2 minutes with a ratio of 30:2 (30 compressions and 2 breaths). Do <i>not</i> remove the pads.	Continues cardiac perfusion.
11 Deliver two breaths using mouth-to-mouth with barrier device or mouth-to-mask device or bag-mask device. Watch for chest rise and fall. Deliver 10 to 12 breaths/min.	In a hospital setting where protected methods of artificial ventilation are available, mouth-to-mouth without a barrier device is not recommended because of risk for microbial contamination.

Continued

STEP

RATIONALE

- 12 After 2 minutes of CPR, the AED will prompt you not to touch patient and will resume analysis of patient's rhythm. This cycle will continue until patient regains a pulse or physician determines death.
- 13 Inspect pad adhesion to chest wall. If pads are not in good contact with chest wall, remove them and apply a new set. Attach new set of pads to the AED.
- 14 Continue resuscitative efforts until patient regains pulse or until physician determines death.

Poor pad-skin contact reduces the effectiveness of the shock, causes skin burns, or increases chance of shocking those involved in the rescue efforts. Always apply a new set of pads. Do *not* reuse.

Recording and Reporting

- Immediately report arrest via the hospital-wide communication system, indicating exact location of victim.
- Cardiopulmonary arrest requires precise documentation. Most hospitals use a form designed specifically for in-hospital arrests.
- Record the following in nurses' notes and electronic health record (EHR) or on designated CPR worksheet: onset of arrest, time and number of AED shocks (you will not know the exact energy level used by the AED), time and energy level of manual defibrillations, medications given, procedures performed, cardiac rhythm, use of CPR, and patient's response.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's heart rhythm does not convert into stable rhythm with pulse after defibrillation.	• Assess pad contact on patient's chest wall. • Do not touch patient during AED's rhythm analysis. • Avoid placing AED pads over medication patches, pacemaker, or implantable defibrillator generators.
2 Patient's skin has burns under AED pads.	• Assess AED pad contact on chest. • Ensure that chest is dry before applying pads to chest. • Apply skin care as indicated if patient is resuscitated successfully.

Bladder Volume Measurement

A bladder scanner is a noninvasive device that creates an ultrasound image of the bladder for measuring the volume of urine in the bladder. The device makes calculations to report accurate urine volumes, especially lower volumes. Use a bladder scanner to assess bladder volume whenever inadequate bladder emptying is suspected. The most common use for the bladder scan is to measure postvoid residual (PVR)—the volume of urine in the bladder after a normal voiding. To obtain the most reliable reading, measure PVR within 5 to 15 minutes of voiding (Huether et al., 2017). A volume less than 50 mL is considered normal. Two or more PVR measurements greater than 100 mL require further investigation.

Delegation Considerations

The skill of measuring bladder volume by bladder scan can be delegated to nursing assistive personnel (NAP). The nurse must first determine the timing and frequency of the bladder scan measurement and interpret the measurements obtained. The nurse also assesses the patient's ability to toilet before measuring PVR and, if urinary retention is suspected, assesses the patient's abdomen for distention. The nurse directs the NAP to do the following:

- Follow manufacturer's recommendations for the use of the device.
- Measure PVR volumes within 5 to 15 minutes after helping the patient to void.
- Report and record bladder scan volumes.

Equipment

- Bladder scanner (Fig. 6.1)
- Ultrasound transmission gel
- Cleaning agent for scanner head, such as an alcohol pad

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.



Fig. 6.1 Bladder scanner reading.
(Courtesy Verathon, Inc., Bothell,
Wash.)

STEP

- 2 Use bladder scanner to assess PVR:
 - a Assist patient to a supine position with head slightly elevated.
 - b Expose the patient's lower abdomen.
 - c Turn on the scanner per manufacturer's guidelines.
 - d Set gender designation per manufacturer's guidelines. Women who have had a hysterectomy should be designated as male.
 - e Wipe the scan head with an alcohol pad or other cleaner and allow to air dry.
 - f Palpate the patient's symphysis pubis (pubic bone), and apply a generous amount of ultrasound gel (or a bladder scan gel pad) to midline abdomen about 2.5 to 4 cm (1 to 1½ inches) above symphysis pubis.

RATIONALE

Allows for correct positioning of scanner.

Continued

Fig. 6.2 Correct placement of bladder scanner head.



STEP	RATIONALE
g Place the scan head on the gel, ensuring that scanner head is oriented per manufacturer’s guidelines. h Apply light pressure, keep the scanner head steady, and point it slightly downward toward bladder. Press and release the scan button (Fig. 6.2). i Verify accurate aim (refer to manufacturer’s guidelines). Complete scan, and print image (if needed). 3 Remove ultrasound gel from patient’s abdomen with paper towel. 4 Remove ultrasound gel from scanner head and wipe with alcohol pad or other cleaner; allow to air dry. 5 Complete postprocedure protocol.	Use of gel improves the clarity of the scanned image.

Recording and Reporting

- Record and report amount voided before scan and scan volume.

Blood Administration

Transfusion therapy or blood replacement is the intravenous (IV) administration of whole blood, its components, or plasma-derived product for therapeutic purposes (Alexander et al., 2014). Transfusions restore intravascular volume with whole blood or albumin, restore oxygen-carrying capacity of blood with red blood cells (RBCs), and provide clotting factors and/or platelets. Despite precautions, transfusion therapy carries risks. Compatibility of the patient and donor is essential.

A health care provider's order is required for the administration of a blood product. A nurse is responsible for understanding which components are appropriate in various situations.

Delegation Considerations

The skill of initiating transfusion therapy cannot be delegated to nursing assistive personnel (NAP). The skill of initiating transfusion therapy by a licensed practical nurse (LPN) varies by state Practice Acts. After the transfusion has been started and the patient is stable, monitoring of a patient by NAP does not relieve a registered nurse (RN) of the responsibility to continue to assess the patient during the transfusion. The nurse instructs the NAP about the following:

- Frequency of vital sign monitoring needed
- What to observe, such as complaints of shortness of breath, hives, and/or chills, and reporting this information to the nurse
- Obtaining blood components from the blood bank (check agency policy)

Equipment

- Y-type blood administration set (in-line filter) (**NOTE:** Depending on blood product, special tubing and filter are necessary.)
- Prescribed blood product
- 250-mL bag 0.9% NaCl (normal saline [NS]) IV solution
- 5- to 10-mL prefilled syringe with preservative-free 0.9% NS
- Antiseptic wipes (chlorhexidine based)
- Clean gloves
- Tape
- Vital sign equipment: thermometer, blood pressure cuff, and stethoscope
- Signed transfusion consent form

Optional Equipment

- Rapid infusion pump
- Electronic infusion device (EID) (Verify that pump can be used to deliver blood and blood products.)
- Leukocyte-depleting filter
 - (Note: Agency may irradiate blood products within the blood bank)
- Blood warmer
- Pressure bag
- Cardiac monitor for emergencies

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Verify that IV cannula is patent and that complications such as infiltration or phlebitis are not present: a Administer blood or blood components to an adult through a 14- to 24-gauge short-peripheral catheter with 18 to 20 gauge appropriate for the general population, and 14 to 18 gauge when rapid infusion is required (INS, 2016a; Phillips and Gorski, 2014). b Transfuse a neonate, pediatric patient, and older adult using a 22- to 24-gauge device (INS, 2016a). c An appropriate gauge central vascular access device (CVAD) also may be used.	Patent IV ensures that transfusion will be initiated and infused within established time guidelines. Gauge of IV cannula should be appropriate for accommodating infusion of blood and/or blood components (Infusion Nurses Society [INS], 2016a). Large cannulas promote optimal flow of blood components. Use of smaller cannulas, such as 24 gauge, may require blood bank to divide unit so that each half can be infused within allotted time or may require pressure-assisted devices. The use of a CVAD for administration of blood is dependent on the catheter gauge and the manufacturer's recommendations for use. (Phillips and Gorski, 2014).

STEP

- 3 Check that patient has properly completed and signed transfusion consent before retrieving blood, and assess laboratory values such as hematocrit, coagulation values, and platelet count.
- 4 Obtain and record pretransfusion baseline vital signs (temperature, pulse, respirations, and blood pressure). If patient is febrile (temperature greater than 37.8° C [100° F]), notify health care provider before initiating transfusion.
- 5 Preadministration:
 - a Obtain blood component from blood bank following agency protocol.
 - b Verbally compare and correctly verify patient, blood product, and type with another person considered qualified by your agency (e.g., RN or LPN):

RATIONALE

Informed consent is required prior to transfusion. The consent form should include the risks, benefits, and treatment alternatives; the right to accept or refuse transfusion; and opportunity to ask questions ([American Association of Blood Banks \[AABB\], 2014](#); [INS, 2016a](#)). Administration of albumin does not require an informed consent.

Change from baseline vital signs during infusion alerts nurse to potential transfusion reaction or adverse effect of therapy ([INS, 2016b](#); [Phillips and Gorski, 2014](#)).

Timely acquisition ensures product is safe to administer. Agency protocol usually encompasses safeguards to ensure quality control throughout transfusion process. Strict adherence to verification procedures before administration of blood or blood components reduces risk for administering wrong blood product to patient. Misidentification of patient is one of the most important factors in transfusion errors ([Weinstein and Hagle, 2014](#)).

Continued

STEP

- (1) Identify patient using two identifiers (e.g., name and birthday or name and medical record number) according to agency policy. Compare identifiers with information on patient's medication administration record (MAR) or medical record.
- (2) Check that transfusion record number and patient's identification number match.
- (3) Check that the patient's name is correct on all documents.
- (4) Check unit number on blood bag with blood bank form to ensure that they are the same.
- (5) Verify that blood type matches on transfusion record and blood bag. Verify that blood type received from blood bank is the same component physician or health care provider ordered (e.g., packed red cells, platelets).
- (6) Check that patient's blood type and Rh type are compatible with donor blood type and Rh type.

RATIONALE

Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2016).

Prevents accidental administration of wrong component.

Ensures that patient receives correct therapy. Misidentification and improper labeling result in transfusing the wrong ABO group (Alexander et al., 2014).

Verifies accurate donor blood type and compatibility.

STEP	RATIONALE
(7) Check expiration date and time on unit of blood. c Empty urine drainage collection container, or have patient void.	Never use expired blood as cell components deteriorate and may contain excess citrate ions. There is also a higher rate of infection with expired blood (AABB, 2014; Weinstein and Hagle, 2014). If a transfusion reaction occurs, a urine specimen containing urine produced after initiation of the transfusion will be sent to the laboratory.
SAFETY ALERT Blood transfusion should be initiated within 30 minutes from time of release from blood bank. If this cannot be completed because of factors such as an elevated temperature, immediately return the blood to the blood bank and retrieve it when you can administer it (Weinstein and Hagle, 2014). It is important that the blood bag not be spiked until you ensure that no factors exist preventing transfusion.	
6 Administration: a Perform hand hygiene, and apply clean gloves. b Open Y-tubing blood administration set. c Set all clamps to “off” position. d Spike 0.9% NS IV bag with one of Y-tubing spikes (Fig. 7.1). Hang the bag on an IV pole, and prime tubing. Open the upper clamp on	Using standard precautions reduces risk for transmission of microorganisms. Y-tubing facilitates maintenance of IV access in case patient will need more than 1 unit of blood. Setting clamps to “off” position prevents accidental spilling and wasting of product. Prime tubing with fluid to eliminate air in Y-tubing. Closing the clamp prevents spillage and waste of fluid.

Continued



Fig. 7.1 Blood administration set is primed with normal saline.



Fig. 7.2 Unit of blood connected to Y-tubing.

STEP

- normal saline side of tubing, and squeeze the drip chamber until fluid covers the filter and one-third to one-half of the drip chamber.
- e Maintain clamp on blood product side of Y-tubing in “off” position. Open common tubing clamp to finish priming the tubing to the distal end of tubing connector. Close tubing clamp when tubing is filled with saline. All three tubing clamps should be closed. Maintain protective sterile cap on tubing connector.
- f Prepare blood component for administration. Gently agitate blood unit bag. Remove protective covering from access port. Spike blood component unit with other Y connection (Fig. 7.2).

RATIONALE

Prime the tubing with saline so that the IV line is ready to be connected to the patient’s vascular access device (VAD).

Gentle agitation suspends the red blood cells in the anticoagulant. A protective barrier drape may be used to catch any potential blood spillage. The tubing is primed with the blood unit and ready for transfusion into the patient.

STEP**RATIONALE**

- g Close normal saline clamp above filter, and open clamp above filter to blood unit and prime tubing with blood. Blood will flow into the drip chamber. Tap the filter chamber to ensure residual air is removed. Allow saline in tubing to flow into receptacle, being careful to ensure any blood spillage is contained in blood precaution container.

SAFETY ALERT NS is compatible with blood products, unlike solutions that contain dextrose, which causes coagulation of donor blood. Only use 0.9% NS to administer blood. No other solutions are to be administered with blood piggybacked. (AABB, 2014; INS, 2016a).

- h Maintaining asepsis, attach primed tubing to patient's VAD. Open common tubing clamp, and regulate blood infusion to allow only 2 mL/min to infuse in the initial 15 minutes.
- i Remain with patient during the first 15 minutes of a transfusion. Initial flow rate during this time should be 2 mL/min (20 gtt/min).

Initiates infusion of blood product into patient's vein.

Most transfusion reactions occur within the first 15 minutes of a transfusion (Snyder et al., 2008). Infusing a small amount of blood component initially minimizes the volume of blood to which the patient is exposed, thereby minimizing the severity of a reaction.

SAFETY ALERT If signs of a transfusion reaction occur, stop the transfusion, start 0.9% NS with a new primed tubing attached directly to the VAD hub, and notify the health care provider immediately. Do not discard the blood product or tubing because they need to be returned to the blood bank. Do not infuse saline through existing tubing because it will cause blood in tubing to enter patient.

Continued

STEP	RATIONALE
j Monitor patient's vital signs within 5 to 15 minutes of initiating the transfusion and at the completion of the transfusion (AABB, 2014; Phillips and Gorski, 2014) or according to agency policy. k If there is no transfusion reaction, regulate rate of transfusion according to health care provider's orders. Check the drop factor for the blood tubing.	Frequently monitoring the patient helps to quickly alert you to transfusion reaction (Weinstein and Hagle, 2014). Maintaining the prescribed rate of flow decreases risk for fluid volume excess while restoring vascular volume. In most cases, drop factor for blood tubing is 10 gtt/mL.
SAFETY ALERT Do not let a unit of blood hang for more than 4 hours because of danger of bacterial growth. When a longer transfusion time is clinically indicated, the unit may be divided by the blood bank, and the portion not being transfused can be properly refrigerated (Phillips and Gorski, 2014). Administration sets should be changed at the completion of each unit or every 4 hours to reduce bacterial contamination (INS, 2016a). Blood should only be stored in a refrigerator specific for blood or blood products in order to maintain appropriate temperature controls.	
SAFETY ALERT Medications and solutions should not be infused into the same IV line with a blood component because of the possibility of incompatibility, unless the drug or solution has been approved by the FDA for use with blood administration. Maintain a separate IV access if patient requires IV solutions or medications (Phillips and Gorski, 2014).	
l After blood has infused, clear IV line with 0.9% NS and discard blood bag according to agency policy. When consecutive units are ordered, maintain IV patency with 0.9% NS at keep-vein-open (KVO) rate as ordered by the health care provider and retrieve subsequent unit for administration.	Infusing IV NS allows remainder of blood in IV tubing to infuse and keeps IV line patent for supportive measures in case of transfusion reaction (Phillips and Gorski, 2014). KVO must specify an infusion rate as required by the rights of medication administration.

STEP**RATIONALE**

m Appropriately dispose of all supplies. Remove gloves, and perform hand hygiene.	Standard precautions during a transfusion reduce transmission of microorganisms.
n Monitor IV site and status of infusion each time vital signs are taken.	Detects presence of infiltration or phlebitis and verifies continuous and safe infusion of blood product.
o Observe for any changes in vital signs and for chills, flushing, itching, dyspnea, rash, or other signs of transfusion reaction.	Compare presenting signs and symptoms with baseline assessment of patient before transfusion. These are early signs of a transfusion reaction.
p Complete postprocedure protocol.	

Recording and Reporting

- Prior to transfusion, record pretransfusion medications, vital signs, location and condition of IV site, and patient education in the electronic health record (EHR) or chart.
- Record the type and volume of blood component, blood unit/donor/recipient identification, compatibility, and expiration date according to agency policy, along with patient's response to therapy. Document on the transfusion record, nurses' notes in the EHR or chart, medication administration record, flow sheet, and/or intake and output sheet, depending on agency policy.
- Record volume of NS and blood component infused.
- Report signs and symptoms of a transfusion reaction immediately to the health care provider.
- Record amount of blood received by autotransfusion and patient's response to therapy.
- Report to health care provider any intratransfusion/posttransfusion deterioration in cardiac, pulmonary, and/or renal status.
- Record vital signs before initiation, shortly after initiation, and after transfusion.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient displays signs and symptoms of transfusion reaction.	• Stop transfusion immediately. • Disconnect blood tubing at VAD hub, and cap distal end with sterile connector to maintain sterile system. • Connect NS-primed tubing at VAD hub to prevent any subsequent blood from infusing from tubing. • Keep vein open with slow infusion of NS at 1 to 2 mL/min to ensure venous patency and maintain venous access for medication or to resume transfusion. • Notify health care provider.
2 Patient develops infiltration or phlebitis at venipuncture site.	• Remove IV and insert new VAD at different site. Restart the product if remainder can be infused within 4 hours of initiation of transfusion. • Institute nursing measures to reduce discomfort at infiltrated or infected site.
3 Fluid overload occurs, and/or patient exhibits difficulty breathing or has crackles upon auscultation.	• Slow or stop transfusion, elevate head of bed, and inform health care provider of physical findings. • Administer diuretics, morphine, and/or oxygen as ordered by health care provider. • Continue frequent assessments, and closely monitor vital signs, intake, and output.

Blood Pressure by Auscultation: Upper Extremities, Lower Extremities, Palpation

The most common technique of measuring blood pressure is auscultation with a sphygmomanometer and stethoscope. As the sphygmomanometer cuff is deflated, the five different sounds heard over an artery are called *Korotkoff phases*. The sound in each phase has unique characteristics (Fig. 8.1). Blood pressure is recorded with the systolic reading (first Korotkoff sound) before the diastolic (beginning of the fifth Korotkoff sound). The difference between systolic and diastolic pressure is the pulse pressure. For a blood pressure of 120/80 mm Hg, the pulse pressure is 40 mm Hg.

The size of cuff selected is proportional to the circumference of the limb that is being used for assessment. Ideally the width of the cuff should be 40% of the circumference (or 20% wider than the diameter) of the midpoint of the limb on which the cuff is to be used. The bladder enclosed within the cuff should encircle at least 80% of the upper arm (James et al., 2014).

Delegation Considerations

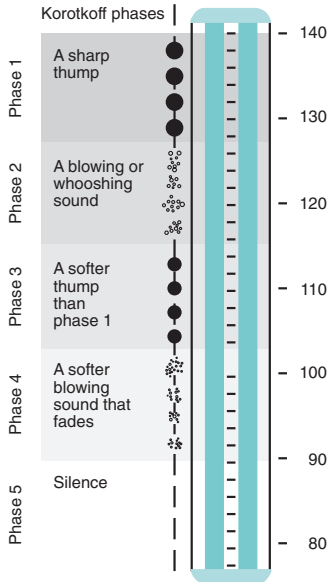
The skill of blood pressure measurement can be delegated to nursing assistive personnel (NAP) unless the patient is considered unstable (i.e., hypotensive). The nurse instructs the NAP by doing the following:

- Explaining the appropriate limb to use for measurement, blood pressure cuff size, and equipment (manual or electronic) to be used
- Communicating the frequency of measurement and factors related to the patient's history such as risk for orthostatic hypotension
- Reviewing the patient's usual blood pressure values and significant changes or abnormalities to report to the nurse

Equipment

- Aneroid sphygmomanometer
- Cloth or disposable vinyl pressure cuff of appropriate size for patient's extremity
- Stethoscope
- Alcohol swab
- Pen and vital sign flow sheet or electronic health record (EHR)

Fig. 8.1 The sounds auscultated during blood pressure measurement can be differentiated into five Korotkoff phases. In this example, the blood pressure is 140/90 mm Hg.



Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Assess for factors that influence blood pressure: Age, gender, daily (diurnal) variation, position, exercise, weight, medications, smoking, ethnicity
- 3 Determine best site for blood pressure assessment. Avoid applying cuff to extremity where intravenous (IV) fluids are infusing, an arteriovenous shunt or fistula is present, or breast or axillary surgery has been performed on that side. In addition, avoid applying cuff to extremity that has been

RATIONALE

Acceptable values for blood pressure vary throughout life. Blood pressure varies throughout the day.

Inappropriate site selection may result in poor amplification of sounds, causing inaccurate readings. Application of pressure from inflated bladder temporarily impairs blood flow and can further compromise circulation in extremity that already has impaired blood flow.

STEP

traumatized or diseased or requires a cast or bulky bandage. Use lower extremities when brachial arteries are inaccessible. Select appropriate cuff size (Fig. 8.2).

4 Assess blood pressure by auscultation:

- a *Upper extremity:* With patient sitting or lying, position his or her forearm at heart level with palm turned up. If sitting, instruct patient to keep feet flat on floor without legs crossed. If supine, patient should not have legs crossed.

Lower extremity: With patient prone, position patient so knee is slightly flexed (Fig. 8.3).

RATIONALE

If arm is extended and not supported, patient will perform isometric exercise that can increase diastolic pressure. Placement of arm above level of heart causes false-low reading—2 mm Hg for each inch above heart level. Leg crossing can falsely increase blood pressure.

Continued

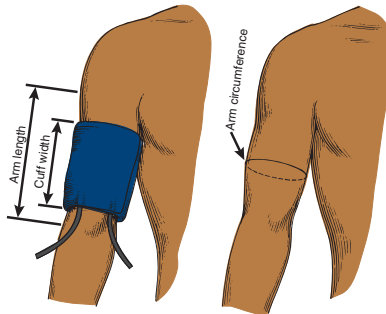


Fig. 8.2 Guidelines for proper blood pressure cuff size. Cuff width = 20% more than upper arm diameter, or 40% of circumference and two-thirds of upper arm length.

Fig. 8.3 Cuff placement on lower extremity.



STEP

- b Expose extremity (arm or leg) fully by removing constricting clothing. Cuff may be placed over a sleeve as long as stethoscope rests on the skin (Ki et al., 2013).
- c Palpate brachial artery (Fig. 8.4, A) or popliteal artery. With cuff fully deflated, apply bladder of cuff above artery by centering arrows marked on cuff over artery. If cuff does not have any center arrows, estimate center of bladder and place this center over artery. Position cuff 2.5 cm (1 inch) above site of pulsation (antecubital or popliteal space). With cuff fully deflated, wrap it evenly and snugly around upper arm (Fig. 8.4, B).

RATIONALE

Ensures proper cuff application.

Placing bladder directly over artery ensures that you apply proper pressure during inflation. Loose-fitting cuff causes false-high readings. Popliteal artery is just below patient's thigh, behind knee. Placing bladder directly over artery ensures that you apply proper pressure during inflation.

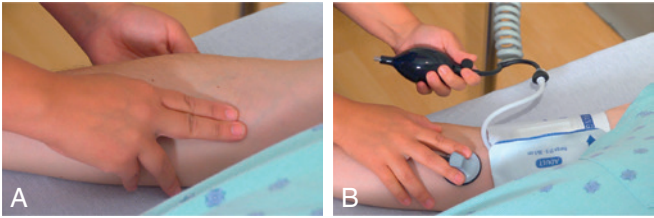


Fig. 8.4 A, Palpating brachial artery. B, Blood pressure cuff wrapped around upper arm.

STEP

- d Position manometer gauge vertically at eye level. You should be no farther than 1 meter (approximately 1 yard) away.
- e Measure blood pressure.
 - (1) Two-step method:**
 - (a)** Relocate brachial or popliteal pulse. Palpate artery distal to cuff with fingertips of nondominant hand while inflating cuff rapidly to a pressure 30 mm Hg above point at which pulse disappears. Slowly deflate cuff and note point when pulse reappears. Deflate cuff fully and wait 30 seconds.

RATIONALE

Looking up or down at scale can result in distorted readings.

Estimating prevents false-low readings. Determine maximal inflation point for accurate reading by palpation. If unable to palpate artery because of weakened pulse, use an ultrasonic stethoscope. Completely deflating cuff prevents venous congestion and false-high readings.

Continued

STEP

- (b) Place stethoscope earpieces in ears and be sure that sounds are clear, not muffled.
- (c) Relocate artery, and place bell or diaphragm chest piece of stethoscope over it. Do not allow chest piece to touch cuff or clothing.
- (d) Close valve of pressure bulb clockwise until tight. Quickly inflate cuff to 30 mm Hg above patient's estimated systolic pressure.
- (e) Slowly release pressure bulb valve and allow manometer needle to fall at rate of 2 to 3 mm Hg/second.
- (f) Note point on manometer at which you hear first clear sound. The sound will slowly increase in intensity.

RATIONALE

Ensure that each earpiece follows angle of ear canal to facilitate hearing.

Proper stethoscope placement ensures best sound reception. The bell provides better sound reproduction, whereas the diaphragm is easier to secure with fingers and covers a larger area.

Tightening valve prevents air leak during inflation. Rapid inflation ensures accurate measurement of systolic pressure.

Too rapid or too slow a decline causes inaccurate readings (Zheng et al., 2011).

First Korotkoff sound reflects systolic blood pressure.

STEP

RATIONALE

(g) Continue to deflate cuff gradually, noting point at which sound disappears in adults. Note pressure to nearest 2 mm Hg. Listen for 20 to 30 mm Hg after last sound and allow remaining air to escape quickly.	Beginning of the last or fifth sound is indication of diastolic pressure in adults (Kaplan et al., 2015). In children, the distinct muffling of sounds indicates the diastolic pressure (Kaplan et al., 2015).
(2) One-step method: (a) Place stethoscope earpieces in ears and be sure that sounds are clear, not muffled. (b) Relocate brachial or popliteal artery and place bell or diaphragm chest piece of stethoscope over it. Do not allow chest piece to touch cuff or clothing. (c) Close valve of pressure bulb clockwise until tight. Quickly inflate cuff to 30 mm Hg above patient's usual systolic pressure.	Earpieces should follow angle of ear canal to facilitate hearing. Proper stethoscope placement ensures optimal sound reception. Tightening valve prevents air leak during inflation. Inflation above systolic level ensures accurate measurement of systolic pressure.

Continued

STEP

- (d) Slowly release pressure bulb valve and allow manometer needle to fall at rate of 2 to 3 mm Hg/second. Note point on manometer at which you hear first clear sound. Sound will slowly increase in intensity.
- (e) Continue to deflate cuff gradually, noting point at which sound disappears in adults. Note pressure to nearest 2 mm Hg. Listen for 10 to 20 mm Hg after last sound and allow remaining air to escape quickly.
- (f) The American Heart Association recommends average of two sets of blood pressure measurement, 2 minutes apart. Use second set of blood pressure measurements as baseline. If readings are different by more than 5 mm Hg, additional readings are necessary.

RATIONALE

Too rapid or too slow a decline in mercury level causes inaccurate readings (Zheng et al., 2011). First sound reflects systolic pressure.

Beginning of fifth sound is indication of diastolic pressure in adults (Kaplan et al., 2015). In children, the distinct muffling of sounds indicates the diastolic pressure (Kaplan et al., 2015).

Two sets of blood pressure measurements help to prevent false-positive readings based on patient's sympathetic response (alert reaction). Averaging minimizes effect of anxiety, which often causes first reading to be higher than subsequent measures (Kaplan et al., 2015).

STEP	RATIONALE
5 Assess systolic blood pressure by palpation: - a Follow Steps 4a through 4d of auscultation method. - b Locate and then continually palpate brachial, radial, or popliteal artery with fingertips of one hand. Inflate cuff to a pressure 30 mm Hg above point at which you can no longer palpate pulse.	Ensures accurate detection of true systolic pressure once pressure valve is released.
SAFETY ALERT If unable to palpate artery because of weakened pulse, use a doppler ultrasonic stethoscope.	
- c Slowly release valve and deflate cuff, allowing manometer needle to fall at rate of 2 mm Hg/second. Note point on manometer at which pulse is again palpable. - d Deflate cuff rapidly and completely. Remove cuff from patient's extremity unless you need to repeat measurement. - e Help patient return to comfortable position and cover extremity if previously clothed. - f If assessing blood pressure for the first time, establish baseline blood pressure if it is within acceptable range. - g Compare blood pressure reading with patient's previous baseline and usual blood pressure for patient's age. 6 Complete postprocedure protocol.	Too rapid or too slow a decline results in inaccurate readings (Zheng et al., 2011). Palpation helps identify systolic pressure only. Continuous cuff inflation causes arterial occlusion, resulting in numbness and tingling of extremity. Restores comfort and promotes sense of well-being. Used to compare future blood pressure measurements. Allows nurse to assess for change in condition. Provides comparison with future blood pressure measurements.

Recording and Reporting

- Record blood pressure and site assessed on vital sign flow sheet or nurses' notes in chart or EHR.
- Document measurement of blood pressure and any signs or symptoms of blood pressure alterations after administration of specific therapies in nurses' notes in chart or EHR.
- Report abnormal findings to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's blood pressure is above acceptable range.	• Repeat measurement in other extremity and compare findings. • Verify correct selection and placement of blood pressure cuff. • Have another nurse repeat measurement in 1 to 2 minutes. • Observe for related symptoms that are not apparent unless blood pressure is extremely high, including headache, facial flushing, nosebleed, and fatigue in older patient. • Report blood pressure to nurse in charge or health care provider to initiate appropriate evaluation and treatment. • Administer antihypertensive medications as ordered.
2 Patient's blood pressure is not sufficient for adequate perfusion and oxygenation of tissues.	• Compare blood pressure value to baseline. • Position patient in supine position to enhance circulation and restrict activity that decreases blood pressure further.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Unable to obtain blood pressure reading. 4 Patient experiences orthostatic hypotension.	• Assess for signs and symptoms associated with hypotension, including tachycardia; weak, thready pulse; weakness; dizziness; confusion; and cool, pale, dusky, or cyanotic skin. • Assess for factors that contribute to a low blood pressure, including hemorrhage, dilation of blood vessels resulting from hyperthermia, anesthesia, or medication side effects. • Report blood pressure to nurse in charge or health care provider to initiate appropriate evaluation and treatment. • Increase rate of IV infusion or administer vasoconstriction drugs if ordered. • Determine that no immediate crisis is present by obtaining pulse and respiratory rate. • Assess for signs and symptoms of decreased cardiac output; if present, notify nurse in charge or health care provider immediately. • Use alternative sites or procedures to obtain blood pressure; use doppler ultrasonic instrument; palpate systolic blood pressure. • Maintain patient safety. • Return patient to safe position in bed or chair.

Blood Glucose Testing

Blood glucose monitoring is an essential component of any diabetes self-management program ([American Diabetes Association \[ADA\], 2013a](#); [Lecklider, 2015](#)). The procedure is less painful than venipuncture, and the ease of the skin puncture method makes it possible for patients to perform this procedure at home. Blood glucose reflectance meters are lightweight and run on batteries (e.g., AccuChek III, OneTouch; [Fig. 9.1](#)). After a drop of blood from the skin puncture is dropped or wicked onto a reagent strip, the meter provides an accurate measurement of blood glucose level in 5 to 50 seconds. The meters differ in several ways, including amount of blood needed for each test, testing speed, overall size, ability to store test results in memory, cost of the meter, and cost of test strips ([Diabetes Forecast, 2013](#)).

Delegation Considerations

Assessment of a patient's condition cannot be delegated to nursing assistive personnel (NAP). When the patient's condition is stable, the skill of obtaining and testing a sample of blood for blood glucose level can be delegated to NAP. The nurse informs the NAP by doing the following:

- Explaining appropriate sites to use for puncture and when to obtain glucose levels
- Reviewing expected blood glucose levels and when to report unexpected glucose levels to the nurse

Equipment

- Antiseptic swab
- Cotton ball
- Lancet device, either self-activating or button activated
- Blood glucose meter (e.g., Accu-Chek III, OneTouch)
- Blood glucose test strips appropriate for meter brand used
- Clean gloves
- Paper towel

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	



Fig. 9.1 Blood glucose monitor showing result.

STEP

- 2 Perform hand hygiene.
Instruct adult to perform hand hygiene, including forearm (if applicable) with soap and water. Rinse and dry. Position patient.
- 3 Remove reagent strip from vial and tightly seal cap. Check code on test strip vial. Use only test strips recommended for glucose meter. Some newer meters do not require code and/or have disk or drum with 10 or more test strips.
- 4 Insert strip into meter (refer to manufacturer's directions; [Fig. 9.2](#)).

RATIONALE

Promotes skin cleansing and vasodilation at selected puncture site. Reduces transmission of microorganisms.

Protects strips from accidental discoloration caused by exposure to air or light. Code on test strip vial must match code entered into glucose meter.

Some machines must be calibrated; others require zeroing of timer. Each meter is adjusted differently.

Continued

Fig. 9.2 Load test strip into meter.



STEP	RATIONALE
5 Meter displays code on screen that must match code from test strip vial. Press proper button on meter to confirm matching codes. Meter is ready for use. 6 Apply clean gloves. Prepare single-use lancet or multiple-use lancet device.	Codes must match for meter to operate. Meters have different messages that confirm that meter is ready for testing and blood can be applied. Reduces transmission of microorganisms.
SAFETY ALERT Never reuse a lancet because of risk for infection.	
7 Obtain blood sample: a Wipe patient's finger or forearm lightly with antiseptic swab and allow to dry. Choose vascular area for puncture site. In stable adults, select lateral side of finger. Avoid central tip of finger, which has denser nerve supply (Pagana and Pagana, 2015).	Removes microorganisms from skin surface. Side of finger is less sensitive to pain.

STEP

- b Hold area to be punctured in dependent position. Do not milk or massage finger site.
- c Hold tip of lancet device against area of skin chosen for test site (Fig. 9.3). Press release button on device. Some devices allow you to see blood sample forming. Remove device.
- d With some devices a blood sample begins to appear. Otherwise, gently squeeze until round drop of blood forms (Fig. 9.4).

RATIONALE

Increases blood flow to area before puncture. Milking may hemolyze specimen and introduce excess tissue fluid (Pagana and Pagana, 2015). Placement ensures that lancet enters skin properly.

Adequate-size blood sample is needed to test glucose.

Continued



Fig. 9.3 Prick side of finger with lancet.



Fig. 9.4 Gently squeeze puncture site until drop of blood forms.

Fig. 9.5 Touch test strip to blood drop. Blood wicks into test strip.



STEP

- 8 Obtain test results:
 - a Be sure that meter is still on. Bring test strip in meter to drop of blood. Blood will be wicked onto test strip (Fig. 9.5). Follow specific meter instructions to be sure that you obtain adequate sample.
 - b Blood glucose test result will appear on screen. Some devices beep when completed.
- 9 Turn meter off. Some meters turn off automatically. Dispose of test strip, lancet, and gloves in proper receptacles.
- 10 Complete postprocedure protocol.

RATIONALE

Blood enters strip, and glucose device shows message on screen to signal that enough blood is obtained.

Meter is battery powered. Proper disposal reduces risk for needlestick injury and spread of infection.

Recording and Reporting

- Record procedure and glucose level in nurses' notes in electronic health record (EHR) or chart or on special flow sheet; if applicable, record action taken for abnormal range.
- Describe patient response, including appearance of puncture site, in nurses' notes in EHR or chart.

- Describe explanations or teaching provided in nurses' notes in EHR or chart.
- Document your evaluation of patient learning.
- Record and report abnormal blood glucose levels.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Puncture site is bruised or continues to bleed.	• Apply pressure. • Notify health care provider if bleeding continues.
2 Blood glucose level is above or below target range.	• Continue to monitor patient. • Check if there are medication orders for deviations in glucose level. • Notify health care provider. • Administer insulin or carbohydrate source as ordered, depending on glucose level.
3 Glucose meter malfunctions.	• Review instructions for troubleshooting glucose meter. • Repeat test.
4 Unable to perform teach-back.	• Encourage patient to ask questions. • Revise your instruction and clarify misconceptions or directions.

Blood Pressure

Automatic

Many different styles of electronic blood pressure (BP) machines are available to determine BP automatically. Electronic BP machines rely on an electronic sensor to detect the vibrations caused by the rush of blood through an artery. Although electronic BP machines are fast, the nurse must consider the advantages and limitations of electronic BP machines. The devices are used when frequent assessment is required, such as in critically ill or potentially unstable patients, during or after invasive procedures, or when therapies require frequent monitoring.

Delegation Considerations

The skill of BP measurement using an electronic BP machine can be delegated to nursing assistive personnel (NAP) unless the patient is considered unstable (i.e., hypotensive). The nurse instructs the NAP by doing the following:

- Explaining the frequency and extremity to use for measurement
- Reviewing how to select appropriate-size BP cuff for designated extremity and appropriate cuff for the machine
- Reviewing patient’s usual BP and reporting significant changes or abnormalities to the nurse

Equipment

- Electronic BP machine
- BP cuff of appropriate size, as recommended by manufacturer
- Pen and vital sign flow sheet or electronic health record (EHR)

Implementation

STEP	RATIONALE
1	Complete preprocedure protocol. Determine the appropriateness of using electronic BP measurement. Patients with irregular heart rate, peripheral vascular disease, seizures, tremors, or shivering are not candidates for this device (Suokhrie et al., 2013).
2	

STEP	RATIONALE
3	Determine best site for cuff placement.
4	Perform hand hygiene. Assist patient to comfortable position, either lying or sitting. Plug in and place device near patient, ensuring that connector hose between cuff and machine will reach.
5	Locate on/off switch, and turn on machine to enable device to self-test computer systems (Fig. 10.1).
6	Select appropriate cuff size for patient extremity (see Skill 8) and appropriate cuff for machine. Electronic BP cuff and machine must be matched by manufacturer and are not interchangeable.
7	Expose extremity by removing constricting clothing to ensure proper cuff application. Do not place BP cuff over clothing.
8	Prepare BP cuff by manually squeezing all the air out of the cuff and connecting cuff to connector hose.

Continued



Fig. 10.1 Digital electronic blood pressure display. (Courtesy Welch Allyn.)

STEP	RATIONALE
9	Wrap flattened cuff snugly around extremity, verifying that only one finger can fit between cuff and patient's skin. Make sure the "artery" arrow marked on the outside of the cuff is placed correctly.
10	Verify that connector hose between cuff and machine is not kinked. Kinking prevents proper inflation and deflation of cuff.
11	Following manufacturer's directions, set the frequency control for automatic or manual and then press the start button. The first BP measurement will pump the cuff to a peak pressure of about 180 mm Hg. After this pressure is reached, the machine begins a deflation sequence that determines the BP. The first reading determines the peak pressure inflation for additional measurements.
12	When deflation is complete, digital display will provide most recent values and flash time in minutes that has elapsed since the measurement occurred.

SAFETY ALERT *If unable to obtain BP with electronic device, verify machine connections (e.g., plugged into working electrical outlet, hose-cuff connections tight, machine on, correct cuff). Repeat electronic BP; if unable to obtain, use auscultatory technique (see Skill 8).*

STEP**RATIONALE**

13

Set frequency of BP measurements and upper and lower alarm limits for systolic, diastolic, and mean BP readings. Intervals between BP measurements can be set from 1 to 90 minutes. The nurse determines frequency and alarm limits based on patient's acceptable range of BP, nursing judgment, and health care provider order.

14

Obtain additional readings at any time by pressing the start button. Pressing the cancel button immediately deflates the cuff.

15

If frequent measurements are required, the cuff may be left in place. Remove cuff at least every 2 hours to assess underlying skin integrity and, if possible, alternate BP sites. Patients with abnormal bleeding tendencies are at risk for microvascular rupture from repeated inflations. When the patient no longer requires frequent BP monitoring, remove and clean BP cuff according to facility policy to reduce transmission of microorganisms.

Continued

STEP	RATIONALE
16	Discuss findings with patient. Perform hand hygiene.
17	Compare electronic BP readings with auscultatory BP measurements to verify the accuracy of electronic BP device.
18	Record BP and site assessed on vital sign flow sheet, EHR, or nurses' notes; record any signs or symptoms of BP alterations in narrative form in EHR and nurses' notes; report abnormal findings to nurse in charge or health care provider.

Cardiac Monitor

Applying

The cardiac monitor can be a bedside, hard-wired monitor or a wireless transmitter used with telemetry systems. A continuous electrocardiogram (ECG) rhythm is obtained using three or five electrodes and leads on the patient. Cardiac monitors are attached to patients for immediate dysrhythmia detection, and most provide alarms when dysrhythmias appear or heart rate limits are exceeded.

It is important to monitor only patients with clinical indications for cardiac monitoring. This can significantly decrease the number of false alarms (Sendelbach and Jepsen, 2013). Alarm fatigue develops when a person is exposed to an excessive number of alarms (Sendelbach and Jepsen, 2013). This situation can result in sensory overload, which may cause the person to become desensitized to the alarms. Consequently, the response to alarms may be delayed or alarms may be missed altogether (Sendelbach and Jepsen, 2013). Some patient deaths have been attributed to alarm fatigue.

In general, the mechanisms of dysrhythmias are the same in children as they are in adults; however, the appearance of the arrhythmias on the ECG may differ because of developmental issues such as heart size, baseline heart rate, sinus and AV node function, and autonomic innervation.

Delegation and Collaboration

The skill of applying a cardiac monitor can be delegated to nursing assistive personnel (NAP) who are specifically trained. In some agencies the responsible party for monitoring ECG rhythms and alarms may also be that of a specifically trained NAP such as a telemetry technician. The nurse directs the NAP to do the following:

- Immediately report to the nurse alarms or patient complaints of pain, shortness of breath, or hypotension.
- Ensure that the parameters for alarms and heart rate are set per the health care provider's orders.

Equipment

- Bedside cardiac monitor or telemetry transmitter
- Three or five ECG electrodes (disposable, self-adhesive)
- Three or five ECG leads with snap-on attachments
- Clean, dry towel, washcloth, or gauze
- Hair clippers (optional depending on hair at electrode sites)

Implementation

STEP	RATIONALE
1 Identify patient using at least two identifiers (e.g., name and birthday or name and medical record number) according to agency policy.	Ensures patient safety. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).
2 Check skin for excess oil or moisture. If present, wipe chest or limbs with clean, dry towel.	Provides clear, accurate recording without artifact.
3 Prepare patient for procedure: a Remove or reposition patient's gown to expose only patient's chest. Keep abdomen and thighs covered.	Facilitates correct placement of cardiac leads and maintains patient's modesty.
b Place patient in supine position.	Electrodes must be placed on anterior chest.
4 Perform hand hygiene.	Reduces transmission of microorganisms.
5 Clean and prepare chest area for electrode placement with soap and water. Wipe area with rough washcloth or gauze or use edge of electrode to gently scrape area. Clip excessive hair from electrode area rather than shaving.	Proper skin preparation before ECG electrodes are placed decreases skin impedance and signal noise, thereby producing a clean, accurate recording. Do not use alcohol to clean area. It will dry skin. Roughening skin helps remove epidermis outer layer to allow electrical signals to travel (Sendelbach and Jepsen, 2013). Clipping reduces risk for infection.

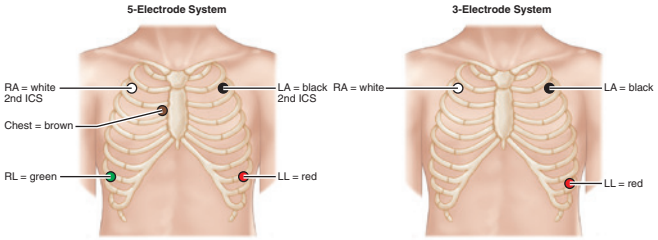


Fig. 11.1 Positioning of chest leads (3- and 5-lead systems).

STEP

- 6 Apply electrodes in correct positions for either a three- or five-electrode system (Fig. 11.1).
- 7 Attach monitor leads to electrodes. Colors of leads represent their polarity. White is negative. Black is positive. Red is ground or neutral. Two additional leads on five-lead system include a green lead (positive or negative) and a brown lead (positive), which can be placed at a V_1 lead location on precordial chest (fourth intercostal space just right of the sternum).
- 8 Check bedside monitor or telemetry station for any messages indicating electrode or lead issues. Troubleshoot as needed.

RATIONALE

Proper placement of leads is important for accurate dysrhythmia interpretation.

Coloring system allows for consistent application of leads. The V_1 position (brown lead at fourth intercostal space just right of the sternum) is designed to mimic the V_1 position on the 12 lead ECG. However, the position of the brown lead can be changed to mirror any one of the precordial (chest) lead positions, V_1 to V_6 .

Monitoring system itself may detect bad electrode contact with skin or loose connection.

Continued

STEP	RATIONALE
9 Check that the ECG rhythm can be visualized on bedside monitor, central station, or remote viewing station.	If staff is watching monitor remotely, communicate with them before leaving the room so any issues can be corrected while on the phone with viewers. This call can also serve as notification that monitoring has started.
10 Change ECG electrodes daily or more often if electrode contact to skin is loose.	Changing ECG electrodes decreases the number of false alarms.
11 Customize alarm limits within 1 hour of assuming care of patient and on condition changes. Changes made should be in accordance with agency policies and health care provider's orders.	Customize alarms to individual patient to reduce false alarms and focus true alarms on reasons for monitoring (Sendelbach and Jepsen, 2013).

Recording and Reporting

- Review alarm trends and waveforms at least once per shift and on report of an alarm.
- Record at least one rhythm strip per shift per agency policy, either on paper or save to electronic health record (EHR).
- Report any unexpected outcomes immediately to the health care provider.

Special Considerations

Pediatric

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Monitor tracing cannot be interpreted. • Absence of tracing on one or more leads • Presence of artifact in ECG tracings	• Inspect electrodes for secure placement. Replace as needed and provide new skin preparation. • Reposition any wires that move as result of patient breathing or movement or vibrations in environment. Do not reposition electrodes if in correct position. • If artifact looks like 60-cycle interference (very thick-lined waveform), unplug battery-operated equipment in room one item at a time to see if interference disappears. NOTE: 60-cycle interference is rare.

Central Venous Access Device Care

Central Venous Catheter, Ports

A central vascular access device (CVAD) differs from short peripheral or midline catheters in relation to the final catheter tip location. Final tip placement for CVADs placed in the upper body should end in the lower segment of the superior or inferior vena cava at or near the cavoatrial junction ([Fig. 12.1](#)), and those placed in the lower body should end in the inferior vena cava above the level of the diaphragm ([Infusion Nurses Society \[INS\], 2016](#)). CVADs placed in the femoral region are not recommended in adults (Ciocson et al., 2014).

Valve-ended catheters (e.g., Groshong) have a rounded catheter tip with a three-way pressure-activated valve that prevents reflux of blood into the catheter to reduce the risk of hemorrhage, air embolism, and occlusion. This technology can also be located in the catheter hub (e.g., PASV, SOLO2). Manufacturers of valved catheters state that heparin is not needed to maintain patency, and recommend flushing with only 0.9% sodium chloride (NS; [Phillips and Gorski, 2014](#)).

CVADs can have single or multiple lumens ([Fig. 12.2](#)). The choice of the number of lumens depends on a patient's condition and prescribed therapy. You access a CVAD through the hub of the device located on the end of each external lumen.

An implanted venous port is a CVAD that has a reservoir placed in a pocket under the skin with the catheter inserted into a major vessel (e.g., subclavian). The CVAD has no external lumen or hub. Instead, you access an implanted venous port by inserting a special 90-degree-angle, noncoring needle through the skin into the self-sealing injection port in the septum of the reservoir ([Fig. 12.3](#)).

Complications associated with CVADs can include local or systemic infection. A local infection can develop around the catheter insertion site. A more serious infection of the bloodstream may be caused by contamination of the catheter from the skin of the patient or poor infection prevention practices during insertion or care and maintenance (Alexander et al., 2014). The implementation of the IHI Central Line Bundle prevents infection. The key components of the IHI Central Line Bundle are: hand hygiene prior to catheter insertion, maximal sterile barrier precautions with insertion, chlorhexidine skin antisepsis, optimal

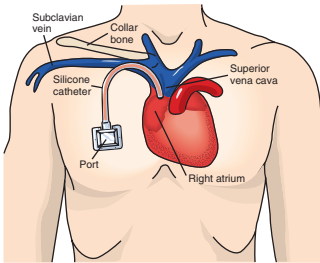


Fig. 12.1 Catheter tip of central venous access device (CVAD) lies in superior vena cava.

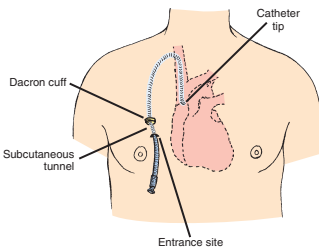


Fig. 12.2 Peripherally inserted central catheter (PICC) showing three access ports to individual lumens. (Courtesy and copyright © Bard Access Systems.)

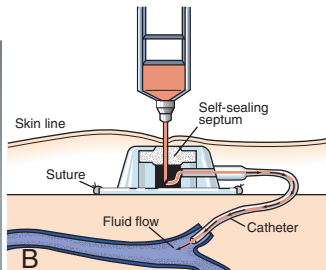


Fig. 12.3 **A**, Cross section of implantable port showing access of the port with noncoring needle. **B**, Implanted port and catheter.

catheter site selection (with avoidance of the femoral vein for central venous access in adult patients), and daily review of the line necessity with prompt removal of unnecessary lines.

Delegation Considerations

The skill of managing a CVAD cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Report the following to the nurse immediately: bleeding or swelling around CVAD insertion site; shortness of breath; loosened

or soiled dressing; or if the patient has a fever, complains of pain at the site, or catheter becomes dislodged.

- Inform nurse if the electronic infusion device (EID) alarm signals or if the fluid level in container is low or empty.
- Help with positioning patient during insertion and care.

Equipment

Site Care and Dressing Change

- CVAD dressing change kit, which includes: sterile gloves, mask, antiseptic swabs for skin disinfection (chlorhexidine solution preferred, povidone-iodine, or 70% alcohol), transparent semipermeable membrane dressing (TSM), 4 × 4 gauze pads, tape measure, sterile tape, label
- Engineered stabilization device (if not sutured) for PICC or nontunneled catheters
- Skin protectant swab
- Clean gloves
- Needleless injection cap(s) for each lumen(s)

Blood Sampling

- Clean gloves
- Antiseptic swabs (chlorhexidine solution, povidone-iodine, or 70% alcohol)
- 5-mL Luer-Lok syringes
- 10-mL Luer-Lok syringes
- Vacuum system or blood transfer device (see agency policy)
- Blood tubes, including waste tubes, labels
- Needleless injection cap
- Syringe (5 mL or 10 mL; see agency policy) for discarded blood
- 10-mL syringe with 5 to 10 mL preservative-free 0.9% NS
- 10-mL syringe with heparin flush solution
- Sterile cap to maintain sterility of distal end of intravenous (IV) tubing

Changing the Injection Cap

- Clean gloves
- Antiseptic swabs (chlorhexidine solution, povidone-iodine, or 70% alcohol)
- Needleless injection cap(s)
- 10-mL syringe with 10 mL preservative-free 0.9% NS
- 10-mL syringe with heparin flush solution

Discontinuation of a Nontunneled Catheter or PICC

- Personal protective equipment, as indicated (goggles, gown, mask, and clean gloves)
- CVAD dressing change kit, which includes: sterile gloves, mask, antiseptic swabs for skin disinfection, TSM dressing, 4 × 4 gauze pads, tape measure, sterile tape, label
- Petroleum-based ointment or petroleum-based gauze, sterile
- Suture removal kit (if sutures are in place)

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 When CVAD is in place, assess the type of device. Review manufacturer's directions concerning the catheter and maintenance.
- 3 Assess if any lumens require flushing or site needs dressing change by referring to medical record, nurses' notes, agency policies, and manufacturer's recommended guidelines for use.

Care and management depend on type and size of catheter or port, number of lumens, purpose of therapy.

Provides guidelines for maintaining catheter patency and preventing infection.

4 Insertion site care:

- a Position patient in comfortable position with head slightly elevated. In the case of a PICC or midline device, have arm extended.
- b Prepare dressing materials.
TSM dressing: change at least every 5 to 7 days
Gauze dressing: change at least every 2 days

Provides access to patient. Infusion port requires palpation.

TSM dressings have the advantage of being able to visualize the IV site. Gauze dressings are also associated with a lower rate of catheter tip infection (Band et al., 2015).

Continued

STEP	RATIONALE
c Perform hand hygiene and apply mask. Instruct patient to turn head away from site during dressing change or provide mask for patient. d Apply clean gloves. Remove old TSM dressing by stabilizing catheter with nondominant hand, then remove dressing by pulling up one corner and gently pulling straight out and parallel to skin. Repeat on all sides until dressing has been removed. e Remove catheter stabilization device if used and requires changing. Must use alcohol to remove adhesive stabilization devices.	Reduces transfer of microorganisms; prevents spread of airborne microorganisms over CVAD insertion site. Stabilizes catheter as you remove dressing. Allows visualization of insertion site and allows for appropriate skin antisepsis (INS, 2016). Use of alcohol minimizes risk for medical adhesive-related skin injury.

SAFETY ALERT If sutures are used for initial catheter stabilization and become loosened or are no longer intact, alternative stabilization measures should be used. Use of an engineered stabilization device is recommended because sutures are associated with increased risk of infection (Alexander et al., 2014; INS, 2016).

f Inspect catheter, insertion site, and surrounding skin. Measure external CVAD length and compare to measurement from insertion if dislodgement is suspected. For PICC and midlines, measure upper-arm circumference 10 cm above antecubital fossa if clinically indicated and compare to baseline.	Insertion sites require regular inspection for early detection of signs and symptoms of IV-related complications (INS, 2016). Measurement of external catheter length provides comparison to determine dislodgement; arm measurement with a 3-cm increase can indicate thrombosis (INS, 2016).

STEP

RATIONALE

g Remove and discard clean gloves; perform hand hygiene. Open CVAD dressing kit using sterile technique and *apply sterile gloves*.

Sterile technique is required to apply new dressing.

h Cleanse site:

(1) Perform skin antisepsis with chlorhexidine solution using friction in a back and forth motion for 30 seconds and allow to dry completely.

Reduces the incidence of catheter-related infections (Alexander et al., 2014). Allow any skin antiseptic agent to fully dry for complete antisepsis (INS, 2016).

(2) Povidone-iodine and alcohol may be used in some settings or if the patient is sensitive to chlorhexidine (see agency policy). If using alcohol or povidone-iodine, clean in concentric circle moving from insertion site outward with the swab. Allow to dry completely.

i Apply skin protectant to entire area. Allow to dry completely so that skin is not tacky.

Protects irritated or fragile skin from dressing and stabilization device, if used, and minimizes risk for MARSI.

j Apply new catheter stabilization device per manufacturer's instructions if the catheter is not sutured in place.

Use of engineered stabilization devices that allow visual inspection of an insertion site can reduce risk for CVAD complications (i.e., phlebitis, infection, migration) and unintentional loss of access (INS, 2016).

Continued

STEP	RATIONALE
- k Apply sterile, transparent, semipermeable dressing or gauze dressing over insertion site. - l Apply label with date, time, and your initials. - m Dispose of soiled supplies and used equipment. Remove gloves, and perform hand hygiene.	Protects catheter insertion site and minimizes risk for infection (Phillips and Gorski, 2014). Allows for clear visualization of catheter site between dressing changes (Policy and Procedures INS, 2016). Provides information about next dressing change. Reduces transmission of microorganisms.
5 Blood sampling: - a Perform hand hygiene and apply clean gloves. - b Turn off all infusions for at least 1 to 5 minutes before drawing blood. NOTE: If you cannot stop infusion, draw blood from peripheral vein. - c When drawing through staggered multilumen catheters, draw from the distal lumen (or one recommended by manufacturer). - f Syringe method: NOTE: Check agency policy for use of Vacutainer with CVADs. (1) Remove end of IV tubing or injection cap from catheter hub. Keep end of tubing sterile.	Reduces transmission of microorganisms. Prevents transfer of body fluids. Prevents interruption of critical fluid therapy. Distal lumen typically is largest gauge lumen (Phillips and Gorski, 2014).

STEP

RATIONALE

- (2) Scrub catheter hub with antiseptic swab for at least 15 seconds and allow to dry completely.
- (3) Attach an empty 5-mL syringe, unclamp catheter (if necessary) and withdraw 4 to 5 mL of blood for the discard sample.
- (4) Clamp catheter (if necessary); remove syringe with blood and discard in appropriate biohazard container.
- (5) Scrub catheter hub with another antiseptic swab for 15 seconds and allow to dry completely.
- (6) Attach second syringe(s) to obtain required volume of blood needed for specimen ordered.
- (7) Unclamp catheter (if necessary) to withdraw blood.
- (8) Once specimens are obtained, reclamp catheter (if necessary) and remove syringe.
- (9) Scrub catheter hub with antiseptic swab for 15 seconds and allow to dry completely.

Reduces risk for microorganisms.

Discard sample reduces risk of drug concentrations or diluted specimen (Alexander et al., 2014). Drawing specimens for international normalized ratio (INR) studies from heparinized lines is not recommended (INS, 2016).

Valved catheters do not require clamping because the clamp opens the valve and allows reflux of blood into catheter.

Multiple syringes may be required, depending on specimens required and number of blood tubes needed.

Continued

STEP	RATIONALE
(10) Attach prefilled syringe with 10-mL 0.9% NS and flush catheter using the appropriate flush/clamp/disconnect sequence based on the type of needleless connector (e.g., neutral, negative or positive pressure displacement). Ensure that clamp is engaged (if available).	Flush with a minimum volume of twice the internal volume of the catheter with 0.9% NS (INS, 2016). Refer to agency policy and procedure for flush volume requirements. Reduces risk for catheter clotting after procedure.
(11) Remove syringe and discard into appropriate biohazard container.	Reduces transmission of microorganisms.
g Transfer blood using transfer vacuum device.	Reduces risk for blood exposure.
h Flush catheter with heparin flush based on type of catheter and agency policy and procedure using the appropriate flush/clamp/disconnect sequence. Ensure that clamp is engaged (if available).	Prevents clot formation. Heparin flush volume and concentration vary by agency and type of catheter. Valved catheters are flushed with 0.9% NS only and do not require heparin.

SAFETY ALERT Always use a 10-mL syringe or a syringe designed to generate lower injection pressure (i.e., 10 mL-diameter syringe barrel) on central lines in adults to minimize pressure during injection (INS, 2016).

i Remove syringe. Scrub exposed hub with antiseptic swab for 15 seconds and allow to dry. Attach new sterile injection cap or IV tubing to hub of catheter. Resume infusion as ordered or clamp catheter (if necessary).	Decreases risk of contamination.

STEP

RATIONALE

- j Dispose of soiled equipment and used supplies. Remove gloves, and perform hand hygiene.

6 Changing injection cap:

- a Determine if injection caps should be changed.

Reduces transmission of microorganisms.

Injection caps should be changed no more frequently than 96-hour intervals, with primary administration set change for continuous infusions, if it is removed for any reason, if there is residual blood or debris in it, if it becomes contaminated, or according to agency policies and procedures (INS, 2016).

- b Prepare new injection cap(s):

- (1) Perform hand hygiene. Apply clean gloves. Remove cap from package. Do not contaminate sterile injection port.

Reduces transfer of microorganisms. Maintains sterility.

- (2) Keep the protective cap on the tip of the injection cap.

Maintains sterility.

- (3) Prime the injection cap by flushing with 0.9% NS through cap until fluid is seen in the protective cap. Keep syringe attached.

Removes air from system preventing it from being introduced into vein (Alexander et al., 2014).

- c Based on catheter type, clamp catheter lumens one at a time by using slide or squeeze clamp, if necessary. If catheter is not clamped, ask patient to perform Valsalva maneuver until new cap is applied.

Prevents air from entering system when opened. Valsalva maneuver prevents air embolus (Phillips and Gorski, 2014).

Continued

STEP	RATIONALE
d Apply clean gloves. e Scrub catheter hub and injection cap with antiseptic swab for 15 seconds and allow to dry completely. Remove and dispose old injection cap using aseptic technique. f Scrub exposed catheter hub with antiseptic swab for 15 seconds and allow to dry completely. Connect new injection cap(s) on catheter hub. g Flush catheter with 10-mL 0.9% NS, followed by heparin flush based on type of catheter and agency policy and procedure using the appropriate sequence to clamp/flush/disconnect based on the type of needleless connector (e.g., neutral, negative, or positive pressure displacement). Ensure that clamp is engaged (if available). h Dispose of all soiled supplies and used equipment. Remove gloves, and perform hand hygiene.	Prevents transmission of microorganisms by nurse's hands. Routine injection cap changes decrease catheter infections. Drying allows time for maximum antimicrobial activity of agents. Prevents clot formation. Heparin flush volume and concentration vary by agency and type of catheter. Valved catheters are flushed with 0.9% NS only and do not require heparin. Engaging the clamp minimizes risk if injection cap loosens or comes off, which can cause infection, air embolism, and bleeding. Reduces spread of microorganisms.

STEP**RATIONALE****7 Discontinuing nontunneled catheters or PICCs:**

- a** Verify health care provider's order to discontinue line. Check agency policy because most require health care providers to discontinue CVAD. In some settings advanced practice nurses or specially credentialed nurses can remove devices.
- b** If IV solutions or medications are to continue, arrange placement of a short-peripheral or midline before CVAD discontinuation.
NOTE: Be aware of pH and osmolarity of solution or medication for appropriateness of conversion to short-peripheral or midline catheter.
- c** Position patient in supine flat or 10-degree Trendelenburg position, unless contraindicated.
- d** Perform hand hygiene, and turn off IV fluids infusing through central line.
- e** Apply gown, mask, goggles, and clean gloves.

Verifies appropriateness of procedure. Only a competent health care professional can remove a CVAD.

Prevents interruption of IV therapy.

Position promotes venous filling and prevents air embolus during catheter removal.

Prevents transmission of microorganisms and nurse's exposure to bloodborne pathogens.

Continued

STEP

- f** Gently remove CVAD dressing by stabilizing catheter with nondominant hand, pulling up one corner, and gently pulling straight out and parallel to skin. Repeat on all sides until dressing has been removed.
- g** If catheter securement device is present, carefully remove catheter from device and remove device with alcohol.
- h** Remove gloves and perform hand hygiene; open CVAD dressing change kit and suture removal kit (if sutures in place), and apply sterile gloves.
- i** Perform skin antisepsis to insertion site with chlorhexidine solution using friction in a back and forth motion for 30 seconds and allow to dry completely.
If CVAD is sutured in place, remove sutures.
- j** Using nondominant hand, apply sterile 4 × 4-inch gauze to site. Instruct patient to take deep breath and perform Valsalva maneuver as catheter is withdrawn.

RATIONALE

Prevents skin tears. Allows inspection of CVAD insertion site before removal.

Alcohol aids in removal of securement device.

Prevents transfer of organisms on soiled dressing to catheter insertion site.

Reduces the risk of migration of microbes into catheter tract. Allows CVAD removal.

Valsalva maneuver reduces the risk for air embolus by decreasing negative pressure in respiratory system.

STEP

RATIONALE

- k** With dominant hand, slowly remove catheter in smooth, continuous motion an inch at a time. Keeping fingers near insertion site, immediately apply pressure to site, and continue until bleeding stops. Stop removal procedure if resistance is met while removing catheter (INS, 2016b).

Gentle removal of catheter prevents stretching and breaking of the catheter. Damaged catheter may break off and leave a piece of catheter in patient's arm. Direct pressure reduces risk for bleeding and hematoma formation.

SAFETY ALERT It is often necessary to apply pressure longer if patient is receiving anticoagulants.

- l** Apply petroleum-based ointment or gauze to exit site. Apply sterile occlusive dressing such as TSM dressing or sterile gauze to site. Change dressing every 24 hours until healed.

Reduces chance of air embolism and seals skin-to-vein tract (Alexander et al., 2014). Allows for inspection of site for bleeding and infection until it is healed.

- m** Label dressing with date, time, and your initials.

Identifies date of catheter removal and need for dressing change.

- n** Inspect catheter integrity for intactness, especially along tip, and that length is appropriate for device. Discard in appropriate biohazard container.

If catheter tip is broken or compromised, place in container and label for possible follow-up and notify health care provider

NOTE: Catheter cultures should be performed when catheter is removed for suspected catheter-related blood infection. Catheter cultures should not be obtained routinely (INS, 2016).

Continued

STEP	RATIONALE
- o Position patient in a supine position for 30 minutes after nontunneled CVAD removal (INS, 2016). Be sure that short-peripheral IV or midline is infusing at correct rate. - p Complete postprocedure protocol.	Reduces chance of air embolism. Maintains prescribed IV solution therapy.

Recording and Reporting

- Immediately notify health care provider of signs and symptoms of any complications.
- Document catheter site care in nurses’ notes in the electronic health record (EHR) or chart including catheter location, size of catheter, number of lumens, condition of catheter insertion site or port site, including skin integrity, external catheter length, mid-arm circumference for PICC, condition and type of securement device, date and time of dressing change, change of injection caps, flushes used and patency of catheter including presence or absence of blood return, and patient’s tolerance of the procedure.
- Document in nurses’ notes and EHR catheter removal: patient position, appearance of site, length of catheter removed, integrity of catheter after removal, dressing applied, patient’s tolerance of procedure, presence/absence of bleeding from site every 15 minutes for 1 hour, and any problems with removal.
- Document in nurses’ notes and EHR blood draw: date, time, sample drawn, waste volume, and flushes used.
- Document in nurses’ notes and EHR unexpected outcomes and CVAD complications, health care provider notification, interventions, and patient response to treatment.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Catheter damage, breakage	• Clamp the catheter near insertion site, and place sterile gauze over break or hole until repaired. • Use permanent repair kit, if available. • Remove catheter.
2 Occlusion: thrombus, precipitation, malposition	• Reposition patient. • Have patient cough and deep breathe. • Raise patient's arm overhead. • Obtain venogram if ordered. • Remove catheter (CVAD requires order). • Obtain x-ray examination as ordered. • If precipitate, try hydrochloric acid or ethanol solution per orders. • Do not use a 1-mL syringe to instill saline because pressure exceeds 200 psi.
3 Infection and sepsis: exit site, tunnel, thrombus, port pocket	• Obtain blood cultures first from peripheral and CVAD, if ordered. • Administer antibiotic therapy as ordered. • Remove catheter (CVAD requires order). • Administer thrombolytic agent, if ordered. • Replace catheter.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
4 Infiltration, extravasation	• Apply cold/warm compresses according to specific vesicant protocol. • Provide emotional support. • Obtain x-ray examination, if ordered. • Use antidotes per protocol. • Discontinue IV fluids.
5 Pneumothorax, hemothorax, air emboli, hydrothorax	• Administer oxygen as ordered. • Elevate feet. Aspirate air, fluid. • If air emboli suspected, place patient on left side with head elevated slightly. Remove catheter as ordered. • Assist with insertion of chest tubes as ordered.
6 Incorrect placement	• Stop all fluid administration until placement is confirmed. Discontinue catheter (central venous catheter [CVC] requires order). • Obtain x-ray examination and electrocardiogram (PICC and CVAD). Administer support medications as ordered.

Chest Tube Care

A chest tube is a large catheter inserted through the thorax to remove fluid (effusions), blood (hemothorax), and/or air (pneumothorax). The location of the chest tube indicates the type of drainage expected. Apical (second or third intercostal space) and anterior chest tube placement promotes removal of air. Chest tubes placed low (usually in the fifth or sixth intercostal space) and/or in the posterior or lateral chest drain fluid (Fig. 13.1). A mediastinal chest tube is placed in the mediastinum, just below the sternum (Fig. 13.2), and it is connected to a drainage system. This tube drains blood or fluid, preventing its accumulation around the heart. This skill reviews the nursing responsibilities and interventions related to the safe management of chest tubes. Review the roles and responsibilities of the health care provider for chest tube placement (Table 13.1). There are two types of commercial drainage systems: the water-seal and the waterless systems.

Delegation Considerations

The skill of chest tube management cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Proper positioning of the patient with chest tubes to facilitate chest tube drainage and optimal functioning of the system
- How to ambulate and transfer patient with chest drainage
- Measuring vital signs and reporting to the nurse immediately any abnormal changes in vital signs, any complaints of chest pain or sudden shortness of breath, or excessive bubbling in water-seal chamber
- The danger of any disconnection of system, change in type and amount of drainage, sudden bleeding, or sudden cessation of bubbling, and the importance of notifying the nurse immediately

Equipment

- Prescribed chest drainage system
- Suction source and setup (wall canister or portable)
 - *Water-seal system:* Sterile water or normal saline (NS) solution to cover the lower 2 cm of the water-seal chamber (pour sterile water or NS into the suction-control chamber if suction is to be used according to manufacturer directions).
 - *Waterless system:* Vial of 30- to 45-mL sterile sodium chloride or water (for diagnostic air-leak indicator), 20-mL syringe, 21-gauge needle, and antiseptic swab
 - Dry suction system

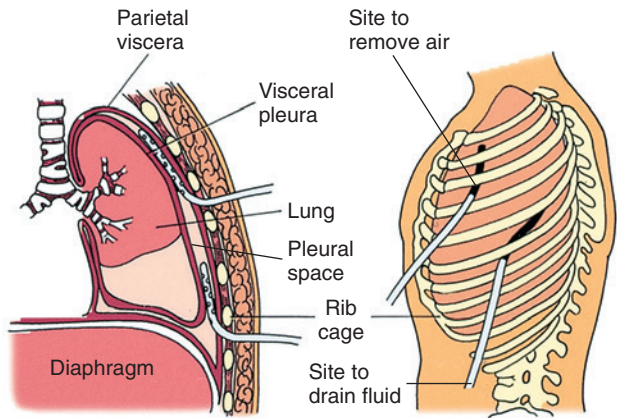


Fig. 13.1 Diagram of sites for chest tube placement.

Fig. 13.2 Mediastinal chest tube.



TABLE 13.1 Physician's or Advanced Practice Nurse's Role in Chest Tube Placement

Role	Purpose
Explain purpose, procedure, and possible complications to the patient, and have patient sign consent form.	Provides informed consent.
Have pain medication available to administer before or immediately after chest tube insertion as appropriate according to patient's condition.	Analgesia improves patient comfort throughout the procedure and assists patient in taking appropriate deep breaths to promote lung reexpansion and drainage of fluid in the pleural space.
Unless an emergent situation exists, perform "time out" before initiating procedure.	Verifies correct patient and procedure.
Perform hand hygiene. Cleanse chest wall with antiseptic.	Reduces transmission of microorganisms.
Apply mask and gloves.	Maintains surgical asepsis.
Drape area of chest tube insertion with sterile towels.	Maintains surgical asepsis.
Inject local anesthetic, and allow time to take effect.	Decreases pain during procedure.
Make a small incision over the rib space where tube is to be inserted. Thread a clamped chest tube through the incision. Health care provider clamps chest tube until system is connected to water seal.	Inserts chest tube into the intrapleural space. Clamping prevents entry of atmospheric air into the chest and worsening of pneumothorax.
Suture chest tube in place if suturing is policy or health care provider preference.	Secures chest tube in place.
Cover the chest insertion site with sterile 4 × 4-inch gauze and large dressing to form an occlusive dressing supported with an elastic bandage (Elastoplast). Sterile petrolatum gauze is used around the tube.	Holds chest tube in place and occludes site around chest tube. Helps stabilize chest tube and holds dressing tightly in place. Sterile petrolatum gauze helps prevent bacteria entry and air leak.

Continued

TABLE 13.1 Physician’s or Advanced Practice Nurse’s Role in Chest Tube Placement—cont’d

Role	Purpose
Water-Seal System Remove connector cover from patient’s end of chest drainage tubing with sterile technique. Secure drainage tubing to the chest tube and drainage system.	Health care provider is responsible for making certain that the system is set up properly, the proper amount of water is in the water seal, the dressing is secure, and the chest tube is securely connected to the drainage system.
Water-Seal Suction Connect system to suction or supervise a nurse connecting it to suction if suction is to be used.	The health care provider is responsible for determining and checking the amount of fluid that is to be added to the suction control chamber and prescribing the suction setting.
Waterless System Remove connector cover from patient’s end of chest drainage tubing with sterile technique. Secure drainage tubing to the chest tube and drainage system.	Health care provider is responsible for making certain that the system is set up properly and the chest tube is securely connected to the drainage system.
Waterless Suction Turn on suction source. Set suction indicator (float ball or bellows) to prescribed setting. The health care provider or nurse adds sterile water or NS to diagnostic indicator. Unclamp the chest tube. In each system health care provider orders and reviews chest x-ray film studies.	Health care provider is responsible for prescribing level of float ball and prescribing the suction setting. Allows quick assurance that the system is functioning properly. Connects chest tube to drainage. Verifies correct chest tube placement.

- Clean gloves
- Sterile gauze sponges
- Local anesthetic, if not an emergent procedure
- Chest tube tray (all items are sterile): Knife handle (1), knife blade No. 10 or disposable safety scalpel No. 10, chest tube clamp, small sponge forceps, needle holder, size 3-0 silk sutures, tray liner (sterile field), curved 8-inch Kelly clamps (2), 4 × 4-inch sponges (10), suture scissors, hand towels (3), sterile gloves
- Dressings: Petrolatum or Xeroform gauze, split chest-tube dressings, several 4 × 4-inch gauze dressings, large gauze dressings (2), and 4-inch tape
- Head cover
- Face mask/face shield
- Sterile gloves
- Two rubber-tipped hemostats (shodded) for each chest tube
- 2.5-cm (1-inch) waterproof adhesive tape or plastic zip ties for securing connections
- Stethoscope, sphygmomanometer, and pulse oximeter

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Perform a complete respiratory assessment; obtain baseline vital signs and pulse oximetry (SpO₂).
- 3 Assess patient for known allergies. Ask patient if he or she has had a problem with medications, latex, or anything applied to the skin.

Baseline assessment and vital signs are essential for any invasive procedure. Chest tube insertion often causes respiratory distress.

Povidone-iodine or chlorhexidine are antiseptic solutions used to clean skin before tube insertion (Kuhajda et al., 2014). Lidocaine is a local anesthetic administered to reduce pain. The chest tube will be held in place with tape and sutures.

Continued

STEP

RATIONALE

4 Review patient's medication record for anticoagulant therapy, including aspirin, warfarin (Coumadin), heparin, or platelet aggregation inhibitors such as ticlopidine (Ticlid) or dipyridamole (Persantine).

Anticoagulation therapy can increase procedure-related blood loss.

5 For patients who have chest tubes:

a Observe chest tube dressing and site surrounding tube insertion.

Ensures that dressing is intact and occlusive seal remains without air or fluid leaks and that area surrounding insertion site is free of drainage or skin irritation.

b Observe tubing for kinks, dependent loops, or clots.

Maintains a patent, freely draining system, preventing fluid accumulation in chest cavity. When tubing is coiled, looped, or clotted, drainage is impeded, and there is an increased risk for tension pneumothorax or surgical emphysema (Kane et al., 2013; [Rajan, 2013](#)).

c Chest drainage system should remain upright and below level of tube insertion.

An upright drainage system facilitates drainage and maintains the water seal.

6 Set up water-seal system (or dry system with suction); see manufacturer guidelines:

a Obtain chest drainage system. Remove wrappers, and prepare to set up the system.

Maintains sterility of system for use under sterile operating room conditions.

STEP

b While maintaining sterility of the drainage tubing, stand the system upright and add sterile water or NS to the appropriate compartments:

- (1)** *For a two-chamber system (without suction):* Add sterile solution to the water-seal chamber (second chamber), bringing fluid to required level as indicated.
- (2)** *Three-chamber system (with suction):* Add sterile solution to water-seal chamber (middle chamber). Add amount of sterile solution prescribed by health care provider to the suction control (third chamber), usually 20 cm (8 inches). Connect tubing from suction control chamber to suction source. Tailor length of drainage tube to patient. **NOTE:** Suction control chamber vent must not be occluded when using suction

RATIONALE

Reduces possibility of contamination.

Water-seal chamber acts as one-way valve so air cannot enter pleural space (Kane et al., 2013).

Depth of fluid level dictates highest amount of negative pressure that can be present within system. For example, 20 cm of water is approximately 20 cm of water pressure. Any additional negative pressure applied to the system is vented into the atmosphere through suction-control vent. This safety device prevents damage to pleural tissues from unexpected surge of negative pressure from suction source. After chest tube is inserted, turn up the wall or portable suction device until water in suction-control bottle exhibits continuous, gentle bubbling.

SAFETY ALERT When increasing suction, remember that increased bubbling does not result in more suction to the chest cavity, but only serves to evaporate the water more quickly.

Continued

STEP

- (3) *Dry suction system:*
Fill the water-seal chamber with 2 cm of sterile solution. Adjust the suction control dial to the prescribed level of suction; suction ranges from -10 to -40 cm of water pressure. The suction control chamber vent is never occluded when suction is used.

7 Prepare a waterless drainage system (see manufacturer's guidelines):

- a Remove sterile wrappers, and prepare to set up.
- b For a two-chamber system (without suction), nothing is added or needs to be done to the system.
- c For a three-chamber waterless system with suction, connect tubing from suction control chamber to the suction source.
- d Instill 15 mL of sterile water or NS into the diagnostic indicator injection port located on top of the system.

RATIONALE

The automatic control valve on the dry suction control device adjusts to changes in patient air leaks and fluctuation in suction source and vacuum to deliver the prescribed amount of suction.

Maintains sterility of the system for use in sterile operating room conditions.

Waterless two-chamber system is ready for connecting to the patient's chest tube after opening the wrappers.

The suction source provides additional negative pressure to the system.

Allows observation of the rise and fall in the diagnostic air-leak window. Constant left-to-right bubbling or rocking is abnormal and may indicate an air leak.

STEP**RATIONALE**

8 Secure all tubing connections with tape in double-spiral fashion using 2.5-cm (1-inch) adhesive tape or use zip-ties (nylon cable) with a clamp (Bauman and Handley, 2011). Check system for patency: - a Clamp drainage tubing that will connect to patient's chest tube. - b Connect tubing from float-ball chamber to suction source. - c Turn on suction to prescribed level.	Prevents atmospheric air from leaking into system and patient's intrapleural space. Provides chance to ensure airtight system before connection to patient.
9 Turn off suction source and unclamp drainage tubing before connecting patient to system. Make a second check to be sure that drainage tubing is not excessively long. Suction source is turned on again after patient is connected.	Having patient connected to suction when it is initiated could damage pleural tissues from sudden increase in negative pressure. Tubing that is coiled or looped may become clotted and cause a tension pneumothorax.
10 Administer premedication such as sedatives or analgesics as ordered.	Reduces patient anxiety and pain during procedure.

SAFETY ALERT During procedure, carefully monitor patient for changes in level of sedation.

11 Provide psychological support to patient (Kane et al., 2013). - a Reinforce preprocedure explanation. - b Coach and support patient throughout procedure.	Reduces patient anxiety and helps complete procedure efficiently.

Continued

STEP

- 12 Perform hand hygiene, and apply clean gloves.
- 13 Position patient for tube insertion so that side in which tube is to be inserted is accessible to health care provider.
- 14 Help health care provider with chest tube insertion by providing needed equipment and local analgesic. Health care provider will anesthetize skin over insertion site, make a small skin incision, insert a clamped tube, suture it in place, and apply occlusive dressing.
- 15 Help health care provider attach drainage tube to chest tube; remove clamp. Turn on suction to prescribed level.
- 16 Tape or zip-tie all connections between chest tube and drainage tube.
NOTE: Chest tube is usually taped by health care provider at time of tube placement; check agency policy.
- 17 Check systems for proper functioning. Health care provider will order a chest x-ray film.

RATIONALE

Reduces transmission of microorganisms.

For pneumothorax, place patient in lateral supine position. For hemothorax, place patient in semi-Fowler position (Kane et al., 2013).

Ensures smooth insertion.

Connects drainage system and suction (if ordered) to chest tube.

Secures chest tube to drainage system and reduces risk for air leak that causes breaks in airtight system (Shlamovitz, 2014).

Verifies intrapleural placement of tube.

STEP

RATIONALE

18 After tube placement position patient: - a Use semi-Fowler or high-Fowler position to evacuate air (pneumothorax; Rajan, 2013). - b Use high-Fowler position to drain fluid (hemothorax; Rajan, 2013).	Permits optimum drainage of fluid and/or air.
19 Check patency of air vents in system. - a Water-seal vent must have no occlusion. - b Suction control chamber vent is not occluded when suction is used. - c Waterless systems have relief valves without caps.	Permits displaced air to pass into atmosphere. Provides safety factor of releasing excess negative pressure into atmosphere. Provides safety factor of releasing excess negative pressure.
20 Position excess tubing horizontally on mattress next to patient. Secure with clamp provided so it does not obstruct tubing.	Prevents excess tubing from hanging over edge of mattress in dependent loop. Drainage collected in loop can occlude drainage system, which predisposes patient to tension pneumothorax (Kane et al., 2013).
21 Adjust tubing to hang in straight line from chest tube to drainage chamber.	Promotes drainage and prevents fluid or blood from accumulating in pleural cavity.

SAFETY ALERT Frequent gentle lifting of the drain allows gravity to help blood and other viscous material move to the drainage bottle. Patients with recent chest surgery or trauma need to have the chest drain lifted on the basis of assessment of the amount of drainage; some patients might need chest tube drains lifted every 5 to 10 minutes until drainage volume decreases. However, when coiled or dependent looping of tubing is unavoidable, lift the tubing every 15 minutes at a minimum to promote drainage (Kane et al., 2013).

Continued

STEP	RATIONALE
22 Place two rubber-tipped hemostats (for each chest tube) in an easily accessible position (e.g., taped to top of patient’s headboard). These should remain with patient when ambulating.	Chest tubes are double clamped under specific circumstances: (1) to assess for an air leak (Table 13.2), (2) to empty or quickly change disposable systems, or (3) to assess if patient is ready to have tube removed.
SAFETY ALERT In the event of a chest tube disconnection and risk for contamination, submerge the tube 2 to 4 cm (1 to 2 inches) below the surface of a 250-mL bottle of sterile water or NS until a new chest tube unit can be set up (Bauman and Handley, 2011).	
23 Dispose of sharps in proper container, dispose of used supplies, and then perform hand hygiene.	Reduces transmission of microorganisms.

Continued

TABLE 13.2 Problem Solving With Chest Tubes

Assessment	Intervention
Air leak can occur at insertion site, at connection between tube and drainage device, or within drainage device itself. Determine when air leak occurs during respiratory cycle (e.g., inspiration or expiration). Continuous bubbling is noted in water-seal chamber that is attached to suction (Kane et al., 2013).	Check all connections between chest tube and drainage system to make sure they are tight. When in doubt, remove tape without disconnecting the tube to inspect connections. Inspect the chest drainage unit for cracks or breaks that can allow air into the system. Leaks are corrected when constant bubbling stops. If present on a chest drainage system such as the Sahara S 1100a Pleur-Evac, observe the air-leak meter to determine the size of the leak.

TABLE 13.2 Problem Solving With Chest Tubes—cont'd

Assessment	Intervention
Assess for location of leak by squeezing the chest drainage tubing between your hands. If the bubbling stops, air leak is inside patient's thorax or at chest insertion site.	Release the pressure on the drainage tube, reinforce chest dressing, and notify health care provider immediately. Leaving chest tube clamped can cause collapse of lung, mediastinal shift, and eventual collapse of other lung from buildup of air pressure within the pleural cavity.
If bubbling continues, leak is in the drainage system.	Change the drainage system.
Assess for tension pneumothorax: • Severe respiratory distress • Low oxygen saturation • Chest pain • Absence of breath sounds on affected side • Tracheal shift to unaffected side • Hypotension and signs of shock • Tachycardia	Make sure that chest tubes are patent: remove clamps, eliminate kinks, or eliminate occlusion. Notify health care provider immediately and prepare for another chest tube insertion. A one-way flutter (Heimlich) valve or large-gauge needle may be used for short-term emergency release of pressure in the intrapleural space. Have emergency equipment, oxygen, and code cart available, because condition is life threatening.
Water-seal tube is no longer submerged in sterile fluid because of evaporation.	Add sterile water to water-seal chamber until distal tip is 2 cm under surface level. Most chest drainage units are marked at the 2-cm level to indicate the fill line.

STEP

24 Care of patient after chest tube insertion:

- a Perform hand hygiene, and apply clean gloves. Assess vital signs; oxygen saturation; skin color; breath sounds; rate, depth, and ease of respirations; and insertion site every 15 minutes for first 2 hours and then at least every shift.
- b Monitor color, consistency, and amount of chest tube drainage every 15 minutes for first 2 hours. Indicate level of drainage fluid, date, and time on write-on surface of chamber:
 - (1) From mediastinal tube, expect less than 100 mL/hr immediately after surgery and no more than 500 mL in first 24 hours.
 - (2) From posterior chest tube, expect between 100 and 300 mL in first 3 hours after insertion, with total of 500 to 1000 mL expected in first 24 hours. Drainage is grossly bloody during first several hours after surgery and changes to serous (Kane et al., 2013).

RATIONALE

Provides immediate information about procedure-related complications such as respiratory distress and leakage.

Provides baseline for continuous assessment of type and quantity of drainage. Ensures early detection of complications.

Sudden gush of drainage may result from coughing or changing patient's position that releases pooled/collected blood rather than indicating active bleeding.

Acute bleeding indicates hemorrhage. Health care provider should be notified if there is more than 250 mL of bloody drainage in an hour.

STEP

RATIONALE

(3) Expect little or no output from anterior chest tube that is inserted for a pneumothorax (Kane et al., 2013). c Observe chest dressing for drainage. d Palpate around tube for swelling and crepitus (subcutaneous emphysema) as noted by crackling. e Check tubing to ensure that it is free of kinks and dependent loops. f Observe for fluctuation of drainage in tubing and water-seal chamber during inspiration and expiration. Observe for clots or debris in tubing. g Keep drainage system upright and below level of patient's chest.	Drainage around tube may indicate blockage. Indicates presence of air trapping in subcutaneous tissues. Small amounts are commonly absorbed. Large amounts are potentially dangerous. Promotes drainage. If fluctuation or tidaling stops, it means that either the lung is fully expanded or system is obstructed (Bauman and Handley, 2011). In spontaneously breathing patient, fluid rises in water-seal or diagnostic indicator (waterless system) with inspiration and falls with expiration. The opposite occurs in patient who is mechanically ventilated. This indicates that system is functioning properly (Atrium, 2015b; Kane et al., 2013). Promotes gravity drainage and prevents backflow of fluid and air into pleural space.

Continued

STEP	RATIONALE
- h Check for air leaks by monitoring bubbling in water-seal chamber: Intermittent bubbling is normal during expiration when air is being evacuated from pleural cavity, but continuous bubbling during both inspiration and expiration indicates leak in system. - i Remove gloves and dispose of used, soiled equipment in appropriate biohazard container. Perform hand hygiene.	Absence of bubbling may indicate that lung is fully expanded in patient with a pneumothorax. Check all connections and locate sources of air leak (see Table 13.2). Prevents accidents involving contaminated equipment.

Recording and Reporting

- Record respiratory assessment, type of drainage device, amount of suction (if used), amount of drainage in chamber, and presence or absence of an air leak. Document the integrity of the dressing and color and type of drainage for comparison between shifts. Record patient teaching and validation of understanding on flow sheet or nurses' notes in electronic health record (EHR) or chart.
- Record level of patient comfort and baseline vital signs, including oxygen saturation. If postoperative patient, record vital signs and oxygen saturation every 15 minutes for at least 2 hours after surgery on flow sheet or nurses' notes in EHR or chart.
- Report any unexpected outcomes immediately to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops respiratory distress: chest pain, a decrease in breath sounds over affected and nonaffected lungs, marked cyanosis, asymmetric chest movements, presence of subcutaneous emphysema around tube insertion site or neck, hypotension, tachycardia, and/or mediastinal shift are critical and indicate a severe change in patient status, such as excessive blood loss or tension pneumothorax.	• Notify health care provider immediately. • Collect set of vital signs and pulse oximetry. • Prepare for chest x-ray. • Provide oxygen as ordered.
2 Air leak unrelated to patient's respirations occurs.	• Locate source (see Table 13.2).
3 No chest tube drainage.	• Notify health care provider. • Observe for kink in chest drainage system. • Observe for possible clot in chest drainage system. • Observe for mediastinal shift or respiratory distress (medical emergency). • Notify health care provider.
4 Chest tube is dislodged.	• Immediately apply pressure over chest tube insertion site. • Have assistant apply occlusive gauze dressing and tape three sides. • Notify health care provider.
5 Substantial increase in bright red drainage occurs.	• Obtain vital signs. • Monitor drainage. • Assess patient's cardiopulmonary status. • Notify health care provider.

Cold Applications

A variety of cold (cryotherapy) modalities such as ice packs, moist cold compresses, chemical cold packs, electromechanical or compression devices, or cold-soak immersion of a body part are available. Cold therapy treats localized inflammatory responses that lead to edema, hemorrhage, muscle spasm, or pain (see [Table 14.1](#)). Cold exerts a profound physiologic effect on the body, reducing inflammation caused by injuries to the musculoskeletal system ([American Physical Therapy Association \[APTA\], 2016](#)). Vasoconstriction resulting from cold application reduces blood flow to the injured part and thus reduces fluid accumulation and slows bleeding and hematoma formation associated with trauma. The lower temperature also suppresses muscle spasm and produces a local anesthetic response (Petrofsky et al., 2013). When used appropriately, cold applications significantly lessen pain; thus mobility is improved. Cold applications produce maximal analgesia, control the inflammatory response, and decrease nerve conduction (da Costa Santos et al., 2015).

Delegation Considerations

The skill of applying cold applications can be delegated to nursing assistive personnel (NAP) in special situations (see agency policy). The nurse must assess and evaluate the patient and explain the purpose of the treatment. If there are risks or complications, the skill is not delegated. Direct NAP to do the following:

- Keep the application in place for only the length of time specified in the health care provider's order.
- Immediately report to the nurse any excessive redness on the skin, increase in pain, or decrease in sensation.
- Report when treatment is complete so that a nurse can evaluate the patient's response.

Equipment

All Compresses, Bags, and Packs

- Clean gloves (if blood or body fluids are present)
- Cloth tape or ties or elastic wrap bandage
- Soft cloth cover: towel, pillowcase, or stockinette
- Bath towel or blanket and waterproof pad

Cold Compress

- Absorbent gauze (clean or sterile) folded to desired size
- Basin
- Prescribed solution at desired temperature

TABLE 14.1 Pathophysiologic Effects of Hot and Cold Applications

	Cold	Hot
Pain	↓	↓
Spasm	↓	↓
Metabolism	↓	↑
Blood flow	↓	↑
Inflammation	↓	↑
Edema	↓	↑
Extensibility	↓	↑

Modified from Garner A, Fendius A: Temperature physiology, assessment and control, *Br J Neurosci Nurs* 6(8):397, 2010; Superficial heat, *Physiother Can* 62(5):47, 2010, DOI:10.3138/ptc.2009-09-s6.

Ice Bag or Gel Pack

- Ice bag
- Ice chips and water
- Reusable commercial gel pack (cold pack)
- Disposable commercial chemical cold pack

Electrically Controlled Cooling Device

- Cool water flow pad or cooling pad (e.g., aquathermia pad) and electrical pump
- Gauze roll or elastic wrap

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Position patient carefully, keeping body part in proper alignment and exposing only area to be treated, and drape patient with bath blankets.
- 3 Place towel or absorbent pad under area you will treat.
- 4 Apply clean gloves.

Prevents further injury to body part. Avoids unnecessary exposure of body parts, maintaining patient's comfort and privacy.

Prevents soiling of bedclothes.

Reduces spread of infection.

Continued

STEP	RATIONALE
5 Apply cold compress:	Extreme temperature can cause tissue damage.
a Check temperature of solution, and submerge gauze into basin filled with cold solution; wring out excess moisture.	
b Apply compress to affected area, molding it gently over site.	
c Remove, remoisten, and reapply to maintain temperature as needed.	Ensures that cold is directed over site of injury.
6 Apply ice pack or bag:	
a Fill bag with water, secure cap, and invert.	
b Empty water, and fill bag two-thirds full with small ice chips and water.	Ensures that there are no leaks.
c Express excess air from bag, secure bag closure, and wipe bag dry.	
d Squeeze or knead commercial ice pack.	
e Wrap pack or bag with towel, pillowcase, or stockinette. Apply over injury. Secure with tape as needed.	Bag is easier to mold over body part when it is not full.
7 Apply commercial gel pack:	
a Remove from freezer.	
b Wrap pack with towel, pillowcase, or stockinette. Apply pack directly over injury (Fig. 14.1).	Excess air interferes with cold conduction. Allows bag to conform to area and promotes maximum contact.
c Secure with gauze, cloth tape, or ties as needed.	
	Releases alcohol-based solution to create cold temperature.
	Protects patient's tissue and absorbs condensation. Prevents direct exposure of cold against patient's skin.
	Protects patient's tissue and absorbs condensation. Prevents direct exposure of cold against patient's skin.

SAFETY ALERT Do not reapply ice pack to red or bluish areas; continual use of ice pack makes ischemia worse.

STEP

8 Apply electrically controlled cooling device:

- a** Wrap flow pad in towel or pillowcase.
 - b** Wrap cool water flow pad around body part (Fig. 14.2).
 - c** Turn pad on, and be sure correct temperature is set.
 - d** Secure with elastic wrap bandage, gauze roll, or ties.
- 9** Remove gloves and dispose of in proper container.
- 10** Check condition of skin every 5 minutes for duration of application.

RATIONALE

Prevents adverse reactions from cold such as burn or frostbite. Ensures even application of cold temperature.

Ensures effective therapy.

Reduces transfer of microorganisms. Determines if there are adverse reactions to cold (e.g., mottling, redness, burning, blistering, and numbness).

Continued



Fig. 14.1 Commercial ice pack.



Fig. 14.2 Aquathermia pad.

STEP	RATIONALE
a If area is edematous, sensation may be reduced; use extra caution during cold therapy and assess more often. b Numbness and tingling are common sensations with cold applications and indicate adverse reactions only when severe and coupled with other symptoms. Stop when patient complains of burning sensation or skin begins to feel numb. 11 After 20 minutes (or as ordered by the physician), apply clean gloves, remove compress or pad, and gently dry off any moisture.	When applying cold, skin will initially feel cold, followed by relief of pain. As cryotherapy continues, patient will feel a burning sensation, then pain in the skin, and finally numbness. Drying prevents maceration of skin.
SAFETY ALERT Areas with little body fat (e.g., knee, ankle, or elbow) do not tolerate cold as well as fatty areas (e.g., thigh or buttocks). For bony areas, decrease time of cold application to lower ranges.	
12 Assist patient to comfortable position. 13 Complete postprocedure protocol.	Maintains relaxing environment. Reduces transfer of microorganisms.

Recording and Reporting

- Record procedure, including type, location, and duration of application and patient's response on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Document your evaluation of patient or family caregiver learning.
- Report any sensations of burning, numbness, or unrelieved skin color changes to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin appears mottled, reddened, or bluish purple as a result of prolonged exposure. 2 Patient complains of burning type of pain and numbness. 3 Patient or family caregiver is unable to describe or demonstrate therapy.	• Stop the treatment. • Notify nurse in charge or health care provider. • Stop the treatment because these are signs of ischemia. • Notify nurse in charge or health care provider. • Provide further instruction and/or demonstration.

Condom Catheter

The external urinary catheter, also called a *condom catheter* or *penile sheath*, is a soft, pliable condomlike sheath that fits over the penis, providing a safe and noninvasive way to contain urine. Most external catheters are made of soft silicone, which reduces friction. Latex catheters are still available and used by some patients. The catheters come in a variety of styles and sizes. For the best fit and correct application it is important to refer to manufacturer's guidelines.

Delegation Considerations

Assessment of the skin of a patient's penile shaft and determination of a latex allergy are done by a nurse before catheter application. The skill of applying a condom catheter can be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Follow the manufacturer's directions for applying the condom catheter and securing the device.
- Monitor urine output, and record intake and output (I&O), if applicable.
- Immediately report any redness, swelling, skin irritation, or breakdown of glans or penile shaft.

Equipment

- Condom catheter kit (condom sheath of appropriate size, securing device, skin preparation solution [per manufacturer's directions])
- Urinary collection bag with drainage tubing or leg bag and straps
- Basin with warm water and soap
- Towels and washcloth(s)
- Bath blanket
- Clean gloves
- Scissors, hair guard or paper towel

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

STEP**RATIONALE**

- 2 Assess condition of penis. Use the manufacturer's measuring guide to measure the diameter of penis in a flaccid state.

Provides baseline to compare changes in condition of skin after condom catheter application. Condom catheters can be applied only to intact skin. Measurement of the penile shaft aids in determining appropriate catheter size.

- 3 Prepare urinary drainage collection bag and tubing. Clamp off drainage bag port. Place nearby ready to attach to condom after applied.

Provides easy access to drainage equipment after applying condom catheter.

- 4 Apply clean gloves. Provide perineal care. Dry thoroughly before applying device. In uncircumcised patient, ensure that foreskin has been replaced to normal position. Do not apply barrier cream.

Prevents skin breakdown from exposure to secretions. Removes any residual adhesives. Perineal care minimizes skin irritation and promotes adhesion of new external catheter. Barrier creams prevent sheath from adhering to penile shaft.

- 5 Clip hair at base of penis as necessary before application of condom sheath. Some manufacturers provide a hair guard that is placed over penis before applying device. Remove hair guard after applying catheter. An alternative to hair guard is to tear a hole in a paper towel, place it over penis, and remove after application of device.

Hair adheres to condom and is pulled during condom removal or may get caught in adhesive as external catheter is applied.

SAFETY ALERT The pubic area should not be shaved because it may increase risk for skin irritation.

Continued

STEP

- 6 Apply condom catheter.
With nondominant hand, grasp penis along shaft. With dominant hand, hold rolled condom sheath at tip of penis and smoothly unroll sheath onto penis. Allow 2.5 to 5 cm (1 to 2 inches) of space between tip of glans penis and end of condom catheter (Fig. 15.1).
- 7 Apply appropriate securing device as indicated in manufacturer's directions:
 - a Self-adhesive condom catheters: after application, apply gentle pressure on penile shaft for 10 to 15 seconds to secure catheter.
 - b Outer securing strip-type condom catheters: spiral wrap penile shaft with strip of supplied elastic adhesive. Strip should not overlap itself. Elastic strip should be snug, not tight (Fig. 15.2).
- 8 Remove hair guard if used. Connect drainage tubing to end of condom catheter. Be sure that condom is not twisted. If using large drainage bag, place excess tubing on bed and secure to bottom sheet.

RATIONALE

Excessive wrinkles or creases in external catheter sheath after application may mean that patient needs smaller size.

Condom must be secured firmly so it is snug and stays on but not tight enough to cause constriction of blood flow. Application of gentle pressure ensures adherence of adhesive with penile skin.

Using spiral-wrap technique allows supplied elastic adhesive to expand so blood flow to penis is not compromised.

Allows urine to be collected and measured. Keeps patient dry. Twisted condom obstructs urine flow, causing urine pooling; skin irritation; and weakening and deterioration of adhesive, causing catheter to come off.

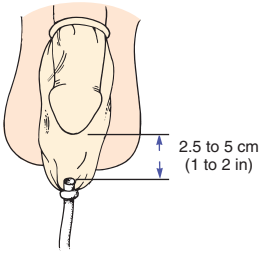


Fig. 15.1 Distance between end of penis and tip of condom.

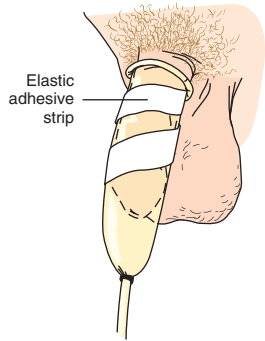


Fig. 15.2 Tape applied in spiral fashion.

STEP

- 9 Place patient in safe, comfortable position. Lower bed, and place side rails up as required.
- 10 Complete postprocedure protocol.

RATIONALE

- Promotes safety and comfort.
- Reduces spread of microorganisms.

Recording and Reporting

- Record condom application; condition of penis, skin, and scrotum; urinary output; and voiding pattern in nurses' notes and electronic health record (EHR).
- Report penile erythema, rashes, and/or skin breakdown.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin around penis is erythematous, ulcerated, or denuded.	• Check for latex allergy or allergy to skin preparation or adhesive device. • Remove condom, and notify prescriber. • Do not reapply until penis and surrounding tissue are free from irritation. • Ensure that condom is not twisted and urine flow is unobstructed after reapplication.
2 Penile swelling or discoloration occurs.	• Remove external catheter. • Notify health care provider. • Reassess current condom size. See manufacturer's size chart.
3 Condom does not stay on.	• Ensure that catheter tubing is anchored and that patient understands to not pull or tug on catheter. • Reassess condom catheter size. Refer to manufacturer's guidelines for sizing. • Observe whether outlet is kinked and urine is pooling at tip of condom. Reapply as necessary, and avoid catheter obstruction. • Assess need for another brand of external catheter (i.e., one that is self-adhesive).

Continuous Passive Motion Machine

The continuous passive motion (CPM) machine is designed to exercise various joints such as the hip, ankle, knee, shoulder, and wrist. It is usually prescribed from the first to fourth day following surgery for 1.5 to 24 hours per day, depending on a surgeon's preference and patient's condition (Harvey et al., 2014). The purpose of the CPM machine is to keep a joint mobilized to improve range of motion (ROM), reduce swelling, and ultimately, to prevent contractures and improve function.

Delegation Considerations

The skill of applying the CPM machine cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Immediately report to the nurse any increase in patient's pain when on CPM.
- Notify nurse of any skin breakdown observed when CPM is off.

Equipment

- CPM machine
- Padding
- Clean gloves

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Provide analgesic 30 minutes before CPM machine as needed.	Pain control assists patient in tolerating exercise.
3 Wear clean gloves if wound drainage is present.	Reduces nurse's risk for exposure to bloodborne viruses or bacteria.
4 Place elastic hose on patient if ordered (see Skill 68).	Elastic stockings promote venous return from lower extremities.
5 Place CPM machine on bed.	

Continued

STEP	RATIONALE
6 Set limits of flexion and extension as prescribed by health care provider, and set speed control to slow or moderate range.	Prevents injury by setting machine at safe limits.
7 Put machine through one full cycle.	Ensures CPM machine is working properly.
8 Stop CPM machine when in extension. Place padding on CPM machine.	Ensures all exposed hard surfaces are padded to prevent rubbing and chafing of patient's skin.
9 Support patient's joints while placing extremity in CPM machine (Fig. 16.1).	
10 Adjust CPM machine to patient's extremity. Lengthen and shorten appropriate sections of frame.	
11 Center patient's extremity on frame.	Avoids pressure areas on extremity.
12 Align patient's joint with CPM's mechanical joint.	
13 Secure patient's extremity on CPM machine with Velcro straps. Apply loosely.	Protects skin from irritation.
14 Start machine: When it reaches flexed position, stop machine and check degree of flexion.	Prevents possible complications and ensures correct settings.
15 Start CPM machine, and observe for two full cycles.	Ensures CPM machine is fully operational at the preset extension and flexion modes.

Fig. 16.1 Patient's extremity properly placed and secured on CPM machine.



STEP	RATIONALE
16 Make sure patient is comfortable.	Prevents excessive stress on joint.
17 Instruct patient to turn CPM machine off if malfunctioning or if he or she is experiencing pain. Instruct patient to notify nurse immediately.	
18 Provide patient with on/off switch.	Allows patient to turn CPM machine on and off if it malfunctions or discomfort develops.
19 Complete postprocedure protocol.	

Recording and Reporting

- Record in nurses' notes and electronic health record (EHR) the patient's tolerance for CPM machine, rate of cycles per minute, degree of flexion and extension used, condition of extremity and skin, condition of operative site if present, and length of time CPM machine in use.
- Report immediately to nurse in charge or health care provider any resistance to range of motion; increased pain; and swelling, heat, or redness in joint.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient does not tolerate increase in flexion or extension.	- Consult with health care provider and physical therapist to plan additional therapies to increase flexion and extension of joint. - Provide rest periods throughout day to rest the joint. - Consider need for analgesia before CPM machine is used.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient experiences increased pain when using CPM machine.	• Determine efficacy of current analgesic, and obtain new orders to change dosage or medication. • Determine cause of increased pain.
3 Patient develops reddened areas on bony prominences or extremity.	• Determine if hard surfaces on CPM machine are well padded. • Monitor patient's alignment and positioning at least every 2 hours. • Provide skin care at least every 2 hours.

Continuous Subcutaneous Infusion

The continuous subcutaneous infusion (CSQI or CSCI) route of medication administration is used for selected medications (e.g., opioids, insulin). The route is also effective with medications to stop preterm labor (e.g., terbutaline) and to treat pulmonary hypertension (e.g., treprostinil sodium; [Box 17.1](#)). One factor that determines the infusion rate of CSQI is the rate of medication absorption. Most patients can absorb 1 to 2 mL/hr of medication, but the rate of absorption is more dependent on osmotic pressure than rate of administration (Alexander et al., 2014; [Arthur, 2015](#)).

Use a small-gauge (25 to 27) winged butterfly intravenous (IV) needle or special commercially prepared Teflon cannula to deliver medications. Use the needle with the shortest length and the smallest gauge necessary to establish and maintain the infusion.

Use the same anatomic sites for subcutaneous injections (see [Skill 72](#)) and the upper chest. Site selection depends on a patient's activity level and the type of medication delivered. Avoid sites where the tubing of the pump could be disturbed. Rotate sites used for medication administration at least every 2 to 7 days or whenever complications such as leaking occur (Alexander et al., 2014; [Arthur, 2015](#); [Infusion Nurses Society \[INS\], 2016a](#)).

Delegation Considerations

The skill of administering CSQI medications cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP about the following:

- Potential medication side effects or reactions and to report their occurrence to the nurse
- Reporting complications (e.g., leaking, redness, discomfort) at the CSQI needle insertion site to the nurse
- Obtaining any required vital signs and reporting them to the nurse

Equipment

Initiation of CSQI Therapy

- Clean gloves
- Alcohol swab
- Antibacterial skin preparation such as chlorhexidine
- Small-gauge (25 to 27) winged IV catheter with attached tubing or CSQI–designed catheter (e.g., Sof-Set)

BOX 17.1 Pain Management Benefits With Use of Continuous Subcutaneous Infusion

- Benefits patients with poor venous access
- Provides pain relief to patients who are unable to tolerate oral pain medications
- Allows patients greater mobility
- Onset of action about 20 minutes
- Better pain control than intramuscular injections
- Lower rates of infection

Modified from Arthur A: Innovations in subcutaneous infusions, *J Infus Nurse* 38(3):179, 2015; Bartz L, et al.: Subcutaneous administration of drugs in palliative care: result of a systematic observational study, *J Pain Symptom Manag* 48(4):540, 2014.

- Infusion pump
- Occlusive, transparent dressing
- Tape
- Medication in appropriate syringe or container
- Medication administration record (MAR) or computer printout

Discontinuing CSQI

- Clean gloves
- Small sterile gauze dressing
- Tape or adhesive bandage
- Alcohol swab and chlorhexidine (optional)
- Puncture-proof container

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR or computer printout.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012). Illegible MARs are a source of medication errors (Alassaad et al., 2013).

STEP

RATIONALE

3 Perform hand hygiene. Prepare medication using aseptic technique, or check dose on prefilled syringe. Connect syringe and prime tubing with medication, being careful not to lose any medication. Compare label of the medication with the MAR or computer printout two times.	<i>This is the first check for accuracy and ensures that correct medication is administered.</i>
4 Obtain and program medication administration pump. Place syringe in pump.	Ensures that medication dose is administered accurately.
5 Read label on prefilled syringe, and compare with MAR or computer printout.	<i>This is the second check for accuracy.</i>
6 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.	Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).
7 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.	Some agencies now use a bar code system to help with patient identification. <i>This is the final check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.</i>
8 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask questions. Tell patient that needle insertion will cause slight burning or stinging.	Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy.

Continued

STEP	RATIONALE
9 Position patient supine, drape, and provide for privacy.	Respects patient's dignity.
10 Initiate CSQI:	
a Be sure patient is comfortable: sitting or lying down.	Eases pain associated with insertion of needle.
b Select appropriate injection site free of irritation and away from bony prominences and waistline. Most common sites used are subclavicular and abdominal.	
c Apply clean gloves.	Ensures proper medication absorption.
d Cleanse injection site with alcohol using a circular motion, followed by antiseptic, using straight cleansing strokes. Allow both agents to dry.	
e Hold needle in dominant hand, and remove needle guard.	Reduces risk for infection at insertion site.
f Gently pinch or lift up skin with nondominant hand.	
g Gently and firmly insert needle at a 45- to 90-degree angle (Fig. 17.1).	Prepares needle for insertion.
h Release skinfold, and apply tape over “wings” of needle.	
	Ensures needle will enter subcutaneous tissue.
	Decreases pain related to insertion of needle.
	Secures needle.

SAFETY ALERT Some cannulas have a sharp needle covered with a plastic catheter. In this case, remove the needle and leave the plastic catheter in the skin.



Fig. 17.1 Insertion of butterfly needle into subcutaneous tissue of abdomen.



Fig. 17.2 Securing insertion site.

STEP	RATIONALE
i Place occlusive, transparent dressing over insertion site (Fig. 17.2). j Attach tubing from needle to tubing from infusion pump, and turn pump on. k Dispose of any sharps in appropriate leak- and puncture-proof container. Discard used supplies, remove gloves, and perform hand hygiene.	Protects site from infection and allows assessment of site during medication infusion. Allows administration of medication. Prevents accidental needlestick injuries and follows Centers for Disease Control and Prevention guidelines for disposal of sharps (Occupational Safety & Health Administration [OSHA], n.d.).
11 Discontinue CSQI: a Verify order, and establish alternative method for medication administration, if applicable.	If medication will be required after discontinuing CSQI, a different medication and/or route is often necessary to continue to manage patient's illness or pain.

Continued

STEP	RATIONALE
b Stop infusion pump. c Perform hand hygiene, and put on clean gloves. d Remove dressing without dislodging or removing the needle. Discard properly. e Remove tape from the wings of needle, and pull needle out at the same angle it was inserted. f Apply gentle pressure at site until no fluid leaks out of skin. g Apply small sterile gauze dressing or adhesive bandage to site.	Prevents medication from spilling. Follows CDC recommendations to prevent accidental exposure to blood and body fluids (OSHA, n.d.). Exposes needle. Minimizes patient discomfort. Dressing will adhere to site if skin remains dry. Prevents bacterial entry into puncture site.
12 Complete postprocedure protocol.	

Recording and Reporting

- After initiating CSQI, immediately chart medication, dose, route, site, time, date, and type of medication pump in the electronic health record (EHR) or chart. Use initials or signature.
- If medication is an opioid, follow agency policy to document waste.
- Record patient's response to medication and appearance of site every 4 hours or according to agency policy in nurses' notes in electronic health record (EHR) or chart.
- Record patient teaching, validation of understanding, and patient's response to medication in nurse's notes in EHR or chart.
- Report any adverse effects from medication or infection at insertion site to patient's health care provider and document according to agency policy. Patient's condition often indicates need for additional medical therapy.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of localized pain or burning at insertion site, or site appears red or swollen or is leaking, indicating potential infection or needle dislodgment. 2 Patient displays signs of allergic reaction to medication. 3 CSQI becomes dislodged.	• Remove needle, and place new needle in a different site. • Continue to monitor original site for signs of infection, and notify health care provider if you suspect infection. • Stop delivering medication immediately, and follow agency policy or guidelines for appropriate response to allergic reaction (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine) and reporting of adverse drug reactions. • Notify patient's health care provider of adverse effects immediately. • Add allergy information to patient's medical record per agency policy. • Stop the infusion, apply pressure at the site until no fluid leaks out of skin, cover site with a gauze dressing or adhesive bandage, and initiate a new site. • Assess patient to determine effects of not receiving medication (e.g., assess patient's pain level using age-appropriate pain scale; obtain blood glucose level).

Dressings

Dry and Moist-to-Dry

Dry dressings are commonly used for abrasions and nondraining postoperative incisions. Dry dressings are not appropriate for debriding wounds. Damp-to-dry dressings (also called *wet-to-dry* or *moist-to-dry*) are gauze moistened with an appropriate solution. A moist-to-dry dressing has a moist contact dressing layer that touches the wound surface. The moistened gauze increases the absorptive ability of the dressing to collect exudate and wound debris. When other forms of moisture-retentive dressings are not available, moist gauze is effective to mechanically debride the wound and promote wound healing (Bryant and Nix, 2016).

Delegation Considerations

The skill of applying dry and moist-to-dry dressings may sometimes be delegated to nursing assistive personnel (NAP) if the wound is chronic (see agency policy and state Nurse Practice Act). All wound assessments, care of acute new wounds, and wound care requiring sterile technique cannot be delegated. The nurse directs the NAP about the following:

- Any unique modifications of the dressing change, such as the need for use of special tape or taping techniques to secure the dressing
- Reporting pain, fever, bleeding, or wound drainage to the nurse immediately

Equipment

- Clean gloves
- Sterile gloves (optional)
- Sterile dressing set (scissors, forceps) (optional, check agency policy)
- Sterile drape (optional)
- Sterile dressings: fine mesh gauze, 4 × 4-inch gauze, abdominal (ABD) pads
- Sterile basin (optional)
- Antiseptic ointment (as prescribed)
- Wound cleaner (as prescribed)
- Sterile normal saline (NS) or prescribed solution
- Debriding gel, as ordered
- Tape, Montgomery ties, or DuoDERM, as needed (include nonallergenic tape if necessary)
- Skin barrier (optional if using Montgomery ties)
- Protective waterproof underpad

- Biohazard bag
- Adhesive remover (optional)
- Measurement devices (optional): Cotton-tipped applicator, measuring guide, camera
- Personal protective equipment (PPE): gown, goggles, mask, as needed
- Additional lighting if needed (e.g., flashlight, treatment light)

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Ask patient to rate his or her level of pain using a pain scale of 0 to 10, and assess character of pain. Administer prescribed analgesic as needed 30 minutes before dressing change.
- 3 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy.
- 4 Position patient comfortably, and drape to expose only wound site. Instruct patient not to touch wound or sterile supplies.
- 5 Place disposable waterproof bag within reach of work area. Fold top of bag to make cuff. Apply gown, goggles, and mask if risk for splashing exists.

Superficial wounds with multiple exposed nerves may be intensely painful, whereas deeper wounds with destruction of dermis should be less painful (Krasner, 2016). A comfortable patient is less likely to move suddenly, causing wound or supply contamination.

Serves as baseline to measure response to dressing therapy.

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Draping provides access to the wound yet minimizes unnecessary exposure. Prevents contamination of the wound or sterile supplies.

Ensures easy disposal of soiled dressings. Prevents contamination of bag's outer surface. Use of PPE reduces transmission of microorganisms.

Continued

STEP

- 6 Apply clean gloves. Gently remove tape, bandages, or ties: use nondominant hand to support dressing, and with dominant hand, pull tape parallel to skin and toward dressing. If dressing is over hairy area, remove in direction of hair growth. Get patient permission to clip or shave area (check agency policy). Remove any adhesive from skin.
- 7 With gloved hand or forceps, remove dressing one layer at a time, observing appearance and drainage on dressing. Carefully remove outer secondary dressing first, and then remove inner primary dressing that is in contact with the wound bed. If drains are present, slowly and carefully remove dressings and avoid tension on any drainage devices. Keep soiled undersurface from patient's sight:
 - a If moist-to-dry dressing adheres to wound, gently free dressing and alert patient of discomfort.
 - b If dry dressing adheres to wound that is not to be debrided, moisten with NS and remove.

RATIONALE

Pulling tape toward dressing reduces stress on suture line or wound edges and reduces irritation and discomfort.

The purpose of the primary dressing is to remove necrotic tissue and exudate. Appearance of drainage may be upsetting to patient. Avoids accidental removal of drain.

Damp-to-dry dressing should debride wound ([The Wound Healing and Management Node Group, 2011](#)).

Prevents injury to wound surface and periwound during dressing removal.

STEP

- 8 Inspect wound and periwound for appearance, color, size (length, width, and depth), drainage, edema, presence and condition of drains, approximation (i.e., whether wound edges are together), granulation tissue, and odor. Use measuring guide or ruler to measure size of wound. Gently palpate wound edges for boggy or patient report of increased pain.
- 9 Fold dressing with drainage contained inside, and remove gloves inside out. With small dressings, remove gloves inside out over the dressing. Dispose of gloves and soiled dressing according to agency policy. Cover wound lightly with sterile gauze pad, and perform hand hygiene.
- 10 Describe the appearance of the wound and any indicators of wound healing to the patient.
- 11 Create sterile field with a sterile dressing tray or individually wrapped sterile supplies on over-bed table.

RATIONALE

Assesses condition of wound and periwound condition. Indicates status of healing.

Contains soiled dressings, prevents contact of nurse's hands with drainage, and reduces cross-contamination.

Wounds may appear unsettling to patients; it is helpful for the patient to know that the wound appearance is as expected and that healing is taking place.

Sterile dressings remain sterile while on or within sterile surface. Preparation of all supplies prevents break in technique during dressing change.

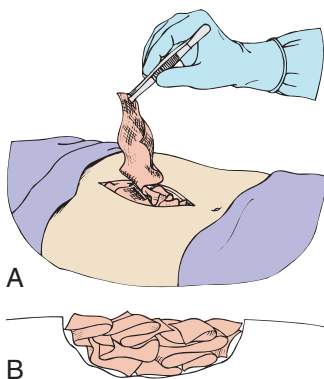
Continued

STEP	RATIONALE
12 Cleanse wound: - Perform hand hygiene, and apply clean gloves. Use gauze or cotton ball moistened in saline or antiseptic swab (per health care provider order) for each cleansing stroke, or spray wound surface with wound cleanser. - Clean from least contaminated area to most contaminated. - Cleanse around the drain (if present), using circular stroke starting near drain and moving outward and away from the insertion site. 13 Use sterile, dry gauze to blot in same manner as in Step 12 to dry wound. 14 Apply antiseptic ointment (if ordered) with sterile cotton-tipped swab or gauze, using same technique to apply as for cleaning. Dispose of gloves. Perform hand hygiene. 15 Apply dressing: a Dry sterile dressing: - Apply clean gloves (see agency policy). - Apply loosely woven gauze as contact layer. - If drain is present, apply a precut 4 × 4-inch gauze flat around drain. - Apply additional layers of gauze as needed.	Prevents transfer of microorganisms from previously cleaned area. Cleansing in this direction prevents introduction of organisms into wound. Correct aseptic technique in cleansing to prevent contamination. Drying reduces excess moisture, which could eventually harbor microorganisms. Helps reduce growth of microorganisms. Some agencies or condition of wounds may require <i>sterile gloves</i>. Promotes proper absorption of drainage. Secures drain and promotes drainage absorption at site. Ensures proper coverage and optimal absorption.

STEP	RATIONALE
(5) Apply thicker woven pad (e.g., Surgipad, abdominal dressing). b Moist-to-dry dressing: (1) Apply <i>sterile gloves</i>. (2) Place fine-mesh or loose 4 × 4-inch gauze in container of prescribed sterile solution. Wring out excess solution.	This type of dressing is often used on postoperative wounds with excessive drainage. Moist gauze absorbs drainage and, when allowed to dry, traps debris.
SAFETY ALERT If a “packing strip” is used to pack the wound, use sterile scissors to cut the amount of dressing that you will use to pack the wound. Do not let packing strip touch the side of the bottle. Pour prescribed solution over the packing gauze or strip to moisten it.	
(3) Apply moist fine-mesh, open-weave gauze as a single layer directly onto wound surface. If wound is deep, gently pack gauze into wound with sterile gloved hand or forceps until all wound surfaces are in contact with moist gauze including dead spaces from sinus tracts, tunnels, and undermining. Be sure gauze does not touch periwound skin (Fig. 18.1, A).	Inner gauze should be moist, not dripping wet, to absorb drainage and adhere to debris. When packing a wound, gauze should conform to base and side of wound (Rolstad et al., 2011). Wound is loosely packed to facilitate wicking of drainage into absorbent outer layer of dressing. Moisture that escapes dressing often macerates the periwound area.
SAFETY ALERT When packing the wound, do not overpack or underpack it (Bryant and Nix, 2016). Packing should fill the wound but should not be above the level of the skin. (Fig. 18.1, B).	
(4) Apply dry sterile 4 × 4-inch gauze over moist gauze.	Dry layer pulls moisture from wound.

Continued

Fig. 18.1 A, Packing wound.
B, Wound packed loosely.



STEP

- (5) Cover with an ABD pad, Surgipad, or gauze.

16 Secure dressing:

- a *Tape*: Apply tape 2.5 to 5 cm (1 to 2 inches) beyond dressing. Use nonallergenic tape when necessary.
- b *Montgomery ties* (Fig. 18.2):
 - (1) Be sure that skin is clean. Application of skin barrier is recommended.
 - (2) Expose adhesive surface of tape ends.
 - (3) Place ties on opposite sides of dressing over skin or skin barrier.
 - (4) Secure dressing by lacing ties across dressing snugly enough to hold it secure but without placing pressure on skin.

RATIONALE

Protects wound from entrance of microorganisms.

Supports wound and ensures placement and stability of dressing.

Ties allow for repeated dressing changes without removal of tape.



Fig. 18.2 Securing Montgomery ties.



Fig. 18.3 Application of roll gauze.

STEP

- c For dressing an extremity, secure with roll gauze (Fig. 18.3) or elastic net.
- 17 Complete postprocedure protocol.
- 18 Observe appearance of wound for healing, including size of wound; amount, color, and type of drainage; and periwound erythema or swelling.
- 19 Ask patient to rate pain using a scale of 0 to 10.
- 20 Inspect condition of dressing at least every shift.
- 21 Ask patient and/or family caregiver to describe steps and techniques of dressing change.

RATIONALE

Determines rate of healing.

Increased pain is often an indication of wound complications, such as infection, or a result of dressing pulling tissue.

Determines status of wound drainage.

Evaluates patient's learning.

Recording and Reporting

- Record appearance and size of wound, characteristics of drainage, presence of necrotic tissue, type of dressing applied, patient’s response to dressing change, and level of comfort on flow sheet in nurses’ notes in electronic health record (EHR) or chart.
- Record patient’s understanding through teach-back for effective dressing change.
- Report any unexpected appearance of wound drainage, accidental removal of drain, bright red bleeding, or evidence of wound dehiscence or evisceration.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Wound appears inflamed and tender, drainage is evident, and/or an odor is present.	• Monitor patient for signs of infection. • Notify health care provider. • Obtain wound culture. • If there is yellow, tan, or brown necrotic tissue, refer to health care provider to determine need for debridement.
2 Wound bleeds during dressing change.	• Observe color and amount of drainage. If excessive, apply pressure dressing. • Inspect area along dressing and directly underneath patient to determine the amount of bleeding. • Obtain vital signs as needed. • Notify health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient reports sensation that “something has given way under the dressing.”	• Observe wound for increased drainage or dehiscence (partial or total separation of wound layers) or evisceration (total separation of wound layers and protrusion of viscera through wound opening). • Protect wound. Cover with sterile moist dressing. • Instruct patient to lie still. • Remain with patient to monitor vital signs. • Notify health care provider.

Dressings

Hydrocolloid, Hydrogel, Foam, or Alginate

Hydrocolloid dressings are a formulation of elastomeric, adhesive, and gelling agents. These dressings absorb drainage and hydrate and debride wounds. When in contact with wound drainage, the hydrocolloid forms a gel that promotes a moist environment and facilitates autolytic and enzymatic debridement. The cushioning effect of a hydrocolloid adhesive dressing diminishes pain and protects the wound and periwound skin. This type of dressing conforms well to different body contours and protects the periwound from blister formation when a dressing over a joint (e.g., knee or hip) is flexed with movement (Siddique et al., 2011). Hydrocolloid dressings come in the form of granules, paste, or wafers.

Hydrogel dressings are glycerin- or water-based dressings designed to hydrate a wound, thus promoting moist wound healing and autolysis (Bryant and Nix, 2016). They have some absorptive properties. These dressings are similar to hydrocolloids and come in the form of sheets, amorphous gels, and impregnated gauze. Gel dressings are nonadherent and less painful to remove.

Polyurethane foam dressings are sheets of foamed polymers that contain small open cells capable of holding wound exudate away from a wound bed (Bryant and Nix, 2016). Foam dressings are not appropriate when there is wound tunneling, because the dressing expands, which can enlarge the tunnel. Foam dressings protect the wound surface while maintaining a moist, insulated environment. Application directions for the different brands of foam dressings vary.

Alginate dressings create a moist environment and promote autolysis, granulation, and epithelization (Bryant and Nix, 2016). These dressings include calcium alginate materials, which are manufactured from natural material (seaweed) and known for their absorptive properties, forming a gel over the wound surface to contain exudate. The dressing may come as a sheet or rope that can be packed into a wound. You can safely pack deep tracking wounds with calcium-sodium alginate preparation, which allows easy removal with little risk for retained dressing deep in the wound cavity (Bryant and Nix, 2016).

Delegation Considerations

The skill of applying a hydrocolloid, hydrogel, foam, or alginate dressing cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Help position patient during dressing application.
- Immediately report to the nurse any pain, fever, bleeding, wound drainage, or slippage of dressing.

Equipment

- Sterile gloves (optional)
- Clean gloves

Dressing Set (Optional)

- Sterile scissors (optional)
- Sterile drape (optional)
- Necessary primary dressings: gauze, hydrocolloid, hydrogel, foam, or alginate
- Secondary dressing of choice
- Sterile 4 × 4-inch gauze pads
- Sterile saline or other cleaning solution (as ordered)
- Skin barrier wipe
- Tape (nonallergenic paper or adhesive), ties as needed
- Measuring guide (tape measure, tracing paper, camera, as needed)
- Adhesive remover
- Biohazard bag
- Debriding gel (as ordered)
- Irrigating solution as supplies if indicated
- Personal protective equipment (PPE; e.g., gown, goggles, and mask, as needed)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Review health care provider's orders for frequency and type of dressing change. <i>Do not use alginate or absorptive dressings on nonexudative wounds.</i>	Allows nurse to determine supplies and assistance needed. Indicates type of dressing or application to use.

Continued

STEP

- 3 Expose wound site, and drape patient. Instruct patient not to touch wound or sterile supplies.
- 4 Place biohazard bag within reach of work area. Fold top of bag to make a cuff.
- 5 Perform hand hygiene, and put on clean, disposable gloves. Don moisture-proof gown, mask, and goggles if there is a risk for splashing.
- 6 Remove old dressing one layer at a time. Note amount and character of drainage. Use caution to avoid tension on any drains.
- 7 Fold dressings with drainage contained inside and remove gloves inside out. With small dressings, remove gloves inside out to enclose dressing. Dispose of gloves and soiled dressing according to agency policy. Cover wound lightly with a sterile 4 × 4-inch gauze pad. Perform hand hygiene.
- 8 Prepare sterile field with sterile dressing kit or individually wrapped sterile supplies on over-bed table. Pour prescribed solution into sterile bowl.
- 9 Remove gauze cover over wound.

RATIONALE

Draping provides access to wound while minimizing patient exposure. Dressing supplies become contaminated when touched by patient's hand.

Ensures easy disposal of soiled dressings. Nurse should not reach across sterile field.

Reduces transmission of microorganisms.

Reduces irritation and possible injury to skin.

Contains soiled dressings; prevents contact of nurse's hands with drainage; reduces cross-contamination.

Creates sterile work area.

STEP

RATIONALE

a Hydrocolloid dressings:

- (1) Select proper size wafer, allowing dressing to extend onto intact periwound skin at least 2.5 cm (1 inch; Bryant and Nix, 2016). Do not stretch dressing; avoid wrinkles and tenting.
- (2) In the case of a deep wound, apply hydrocolloid granules, impregnated gauze, or paste before the wafer.
- (3) Remove paper backing from adhesive side and place over wound. Do not stretch, and avoid wrinkles or tenting. Hold dressing in place for 30 to 60 seconds after application.
- (4) If cut from larger piece, tape edges with nonallergenic tape to avoid rolling or adherence to clothing.

b Hydrogel dressings:

- (1) Apply skin barrier wipe to surrounding skin that will come in contact with any adhesive or gel.

Hydrocolloid design prevents shear and friction from loosening edges and circumvents need for tape along dressing borders (Bryant and Nix, 2016).

Functions as filler material to ensure contact with all wound surfaces.

Molds dressing at body temperature (Bryant and Nix, 2016).

Protects periwound skin. Because of high water content of gels, care must be taken to protect periwound skin through use of skin barrier (Bryant and Nix, 2016).

STEP	RATIONALE
(2) Apply skin barrier wipe to surrounding skin that will come in contact with thin foam dressing adhesive. (3) Cut foam sheet to extend 2.5 cm (1 inch) out onto intact periwound skin. (Verify which side of foam dressing should be placed toward wound bed and which side should be facing away from wound bed; check product instructions.) (4) Cut foam to fit around drain or tube. (5) Cover with secondary dressing as necessary.	Protects periwound skin from maceration or irritation from adhesive. Ensures proper absorption and keeps wound exudate away from wound bed (Bryant and Nix, 2016). Some foam must be covered with secondary dressing (Bryant and Nix, 2016).
d Alginate dressings:	Highly absorptive product expands with absorption of serous fluid or exudate (Bryant and Nix, 2016).
(1) Cut sheet or rope to fit size of wound or loosely pack into wound space, filling one-half to two-thirds full. (2) Apply secondary dressing such as transparent film, foam, or hydrocolloid.	Secondary dressing prohibits drainage on bedclothes and clothing.
14 Complete postprocedure protocol.	Reduces transfer of microorganisms.

Recording and Reporting

- Record appearance of wound, color, size, characteristics of drainage, response to dressing change, condition of periwound skin, and patient's level of comfort on flow sheet in nurses' notes in electronic health record (EHR) or chart.

- Graph wound surface area or volume if wound is chronic.
- Record patient's understanding through teach-back for proper wound dressing.
- Report signs of infection, necrosis, or deteriorating wound status to health care provider immediately.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Wound develops more necrotic tissue and increases in size.	• In rare instances, some wounds will not tolerate hypoxia induced by hydrocolloid dressings. Discontinue use in these patients. Notify health care provider. • Evaluate appropriateness of wound care protocol. • Evaluate for other factors impairing wound healing.
2 Dressing does not stay in place.	• Evaluate size of dressing used for adequate margin (2.5 to 3.75 cm [1 to 1½ inches]), or dry skin more thoroughly before reapplication. • Consider custom shapes for difficult body parts. “Picture frame” the edges of the hydrocolloid dressing using tape. • Dressing may be secured with roll gauze, tape, transparent dressing, or dressing sheet.
3 Periwound skin is macerated.	• Assess moisture-control property of dressing or application technique. May need new type of dressing.

Dressings

Transparent

A transparent film dressing is a clear, adherent, nonabsorptive, polyurethane sheet. Once it is applied, a moist exudate forms over the wound surface, which prevents tissue dehydration and allows for rapid, effective healing by speeding epithelial cell growth (Bryant and Nix, 2016). The dressings are appropriate for prophylaxis on high-risk intact skin (e.g., high-friction areas), superficial wounds with minimal or no exudate, and eschar-covered wounds when autolysis is indicated and safe (National Pressure Ulcer Advisory Panel [NPUAP-EPUAP], 2014). Clinicians commonly use transparent dressings as the dressing of choice over an intravenous (IV) catheter insertion site.

Delegation Considerations

The skill of applying a transparent dressing for select wounds can be delegated to nursing assistive personnel (NAP; refer to agency policy). The assessment of the wound and care of sterile or new acute wounds cannot be delegated to NAP. The nurse directs the NAP about the following:

- Explaining how to adapt the skill for a specific patient
- Reporting any signs of bleeding, drainage, infection, or poor wound healing immediately to the nurse

Equipment

- Sterile gloves (optional)
- Dressing set (optional)
- Sterile saline or other agent (as ordered)
- Clean gloves
- Cotton swabs
- Biohazard bag for disposal
- Transparent dressing (size as needed)
- Sterile gauze pads (4 × 4 inches)
- Skin preparation materials (optional)
- Personal protective equipment (PPE), as needed

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

STEP

RATIONALE

2 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy.	Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).
3 Position patient to allow access to dressing site.	Facilitates application of dressing.
4 Close door or cubicle curtains; keep sheet or gown draped over body parts not requiring exposure.	Provides privacy and decreases transfer of microorganisms.
5 Expose wound site, minimizing exposure. Instruct patient not to touch wound or sterile supplies.	Dressing supplies become contaminated when touched by patient's hand.
6 Place biohazard bag within reach of work area.	Ensures easy disposal of soiled dressing.
7 Perform hand hygiene, and apply gloves. Don PPE (gown, mask, goggles as needed).	Reduces transmission of infectious organisms from soiled dressings to nurse's hands.
8 Remove old dressing by stretching film in direction parallel to wound rather than pulling.	Stretching action gently breaks dressing seal (Bryant and Nix, 2016). Reduces excoriation, tearing, or irritation of skin after dressing removal.
9 Dispose of soiled dressings in waterproof bag, remove gloves by pulling them inside out, dispose of them in waterproof bag, and perform hand hygiene.	Reduces transmission of microorganisms.
10 Prepare dressing supplies. Use sterile supplies for new wounds.	Reduces risk for break in sterile technique.
11 Pour saline or prescribed solution over 4 × 4-inch sterile gauze pads.	Maintains sterility of dressing.
12 Apply clean or sterile gloves (check agency policy).	Allows nurse to handle dressings.

Continued

STEP	RATIONALE
13 Clean wound and periwound area gently with 4 × 4-inch sterile gauze pads moistened in sterile saline, or spray with wound cleanser. Clean from least to most contaminated area.	Reduces introduction of organisms into wound.
14 Pat dry skin around wound thoroughly with dry 4 × 4-inch sterile gauze pads.	Transparent dressing with adhesive backing does not adhere to damp surface (Bryant and Nix, 2016).
15 Inspect wound for tissue type, color, odor, and drainage; measure if indicated.	Provides a baseline for monitoring wound healing.
16 Remove gloves, and perform hand hygiene.	Reduces transmission of microorganisms.
SAFETY ALERT If wound has a large amount of drainage, choose another dressing that can absorb drainage.	
17 Apply clean gloves. Apply transparent dressing according to manufacturer's directions. <i>Do not stretch film during application, and avoid wrinkles.</i> - a Remove paper backing, taking care not to allow adhesive areas to touch each other. - b Place film smoothly over wound without stretching (Fig. 20.1). - c Use your fingers to smooth and adhere dressing.	Wrinkles provide tunnel for exudate drainage. Ensures coverage of wound. Prevents shearing of skin from dressing that is too tight. Stretching can also break wound seal.

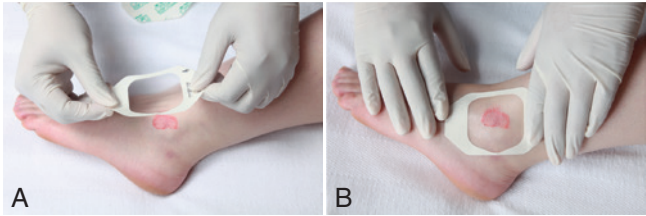


Fig. 20.1 A, Transparent dressing placed over small wound on ankle. B, Place film smoothly without stretching.



Fig. 20.2 Transparent dressing correctly labeled.

STEP

- d Mark dressing with date, your initials, and time of dressing change on outer edge of dressing (Fig. 20.2).
- 18 Complete postprocedure protocol.

RATIONALE

Recording and Reporting

- Record appearance of wound, presence and characteristics of drainage, and presence of odor on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding through teach-back for effective application of dressing.
- Report any signs of infection to the health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Wound is inflamed, tender; accumulation of fluid with white, opaque appearance and erythema of surrounding tissue; increased drainage or change in the color of drainage; necrosis; and/or odor is present.	• Remove dressing, and obtain wound culture according to agency policy. • Different type of dressing may be required. • Notify health care provider.
2 Dressing does not stay in place.	• Evaluate size of dressing used for adequate wound margin (2.5 to 3.75 cm [1 to 1½ inches]). • Dry patient's skin thoroughly before reapplication.
3 Outer layer of patient's skin tears on removal of dressing.	• Adhesive backing may be too strong for fragile skin. • Consider other, non-adhesive-backed transparent dressing.

Ear Drop Administration

When administering ear medications, be aware of certain safety precautions. Internal ear structures are very sensitive to temperature extremes; administer ear drops at room temperature. Instilling cold drops can cause vertigo (severe dizziness) or nausea and debilitate a patient for several minutes. Although structures of the outer ear are not sterile, use sterile drops and solutions in case the eardrum is ruptured. A final safety precaution is to avoid forcing any solution into the ear. Do not occlude the ear canal with a medicine dropper because this can cause pressure within the canal during instillation and subsequent injury to the eardrum. If you follow these precautions, instillation of ear drops is a safe and effective therapy.

Delegation Considerations

The skill of administering ear medications cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential side effects of medications and reporting their occurrence to the nurse

Equipment

- Medication bottle with dropper
- Cotton-tipped applicator, cotton balls (*optional*)
- Clean gloves
- Medication administration record (MAR)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR with health care provider's medication order. Check patient's name, drug name and dosage, route, and time for administration. Clarify incomplete or unclear orders with health care provider before administration.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives correct medications (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013).

Continued

STEP

- 3 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- 4 Discuss the purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about the drugs.
- 5 Perform hand hygiene. Apply clean gloves (only if drainage is present).
- 6 Position patient on side (if not contraindicated) with ear to be treated facing up, or patient may sit in chair or at bedside. Stabilize patient's head with his or her own hand.
- 7 Straighten ear canal by pulling pinna up and back to 10 o'clock position (child older than age 3) (Fig. 21.1) or down and back to 6 to 9 o'clock position (child younger than age 3).
- 8 If cerumen or drainage occludes outermost portion of ear canal, wipe out gently with cotton-tipped applicator. Take care not to force cerumen into ear canal.
- 9 Instill prescribed drops, holding dropper 1 cm ($\frac{1}{2}$ inch) above ear canal.

RATIONALE

- Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).
- Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy.
- Reduces transmission of microorganisms.
- Facilitates distribution of medication into ear.
- Straightening ear canal provides direct access to deeper ear structures. Anatomic differences in younger children and infants necessitate different methods of positioning canal (Hockenberry and Wilson, 2015).
- Cerumen and drainage harbor microorganisms and can block distribution of medication into canal. Occlusion blocks sound transmission.
- Avoiding contact prevents contamination of dropper, which could contaminate medication in container.



Fig. 21.1 Pull the pinna up and back for children older than 3 years.

STEP

- 10 Ask the patient to remain in side-lying position for a few minutes. Apply gentle massage or pressure to tragus of ear with finger.
- 11 If ordered, gently insert portion of cotton ball into outermost part of canal. Do not press cotton into canal.
- 12 Remove cotton after 15 minutes.
- 13 Dispose of soiled supplies in proper receptacle, remove and dispose of gloves, and perform hand hygiene.

RATIONALE

Allows complete distribution of medication. Pressure and massage move medication inward.

Prevents escape of medication when patient sits or stands.

Allows for drug distribution and absorption.

Reduces spread of microorganisms.

Recording and Reporting

- Record drug, concentration, dose or strength, number of drops, site of application (left, right, or both ears), and time of administration on MAR immediately after administration, not before. Include initials or signature.
- Record patient teaching and validation of patient's understanding on flow sheet or in nurses' notes in electronic health record (EHR) or chart.

- Record objective data related to tissues involved (e.g., drainage, tenderness, irritation), any subjective data (e.g., ear pain, ringing in ears, change in hearing acuity), and patient's response to medications. Note any side effects experienced in nurses' notes in EHR or chart.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider. Depending on medication, immediate health care provider notification may be required.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Ear canal remains inflamed, swollen, tender to palpation. Drainage is present.	• Notify health care provider for possible adjustment in medication type and dosage.
2 Patient's hearing acuity continues to be reduced.	• Notify health care provider. • Cerumen may be impacted, requiring ear irrigation.

Ear Irrigations

The common indications for irrigation of the external ear are presence of foreign bodies, local inflammation, and buildup of cerumen in the ear canal. The procedure is not without potential hazards. Usually irrigations are performed with liquid warmed to body temperature to avoid vertigo or nausea in patients. The greatest danger during ear irrigation is rupture of the tympanic membrane by forcing irrigant into the canal under pressure.

Delegation Considerations

The skill of administering ear irrigation cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Immediately report any potential side effects of ear irrigation (e.g., pain, drainage, dizziness).
- Help a patient when ambulating because some light-headedness may be present, which increases the patient's risk for falling.

Equipment

- Clean gloves
- Irrigation syringe
- Basin for irrigation solution (use a sterile basin if a sterile irrigating solution is used)
- Emesis basin for drainage or irrigating solution exiting the ear
- Towel
- Cotton balls or 4 × 4-inch gauze
- Prescribed irrigation solution warmed to body temperature, mineral oil, or over-the-counter softener
- Medication administration record (MAR)
- Otoscope (*optional*)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

Continued

STEP	RATIONALE
2 Review health care provider's medication order, including solution to be instilled and affected ear(s): right (AU), left (AS), or both (AD) to receive irrigation.	Ensures safe and correct administration of medication.
3 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.	Ensures correct patient. Complies with The Joint Commission Standards and improves patient safety (TJC, 2016).
4 Perform hand hygiene; arrange supplies at bedside.	Reduces transfer of microorganisms; helps nurse to perform procedure smoothly.
5 Close curtain or room door.	Maintains privacy.
6 Help patient to a sitting or lying position with head turned toward unaffected ear. Place towel under patient's head and shoulder, and have patient, if able, hold emesis basin under affected ear.	Position minimizes leakage of fluids around neck and facial area. Solution will flow from ear canal to basin.
7 Pour irrigating solution into basin. Check temperature of solution by pouring small drop on your inner forearm. NOTE: If a sterile irrigating solution is used, a sterile basin is required.	
8 Apply clean gloves. Gently clean auricle and outer ear canal with gauze or cotton balls. Do <i>not</i> force drainage or cerumen into the ear canal.	Prevents infected material from reentering ear canal. Forceful instillation of solution into occluded canal can cause injury to eardrum.

STEP

- 9 Fill irrigating syringe with solution (approximately 50 mL).
- 10 For adults and children over 3 years old, gently pull pinna up and back. In children 3 years or younger, pinna should be pulled down and back (Hockenberry and Wilson, 2015).
- 11 Slowly instill irrigating solution by holding tip of syringe 1 cm ($\frac{1}{2}$ inch) above opening to ear canal. Direct the fluid toward the superior aspect of ear canal. Allow it to drain into basin during instillation. Continue until canal is cleansed or solution is used (Fig. 22.1).

RATIONALE

Enough fluid is needed to provide a steady irrigating stream.

Pulling pinna straightens external ear canal. Prevents obstruction of canal with device, which can lead to increased pressure on tympanic membrane.

Slow instillation prevents buildup of pressure in ear canal and ensures contact of solution with all canal surfaces.

Continued



Fig. 22.1 Tip of syringe does not occlude ear canal during irrigation.

STEP	RATIONALE
12 Dry outer ear canal with cotton ball. Leave cotton loosely in place for 5 to 10 minutes.	Drying prevents buildup of moisture that can lead to otitis externa.
13 Help patient to a sitting position.	Maintains comfort.
14 Remove gloves, dispose of supplies, and perform hand hygiene.	Reduces transmission of infection.

Recording and Reporting

- Record in the nurses' notes, electronic health record (EHR), and/or MAR the procedure, amount of solution instilled, time of administration, and ear receiving irrigation.
- Record appearance of external ear and patient's hearing acuity in the nurses' notes and EHR.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of increased ear pain during irrigation.	Rupture of eardrum may have occurred. Stop irrigations immediately, and notify health care provider immediately.
2 Ear canal remains occluded with cerumen.	Repeat irrigation.
3 Foreign body remains in ear canal.	Refer patient to an otolaryngologist if a foreign object remains after irrigation.

Electrocardiogram

Obtaining A 12-Lead Electrocardiogram

Electrical impulses of the heart are conducted to the surface of the body and are detected by electrodes placed on the skin of the limbs and torso. The electrodes carry these impulses to either a continuous monitor or a 12-lead electrocardiogram (ECG) machine. The appearance of the ECG pattern helps to diagnose whether there are any abnormalities in the electrical conduction through the heart. The 12-lead ECG provides a snapshot of the waveforms from 12 different angles or views of the heart. One electrode is placed on each of the four extremities, and six electrodes are placed at specific sites on the chest for a total of 10 electrodes on the patient's skin. They are bipolar limb leads I, II, III; augmented limb leads aV_R , aV_L , aV_F ; and precordial chest leads V_1 to V_6 . The leads view a specific part of the surface of the heart and can help determine which part of the heart has sustained damage and the origin and flow of the impulse.

Delegation and Collaboration

The skill of obtaining a 12-lead ECG can be delegated to nursing assistive personnel (NAP) who are specifically trained in obtaining the measurement. The nurse directs the NAP to do the following:

- Immediately report to the nurse changes in the patient's cardiac status such as complaints of chest pain.
- Immediately deliver the completed 12-lead ECG recording to a health care provider for interpretation.
- Use specific patient precautions related to disease, mobility status, or position restrictions.

Equipment

- 12-lead ECG machine
- 10 ECG leads with alligator clip, suction cup, or snap-on attachments
- 10 ECG electrodes (disposable, self-adhesive) or electrode paste
- Clean, dry towel or sponge wipes
- Hair clippers (optional depending on hair at electrode sites)

Implementation

STEP	RATIONALE
1 Identify patient using at least two identifiers (e.g., name and birthday or name and medical record number) according to agency policy. 2 Assess patient's ability to follow directions and remain still in supine position. 3 Close room door or bedside curtains. 4 Prepare patient for procedure: - a Remove or reposition patient's clothing to expose only patient's chest and arms. Keep abdomen and thighs covered. - b Place patient in supine position with head of bed no higher than 30 degrees. - c Instruct patient to lie still without talking and do not cross legs. 5 Turn on machine; enter required demographic information. 6 Perform hand hygiene.	• Ensures patient safety. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). • Provides clear, accurate recording without artifact. • Provides privacy. • Facilitates correct placement of cardiac leads and maintains patient's modesty. Improper lead placement produces artifact, which necessitates repeating test or interpretation errors. • Electrodes must be placed on anterior chest for standard 12-lead ECG (O'Gara et al., 2013). • Body movement or talking produces artifact, which may necessitate repeating test. • Turning machine on first helps to identify electrode and lead issues on application. • Reduces transmission of microorganisms.

STEP

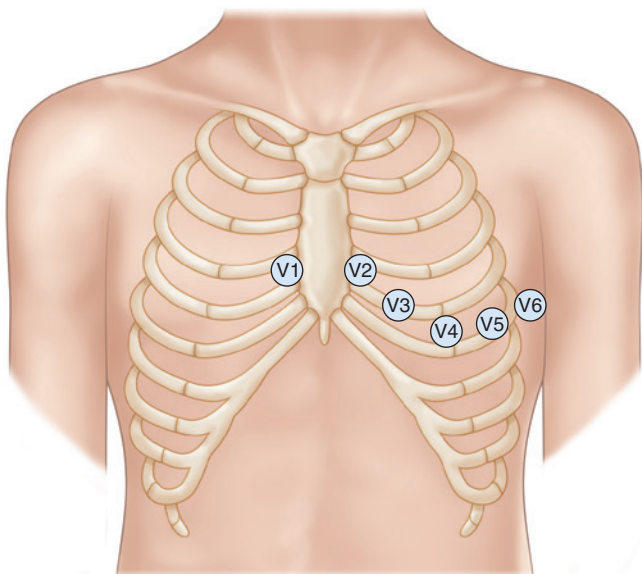
- 7 Clean and prepare isolated electrode area with soap and water. Wipe area with rough washcloth or gauze or use edge of electrode to gently scrape area. Clip excessive hair from electrode area.

- 8 Apply electrodes in correct positions. If using leads with suction cups, apply electrode paste to areas before attaching leads. (For women, ensure that electrodes are placed directly on the chest wall and not the breast tissue. The breast may need to be lifted to accommodate chest leads V_4 , V_5 , V_6 .)
 - a Chest (precordial) leads (Fig. 23.1)
 - V_1 —Fourth intercostal space (ICS) at right sternal angle
 - V_2 —Fourth ICS at left sternal border
 - V_3 —Midway between V_2 and V_4
 - V_4 —Fifth ICS at midclavicular line
 - V_5 —Left anterior axillary line at level of V_4 horizontally
 - V_6 —Left midaxillary line at level of V_4 horizontally

RATIONALE

- Proper skin preparation before ECG electrodes are placed decreases skin impedance and signal noise, thereby producing clean, accurate recording. Do not use alcohol to clean area. It will dry out skin. Clipping hair in electrode area is preferred over shaving because of risk for infection.
- Proper placement of leads is important for accurate interpretation of 12-lead ECG. Ensure that correct lead is in correct location. If any leads are misplaced, ECG reading will be inaccurate (O’Gara et al., 2013).

Continued



V1 – 4th intercostal space (ICS) at right sternal angle
 V2 – 4th ICS at left sternal border
 V3 – Midway between V2 and V4
 V4 – Fifth ICS at midclavicular line
 V5 – Left anterior axillary line at level of V4 horizontally
 V6 – Left midaxillary line at level of V4 horizontally

Fig. 23.1 Chest electrode positioning for 12-lead ECG.

STEP

- b Extremities: One lead on each extremity (Fig. 23.2); right wrist, left wrist, left ankle, right ankle
- 9 Check 12-lead machine for messages to correct electrode or lead issues. If no messages occur, press button to obtain 12-lead ECG.

RATIONALE

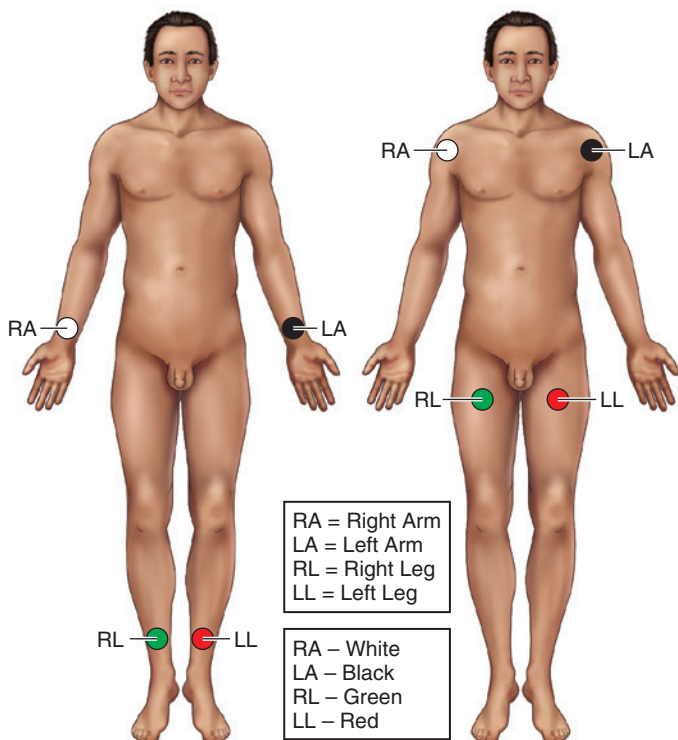


Fig. 23.2 Limb electrode positioning for 12-lead ECG.

STEP

- 10 If tracing is without artifact, disconnect leads and wipe off excess electrode paste from chest.
- 11 If “STAT,” immediately deliver ECG tracing (if not computerized) to appropriate health care provider for interpretation.

RATIONALE

- Promotes comfort and hygiene.
- If non-“STAT” 12-lead ECG, place in patient’s chart or designated area.

Recording and Reporting

- Record date and time ECG was obtained, reason for obtaining ECG, and to whom ECG was given for interpretation in nurses' notes in electronic health record (EHR) or chart.
- Report any unexpected outcomes immediately.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 ECG cannot be interpreted: • Absence of tracing on one or more leads • Presence of artifact in ECG tracings	• Inspect electrodes for secure placement. Reposition any wires that move as a result of patient breathing or movement or vibrations in environment. Do not reposition electrodes if in correct position. • Remind patient that lying still is necessary to obtain good tracing. • If artifact looks like 60-cycle interference (very thick-lined waveform), unplug battery-operated equipment in room one item at a time to see if interference disappears. NOTE: 60-cycle interference is rare.
2 Patient has chest pain or anxiety.	• Repeat tracing. • Continue to monitor patient. • Reassess factors contributing to anxiety or distress. • Follow specific orders related to findings. • Notify health care provider.

Enemas

An enema is the instillation of a solution into the rectum and sigmoid colon to promote defecation by stimulating peristalsis. Cleansing enemas promote complete evacuation of feces from the colon. They act by stimulating peristalsis through infusion of large volumes of solution. Oil-retention enemas act by lubricating the rectum and colon, allowing feces to absorb oil and become softer and easier to pass. Medicated enemas contain pharmacologic therapeutic agents. Some are prescribed to reduce dangerously high serum potassium levels (e.g., sodium polystyrene sulfonate enema) or to reduce bacteria in the colon before bowel surgery (e.g., neomycin enema).

Delegation Considerations

The skill of enema administration can be delegated to nursing assistive personnel (NAP) unless medication is instilled via an enema. The nurse directs the NAP about the following:

- Properly positioning patients who have mobility restrictions or therapeutic equipment such as drains, IV catheters, or traction
- Informing nurse about patient's new abdominal pain (*exception*: a patient reports abdominal cramping) or rectal bleeding
- Informing the nurse immediately about the presence of blood in the stool or around the rectal area, or about any change in the patient's vital signs

Equipment

- Clean gloves
- Water-soluble lubricant
- Waterproof, absorbent pads
- Toilet tissue
- Bedpan, bedside commode, or access to toilet
- Bath blanket
- Basin, washcloths, towel, and soap
- Stethoscope

Enema Bag Administration

- Enema container with tubing and clamp
- IV pole
- Appropriate-size rectal tube (adult: 22 to 30 Fr; child: 12 to 18 Fr)
- Correct volume of warmed (tepid) solution (adult: 750 to 1000 mL; adolescent: 500 to 700 mL). For pediatric patients, the

weight of the child usually determines the volume for the enema, usually 5 to 10 mL/kg (Nurko and Zimmerman, 2014).

Prepackaged Enema

- Prepackaged enema container with lubricated rectal tip

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
SAFETY ALERT “Enemas until clear” order means that you repeat enemas until patient passes fluid that is clear of fecal matter. Check agency policy, but usually patient should receive only three consecutive enemas to avoid disruption of fluid and electrolyte balance. It is essential to observe contents of solution passed.	
2 With side rail raised on patient’s right side and bed raised to appropriate working height, help patient turn onto left side-lying (Sims) position with right knee flexed. Encourage patient to remain in position until procedure is complete. Place a child in the dorsal recumbent position.	Allows enema solution to flow downward by gravity along natural curve of sigmoid colon and rectum, thus improving retention of solution.
SAFETY ALERT Patients with poor sphincter control require placement of a bedpan under the buttocks. Administering enema with patient sitting on toilet is unsafe because curved rectal tubing can abrade rectal wall.	
3 Apply clean gloves and place waterproof pad, absorbent side up, under hips and buttocks. Cover patient with bath blanket, exposing only rectal area, clearly visualizing anus.	Pad prevents soiling of linen. Blanket provides warmth, reduces exposure of body parts, and allows patient to feel more relaxed and comfortable.

STEP

RATIONALE

- 4 Separate buttocks, and examine perianal region for abnormalities, including hemorrhoids, anal fissure, and rectal prolapse.

Findings influence approach for inserting enema tip. Prolapse contraindicates enema.

- 5 Administer enema:

a Administer prepackaged disposable enema:

- (1) Remove plastic cap from tip of container. Tip may be already lubricated. Apply more water-soluble lubricant as needed.
- (2) Gently separate buttocks, and locate anus. Instruct patient to relax by breathing out slowly through mouth.
- (3) Expel any air from the enema container.
- (4) Insert lubricated tip of container gently into anal canal toward the umbilicus (Fig. 24.1).
Adult: 7.5 to 10 cm (3 to 4 inches)
Adolescent: 7.5 to 10 cm (3 to 4 inches)
Child: 5 to 7.5 cm (2 to 3 inches)
Infant: 2.5 to 3.75 cm (1 to 1½ inches)

Lubrication provides for smooth insertion of rectal tube without causing rectal irritation or trauma. With presence of hemorrhoids, extra lubricant provides added comfort.

Breathing out promotes relaxation of external rectal sphincter.

Introducing air into colon causes further distention and discomfort.

Gentle insertion prevents trauma to rectal mucosa.

SAFETY ALERT If pain occurs or you feel resistance at any time during procedure, stop and discuss with health care provider. Do not force insertion.

Continued

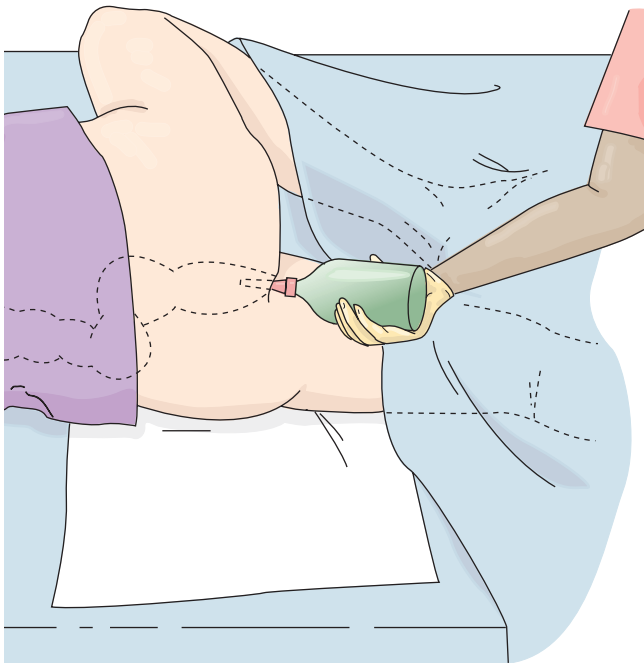


Fig. 24.1 With patient in left lateral Sims position, insert tip of commercial enema into rectum.

STEP

- (5) Roll plastic bottle from bottom to tip until all of solution has entered rectum and colon. Instruct patient to retain solution until urge to defecate occurs, usually 2 to 5 minutes.

RATIONALE

Prevents instillation of air into colon and ensures all content enters rectum. Hypertonic solutions require only small volumes to stimulate defecation.

STEP

RATIONALE

b Administer enema using enema bag:

- (1) Add warmed solution to enema bag: Warm tap water as it flows from faucet, place saline container in basin of warm water before adding saline to enema bag, and check temperature of solution by pouring small amount of solution over inner wrist.
- (2) If soap suds enema (SSE) is ordered, add castile soap after water.
- (3) Raise container, release clamp, and allow solution to flow long enough to fill tubing.
- (4) Reclamp tubing.
- (5) Lubricate 6 to 8 cm (2½ to 3 inches) of tip of rectal tube with lubricant.
- (6) Gently separate buttocks, and locate anus. Instruct patient to relax by breathing out slowly through mouth. Touch patient's skin next to anus with tip of rectal tube.

Hot water burns intestinal mucosa. Cold water causes abdominal cramping and is difficult to retain.

Prevents bubbles in bag.

Removes air from tubing.

Prevents further loss of solution.

Allows smooth insertion of rectal tube without risk for irritation or trauma to mucosa.

Breathing out and touching skin with the tube promote relaxation of external anal sphincter.

Continued

STEP	RATIONALE
(7) Insert tip of rectal tube slowly by pointing it in direction of patient's umbilicus. Length of insertion varies: <i>Adult:</i> 7.5 to 10 cm (3 to 4 inches) <i>Adolescent:</i> 7.5 to 10 cm (3 to 4 inches) <i>Child:</i> 5 to 7.5 cm (2 to 3 inches) <i>Infant:</i> 2.5 to 3.75 cm (1 to 1½ inches)	Careful insertion prevents trauma to rectal mucosa from accidental lodging of tube against rectal wall. Insertion beyond proper limit causes bowel perforation.
SAFETY ALERT If tube does not pass easily, do not force. Consider allowing a small amount of fluid to infuse, and then try to reinsert the tube slowly. The instillation of liquid relaxes the sphincter and provides additional lubrication. Remove an impaction before administering the enema.	
(8) Hold tubing in rectum constantly until end of fluid instillation. (9) Open regulating clamp and allow solution to enter slowly with container at patient's hip level. (10) Raise height of enema container slowly to appropriate level above anus: 30 to 45 cm (12 to 18 inches) for high enema, 30 cm	Prevents expulsion of rectal tube during bowel contractions. Rapid instillation stimulates evacuation of tubing and can cause cramping. Allows for continuous, slow instillation of solution. Raising container too high causes rapid instillation and possible painful distention of colon. High pressure causes rupture of bowel in infant.

STEP

RATIONALE

(12 inches) for regular enema,
7.5 cm (3 inches) for low enema.
Instillation time varies with volume of solution administered (e.g., 1 L/10 min) (Fig. 24.2). You may use an IV pole to hold an enema bag once you get a slow flow of fluid established.

SAFETY ALERT Temporary cessation of infusion minimizes cramping and promotes ability to retain solution. Lower container or clamp tubing if patient complains of cramping or if fluid escapes around rectal tube.

(11) Instill all solution and clamp tubing. Tell patient that procedure is completed and that you will be removing tubing.	Prevents entrance of air into rectum. Patients may misinterpret sensation of removing tube as loss of control.
6 Place layers of toilet tissue around tube at anus and gently withdraw rectal tube and tip.	Provides for patient's comfort and cleanliness.
7 Explain to patient that some distention and abdominal cramping are normal. Ask patient to retain solution as long as possible until urge to defecate occurs. This usually takes a few minutes. Stay at bedside. Have patient lie quietly in bed if possible. (For infant or young child, gently hold buttocks together for a few minutes.)	Solution distends bowel. Length of retention varies with type of enema and patient's ability to contract rectal sphincter. Longer retention promotes stimulation of peristalsis and defecation.

Continued

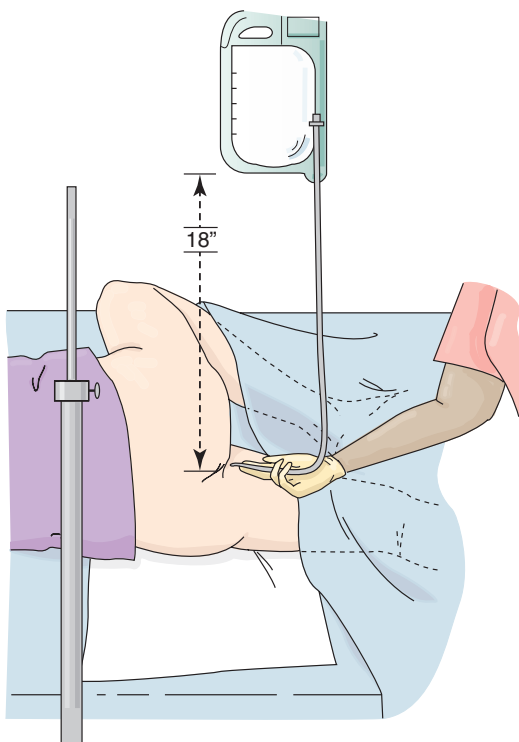


Fig. 24.2 Enema is given in Sims position. IV pole is positioned so that enema bag is 18 inches above anus.

STEP

- 8 Discard enema container and tubing in proper receptacle.
- 9 Help patient to bathroom or commode if possible. If using bedpan, help to as near normal position for evacuation as possible.

RATIONALE

Reduces transmission and growth of microorganisms. Normal squatting position promotes defecation.

STEP	RATIONALE
10 Observe characteristics of stool and solution. (Caution patient against flushing toilet before inspection.) 11 Help patient as needed to wash anal area with warm soap and water (if nurse administers perineal care, use gloves). 12 Complete postprocedure protocol.	Fecal contents irritate skin. Hygiene promotes patient's comfort.

Recording and Reporting

- Record the type and volume of enema given, time of administration, characteristics of results, and patient's tolerance of the procedure on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding through teach-back for self-administration of a prepackaged disposable enema in nurses' notes in EHR or chart.
- Report the failure of patient to defecate and any adverse effects to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Severe abdominal cramping, bleeding, or sudden abdominal pain develops and is unrelieved by temporarily stopping or slowing flow of solution. 2 Patient is unable to hold enema solution.	• Stop enema. • Notify health care provider. • If this occurs during installation, slow rate of infusion.

Enteral Nutrition via a Gastrostomy or Jejunostomy Tube

Enteral nutrition, or tube feeding, is a method for providing nutrients to patients who are not able to meet their nutritional requirements orally. As a rule, candidates for enteral nutrition must have a sufficiently functional gastrointestinal (GI) tract to absorb nutrients. Gastric feedings are the most common type of enteral nutrition, allowing tube-feeding formulas to enter the stomach and then pass gradually through the intestinal tract to ensure absorption (Fig. 25.1). In contrast, small-bowel feeding occurs beyond the pyloric sphincter of the stomach (Fig. 25.2), which theoretically reduces the risk for pulmonary aspiration, provided that feedings do not reflux back into the stomach (Metheny et al., 2011). Enteral infusion pumps control the rate of administration.

Efforts should be made to prevent or minimize aspiration. [American Association of Critical Care Nurses \(AACN, 2012\)](#) recommends maintaining head-of-bed elevation at an angle of 30 to 45 degrees unless contraindicated, using sedatives as sparingly as feasible, assessing placement of the feeding tube in tube-fed patients at 4-hour intervals, and avoiding bolus feedings in those at high-risk, and, for patients receiving gastric tube feedings, assessing for GI intolerance to the feedings at 4-hour intervals.

Delegation Considerations

The skill of administration of nasoenteric tube feeding can be delegated to nursing assistive personnel (NAP) (refer to agency policy). A registered nurse (RN) or licensed practical nurse (LPN) must first verify tube placement and patency. The nurse directs the NAP to do the following:

- Elevate head of bed to 30 to 45 degrees or sit patient up in bed or a chair.
- Not adjust feeding rate; infuse the feeding as ordered.
- Report any difficulty infusing the feeding or any discomfort voiced by patient.
- Report any gagging, paroxysms of coughing, or choking.
- Provide frequent oral hygiene.

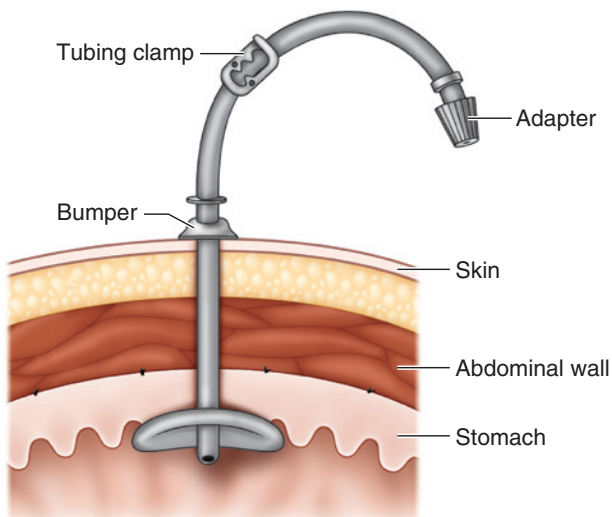


Fig. 25.1 Placement of percutaneous endoscopic gastrostomy (PEG) tube into stomach.

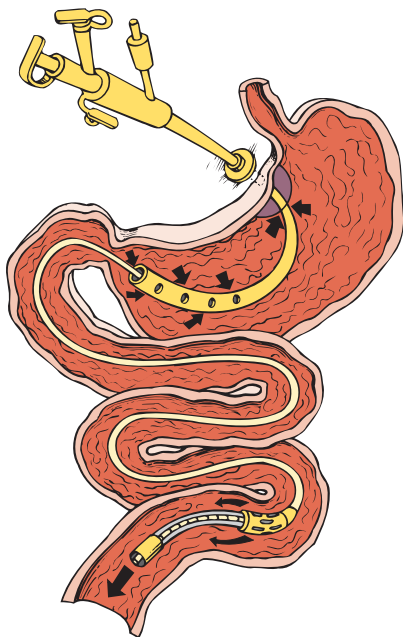


Fig. 25.2 Endoscopic insertion of jejunostomy tube.

Equipment

- Disposable feeding bag, tubing, or ready-to-hang system
- 60-mL or larger ENFit syringe
- Stethoscope
- Enteral infusion pump for continuous feedings
- pH indicator strip (scale 1.0 to 11.0)
- Prescribed enteral formula
- Clean gloves
- ENFit connector

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Perform hand hygiene. Apply clean gloves.	Reduces transmission of microorganisms and potential contamination of enteral formula.
3 Obtain formula to administer: - a Verify correct formula and check expiration date; note condition of container. - b Provide formula at room temperature.	Ensures that correct therapy is administered and checks integrity of formula. Cold formula causes gastric cramping and discomfort, because liquid is not warmed by mouth and esophagus.
4 Prepare formula for administration: a Use aseptic technique to connect tubing to container as needed. Use proper ENFit connector and avoid handling feeding system or touching can tops, container openings, spike, and spike port.	Bag, connections, and tubing must be free of contamination to prevent bacterial growth (Bankhead et al., 2009).

STEP

RATIONALE

b Shake formula container well. Clean top of canned formula with alcohol swab before opening it (Bankhead et al., 2009). c For closed systems, connect administration tubing to container. If using open system, pour formula from brick pack or can into administration bag.	Ensures integrity of formula; prevents transmission of microorganisms.
5 Open roller clamp and allow administration tubing to fill. Clamp off tubing with roller clamp. Hang container on intravenous (IV) pole.	Formulas are available in closed-system containers that contain a 24- to 48-hour supply of formula or in an open system, in which formula must be transferred from brick packs or cans to a bag before administration.
6 Place patient in high-Fowler position or elevate head of bed at least 30 degrees (preferably 45 degrees). For patient forced to remain supine, place in reverse Trendelenburg position.	Prevents introduction of air into stomach once feeding begins.
7 Verify tube placement (see Skill 26). Observe appearance of aspirate and note pH measurement.	Elevated head helps prevent pulmonary aspiration.
8 Check gastric residual volume (GRV) before each feeding (for bolus and intermittent feedings) and every 4 to 6 hours (for continuous feedings).	Verifies if tip of tube is in stomach or intestine based on pH value. GRV determines if gastric emptying is delayed. Intestinal residual is usually very small. If residual volume is greater than 10 mL, displacement of tube into stomach may have occurred.

Continued

STEP	RATIONALE
a Draw up 10 to 30 mL air into ENFit syringe and connect to end of feeding tube. b Inject air into tube. Pull back slowly and aspirate total amount of gastric contents. c Return aspirated contents to stomach unless volume exceeds 250 mL (see agency policy) (Metheny, 2010). d GRVs in range of 200 to 500 mL should raise concern and lead to implementation of measures to reduce risk of aspiration. Automatic cessation of feeding should not occur for GRV less than 500 mL in absence of other signs of intolerance (McCarthy and Martindale, 2015). e Flush feeding tube with 30 mL water (see Skill 26). 9 ENFit devices are to be used when administering enteral feedings.	GRV may not be easy to obtain from small-bore feeding tube. 60-mL syringe prevents gastric tube collapse (Makic et al., 2011). Prevents loss of nutrients and electrolytes in discarded fluid. Some questions exist regarding safety of returning high volumes of fluid into stomach (Metheny, 2010). Raising cutoff value for GRV from lower number to higher number does not increase risk for regurgitation, aspiration, or pneumonia. Elevated GRV should raise concern and lead to measures to reduce risk of aspiration (McCarthy and Martindale, 2015). Prevents clogging of tubing. These devices are not compatible with Luer-Lok connection. Use of ENFit prevents misadministration of enteral feeding or medication by wrong route such as IV tubing (Institute for Safe Medication Practices [ISMP], 2015).

STEP

RATIONALE

10 Intermittent gravity drip:

- a** Pinch proximal end of feeding tube and remove cap. Connect distal end of administration set tubing to ENFit device on feeding tube and release tubing.
- b** Set rate by adjusting roller clamp on tubing or attach tubing to feeding pump. Allow bag to empty gradually over 30 to 45 minutes (length of time of a comfortable meal). Label bag with tube-feeding type, strength, and amount. Include date, time, and initials.
- c** Immediately follow feeding with water (per health care provider's orders or agency policy). Cover end of feeding tube with cap when not in use. Keep bag as clean as possible. Change administration set every 24 hours.

11 Continuous drip method:

- a** Remove cap on tubing and connect distal end of administration set tubing to feeding tube using ENFit connector as in Step 10a.

Prevents excessive air from entering patient's stomach and leakage of gastric contents. Ensures that feeding will be administered into correct tubing (ISMP, 2015).

Gradual emptying of tube feeding by gravity from feeding bag reduces risk for abdominal discomfort, vomiting, or diarrhea induced by bolus or too-rapid infusion of tube feedings. Labeling provides means to determine when to change administration set and confirms that right patient is receiving feeding.

Prevents tube from clogging. Prevents air from entering stomach between feedings and limits microbial contamination of system.

Continuous feeding method is designed to deliver prescribed hourly rate of feeding. This method reduces risk for abdominal discomfort.

Prevents excess air from entering patient's stomach and leakage of gastric contents.

Continued

STEP	RATIONALE
b Thread tubing through feeding pump; set rate on pump and turn on (see Skill 26).	Delivers continuous feeding at a steady rate and pressure. Feeding pump alarms for increased resistance.
SAFETY ALERT Maximum hang time for formula is 12 hours in an open system, and 24 to 48 hours in a closed, ready-to-hang system (if it remains closed). Refer to manufacturer's guidelines.	
12 Advance rate of tube feeding gradually, as ordered.	Tube feeding can usually begin with full-strength formula. Conservative initiation and advancement of enteral nutrition depend on factors
13 After feeding, flush tubing with 30 mL water every 4 hours during continuous feeding (see agency policy) or before and after an intermittent feeding. Have registered dietitian recommend total free-water requirement per day and obtain health care provider's order.	such as patient's age, medical condition, nutritional status, and expected patient tolerance (Kozeniecki et al., 2015).
14 Rinse bag and tubing with warm water whenever feedings are interrupted. Use a new administration set every 24 hours.	Provides patient with source of water to help maintain fluid and electrolyte balance. Clears tubing of formula.
15 Complete postprocedure protocol.	Rinsing bag and tubing with warm water clears old tube feedings and reduces bacterial growth.

Recording and Reporting

- Record amount and type of feeding, infusion rate, method of infusion, patient's response to tube feeding (e.g., GRV, cramping, bowel sounds, patency of tube, condition of skin at tube site).

- Record volume of formula and any additional water on intake and output form.
- Report type of feeding, status of feeding tube, patient's tolerance, and adverse outcomes.
- Document your evaluation of patient learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Feeding tube becomes clogged.	• Attempt to flush tube with water. • Special products are available for unclogging feeding tubes; do not use carbonated beverages and juices. • Hold feeding and notify health care provider. • Maintain patient in semi-Fowler position. • Contact pharmacist to change medications to liquid form and flush before and after intermittent feedings and medications (Kozeniecki et al., 2015).
2 Patient develops large amount of diarrhea (more than three loose stools in 24 hours).	• Notify health care provider. • Consult dietitian about need to change formula to prevent malabsorption. • Identify and treat underlying medical/surgical issues and infections (Kozeniecki et al., 2015). • Provide perianal skin care after each stool. • Determine other causes of diarrhea (e.g., <i>Clostridium difficile</i> infection, contaminated tube feeding, medication containing sorbitol).

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient develops nausea and vomiting.	• Administer antiemetic as ordered. • Use agents (ordered by health care provider) to increase gastric motility. • Withhold tube feeding and notify health care provider. • Be sure that tube is patent; aspirate for residual.
4 Patient aspirates formula (auscultation of crackles or wheezes, dyspnea, or fever).	• Report change in condition to health care provider. • Position patient on side. • Suction nasotracheally or orotracheally.

Enteral Nutrition via a Nasoenteric Feeding Tube

Enteral nutrition, or tube feeding, is a method for providing nutrients to patients who are not able to meet their nutritional requirements orally. As a rule, candidates for enteral nutrition must have a sufficiently functional gastrointestinal (GI) tract to absorb nutrients. Examples of indications for enteral feeding include the following:

- Situations in which normal eating is not safe because of high risk for aspiration
- Clinical conditions that interfere with normal ingestion or absorption of nutrients or create hypermetabolic states: surgical resection of oropharynx, proximal intestinal obstruction or fistula, pancreatitis, burns, and severe pressure injuries
- Conditions in which disease or treatment-related symptoms reduce oral intake: anorexia, nausea, pain, fatigue, shortness of breath, or depression

Gastric feedings are the most common type of enteral nutrition, allowing tube-feeding formulas to enter the stomach and then pass gradually through the intestinal tract to ensure absorption. In contrast, small bowel feeding occurs beyond the pyloric sphincter of the stomach, which theoretically reduces the risk for pulmonary aspiration, provided that feedings do not reflux into the stomach (Metheny et al., 2011).

Delegation Considerations

The skill of administration of nasoenteric tube feeding can be delegated to nursing assistive personnel (NAP) (refer to agency policy.) A registered nurse (RN) or licensed practical nurse (LPN) must first verify tube placement and patency. The nurse directs the NAP to do the following:

- Elevate head of bed to 30 to 45 degrees or sit patient up in bed or a chair.
- Not adjust feeding rate; infuse the feeding as ordered.
- Report any difficulty infusing the feeding or any discomfort voiced by patient.
- Report any gagging, paroxysms of coughing, or choking.
- Provide frequent oral hygiene.

Equipment

- Disposable feeding bag, tubing, and formula or ready-to-hang system
- 60-mL or larger catheter-tip syringe
- Stethoscope
- Enteral infusion pump for continuous feedings
- pH indicator strip (scale 0.0 to 11.0)
- Prescribed enteral formula
- Clean gloves
- ENFit connector

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Obtain formula to administer: a Verify correct formula and check expiration date; note condition of container. b Provide formula at room temperature.	Ensures that correct therapy is administered and checks integrity of formula. Cold formula causes gastric cramping and discomfort because liquid is not warmed by mouth and esophagus.
3 Prepare formula for administration: a Use aseptic technique to connect tubing to container as needed. Use proper ENFit connector and avoid handling feeding system or touching can tops, container openings, spike, and spike port. b Shake formula container well. Clean top of canned formula with alcohol swab before opening it (Bankhead et al., 2009).	Bag, connections, and tubing must be free of contamination to prevent bacterial growth (Bankhead et al., 2009). Ensures integrity of formula; prevents transmission of microorganisms.

STEP

RATIONALE

c For closed systems, connect administration tubing to container. If using open system, pour formula from brick pack or can into administration bag. 4 Open roller clamp and allow administration tubing to fill. Clamp off tubing with roller clamp. Hang container on intravenous (IV) pole. 5 Place patient in high-Fowler position or elevate head of bed at least 30 degrees (preferably 45 degrees). For patient forced to remain supine, place in reverse Trendelenburg position. 6 Verify placement of tube. Observe appearance of aspirate and note pH measurement. 7 Check gastric residual volume (GRV) before each feeding (for bolus and intermittent feedings) or every 4 to 6 hours (for continuous feedings) (Fig. 26.1) (Bankhead et al., 2009). a Draw up 10 to 30 mL of air into ENFit syringe and connect to end of feeding tube. b Inject air into tube. Pull back slowly and aspirate total amount of gastric contents.	Formulas are available in closed-system containers that contain a 24- to 48-hour supply of formula or in an open system, in which formula must be transferred from brick packs or cans to a bag before administration. Prevents introduction of air into stomach once feeding begins. Elevated head helps prevent pulmonary aspiration. Verifies if tip of tube is in stomach or intestine based on pH value. GRV determines if gastric emptying is delayed. Intestinal residual is usually very small. If residual volume is greater than 10 mL, displacement of tube into stomach may have occurred. GRV may not be easy to obtain from small-bore feeding tube. 60-mL syringe prevents gastric tube collapse (Makic et al., 2011).

Continued



Fig. 26.1 Check for gastric residual volume (GRV).

STEP

- c Return aspirated contents to stomach unless volume exceeds 250 mL (see agency policy) (Metheny, 2010).
- d GRVs in range of 200 to 500 mL should raise concern and lead to implementation of measures to reduce risk of aspiration. Automatic cessation of feeding should not occur for GRV less than 500 mL in absence of other signs of intolerance (McCarthy and Martindale, 2015).
- e Flush feeding tube with 30 mL of water.

RATIONALE

Prevents loss of nutrients and electrolytes in discarded fluid. Some questions exist regarding safety of returning high volumes of fluid into stomach (Metheny, 2010).

Raising cutoff value for GRV from lower number to higher number does not increase risk for regurgitation, aspiration, or pneumonia. Elevated GRV should raise concern and lead to measures to reduce risk of aspiration (McCarthy and Martindale, 2015).

Prevents clogging of tubing.

STEP

- 8 ENFit devices are to be used when administering enteral feedings.

9 Intermittent gravity drip:

- a Pinch proximal end of feeding tube and remove cap. Connect distal end of administration set tubing to ENFit device on feeding tube and release tubing.
- b Set rate by adjusting roller clamp on tubing, or attach tubing to feeding pump. Allow bag to empty gradually over 30 to 45 minutes. Label bag with tube-feeding type, strength, and amount. Include date, time, and initials.
- c Immediately follow feeding with water (per health care provider's orders or agency policy). Cover end of feeding tube with cap when not in use. Keep bag as clean as possible. Change administration set every 24 hours.

RATIONALE

These devices are not compatible with Luer-Lok connection. Use of ENFit prevents misadministration of enteral feeding or medication by wrong route such as IV tubing (Institute for Safe Medication Practices [ISMP], 2015).

Prevents excessive air from entering patient's stomach and leakage of gastric contents. Ensures that feeding will be administered into correct tubing (ISMP, 2015).

Gradual emptying of tube feeding reduces risk for abdominal discomfort, vomiting, or diarrhea induced by bolus or too-rapid infusion of tube feedings. Labeling provides means to determine when to change administration set and confirms that right patient is receiving feeding.

Prevents tube from clogging. Prevents air from entering stomach between feedings and limits microbial contamination of system.

Continued

STEP	RATIONALE
10 Continuous drip method: a Remove cap on tubing and connect distal end of administration set tubing to feeding tube using ENFit connector as in Step 9a. b Thread tubing through feeding pump; set rate on pump and turn on (Fig. 26.2).	Continuous feeding method is designed to deliver prescribed hourly rate of feeding and reduce risk for abdominal discomfort. Delivers continuous feeding at steady rate and pressure. Feeding pump alarms for increased resistance.

SAFETY ALERT Maximum hang time for formula is 12 hours in an open system; 24 to 48 hours in a closed, ready-to-hang system (if it remains closed). Refer to manufacturer's guidelines.



Fig. 26.2 Connect tubing through infusion pump. (Image used with permission of Covidien. All rights reserved.)

STEP	RATIONALE
11 Advance rate of tube feeding gradually, as ordered.	Tube feeding can usually begin with full-strength formula. Conservative initiation and advancement of enteral nutrition depend on factors such as patient's age, medical condition, nutritional status, and expected patient tolerance (Kozeniecki et al., 2015).
12 Flush tubing with 30 mL of water every 4 hours during continuous feeding (see agency policy) and before and after an intermittent feeding. Have registered dietitian recommend total free water requirement per day and obtain health care provider's order.	Provides patient with source of water to help maintain fluid and electrolyte balance. Clears tubing of formula.
13 Rinse bag and tubing with warm water whenever feedings are interrupted. Use new administration set every 24 hours.	Rinsing bag and tubing with warm water clears old tube feedings and reduces bacterial growth.
14 Complete postprocedure protocol.	

Recording and Reporting

- Record amount and type of feeding, infusion rate, method of infusion, patient's response to tube feeding (e.g., GRV, cramping, bowel sounds, patency of tube, condition of skin at tube site).
- Record volume of formula and any additional water on intake and output form.
- Report type of feeding, status of feeding tube, patient's tolerance, and adverse outcomes.
- Document your evaluation of patient learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Feeding tube becomes clogged.	• Attempt to flush tube with water. • Special products are available for unclogging feeding tubes; do not use carbonated beverages and juices. • Hold feeding and notify health care provider. • Maintain patient in semi-Fowler position. • Contact pharmacist to change medications to liquid form and flush before and after intermittent feedings and medications (Kozeniecki et al., 2015).
2 Patient develops large amount of diarrhea (more than three loose stools in 24 hours).	• Notify health care provider. • Consult dietitian about need to change formula to prevent malabsorption. • Identify and treat underlying medical/surgical issues and infections (Kozeniecki et al., 2015). • Provide perianal skin care after each stool. • Determine other causes of diarrhea (e.g., <i>Clostridium difficile</i> infection, contaminated tube feeding, medication containing sorbitol).

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient develops nausea and vomiting.	• Administer antiemetic as ordered. • Use agents (ordered by health care provider) to increase gastric motility. • Withhold tube feeding and notify health care provider. • Be sure that tube is patent; aspirate for residual.
4 Patient aspirates formula (auscultation of crackles or wheezes, dyspnea, or fever).	• Report change in condition to health care provider. • Position patient on side. • Suction nasotracheally or orotracheally.

Epidural Analgesia

Epidural analgesia is highly effective for controlling acute pain during labor; after surgery; or after trauma to the chest, abdomen, pelvis, or lower limbs. It has the potential to provide excellent pain relief, minimal side effects, and high patient satisfaction when compared with other methods of analgesia (Rowbotham et al., 2010). The epidural space is a potential space that contains a network of vessels, nerves, and fat located between the vertebral column and the dura mater, the outermost meninges covering the spinal cord (Fig. 27.1). Analgesics delivered into this space distribute by: (1) diffusion through the dura mater into the cerebrospinal fluid (CSF), where they act directly on the receptors in the dorsal horn of the spinal cord; (2) blood vessels in the epidural space, where they are delivered systemically; and/or (3) absorption by fat in the epidural space, creating a depot where the analgesia is slowly released systemically.

Opioids and local anesthetics, separately or in combination, are used in epidural analgesia. Opioids are delivered close to their site of action (central nervous system) and thus require much smaller doses to achieve the same pain relief (D'Arcy, 2011). Common opioids given epidurally include morphine, hydromorphone, fentanyl, and sufentanil.

A patient is placed in the lateral side-lying or sitting position with the shoulders and hips in alignment and the hips and head flexed during insertion of an epidural catheter. An anesthesia provider places a catheter into the epidural space below the second lumbar vertebra, where the spinal cord ends (Fig. 27.2). However, epidurals may also be placed at the thoracic level of the spinal cord. A catheter intended for permanent or long-term use is “tunneled” subcutaneously and exits on the side of the body (Fig. 27.3) or on the abdomen. Tunneling reduces infection and catheter dislodgement. A sterile occlusive dressing covers the catheter exit site and is secured to the patient. An x-ray film confirms epidural catheter placement.

The use of epidural opioids requires astute nursing observation and care; thus most institutions require specialized training for nurses who will manage epidural analgesia. The catheter poses a threat to patient safety because of its anatomic location, its potential for migration through the dura, and its proximity to spinal nerves and vessels. Catheter migration into the subarachnoid space can produce dangerously high medication levels. Frequent complications include hypotension, respiratory depression, motor block, urinary retention, pruritus, and superficial infection around a catheter. *Do not administer other supplemental opioids or sedatives when patients are on an epidural.* The combined effect adds to the risk for

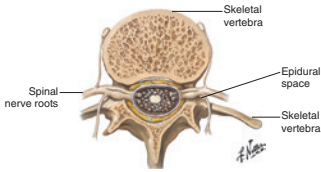


Fig. 27.1 Anatomic drawing of epidural space. (Reprinted from www.netterimages.com Elsevier, Inc. All rights reserved.)

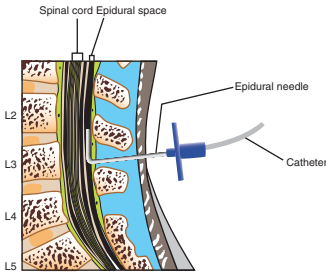


Fig. 27.2 Placement of epidural catheter.

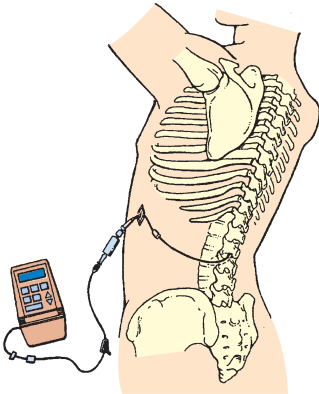


Fig. 27.3 Epidural catheter attached to ambulatory infusion pump. (Image courtesy Astra Zeneca Pharmaceuticals, Wilmington, Del. All rights reserved.)

respiratory depression. In many health care agencies anesthesia providers are the only health care providers who may initiate epidural opioid infusions or administer a medication bolus.

Delegation Considerations

The skill of epidural analgesia administration cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Observe the dressing over the insertion site when repositioning or ambulating patients to prevent catheter disruption.
- Avoid pulling patient up in bed while patient is lying flat on his or her back, which can dislodge the epidural catheter.
- Report any catheter disconnection or leakage from dressing immediately.
- Immediately report to the nurse any change in patient status, comfort level, or loss of sensation or movement.

Equipment

- Clean gloves
- Sterile gloves (if removing epidural dressing)
- Prediluted preservative-free opioid as prescribed by health care provider for use in IV infusion pump (This is prepared by pharmacy.)
- Infusion pump and compatible tubing (Do not use Y-ports for infusion; some infusion pumps have color-coded tubing for intraspinal use.)
- Antibacterial filter
- Tape
- Label (for tubing and injection port)
- Equipment for vital signs and pulse oximetry or capnography (see agency policy)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Verify that catheter is secured to patient's skin from the back or front.	Prevents dislodging or migration of catheter.
3 Assess catheter insertion site for redness, warmth, tenderness, swelling, and drainage. Apply sterile gloves when removing occlusive dressing.	Catheter sites are at risk for local infections. Purulent drainage is a sign of infection. Clear drainage may indicate CSF leakage from punctured dura. Bloody drainage may indicate that catheter entered blood vessel.

STEP

- 4 Verify health care provider's order against medication administration record (MAR) for name of medication, dosage, route, infusion method (bolus, continuous, or demand), and lockout settings.
- 5 For continuous infusion check patency of IV tubing and check infusion pump for proper calibration and operation. Keep IV line patent for 24 hours after epidural analgesia is completed.
- 6 Prepare analgesia, following "six rights" of medication administration. **NOTE:** Pharmacy prepares medication for pump. In the case of a bolus injection, draw up prediluted, preservative-free opioid solution through the filter needle into syringe.
- 7 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.

RATIONALE

Ensures that right drug is administered to patient. *This is the first check for accuracy.*

Kinked or clamped tubing will interrupt analgesic infusion; may cause clotting at end of IV catheter and require replacement. Patent IV line allows IV access in case medications are needed to counteract adverse reactions.

Ensures safe and appropriate medication administration. *This is the second check for accuracy.*

Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2014).

Continued

STEP	RATIONALE
8 Attach “epidural line” label to the epidural infusion tubing. Be sure that there are <i>no</i> Y-ports for continuous or demand infusions.	Labeling helps to ensure that analgesic medication is administered into correct line and epidural space. Labeling of high-risk catheters prevents connection with an inappropriate tube or catheter (TJC, 2014). Using tubing without Y-ports prevents accidental injection or infusion of other medications.
9 At bedside compare the MAR or computer printout with the name of medication on the drug container.	<i>This is the third check for accuracy.</i> It ensures that the right patient receives the right medication.
10 Perform hand hygiene, and apply clean gloves.	
11 Administer continuous infusion:	
a Attach container of diluted, preservative-free medication to infusion pump tubing, and prime tubing (see Skill 55).	Tubing should be filled with solution and free of air bubbles to avoid air embolus.
b Insert tubing into infusion pump; then attach distal end of tubing to epidural catheter.	Infusion pumps propel fluid through tubing.
c Check infusion pump for proper calibration and operation. Many institutions have two nurses check settings.	Ensures patient is receiving proper dose and pain relief.
d Tape all connections. Give ordered bolus, or start infusion.	Taping maintains a secure, closed system to help prevent infection. Sometimes a filter is necessary in the tubing (see agency policy).

STEP

RATIONALE

12 Administer bolus dose of medication:

- a** Take prepared syringe, and change filter needle to regular 20-gauge needleless adapter.
- b** Clean injection cap of epidural catheter with antiinfective according to agency policy. (Do not use alcohol.)
- c** Dry injection cap with sterile gauze.
- d** Insert needleless adapter of syringe into injection cap. Aspirate.

Prevents infusion of microscopic glass particles and allows medication to be injected.

Cleaning agent prevents introduction of microorganisms into the central nervous system. Alcohol causes pain and is toxic to neural tissue.

Reduces possible injection of antiseptic.

Aspiration determines position of catheter. Should aspirate less than 1 mL of clear fluid.

SAFETY ALERT Aspiration of more than 1 mL of clear fluid or bloody return means catheter may have migrated into subarachnoid space or into a vessel. Do not inject drug. Notify anesthesia care provider.

- e** Inject opioid at a rate of 1 mL over 30 seconds.
- f** Remove syringe from injection cap. There is no need to flush with saline.
- g** Dispose of syringe in sharps container.

Slow injection prevents discomfort by lowering the pressure exerted by fluid as it enters the epidural space.

The catheter is in a space, not a blood vessel; thus flushing with saline is not required (Pasero and McCaffery, 2011).

Prevents possible exposure to blood.

13 Complete postprocedure protocol.**Recording and Reporting**

- Record drug, dose, method (bolus, demand, or continuous), and time given (if injection) or time begun and ended (if demand or continuous) on appropriate medication record. Specify concentration and diluent.

- With continuous or demand infusion, obtain and record pump readout hourly for first 24 hours after infusion begins and then every 4 hours. Review pump settings and usage together with staff starting the next shift.
- Record regular periodic assessments of patient's status in nurses' notes, in electronic health record (EHR), and/or on appropriate flow sheet, including vital signs, pulse oximetry, intake and output (I&O), sedation level, pain severity score, neurologic status, appearance of epidural site, presence or absence of adverse reactions to medication, and presence or absence of complications resulting from placement and maintenance of epidural catheter (Pasero and McCaffery, 2011).
- Report any adverse reactions or complications to health care provider immediately.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient states pain is still present or has increased. Primary causes are insufficient drug dose or catheter blockage, breakage, or improper position. 2 Patient is sedated or not easily arousable.	• Check all tubing, connections, medication doses, and pump settings. • Report to health care provider adequacy of medication dose. • Stop epidural infusion and elevate patient's head of bed 30 degrees (unless contraindicated). • Prepare to administer opioid-reversing agent per health care provider's order. • Monitor all vital signs, pulse oximetry, and sedation level continuously until patient is easily aroused.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient experiences periods of apnea or respirations are less than 8 breaths per minute, shallow, or irregular.	• Instruct patient to take deep breaths. • Notify health care provider. • Prepare to administer opioid-reversing agent, such as naloxone (Narcan), per health care provider's order. (Agency manual may have protocol.) • Monitor at least every 30 minutes until respirations are 8 breaths or more per minute and of adequate depth for 2 hours.
4 Patient reports sudden headache. Clear drainage is present on epidural dressing or more than 1 mL of fluid is aspirated from catheter. Possible indication that catheter has migrated into the subarachnoid space.	• Stop infusion. • Notify health care provider.
5 Blood is present on epidural dressing or aspirated from the catheter. Probable indication that catheter has punctured a blood vessel.	• Stop infusion. • Notify health care provider.
6 Redness, warmth, tenderness, swelling, or exudate is noted at catheter insertion site. These are signs and symptoms of infection.	• Notify health care provider.
7 Patient experiences minimal urinary output, urinary frequency or urgency, bladder distention, pruritus, or nausea and vomiting.	• Consult with health care provider about reducing the dose of opioid, and discuss treatment for side effects.

Eye Irrigation

A chemical injury to the eye is an emergency and requires flushing the eye with copious amounts of irrigation fluid. Cool tap water is recommended because it is effective and initially helps to dilute the concentration of the chemical. Tap water irrigation is also used in emergency situations when a foreign object has entered the eye. Irrigate immediately with copious amounts of cool water or saline for at least 15 minutes to minimize corneal damage (Chau et al., 2012; Serrano et al., 2013). If the person wears a contact lens that did not wash out with the irrigation, have him or her try to remove the lens.

Delegation Considerations

The skill of eye irrigation cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Report any patient complaint of discomfort or excess tearing following irrigation.

Equipment

- Emergency: cool tap water
- Prescribed irrigating solution: volume usually 30 to 180 mL at 32° to 38° C (90° to 100° F) (For chemical flushing, use normal saline or lactated Ringer solution in large volume to provide continuous irrigation over 15 minutes.)
- pH test strip
- Sterile basin or bag of solution
- Curved emesis basin
- Waterproof pad or towel
- 4 × 4-inch gauze pads
- Soft bulb syringe, eyedropper, or intravenous (IV) tubing
- Clean gloves
- Penlight
- Medication administration record (MAR)

Implementation

STEP	RATIONALE
1 In acute emergent situations: Use copious amounts of clear cool water (normal saline, or lactated Ringer solution if	Minimizes corneal damage (Chau et al., 2012).

STEP

RATIONALE

quickly available) to flush eyes for at least 15 minutes. Sometimes irrigating volumes up to 20 L or more are required to change pH to physiologic levels (pH testing should be done) (Singh et al., 2013).

- 2 If not an immediate emergency, identify patient using at least two identifiers (e.g., name and birthday or name and medical record number) according to agency policy.
- 3 Perform hand hygiene. Apply clean gloves.
- 4 Remove any contact lens, if possible. Remove gloves after contact lens is removed. Reapply new gloves.

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Reduces transmission of microorganisms. Protects hands from chemical irritants. Prompt removal of lenses is needed to safely and completely irrigate foreign substances from patient's eyes. Removal of gloves following contact lens removal prevents reintroduction of chemical transferred from lens to glove.

SAFETY ALERT In an emergency such as first aid for a chemical burn, do not delay by removing patient's contact lens before irrigation. Do not remove lens unless rapid swelling is occurring. Flush eye from the inner to outer canthus with cool tap water immediately (Chau et al., 2012; Serrano et al., 2013).

- 5 Place towel or waterproof pad under patient's face and curved emesis basin just below patient's cheek on side of affected eye.

Catches irrigation fluid.

Continued

STEP	RATIONALE
6 Explain next steps to patient and encourage relaxation: - With gloved finger gently retract upper and lower eyelids to expose conjunctival sacs. - To hold lids open, apply gentle pressure to lower bony orbit and bony prominence beneath eyebrow. Do not apply pressure over eye. 7 Hold irrigating syringe, dropper, or IV tubing approximately 2.5 cm (1 inch) from inner canthus. 8 Ask patient to look toward brow. Gently irrigate with steady stream toward lower conjunctival sac, moving from inner to outer canthus (Fig. 28.1). 9 Reinforce importance of procedure and encourage patient by using calm, confident, soft voice. 10 Allow patient to blink periodically. 11 Continue irrigation with prescribed solution volume or time or until secretions are cleared. (NOTE: In emergent situation, an irrigation of 15 minutes or more is needed to flush chemicals.)	Retraction minimizes blinking and allows irrigation of conjunctiva. Direct contact with irrigation equipment may injure eye. Minimizes force of stream on patient's cornea. Flushes irritant out and away from the other eye and nasolacrimal duct. Reduces anxiety. Lid closure moves secretions from upper conjunctival sac. Assessment of eye secretion pH may be necessary if eye was exposed to an acidic or basic solution during injury (Chau et al., 2012).

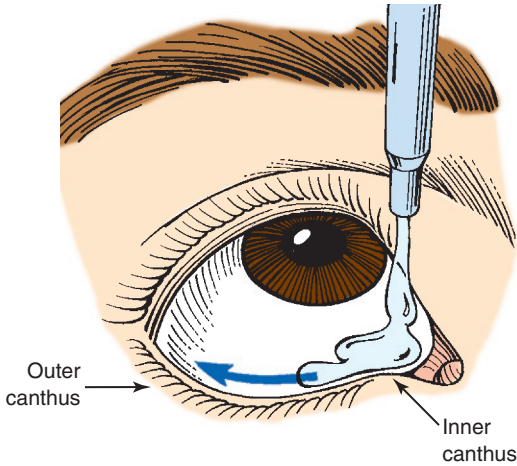


Fig. 28.1 Irrigation of eye from inner to outer canthus.

STEP

- 12 Blot excess moisture from eyelids and face with gauze or towel.
- 13 Complete postprocedure protocol.

RATIONALE

Reduces transmission of microorganisms.

Recording and Reporting

- Record in nurses' notes in electronic health record (EHR) or chart the condition of eye and patient's report of pain and visual symptoms. Record amount and type of irrigation in patient's MAR.
- Document your evaluation of patient learning.
- Report continuing symptoms of pain or blurred vision.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Anxiety.	• Reinforce rationale for irrigation. • Allow patient to close eye periodically during irrigation. • Instruct patient to take slow, deep breaths.
2 Patient complains of photophobia, excessive tearing, pain, or foreign body sensation in eye following irrigation.	• Advise patient to close eye and avoid eye movement. • Immediately notify health care provider or eye care practitioner.

Eye Medications

Drops and Ointment

The eye is the most sensitive organ to which you apply medications. The cornea is richly supplied with sensitive nerve fibers. Care must be taken to prevent instilling medication directly onto the cornea. The conjunctival sac is much less sensitive and thus a more appropriate site for medication instillation.

Any patient receiving topical eye medications should learn correct self-administration of the medication, especially patients with glaucoma, who must often undergo lifelong medication administration for control of their disease. Nurses can easily instruct patients while administering medications. Family caregivers may need to administer eye medications when a patient is unable to manipulate an applicator, when a patient has recently undergone eye surgery, or when a patient's vision is so impaired that it is difficult to assemble needed supplies and handle applicators correctly.

Delegation Considerations

The skill of administering ophthalmic medications cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP about the following:

- The specific potential side effects of medications and to report their occurrence
- The potential for temporary burning or blurring of vision after administration of eye medications

Equipment

- Appropriate medication (eyedrops with sterile eyedropper, ointment tube, medicated intraocular disk)
- Clean gloves
- Medication administration record (MAR) (electronic or printed)

Eyedrops/Ointment

- Cotton ball or tissue
- Wash basin filled with warm water and washcloth
- Eye patch and tape (*optional*)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR with prescriber’s written medication order. Check patient’s name, drug name and dosage, route (eye[s]), and time of administration. Clarify incomplete or unclear orders with health care provider before administration. 3 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient’s MAR or medical record. 4 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about the drugs. Patients who self-instill medications may be allowed to give drops under nurse’s supervision (check agency policy). Tell patients receiving eyedrops (mydriatics) that vision will be blurred temporarily and sensitivity to light may occur. 5 Apply clean gloves. Ask patient to lie supine or to sit back in chair with head slightly hyperextended, looking up.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives correct medications (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013). Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). Patient has right to be informed, and patient’s understanding of each medication improves adherence to drug therapy. Position provides easy access to eye for medication instillation and minimizes drainage of medication into tear duct.

STEP

- 6 If drainage or crusting is present along eyelid margins or inner canthus, gently wash away. Soak any dried crusts with warm, damp washcloth or cotton ball applied over eye for several minutes. Always wipe clean from inner to outer canthus (Fig. 29.1). Remove gloves and perform hand hygiene.

RATIONALE

Soaking allows easy removal of crusts without applying pressure to eye. Cleaning from inner to outer canthus avoids entrance of microorganisms into lacrimal duct (Burchum and Rosenthal, 2016).

SAFETY ALERT Do not hyperextend the neck of a patient with cervical spine injury.

Continued

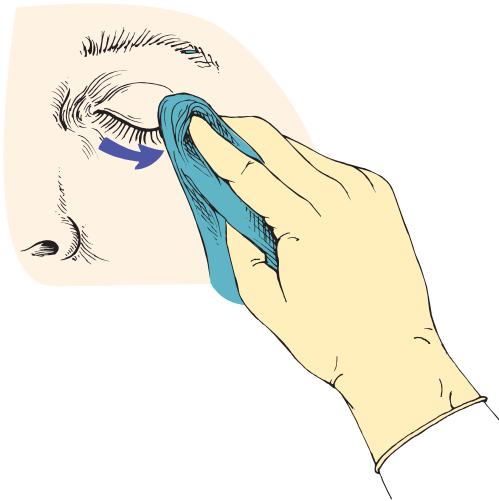


Fig. 29.1 Cleanse eye, washing from inner to outer canthus before administering drops or ointment.

STEP

a Instill eyedrops:

- (1) Apply clean gloves. Hold cotton ball or clean tissue in nondominant hand on patient's cheekbone just below lower eyelid.
- (2) With tissue or cotton resting below lower lid, gently press downward with thumb or forefinger against bony orbit, exposing conjunctival sac. Never press directly against patient's eyeball.
- (3) Ask patient to look at ceiling. Rest dominant hand on patient's forehead; hold filled medication eyedropper approximately 1 to 2 cm ($\frac{1}{4}$ to $\frac{1}{2}$ inches) above conjunctival sac.
- (4) Drop prescribed number of drops into conjunctival sac (Fig. 29.2).
- (5) If patient blinks or closes eye, causing drops to land on outer lid margins, repeat procedure.

RATIONALE

Cotton or tissue absorbs medication that escapes eye.

Prevents pressure and trauma to eyeball and prevents fingers from touching eye.

Action moves cornea up and away from conjunctival sac and reduces blink reflex. Prevents accidental contact of eyedropper with eye and reduces risk of injury and transfer of microorganisms to dropper (ophthalmic medications are sterile).

Conjunctival sac normally holds 1 or 2 drops. Provides even distribution of medication across eye.

Therapeutic effect of drug is obtained only when drops enter conjunctival sac.



Fig. 29.2 Eyedropper held above conjunctival sac.

STEP

- (6) When administering drops that may cause systemic effects, apply gentle pressure to patient's nasolacrimal duct with clean tissue for 30 to 60 seconds over each eye, one at a time. Avoid pressure directly against patient's eyeball.
- (7) After instilling drops, ask patient to close eyes gently.

RATIONALE

Prevents overflow of medication into nasal and pharyngeal passages. Prevents absorption into systemic circulation (American Society of Health-System Pharmacists [ASHP], 2013b).

Helps distribute medication. Squinting or squeezing eyelids forces medication from conjunctival sac.

Continued

STEP

b Instill eye ointment:

- (1) Holding applicator above lower lid margin, apply thin ribbon of ointment evenly along inner edge of lower eyelid on conjunctiva (Fig. 29.3) from inner to outer canthus.
- (2) Have patient close eye and rub lid lightly in circular motion with cotton ball, if rubbing is not contraindicated. Avoid placing pressure directly against patient's eyeball.
- (3) If excess medication is on eyelid, gently wipe it from inner to outer canthus.

RATIONALE

Distributes medication evenly across eye and lid margin.

Further distributes medication without traumatizing eye.

Promotes comfort and prevents trauma to eye.



Fig. 29.3 Nurse applies ointment along the lower eyelid from the inner to outer canthus.

STEP

- (4) If patient needs an eye patch, apply clean one by placing it over affected eye so entire eye is covered. Tape securely without applying pressure to eye.

c Apply intraocular disk:

- (1) Open package containing the disk. Gently press your fingertip against the disk so that it adheres to your finger. It may be necessary to moisten gloved finger with sterile saline. Position the convex side of the disk on your fingertip.
- (2) With your other hand, gently pull the patient's lower eyelid away from the eye. Ask patient to look up.
- (3) Place the disk in the conjunctival sac, so that it floats on the sclera between the iris and lower eyelid (Fig. 29.4).
- (4) Pull the patient's lower eyelid out and over the disk (Fig. 29.5).

RATIONALE

Clean eye patch reduces risk of infection.

Allows nurse to inspect disk for damage or deformity.

Prepares conjunctival sac for receiving medicated disk and moves sensitive cornea away.

Ensures delivery of medication.

Ensures accurate medication delivery.

Continued

Fig. 29.4 Place intraocular disk in the conjunctival sac between the iris and the lower eyelid.

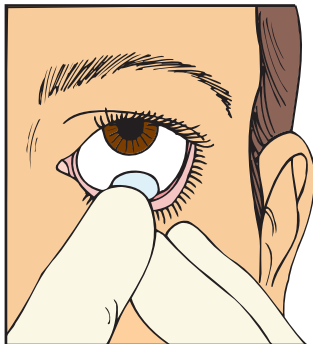
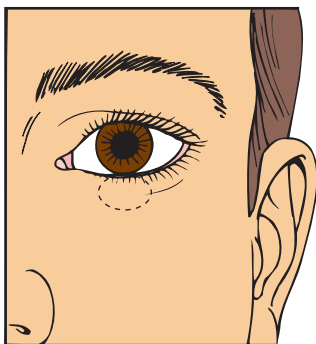


Fig. 29.5 Gently pull the patient's lower eyelid over the disk.



STEP

d Remove intraocular disk:

- (1) Perform hand hygiene and apply clean gloves. Gently pull on the patient's lower eyelid to expose the disk.

RATIONALE

Intraocular disks may remain in place for up to 1 week (duration varies).
Exposes disk.

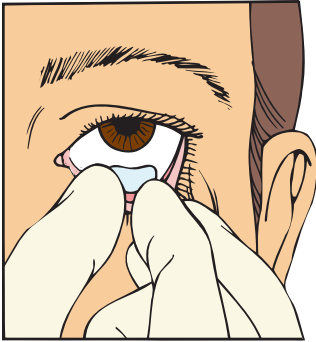


Fig. 29.6 Carefully pinch the disk to remove it from the patient's eye.

STEP

- (2) Using your forefinger and thumb of your dominant hand, pinch the disk, and lift it out of the patient's eye (Fig. 29.6).
- 7 Complete postprocedure protocol.

RATIONALE

Recording and Reporting

- Record drug, concentration, dose or strength, number of drops, site of application (left, right, or both eyes), and time of administration on MAR immediately after administration, not before. Include initials or signature.
- Record patient teaching and validation of patient's understanding on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Record objective data related to tissues involved (e.g., redness, drainage, irritation), any subjective data (e.g., pain, itching, altered vision), and patient's response to medications. Note any side effects experienced on flow sheet or in nurses' notes in EHR or chart.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider. Depending on medication, immediate health care provider notification may be required.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of burning or pain or experiences local side effects (e.g., headache, bloodshot eyes, local eye irritation).	• Eyedrops may have been instilled onto cornea or dropper touched surface of eye. • Notify health care provider for possible adjustment in medication type and dosage.
2 Patient experiences systemic effects from drops (e.g., increased heart rate and blood pressure from epinephrine, decreased heart rate and blood pressure from timolol).	• Notify prescriber immediately. • Remain with patient. • Withhold further doses.

Fall Prevention in a Health Care Facility

Each year approximately 700,000 to 1,000,000 people in the United States fall in hospitals ([Agency for Healthcare Research and Quality \[AHRQ\], 2013a](#)). Research shows that approximately one-third of falls can be prevented ([AHRQ, 2013a](#)). Fall prevention involves identifying and managing a patient's underlying fall risk factors and optimizing the physical design and environment of the health care agency.

Falls are multifactorial. Individual intrinsic factors such as urinary incontinence increase the risk of falling in a hospital (de Jong et al., 2013; Spoelstra et al., 2012). Extrinsic fall risks such as the environment of a health care agency (e.g., poor lighting) also contribute to falls (de Jong et al., 2013).

Fall prevention is not simple. There is no conclusive evidence for any particular set of interventions that will consistently prevent falls. The Joint Commission (TJC) Center for Transforming Healthcare aims to prevent inpatient falls with injury by creating awareness among staff, empowering patients to take an active role in their own safety, using a validated fall risk assessment tool, engaging patients and their families in the fall safety program, providing hourly rounding that includes proactive toileting, and engaging all hospital staff to ensure that no patient walks unaccompanied ([TJC, 2014](#)). Preventing falls and fall-related injuries requires diligent ongoing nursing assessment and engagement of the entire health care team.

Delegation Considerations

Assessment of a patient's risk for falling cannot be delegated to nursing assistive personnel (NAP). However, the skills necessary to prevent falls can be delegated. The nurse directs NAP by doing the following:

- Explaining a patient's mobility limitations and specific measures needed to minimize risks.
- Teaching specific environmental safety precautions to use (e.g., bed locked in low position, nonskid footwear).
- Explaining patient behaviors (e.g., disorientation, wandering, anxiousness) that are precursors to falls and that should be reported immediately.

Equipment

- Validated fall risk assessment tool ([TJC, 2014](#))
- Hospital bed with side rails; low bed (*optional*)

- Wedge cushion
- Call-light intercom system
- Gait belt for assisting with ambulation
- Wheelchair and seat belt (as needed)
- Additional safety devices (e.g., bed alarm pad)

Implementation

STEP

RATIONALE

- 1 Assess for fall risks using a validated fall risk assessment tool specific and sensitive to population being screened: patient's age (over 65), presence of comorbidities, altered memory and cognition, incontinence or urinary frequency/urgency, reduced hearing and vision, orthostatic hypotension, arthritis, impaired gait, weak lower extremities, poor balance, fatigue, need for transfer assistance, and decreased peripheral sensation (Pfortmueller, 2014; Spoelstra, 2012). Also assess for risk for injury during fall (e.g., vitamin D level, osteoporosis, bleeding tendency).
- 2 Determine if patient has a history of recent falls or other injuries within the home. Assess previous falls using the acronym *SPLATT* (Touhy and Jett, 2014).
 - Symptoms at time of fall
 - Previous fall
 - Location of fall
 - Activity at time of fall
 - Time of fall
 - Trauma after

A variety of physiologic factors predispose patients to fall and injury from falling. There are a variety of fall risk assessment tools. Those with a greater number of risk factors are less likely to be sensitive because all patients will be found at risk. Tools based on the risk factors of a population (e.g., elderly, oncology, or neurologic patient) are more likely to be sensitive to predicting falls.

Key symptoms are often helpful in identifying cause for falls. Onset, location, and activity associated with a fall provide further details on causative factors and how to prevent future falls.

Continued

STEP

- (3 meters) as quickly and safely as possible (cross a line marked on the floor), turn around, walk back, and sit down.
- Have patient rise from straight-back chair without using arms for support.
 - Begin counting.
 - Look for unsteadiness in patient's gait.
 - Have patient return to chair and sit down without using arms for support. Check time elapsed.
 - For accuracy, a patient should have one practice trial that is not included in the score. Patient must use the same assistive device each time he or she is tested to be able to compare scores.
- 7 Assess patient for osteoporosis, anticoagulant therapy, history of previous fracture, and recent chest or abdominal surgery.
- 8 Use patient-centered approach, and determine what patient knows about risks for falling and steps the patient can take to prevent falls.
- 9 If patient is assessed to be a fall risk, apply color-coded wristband (see illustration). Some agencies institute fall risk signs on doors.
- 10 Complete preprocedure protocol.

RATIONALE

gait and posture are normal. The TUG test is a measure of physical and cognitive performance. Ability to follow simple instructions measures cognitive function. An older adult who takes ≥ 12 seconds to complete the TUG test is at high risk for falling ([Centers for Disease Control and Prevention \[CDC\], 2015](#)).

Factors increase likelihood of injury from a fall.

Patient's own knowledge of risks influences ability to take necessary precautions in reducing falls.

Color-coded yellow bands are easily recognizable.

STEP	RATIONALE
11 Conduct hourly rounds on all patients to determine status of pain, need to toilet, and need to relocate personal items for easy reach; provide pain relief intervention.	Provides nurses with surveillance mechanism to purposefully keep patients safe and comfortable by proactively meeting their needs. Research associating rounds to fall reduction needs to be more rigorous (Hempel et al., 2013). Height of bed allows ambulatory patient to get in and out of bed easily and safely. Pads provide nonslippery surface on which to stand.
12 Adjust bed to low position with wheels locked. Place padded mats on floor at side of bed.	
13 Encourage patient to wear properly fitted skidproof footwear.	
14 Orient patient to surroundings and call light/bed control system: a Provide patient's hearing aid and glasses. b Explain and demonstrate how to turn call light/intercom system on and off at bedside and in bathroom. c Explain to patient and family when and why to use call system (e.g., report pain, get out of bed, go to bathroom).	Prevents falls caused by slipping on floor. Enables patient to remain alert to conditions in environment. Knowledge of location and use of call light is essential to patient safety. Increases likelihood of nurse's being able to respond.
15 Use of hospital side rails (acute care): a Explain to patient and family the main reason for using side rails: moving and turning self in bed. b Check agency policies regarding side rail use.	

Continued

STEP

RATIONALE

(1) Dependent, less mobile patients: In a two-side rail bed, keep both rails up. (NOTE: Rails on newer hospital beds allow for room at foot of bed for patient to safely exit bed.) In a four-side rail bed, leave two upper rails up. (2) Patient able to get out of bed independently: In a four-side rail bed, leave only one upper side rail up. In a two-side rail bed, keep only one rail up.	Side rails are a restraint device if they immobilize or reduce ability of patient to move arms, legs, body, or head freely. Allows for safe exit out of bed.
16 Provide environmental interventions: a Remove excess equipment, supplies, and furniture from rooms and halls. b Keep floors, particularly path to bathroom, free of clutter and obstacles. Coil and secure excess electrical, telephone, and other cords or tubing. c Clean all spills promptly. Post sign indicating wet floor. Remove sign when floor is dry. d Ensure adequate glare-free lighting: use nightlight at night.	Reduces likelihood of falls from tripping. Reduces likelihood of falls from tripping. Reduces falls from slipping on wet surface. Reduces fall risk; glare is a problem for older adults because of normal visual changes.

STEP**RATIONALE**

- e Have assistive devices (e.g., walker, cane, bedside commodes) located on exit side of bed. - f Arrange necessary items (e.g., water pitcher, eyeglasses, dentures, telephone) within patient's easy reach. - g Secure locks on beds, stretchers, and wheelchairs.	Provides added support when transferring out of bed. Commode eliminates need to get up to walk to bathroom. Facilitates independence and self-care; prevents falls related to reaching for hard-to-reach items. Prevents accidental movement of devices during patient transfer.
17 Additional interventions for patients at high risk (based on fall risk assessment): - a Prioritize call-light responses to patients at high risk, using a team approach. - b Establish elimination schedule, using bedside commode when appropriate. - c Stay with patient during toileting. - d Place patients in geri chair or wheelchair with wedge cushion. Use wheelchair only for transport, not for sitting an extended time. - e Use low bed that has low height above floor and floor mats. - f Activate bed alarm for patient.	Level of risk defined by fall risk assessment tool. Ensures rapid response to calls from patients. Proactive toileting keeps patients from being unattended with sudden urge to use toilet. Designed to maintain alignment and comfort and makes it difficult to exit chair. Reduces fall-related injuries. Alarm activates when patient rises off sensor. Alarm sounds alert to staff.

Continued

STEP	RATIONALE
g Confer with physical therapy on feasibility of gait training, strength and balance training, and regular weight-bearing activities. h Use sitters or restraints only when alternatives are exhausted.	Exercise can reduce falls, fall-related fractures, and several risk factors for falls in individuals with low bone density and older adults (Schubert, 2011). Strength and balance training has been shown to reduce the rate of injurious falls in older adults (Uusi-Rasi et al., 2015). A sitter is a nonprofessional staff member or volunteer who stays in a patient room to closely observe patients who are at risk for falling. Restraints should be used only as final option.
18 When ambulating patient, have patient wear a gait belt or walking sling and walk along his or her side.	Safe patient-handling techniques (e.g., use of walking sling/gait belt) allows for safe patient ambulation and prevention of injury to you and patient.

Recording and Reporting

- Record fall risk assessment findings, specific interventions used to prevent falls, and patient’s response to teach-back in nurses’ notes, care plan on flow sheet, or nurses’ notes in electronic health record (EHR) or chart.
- Report to health care personnel specific risks to patient’s safety and measures taken to minimize risks.
- Document evaluation of patient learning.
- If a fall occurs, document a description of the fall as given by patient or you as witness. Be sure to include baseline assessment, any injuries noted, tests or treatments given, follow-up care, and additional safety precautions taken after fall. Complete an agency adverse event report.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient is unable to identify safety risks. 2 Patient starts to fall while ambulating with a caregiver. 3 Patient found after suffering a fall.	• Reinforce identified risks with patient, or review needed safety measures with family. • Put both arms around patient's waist, or grasp gait belt. • Stand with feet apart to provide broad base of support. • Extend one leg, and let patient slide against it to the floor. • Bend knees to lower body as patient slides to floor. • Call for assistance. • Assess patient for injury, and stay with patient until assistance arrives. • Notify health care provider. • Follow institution's incident/occurrence reporting policy. • Evaluate patient and environment; determine if fall could have been prevented. • Reinforce identified risks with patient and measures recommended to prevent recurrent fall. • Monitor patient closely after fall to assess for possible injury.

Fecal Impaction

Removing Digitally

Fecal impaction is the inability to pass a collection of hard stool. This condition occurs in all age groups. Physically and mentally incapacitated individuals and institutionalized older adults are at greatest risk. Symptoms of fecal impaction include constipation, rectal discomfort, anorexia, nausea, vomiting, abdominal pain, abdominal bloating, diarrhea (leaking around the impacted stool), and urinary frequency (Ness, 2013). Prevention is the key to managing fecal impaction. With newer bowel management techniques such as transanal irrigation, digital removal of fecal material is not needed (Ness, 2013). However, once impaction occurs, digital removal of stool is the only alternative.

Delegation Considerations

The skill of removing a fecal impaction digitally cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to:

- Help the nurse position the patient for the procedure.
- Observe the stool for color, consistency, rectal bleeding, or bloody mucus and report immediately to the nurse.
- Provide perineal care following each bowel movement.

Equipment

- Clean gloves
- Water-soluble local anesthetic lubricant (**NOTE:** Some agencies require use of water-soluble lubricant without anesthetic when nurse performs procedure.)
- Waterproof, absorbent pads
- Bedpan
- Bedpan cover (*optional*)
- Bath blanket
- Wash basin, washcloths, towels, and soap
- Vital signs equipment

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.

STEP

RATIONALE

SAFETY ALERT Because of the potential to stimulate the sacral branch of the vagus nerve, patients with a history of dysrhythmias or heart disease have a greater risk for changes in heart rhythm. Be sure to monitor patient's pulse before and during procedure. This procedure is often contraindicated in patients who have cardiac abnormalities: if in doubt, verify with the health care provider.

- 2 Check patient's record for health care provider's order for digital removal of impaction and use of anesthetic lubricant.
- 3 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's medication administration record or medical record.
- 4 Obtain assistance to help change patient's position if necessary. Raise bed horizontally to comfortable working height.
- 5 Pull curtains around bed, or close door to room.
- 6 Lower side rail on patient's right side. Keeping the far side rail raised, help patient to left side-lying position with knees flexed.
- 7 Drape patient's trunk and lower extremities with bath blanket, and place waterproof pad under patient's buttocks.
- 8 Perform hand hygiene, apply clean gloves, and place bedpan next to patient.

Obtain written order before performing procedure, because this procedure involves excessive stimulation of vagus nerve.

Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2014).

Promotes patient safety and use of good body mechanics.

Promotes patient safety. Provides access to rectum.

Maintains patient's sense of privacy and prevents unnecessary exposure of body parts.

Continued

STEP

- 9 Lubricate gloved index finger and middle finger of dominant hand with anesthetic lubricant.
- 10 Instruct patient to take slow, deep breaths during procedure. Gradually and gently insert gloved index finger, and feel anus relax around the finger. Insert middle finger.
- 11 Gradually advance fingers slowly along rectal wall toward umbilicus.
- 12 Gently loosen fecal mass by moving fingers in scissors motion to fragment the fecal mass. Work fingers into hardened mass.
- 13 Work stool downward toward end of rectum. Remove small sections of feces, and discard into bedpan.
- 14 Observe patient's response and periodically assess heart rate. Look for signs of fatigue.

RATIONALE

Prevents transmission of microorganisms. Reduces discomfort and permits smooth insertion of finger into anus and rectum.

Slow, deep breaths help to relax patient. Gradual insertion of index finger helps to dilate anal sphincter.

Guiding finger toward rectal wall follows natural direction of colon, allowing for access to impacted stool high in rectum (Ness, 2013).

Loosening and penetrating mass allow for removal of stool in small pieces, resulting in less discomfort to patient.

Prevents need to force finger up into rectum and minimizes trauma to mucosa.

Vagal stimulation slows heart rate and causes dysrhythmias. Procedure often exhausts patient.

SAFETY ALERT Stop procedure if heart rate drops or rhythm changes from patient's baseline or if patient has dyspnea or complaints of palpitations.

- 15 Continue to clear rectum of feces, and allow patient to rest at intervals.

Rest improves patient's tolerance of procedure, allowing heart rate to return to normal.

STEP

- 16 After removal of impaction, perform perineal hygiene.
- 17 Remove bedpan, and inspect feces for color and consistency. Dispose of feces in toilet.
- 18 If needed, help patient to toilet or clean bedpan. (Procedure may be followed with enema or cathartic.)
- 19 Remove gloves by turning inside out and discarding in proper receptacle. Perform hand hygiene.
- 20 Complete postprocedure protocol.

RATIONALE

Promotes patient's sense of comfort and cleanliness.

Reduces transmission of microorganisms.

Removal of impaction stimulates defecation reflex.

Reduces transmission of microorganisms.

Recording and Reporting

- Record patient's tolerance to procedure, amount and consistency of stool removed, vital signs, and adverse effects on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding about the types of high-fiber foods to reduce the frequency of constipation.
- Report any changes in vital signs and adverse effects to health care provider.

UNEXPECTED OUTCOMES**RELATED INTERVENTIONS**

- 1 Patient experiences trauma to rectal mucosa as evidenced by rectal bleeding.

- Assess anal and perianal region for source of bleeding.
- Stop procedure if bleeding is excessive.

- 2 Patient experiences bradycardia, decrease in blood pressure, and decrease in level of consciousness as result of vagus nerve stimulation.

- Stop procedure, and measure vital signs.
- Notify health care provider and remain with patient.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient has seepage of liquid stool after procedure complete.	• Assess patient for continuing impaction. • Notify health care provider for possible suppository or enema. • Increase patient's fluid intake and dietary fiber.

Hypothermia and Hyperthermia Blankets

A hypothermia or hyperthermia blanket raises, lowers, or maintains body temperature through conductive heat or cold transfer between the blanket and the patient (Fig. 32.1). When operated manually, the unit is adjusted to reach a desired temperature setting. When operating in the automatic setting, the unit continually monitors a patient's temperature with a thermistor probe (rectal, skin, or esophageal). Patients can have high, prolonged fevers from infectious neurologic diseases, from side effects of anesthesia, and following severe brain injury (Bohman and Levine, 2014). Recent research shows that induced hypothermia prevents or moderates neurologic outcomes following neurosurgery, traumatic brain injury, and acute stroke (Bohman and Levine, 2014; Rittenberger and Callaway, 2016). Mild hypothermia (32°C to 34° C [89.6° F to 93.2° F]) in the first hours after an ischemic event and for 72 hours or until stabilization occurs helps prevent permanent damage. However, hypothermic therapy is not without risk. Severe hypothermia causes vasoconstriction, shivering, increased oxygen demand, altered coronary blood flow, cardiac dysrhythmias, acid-base imbalances, and impaired coagulation (Block et al., 2012; Kaplow, 2013). Therapeutic interventions designed to correct hypothermia and progressively raise body temperature are essential to improve patient outcomes by correcting acid-base imbalances, body temperature, and coagulopathies that, if left uncorrected, result in death (Block et al., 2012).

Delegation Considerations

The skill of applying a hypothermia or hyperthermia blanket can be delegated to nursing assistive personnel (NAP) (see agency policy). The nurse is responsible for assessing and evaluating treatment and related patient education. If the patient is unstable and at risk for complications, this skill is not delegated. The nurse directs the NAP to do the following:

- Maintain proper temperature of the application throughout the treatment and discontinue the application as specified in the health care provider's order.
- Inform the nurse of any unexpected patient outcomes (e.g., shivering or redness to the skin).
- Report when treatment is complete so an evaluation of the patient's response can be made.



Fig. 32.1 Hypothermia cooling blanket is applied over paper sheet before additional top sheet is applied to bed. (Courtesy Cincinnati Sub-Zero Maxi-Therm Hyper-Hypothermia Blanket.)

Equipment

- Hypothermia or hyperthermia blanket with control panel and rectal probe
- Sheet or thin bath blanket
- Distilled water to fill the units if necessary
- Disposable gloves
- Rectal thermometer

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
SAFETY ALERT Antipyretic therapy may be used in combination with a cooling blanket. Temperatures greater than 41° C (105.8° F) have detrimental effects in the neurologic patient, children, and older adults (Cannon, 2013).	
2 Prepare blanket according to agency policy and manufacturer's instructions.	Agencies have specific policies on maintaining equipment in functional order.
3 Perform hand hygiene, and apply clean gloves.	Reduces transmission of microorganisms.

STEP	RATIONALE
4 Turn on blanket, and observe that cool or warm light is on. Precool or prewarm blanket, setting pad temperature to desired level.	Verifies that blanket is correctly set to help decrease (cool) or increase (warm) patient's body temperature. Prepares blanket for prescribed therapy.
5 Verify that pad temperature limits are set at desired safety ranges.	Safety ranges prevent excessive cooling or warming. The blanket automatically shuts off when preset body temperature is achieved.
6 Cover the hypothermia or hyperthermia blanket with a thin paper or cloth sheet or bath blanket.	Injuries from hot or cold therapies are preventable events (National Quality Forum [NQF], 2016b). Thin sheet protects patient's skin from direct contact with blanket, thus reducing risk for injury to skin. Sheet or blanket covers plastic and provides insulation between patient and appliance.
7 Position hypothermia or hyperthermia blanket following manufacturer directions. a Wrap patient's hands and feet in gauze. b Wrap scrotum with towels.	Provides wide distribution of blanket against patient's skin. Reduces risk for thermal injury to body's distal areas. Protects sensitive tissue from direct contact with cold.
8 Lubricate rectal probe, and insert into patient's rectum.	When using hypothermia or hyperthermia blanket, it is imperative that you continuously monitor patient's core interior (rectal) temperature.
9 Turn and position patient regularly to protect from pressure injury development and impaired body alignment (see Skill 60). Keep linens free of perspiration and condensation.	Patient has an increased risk for pressure injury development because of skin moisture created by blanket and patient's body temperature.

Continued

STEP	RATIONALE
10 Double-check fluid thermometer on control panel of blanket before leaving room.	Verifies that pad temperature is maintained at desired level.
11 Complete postprocedure protocol.	

Recording and Reporting

- Record baseline data: vital signs, neurologic and mental status, status of peripheral circulation, and skin integrity when therapy was initiated. Include type of hyperthermia-hypothermia unit used; control settings (manual or automatic and temperature settings); date, time, duration; and patient’s tolerance of treatment in nurses’ notes in electronic health record (EHR) or chart.
- Chart on temperature graph repeated measurements of vital signs to document response to therapy.
- Document your evaluation of family caregiver learning.
- Report any unexpected outcome to health care provider. Further treatment may be needed.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient’s core body temperature decreases or increases rapidly.	- Adjust blanket temperature no more than 1° F (0.6° C) every 15 minutes to avoid complications. - Patient may need hypothermic or hyperthermic treatment of additional sites, such as axilla, groin, and neck, in addition to those covered by blanket. - Discuss use of an antipyretic with health care provider.
2 Patient’s core temperature remains unchanged.	

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient begins to shiver.	• Adjust temperature to more comfortable range, and assess if shivering decreases. • If shivering continues, stop treatment and notify health care provider.

Using Incentive Spirometry

Incentive spirometry (IS) helps a patient deep breathe. It works by providing visual feedback that helps encourage the patient to take long, deep, slow breaths (Smetana, 2016). It should be used in combination with other pulmonary maneuvers such as deep breathing and coughing, early mobilization of the patient, and directed coughing (do Nascimento et al., 2014; Smetana, 2016).

Delegation Considerations

The skill of helping a patient to use IS can be delegated to nursing assistive personnel (NAP). The nurse is responsible for assessing and monitoring the patient, evaluating the patient response, educating the patient about the proper use of the IS, and evaluating that education. The nurse directs the NAP by doing the following:

- Informing about the patient’s target goal for IS
- Informing to immediately notify the nurse about any unexpected outcomes such as chest pain, excessive sputum production, and fever

Equipment

- Flow- or volume-oriented IS
- Stethoscope
- Pulse oximeter monitor

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	Reduces transmission of microorganisms. Promotes optimal lung expansion during respiratory maneuver.
2 Perform hand hygiene.	
3 Position patient in the most erect position (e.g., high-Fowler position if tolerated).	

STEP**RATIONALE**

- 4 Instruct patient to exhale completely through mouth and place lips tightly around the mouthpiece.

Allows for proper function of IS (Smetana, 2016). Showing patient how to correctly place mouthpiece is reliable technique for teaching psychomotor skill and enables patient to ask questions.

- 5 Instruct patient to take a slow, deep breath and maintain constant flow, like pulling through a straw. If flow-oriented IS, inhalation should raise the ball. If volume-oriented IS, inhalation should raise the piston. Remove mouthpiece at point of maximal inhalation; then have patient hold his or her breath for 3 seconds and exhale normally.

Maintains maximal inspiration; reduces risk for progressive collapse of individual alveoli.

SAFETY ALERT Some patients are unable to hold their breath for 3 seconds. Encourage them to do their best and try to extend the duration of breath holding. Allow patients to rest between IS breaths to prevent hyperventilation and fatigue.

- 6 Have patient repeat the maneuver, encouraging patient to reach prescribed goal.
- 7 Complete postprocedure protocol.

Ensures correct use of the spirometer and patient's understanding of use.

Recording and Reporting

- Record lung sounds, respiratory rate, and pulse oximeter readings before and after incentive spirometry; frequency of use; volumes achieved; and any adverse effects on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Document your evaluation of learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient is unable to achieve incentive spirometry target volume.	• Encourage patient to attempt IS more frequently, followed by rest periods. • Teach cough-control exercises. • Teach patient how to splint and protect incision sites during deep breathing. • Administer ordered analgesic if acute pain is inhibiting use of IS.
2 Patient has decreased lung expansion and/or abnormal breath sounds.	• Teach patient cough-control exercises. • Provide assistance with suctioning if patient cannot effectively expel secretions.

Intradermal Injections

Typically, intradermal (ID) injections are given for skin testing (e.g., tuberculosis screening and allergy tests). Because such medications are potent, inject them into the dermis, where blood supply is reduced and drug absorption occurs slowly. A patient may have an anaphylactic reaction if the medications enter the circulation too rapidly. Skin testing often requires you to visually inspect the test site; therefore make sure that the ID sites are free of lesions and injuries and relatively hairless. The inner forearm and upper back are ideal locations. To administer an ID injection, use a tuberculin (TB) or small syringe with a short (3/8 to 5/8 inch), fine-gauge (25 to 27) needle. The angle of insertion for an ID injection is 5 to 15 degrees ([Fig. 34.1](#)). Inject only small amounts of medication (0.01 to 0.1 mL) intradermally.

Delegation Considerations

The skill of administering ID injections cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential medication side effects and reporting their occurrence to the nurse
- Reporting any change in the patient's condition to the nurse

Equipment

- Syringe: 1-mL TB syringe with preattached 25- or 27-gauge needle, 3/8 to 5/8 inch
- Small gauze pad
- Alcohol swab
- Vial or ampule of medication
- Clean gloves
- Medication administration record (MAR) or computer printout
- Puncture-proof container

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE

Continued

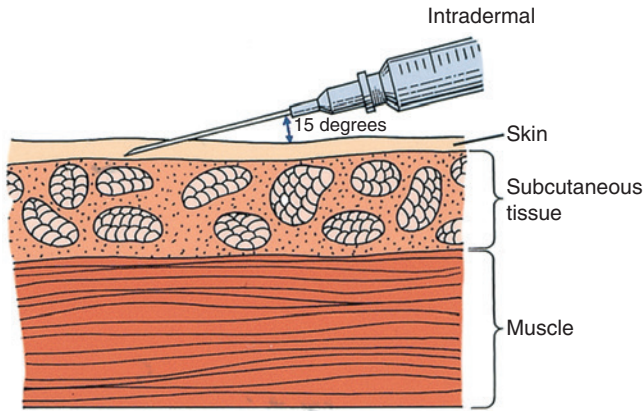


Fig. 34.1 Intradermal needle tip inserted into dermis.

STEP

- 2 Check accuracy and completeness of the MAR or computer printout with prescriber's original medication order. Check patient's name, medication name and dosage, route of administration, and time of administration.
- 3 Prepare medications for one patient at a time using aseptic technique and avoiding distractions. Check label of medication carefully with MAR or computer printout two times when preparing medication.

RATIONALE

The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012).

Ensures that medication is sterile. Preventing distractions reduces medication preparation errors. Use no-interruption zone (NIZ) when possible (Prakash et al., 2014; Yoder et al., 2015).

These are the first and second checks for accuracy and ensure that correct medication is administered.

STEP

4 Take medication(s) to patient at correct time. Medications that require exact timing include immediate (STAT), first-time or loading doses, and one-time doses. Give time-critical scheduled medications (e.g., antibiotics, anticoagulants, insulin, anticonvulsants, immunosuppressive agents) at exact time ordered (no later than 30 minutes before or after scheduled dose). Give non-time-critical scheduled medications within a range of 1 or 2 hours of scheduled dose (ISMP, 2011). During administration, apply six rights of medication administration.

5 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.

RATIONALE

Hospitals must adopt medication administration policy and procedure for timing of medication administration that considers nature of the prescribed medication, specific clinical application, and patient needs (Institute for Safe Medication Practices [ISMP], 2011). Time-critical scheduled medications are those for which early or delayed administration of maintenance doses of greater than 30 minutes before or after the scheduled dose may cause harm or result in substantial suboptimal therapy or pharmacologic effect. Non-time-critical medications are those for which early or delayed administration within a specified range of either 1 or 2 hours should not cause harm or result in substantial suboptimal therapy or pharmacologic effect (Centers for Medicare and Medicaid Services [CMS], 2011; ISMP, 2011).

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Some agencies are now using a bar code system to help with patient identification.

Continued

STEP

- 6 At patient's bedside again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- 7 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions. Tell patient that injection will cause a slight burning or sting.
- 8 Perform hand hygiene and apply clean gloves. Keep sheet or gown draped over body parts not requiring exposure.
- 9 Select appropriate site. Note lesions or discolorations of skin. If possible, select site three to four finger widths below antecubital space and one hand width above wrist. If you cannot use forearm, inspect the upper back. If necessary, use sites appropriate for subcutaneous injections (see [Skill 72](#)).
- 10 Help patient to comfortable position. Have patient extend elbow and support it and forearm on flat surface.
- 11 Clean site with an antiseptic swab. Apply swab at center of site and rotate outward in a circular direction for about 5 cm (2 inches).
Option: Use vapocoolant spray (e.g., ethyl chloride) before injection.

RATIONALE

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy. Helps minimize patient's anxiety.

Reduces transfer of infection.

An ID injection site is free of discoloration or hair so you can see results of skin test and interpret them correctly ([World Health Organization \[WHO\], 2015a](#)).

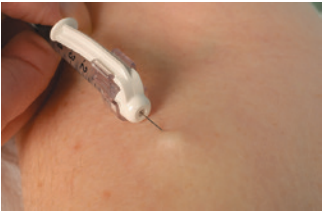
Stabilizes injection site for easiest accessibility.

Mechanical action of swab removes secretions containing microorganisms.
Decreases pain at injection site.

STEP	RATIONALE
12 Hold swab or gauze between third and fourth fingers of nondominant hand. 13 Remove needle cap from needle by pulling it straight off. 14 Hold syringe between thumb and forefinger of dominant hand with bevel of needle pointing up. 15 With nondominant hand, stretch skin over site with forefinger or thumb. 16 With needle almost against patient's skin, insert it slowly at 5- to 15-degree angle until resistance is felt. Then advance needle through epidermis to approximately 3 mm (1/8 inch) below skin surface. You will see bulge of needle tip through skin. 17 Inject medication slowly. Normally you feel resistance. If not, needle is too deep; remove and begin again.	Gauze or swab remains readily accessible when withdrawing needle. Preventing needle from touching sides of cap prevents contamination. Smooth injection requires proper manipulation of syringe parts. With bevel up, you are less likely to deposit medication into tissues below dermis. Needle pierces tight skin more easily. Ensures that needle tip is in dermis. You obtain inaccurate results if you do not inject needle at correct angle and depth (WHO, 2015a). Slow injection minimizes discomfort at site. Dermal layer is tight and does not expand easily when you inject solution.
SAFETY ALERT It is not necessary to aspirate because dermis is relatively avascular.	
18 While injecting medication, note that small bleb (approximately 6 mm [$\frac{1}{4}$ inch]) resembling mosquito bite appears on skin surface (Fig. 34.2). 19 After withdrawing needle, apply alcohol swab or gauze gently over site.	Bleb indicates you deposited medication in dermis. Do not massage site. Apply bandage if needed.

Continued

Fig. 34.2 Injection creates small bleb.



STEP	RATIONALE
20 Complete postprocedure protocol. 21 Inspect bleb. <i>Optional:</i> Use skin pencil and draw circle around perimeter of injection site. Read TB test site at 48 to 72 hours; look for induration (hard, dense, raised area) of skin around injection site of: • 15 mm or more in patients with no known risk factors for tuberculosis. • 10 mm or more in patients who are recent immigrants; injection drug users; residents and employees of high-risk settings; patients with certain chronic illnesses; children less than 4 years of age; and infants, children, and adolescents exposed to high-risk adults.	Determines if reaction to antigen occurs; indication positive for TB or tested allergens. Degree of reaction varies based on patient condition. Site must be read at various intervals to determine test results. Pencil marks make site easy to find. You determine the results of skin testing at various times, based on type of medication used or type of skin testing completed. Manufacturer's directions determine when to read test results.

Recording and Reporting

- Record drug, dose, route, site, time, and date on MAR immediately after administration, not before. Correctly sign MAR according to agency policy.
- Record area of ID injection and appearance of skin in your notes.

- Report any undesirable effects from medication to patient's health care provider, and document adverse effects according to agency policy.
- Record patient teaching, validation of patient understanding, and patient's response to medication.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of localized pain or continued burning at injection site, indicating potential injury to nerve or vessels.	• Assess injection site. • Notify patient's health care provider.
2 Raised, reddened, or hard zone (induration) forms around ID test site.	• Notify patient's health care provider. • Document sensitivity to injected allergen or positive test if tuberculin skin testing was completed.
3 Patient has adverse reaction with signs of urticaria, pruritus, wheezing, and dyspnea.	• Notify patient's health care provider. • Follow agency policy for appropriate response to drug reactions (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine). • Add allergy information to patient's record.

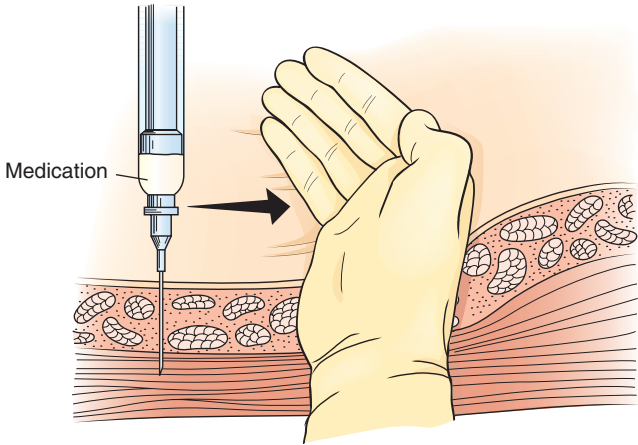
Intramuscular Injections

The intramuscular (IM) injection route deposits medication into deep muscle tissue, which has a rich blood supply, allowing medication to absorb faster than by the subcutaneous route. Any factor that interferes with local tissue blood flow affects the rate and extent of drug absorption. There is an increased risk for injecting drugs directly into blood vessels using the IM route.

Determine needle gauge by the medication to be administered. Use a longer and heavier-gauge needle to pass through subcutaneous tissue and penetrate deep muscle tissue. The angle of insertion for an IM injection is 90 degrees. A normal, well-developed adult patient tolerates 2 to 5 mL of medication into a larger muscle without severe muscle discomfort (Hopkins and Arias, 2013; Nicoll and Hesby, 2002). However, larger volumes of medication (4 to 5 mL) are unlikely to be absorbed properly. Children, older adults, and thin patients tolerate only 2 mL of an IM injection. Do not give more than 1 mL to small children and older infants, and do not give more than 0.5 mL to smaller infants (Hockenberry and Wilson, 2015).

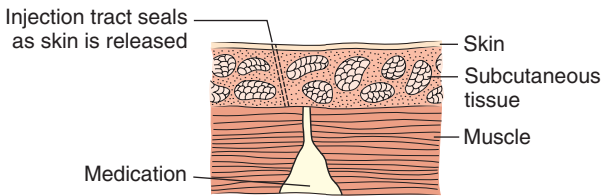
Rotate IM injection sites to decrease the risk for hypertrophy. The Z-track method, a technique for pulling the skin during an injection, is recommended for IM injections (Nicoll and Hesby, 2002). It prevents leakage of medication into subcutaneous tissues, seals medication in the muscle, and minimizes irritation. To use the Z-track method, apply the appropriate-size needle to the syringe and clean and select an IM site. Pull the overlying skin and subcutaneous tissues approximately 2.5 to 3.5 cm (1 to 1½ inches) laterally to the side with the ulnar side of the nondominant hand. Hold the skin in this position until you have administered the injection (Fig. 35.1). Inject the needle deeply into the muscle. To reduce injection site discomfort, there is no longer any need to aspirate after the needle is injected when *administering vaccines* (Centers for Disease Control and Prevention [CDC], 2015d). However, follow agency policy. Release the skin after withdrawing the needle. This leaves a zigzag path that seals the needle track wherever tissue planes slide across one another (see Fig. 35.2). The medication is sealed in the muscle tissue.

When selecting an IM site, determine that the site is free of pain, infection, necrosis, bruising, and abrasions. Also consider the location of underlying bones, nerves, and blood vessels and the volume of medication that you will administer. Because of the sciatic nerve location, the dorsogluteal muscle is not recommended as an injection site.



During injection

Fig. 35.1 Pulling on overlying skin during IM injection moves tissue to prevent later tracking.



After release

Fig. 35.2 The Z-track left after injection prevents the deposit of medication from leaking through sensitive tissue.

The ventrogluteal muscle involves the gluteus medius; it is situated deep and away from major nerves and blood vessels. This site is the preferred and safest site for all adults, children, and infants (Hockenberry and Wilson, 2015; Hopkins and Arias, 2013; Nicoll and Hesby, 2002) and is recommended for volumes greater than 2 mL (Hopkins and Arias, 2013; Nicoll and Hesby, 2002).

To locate the ventrogluteal muscle, have a patient lie in either the supine or lateral position; place the heel of your hand over the greater trochanter of the patient's hip with the wrist almost perpendicular to

the femur. Use your right hand for the left hip and the left hand for the right hip. Point the thumb toward the patient's groin; point the index finger to the anterior superior iliac spine; and extend the middle finger back along the iliac crest toward the buttock. The index finger, the middle finger, and the iliac crest form a V-shaped triangle. The injection site is the center of the triangle (Fig. 35.3)

The vastus lateralis muscle is another injection site used in adults and is the preferred site for administration of biologics (e.g., immunizations) to infants, toddlers, and children (Hockenberry and Wilson, 2015). The muscle is thick and well developed; it is located on the anterior lateral aspect of the thigh. It extends in an adult from a hand breadth above the knee to a hand breadth below the greater trochanter of the femur (Fig. 35.4). Use the middle third of the muscle for injection. The width of the muscle usually extends from the midline of the thigh to the midline of the outer side of the thigh. With young children or cachectic patients, it helps to grasp the body of the muscle during injection to be sure that the medication is deposited in muscle tissue.

Although the deltoid site is easily accessible, it is not well developed in many adults. Use this site for small medication volumes; for administration of routine immunizations in toddlers, older children, and adults; or when other sites are inaccessible because of dressings or casts.

Locate the deltoid muscle by fully exposing the patient's upper arm and shoulder and asking him or her to relax the arm at the side or by supporting the patient's arm and flexing the elbow. Do not roll up any tight-fitting sleeve. Allow the patient to sit, stand, or lie down. Palpate

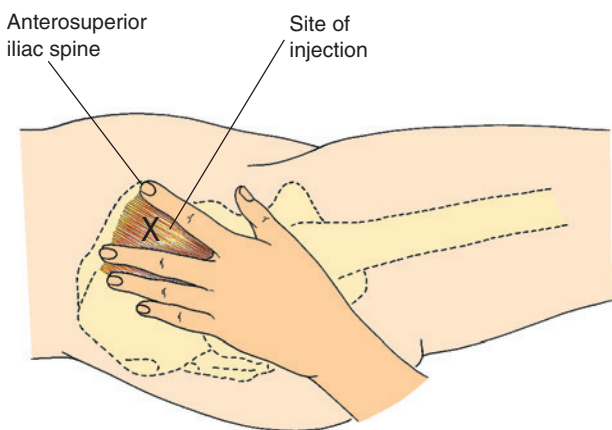


Fig. 35.3 Anatomic site for ventrogluteal injection.

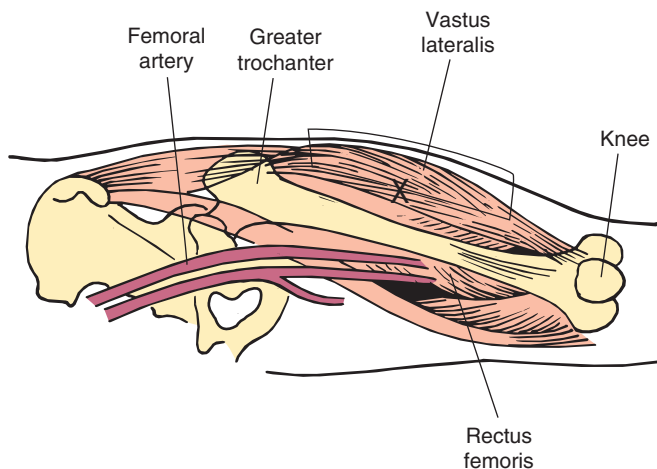


Fig. 35.4 Anatomic site for vastus lateralis injection.

the lower edge of the acromion process, which forms the base of a triangle in line with the midpoint of the lateral aspect of the upper arm. The injection site is in the center of the triangle, about 3 to 5 cm (1 to 2 inches) below the acromion process (Fig. 35.5).

Delegation Considerations

The skill of administering IM injections cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP about the following:

- Potential medication side effects and to report their occurrence to the nurse
- Reporting any change in the patient's condition to the nurse

Equipment

- Proper-size syringe and needle:
 - 2 to 3 mL for adults
 - 0.5 to 1 mL for infants and small children
 - Needle length corresponds to site of injection and age of patient
 - Needle gauge often depends on length of needle; administer biological and medication in aqueous solution with a 20- to 25-gauge needle
- Alcohol swab
- Small gauze pad

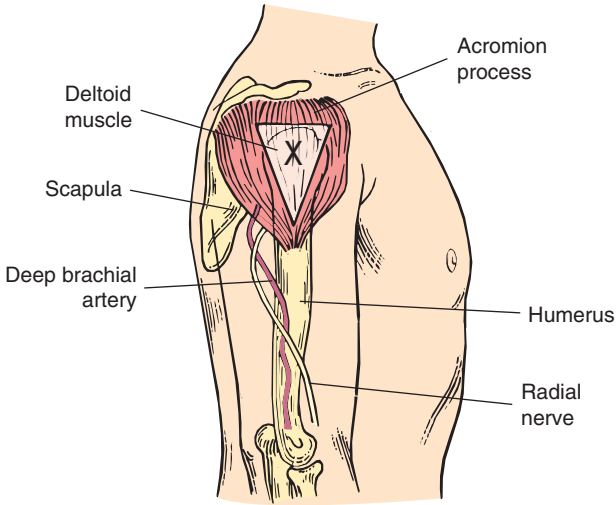


Fig. 35.5 Anatomic site for deltoid injection.

- Vial or ampule of medication
- Clean gloves
- Medication administration record (MAR) or computer printout
- Puncture-proof container

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of the MAR or computer printout with prescriber's written medication order. Check patient's name, medication name and dosage, route of administration, and time of administration. Recopy or reprint any portion of the MAR that is difficult to read.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012). Illegible MARs are a source of medication errors (Alassaad et al., 2013).

STEP

- 3 Prepare medications for one patient at a time using aseptic technique. Keep all pages of MARs or computer printouts for one patient together, or look at only one patient's electronic MAR at a time. Check label of medication carefully with MAR or computer printout two times when preparing medication.
- 4 Take medication to patient at right time.
- 5 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- 6 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.

RATIONALE

Ensures that medication is sterile. Preventing distractions reduces medication preparation errors. Use no-interruption zone (NIZ) when possible (Prakash et al., 2014; Yoder et al., 2015).

These are the first and second checks for accuracy and ensure that correct medication is administered.

Hospitals must adopt medication administration policy and procedure for timing of medication administration that considers nature of the prescribed medication, specific clinical application, and patient needs (Department of Health and Human Services [DHHS], 2011; Institute for Safe Medication Practices [ISMP], 2011).

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Some agencies are now using a bar-code system to help with patient identification.

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Continued

STEP	RATIONALE
7 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions. Tell patient that injection will cause a slight burning or sting.	Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy. Helps minimize patient's anxiety.
8 Perform hand hygiene and apply clean gloves. Keep sheet or gown draped over body parts not requiring exposure.	Reduces transmission of infection. Respects patient's dignity while exposing injection site.
9 Select appropriate site. Note integrity and size of muscle. Palpate for tenderness or hardness. Avoid these areas. If patient receives frequent injections, rotate sites. Use ventrogluteal if possible.	Ventrogluteal is preferred injection site for adults. It is also preferred site for children of all ages (Hockenberry and Wilson, 2015; Nicoll and Hesby, 2002; Ogston-Tuck, 2014b).
10 Help patient to comfortable position. Position patient depending on chosen site (e.g., sit, lie flat, on side, or prone).	Reduces strain on muscle and minimizes injection discomfort.
11 Relocate site using anatomic landmarks.	Injection into correct anatomic site prevents injury to nerves, bone, and blood vessels.
12 Cleanse site with antiseptic swab. Apply swab at center of site, and rotate outward in circular direction for about 5 cm (2 inches). <i>Option:</i> Apply EMLA cream on injection site at least 1 hour before IM injection, or use vapocoolant spray (e.g., ethyl chloride) just before injection.	Mechanical action of swab removes secretions containing microorganisms. Decreases pain at injection site.

STEP

- 13 Hold swab or gauze between third and fourth fingers of nondominant hand.
- 14 Remove needle cap by pulling it straight off.
- 15 Hold syringe between thumb and forefinger of dominant hand; hold as dart, palm down (Fig. 35.6).
- 16 Administer injection.
 - a Position ulnar side of nondominant hand just below site, and pull skin laterally approximately 2.5 to 3.5 cm (1 to 1½ inches). Hold position until medication is injected. With dominant hand, inject needle quickly at 90-degree angle into muscle.

RATIONALE

Swab or gauze remains readily accessible when withdrawing needle.

Preventing needle from touching sides of cap prevents contamination.

Quick, smooth injection requires proper manipulation of syringe parts.

Z-track creates zigzag path through tissues that seals needle track to avoid tracking medication. A quick, dartlike injection reduces discomfort. Use Z-track for all IM injections (Hopkins and Arias, 2013; Nicoll and Hesby, 2002; Ogston-Tuck, 2014b).

Continued

Fig. 35.6 Injection at the ventrogluteal site avoids major nerves and blood vessels.

STEP	RATIONALE
b <i>Option:</i> If patient's muscle mass is small, grasp body of muscle between thumb and forefingers. c After needle pierces skin, still pulling on skin with nondominant hand, grasp lower end of syringe barrel with fingers of nondominant hand to stabilize it. Move dominant hand to end of plunger. Avoid moving syringe. d Pull back on plunger 5 to 10 seconds. If no blood appears, inject medication slowly at a rate of 10 sec/mL (Nicoll and Hesby, 2002).	Ensures that medication reaches muscle mass (CDC, 2015; Hockenberry and Wilson, 2015). Smooth manipulation of syringe reduces discomfort from needle movement. Skin remains pulled until after medication is injected to ensure Z-track administration. Aspiration of blood into syringe indicates intravenous (IV) placement of needle. Slow injection rate reduces pain and tissue trauma and reduces chance of leakage of medication back through needle track (Hockenberry and Wilson, 2015; Nicoll and Hesby, 2002). The CDC (2015) no longer recommends aspiration when administering an immunization.
SAFETY ALERT If blood appears in syringe, remove needle, dispose of medication and syringe properly, and prepare another dose of medication for injection.	
e Wait 10 seconds, then smoothly and steadily withdraw needle, release skin, and apply alcohol swab or gauze gently over site. 17 Apply gentle pressure to site. Do not massage site. Apply bandage if needed.	Allows time for medication to absorb into muscle before syringe is removed. Dry gauze minimizes discomfort associated with alcohol on nonintact skin. Massage damages underlying tissue.

STEP	RATIONALE
18 Discard uncapped needle or needle enclosed in safety shield and attached syringe into a puncture-proof and leak-proof receptacle.	Prevents injury to patients and health care personnel. Recapping needles increases risk for a needlestick injury (Occupational Safety & Health Administration [OSHA], n.d.).
19 Complete postprocedure protocol.	
20 Return to room in 15 to 30 minutes, and ask if patient feels any acute pain, burning, numbness, or tingling at injection site.	Continued discomfort may indicate injury to underlying bones or nerves.

Recording and Reporting

- Immediately after administration, record medication dose, route, site, time, and date given on MAR. Correctly sign MAR according to institutional policy.
- Record patient teaching, validation of understanding, and patient's response to medication in nurses' notes and electronic health record (EHR).
- Report any undesirable effects from medication to patient's health care provider, and document adverse effects in record.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of localized pain or continued burning at injection site, indicating potential injury to nerve or vessels.	• Assess injection site. • Notify patient's health care provider.
2 During injection, blood is aspirated.	• Immediately stop injection, and remove needle. • Prepare new syringe of medication for administration.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient displays adverse reaction with signs of urticaria, eczema, pruritus, wheezing, and dyspnea.	• Follow institutional policy or guidelines for appropriate response to allergic reactions (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine). • Notify patient’s health care provider immediately. • Add allergy information to patient’s record.

Intravenous Medications

Intermittent Infusion Sets and Mini-Infusion Pumps

One method of administering intravenous (IV) medications uses small volumes (25 to 250 mL) of compatible IV fluids infused over a desired period of time. This method reduces the risk for rapid dose infusion and provides independence for patients. Patients must have an established IV line that is kept patent either by continuous infusion or by intermittent flushes of normal saline. You can administer intermittent infusion of medication with any of the following methods: piggyback, volume-control administration (Volutrol, Buretrol, or Pediatrol), or mini-infusion pump.

Delegation Considerations

The skill of administering IV medications by piggyback, intermittent infusion sets, and mini-infusion pumps cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential medication side effects and to report their occurrence to the nurse
- Reporting any patient complaint of moisture or discomfort around the IV insertion site
- Reporting any change in the patient's condition or vital signs to the nurse

Equipment

- Adhesive tape (*optional*)
- Antiseptic swab
- Clean gloves
- IV pole or rack
- Medication administration record (MAR) or computer printout
- Puncture-proof container

Piggyback or Mini-Infusion Pump

- Medication prepared in 50- to 250-mL labeled infusion bag or syringe
- Prefilled syringe of normal saline flush solution (for saline lock only)
- Short microdrip, macrodrip, or mini-infusion IV tubing set with blunt-ended (needleless) cannula attachment

- Needleless device
- Mini-infusion pump, if indicated

Volume-Control Administration Set

- Volutrol or Buretrol
- Infusion tubing with needleless system attachment
- Syringe (1 to 20 mL)
- Vial or ampule of ordered medication

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
SAFETY ALERT Never administer IV medications through tubing that is infusing blood, blood products, or parenteral nutrition solutions.	
2 Assess patency of patient’s existing IV infusion line or saline lock (see Skill 54).	Do not administer medication if site is edematous or inflamed.
SAFETY ALERT If the patient’s IV site is saline locked, cleanse the port with alcohol, and assess the patency of the IV line by flushing it with 2 to 3 mL of sodium chloride.	
3 Assess patient’s symptoms before initiating medication therapy.	Provides information to evaluate the desired effects of medication.
4 Assess patient’s knowledge of medication.	Poses implications for patient education.
5 Prepare medications for one patient at a time using aseptic technique. Check label of medication carefully with MAR or computer printout two times when preparing medication. Pharmacy prepares piggyback and prefilled syringes. You will prepare medication for Volutrol.	Ensures that medication is sterile. Preventing distractions reduces medication preparation errors. Use no-interruption zone (NIZ) when possible (Prakash et al., 2014; Yoder et al., 2015). <i>These are the first and second checks for accuracy</i> and ensure that correct medication is administered.

STEP

- 6 Take medication(s) to patient at correct time (see agency policy). Medications that require exact timing include immediate (STAT), first-time or loading doses, and one-time doses. Give time-critical scheduled medications (e.g., antibiotics, anticoagulants, insulin, anticonvulsants, immunosuppressive agents) at exact time ordered (no later than 30 minutes before or after scheduled dose). Give non-time-critical scheduled medications within a range of 1 or 2 hours of scheduled dose (Institute for Safe Medication Practices [ISMP], 2011). During administration, apply six rights of medication administration.
- 7 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- 8 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.

RATIONALE

Hospitals must adopt medication administration policy and procedure for timing of medication administration that considers nature of the prescribed medication, specific clinical application, and patient needs (Department of Health and Human Services [DHHS], 2011; ISMP, 2011).

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). Some agencies are now using a bar code system to help with patient identification. *This is the third check for accuracy* and ensures that patient receives correct medication. Confirms patient's allergy history.

Continued

STEP

- 9 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions. Explain that you will give medication through existing IV line. Encourage patient to report symptoms of discomfort at site.
- 10 Administer infusion:
 - a **Piggyback infusion:**
 - (1) Connect infusion tubing to medication bag (see [Skill 55](#)). Fill tubing by opening regulator flow clamp. Once tubing is full, close clamp, and cap end of tubing.
 - (2) Hang piggyback medication bag above level of primary fluid bag. (Use hook to lower main bag.)
 - (3) Connect tubing of piggyback to appropriate connector on upper Y-port of primary infusion line:
 - (a) *Needleless system:* Wipe off needleless port on main IV line with alcohol swab, allow it to dry, and then insert tip of piggyback infusion tubing ([Fig. 36.1](#)).

RATIONALE

Keeps patient informed of planned therapies, minimizing anxiety. Patients who verbalize pain at IV site help detect IV infiltrations early, lessening damage to surrounding tissues.

Filling infusion tubing with solution and freeing air bubbles prevent air embolus.

Height of fluid bag affects rate of flow to patient.

Connection allows IV medication to enter main IV line.

Use needleless connections to prevent accidental needlestick injuries ([Infusion Nurses Society \[INS\], 2016a](#); [Occupational Safety and Health Administration \[OSHA\], 2012](#)).

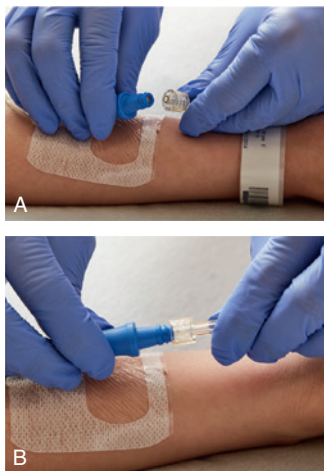


Fig. 36.1 A, Needleless lever lock cannula system. B, Blunt-ended cannula inserts into ports and locks.

STEP

- (4) Regulate flow rate of medication solution by adjusting regulator clamp or IV pump infusion rate. Infusion times vary. Refer to medication reference or institutional policy for safe flow rate.
- (5) Once medication has infused:
 - (a) Continuous infusion: Check flow rate of primary infusion. Primary infusion automatically begins after piggyback solution is empty.

RATIONALE

Provides slow, safe, intermittent infusion of medication and maintains therapeutic blood levels.

Back-check valve on piggyback prevents flow of primary infusion until medication infuses. Checking flow rate ensures proper administration of IV fluids.

Continued

STEP

RATIONALE

(b) Normal saline lock: Disconnect tubing, clean port with alcohol, and flush IV line with 2 to 3 mL of sterile 0.9% sodium chloride. Maintain sterility of IV tubing between intermittent infusions.

(6) Regulate continuous main infusion line to ordered rate.

(7) Leave IV piggyback and tubing in place for future drug administration (see agency policy), or discard in puncture- and leak-proof container.

b Volume-control administration set (e.g., Volutrol):

(1) Fill Volutrol with desired amount of IV fluid (50 to 100 mL) by opening clamp between Volutrol and main IV bag.

(2) Close clamp, and check to be sure that clamp on air vent Volutrol chamber is open.

(3) Clean injection port on top of Volutrol with antiseptic swab.

Infusion of piggyback sometimes interferes with main line infusion rate.

Establishment of secondary line produces route for microorganisms to enter main line. Repeated changes in tubing increase risk for infection transmission.

Small volume of fluid dilutes IV medication and reduces risk of fluid infusing too rapidly.

Prevents additional leakage of fluid into Volutrol. Air vent allows fluid in Volutrol to exit at regulated rate.

Prevents introduction of microorganisms during needle insertion.

STEP

- (4) Remove needle cap or sheath, and insert needleless syringe or syringe needle through port and inject medication (Fig. 36.2). Gently rotate Volutrol between hands.
- (5) Regulate IV infusion rate to allow medication to infuse in time recommended by agency policy, pharmacist, or medication reference manual.
- (6) Label Volutrol with name of medication; dosage, total volume, including diluent; and time of administration following ISMP (2015b) safe-medication label format.

RATIONALE

Rotating mixes medication with solution to ensure equal distribution in Volutrol.

For optimal therapeutic effect, medication should infuse in prescribed time interval.

Alerts nurses to medication being infused. Prevents other medications from being added to Volutrol.

Continued



Fig. 36.2 Medication injected into volume-control set.

STEP

RATIONALE

(7) If patient is receiving continuous IV infusion, check infusion rate after Volutrol infusion is complete. (8) Dispose of uncapped needle or needle enclosed in safety shield and syringe in puncture- and leak-proof container. (9) Discard supplies in appropriate container. Perform hand hygiene. c Mini-infusion administration: (1) Connect prefilled syringe to mini-infusion tubing. Remove end cap of tubing. (2) Carefully apply pressure to syringe plunger, allowing tubing to fill with medication. (3) Place syringe into mini-infusion pump (follow product directions) and hang on IV pole. Be sure syringe is secured (Fig. 36.3). (4) Connect mini-infusion tubing to main IV line or saline lock:	Ensures appropriate rate of administration. Prevents accidental needlesticks (OSHA, n.d.). Reduces transmission of microorganisms. Special tubing designed to fit syringe delivers medication to main IV line. Ensures tubing is free of air bubbles to prevent air embolus. Secure placement is needed for proper medication administration. Establishes route for IV medication to enter main IV line.



Fig. 36.3 Ensure that syringe is secure after placing it into mini-infusion pump.

STEP

- (a) *Existing IV line:* Wipe off needleless port on main IV line with alcohol swab, allow it to dry, and then insert tip of mini-infusion tubing through center of port.
- (b) *Normal saline lock:* Flush and prepare lock. Wipe off port with alcohol swab, allow it to dry, and then insert tip of mini-infusion tubing.
- (5) Set pump to deliver medication within time recommended by agency policy, pharmacist, or medication reference manual. Press button on pump to begin infusion.

RATIONALE

Needleless connections reduce risk for accidental needlestick injuries (OSHA, n.d.).

Pump automatically delivers medication at safe, constant rate based on volume in syringe.

Continued

STEP	RATIONALE
(6) Once medication has infused: (a) <i>Main IV infusion:</i> Check flow rate. Infusion automatically begins to flow once pump stops. Regulate infusion to desired rate as needed. (b) <i>Normal saline lock:</i> Disconnect tubing, clean port with alcohol, and flush IV line with 2 to 3 mL of sterile 0.9% sodium chloride. Maintain sterility of IV tubing between intermittent infusions. (7) Complete postprocedure protocol. (8) Stay with patient for several minutes and observe for any allergic reactions.	Maintains patent primary IV fluids. Dyspnea, wheezing, and circulatory collapse are signs of severe anaphylactic reaction.

Recording and Reporting

- Immediately record medication, dose, route, infusion rate, and date and time administered on MAR or computer printout.
- Record volume of fluid in medication bag or Volutrol on intake and output (I&O) form.
- Report any adverse reactions to patient's health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops adverse or allergic reaction to medication.	• Stop medication infusion immediately. • Follow agency policy or guidelines for appropriate response to allergic reaction (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine) and reporting of adverse medication reactions. • Notify patient's health care provider of adverse effects immediately. • Add allergy information to patient record per agency policy.
2 Medication does not infuse over established time frame.	• Determine reason (e.g., improper calculation of flow rate, poor position of IV needle at insertion site, infiltration). • Take corrective action as indicated, and resume infusion.
3 Intravenous site shows signs of infiltration or phlebitis (see Skill 54).	• Stop IV infusion and discontinue access device. • Treat IV site as indicated by agency policy. • Insert new IV catheter if therapy continues. • For infiltration, determine how harmful IV medication is to subcutaneous tissue. Provide IV extravasation care (e.g., injecting phentolamine [Regitine] around the IV infiltration site) as indicated by agency policy, or consult pharmacist to determine appropriate follow-up care.

Intravenous Medications

Intravenous Bolus

An intravenous (IV) bolus introduces a concentrated dose of a medication directly into a vein by way of an existing IV access. An IV bolus, or “push,” usually requires small volumes of fluid, which is an advantage for patients who are at risk for fluid overload. The IV bolus is a dangerous method for administering medications because it allows no time for correction of errors. Therefore, be very careful in calculating the correct amount of the medication for administration. In addition, a bolus may cause direct irritation to the lining of blood vessels; thus always confirm placement of the IV catheter or needle by flushing the line before and after administration. Never give an IV bolus if the insertion site appears edematous or reddened or if the IV fluids do not flow at the ordered rate. Accidental injection of some medications into tissues surrounding a vein can cause pain, sloughing of tissues, and abscesses.

Agencies have policies and procedures that identify the medications that nurses are allowed to administer by IV bolus or push based on the medication, compatibility with mainline IV fluids and other medications, and availability of staff, and type of monitoring equipment available.

The Institute for Safe Medication Practices ([ISMP, 2015b](#)) has identified the following strategies to reduce harm from rapid IV push medications:

- Use commercially available or pharmacy prepared IV push medication whenever possible.
- Do not dilute IV push medications unless recommended by the manufacturer, agency policy, or reference literature.
- IV push medications should be administered at the rate recommended by the manufacturer, agency policy, or reference literature.
- Appropriately label clinical-prepared syringes.

Verify the rate of administration of IV push medication and compatibility using agency guidelines or a medication reference manual.

Delegation Considerations

The skill of administering intravenous medications by IV bolus cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential actions and side effects of the medications and to report their occurrence to the nurse

- Reporting any patient complaint of moisture or discomfort around infusion site
- Obtaining any required vital signs and reporting them to the nurse

Equipment

- Watch with second hand
- Clean gloves
- Antiseptic swab
- Medication in vial or ampule
- Proper-size syringes for medication and saline flush with needleless device or sharps with engineered sharps injury protection (SESIP) needle (21 to 25 gauge)
- Intravenous lock: Vial of normal saline flush solution (saline recommended [Alexander et al., 2014]); when heparin is used for flushing, the most common concentration is 10 units/mL; check agency policy.
- Medication administration record (MAR) or computer printout
- Puncture-proof container

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR or computer printout with prescriber's written medication order. Check patient's name, medication name and dosage, route of administration, and time of administration. 3 Perform hand hygiene. Assess condition of IV needle insertion site for patency and signs of infiltration or phlebitis.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012). Illegible MARs are a source of medication errors (Alsaad et al., 2013). Do not administer medication if site is edematous or inflamed. For medication to reach venous circulation effectively, IV line must be patent, and fluids must infuse easily.

Continued

STEP	RATIONALE
SAFETY ALERT Some IV medications require dilution before administration. Verify with agency policy or pharmacy. If a small amount of medication is given (e.g., less than 1 mL), dilute medication in small amount (e.g., 5 mL) of normal saline or sterile water so the medication does not collect in the “dead spaces” (e.g., Y-site injection port, IV cap) of the IV delivery system.	
4 Take medication(s) to patient at correct time (see agency policy).	Hospitals must adopt medication administration policy and procedure for timing of medication administration that considers nature of the prescribed medication, specific clinical application, and patient needs (Department of Health and Human Services [DHHS], 2011; ISMP, 2011). Time-critical scheduled medications are those for which early or delayed administration of maintenance doses of greater than 30 minutes before or after the scheduled dose may cause harm or result in substantial suboptimal therapy or pharmacologic effect. Non–time-critical medications are those for which early or delayed administration within a specified range of either 1 or 2 hours should not cause harm or result in substantial suboptimal therapy or pharmacologic effect (DHHS, 2011; ISMP, 2011).

STEP

RATIONALE

5 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record. 6 At the patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies. 7 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions. Explain that you will give medication through existing IV line. Encourage patient to report symptoms of discomfort at IV site. 8 Perform hand hygiene and put on clean gloves. 9 Intravenous Push (Existing Line): a Select injection port of IV tubing closest to patient. Use needleless injection port. b Clean injection port with antiseptic swab. Allow it to dry. c Connect syringe to IV line: Insert needleless tip of syringe containing drug through center of port (Fig. 37.1).	Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). Some agencies are now using a bar code system to help with patient identification. <i>This is the third check for accuracy</i> and ensures that patient receives correct medication. Confirms patient's allergy history. Keep patient informed of planned therapies, minimizing anxiety. Patients who verbalize pain at IV site help detect IV infiltrations early, lessening damage to surrounding tissues. Reduces transmission of infection. Follows provisions of the Needle Safety and Prevention Act of 2001 (OSHA, n.d.). Prevents transfer of microorganisms during blunt cannula insertion. Prevents introduction of microorganisms. Prevents damage to port diaphragm and possible leakage from site.

Continued



Fig. 37.1 Connecting syringe to IV line with needleless blunt cannula tip.

STEP

- d** Occlude IV line by pinching tubing just above injection port (Fig. 37.2). Pull back gently on plunger of syringe to aspirate for blood return.

RATIONALE

Final check ensures that medication is being delivered into bloodstream.

SAFETY ALERT In the case of smaller-gauge IV needles, blood return sometimes is not aspirated even if IV is patent. If IV site does not show signs of infiltration and IV fluid is infusing without difficulty, give IV push.



Fig. 37.2 Occluding IV tubing above injection port.

STEP

- e Release tubing, and inject medication within amount of time recommended by agency policy, pharmacist, or medication reference manual. Use watch to time administrations. You can pinch IV line while pushing medication and release it when not pushing medication. Allow IV fluids to infuse when not pushing medication.

RATIONALE

Ensures safe medication infusion. Rapid injection of IV drug can be fatal. Allowing IV fluids to infuse while pushing IV drug enables medication to be delivered to patient at prescribed rate.

Continued

STEP	RATIONALE
f After injecting medication, withdraw syringe, and recheck IV fluid infusion rate. 10 Intravenous Push (Intravenous Lock): a Prepare flush solutions according to agency policy. (1) Saline flush method (preferred method): Prepare two syringes filled with 2 to 3 mL of normal saline (0.9%). (2) Heparin flush method (refer to agency policy). b Administer medication: (1) Clean injection port with antiseptic swab. (2) Insert needleless tip of syringe with normal saline 0.9% through center of injection port of IV lock. (3) Pull back gently on syringe plunger and check for blood return. (4) Flush IV site with normal saline by pushing slowly on plunger.	Injection of bolus may alter rate of fluid infusion. Rapid fluid infusion can cause circulatory fluid overload. Normal saline is effective in keeping IV locks patent and is compatible with wide range of medications (Patidar et al., 2014). Prevents transfer of microorganisms. Indicates if needle or catheter is in vein. Clears needle and reservoir of blood. Flushing without difficulty indicates patent IV.

SAFETY ALERT Carefully observe the area of skin above the IV catheter. Note any puffiness or swelling as the IV site is flushed, which could indicate infiltration into the vein, requiring removal of catheter.

- (5)** Remove saline-filled syringe.

STEP	RATIONALE
(6) Clean injection port with antiseptic swab.	Prevents transmission of microorganisms.
(7) Insert needleless tip of syringe containing prepared medication through injection port of IV lock.	Allows administration of medication.
(8) Inject medication within amount of time recommended by agency policy, pharmacist, or medication reference manual. Use watch to time administration.	Many medication errors are associated with IV pushes being administered too quickly. Following guidelines for IV push rates promotes patient safety.
(9) After administering medication, withdraw syringe.	
(10) Clean lock's injection site with antiseptic swab.	Prevents transmission of microorganisms.
(11) Flush injection port.	
(a) Attach syringe with normal saline, and inject flush at the same rate that the medication was delivered.	Flushing IV line with saline prevents occlusion of IV access device and ensures that all medication is delivered. Flushing IV site at same rate as medication ensures that any medication remaining within IV needle is delivered at the correct rate.
11 Dispose of SESIP needles and syringes in puncture- and leak-proof container.	Prevents accidental needlestick injuries and follows Centers for Disease Control and Prevention guidelines for disposal of sharps (OSHA, n.d.).
12 Complete postprocedure protocol.	

Recording and Reporting

- Immediately record medication administration, including drug, dose, route, time instilled, and date and time administered, on MAR. Include initials or signature.
- Report any adverse reactions to patient’s health care provider. Patient’s response sometimes indicates need for additional medical therapy.
- Record patient’s medication response in nurses’ notes and electronic health record (EHR).

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops adverse reaction to medication.	• Stop delivering medication immediately, and follow agency policy or guidelines for appropriate response to allergic reaction (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine) and reporting of adverse drug reactions. • Notify patient’s health care provider of adverse effects immediately. • Add allergy information to patient’s medical record.
2 IV medication is incompatible with IV fluids (e.g., IV fluid becomes cloudy in tubing) (see agency policy).	• Stop the IV fluids, and clamp the IV line. • Flush the IV with 10 mL of 0.9% sodium chloride or sterile water. • Give IV bolus over appropriate amount of time. • Flush with another 10 mL of 0.9% sodium chloride or sterile water at the same rate as the medication was administered.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Intravenous site shows signs of infiltration or phlebitis.	• Restart the IV fluids with new tubing at prescribed rate. • If unable to stop IV infusion, start a new IV site, and administer medication using IV push (IV lock) method. • Stop IV infusion immediately, or discontinue access device and restart in another site. • Determine how much damage IV medication can produce in subcutaneous tissue. • Provide IV extravasation care (e.g., injecting phentolamine [Regitine] around the IV infiltration site) as indicated by agency policy. Use a medication reference and consult pharmacist to determine appropriate follow-up care.
4 Patient is unable to explain medication information.	• Provide patient with additional information, or acknowledge that patient is unable to learn at this time.

Isolation Precautions

Certain procedures performed at a patient's bedside require the application of personal protective equipment (PPE), such as a mask, cap, eyewear, gown, or gloves. You wear clean gloves before coming in contact with mucous membranes, nonintact skin, blood, body fluids, or other infectious material. Masks are worn when there is the risk of splash during a procedure or when certain sterile procedures such as changing a central line dressing are performed. Protective eyewear and masks become important when there is a risk for splash of blood or other body fluids to the eyes or mouth.

The [Centers for Disease Control and Prevention \(CDC\)](#) (2009, 2011) and the [Occupational Safety and Health Administration \(OSHA\)](#) (2011) have stressed the importance of barrier protection. The Hospital Infection Control Practices Advisory Committee (HICPAC) of the [CDC published revised guidelines for isolation precautions](#) (2009).

Standard precautions, or tier 1 precautions, are for the care of all patients, regardless of risk or presumed infection status ([Box 38.1](#)). Standard precautions are the primary strategies for prevention of infection transmission and apply to contact with blood, body fluids, nonintact skin, respiratory secretions, mucous membranes, and equipment or surfaces contaminated with these potentially infectious materials.

The second tier ([Table 38.1](#)) includes precautions designed for care of patients who are known or suspected to be infected, or colonized, with microorganisms transmitted by the contact, droplet, or airborne route ([Brisko, 2015](#); [CDC, 2007](#)) or by contact with contaminated surfaces. The three types of transmission-based precautions—airborne, droplet, and contact—may be combined for diseases that have multiple routes of transmission (e.g., chickenpox). Whether used either singly or in combination, you use them in addition to standard precautions.

Delegation Considerations

The skill of caring for patients on isolation precautions can be delegated to nursing assistive personnel (NAP). However, the nurse must assess the patient's status and isolation indications. The nurse instructs the NAP about the following:

- Reason patient is on isolation precautions
- Precautions for bringing equipment into the patient's room
- Special precautions regarding individual patient needs, such as transportation to diagnostic tests

BOX 38.1 CDC Isolation Guidelines: Standard Precautions (Tier 1)* for Use With All Patients

- Standard Precautions apply to blood, blood products, all body fluids, secretions, excretions (except sweat), nonintact skin, and mucous membranes.
- Perform hand hygiene before, after, and between direct contact with patients (e.g., between contact: cleaning hands after a patient care activity, moving to a nonpatient care activity, and cleaning hands again before returning to perform patient contact).
- Perform hand hygiene after contact with blood, body fluids, secretions, and excretions; after contact with surfaces or articles in a patient room; and immediately after gloves are removed.
- When hands are visibly soiled or contaminated with blood or body fluids, wash them with either a nonantimicrobial soap or an antimicrobial soap and water.
- When hands are not visibly soiled or contaminated with blood or body fluids, use an alcohol-based hand rub to perform hand hygiene.
- Wash hands with nonantimicrobial soap and water if contact with spores (e.g., *Clostridium difficile*) is likely to have occurred.
- Do not wear artificial fingernails or extenders if duties include direct contact with patients at high risk for infection and associated adverse outcomes.
- Wear gloves when touching blood, body fluids, secretions, excretions, nonintact skin, mucous membranes, or contaminated items or surfaces is likely. Remove gloves and perform hand hygiene between patient care encounters and when going from a contaminated to a clean body site.
- Wear personal protective equipment when the anticipated patient interaction indicates that contact with blood or body fluids may occur.
- A private room is unnecessary unless the patient's hygiene is unacceptable (e.g., uncontained secretions, excretions, or wound drainage).
- Discard all contaminated sharp instruments and needles in a puncture-resistant container. Health care agencies must make available needleless devices. Any needles should be disposed of uncapped, or a mechanical safety device should be activated for recapping.
- Respiratory hygiene/cough etiquette—Have patients:
 - Cover the nose/mouth when coughing or sneezing.
 - Use tissues to contain respiratory secretions and dispose of them in nearest waste container.
 - Perform hand hygiene after contacting respiratory secretions and contaminated objects/materials.
 - Contain respiratory secretions with procedure or surgical mask.
 - Sit at least 91.4 cm (3 feet) away from others if coughing.

*Formerly universal precautions and body substance isolation.

TABLE 38.1 CDC Isolation Guidelines: Transmission-Based Precautions (Tier 2) for Use With Specific Types of Patients

Category	Disease	Barrier Protection
Airborne precautions (droplet nuclei smaller than 5 microns)	Measles, chickenpox (varicella), disseminated varicella zoster, pulmonary or laryngeal tuberculosis	Private room, negative-pressure airflow of at least 6 to 12 exchanges per hour via HEPA filtration; mask or respiratory protection device, N95 respirator required (depending on condition)
Droplet precautions (droplets larger than 5 microns; being within 3 feet of patient)	Diphtheria (pharyngeal), rubella, streptococcal pharyngitis, pneumonia or scarlet fever in infants and young children, pertussis, mumps, <i>Mycoplasma pneumoniae</i> , meningococcal pneumonia or sepsis, pneumonic plague	Private room or cohort patients; mask or respirator required (depending on condition) (refer to agency policy)
Contact precautions (direct patient or environmental contact)	Colonization or infection with multidrug-resistant organisms such as VRE and MRSA, <i>Clostridium difficile</i> , <i>Shigella</i> , and other enteric pathogens; major wound infections; herpes simplex; scabies; varicella zoster (disseminated); respiratory syncytial virus in infants, young children, or immunocompromised adults	Private room or cohort patients (see agency policy), gloves, gowns

TABLE 38.1 CDC Isolation Guidelines: Transmission-Based Precautions (Tier 2) for Use With Specific Types of Patients—cont’d

Category	Disease	Barrier Protection
Protective environment	Allogeneic hematopoietic stem cell transplants	Private room; positive airflow with 12 or more air exchanges per hour; HEPA filtration for incoming air; mask to be worn by patient when out of room during times of construction in area

HEPA, High-efficiency particulate air; MRSA, methicillin-resistant *Staphylococcus aureus*; VRE, vancomycin-resistant enterococcus.
Modified from Centers for Disease Control and Prevention (CDC), Hospital Infection Control Practice Advisory Committee: Guidelines for isolation precautions in hospitals, *Morb Mortal Wkly Rep* 57(RR-16):39, 2007.

Equipment

- Personal protective equipment (PPE) determined by type of isolation required: clean gloves, mask, eyewear or goggles, face shield, and gown (gowns may be disposable or reusable, depending on agency policy)
- Other patient care equipment (as appropriate) (e.g., hygiene items, medications, dressing supplies, sharps container, disposable blood pressure [BP] cuff)
- Soiled linen bag and trash receptacle
- Sign for door indicating type of isolation and/or for visitors to come to the nurses’ station before entering room
- Tuberculin (TB) isolation
- Room with negative airflow
- N95 or P100 respirator

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

Continued

STEP

- 2 Review laboratory test results (e.g., wound culture, acid-fast bacillus [AFB] smears, changes in white blood cell [WBC] count).
- 3 Review agency policies and isolation precautions necessary for type of isolation ordered, and consider types of care measures that you will perform while in patient's room (e.g., medication administration or dressing change).
- 4 Perform hand hygiene.
- 5 Prepare all equipment needed in patient's room.
- 6 Prepare for entrance into isolation room. Before applying PPE, step into patient's room and stay by door. Introduce yourself and explain the care that you are providing.
 - a Apply gown, being sure it covers all outer garments. Pull sleeves down to wrist. Tie securely at neck and waist (Fig. 38.1).
 - b Apply either surgical mask or a fitted respirator around mouth and nose (type and fit-testing will depend on type of isolation and agency policy).

RATIONALE

Reveals type of microorganism for which patient is being isolated, body fluid in which it was identified, and whether patient is immunosuppressed.

Allows you to organize care items for procedures and time spent in patient's room.

Reduces transmission of microorganisms.

Prevents you from making more than one trip into room. The CDC recommends use of dedicated noncritical patient care equipment (CDC, 2007).

Proper preparation ensures nurse is protected from microorganism exposure.

Prevents transmission of infection and protects you when patient has excessive drainage or discharges.

Prevents exposure to airborne microorganisms or exposure to microorganisms that may occur during splashing of fluids.



Fig. 38.1 Nurse applying protective gown and tying at waist.

STEP

- c If needed, apply eyewear or goggles snugly around face and eyes. If you wear glasses, side shield may be used.
- d Apply clean gloves.
(NOTE: Wear unpowdered latex-free gloves if you, the patient, or another health care worker has a latex allergy.) Position glove cuffs over edge of gown sleeves (Fig. 38.2).
- 7 Enter patient's room. Arrange supplies and equipment.

RATIONALE

Protects you from exposure to microorganisms that may occur during splashing of fluids.

Reduces transmission of microorganisms.

Prevents extra trips entering and leaving the room.

Continued



Fig. 38.2 Nurse applies clean gloves.

STEP

- 8 Explain purpose of isolation and precautions that should be taken by patient and family. Offer opportunity to ask questions.
- 9 Assess vital signs:
 - a If patient is infected or colonized with resistant organism (e.g., vancomycin-resistant enterococci [VRE], methicillin-resistant *Staphylococcus aureus* [MRSA]), equipment remains in room, including stethoscope and BP cuff (CDC, 2010a).

RATIONALE

Improves patient's and family's ability to participate in care and minimizes anxiety. Identifies opportunity for planning social interaction and diversional activities.

Decreases the risk of infection transmission to another patient.

STEP	RATIONALE
- b If stethoscope is to be reused, clean earpieces and diaphragm or bell with 70% alcohol or facility-approved germicide. Set aside on clean surface. - c Use individual or disposable thermometers and blood pressure cuffs when available.	Systematic disinfection of stethoscopes with 70% alcohol or approved germicide minimizes chance of spreading infectious agents between patients (CDC, 2009). Prevents cross-contamination.
10 Administer medications: - a Give oral medication in wrapper or cup. - b Dispose of wrapper or cup in plastic-lined receptacle. - c Wear gloves when administering an injection. - d Discard disposable syringe and uncapped or sheathed needle into designated sharps container.	Handle and discard supplies to minimize transfer of microorganisms. Reduces the risk for exposure to blood. Reduces risk for needlestick injury.
11 Administer hygiene, encouraging patient to ask any questions or express concerns about isolation. Provide informal teaching at this time. a Avoid allowing isolation gown to become wet; carry wash basin outward away from gown; avoid leaning against wet tabletop.	Hygiene practices further minimize transfer of microorganisms. Quality time should be spent with patient when in room. Moisture allows organisms to travel through gown to uniform.
SAFETY ALERT When there is a risk for excess soiling, wear a gown impervious to moisture.	
b Help patient remove own gown; discard in leak-proof linen bag.	Reduces transfer of microorganisms.

Continued

STEP

- c Remove linen from bed; avoid contact with isolation gown. Place in leak-proof linen bag.
 - d Provide clean bed linen and set of towels.
 - e Remove gloves and perform hand hygiene if gloves become excessively soiled and further care is necessary. Reglove.
- 12 Collect specimens:
- a Place specimen containers on clean paper towel in patient's bathroom.
 - b Follow agency procedure for collecting specimen of body fluids.
 - c Transfer specimen to container without soiling outside of container. Place container in plastic bag and place label on outside of bag or per agency policy. Label specimen in front of patient ([The Joint Commission \[TJC\], 2016](#)). Perform hand hygiene and reglove if additional procedures are needed.
 - d Check label on specimen for accuracy. Send to laboratory (warning labels are often used, depending on hospital policy). Label containers of blood or body fluids with a biohazard sticker.
- 13 Dispose of linen, trash, and disposable items:

RATIONALE

Handle linen soiled by patient's body fluids to prevent contact with clean items.

Container will be taken out of patient's room; prevents contamination of outer surface.

Specimens of blood and body fluids are placed in well-constructed containers with secure lids to prevent leaks during transport.

Ensures that health care providers who transport or handle containers are aware of infectious contents.

STEP

- a Use single bags that are sturdy and impervious to moisture to contain soiled articles. Use double bag if necessary for heavily soiled linen or heavy wet trash.
 - b Tie bags securely at top in knot.
- 14 Remove all reusable pieces of equipment. Clean any contaminated surfaces with hospital-approved disinfectant (CDC, 2009) (see agency policy).
- 15 Resupply room as needed. Have staff colleague hand new supplies to you.
- 16 Leave isolation room. Remember, order of removal of protective barriers depends on what you wear in room. This sequence describes steps to take if all barriers are worn:
- a Remove gloves. Remove one glove by grasping cuff and pulling glove inside out over hand. Hold removed glove in gloved hand. Slide fingers of ungloved hand under remaining glove at wrist. Peel glove off over first glove (Fig. 38.3). Discard gloves in proper container.
 - b Remove eyewear, face shield, or goggles. Handle by headband or earpieces. Discard in proper container.

RATIONALE

Linen or refuse should be totally contained to prevent exposure of personnel to infectious material.

All items must be properly cleaned, disinfected, or sterilized for reuse.

Limiting trips of personnel into and out of room reduces exposure to microorganisms for you and your patient.

Technique prevents contact with outer surface contaminated of glove.

Change gloves between exposures to body sites and patient equipment. Inadequate glove changes and hand hygiene can lead to contamination, increasing the risk of health care–associated infections (HAIs) (Haas, 2015).

Outside of goggles is contaminated. Hands have not been soiled.

Continued



Fig. 38.3 Nurse removes gloves.

STEP

- c Untie neck strings, and then untie back strings of gown. Allow gown to fall from shoulders (Fig. 38.4); touch inside of gown only. Remove hands from sleeves without touching outside of gown. Hold gown inside at shoulder seams, and fold inside out into a bundle; discard in laundry bag.
- d Remove mask. If the mask secures over the ears, remove elastic from ears and pull mask away from face. For a tie-on mask, untie *bottom* mask strings and then top strings, pull mask away from face, and drop mask into trash receptacle (do not touch outer surface of mask).

RATIONALE

Hands do not come in contact with soiled front of gown.

Ungloved hands will not be contaminated by touching only elastic or mask strings. Prevents top part of mask from falling down over nurse's uniform.



Fig. 38.4 Nurse removes gown.

STEP

- e Perform hand hygiene.
- f Retrieve wristwatch and stethoscope (unless items must remain in room), and record vital sign values on notepaper.
- g Explain to patient when you plan to return to room. Ask whether patient requires any personal care items. Offer books, magazines, audiotapes.
- h Leave room and close door if necessary. Close door if patient is in negative airflow room.

RATIONALE

Reduces transmission of microorganisms.

Clean hands can contact clean items.

Diversions help to minimize boredom and feeling of social isolation.

Continued

STEP	RATIONALE
17 While in room, ask if patient has had sufficient opportunity to discuss health problems, course of treatment, or other topics important to patient.	Measures patient's perception of adequacy of discussions with caregivers.
18 Complete postprocedure protocol.	

Recording and Reporting

- Document procedures performed and patient's response to social isolation. Also document any patient education performed and reinforced on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Document type of isolation in use and the microorganisms (if known).

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient avoids social and therapeutic discussions.	- Confer with family and/or significant other, and determine best approach to reduce patient's sense of loneliness and depression. - Notify physician/employee health department, and treat sensitivity or allergic reaction appropriately. - Use latex-free gloves for future care activities.
2 Patient or health care worker may have an allergy to latex gloves.	

Mechanical Lifts

Knowledge about proper use of assistive equipment promotes safe patient transfer without injury to a patient or health care worker (American Nurses Association [ANA], 2013a,b). Consider an individual patient's clinical problems during a transfer. For example, a patient who has been immobile for several days or longer may be weak or dizzy or may develop orthostatic hypotension (a drop in blood pressure) when transferred. To ensure safe patient transfers, always use a gait or transfer belt or an appropriate lift and get help from a colleague (Freeman et al., 2011; Largo et al., 2012).

Delegation Considerations

The skill of effective transfer techniques can be delegated to trained nursing assistive personnel (NAP). The nurse is responsible to initially assess patient's readiness and ability to transfer. The nurse directs the NAP by doing the following:

- Helping and supervising when moving patients who are transferred for the first time after prolonged bed rest, extensive surgery, critical illness, or spinal cord trauma
- Explaining the patient's mobility restrictions, changes in blood pressure for which to look, or sensory alterations that may affect safe transfer
- Explaining what to observe for and report back to the nurse, such as dizziness or the patient's ability to help

Equipment

- Nonskid shoes, bath blankets, pillows
- Mechanical/hydraulic lift: use frame, canvas strips or chains, and hammock or canvas strips; stand-assist lift device

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Assess physiologic capacity of a patient to transfer and the need for special adaptive techniques. Assess the following:

RATIONALE

Determines patient's ability to tolerate and assist with transfer and whether special adaptive techniques are necessary.

Continued

STEP

RATIONALE

a Muscle strength (legs and upper arms)	Immobile patients have decreased muscle strength, tone, and mass. Affects ability to bear weight or raise body.
b Joint mobility and contracture formation	Immobilization or inflammatory processes (e.g., arthritis) may lead to contracture formation and impaired joint mobility.
c Paralysis or paresis (spastic or flaccid)	Patient with central nervous system (CNS) damage may have bilateral paralysis (requiring transfer by swivel bar, sliding bar, mechanical lift) or unilateral paralysis, which requires belt transfer to strong side. Weakness (paresis) requires stabilization of knee while transferring. Flaccid arm must be supported with sling during transfer.
d Bone continuity (trauma, amputation), or calcium loss from long bones	Patients with trauma to one leg or hip may be non-weight-bearing when transferred. Amputees may use sliding board to transfer. Osteoporosis increases risk for injury.
3 Assess for history of presence of weakness, dizziness, or postural hypotension.	Determines risk for fainting or falling during transfer. The move from supine to vertical position redistributes about 500 mL of blood; immobile patients may have decreased autonomic nervous system response to equalize blood supply, resulting in orthostatic hypotension (Lewis et al., 2014).
4 Assess patient's cognitive status:	Determines patient's ability to follow directions and learn transfer techniques.

STEP

- a Ability to follow verbal instructions.
- b Short-term memory
- c Recognition of physical deficits and limitations to movement
- 5 Refer to safe-handling algorithm (available in most agencies) to determine if a lift device or mechanical transfer device is needed and the number of people needed to help with transfer. Do not start procedure until all required caregivers are available.
- 6 Use ceiling or floor hydraulic lift to transfer patient from bed to chair.
 - a Bring lift to bedside, or lower ceiling lift and position properly.
 - b Position chair near bed, and allow adequate space to maneuver lift.
 - c Raise bed to high position with mattress flat. Lower side rail on side near chair.
 - d Have second nurse positioned at opposite side of bed.

RATIONALE

May indicate patients at risk for injury.

Patients with short-term memory deficits may have difficulty with transfer, initial learning, or consistent performance.

Patient's knowledge of deficits can help the nurse plan a safe transfer.

Ensures safe patient transfer.

Research supports use of mechanical lifts to prevent musculoskeletal injuries (ANA, 2013a,b). Use of ceiling-mounted lifts is a popular choice because of availability of lift in each patient's room.

Ensures safe elevation of patient off bed.

Prepares environment for safe use of lift and subsequent transfer.

Allows you to use proper body mechanics.

Maintains patient safety.

Continued

STEP

- e Roll patient on side away from you.
- f Place hammock or canvas strips under patient to form sling. With two canvas pieces, lower edge fits under patient's knees (wide piece), and upper edge fits under patient's shoulders (narrow piece).
- g Roll patient to opposite side, and pull hammock (strips) through.
- h Return patient to supine position. Be sure that hammock or straps are smooth over bed surface. Sling should extend from shoulders to knees (hammock) to support patient's body weight equally.
- i Place lift's horseshoe bar under side of bed (on side with chair).
- j Lower horizontal bar to sling level by releasing hydraulic valve. Lock valve if required.
- k Attach hooks on strap (chain) to holes in sling. Short chains or straps hook to top holes of sling; longer chains hook to bottom of sling (Fig. 39.1).
- l Elevate head of bed to Fowler position.

RATIONALE

Positions patient for placement of lift sling.

Two types of seats are supplied with mechanical/hydraulic lift: hammock style is better for patients who are flaccid, weak, and need support; canvas strips can be used for patients with normal muscle tone. Hooks should face away from patient's skin. Place sling under patient's center of gravity and greatest portion of body weight.

Completes positioning of patient on mechanical/hydraulic sling.

Positions lift efficiently and promotes smooth transfer.

Positions hydraulic lift close to patient. Locking valve prevents injury to patient.

Secures hydraulic lift to sling.

Positions patient in sitting position.



Fig. 39.1 Sling positioned under the patient and attached to the lift.

STEP

- m Fold patient's arms over chest.
- n Pump hydraulic handle using long, slow, even strokes until patient is raised off bed. For ceiling lift, turn on control device to move lift.
- o Use lift to raise patient off bed and use steering handle to pull lift from bed as you and other nurse maneuver patient to chair. Have second nurse alongside patient.
- p Roll base of lift around chair. Release check valve slowly and lower patient into chair (**Fig. 39.2**).

RATIONALE

Prevents injury to patient's arms.

Ensures safe support of patient during elevation.

Moves patient from bed to chair.

Positions lift in front of the chair to which patient is to be transferred. Safely guides patient into back of chair as seat descends.

Continued



Fig. 39.2 Lowering patient into the chair.

STEP

- q Close check valve or turn off control device as soon as patient is down and straps can be released.
 - r Remove straps and mechanical/hydraulic lift.
 - s Check patient's sitting alignment, and correct if necessary.
- 7 Complete postprocedure protocol.

RATIONALE

If valve is left open or device left on, boom may continue to lower and injure patient.

Prevents damage to skin and underlying tissues from canvas or hooks.

Prevents injury from poor posture.

Recording and Reporting

- Record procedure, including pertinent observations: weakness, ability to follow directions, weight-bearing ability, balance, ability to pivot, number of personnel needed to assist, and amount of assistance (muscle strength) required.
- Report transfer ability and assistance needed to next shift or other caregivers. Report progress or remission to rehabilitation staff (physical therapist, occupational therapist).

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient is unable to comprehend and follow directions for transfer.	• Reassess continuity and simplicity of your instruction. • If patient is tired or in pain, allow for rest period before transferring. • Consider medicating for pain if indicated.
2 Patient sustains injury on transfer.	• Evaluate incident that caused injury (e.g., assessment was inadequate, patient status changed, equipment used improperly). • Complete incident report according to agency policy.

Metered-Dose Inhalers

A metered-dose inhaler (MDI) is a small, handheld device that disperses medication into the airways through an aerosol spray or mist by activation of a propellant. Dry powder inhalers (DPIs) deliver inhaled medication in a fine powder formulation to the respiratory tract. The deeper passages of the respiratory tract provide a large surface area for drug absorption, and the alveolar-capillary network absorbs medication rapidly. Approximately 5 to 10 lbs of pressure is needed to activate the aerosol. This is difficult for some older patients because hand strength diminishes with age. An MDI requires coordination during the breathing cycle. The inhaler must be depressed to expel medication just as the patient inhales. This ensures that medication reaches the lower airways. Poor coordination can lead to erratic medication administration and absorption, but poor coordination can be solved by the use of spacer devices that have a one-way valve that activates on inhalation, thereby removing the need for good hand-breath coordination.

Delegation Considerations

The skill of administering MDIs cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential side effects of medications and to report their occurrence to the nurse
- Reporting breathing difficulty (e.g., paroxysmal coughing, audible wheezing) to the nurse

Equipment

- Inhaler device with medication canister (MDI or DPI)
- Spacer device such as AeroChamber or InspirEase (*optional*)
- Facial tissues (*optional*)
- Stethoscope
- Medication administration record (MAR) (electronic or printed)
- Pulse oximeter (*optional*)

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE

STEP

- 2 Assess patient's ability to hold, manipulate, and depress canister and inhaler.
- 3 Assess patient's readiness and ability to learn: asks questions about medication; is alert; participates in own care; is not fatigued, in pain, or in respiratory distress.
- 4 Assess patient's knowledge and understanding of disease and purpose and action of prescribed medications.
- 5 Prepare medications for inhalation. Check label of medication against MAR two times. Preparation usually involves taking inhaler device out of storage and into patient room. Check expiration date on container.
- 6 Take medication(s) to patient at correct time (see agency policy). Medications that require exact timing include STAT, first-time or loading doses, and one-time doses. Give time-critical scheduled medications (e.g., antibiotics, anticoagulants, insulin, anticonvulsants, immunosuppressive agents) at exact time ordered (no

RATIONALE

Any impairment of grasp or presence of hand tremors interferes with patient's ability to depress canister within inhaler. A spacer device is often necessary.

One-on-one patient assessment prepares patient for self-management and greater adherence to inhaler use (Ari, 2015). In some situations mental or physical limitations affect patient's ability to learn and methods used for instruction.

Knowledge of disease is essential for patient to realistically understand use of inhaler.

These are the first and second checks for accuracy. Process ensures that right patient receives right medication.

Hospitals must adopt medication administration policy and procedure for timing of medication administration that considers nature of the prescribed medication, specific clinical application, and patient needs (Centers for Medicare and Medicaid Services [CMS], 2011; Institute for Safe Medication Practices [ISMP], 2011).

Continued

STEP

later than 30 minutes before or after scheduled dose). Give non–time-critical scheduled medications within a range of 1 to 2 hours of scheduled dose (ISMP, 2011). During administration, apply six rights of medication administration.

- 7 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- 8 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- 9 Explain procedure to patient. Be specific if patient wishes to self-administer drug. Explain where and how to set up at home. Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about the drugs. Explain what a metered dose is and how to administer. Warn about overuse of inhaler and side effects.

RATIONALE

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). Some agencies are now using a bar-code system to help with patient identification.

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy.

STEP

RATIONALE

- 10 Allow adequate time for patient to manipulate inhaler, canister, and spacer device (if provided). Explain and demonstrate how canister fits into inhaler.

Patient must be familiar with how to use equipment.

SAFETY ALERT If using an MDI that is new or has not been used for several days, push a “test spray” into the air to prime the device before using. This ensures that the MDI is patent and the metal canister is positioned properly.

- 11 Explain steps for administering MDI without spacer (demonstrate steps when possible):
- Remove mouthpiece cover from inhaler after inserting MDI canister into holder.
 - Shake inhaler well for 2 to 5 seconds (five or six shakes).
 - Hold inhaler in dominant hand.
 - Instruct patient to position inhaler in one of two ways:
 - Place mouthpiece in mouth with opening toward back of throat, closing lips tightly around it. Do not block the mouthpiece with the teeth or tongue (Fig. 40.1).

Simple step-by-step explanation allows patient to ask questions at any point during procedure.

Ensures mixing of medication in canister.

Ensures proper fit to inhale medication.

Continued

Fig. 40.1 One technique for use of an inhaler. The patient opens lips and places the inhaler in the mouth with the opening toward the back of the throat.



STEP	RATIONALE
(2) Position the device 2 to 4 cm (1 to 2 inches) in front of widely opened mouth (Fig. 40.2), with opening of inhaler toward back of throat. Lips should not touch the inhaler. e While holding the mouthpiece away from the mouth, have patient take deep breath and exhale completely. f With inhaler positioned, have patient hold it with the thumb at the mouthpiece and the index and middle fingers at the top. This is a three-point or bilateral hand position.	Directs aerosol spray toward airway. This is the best way to deliver the medication without a spacer. Empties lung volume and prepares airway to receive medication. Hand position ensures proper activation of MDI and distribution of dosage (Burchum and Rosenthal, 2016).



Fig. 40.2 Another technique for use of an inhaler. The patient positions the mouthpiece 2 to 4 cm (1 to 2 inches) from widely opened mouth. This is considered the best way to deliver medication without a spacer.

STEP

- g Instruct patient to tilt head back slightly and inhale slowly and deeply through mouth for 3 to 5 seconds while depressing canister fully.
 - h Have patient hold breath for approximately 10 seconds.
 - i Remove the MDI from mouth before exhaling and exhale slowly through nose or pursed lips.
- 12 Explain steps to administer MDI and prepare mouthpiece of spacer device (demonstrate when possible).
- a Remove mouthpiece cover from MDI and mouthpiece of spacer device.

RATIONALE

Medication is distributed to airways during inhalation.

Allows tiny drops of aerosol spray to reach deeper branches of airways.

Keeps small airways open during exhalation.

Simple one-on-one instruction and demonstration of step-by-step administration allows patient to ask questions at any point during procedure and increases patient adherence to inhaler use (Ari, 2015).

Inhaler fits into end of spacer device.

Continued

STEP

RATIONALE

b Shake inhaler well for 2 to 5 seconds (five or six shakes)	Ensures mixing of medication in canister.
c Insert MDI into end of spacer device.	Spacer device traps medication released from MDI; patient then inhales drug from device.
d Instruct patient to place spacer device mouthpiece in mouth and close lips. Do not insert beyond raised lip on mouthpiece. Avoid covering small exhalation slots with the lips.	These devices improve delivery of correct dose of inhaled medication (Barrons et al., 2011).
e Have patient breathe normally through spacer device mouthpiece.	Medication should not escape through mouth.
f Instruct patient to depress medication canister, spraying one puff into spacer device.	Allows patient to relax before delivering medication.
g Patient breathes in slowly and fully (for 5 seconds).	Device contains fine spray and allows patient to inhale more medication. The spacer increases drug delivery and deposition of the medication on the oropharyngeal mucosa (Burchum and Rosenthal, 2016).
h Instruct patient to hold full breath for 10 seconds.	Ensures particles of medication are distributed to deeper airways.
13 Instruct patient to wait 20 to 30 seconds between inhalations (if same medication), or 2 to 5 minutes between inhalations (if different medications).	Ensures full drug distribution.
	Drugs must be inhaled sequentially. Always administer bronchodilators before steroids so dilators can open airway passages (Burchum and Rosenthal, 2016).

STEP**RATIONALE**

14 Instruct patient to avoid repeated inhalations before next scheduled dose.

Drugs are prescribed at intervals during day to provide constant drug levels and to minimize side effects. Beta-adrenergic MDIs are used on either an “as needed” basis or on a fixed schedule every 4 to 6 hours.

15 Warn patients that they may feel gagging sensation in throat caused by droplets of medication on pharynx or tongue.

This occurs when medication is sprayed and inhaled incorrectly.

16 About 2 minutes after last dose, instruct patient to rinse mouth with warm water and expel water.

Steroids may alter normal flora of oral mucosa and lead to development of fungal infection. Rinsing out patient’s mouth reduces risk of fungal infection ([Ari, 2015](#)).

17 For daily cleaning, instruct patient to remove the medication canister, rinse the inhaler and cap with warm running water, and ensure that inhaler is completely dry before reuse. Do not allow the valve mechanism of the canister to become wet.

Removes residual medication and reduces transmission of microorganisms. Water damages valve mechanism of canister.

18 Complete postprocedure protocol.

Recording and Reporting

- Record drug administered, dose or strength, route, number of inhalations, and actual time administered on MAR immediately after administration, not before. Include initials or signature.
- Record patient teaching and validation of patient’s understanding on flow sheet or in nurses’ notes in electronic health record (EHR) or chart.

- Record on flow sheet or in nurses' notes in EHR or chart patient's response to MDI (e.g., breath sounds), evidence of side effects (e.g., arrhythmia, feelings of anxiety), and ability to use MDI.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's respirations are rapid and shallow; breath sounds indicate wheezing.	• Evaluate vital signs and respiratory status. • Notify health care provider. • Reassess type of medication and/or delivery method.
2 Patient needs bronchodilator more than every 4 hours (may indicate respiratory problem).	• Reassess type of medication and delivery methods needed. • Notify health care provider.
3 Patient experiences cardiac dysrhythmias (light-headedness, syncope), especially if receiving beta-adrenergic medications.	• Withhold all further doses of medication. • Evaluate cardiac and pulmonary status. • Notify health care provider for reassessment of type of medication and delivery method.

Moist Heat (Compress and Sitz Bath)

A warm compress is a section of sterile or clean gauze moistened with a prescribed heated solution (i.e., normal saline or sterile water) and applied directly to an affected area. Commercially packaged sterile, premoistened compresses are available in some agencies. Moist heat application also includes the use of warm baths, soaks, and sitz baths. A warm bath or soak involves immersion of a body part into a warmed solution. Warm soaks and sitz baths promote circulation, reduce edema and inflammation, promote muscle relaxation, debride wounds, and apply medicated solutions. If a body part is too large to immerse, you can soak it by wrapping it in a dressing saturated with the prepared, warmed solution. Sitz baths use a special tub or chair basin that allows a patient to sit in water without immersing the legs, feet, and upper trunk.

When preparing a soak or bath, remember that the heated solution is in direct contact with the patient's skin. Be sure to check water temperature frequently to prevent burns. It is desirable to keep the solution temperature constant to enhance the therapeutic effects of the moist heat. Whenever you add heated solution to a soak basin or bath, remove the patient's body part and reimmerse once the solution has mixed and the temperature has been checked.

Delegation Considerations

The skill of applying moist heat can be delegated to nursing assistive personnel (NAP). However, in most settings the nurse applies any sterile applications. The assessment of the patient's condition and the skin and tissues in the area that is treated, evaluation of the patient's response, and explanation of the purpose of the treatment cannot be delegated. The nurse instructs the NAP about the following:

- Proper temperature of the application
- Skin changes to immediately report to the nurse (e.g., burning, blistering, or excessive redness)
- Specific patient complaints and changes in vital signs to immediately report to the nurse (e.g., pain, dizziness or light-headedness, increased or decreased pulse, decreased blood pressure)
- Specific positioning and application time requirements based on agency policy and manufacturer instructions
- Reporting when treatment is complete so an evaluation of the patient's response can be made

Equipment

All Moist Heat Applications

- Prescribed analgesia (if ordered)
- Dry bath towel, bath blanket
- Warmed prescribed solution (i.e., normal saline) or commercially prepared compresses or commercial heat pack
- Biohazard waste bag
- Clean gloves
- Compress
- Clean basin
- Waterproof pad
- Ties or cloth tape
- Clean gauze or towel
- Options for moist heat application, depending on health care provider’s order:
 - Sterile compress: sterile basin, sterile gauze, and sterile gloves
 - Aquathermia pad
 - Disposable sitz bath: prescribed solution and any topical medication after the soak

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Assess skin around area to be treated. Perform neurovascular assessments for sensitivity to temperature and pain by measuring light touch, pinprick, and temperature sensation.	Certain conditions alter conduction of sensory impulses that transmit temperature and pain, predisposing patients to injury from heat applications.
SAFETY ALERT Patients with diabetes mellitus, stroke or spinal cord injury, peripheral neuropathy, and rheumatoid arthritis are at greater risk for thermal injury.	
3 Describe the sensation the patient will feel, such as wetness and decreasing warmth. Explain precautions to prevent burning.	Minimizes patient’s anxiety and promotes cooperation during procedure.

STEP	RATIONALE
4 Perform hand hygiene and apply clean gloves. 5 Apply moist sterile compress: a Assist patient in assuming comfortable position in proper body alignment. Expose body part to be covered with compress, and drape patient with bath blanket. b Heat prescribed solution to desired temperature by immersing closed bottle of solution in basin of very warm water. c Remove any present existing dressing covering wound. Inspect condition of wound and surrounding skin. Inflamed wound appears reddened, but surrounding skin is less red in color. Dispose of gloves and old dressings in biohazard bag.	Reduces transmission of infection. Limited mobility in uncomfortable position causes muscular stress. Prevents cooling. Prevents burns by ensuring proper temperature of solution. Reduces transmission of microorganisms. Provides baseline to determine response to moist heat.

SAFETY ALERT If skin surrounding wound is inflamed or reddened or has active drainage, moist heat application may be contraindicated.

d Perform hand hygiene.	Reduces risk for transmission of microorganisms.
e Prepare compress.	Use of appropriate aseptic technique keeps gauze compress clean or sterile. Sterile compress is needed when applied to open wound.

Continued

STEP	RATIONALE
(1) Pour warmed solution into container. (If sterile asepsis is required, use sterile technique to add sterile gauze into warmed sterile solution to immerse gauze.) (2) Open gauze. If applying sterile compress, open sterile supplies using sterile technique. (3) Add gauze to container of solution to immerse gauze: use proper aseptic technique. (4) If using commercially prepared compress, follow manufacturer instructions for warming.	Sterile compress is needed when applied to open wound.

SAFETY ALERT To avoid injury to patient, test temperature of sterile solution by applying a drop to your forearm (without contaminating the solution). It should feel warm to the skin without burning.

f Apply sterile gloves if dressing change is sterile; otherwise, you may use clean gloves. g Pick up one layer of immersed gauze, wring out any excess solution, and apply it lightly to wound; avoid surrounding unaffected skin. <i>Option:</i> Apply commercial compress or heat pack over wound only; only use with clean wounds.	Allows you to manipulate sterile dressing and touch open wound. Excess moisture macerates skin and increases risk for burns and infection. Skin is sensitive to sudden change in temperature.

STEP

RATIONALE

h After a few seconds, lift edge of gauze to assess for redness. i If patient tolerates compress, pack gauze snugly against wound. Be sure to cover all wound surfaces by warm compress. j Cover moist compress with dry sterile dressing and bath towel. If necessary, secure by pin or tie. Remove and dispose of sterile gloves. k <i>Option:</i> When using gauze compress, apply aquathermia, commercial heat pack, or waterproof heating pad (see Skill 2) over towel. Keep it in place for desired duration of application. l Leave compress in place for 20 minutes or less (per order or agency policy). If aquathermia pad or commercial heat pack is <i>not</i> used, change warm compress using sterile technique every 5 to 10 minutes or as ordered during duration of therapy. m After prescribed time, apply clean gloves, and remove pad, towel, and compress. Reassess wound and condition of skin, and replace dry sterile dressing as ordered.	Increased redness indicates burn. Burns and injuries from hot therapies are preventable events (National Quality Forum [NQF], 2016b). Packing of compress prevents rapid cooling from underlying air currents. Dry sterile dressing will prevent transfer of microorganisms to wound via capillary action caused by moist compress. Towel insulates compress to prevent heat loss. Provides constant temperature to compress. Maintains constant temperature for best therapeutic benefit. Moist heat promotes transfer of heat to underlying subcutaneous tissues, which helps to reduce thermal injury to skin (Igaki et al., 2014). Time limit prevents risk of overexposure and injury to underlying skin. Continued exposure to moisture will macerate skin. Prevents entrance of microorganisms into wound site.

Continued

STEP

RATIONALE

6 Sitz bath or soak to intact skin or wound:

- a** Apply clean gloves. Remove any existing dressing covering wound. Dispose of gloves and dressings in proper receptacle and perform hand hygiene.
- b** Inspect condition of wound and surrounding skin. Pay particular attention to suture line.
- c** When exudate is present, apply clean gloves and clean intact skin around open area with clean cloth and soap and water or sterile gauze, in which case sterile gloves and sterile normal saline or water are needed. Dispose of gloves and perform hand hygiene.
- d** Fill sitz bath or bathtub in bathroom with warmed solution. Check temperature.
- e** Help patient to bathroom to immerse body part in sitz bath, bathtub, or basin. Cover patient with bath blanket or towel as desired.
- f** Assess heart rate. Make sure that patient does not feel light-headed or dizzy and that call light is within reach.
- g** Maintain constant temperature throughout 15- to 20-minute soak.

Reduces transmission of microorganisms.

Provides baseline to determine response to warm soak.

Cleaning prevents transmission of microorganisms.

Ensures proper temperature and reduces risk for burns.

Prevents falls. Covering patient prevents heat loss through evaporation and maintains constant temperature.

Provides baseline to determine if vascular response to vasodilation occurs during treatment.

Ensures proper therapeutic effect.

STEP

- h** After 15 to 20 minutes, remove patient from soak or bath; dry body parts thoroughly. (Wear clean gloves if drainage is present.)
- i** Drain solution from basin or tub. Clean and place in proper storage area. Dispose of soiled linen and gloves; perform hand hygiene.
- 7** Complete postprocedure protocol.

RATIONALE

Removing patient from bath before water cools prevents chilling. Enhances patient's comfort.

Reduces transmission of microorganisms.

Recording and Reporting

- Record and report procedure, noting type, location, and duration of application; solution and temperature; condition of body part, wound, and skin before and after treatment; and patient's response to therapy on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record preprocedure and postprocedure vital signs (as indicated).
- Document your evaluation of patient or family caregiver learning.

UNEXPECTED OUTCOMES

RELATED INTERVENTIONS

1 Patient's skin is reddened and sensitive to touch. Extreme warmth caused burning of skin layer.

- Discontinue moist application immediately.
- Verify proper temperature, or check device for proper functioning.
- Notify health care provider and, if there is a burn, complete an incident report (see agency policy).

2 Patient complains of burning and discomfort.

- Reduce temperature.
- Assess for skin breakdown.
- Notify health care provider.

Mouth Care

Unconscious or Debilitated Patients

Unconscious or debilitated patients pose challenges because of their risk for alterations of the oral cavity from drying of the mucous membrane, thickened secretions, and the inability to eat or drink. They are susceptible to infection because of the change in the normal flora of the oral cavity and at risk for infection because of increased plaque formation from the dryness of the mouth and decreased salivation. Debilitated patients are also at risk for aspiration.

Some patients require mouth care as often as every 1 to 2 hours until the mucosa returns to normal. Proper hygiene requires keeping the mucosa moist and removing secretions as they accumulate in the back of the throat. Evaluate the level and frequency of oral care on a daily basis during assessment of the oral cavity. Routine suctioning of the mouth and pharynx is required to manage oral secretions to reduce the risk for aspiration.

Delegation Considerations

The skill of providing oral hygiene to an unconscious or debilitated patient can be delegated to nursing assistive personnel (NAP). The nurse is responsible for assessing a patient's gag reflex. The nurse instructs the NAP to do the following:

- Have another NAP help and properly position patient for mouth care.
- Be aware of special precautions such as aspiration precautions.
- Use an oral suction catheter for clearing oral secretions.
- Report signs of impaired integrity of oral mucosa to the nurse.
- Report any bleeding of mucosa or gum or excessive coughing or choking to the nurse.

Equipment

- Small pediatric, soft-bristled toothbrush; toothette sponges; or suction toothbrushes for patients for whom brushing is contraindicated
- Antibacterial solution per organization protocol (e.g., chlorhexidine gluconate [CHG])
- Fluoride toothpaste
- Water-based mouth moisturizer

- Tongue blade
- Penlight
- Oral suction equipment
- Oral airway (uncooperative patient or patient who shows bite reflex)
- Water-soluble lip lubricant
- Water glass with cool water
- Face and bath towel
- Emesis basin
- Clean gloves

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	Reduces transmission of microorganisms in blood or saliva. Helps in determining aspiration risk.
2 Perform hand hygiene, and apply clean gloves.	
3 Test for presence of gag reflex by placing tongue blade on back half of tongue.	

SAFETY ALERT Patients with impaired gag reflex require oral care but are at risk for aspiration. Keep suction equipment available when caring for patients who are at risk for aspiration.

4 Raise bed to appropriate working height; lower side rail. Unless contraindicated (e.g., head injury, neck trauma), lower side rail and position patient in Sims or side-lying position. Turn patient's head toward mattress in dependent position with head of bed (HOB) elevated at least 30 degrees.	Use of good body mechanics with bed in high position prevents injury. Allows secretions to drain from mouth instead of collecting in back of pharynx. Prevents aspiration.
5 Remove dentures or partial plates if present.	Allows for thorough cleansing of prosthetics later. Provides clearer access to oral cavity.

Continued

STEP	RATIONALE
6 If patient is uncooperative or having difficulty keeping mouth open, insert an oral airway. Insert upside down; then turn the airway sideways and over tongue to keep teeth apart. Insert when patient is relaxed, if possible. Do not use force.	Prevents patient from biting down on nurse's fingers and provides access to oral cavity.
SAFETY ALERT Never place fingers into the mouth of an unconscious or debilitated patient. The normal response is to bite down.	
7 Clean mouth using brush moistened in water. Apply toothpaste or use antibacterial solution first to loosen crusts. Hold toothbrush bristles at 45-degree angle to gum line. Be sure that tips of bristles rest against and penetrate under gum line. Brush inner and outer surfaces of upper and lower teeth by brushing from gum to crown of each tooth; clean biting surfaces of teeth by holding top of bristles parallel with teeth and brushing gently back and forth. Brush sides of teeth by moving bristles back and forth. Use toothette sponge if patient has bleeding tendency or use of toothbrush is contraindicated. Suction any accumulated secretions.	Brushing action removes food particles between teeth and along chewing surfaces and crusts for mucosa. Do not use commercial swabs because they do not clean teeth. Repeated rinsing removes all debris and helps to moisten mucosa. Suction removes secretions and fluids that collect in posterior pharynx, thus reducing aspiration risk.

STEP**RATIONALE**

Moisten brush with clear water or CHG solution to rinse. Use brush or toothette to clean roof of mouth, gums, and inside cheeks. Gently brush tongue but avoid stimulating gag reflex (if present). Repeat rinsing several times and use suction to remove secretions. Use towel to dry off.

- 8 Use toothbrush or toothette sponge to apply thin layer of water-soluble moisturizer to lips.

- 9 Inform patient that procedure is completed. Return patient to comfortable and safe position.

- 10 Complete postprocedure protocol.

Lubricates lips to prevent drying and cracking.

Provides meaningful stimulation to unconscious or less-responsive patient.

Recording and Reporting

- Record procedure, appearance of oral cavity, presence of gag reflex, and patient's response to procedure in medical record in electronic health record (EHR) or chart.
- Report any unusual findings (e.g., bleeding, ulceration, choking response) to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Secretions or crusts remain on mucosa, tongue, or gums.	• Provide more frequent oral hygiene.
2 Localized inflammation or bleeding of gums or mucosa is present.	• Provide more frequent oral hygiene with toothette sponges. • Apply a water-based mouth moisturizer to provide moisture and maintain integrity of oral mucosa. • Chemotherapy and radiation can cause mucositis (inflammation of mucous membranes in mouth) because of sloughing of epithelial tissue. Room temperature saline rinses, bicarbonate and sterile water rinses, and oral care with a soft-bristled toothbrush decrease severity and duration of mucositis.
3 Lips are cracked or inflamed.	• Apply moisturizing gel or water-soluble lubricant to lips.
4 Patient aspirates secretions.	• Suction oral airway as secretions accumulate to maintain airway patency. • Elevate patient's head of bed to facilitate breathing. • If aspiration is suspected, notify the health care provider. Prepare the patient for a chest x-ray examination.

Nail and Foot Care

Feet and nails often require special care to prevent infection, odors, pain, and injury to soft tissues. Often people are unaware of foot or nail problems until discomfort or pain occurs. For proper foot and nail care, instruct patients to protect the feet from injury, to keep the feet clean and dry, and to wear appropriate footwear.

Patients most at risk for developing serious foot problems are those with peripheral neuropathy and peripheral vascular disease (PVD). These two disorders, commonly found in patients with diabetes mellitus, cause a reduction in blood flow to the extremities and a loss of sensory, motor, and autonomic nerve function. As a result, the patient is unable to feel heat and cold, pain, pressure, and positioning of the foot or feet. The reduction in blood flow impairs healing and promotes risk for infection.

Delegation Considerations

The skill of nail and foot care of patients *without diabetes or circulatory compromise* can be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP about the following:

- Refraining from trimming patient's nails
- Implementing special considerations for patient positioning
- Reporting any breaks in skin, redness, numbness, swelling, or pain

Equipment

- Wash basin
- Emesis basin
- Washcloth and towel
- Nail clippers (see agency policy)
- Soft nail or cuticle brush
- Plastic applicator stick
- Emery board or nail file
- Body lotion
- Disposable bath mat
- Clean gloves

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE

Continued

STEP

- 2 Apply clean gloves. Inspect all surfaces of fingers, toes, feet, and nails. Pay particular attention to areas of dryness, inflammation, or cracking. Also inspect areas between toes, heels, and soles of feet. Inspect socks for stains.
- 3 Assess type of footwear patient wears: Does patient wear socks? Are shoes tight or ill fitting? Are garters or knee-high nylons worn? Is footwear clean?
- 4 Identify patient's risk for foot or nail problems:
 - a Older adult
 - b Diabetes mellitus
 - c Heart failure, renal disease

RATIONALE

Integrity of feet and nails determines frequency and level of hygiene required. Heels, soles, and sides of feet are prone to irritation from ill-fitting shoes. Socks may become stained from bleeding or draining ulcer.

Some types of shoes and footwear predispose patient to foot and nail problems (e.g., infection, areas of friction, ulcerations).

Certain conditions increase likelihood of foot or nail problems.

Poor vision, lack of coordination, or inability to bend over contributes to difficulty in performing foot and nail care. Normal physiologic changes of aging can result in brittle nails. Discolored, extremely thickened, and deformed nails can indicate infection, fungus, or disease (Anastasi et al., 2013).

Vascular changes associated with diabetes reduce blood flow to peripheral tissues. Break in skin integrity places patients with diabetes at high risk for skin infection.

Both conditions increase tissue edema, particularly in dependent areas (e.g., feet). Edema reduces blood flow to neighboring tissues.

STEP

RATIONALE

d Cerebrovascular accident (stroke) 5 Help ambulatory patient sit in chair. Help bedfast patient to supine position with head of bed elevated 45 degrees. Place disposable bath mat on floor under patient's feet or place waterproof pad on mattress. 6 Fill wash basin with warm water. Test water temperature. Place basin on floor or pad on mattress. Have patient immerse feet.	Presence of residual foot or leg weakness or paralysis results in altered walking patterns. Altered gait pattern causes increased friction and pressure on feet. Sitting in chair facilitates immersing feet in basin. Bath mat protects feet from exposure to soil or debris. Prevents accidental burns to patient's skin.

SAFETY ALERT Patients who have diabetes mellitus, peripheral neuropathy, or PVD should not soak their hands and feet because of the increased risk of maceration that makes skin susceptible to infection.

7 Adjust over-bed table to low position and place it over patient's lap. 8 Fill emesis basin with warm water and place basin on paper towels on over-bed table. Test water temperature. 9 Instruct patient to place fingers in emesis basin and arms in comfortable position. 10 Unless patient has diabetes mellitus, peripheral neuropathy, or PVD, allow feet and fingernails to soak 10 minutes.	Easy access prevents accidental spills. Warm water softens nails and thickened epidermal cells. Prevents accidental burns to patient's skin. Prolonged positioning causes discomfort unless normal anatomic alignment is maintained. Goal is to soften debris beneath nails so it can be removed easily.

Continued

STEP	RATIONALE
11 Clean gently under fingernails with end of plastic applicator stick while fingers are immersed.	Removes debris under nails that harbors microorganisms.
12 Use soft cuticle brush or nailbrush to clean around cuticles to decrease overgrowth.	Nailbrush helps to prevent inflammation and injury to cuticles.
13 Remove emesis basin, and dry fingers thoroughly.	Thorough drying impedes fungal growth and prevents maceration of tissues.

SAFETY ALERT Check agency policy for appropriate process for cleaning beneath nails. Do not use an orange stick or end of cotton swab; these splinter and can cause injury.

14 Check agency policy on nail care regarding filing and trimming. Trim nails straight across at level of finger or follow curve of finger, ensuring that you do not cut down into nail grooves (Fig. 43.1). Use disposable emery board, and file nail to ensure that there are no sharp corners.	Trimming straight across avoids skin overgrowth at nail edges, which can lead to ingrown nails or infection. Filing nail straight across to eliminate sharp nail edges minimizes risk that nail can injure the adjacent finger (Anastasi et al., 2013).

SAFETY ALERT If patient has diabetes or circulatory problems, do not cut nails. Check agency policy.

15 Move over-bed table away from patient. Scrub callused areas with washcloth.	Provides easier access to feet. Friction removes dead skin layers.
16 Dry feet thoroughly, and trim or cut nails following Step 14.	Moisture can cause skin maceration.
17 Apply lotion to feet and hands. Rub in thoroughly. Help patient back to bed and into comfortable position.	Lotion lubricates dry skin by helping to retain moisture.
18 Complete postprocedure protocol.	

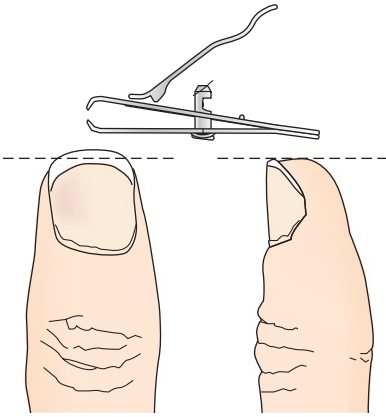


Fig. 43.1 Use nail clipper to clip fingernails straight across.

Recording and Reporting

- Record procedure and observations in medical record (e.g., breaks in skin, inflammation, ulcerations).
- Report any breaks in skin or ulcerations to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Cuticles and surrounding tissues are inflamed and tender to touch. 2 Localized areas of tenderness occur on feet with calluses or corns at point of friction. 3 Ulcerations involving toes or feet may remain.	• Repeat nail care. • Evaluate need for antifungal cream. • Change in footwear or corrective foot surgery may be needed for permanent improvement in calluses or corns. • Refer patient to podiatrist. • Institute wound care policies. • Consult with wound care specialist and/or podiatrist. • Increase frequency of assessment and hygiene.

Nasoenteral Tube Placement and Irrigation

Some types of nasogastric (NG) tubes, which are larger and more rigid, are used for gastric decompression instead of feeding. Small-bowel *nasointestinal* (NI) tubes such as nasojejunal (NJ) tubes are also used for enteral tube feedings, and these are advanced into the jejunum of the small intestine by way of the nose. Feeding tubes are soft and flexible; many use a removable guidewire or stylet to provide stiffness during tube insertion. Although these wires facilitate placement of a tube, they also add to the risk of pulmonary or esophageal injury during insertion. Nurses can also pass feeding tubes through the mouth (oral gastric tube), especially in critical care when the patient is also intubated or when contraindications to nasal placement such as a basilar skull fracture or facial trauma exist.

Placement of a feeding tube requires a health care provider's order. All candidates for NG or NI tube placement require an assessment of their coagulation status. Anticoagulation and bleeding disorders pose a risk for epistaxis during nasal tube placement.

Delegation Considerations

The skill of feeding tube insertion cannot be delegated to nursing assistive personnel (NAP). However, NAP may help with patient positioning and comfort measures during tube insertion.

Equipment

Insertion

- Small-bore NG or nasoenteric tube with or without stylet (select the smallest diameter possible to enhance patient comfort)
- 60-mL ENFit syringe
- Stethoscope, pulse oximeter, capnography (*optional*)
- Hypoallergenic tape, semipermeable (transparent) dressing, or tube fixation device
- Tincture of benzoin or other skin barrier protectant
- pH indicator strip (scale 1.0 to 11.0)
- Cup of water and straw or ice chips (for patients able to swallow)
- Water-soluble lubricant
- Emesis basin
- Towel or disposable pad
- Facial tissues

- Clean gloves
- Suction equipment in case of aspiration
- Penlight to check placement in nasopharynx
- Tongue blade
- Oral hygiene supplies

Implementation

STEP

RATIONALE

1 Complete preprocedure protocol.

Insertion of Nasoenteral Tube

- 1 Have patient close each nostril alternately and breathe. Examine each naris for patency and skin breakdown.
- 2 Assess patient's mental status (ability to cooperate with procedure, sedation), presence of cough and gag reflex, ability to swallow, critical illness, and presence of an artificial airway.

Sometimes nares are obstructed or irritated, or septal defect or facial fractures are present.

These are risk factors for inadvertent tube placement into tracheobronchial tree (Krenitsky, 2011).

SAFETY ALERT Recognize situations in which blind placement of a feeding tube poses an unacceptable risk for placement. Devices designed to detect pulmonary intubation such as CO₂ sensors or electromagnetic tracking devices enhance patient safety. Alternatively, to avoid insertion complications from blind placement in high-risk situations, clinicians trained in the use of visualization or imaging techniques should place tubes (American Association of Critical Care Nurses [AACN] 2010; Krenitsky, 2011).

- 3 Perform physical assessment of abdomen.

Absent bowel sounds, abdominal pain, tenderness, or distention may indicate medical problem contraindicating feedings.

Continued

STEP	RATIONALE
4 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's medication administration record or medical record.	Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016b). Some agencies are now using a bar-code system to help with patient identification.
5 Perform hand hygiene.	Reduces transmission of microorganisms.
6 Stand on same side of bed as naris chosen for insertion and position patient upright in high-Fowler position (unless contraindicated). If patient is comatose, raise head of bed as tolerated in semi-Fowler position with head tipped forward, using a pillow chin to chest. If necessary have a NAP help with positioning of confused or comatose patients. If patient is forced to lie supine, place in reverse Trendelenburg position.	Allows for easier manipulation of tube. Fowler position reduces risk of aspiration and promotes effective swallowing. Forward head position helps with closure of airway and passage of tube into esophagus.
7 Determine length of tube to be inserted, and mark location with tape or indelible ink.	Being aware of proper length to intubate determines approximate depth of insertion.
a Measure distance from tip of nose to earlobe to xiphoid process of sternum (Fig. 44.1).	Length approximates distance from nose to stomach.



Fig. 44.1 Determine length of tube to be inserted.

STEP

RATIONALE

- b** Measure distance from tip of nose to earlobe to mid-umbilicus for pediatric patient.
- c** Add 20 to 30 cm (8 to 12 inches) for NJ tubes.

Length approximates distance from nose to jejunum.

SAFETY ALERT Tip of tube must reach stomach to avoid the risk for pulmonary aspiration, which occurs when tubes terminate in the esophagus.

- 8** Prepare NG or NJ tube for intubation.
NOTE: Do not use iced tubes.
- a** Obtain order for stylet tube and check agency policy for trained clinician to insert tube.

Iced tube becomes stiff and inflexible, causing trauma to nasal mucosa.

Continued

STEP

- b** If tube has guidewire or stylet, inject 10 mL of water from ENFit syringe into tube.
- c** If using stylet, make certain that it is positioned securely within tube. Inject 10 mL of water from ENFit syringe into tube.
- 9** Cut hypoallergenic tape 10 cm (4 inches) long, or prepare membrane dressing or other fixation device.
- 10** Apply clean gloves.
- 11** *Option:* Dip tube with surface lubricant into glass of room temperature water, or apply water-soluble lubricant.
- 12** Explain the step, and gently insert tube through nostril to back of throat (posterior nasopharynx). This may cause patient to gag. Aim back and down toward ear.

RATIONALE

Aids in guidewire or stylet removal. Activates lubrication of tube for easier passage and ensures that tube is patent. ENFit devices will not be compatible with Luer connection or any other type of small-bore medical connector, thus preventing misadministration of an enteral feeding ([Institute for Safe Medication Practices \[ISMP\]](#), 2015b).

Promotes smooth passage of tube into gastrointestinal (GI) tract. Improperly positioned stylet can cause tube to kink or injure patient.

Used to secure tubing after insertion. Fixation devices allow tube to float free of nares, thus reducing pressure on nares, preventing device-related pressure injury (DRPI).

Reduces transmission of microorganisms.

Activates lubricant to facilitate passage of tube into naris and GI tract.

Natural contours facilitate passage of tube into GI tract.

STEP

RATIONALE

13 Have patient take deep breath, relax, and flex head toward chest after tube has passed through nasopharynx.

Closes off glottis and reduces risk of tube entering trachea.

14 Encourage patient to swallow small sips of water. Advance tube as patient swallows. Rotate tube gently 180 degrees while inserting.

Swallowing facilitates passage of tube past oropharynx.

Distinct tug may be felt as patient swallows, indicating that tube is following expected path.

15 Emphasize need to mouth breathe and swallow during the procedure.

Helps facilitate passage of tube and alleviates patient's fears during the procedure.

16 Do not advance tube during inspiration or coughing because it is more likely to enter respiratory tract.

Can cause tube to inadvertently enter patient's airway, which will be reflected in changes in oxygen saturation and/or capnography.

17 Advance tube each time patient swallows until desired length has been passed.

Reduces discomfort and trauma to patient.

SAFETY ALERT Do not force the tube or push against resistance. If patient starts to cough, experiences a drop in oxygen saturation, or shows other signs of respiratory distress, withdraw the tube into the posterior nasopharynx until normal breathing resumes.

18 Check for position of tube in back of throat with penlight and tongue blade.

Tube may be coiled, kinked, or inserted into trachea.

19 Temporarily anchor tube to the nose with a small piece of tape.

Movement of the tube stimulates gagging. Assesses general position before anchoring tube more securely.

20 Keep tube secure, and check placement of tube by aspirating stomach contents to measure gastric pH.

Proper tube position is essential before initiating feeding.

Continued

STEP

RATIONALE

SAFETY ALERT Insufflation of air into tube while auscultating abdomen is not a reliable means to determine position of feeding tube tip (Simons and Abdallah, 2012; Bourgault et al., 2014).

21 Anchor tube to patient's nose, avoiding pressure on nares. Mark exit site on tube with indelible ink. Select one of the following options for anchoring:

a Apply membrane dressing or tube fixation device:

(1) Membrane dressing:

(a) Apply tincture of benzoin or other skin protector to patient's cheek and area of tube to be secured.

(b) Place tube against patient's cheek, and secure tube with membrane dressing, out of patient's line of vision.

(2) Tube fixation device:

(a) Apply wide end of patch to bridge of nose (Fig. 44.2).

(b) Slip connector around feeding tube as it exits nose (Fig. 44.3).

Properly secured tube allows patient more mobility and prevents trauma to nasal mucosa.

Permits longer securement without need to change dressing.

Decreases risk for patient's inadvertent extubation.



Fig. 44.2 Apply patch to bridge of nose.



Fig. 44.3 Slip connector around feeding tube.

STEP

b Apply tape:

- (1)** Apply tincture of benzoin or other skin adhesive on tip of patient's nose and allow it to become "tacky."

RATIONALE

Prevents pulling of tube. May require frequent change if tape becomes soiled.
Helps tape adhere better.
Protects skin.

Continued

STEP

- (2) Remove gloves and tear two horizontal slits on each side of tape at 1/3 and 2/3 length. Do not split tape. Fold middle sections forward.
 - (3) Tear vertical strip at bottom of tape. Print date and time on nasal part of tape.
 - (4) Place intact end of tape over bridge of patient's nose. Wrap each strip around tube as it exits.
- 22 Fasten end of NG tube to patient's gown using a clip or piece of tape. Do not use safety pins to pin the tube to the patient's gown.
- 23 Help patient to comfortable position but keep head of the bed elevated at least 30 degrees (preferably 45 degrees) unless contraindicated (Metheny and Frantz, 2013). For intestinal tube placement, place patient on right side when possible until radiographic confirmation of correct placement is made.

RATIONALE

Creates a gap in tape that will allow tube to float and exert less pressure on naris.

Secures tube firmly.

Tube is free floating in the naris with this taping method, resulting in movement of tube in pharynx. Securing tape to naris in this method reduces pressure on naris and risk for medical device–related pressure ulcer (Markowitz et al., 2013).

Reduces traction on the naris if tube moves.

Safety pins can become unfastened and cause injury to the patient.

Promotes patient comfort and lowers risk of aspiration should patient receive tube feeding. Placing patient on right side promotes passage of NI tube into small intestine.

STEP

RATIONALE

SAFETY ALERT Leave stylet in place until correct position is verified by x-ray. Never try to reinsert a partially or fully removed stylet while feeding tube is in place. This can cause perforation of the tube and injure the patient.

- 24** Obtain x-ray film of chest/abdomen.
- 25** Apply clean gloves and administer oral hygiene. Clean tubing at nostril with washcloth dampened in mild soap and water.
- 26** Remove gloves, dispose of equipment, and perform hand hygiene.

Irrigating Feeding Tube

- 1** Perform hand hygiene, prepare equipment at patient's bedside, and apply gloves.
- 2** Verify tube placement if fluid can be aspirated for pH testing.
- 3** Draw up 30 mL of water in ENFit syringe. Do not use irrigation fluids from bottles that are used on other patients. Patient should have individual bottle of solution.

X-ray film examination is most accurate method to determine feeding-tube placement (Bankhead et al., 2009; Bourgault, 2014)

Promotes patient comfort and integrity of oral mucous membranes.

Reduces transmission of microorganisms.

Reduces transmission of microorganisms.
Ensures an organized approach to irrigation.
With tip of tube correctly placed in stomach, irrigation will not increase risk for aspiration.
This amount of solution will flush length of tube. Water is most effective agent for preventing tube clogging. Alternative flushing solutions such as cola and fruit juices increase clogging of tubes because of acidity of these fluids (Bankhead et al., 2009).

Continued

STEP

- 4 Change irrigation bottle every 24 hours. Irrigation trays, which hold both irrigation fluid and syringe, are considered open systems and may be more easily contaminated than sterile water bottles.

NOTE: Be sure that syringe in tray has ENFit adaptor.

- 5 Kink feeding tube while disconnecting it from administration tubing or while removing plug at end of tube.
- 6 Insert tip of syringe into end of feeding tube. Release kink, and slowly instill irrigating solution.
- 7 If unable to instill fluid, reposition patient on left side, and try again.
- 8 When water has been instilled, remove syringe. Reinstitute tube feeding, or administer medication as ordered. Flush each medication completely through tube.
- 9 Remove and discard gloves; dispose of supplies. Perform hand hygiene.

RATIONALE

Ensures sterile solution. Sterile water is required for neonates and patients who are immune suppressed or critically ill (Bankhead et al., 2009; Hockenberry and Wilson, 2015).

Tap water may be appropriate in some clinical settings and in home care if municipal water supply is safe (Bankhead et al., 2009).

Prevents leakage of gastric secretions.

Infusion of fluid clears tubing.

Tip of tube may be against stomach wall. Changing patient's position may move tip away from stomach wall.

Tubing is clear and patent. Ensures that full dose reaches stomach and medications do not mix with formula.

Reduces transmission of microorganisms.

Recording and Reporting

- Record time of irrigation and amount and type of fluid instilled.
- Report if tubing has become clogged.
- Document your evaluation of patient or family caregiver learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Tube cannot be irrigated and remains obstructed.	• Repeat irrigation; if unsuccessful, notify health care provider. • Tube may need to be removed, and a new tube placed.
2 Fluid and electrolyte imbalances occur. Insufficient irrigation can cause water deficiency; excessive irrigations can cause fluid volume excess.	• Notify health care provider of abnormal electrolyte levels or imbalanced intake and output.

Nasogastric Tube for Gastric Decompression Insertion and Removal

There are times following major surgery or with conditions affecting the gastrointestinal (GI) tract when normal peristalsis is temporarily altered. Because peristalsis is slowed or absent, a patient cannot eat or drink fluids without causing abdominal distention. The temporary insertion of a nasogastric (NG) tube into the stomach serves to decompress the stomach, keeping it empty until normal peristalsis returns.

The Levin and Salem sump tubes are the most common for stomach decompression. The Levin tube is a single-lumen tube with holes near the tip. Connect the tube to a drainage bag or an intermittent suction device to drain stomach secretions. The Salem sump tube is preferable for stomach decompression. The tube has two lumens: one for removal of gastric contents and one to provide an air vent. A blue “pigtail” is the air vent that connects with the second lumen. When the main lumen of the sump tube is connected to suction, the air vent permits free, continuous drainage of secretions. *Never clamp off the air vent, connect to suction, or use for irrigation.*

Delegation Considerations

The skill of inserting and maintaining an NG tube cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Measure and record the drainage from an NG tube.
- Provide oral and nasal hygiene measures.
- Perform selected comfort measures such as positioning or offering ice chips, if allowed.
- Anchor the tube to patient’s gown during routine care to prevent accidental displacement.
- Immediately report to the nurse any signs of redness or irritation to nares.

Equipment

- 14 or 16 Fr NG tube (Smaller-lumen catheters are not used for decompression in adults because they must be able to remove thick secretions.) (*Option:* A dual-purpose tube, one that is used for both gastric decompression and enteral feedings, may be ordered for selected patients.)

- Water-soluble lubricant
- pH test strips (measure gastric aspirate acidity); use paper with a range of at least 1.0 to 11.0 or higher
- Tongue blade
- Flashlight
- Emesis basin
- Asepto bulb or catheter-tipped syringe
- 2.5-cm (1-inch)–wide hypoallergenic tape or commercial fixation device
- Safety pin and rubber band
- Clamp, drainage bag, or suction machine with pressure gauge if wall suction is to be used
- Towel
- Glass of water with straw
- Facial tissues
- Normal saline
- Tincture of benzoin (*optional*)
- Suction equipment
- Stethoscope
- Clean gloves

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Compare patient identifiers with information on patient medication administration record.	
SAFETY ALERT If patient is confused, disoriented, or unable to follow commands, obtain assistance from another staff member to insert the tube.	
3 Verify health care provider order for type of NG tube to be placed and whether tube is to be attached to suction or drainage bag. 4 Perform hand hygiene, and apply clean gloves. 5 Stand on patient's right side if right-handed, left side if left-handed. Lower side rail.	Requires an order from health care provider. Adequate decompression depends on NG suction. Reduces transmission of microorganisms. Allows easiest manipulation of tubing.

Continued

STEP	RATIONALE
6 Instruct patient to relax and breathe normally while occluding one naris. Then repeat this action for other naris. Select nostril with greater airflow.	Tube passes more easily through naris that is more patent.
7 Measure distance from tip of patient's nose to earlobe to xiphoid process of sternum	Length approximates distance from nose to stomach. The NEX (nose-earlobe-xiphoid) method is commonly used in clinical settings.
8 With small piece of tape placed around tube, mark length that will be inserted.	Indicates length of tube you will insert.
9 Prepare materials for tube fixation. Tear off a 7.5- to 10-cm (3- to 4-inch) length of hypoallergenic tape or open membrane dressing or other fixation device.	Fixation devices allow tube to float free of nares, thus reducing pressure on nares and preventing medical device–related pressure injuries (MDRPIs) (Pittman et al., 2015).
10 <i>Option:</i> Dip tube with surface lubricant into glass of room temperature water or lubricate 7.5 to 10 cm (3 to 4 inches) end of tube with water-soluble lubricant (see manufacturer directions).	Water activates lubricant, minimizes friction against nasal mucosa, and aids in insertion of tube. Water-soluble lubricant is less toxic than oil-base lubricant if aspirated.
11 Explain next steps. Insert tube gently and slowly through naris to back of throat (posterior nasopharynx). Aim back and down toward patient's ear.	Natural contour facilitates passage of tube into GI tract and reduces gagging.
12 Have patient relax and flex head toward chest after tube is passed through nasopharynx.	Closes off glottis and reduces risk of tube entering trachea.

STEP

RATIONALE

13 Encourage patient to swallow by taking small sips of water when possible. Advance tube as patient swallows. Rotate tube gently 180 degrees while inserting. 14 Do not advance tube during inspiration of coughing because it will likely enter respiratory tract. Monitor oximetry/capnography. 15 Advance tube each time patient swallows until you reach desired length. 16 Using penlight and tongue blade, check to be sure that tube is not positioned in back of throat. 17 Temporarily anchor tube to nose with small piece of tape. 18 Verify tube placement. Check agency policy for preferred methods for checking tube placement: a Follow order for bedside x-ray film and notify radiology for examination of chest and abdomen.	Swallowing facilitates passage of tube past oropharynx. A tug may be felt as patient swallows, indicating that tube is following desired path. When tube inadvertently enters airway, changes in oxygen saturation or end-tidal CO₂ (capnography) occur. Reduces discomfort and trauma to patient. Tube could become coiled, kinked, or enter trachea. Securing tube prevents movement of tube and subsequent gagging. Allows for verification of tube placement. Radiography is gold standard for verification of initial placement of tube (Tho et al., 2011). This must be done before any medication or liquid is administered (Emergency Nurses Association [ENA], 2015).

Continued

STEP

- b While waiting for x-ray film to be performed, follow these procedures: Attach Asepto or catheter-tipped syringe to end of tube. Aspirate gently back on syringe to obtain gastric contents, observing amount, color, and quality of return.
 - c Use pH test paper to measure aspirate for pH with color-coded pH paper. Be sure that paper range of pH is at least from 1.0 to 11.0.
- 19 Anchor tube (see Skill 44, Step 21).
- 20 Removal of NG tube:
- a Verify order to remove NG tube.
 - b Auscultate abdomen for presence of bowel sounds.
 - c Explain procedure to patient, and reassure that removal is less distressing than insertion.
 - d Perform hand hygiene, and apply clean gloves.
 - e Turn off suction and disconnect NG tube from drainage bag or suction. With irrigating syringe, insert 20 mL of air into lumen of NG tube. Remove tape or fixation device from bridge of nose, and unpin tube from gown.

RATIONALE

Observation of gastric contents is useful to determine initial tube placement. Gastric contents are usually green but are sometimes off-white, tan, bloody, or brown in color. Other common aspirate colors include yellow or bile stained (duodenal placement) or possibly saliva-appearing (esophagus) (Walthen and Peyton, 2014).

Evidence supports pH test to be used as indicator for placement (Walthen and Peyton, 2014; Tho et al., 2011) A pH 1.0 to 4.0 is a good indicator of gastric placement (Walthen and Peyton, 2014).

An order is required for procedure.

Verifies return of peristalsis.

Minimizes anxiety and increases cooperation. Tube passes out smoothly.

Reduces transmission of microorganisms.

Have tube free of connections before removal. Clears gastric fluids from tube to prevent aspiration of contents or soiling of clothing and bedding.

STEP

RATIONALE

f Stand on patient's right side if right-handed, left side if left-handed.	Allows easiest manipulation of tube.
g Hand patient facial tissue; place clean towel across chest. Instruct patient to take and hold breath.	Some patients wish to blow nose after tube removed. Towel keeps gown from soil. Temporary airway obstruction occurs during tube removal.
h Clamp or kink tubing securely and then pull tube out steadily and smoothly into towel held in other hand while patient holds breath.	Clamping prevents tube contents from draining into oropharynx. Reduces trauma to mucosa and minimizes patient's discomfort. Towel covers tube, which is an unpleasant sight. Holding breath helps to prevent aspiration.
i Inspect intactness of tube.	
j Measure amount of drainage, and note character of content. Dispose of tube and drainage equipment into proper container.	Provides accurate measure of fluid output. Reduces transfer of microorganisms.
k Clean nares, and provide mouth care.	Promotes comfort.
l Position patient comfortably, and explain procedure for drinking fluids, if not contraindicated. Instruct patient to notify you if nausea occurs.	Sometimes patients are not allowed anything by mouth (NPO) for up to 24 hours. When fluids are allowed, orders usually begin with small amount of ice chips each hour and increase as patient is able to tolerate more.
21 Complete postprocedure protocol.	

Recording and Reporting

- Record length, size, and type of gastric tube inserted and in which naris it was inserted. In addition, record patient's tolerance of procedure, confirmation of tube placement, location of distal tip

of tube, character of gastric contents, pH value, results of radiography, whether the tube is clamped or connected to drainage bag or to suction, and amount of suction supplied on flow sheet or in nurses' notes in electronic health record (EHR) or chart.

- Record patient's understanding through teach-back of what to report to nurse and purpose of NG tube in nurses' notes in EHR or chart.
- Record difference between amount of normal saline instilled and amount of gastric aspirate removed on intake and output (I&O) sheet. Record the amount and character of contents draining from NG tube, every shift.
- Record removal of tube "intact," patient's tolerance of procedure, and final amount and character of drainage.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of nausea, or patient's abdomen is distended and painful.	• Assess patency of tube. NG tube may be occluded or no longer in stomach. • Irrigate tube. • Verify that suction is on as ordered. • Notify health care provider if distention is unrelieved.
2 Patient develops irritation or erosion of skin around naris.	• Provide frequent skin care to area. • Use taping method designed to reduce MDRPI (see Skill 44, Step 21). • Consider switching tube to other naris.
3 Patient develops signs and symptoms of pulmonary aspiration: fever, shortness of breath, or pulmonary congestion.	• Perform complete respiratory assessment. • Notify health care provider. • Obtain chest x-ray film examination as ordered.

Negative-Pressure Wound Therapy

Negative-pressure wound therapy (NPWT) is the application of a negative pressure to a wound through suction to facilitate healing and collect wound fluid (Netsch et al., 2016). The primary effects of negative pressure at the wound surface (Figs. 46.1 and 46.2) (Netsch, 2016) are removing wound exudates, maintaining a moist wound surface, reducing edema with improved perfusion, macrodeformation (traction on the sides of the wound), which promotes wound contraction, and microdeformation and mechanical stretch on the cells in the wound bed, which changes cell shape and activates intracellular processes to promote healing.

Indications for NPWT include chronic, acute, traumatic, subacute, and dehisced wounds; partial-thickness burns; injuries; flaps and grafts once nonviable tissue is removed; and select high-risk postoperative surgical incisions. NPWT is also used in wounds with tunnels, undermining, or sinus tracts as long as the wound filler can fill the dead space and is easily retrieved (Netsch et al., 2016).

Contraindications to NPWT include necrotic tissue with eschar present; untreated osteomyelitis; nonenteric and unexplored fistulas; malignancy in the wound; exposed vasculature; and exposed nerves, anastomotic site, or organs. Other safety precautions to consider are patients at high risk for bleeding or hemorrhage; patients taking anti-coagulants; and patients requiring magnetic resonance imaging (MRI), hyperbaric chamber, or defibrillation (Netsch et al., 2016).

For patients with severe pain, lower levels of pressure (75 to 80 mm Hg) can be used to reduce pain and discomfort without compromising effectiveness (National Pressure Ulcer Advisory Panel-European Pressure Ulcer Advisory Panel [NAPUAP-EPUAP], 2009; Netsch et al., 2016).

Delegation Considerations

The skill of NPWT cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Use caution in positioning or turning patient to avoid tubing displacement.
- Report any change in dressing shape or integrity to the nurse.
- Report any change in patient's temperature or comfort level to the nurse.
- Report any wound fluid leakage around the edges of the adhesive drape.



Fig. 46.1 Dehiscent wound before V.A.C. therapy.
(Courtesy KCI USA, Inc., San Antonio, TX.)

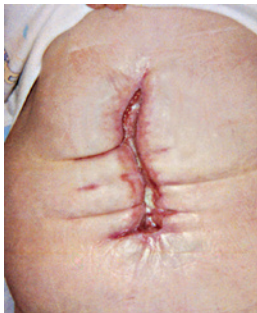


Fig. 46.2 Dehiscent wound after V.A.C. therapy. (Courtesy KCI USA, Inc., San Antonio, TX.)

Equipment

- NPWT unit (requires health care provider's order) (For this skill the vacuum-assisted closure [VAC] unit is used for illustration; several other systems are available, and their applications may differ; see manufacturer instructions.)
 - NPWT dressing (gauze or foam, see manufacturer recommendations; transparent dressing, adhesive drape)
 - NPWT suction device
 - Tubing for connection between NPWT unit and NPWT dressing
- Three pairs of gloves, clean and sterile
- Scissors, sterile
- Waterproof biohazard bag for disposal
- Skin preparation/skin barrier protectant/hydrocolloid dressing/skin barrier
- Moist washcloths
- Linen bag
- Protective equipment: gown, mask, goggles (used when splashing from wound is a risk)

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE

STEP	RATIONALE
- c Gently stretch transparent dressing horizontally, and remove slowly from underlying dressing and skin. - d Remove old dressing one layer at a time and discard in bag. Observe drainage on dressing. Use caution to avoid tension on any drains that are present.	Protects periwound skin. Prevents injury to wound tissue. Determines type and amount of dressings needed for replacement. Prevents accidental removal of drains.
7 Perform wound assessment. Observe surface area and tissue type, color, odor, and drainage within wound. Measure length, width, and depth of wound.	Measurement of wound is necessary to assess wound healing progression and justify continuation of NPWT for third-party payers (Netsch et al., 2016). Determines condition of wound and need for replacement of dressing.
8 Remove and discard gloves in waterproof bag. Avoid having patient see old dressing because sight of wound drainage may be upsetting. Perform hand hygiene.	Reduces transmission of microorganisms. Lessens patient anxiety during procedure.
9 Clean wound. - a Apply sterile or clean gloves (see agency policy). - b Clean wound per agency policy. It may be necessary to irrigate with normal saline or other solution ordered by health care provider. Gently blot periwound with gauze to dry thoroughly.	Irrigation removes wound debris and cleans wound bed. Cleaning periwound is essential for an airtight seal.

STEP

RATIONALE

SAFETY ALERT Health care providers may order wound cultures routinely. However, when drainage looks purulent or has a foul odor or if there is a change in amount or color, obtain wound culture. This may be an indication that NPWT may need to be discontinued (Martindell, 2012).

10 Apply skin protectant, barrier film, ostomy wafer, or hydrocolloid dressing to periwound skin.	Maintains airtight seal needed for NPWT wound therapy (Netsch et al., 2016). Protects periwound skin from moisture-associated skin damage (Martindell, 2012).
11 Fill any uneven skin surfaces (e.g., creases, scars, and skinfolds) with skin barrier product (e.g., paste, strip).	Further helps to maintain airtight seal (Netsch et al., 2016).
12 Remove and discard gloves. Perform hand hygiene.	Prevents transmission of microorganisms.
13 Depending on the type of wound, apply sterile or clean gloves (see agency policy).	Fresh sterile wounds require sterile gloves. Chronic wounds require clean technique (Wound Ostomy and Continence Nurses Society [WOCN], 2016).
14 Apply NPWT foam. a Prepare NPWT filler dressing. Consult with wound-care expert for appropriate type.	Filler dressing depends on NPWT used and can include foam or gauze dressings with or without antimicrobials such as silver. Type of dressing may be adjusted based on undermining, tunneling, or sinus tracts present (Netsch et al., 2016).

Continued

STEP	RATIONALE
(1) Check wound measurement and select appropriate foam dressing. (2) Using sterile scissors, cut foam to exact wound size; make sure to fit size and shape of wound, including tunnels and undermined areas.	Establishes baseline for wound size. Black polyurethane (PU) foam has larger pores and is most effective in stimulating granulation tissue and wound contraction. White soft foam is denser with smaller pores and used when growth of granulation tissue needs to be restricted (Netsch et al., 2016; Martindell, 2012). Proper size of foam dressing maintains negative pressure to entire wound (Netsch et al., 2016).
b Place filler dressing in wound following manufacturer instructions. Be sure that filler dressing is in contact with entire wound base, margins, and tunneled and undermined areas. Count number of filler dressings and document in patient's chart. c Apply NPWT transparent dressing over foam wound dressing.	Maintains negative pressure to entire wound. Edges of foam dressing must be in direct contact with patient's skin. Dressing count provides nurse who removes dressing with number of filler dressings that should be removed.

SAFETY ALERT In some instances an antimicrobial product such as sliver impregnated gauze or topical antibiotic is in order. These products help reduce the bioburden of the wound.

STEP

RATIONALE

- (1) Trim dressing to cover wound so it will extend onto periwound skin approximately 2.5 to 5 cm (1 to 2 inches).

Ensure that the wound is properly covered and that a negative-pressure seal can be achieved (Box 46.1). Dressing should be airtight with no tunnels or gaps to ensure a good seal when suction is activated.

Continued

BOX 46.1 Maintaining an Airtight Seal

To avoid loss of suction (negative pressure), the wound and dressing must stay sealed after therapy is initiated. Problem seal areas include wounds around joints; near skin creases and folds; and near moisture such as diaphoresis, wound drainage, and urine or stool. The following points may help to maintain an airtight seal:

- Clip hair on skin around wound (check agency policy).
- Fill uneven skin surfaces with a skin-barrier product such as paste or strips.
- Make sure that periwound skin surface is dry.
- Cut transparent film to extend 2.5 to 5 cm (1 to 2 inches) beyond wound perimeter.
- Frame periwound area with skin sealant, solid skin barrier, hydrocolloid, or transparent film dressing.
- Cut or mold transparent dressing to fit wound.
- Avoid wrinkles when applying transparent film.
- Identify any air leaks with a stethoscope and repair them with a sealant dressing (e.g., transparent dressing). Use only one or two additional layers for large leaks. Multiple layers reduce moisture vapor transmission and cause maceration of wound.
- Avoid adhesive remover because it leaves a residue that hinders film adherence.

Data from Netsch DS: Refractory wounds. In Wound Ostomy and Continence Nurses Society: *Core curriculum: wound management*, Philadelphia, 2016, Wolters Kluwer; Netsch DS et al: Negative-pressure wound therapy. In Bryant RA, Nix DP, editors: *Acute and chronic wounds: current management concepts*, ed 5, St Louis, 2016, Mosby.

STEP	RATIONALE
(2) Apply transparent dressing, keeping it wrinkle-free.	Ensures that wound is properly covered and negative-pressure seal can be achieved. Dressing should be airtight with no tunnels or gaps to ensure a good seal when suction is activated.
(3) After wound is completely covered, secure tubing of NPWT unit to transparent film, aligning end of tubing to drainage hole to ensure occlusive seal (Fig. 46.3). Do not apply tension to drape and tubing. Set at ordered suction level.	Excessive tension may compress foam dressing and impede wound healing. It also produces shear force on periwound area (Kinetic Concepts International, 2013).
15 Examine system to be sure that seal is intact and therapy is working (this step is different for each type of NPWT).	
16 Complete postprocedure protocol.	

Fig. 46.3 Foam dressing, transparent dressing, and V.A.C. tubing secured over existing wound. (Courtesy KCI USA, Inc., San Antonio, TX.)



Recording and Reporting

- Record appearance of wound, characteristics of drainage, placement of NPWT (type of dressing, pressure mode, and setting), and patient response to dressing change on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Document your evaluation of patient learning.
- Report brisk, bright-red bleeding, evidence of poor wound healing, evisceration or dehiscence, and possible wound infection to health care provider immediately.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Wound appears inflamed and tender, drainage has increased, and an odor is present.	• Notify the health care provider. • Obtain wound culture. • Increase frequency of dressing changes.
2 Patient reports increase in pain.	• Patient may need more analgesia. • Instill normal saline to moisten foam and other filler dressings to allow them to loosen from granulation tissue. • If using black foam, switch to PVA white soft foam. • Decrease pressure setting. • Change from intermittent to continuous cycling. • Change type of NPWT system.
3 Negative-pressure seal has broken.	• Take preventive measures (see Box 46.1).
4 Wound hemorrhages.	• Stop NPWT immediately and notify health care provider.
5 Patient or caregiver is unable to perform dressing change.	• Provide additional teaching and support. • Obtain services of home care agency.

Oral Medications

Patients are usually able to ingest or self-administer oral medications with few problems. If oral medications are contraindicated (e.g., inability to swallow, gastric suction), take precautions to protect patients from aspiration. Nurses usually prepare medications in areas designed for medication preparation or at unit-dose carts.

Delegation Considerations

The skill of administering oral medications cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential side effects of medications and to report their occurrence
- Informing the nurse if the patient's condition changes (e.g., pain, itching, or rash) after medication administration

Equipment

- Automated, computer-controlled drug dispensing system or medication cart
- Disposable medication cups
- Glass of water, juice, or preferred liquid and drinking straw
- Device for crushing or splitting tablets (*optional*)
- Paper towels
- Medication administration record (MAR) (electronic or printed)
- Clean gloves (if handling an oral medication). **NOTE:** Gloves must be worn when administering an oral chemotherapy drug.

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Assess risk for aspiration using a dysphagia screening tool if available (see Skill 3). Protect patient from aspiration by assessing swallowing ability.	Aspiration occurs when food, fluid, or medication intended for gastrointestinal (GI) administration is inadvertently administered into the respiratory tract. Patients with altered ability to swallow are at higher risk for aspiration (Kelly et al., 2011; Park et al., 2013).

STEP

- 3 Assess patient's medical, medication, and diet history, and history of allergies. List any drug allergies on each page of MAR and prominently display on patient's medical record. When allergies are present, patient should wear an allergy bracelet.
- 4 Prepare medications:
 - a Perform hand hygiene.
 - b Arrange medication tray and cups in medication preparation area, or move medication cart to position outside patient's room.
 - c Access automated dispensing system (ADS) or unlock medicine drawer or cart.
 - d Prepare medications for one patient at a time.
 - e Select correct medication from ADS, unit-dose drawer, or stock supply. Compare name of medication label with MAR or computer printout. Be sure to exit ADS after removing drugs.
 - f Check or calculate drug dose as necessary. Double-check any calculation. Check expiration date on all medications and return outdated medication to pharmacy.

RATIONALE

Information reflects patient's need for and potential responses to medication. Information reveals potential food and drug interactions. Communication of allergies is essential for safe, effective care.

Reduces transmission of microorganisms. Organization of equipment saves time and reduces error.

Medications are safeguarded when locked in cabinet, cart, or ADS.

Prevents preparation errors.

Reading label first time and comparing it against transcribed order reduces errors. Exiting ADS ensures that no one else can remove medications using your identity. *This is the first check for accuracy.*

Double-checking pharmacy calculations reduces risk for error. Agency policy may require you to check calculations of certain medications such as insulin with another nurse (Kim and Bates, 2013). Expired medications may be inactive or harmful to patient.

Continued

STEP

g If preparing a controlled substance, check record for previous medication count and compare current count with supply available. Controlled drugs may be stored in computerized locked cart.

h Prepare solid forms of oral medications:

- (1) To prepare unit-dose tablets or capsules, place packaged tablet or capsule directly into medicine cup without removing wrapper. Administer medications only from containers with labels that are clearly marked.
- (2) When using a blister pack, “pop” medications through foil or paper backing into a medication cup.
- (3) If it is necessary to give half the dose of medication, pharmacy should split, label, package, and send medication to unit.
- (4) Place all tablets or capsules that patient will receive in one medicine cup, except for those requiring

RATIONALE

Controlled substance laws require nurses to carefully monitor and count dispensed narcotics.

Wrappers maintain cleanliness and identify drug name and dose, which can facilitate teaching.

Packs provide a 1-month supply, with each “blister” usually containing a single dose.

In health care agencies, only pharmacy should split tablets to ensure patient safety ([Food and Drug Administration \[FDA\], 2013](#)). Reduces contamination of tablet.

Keeping medications that require preadministration assessments separate from others serves as a reminder and makes it easier to withhold drugs as necessary.

STEP

RATIONALE

preadministration assessments (e.g., pulse rate or blood pressure). Place in separate additional cup with wrapper intact.

- (5) If patient has difficulty swallowing and liquid medications are not an option, use a pill-crushing device. Clean device before using. Mix ground tablet in small amount (teaspoon) of soft food (custard or applesauce).

i Prepare liquids:

- (1) Use unit-dose container with correct amount of medication. Gently shake container. Administer medication packaged in a single-dose cup directly from the single-dose cup. Do not pour medicine into another cup.
- (2) Hold bottle with label against palm of hand while pouring.
- (3) Place medication cup at eye level on countertop and fill to desired level on scale. Scale should be even with fluid level at its surface or base of meniscus, not edges.

Large tablets are often difficult to swallow. Ground tablet mixed with palatable soft food is usually easier to swallow.

Using unit-dose container with correct dosage of medication provides most accurate dose of medication ([Institute for Safe Medication Practices \[ISMP\], 2016](#)). Shaking container ensures that medication is mixed before administration.

Prevents spilled liquid from dripping and soiling label.

Ensures accuracy of measurement.

Continued

STEP	RATIONALE
(4) Discard any excess liquid into sink or a place specially designated for wasting of medications. Wipe lip of bottle with paper towel and recap. (5) If giving less than 10 mL of liquid, prepare medication in oral syringe. Do not use hypodermic syringe or syringe with needle or syringe cap.	Prevents contamination of contents of bottle and prevents bottle cap from sticking. Allows more accurate measurement of small amounts.

SAFETY ALERT Use only syringes specifically designed for oral use when administering liquid medications. If using hypodermic syringes, the medication may be inadvertently administered parenterally, or the syringe cap or needle, if not removed from the syringe before administration, may become dislodged and accidentally aspirated when the syringe plunger is pressed.

j Before going to patient's room, compare patient's name and name of medication on label of prepared drugs with MAR. k Return stock containers or unused unit-dose medications to shelf or drawer, and read label again. Label medication cups and poured medications with patient's name before leaving medication preparation area. Do not leave drugs unattended.	Reading labels a second time reduces errors. <i>This is the second check for accuracy.</i> Ensures that the correct medications are prepared for the correct patient.

STEP

RATIONALE

5 Administer medications:

- a Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- b At patient's bedside again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- c Perform necessary preadministration assessment (e.g., blood pressure, pulse) for specific medications.
- d Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about drugs.

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Determines whether specific medications should be withheld at that time.

Patient has right to be informed, and patient's understanding of purpose of each medication improves adherence to drug therapy.

SAFETY ALERT If patient expresses concern regarding accuracy of a medication, do not give the medication. Explore the patient's concern, and verify the physician's order before administering. Listening to the patient's concerns may prevent a medication error.

- e Help patient to sitting or Fowler position. Use side-lying position if patient is unable to sit. Have patient stay in this position for 30 minutes after administration.

Decreases risk for aspiration during swallowing.

Continued

STEP

- f *For tablets:* Patient may wish to hold solid medications in hand or cup before placing in mouth. Offer water or preferred liquid to help patient swallow medications.
- g *For orally disintegrating formulations (tablets or film):* Remove medication from blister packet just before use. Do not push the tablet through the foil. Place medication on top of patient's tongue. Caution patient against swallowing tablet.
- h *For sublingual medications:* Have patient place medication under tongue and allow it to dissolve completely. Caution patient against swallowing tablet (Fig. 47.1).
- i *For buccal-administered medications:* Have patient place medication in mouth against mucous membranes of cheek and gums until it dissolves (Fig. 47.2).

RATIONALE

Patient can become familiar with medications by seeing each drug. Choice of fluid promotes and can improve fluid intake.

Orally disintegrating formulations begin to dissolve when placed on the tongue. Water is not needed. Careful removal from packaging is necessary because the tablets and strips are thin and fragile.

Drug is absorbed through blood vessels of undersurface of tongue. If swallowed, drug is destroyed by gastric juices or so rapidly detoxified by liver that therapeutic blood levels are not attained.

Buccal medications act locally or systemically because they are swallowed in saliva.

SAFETY ALERT Avoid administering anything by mouth until orally disintegrating, buccal, or sublingual medication is completely dissolved.

- j *For powdered medications:* Mix with liquids at bedside, and give to patient to drink.

When prepared in advance, powdered drugs thicken and some even harden, making swallowing difficult.



Fig. 47.1 Proper placement of sublingual tablet in sublingual pocket.

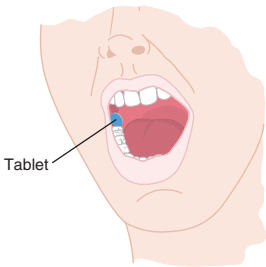


Fig. 47.2 Buccal administration of a tablet.

STEP	RATIONALE
k For <i>crushed medications mixed with food</i>: Give each medication separately in teaspoon of food. l Caution patient against chewing or swallowing lozenges. m For <i>effervescent medication</i>: Add tablet or powder to glass of water. Administer immediately after dissolving. n If patient is unable to hold medications, place medication cup to lips and gently introduce each drug into the mouth, one at a time. A spoon can also be used to place pill in patient's mouth. Do not rush or force medication.	Ensures that patient swallows all of the medicine. Drug acts through slow absorption through oral mucosa, not gastric mucosa. Effervescence improves unpleasant taste of drug and often relieves gastrointestinal problems. Administering single tablet or capsule eases swallowing and decreases risk for aspiration.
SAFETY ALERT If tablet or capsule falls to the floor, discard it and repeat preparation. Drug is contaminated.	
o Stay until patient completely swallows each medication or takes it by the prescribed route.	Ensures that patient receives ordered dosage. If left unattended, patient may not take dose or may save drugs, causing health risks.

Continued

STEP

- p For highly acidic medications (e.g., aspirin), offer patient nonfat snack (e.g., crackers) if not contraindicated by patient's condition.
- 6 Complete postprocedure protocol.

RATIONALE

Reduces gastric irritation. The fat content of foods may delay absorption of the medication.

Recording and Reporting

- Record drug, dose, route, and time administered on patient's MAR immediately after administration, not before. Include initials or signature.
- Record patient's response to medication, patient teaching, and validation of patient's understanding on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- If drug is withheld, record reason on flow sheet or in nurses' notes in EHR or chart and follow agency policy for noting withheld doses.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider. Depending on medication, immediate health care provider notification may be required.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient exhibits adverse effects (e.g., side effect, toxic effect, allergic reaction).	• Withhold further doses. • Assess vital signs. • Notify prescriber and pharmacy. • Symptoms such as urticaria, rash, pruritus, rhinitis, and wheezing may indicate an allergic reaction and need for emergency medications. • Add allergy information to patient's medical record.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient is unable to explain drug information.	• Further assess the patient's or family caregiver's knowledge of medications and guidelines for drug safety. • Further instruction or different approach to instruction is necessary.
3 Patient refuses medication.	• Assess why patient is refusing medication. • Do not force patient to take medications. • Notify health care provider. • Record refused medication and patient's stated reason.

Oral Medications

Medication Administration Through an Enteral Feeding Tube

Patients who have enteral feeding tubes are unable to receive food or medications by mouth. Nasogastric feeding tubes generally are small-bore tubes that are inserted into the stomach via one of the nares. For long-term enteral feedings, a percutaneous endoscopic gastrostomy (PEG) tube or a jejunostomy tube may be inserted surgically. *Do not administer medications into nasogastric tubes that are inserted for decompression.*

Preferably, medications administered by enteral tubes should be in liquid form. If a medication is unavailable in liquid form, the nurse may need to prepare an oral medication tablet or capsule by crushing or dissolving it. However, sublingual, sustained-release, chewable, long-acting, or enteric-coated medications cannot be crushed. If unsure, the nurse should consult with the hospital pharmacist about whether a medication may be crushed or dissolved. Always verify correct placement of a nasogastric tube before administering medications.

Delegation Considerations

The skill of administering medications by enteral feeding tubes cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Keep the head of the bed elevated a minimum of 30 degrees (preferably 45 degrees) for 1 hour after medication administration; follow agency policy.
- Report immediately to the nurse coughing, choking, gagging, or drooling of liquid or dissolved pills.
- Report to the nurse occurrence of possible medication side effects (specific to medication).

Equipment

- Medication administration record (MAR) (electronic or printed)
- Appropriate medication syringe or 60-mL Asepto syringe for large-bore tubes only
- Enteral-only connector (ENFit) designed to fit the specific enteral tube ([The Joint Commission](#)[TJC], 2014)
- Gastric pH test strip (scale of 1 to 11)

- Graduated container
- Medication to be administered
- Pill crusher if medication in tablet form
- Water or sterile water for immunocompromised patients
- Tongue blade or straw to stir dissolved medication
- Clean gloves
- Stethoscope and pulse oximeter (for evaluation)

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Check accuracy and completeness of each MAR with health care provider's medication order. Check patient's name, drug name and dosage, route of administration, and time for administration. Clarify incomplete or unclear orders with health care provider before administration.
- 3 Before administration of medications, verify placement of the feeding tube (see Skill 45).
- 4 Perform hand hygiene. Prepare medications for instillation into feeding tube. Check medication label against MAR two times. Fill graduated container with 50 to 100 mL of tepid water. Use sterile water for immunocompromised or critically ill patients (Allen, 2015; Malone, 2014).

RATIONALE

The health care provider's order is the most reliable source and only legal record of drugs that patient is to receive. Ensures that patient receives correct medication (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013).

Reduces the risk for aspiration.

These are the first and second checks for accuracy. Preparation process ensures that right patient receives right medication. Tepid water prevents abdominal cramping, which can occur with cold water.

Continued

STEP

RATIONALE

SAFETY ALERT Whenever possible, use liquid medications instead of crushed tablets. If you have to crush tablets, flush the tubing before and after the medication administration to prevent the drug from adhering to the inside of the tube. In addition, make sure that concentrated medications are thoroughly diluted. Never add crushed medications directly to a tube feeding (Guenther and Boullatta, 2013).

- a *Tablets*: Crush each tablet into a fine powder, using pill-crushing device or two medication cups. Dissolve each tablet in separate cup of 30 mL of warm water.
- b *Capsules*: Ensure that contents of capsule (granules or gelatin) can be expressed from covering (consult with pharmacist). Open capsule or pierce gel cap with sterile needle and empty contents into 30 mL of warm water (or solution designated by drug company). Gel caps dissolve in warm water, but this may take 15 to 20 minutes.
- 5 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.

Fine powder dissolves more easily, reducing chance of occluding feeding tube.

Ensures that contents of capsules are in solution to prevent occlusion of tube.

Ensures correct patient.
Complies with TJC standards and improves patient safety (TJC, 2016).

STEP

- 6 At patient's bedside again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- 7 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about the drugs.
- 8 Assist patient to sitting position. Elevate head of bed to minimum of 30 degrees and preferably 45 degrees (unless contraindicated) or sit patient up in a chair (Malone, 2014).
- 9 If continuous enteral tube feeding is infusing, adjust infusion pump to hold tube feeding.
- 10 Apply clean gloves. Check placement of feeding tube (see Skill 45, Step 18) by observing gastric contents and checking pH of aspirate contents. *Gastric pH less than 5.0 is a good indicator that tip of tube is correctly placed in stomach* (Clifford et al., 2015).

RATIONALE

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy.

Reduces risk for aspiration.

Feeding solution should not infuse while residuals are checked or medications are administered. The presence of a feeding solution may impede drug absorption (Klang et al., 2013).

Ensures proper tube placement and reduces risk of introducing fluids into respiratory tract.

Continued

STEP

- 11 Check for gastric residual volume (GRV). Draw up 10 to 30 mL of air into a 60-mL syringe and connect syringe to feeding tube. Flush tube with air and pull back slowly to aspirate gastric contents. Determine GRV using either scale on syringe or a graduate container. Return aspirated contents to stomach unless a single GRV exceeds 250 mL (see agency policy). When GRV is excessive, hold medication and contact health care provider.
- 12 Irrigate the tubing.
 - a Pinch or clamp enteral tube and remove syringe. Draw up 30 mL of water into syringe. Reinsert tip of syringe into tube, release clamp, and flush tubing. Clamp tube again and remove syringe.
 - b Using the appropriate enteral connector, attach to enteral tube.
- 13 Remove bulb or plunger of syringe and reinsert syringe into tip of feeding tube.
- 14 Administer first dose of liquid or dissolved medication by pouring into syringe. Allow to flow by gravity.

RATIONALE

Large residuals indicate delayed gastric emptying and put patient at increased risk for aspiration (Malone, 2014).

Pinching or clamping tubing prevents leakage or spillage of stomach contents. Flushing ensures that tube is patent.

Standardization of connector tubing improves patient safety. Tubing standards are designed to reduce tubing misconnections that result in patient injury (TJC, 2014). Removal of bulb or plunger prepares syringe for delivery of medications.

STEP

RATIONALE

SAFETY ALERT If medication does not flow freely, raise the height of the syringe to increase the rate of flow or try having the patient change position slightly because the end of the feeding tube may be against the gastric mucosa. If these measures do not improve the flow, a gentle push with the bulb of an Asepto syringe or the plunger of the syringe may facilitate the flow of fluid.

a If giving only one dose of medication, flush tubing with 30 to 60 mL of water after administration.	Maintains patency of enteral tube and ensures that medication passes through tube to stomach (Klang et al., 2013).
b To administer more than one medication, give each separately, and flush between medications with 15 to 30 mL of water.	Allows for accurate identification of medication if dose is spilled. In addition, some medications may be incompatible, and giving medication separately followed by a flush solution decreases the risk for medication incompatibilities (Zhu and Zhou, 2013).
c Follow last dose of medication with 30 to 60 mL of water.	Maintains patency of enteral tube and ensures passage of medication into stomach (Blumenstein et al., 2014).
15 Clamp the proximal end of the feeding tube if tube feeding is not being administered, and cap end of tube.	Prevents air from entering the stomach between medication doses.
16 When continuous tube feeding is being administered by infusion pump, follow medication administration. If medications are not compatible with feeding solution, hold feeding for additional 30 to 60 minutes (Klang et al., 2013).	Allows for adequate absorption of medication and avoids potential drug-food interaction between medication and enteral feeding (Zhu and Zhou, 2013).

Continued

STEP	RATIONALE
17 Assist patient to comfortable position, but keep the head of the bed elevated for 1 hour after administering the medication.	Prevents aspiration.
18 Complete postprocedure protocol.	

Recording and Reporting

- Record in nurses’ notes in electronic health record (EHR) or chart the method used to check placement of enteral tube, GRV, and pH of stomach aspirate.
- Record actual time that each drug was administered on MAR immediately after administration, not before. Include initials or signature.
- Record patient’s response to medication, patient teaching, and validation of patient understanding on flow sheet or in nurses’ notes in EHR or chart.
- Record total amount of water used for medication administration on proper intake and output (I&O) form.
- Report adverse effects, patient response, and/or withheld drugs to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient exhibits signs of aspiration including respiratory distress, changes in vital signs, or changes in oxygen saturation.	• Stop all medications/fluids through the tube. • Elevate the head of the bed, and stay with the patient. • Assess vital signs and breath sounds while another staff member notifies health care provider.
2 Patient does not receive medication as prescribed because of a blocked nasogastric/enteric tube.	• For newly inserted tube, notify health care provider and obtain x-ray film confirmation of placement. • Requires interventions to unclog tube to ensure drug delivery (Box 48.1).

BOX 48.1 Unclogging a Blocked Feeding Tube

- Prevent tube from becoming blocked by flushing it with at least 15 to 30 mL of tepid water before and after administering each dose of medication, 30 to 60 mL after last dose of medication, before and after checking gastric residual volumes, and every 4 to 12 hours around the clock (refer to agency policies).
- Gently flush tube with large-bore syringe and warm water. Do not use small-bore syringe because this exerts too much pressure and may rupture tube.
- If irrigation with water is not effective, obtain an order for a pancrelipase tablet and follow manufacturer guidelines for tube irrigation. In addition, a declogging stylus may be used (see agency policy).
- The tube may have to be removed and a new one inserted if the medication is urgent.

Modified from Blumenstein I et al: Gastroenteric tube feeding: techniques, problems and solutions, *World J Gastroenterol WJG* 20(26):8505, 2014, <http://doi.org/10.3748/wjg.v20.i26.8505>.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient exhibits adverse effects (side effect, toxic effect, allergic reaction).	• Withhold further doses. • Always notify health care provider and pharmacy when the patient exhibits adverse effects. • Symptoms such as urticaria, rash, pruritus, rhinitis, and wheezing indicate an allergic reaction. • Enter patient allergy in medical record.

Ostomy Care (Pouching)

Immediately after a fecal surgical diversion, it is necessary to place a pouch over the newly created stoma to contain effluent when the stoma begins to function. The pouch will keep the patient clean and dry, protect the skin from drainage, and provide a barrier against odor. A cut-to-fit, transparent pouching system is preferred because it will cover the peristomal skin without constricting the stoma and allow for visibility of the stoma.

In the immediate postoperative period, the stoma may be edematous and the abdomen distended. These symptoms will resolve over a 4- to 6-week period after surgery, but, during this time, it will be necessary to revise the pouching system to meet the changing size of the stoma and the changes in body contours ([Carmel, J.E., 2016](#)).

Delegation Considerations

The skill of pouching a new ostomy/ileostomy cannot be delegated to nursing assistive personnel (NAP). In some agencies, care of an established ostomy (4 to 6 weeks or more after surgery) can be delegated to NAP. The nurse directs the NAP about the following:

- The expected amount, color, and consistency of drainage from the ostomy
- The expected appearance of the stoma
- Special equipment needed to complete the procedure
- Changes in the patient's stoma and surrounding skin integrity that should be reported

Equipment

- Skin barrier/pouch, clear drainable one-piece or two-piece, cut-to-fit or precut size
- Pouch closure device, such as a clip, if needed
- Ostomy measuring guide
- Adhesive remover (*optional*)
- Clean gloves
- Washcloth
- Towel or disposable waterproof barrier
- Basin with warm tap water
- Scissors
- Waterproof bag for disposal of pouch
- Gown and goggles (*optional*) (for use if there is risk of splashing when emptying pouch)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. Perform hand hygiene and apply clean gloves.	Reduces transmission of microorganisms.
2 Observe existing skin barrier and pouch for leakage and length of time in place. Pouch should be changed every 3 to 7 days, not daily (Carmel, 2016). If an opaque pouch is being used, remove it to fully observe stoma. Dispose of pouch in proper receptacle.	Assesses effectiveness of pouching system and detects potential for problems. To minimize skin irritation, avoid unnecessary changing of entire pouching system. When pouch leaks, skin damage from the effluent causes more skin trauma than early removal of wafer.
SAFETY ALERT Repeated leaking may indicate need for different type of pouch. If the pouch is leaking, change it. Taping or patching it to contain effluent leaves the skin exposed to chemical or enzymatic irritation.	
3 Observe amount of effluent in pouch. Empty pouch if it is more than one-third to one-half full by opening clip and draining it into a container for measurement of output. Note consistency of effluent and record output.	Weight of pouch may disrupt seal of adhesive on skin. Monitors fluid balance and bowel function after surgery. Normal colostomy effluent is soft or formed stool, whereas normal ileostomy effluent is liquid.
4 Observe stoma for type, location, color, swelling, presence of sutures, trauma, and healing or irritation of peristomal skin. Remove and dispose of gloves.	Stoma characteristics are one of the factors to consider in selecting an appropriate pouching system. Convexity in the skin barrier is often necessary with a flush or retracted stoma.

Continued

STEP

RATIONALE

5 Position patient in semi-reclining or supine position during assessment and pouching. (NOTE: Some patients with established ostomies prefer to stand.) If possible, provide patient with mirror for observation. 6 Perform hand hygiene, and apply clean gloves. 7 Place towel or disposable waterproof barrier across patient's lower abdomen. 8 Remove used pouch and skin barrier gently by pushing skin away from barrier. An adhesive remover may be used to facilitate removal of skin barrier. 9 Clean peristomal skin gently with warm tap water using washcloth; do not scrub skin. If you touch stoma, minor bleeding is normal. Pat skin dry. Have washcloth handy for additional cleaning if there is output from the stoma while preparing pouch. 10 Measure stoma. 11 Trace pattern of stoma measurement on pouch backing or skin barrier (Fig. 49.1).	When patient is semi-reclining, there are fewer skin wrinkles, which allows for ease of application of pouching system. Reduces transmission of microorganisms. Protects bed linen; maintains patient's dignity. Reduces skin trauma. Improper removal of pouch and barrier can cause peristomal skin irritation or breakdown. Avoid soap. It leaves residue on skin, which may irritate skin. Pouch does not adhere to wet skin. Ileostomies have frequent output especially after eating. Allows for proper fit of pouch that will protect peristomal skin. Prepares for cutting opening in the pouch.

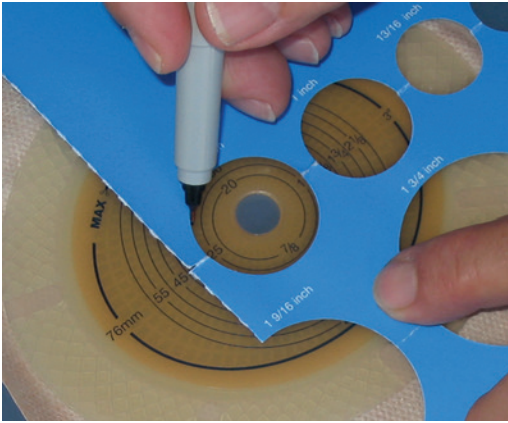


Fig. 49.1 Trace measurement on skin barrier. (Courtesy Coloplast, Minneapolis, MN.)

STEP

- 12 Cut opening on backing or skin barrier wafer (Fig. 49.2). If using moldable or shape-to-fit barrier, use fingers to mold shape-to-fit stoma.
- 13 Remove protective backing from adhesive (Fig. 49.3).
- 14 Apply pouch. Press firmly into place around stoma and outside edges. Have patient hold hand over pouch to apply heat to secure seal (Fig. 49.4).
- 15 Close end of pouch with clip or integrated closure. Remove drape from patient.
- 16 Complete postprocedure protocol.

RATIONALE

Customizes pouch to provide appropriate fit over stoma.

Prepares skin barrier for placement.

Pouch adhesives are heat activated and will hold more securely at body temperature.

Ensures pouch is secure.
Contains effluent.

Continued



Fig. 49.2 Cut opening in wafer. (Courtesy Coloplast, Minneapolis, MN.)



Fig. 49.3 Remove protective backing. (Courtesy Coloplast, Minneapolis, MN.)



Fig. 49.4 Apply pouch over stoma. (Courtesy Coloplast, Minneapolis, MN.)

Recording and Reporting

- Record type of pouch and skin barrier applied, amount and appearance of effluent in pouch, size and appearance of stoma, and condition of peristomal skin.
- Record patient/family level of participation, teaching that was done, and response to teaching.
- Report any of the following to nurse and/or physician: abnormal appearance of stoma, suture line, peristomal skin, or character of output.

UNEXPECTED OUTCOMES

RELATED INTERVENTIONS

1 Skin around stoma is irritated, blistered, or bleeding, or a rash is noted. May be caused by undermining of pouch seal by fecal contents, allergic reaction, or fungal skin eruption.

- Remove pouch more carefully.
- Change pouch more frequently, or use a different type of pouching system.
- Consult ostomy care nurse.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Necrotic stoma is manifested by purple or black color, dry instead of moist texture, failure to bleed when washed gently, or tissue sloughing.	• Report to nurse/health care provider. • Document appearance.
3 Patient refuses to view stoma or participate in care.	• Obtain referral for ostomy care nurse. • Allow patient to express feelings. • Encourage family support.

Oxygen Therapy

Nasal Cannula, Oxygen Mask, T Tube, or Tracheostomy Collar

A nasal cannula is a simple, effective, and comfortable device for delivering oxygen to a patient. It allows a patient to breathe through the mouth or nose, is available for all age groups, and is adequate for short- or long-term use.

A high-flow nasal cannula (HFNC) can deliver heated and humidified air/oxygen mixture at high flows, up to 60 L/min. An oxygen-conserving cannula possesses a built-in reservoir that allows for increasing oxygen concentration at a lower flow rate, which can increase patient comfort.

The simple face mask fits loosely and delivers oxygen concentrations from 35% to 60%. A plastic face mask with a reservoir bag and a Venturi mask deliver higher concentrations of oxygen. When used as a nonre-breather, the plastic face mask with a reservoir bag delivers 60% to 90% oxygen at appropriate flow rates.

A Venturi mask is a cone-shaped high-flow device with entrainment ports of various sizes at the base of the mask, which delivers a concentration of oxygen from 24% to 50% and is based on the flow of the gas.

The face tent is a shield-like device that fits under a patient's chin and sweeps around the face. It is used primarily for humidification and for oxygen only when a patient cannot or will not tolerate a tight-fitting mask. Oxygen hoods are commonly used in the pediatric setting.

Delegation Considerations

The skill of applying a nasal cannula or oxygen mask (not adjusting oxygen flow rate) can be delegated to nursing assistive personnel (NAP). The skill of administering oxygen therapy to a patient with an artificial airway cannot be delegated to NAP. The nurse is responsible for assessing the patient's respiratory system, the patient's response to oxygen therapy, and the setup of the oxygen therapy and liter flow, including the adjustment of oxygen flow rate. The nurse directs the NAP by doing the following:

- Informing how to safely adjust the device (e.g., loosening the strap on the oxygen cannula or mask)
- Instructing to inform the nurse immediately about any changes in vital signs; changes in level of consciousness (LOC); skin irritation

from the cannula, mask, or straps; patient complaints of pain or breathlessness; any increase in anxiety; and increased secretions associated with the oxygen delivery device

- Instructing on patient-specific variations for application or adjustment of the T tube or tracheostomy collar (e.g., methods to avoid pressure or pulling on the artificial airway, methods for handling accumulated secretions in devices)

Equipment

- Oxygen-delivery device as ordered by health care provider
- Oxygen tubing (consider extension tubing)
- Humidifier, if indicated
- Sterile water for humidifier
- Face shield as needed for risk of splash
- Clean gloves, if secretions are present
- Oxygen source
- Oxygen flowmeter
- Appropriate “Oxygen in use” signs
- Pulse oximeter
- Stethoscope

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 If available, note patient’s most recent arterial blood gas (ABG) results or pulse oximetry (SpO ₂) value.	Objectively documents the patient’s pH, arterial oxygen and arterial carbon dioxide concentrations, or arterial oxygen saturation.
3 Attach oxygen delivery device (e.g., cannula, mask, T tube, tracheostomy collar) to oxygen tubing, and attach end of tubing to humidified oxygen source adjusted to prescribed flow rate.	Humidity prevents drying of nasal and oral mucous membranes and airway secretions. Flowmeters with smaller calibrations may be required for patients requiring low-dose oxygen such as pediatric patients or patients with chronic obstructive pulmonary disease (COPD) (Hockenberry and Wilson, 2015; Restrepo and Walsh, 2012).

STEP

RATIONALE

4 Apply oxygen device:

- a Place the two tips of the cannula into patient's nares. If the tips are curved, they should point downward inside the nostrils. Then loop the cannula tubing up and over patient's ears. Adjust the lanyard so the cannula fits snugly but not too tightly.
- b Apply a mask by placing it over patient's mouth and nose. Then bring the straps over patient's head and adjust to form a comfortable but tight seal.

5 Observe for proper function of oxygen delivery device:

- a *Nasal cannula*: Cannula is positioned properly in nares; oxygen flows through tips.
- b *Partial or nonrebreather mask*: Mask seals tightly around mouth. Reservoir fills on exhalation and almost collapses on inspiration. Reservoir should not collapse completely.
- c *Oxygen-conserving cannula (Oxymizer)*: Fit as for nasal cannula. Reservoir is located under patient's nose or worn as a pendant.

Tips of cannula direct flow of oxygen into patient's upper respiratory tract.

A properly fitting device that does not create pressure on nares or ears is comfortable, and patient is more likely to keep it in place; reduces risk for skin breakdown (Schallom et al., 2015).

Ensures patency of delivery device and accuracy of prescribed oxygen flow rate.

Provides prescribed oxygen rate and reduces pressure on tips of nares.

Easily humidifies oxygen and does not dry mucous membranes (Restrepo and Walsh, 2012). Useful for short-term therapy of 24 hours or less.

Delivers higher flow of oxygen with nasal cannula. Delivers 2:1 ratio (e.g., 6 L/min nasal cannula is approximately equivalent to 3.5 L/min with Oxymizer device).

Continued

STEP

- d *Nonrebreather mask*: Apply as regular mask. Contains one-way valves with reservoir; exhaled air does not enter reservoir bag. Can be combined with nasal cannula to provide higher inspired oxygen concentration (FiO_2).
 - e *Simple face mask*: Select appropriate flow rate
 - f *Venturi mask* (Fig. 50.1): Apply as regular mask. Select appropriate flow rate.
 - g *Face tent*: Apply tent under patient's chin and over the mouth and nose. It will be loose, and a mist is always present.
 - h *High-flow nasal cannula*: Fit as for nasal cannula.
 - i *T tube or tracheostomy collar*: If health care provider orders oxygen, adjust flow rate to 10 L/min or as ordered. Adjust nebulizer to proper FiO_2 setting. Attach T tube to endotracheal (ET) or tracheostomy tube. Place tracheostomy collar over tracheostomy tube and adjust straps so it fits snugly.
- 6 Verify setting on flowmeter and oxygen source for proper setup and prescribed flow rate (Fig. 50.2).

RATIONALE

Device of choice for short-term high FiO_2 delivery. Valves on mask side ports permit exhalation but close during inhalation to prevent inhaling room air.

Used for short-term oxygen therapy.

It is used when high-flow device is desired.

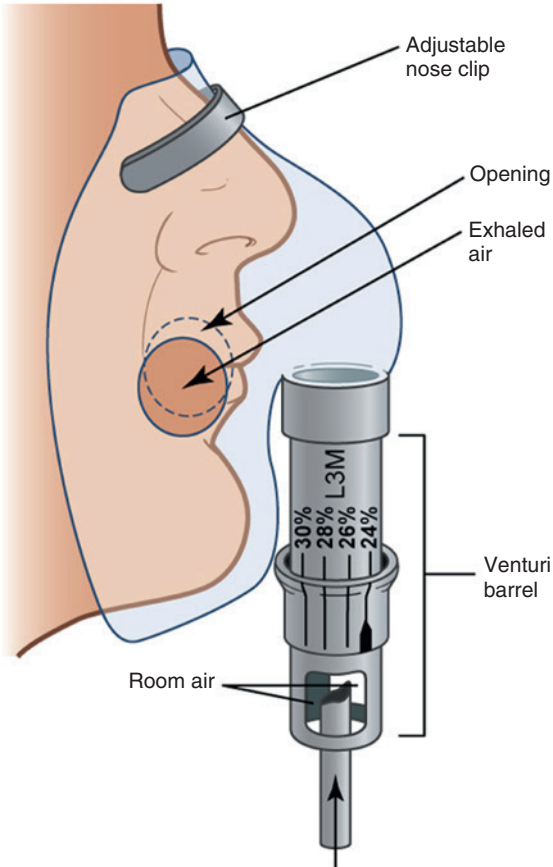
Excellent source of humidification; however, you cannot control oxygen concentrations, and patient who requires high oxygen cannot use this device.

Used when high oxygen delivery is required.

Provides supplemental humidification to avoid drying of the airway. Flow rate ensures humidification; nebulizer regulates FiO_2 .

Ensures delivery of prescribed oxygen therapy in conjunction with the specific cannula/mask.

Continued



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Fig. 50.1 Venturi mask in place.



Fig. 50.2 Nurse adjusts flowmeter setting.

STEP

7 Check cannula/mask every 8 hours. Keep humidification container filled at all times.

8 Post “Oxygen in use” signs on wall behind bed and at entrance to room.

9 Complete postprocedure protocol.

RATIONALE

Ensures patency of cannula and oxygen flow. Oxygen is a dry gas; when it is administered via nasal cannula of 4 L/min or more, you must add humidification so patient inhales humidified oxygen (American Thoracic Society [ATS], 2015a).

Alerts visitors and care providers that oxygen is in use (ATS, 2015a).

Recording and Reporting

- Record respiratory assessment findings; method of oxygen delivery and flow rate; patient’s response; any adverse reactions or side effects; any change in health care provider’s orders.
- Report any unexpected outcome to health care provider or nurse in charge.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient experiences skin irritation or breakdown (e.g., at ears, bridge of nose, nares, other pressure areas), drying of nasal and oral mucosa, sinus pain, or epistaxis. 2 Patient experiences continued hypoxia. 3 Patient experiences drying of nasal and upper airway mucosa.	• Increase humidification to oxygen-delivery system. • Provide appropriate skin care. Do not use petroleum-based gel around oxygen because it is flammable (American Lung Association, 2016). • Notify health care provider. • Obtain health care provider's orders for follow-up SpO₂ monitoring or ABG determinations. • Consider measures to improve airway patency, coughing techniques, and oropharyngeal or orotracheal suctioning. • If oxygen flow rate is greater than 4 L/min, use humidification (Restrepo and Walsh, 2012). At rates greater than 4 L/min, nasal mucous membranes dry, and pain in frontal sinuses may develop (Lewis et al., 2014). • Assess patient's fluid status and increase fluids if appropriate. • Provide frequent oral care.

Parenteral Medication Preparation

Ampules and Vials

Ampules contain single doses of injectable medication in a liquid form. An ampule is made of glass with a constricted, prescored neck that is snapped off to allow access to the medication. A colored ring around the neck indicates where the ampule is prescored. Medication is easily withdrawn from the ampule by aspirating with a filter needle and syringe. Filter needles must be used when preparing medication from a glass ampule to prevent glass particles from being drawn into the syringe (Alexander et al., 2014; Nicholl and Hesby, 2002).

A vial is a single- or multidose plastic or glass container with a rubber seal at the top. Vials may contain liquid or dry forms of medications. Some vials have two chambers separated by a rubber stopper. One chamber contains the diluent solution; the other contains the dry medication. Before preparing the medication, push on the upper chamber to dislodge the rubber stopper and allow the powder and the diluent to mix. Unlike an ampule, a vial is a closed system. You must inject air into the vial to permit easy withdrawal of the solution.

Delegation Considerations

The skill of preparing injections from ampules and vials cannot be delegated to nursing assistive personnel (NAP).

Equipment

Medication in an Ampule

- Syringe, needle, and filter needle
- Small sterile gauze pad or unopened alcohol swab

Medication in a Vial

- Syringe and two needles
- Needles:
 - Needleless blunt-tip vial access cannula or needle (with safety sheath) for drawing up medication (if needed)
 - Filter needle if indicated
- Small sterile gauze pad or alcohol swab
- Diluent (e.g., 0.9% sodium chloride or sterile water) (if indicated)

Both

- Medication administration record (MAR) or computer printout
- Sharps with engineered sharps injury protection (SESIP) safety needle for injection
- Medication in vial or ampule
- Puncture-proof container for disposal of syringes, needles, and glass

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Check accuracy and completeness of each MAR or computer printout with prescriber's written medication order. Check patient's name, medication name and dosage, route of administration, and time of administration. Recopy or reprint any portion of MAR that is difficult to read.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012). Illegible MARs are a source of medication errors (Alassaad et al., 2013).
3 Assess the patient's body build, muscle size, and weight if giving subcutaneous or intramuscular (IM) medication.	Determines type and size of syringe and needles for injection.
4 Perform hand hygiene, and prepare supplies.	Reduces transmission of microorganisms.
5 Prepare medications:	
a If using a medication cart, move it outside patient's room.	Organization of equipment saves time and reduces error.
b Unlock medication drawer or cart, or log onto computerized medication dispensing system.	Medications are safeguarded when locked in cabinet, cart, or computerized medication dispensing system.

Continued

STEP

- c** Follow agency's no-interruption zone (NIZ) policy. Prepare medications for one patient at a time. Keep all pages of MARs or computer printouts for one patient together, or look at only one patient's electronic MAR at a time.
- d** Select correct drug from stock supply or unit-dose drawer. Compare label of medication with MAR computer printout or computer screen.
- e** Check expiration date on each medication, one at a time.
- f** Calculate drug dose as necessary. Double-check calculation. Ask another nurse to check calculations if needed.
- g** If preparing a controlled substance, check record for previous drug count and compare with supply available.
- h** Do not leave drugs unattended.

6 Preparing ampule:

- a** Tap top of ampule lightly and quickly with finger until fluid moves from its neck (Fig. 51.1).

RATIONALE

Preventing distractions reduces medication preparation errors. Use NIZ when possible (Prakash et al., 2014; Yoder et al., 2015).

Reading label and comparing it with transcribed order reduce errors. *This is the first check for accuracy.*

Medications used past their expiration date are sometimes inactive, less effective, or harmful to patients. Double-checking reduces error.

Controlled substance laws require careful monitoring of dispensed narcotics.

Nurse is responsible for safekeeping of drugs.

Dislodges any fluid that collects above neck of ampule. All solution moves into lower chamber.



Fig. 51.1 Tapping moves fluid down neck.

STEP

- b** Place small gauze pad around neck of ampule.
- c** Snap neck of ampule quickly and firmly away from hands (Fig. 51.2).
- d** Draw up medication quickly, using filter needle long enough to reach bottom of ampule.

RATIONALE

Protects nurse's fingers from trauma as glass tip is broken off. Do not use opened alcohol swab to wrap around top of ampule because alcohol may leak into ampule.

Protects your fingers and face from shattering glass.

System is open to airborne contaminants. Filter needles filter out any fragments of glass (Alexander et al., 2014).

Continued

Fig. 51.2 Neck snapped away from hands.



STEP

- e** Hold ampule upside down, or set it on a flat surface. Insert filter needle into center of ampule opening. Do not allow needle tip or shaft to touch rim of ampule.
- f** Aspirate medication into syringe by gently pulling back on plunger (Fig. 51.3).
- g** Keep needle tip under surface of liquid. Tip ampule to bring all fluid within reach of the needle.

RATIONALE

Broken rim of ampule is considered contaminated. When ampule is inverted, solution dribbles out of ampule if needle tip or shaft touches rim of ampule.

Withdrawal of plunger creates negative pressure within syringe barrel, which pulls fluid into syringe.

Prevents aspiration of air bubbles.



Fig. 51.3 Medication aspirated with ampule inverted.

STEP

- h** If you aspirate air bubbles, do not expel air into ampule.
- i** To expel excess air bubbles, remove needle from ampule. Hold syringe with needle pointing up. Tap side of syringe to cause bubbles to rise toward needle. Draw back slightly on plunger, and then push plunger upward to eject air. Do not eject fluid.

RATIONALE

Air pressure forces fluid out of ampule, and medication will be lost.

Withdrawing plunger too far will remove it from barrel. Holding syringe vertically allows fluid to settle in bottom of barrel. Pulling back on plunger allows fluid within needle to enter barrel so fluid is not expelled. You then expel air at top of barrel and within needle.

Continued

STEP

- j** If syringe contains excess fluid, use sink for disposal. Hold syringe vertically with needle tip up and slanted slightly toward sink. Slowly eject excess fluid into sink. Recheck fluid level in syringe by holding it vertically.
- k** Cover needle with its safety sheath or cap. Replace filter needle with regular sharps with engineered sharps injury protection (SESIP) needle.

7 Preparing vial containing a solution:

- a** Remove cap covering top of unused vial to expose sterile rubber seal. If a multidose vial has been used, cap is already removed. Firmly and briskly wipe surface of rubber seal with alcohol swab, and allow it to dry.
- b** Pick up syringe, and remove needle cap or cap covering needleless vial access device. Pull back on plunger to draw amount of air into syringe equivalent to volume of medication to be aspirated from vial.

RATIONALE

Safely dispenses excess medication into sink. Position of needle allows you to expel medication without it flowing down needle shaft. Rechecking fluid level ensures proper dose.

Minimizes needlesticks. Filter needles cannot be used for injection.

Vial comes packaged with cap that cannot be replaced after seal is removed. Not all drug manufacturers guarantee that rubber seals of unused vials are sterile. Swabbing with alcohol reduces transmission of microorganisms. Allowing alcohol to dry prevents alcohol from coating needle and mixing with medication. Injecting air prevents buildup of negative pressure in vial when aspirating medication.

STEP

RATIONALE

SAFETY ALERT Some medications and agencies require use of a filter needle when preparing medications from vials. Check agency policy or medication reference. If you use a filter needle to aspirate medication, you need to change it to a regular SESIP needle of the appropriate size to administer medication (Alexander et al., 2014).

- c With vial on flat surface, insert tip of needle or needleless device through center of rubber seal (Fig. 51.4). Apply pressure to tip of needle during insertion.
- d Inject air into the vial's air space, holding on to plunger. Hold plunger firmly; plunger is sometimes forced backward by air pressure within vial.

Center of seal is thinner and easier to penetrate. Using firm pressure prevents dislodging rubber particles that could enter vial or needle.

Injection of air creates vacuum needed to get medication to flow into syringe. Injecting into air space of vial prevents formation of bubbles and an inaccurate dose.

Continued



Fig. 51.4 Insert needle's adapter through center of vial's diaphragm.

STEP

- e Invert vial while keeping firm hold on syringe and plunger (Fig. 51.5). Hold vial between thumb and middle fingers of nondominant hand. Grasp end of syringe barrel and plunger with thumb and forefinger of dominant hand to counteract pressure in vial.
- f Keep tip of needle or needleless device below fluid level.
- g Allow air pressure from vial to fill syringe gradually with medication. If necessary, pull back slightly on plunger to obtain correct amount of medication.

RATIONALE

Inverting vial allows fluid to settle in lower half of container. Position of hands prevents forceful movement of plunger and permits easy manipulation of syringe.

Prevents aspiration of air.

Positive pressure within vial forces fluid into syringe.

Fig. 51.5 Withdraw fluid with vial inverted.



STEP

RATIONALE

- h** When you obtain desired volume, position needle or needleless device into air space of vial; tap side of syringe barrel gently to dislodge any air bubbles. Eject any air remaining at top of syringe into vial.
- i** Remove needle or needleless access device from vial by pulling back on barrel of syringe.
- j** Hold syringe at eye level at 90-degree angle to ensure correct volume and absence of air bubbles. Remove any remaining air by tapping barrel to dislodge any air bubbles (Fig. 51.6). Draw back slightly on plunger; then push it upward to eject air. Do not eject fluid. Recheck volume of medication.

Forcefully striking barrel while needle is inserted in vial may bend needle. Accumulation of air displaces medication and causes dosage errors.

Pulling plunger rather than barrel causes plunger to separate from barrel, resulting in loss of medication.

Holding syringe vertically allows fluid to settle in bottom of barrel. Tapping dislodges air to top of barrel. Pulling back on plunger allows fluid within needle to enter barrel so you do not expel fluid. You then expel air at top of barrel and within needle.

SAFETY ALERT When preparing medication from single-dose vial, do not assume that volume listed on label is total volume in vial. Some manufacturers provide small amount of extra liquid, expecting loss during preparation. Be sure to draw up only desired volume.

- k** If you need to inject medication into patient's tissue, change needle with regular SESIP to appropriate gauge and length according to route of medication administration.

Inserting needle through a rubber stopper dulls beveled tip. New needle is sharper, and because no fluid is along shaft, does not track medication through tissues.

Continued

Fig. 51.6 Hold syringe upright; tap barrel to dislodge air bubbles.



STEP	RATIONALE
I For multidose vial, make label that includes date of mixing, concentration of drug per milliliter, and your initials. 8 Preparing vial containing a powder (reconstituting medications): a Remove cap covering vial of powdered medication and cap covering vial of proper diluent. Firmly swab both rubber seals with alcohol swab, and allow alcohol to dry. b Draw up manufacturer's suggested volume and type of diluent into syringe following Steps 7b through 7j.	Ensures that nurses will prepare future doses correctly. Some drugs must be discarded within a certain time frame after mixing. Allowing alcohol to dry prevents alcohol from coating needle and mixing with medication. Prepares diluent for injection into vial containing powdered medication.

STEP	RATIONALE
c Insert tip of needle or needleless device through center of rubber seal of vial of powdered medication. Inject diluent into vial. Remove needle. d Mix medication thoroughly. Roll in palms. Do not shake. e Reconstituted medication in vial is ready to be drawn into new syringe. Read label carefully to determine dose after reconstitution. f Draw up reconstituted medication into syringe. Insert needleless device/needle into vial. Do not add air. Then follow Steps 7c through 7j. 9 Compare label of medication with MAR, computer screen, or computer printout. 10 Complete postprocedure protocol.	Diluent begins to dissolve and reconstitute medication. Ensures proper dispersal of medication throughout solution and prevents formation of air bubbles. Once you add diluent, concentration of medication (mg/mL) determines dose you give. Prepares medication for administration. Ensures that dose is accurate. <i>This is the second check for accuracy.</i>

Recording and Reporting

- Record drug, dose, route, site, time, and date on MAR in the electronic health record (EHR) or chart immediately after administration, not before. Correctly sign MAR according to agency policy.
- Record area of ID injection and appearance of skin in the EHR or chart.

- Report any undesirable effects from medication to patient’s health care provider and document adverse effects according to agency policy.
- Record patient teaching, validation of understanding, and patient’s response to medication in the EHR or chart.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Air bubbles remain in syringe.	• Expel air from syringe, and add medication to it until you prepare the correct dose.
2 Incorrect dose of medication is prepared.	• Discard prepared dose. • Prepare correct new dose.

Parenteral Medications

Mixing Medications in One Syringe

Some medications need to be mixed from two vials or from a vial and an ampule. Mixing compatible medications avoids the need to give a patient more than one injection. Compatibility charts are in drug reference guides, posted within patient care areas, or available electronically. If you are uncertain about medication compatibilities, consult a pharmacist. When mixing medications, you must correctly aspirate fluid from each type of container. When using multidose vials, do not contaminate the contents of the vial with medication from another vial or ampule.

Give special consideration to the proper preparation of insulin, which comes in vials. Insulin is the hormone used to treat diabetes mellitus. Insulin is classified by rate of action, including short duration, intermediate duration, and long duration. Often patients with diabetes mellitus receive a combination of different types of insulin to control their blood glucose levels. Before preparing insulin, gently roll all cloudy insulin preparations (Humulin N) between the palms of your hands to resuspend the insulin.

If more than one type of insulin is required to manage the patient's diabetes, you can mix them into one syringe if they are compatible. Always prepare the short- or rapid-acting insulin first to prevent it from being contaminated with the longer-acting insulin (Lehne, 2010). In some settings insulin is not mixed. [Box 52.1](#) lists recommendations for mixing insulins.

Delegation Considerations

The skill of mixing medications in one syringe cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential side effects of medications and the need to report their occurrence to the nurse

Equipment

- Single-dose or multidose vials and ampules containing medication
- Syringe and two needles
- Needles:
 - Needleless blunt-tip vial access cannula or needle for drawing up medication

BOX 52.1 Recommendations for Mixing Insulins

- Patients whose blood glucose levels are well controlled on a mixed-insulin dose need to maintain their individual routine when preparing and administering their insulin.
- Do not mix insulin with any other medications or diluents unless approved by the health care provider.
- Never mix insulin glargine (Lantus) or insulin detemir (Levemir) with other types of insulin.
- Inject rapid-acting insulins mixed with NPH insulin within 15 minutes before a meal.
- Verify insulin doses with another nurse while you are preparing the injection.

- Filter needle if indicated
- Sharps with engineered sharps injury protection (SESIP) needle for injection
- Alcohol swab
- Puncture-proof container for disposing of syringes, needles, and glass
- Medication administration record (MAR) or computer printout
- Medication in vial or ampule

Implementation

STEP	RATIONALE
1 Check accuracy and completeness of MAR or computer printout with prescriber's written medication order. Check patient's name, medication name and dosage, route of administration, and time of administration. Recopy or reprint any portion of the MAR that is difficult to read.	Reduces errors and ensures that patient receives correct medication.
2 Review pertinent information related to medication, including action, purpose, side effects, and nursing implications.	Reduces risk of complications.

STEP

RATIONALE

3 Assess patient body build, muscle size, and weight if giving subcutaneous or intramuscular (IM) medication. 4 Consider compatibility of medications to be mixed and type of injection. 5 Check expiration date of medication printed on vial or ampule. 6 Perform hand hygiene. 7 Prepare medication for one patient at a time following the six rights of medication. Select an ampule or vial from the unit-dose drawer or automated dispensing system. Compare the label of each medication with the MAR or computer printout. In the case of insulin, ensure that correct type(s) of insulin is prepared. <i>This is the first check for accuracy.</i>	Helps ascertain that dosages are correct. Prevents unwanted medication interactions. Expired medications should not be used because potency changes when medications become outdated. Reduces risk of infection. Prevents medication error.
-
8 Mixing medications from two vials (Fig. 52.1): a Take syringe with needleless device or filter needle and aspirate volume of air equivalent to first medication dose (vial A). b Inject air into vial A, making sure that needle or needleless device does not touch solution (Fig. 52.1, A).	Air must be introduced into vial to create positive pressure needed to withdraw solution. Prevents cross contamination.

Continued

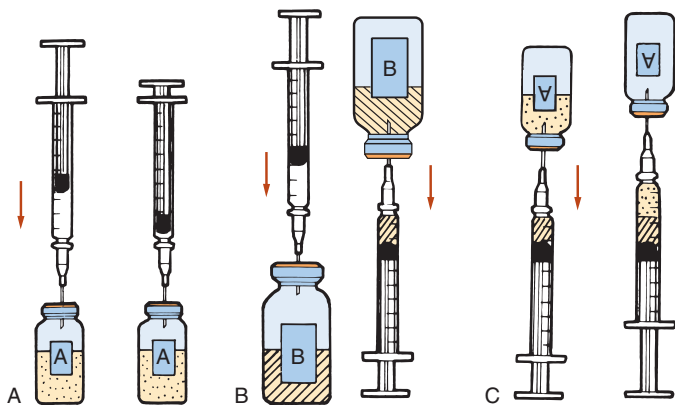


Fig. 52.1 A, Injecting air into vial A. B, Injecting air into vial B and withdrawing dose. C, Withdrawing medication from vial A; medications are now mixed.

STEP

- c** Holding plunger, withdraw needle or needleless device and syringe from vial A. Aspirate air equivalent to second medication dose (vial B) into syringe.
- d** Insert needle or needleless device into vial B, inject volume of air into vial B, and withdraw medication from vial B into syringe (Fig. 52.1, B).
- e** Withdraw needle or needleless device and syringe from vial B. Ensure that proper volume has been obtained.
- f** Determine on syringe scale what the combined volume of medications should measure.

RATIONALE

If plunger is not held in place, injected air may escape from vial A. Air is injected into vial B to create positive pressure needed to withdraw desired dose.

First portion of dose has been prepared.

Ensures that correct dose is prepared.

Prevents accidental withdrawal of too much medication from second vial.

STEP

RATIONALE

- g** Insert needle or needleless device into vial A, being careful not to push plunger and expel medication within syringe into vial. Invert vial and carefully withdraw the desired amount of medication from vial A into syringe (Fig. 52.1, C).
- h** Withdraw needle or needleless device, and expel any excess air from syringe. Check fluid level in syringe for proper dose. Medications are now mixed.

Positive pressure within vial A allows fluid to fill syringe without need to aspirate.

Air bubbles should not be injected into tissues. Excess fluid causes incorrect dose.

SAFETY ALERT If too much medication is withdrawn from second vial, discard syringe and start over. Do not push medication back into vial.

- i** Change needle or needleless device for appropriate-size needle if medication is being injected. Keep needle or needleless device capped until administration time.

Needleless vial access device must be changed for needle if medication is to pierce skin. Filter needles cannot be used for injections.

9 Mixing insulin:

- a** If patient takes insulin that is cloudy, roll bottle of insulin between hands to resuspend insulin preparation. Wipe off tops of both insulin vials with alcohol swab. Verify insulin dose against MAR.

Rolling between hands prevents mixing with air.

Continued

STEP	RATIONALE
b If mixing rapid- or short-acting insulin with intermediate- or long-acting insulin, take insulin syringe and aspirate volume of air equivalent to dose to be withdrawn from intermediate- or long-acting insulin first. If two intermediate- or long-acting insulins are mixed, it makes no difference which vial is prepared first.	Air must be introduced into vial to create pressure needed to withdraw solution.
SAFETY ALERT If the long-acting insulin glargine (Lantus) is ordered, note that this is a clear insulin that should not be mixed with other insulin.	
c Insert needle and inject air into vial of intermediate- or long-acting insulin. Do not let tip of needle touch solution. d Remove syringe from vial of insulin without aspirating medication. e With the same syringe, inject air equal to the dose of rapid- or short-acting insulin into vial and withdraw correct dose into syringe. f Remove syringe from rapid- or short-acting insulin and expel any air bubbles to ensure accurate dose.	Prevents cross contamination. Air will be injected into vial to withdraw desired dose. Filling syringe with rapid- or short-acting insulin first prevents contamination with intermediate- or long-acting insulin. Prevents accidental pulling of plunger, which may cause loss of medication. Ensures that correct dose is prepared.

STEP

- g** Verify short-acting insulin dosage with MAR and show insulin prepared in syringe to another nurse to verify that correct dosage of insulin was prepared. Determine which point on syringe scale the combined units of insulin should measure by adding the number of units of both insulins (e.g., 4 units Regular + 10 units NPH = 14 units total). Verify combined dosage.
- h** Place needle of syringe back into vial of intermediate- or long-acting insulin. Be careful not to push plunger and inject insulin in syringe into vial.
- i** Invert vial and carefully withdraw desired amount of insulin into syringe.
- j** Withdraw needle and check fluid level in syringe. Keep needle of prepared syringe sheathed or capped until ready to administer medication.

10 Mixing medications from vial and ampule:

- a** Prepare medication from vial first (see Skill 51).

RATIONALE

Accentuates accuracy and prevents medication errors.

Positive pressure within vial of intermediate- or long-acting insulin allows fluid to fill syringe without need to aspirate.

Ensures accurate dose. Inaccurate doses of insulin can cause serious hypoglycemia or hyperglycemia. Keeping needle capped or sheathed keeps needle sterile for insulin administration.

Ensures that appropriate amount of medication is prepared.

Continued

STEP	RATIONALE
b Determine on syringe scale what the combined volume of medication should measure.	Ensures accurate dose.
SAFETY ALERT If needleless vial access device was used in preparing medication from vial, change needleless system to filter needle.	
c Next, using the same syringe, prepare second medication from ampule (see Skill 51). d Withdraw filter needle from ampule and verify fluid level in syringe. Change filter needle to appropriate SESIP needle. Keep device or needle sheathed or capped until administering medication. e Check syringe carefully for total combined dose of medications. 11 Compare MAR, computer screen, or computer printout with prepared medication and labels on vials/ampules. <i>This is the second check for accuracy.</i> 12 Complete postprocedure protocol.	Ensures accurate dose. Keeping needle or needleless device capped maintains sterility for medication administration. Ensures accurate and safe medication administration. Reading label second time reduces error.

Recording and Reporting

- Record drug, dose, route, site, time, and date on MAR in the electronic health record (EHR) or chart immediately after administration, not before. Correctly sign MAR according to agency policy.
- Record area of ID injection and appearance of skin in the EHR or chart.

- Report any undesirable effects from medication to patient's health care provider and document adverse effects according to agency policy.
- Record patient teaching, validation of understanding, and patient's response to medication in the EHR or chart.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Air bubbles remain in syringe.	• Expel air from syringe, and add medication to syringe until you prepare the correct dose.
2 Incorrect dose of medication is prepared.	• Discard prepared dose. • Prepare correct new dose.

Patient-Controlled Analgesia

Patient-controlled analgesia (PCA) is an interactive method of pain management that permits patient control over pain through self-administration of analgesics. A patient depresses the button on a PCA device to deliver a regulated dose of analgesic. It is crucial that candidates for PCA be able to understand how, why, and when to self-administer the medication.

PCA has several advantages. It allows more constant serum levels of an opioid and avoids peaks and troughs of a large bolus. Patients receive better pain relief and fewer side effects from opioids because blood levels are maintained at a level of minimum effective analgesia concentration. Increased patient control and independence are other advantages for patients. Because PCA provides medication on demand, the total amount of opioid use can be reduced.

Delegation Considerations

The skill of administration of PCA cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Notify the nurse if the patient complains of change in status, including unrelieved pain or oversedation.
- Notify the nurse if the patient has questions about the PCA process or equipment.
- Never administer a PCA dose for the patient, and notify the nurse if anyone other than the patient is observed administering a dose for the patient.

Equipment

- PCA system and tubing
- Identification label and time tape (may come attached and completed by pharmacy)
- Needleless connector
- Alcohol swab
- Adhesive tape
- Clean gloves (when applicable)
- Equipment for vital signs, pulse oximeter, and capnography (CO₂) monitoring equipment

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Check accuracy and completeness of each medication administration record (MAR) or computer printout with the health care provider's order for name of medication, dosage, frequency of medication (continuous or demand or both), and lockout settings. Verify that patient is not allergic to medication.	Health care provider's order is required for opioid medication. Ensures that patient receives right medication.
3 Assess character of patient's pain, including physical, behavioral, and emotional signs and symptoms.	Establishes baseline to determine patient's response to analgesia.
4 When giving an intravenous (IV) line, assess existing IV infusion line (peripheral or central) and surrounding tissue for patency and condition of site for infiltration or inflammation (see Skill 55).	IV line must be patent with fluid infusing for medication to reach venous circulation safely and effectively. Never attach PCA to an IV line with blood running or to IV lines with incompatible drugs infusing. If necessary, start another IV site.
5 Assess patient's knowledge and effectiveness of previous pain-management strategies, especially previous PCA use.	Response to pain-control strategies helps to identify learning needs and affects patient's willingness to try therapy.
6 Explain purpose and demonstrate function of PCA to patient and family.	Effective explanations allow patient participation in care and independence in pain control (Pasero and McCaffery, 2011).
7 Perform hand hygiene.	Reduces transmission of microorganisms and possible infection.

Continued

STEP

- 8 Obtain PCA analgesic in module prepared by pharmacy. Check label of medication two times: when removed from storage and when preparing for assembly.
- 9 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.
- 10 At the bedside, compare the MAR or computer printout with the name of medication on the drug cartridge. Have a second registered nurse (RN) confirm the health care provider's order and the correct setup of the PCA. The second RN should check the health care provider's order and the device independently and not just look at the existing setup.
- 11 Check infuser and patient-control module for accurate labeling or evidence of leaking.
- 12 Program computerized PCA pump as ordered to deliver prescribed medication dose and lockout interval.
- 13 Insert drug cartridge into infusion device, and prime tubing.
- 14 Apply clean gloves.

RATIONALE

Follows six rights of medication administration to be sure of correct medication. *This is the first and second check for accuracy.*

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Ensures that the correct patient receives the right medication. *This is the third check for accuracy.*

Avoids medication error and injury to patient.

Ensures safe, therapeutic drug administration.

Locks system and prevents air from infusing into IV tubing.

Prevents transmission of microorganisms.

STEP**RATIONALE**

15 Attach needleless adapter to tubing adapter of patient-control module. 16 Wipe injection port of maintenance IV line with alcohol. 17 Insert needleless adapter into injection port nearest patient (at Y-site of peripheral IV or central line or connect to its own IV site). There should not be a chance to use PCA tubing for administering IV push with another drug. 18 Secure connections with tape, and anchor PCA tubing. Label PCA tubing and remove gloves. 19 Administer loading dose of analgesia as prescribed. 20 Complete postprocedure protocol.	Connects device with IV line. Alcohol is a topical antiseptic that minimizes entry of surface microorganisms during needle insertion. Establishes route for medication to enter main IV line. Needleless systems prevent needlestick injuries. Prevents medication interaction and incompatibility. Prevents dislodgment of needleless adapter from port. Label prevents errors caused by connecting tubing from different device to PCA. A one-time dose (bolus) may be given manually by you or programmed into PCA pump.

Recording and Reporting

- Record drug, concentration, dose (basal and/or demand), time started, lockout time, amount of IV solution infused, and remaining solution in the electronic health record (EHR) or chart. Many agencies have special PCA documentation forms.
- Record regular assessment of patient response to analgesia on PCA medication form, in nurses' notes in EHR or chart, on pain-assessment flow sheet, or on other documentation according to agency policy. This includes vital signs, oximetry or capnography, sedation status, pain rating, and status of vascular access site.
- Document your evaluation of patient learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient verbalizes continued or worsening discomfort or displays nonverbal behaviors indicative of pain. 2 Patient is not readily arousable.	• Perform complete pain assessment. • Assess for possible complications other than pain. • Inspect IV site for possible catheter occlusion or infiltration. • Evaluate number of attempts and deliveries initiated by patient. • Check that maintenance IV fluid is continuously running. • Evaluate pump for operational problems. • Consult with health care provider. • Stop PCA. • Notify health care provider. • Elevate head of bed 30 degrees, unless contraindicated. • Instruct patient to take deep breaths. • Apply oxygen at 2 L/min per nasal cannula (if ordered). • Assess vital signs. • Evaluate amount of opioid delivered within past 4 to 8 hours. • Ask family members if they depressed the button without patient knowledge. • Review MAR for other possible sedating drugs. • Prepare to administer an opioid-reversing agent. • Observe patient frequently (American Pain Society (APS), 2009).

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient unable to manipulate PCA device to maintain pain control.	• Consult with health care provider regarding alternative medication route or possible basal (continuous) dose. • If agency allows, assess patient support system for significant other who can responsibly manipulate PCA device (Pasero and McCaffery, 2011).

Peripheral Intravenous Care

Dressing Care, Discontinuation

Short peripheral intravenous (IV) catheters require strict adherence to infection-prevention measures to avoid complications associated with these devices. Securely apply catheter dressings and change dressings when wet, soiled, or loosened or if the integrity is compromised ([Infusion Nurses Society \[INS\], 2016b](#)). Short peripheral catheter transparent semipermeable membrane (TSM) dressing changes should be performed every 5 to 7 days, and gauze dressings every 2 days ([INS, 2016a](#)). If a gauze dressing is underneath a TSM, it should be changed every 2 days ([INS, 2016a](#)).

Discontinue a short peripheral IV catheter when the prescribed length of therapy is completed or a complication occurs (e.g., phlebitis, infiltration, or catheter occlusion). Care must also be taken because the risk of catheter emboli may occur if the catheter breaks during removal.

Delegation Considerations

The skill of changing a short peripheral IV dressing or of discontinuing a short peripheral intravenous line cannot be delegated to nursing assistive personnel (NAP). Delegation to licensed practical nurses (LPNs) varies by state Nurse Practice Act. The nurse instructs the NAP to do the following:

- Report to the nurse if a patient complains of moistness or loosening of an IV dressing.
- Protect the IV dressing during hygiene and activities of daily living (ADLs).
- Report to the nurse any bleeding at the site after the catheter has been removed.
- Report any complaints by the patient of pain or observations of redness at the site.

Equipment

Changing IV Dressing

- Antiseptic swabs (chlorhexidine gluconate [CHG]) solution preferred, povidone-iodine, or 70% alcohol
- Adhesive remover (*optional*)
- Skin protectant swab

- Clean gloves
- Engineered stabilization device or precut strips sterile tape
- Commercially available IV site protection device (*optional*)
- Sterile TSM dressing

Discontinuing Peripheral Intravenous Access

- Clean gloves
- Sterile 2 × 2- or 4 × 4-inch gauze sponge
- Antiseptic swabs (CHG solution preferred, povidone-iodine, or 70% alcohol)
- Tape

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Explain procedure and purpose to patient and family caregiver. 3 Perform hand hygiene. Collect equipment. Apply clean gloves.	Decreases anxiety, promotes cooperation, and gives patient time frame around which to plan personal activities. Reduces transmission of microorganisms. Infections related to IV therapy are most often caused by catheter hub contamination; thus you need to use careful technique throughout dressing change (INS, 2016a).
Changing IV Dressing 1 Remove dressing. - a <i>For transparent semipermeable dressing:</i> Remove by pulling up one corner and pulling side laterally while holding catheter hub with nondominant hand (Fig. 54.1). Repeat on other side. Leave tape or catheter stabilization device that secures IV catheter in place.	Technique minimizes discomfort during removal. Use alcohol swab on transparent dressing next to patient's skin to loosen dressing.

Continued



Fig. 54.1 Remove transparent dressing by pulling side laterally.

STEP

- b *For gauze dressing:*
Stabilize catheter hub while loosening tape and removing old dressing one layer at a time by pulling toward insertion site. Be cautious if IV tubing becomes tangled between two layers of dressing.
- 2 Observe insertion site for signs and symptoms of IV-related complications (tenderness, redness, swelling, exudate, or complaints of pain). If complication exists or if ordered by health care provider, discontinue infusion.

RATIONALE

Presence of infection or complication indicates need to remove vascular access device (VAD) at current site.

STEP

RATIONALE

- 3** If catheter is to remain in place, assess integrity of engineered stabilization device. Continue to stabilize catheter and remove as recommended by manufacturer directions for use. Inspect for signs of adhesive-related skin injury from adhesive-based engineered stabilization devices.

NOTE: Some stabilization devices are designed to remain in place for length of time VAD is in as long as adequate stabilization is evident.

- 4** While stabilizing IV line, perform skin antisepsis to insertion site with CHG solution using friction in back-and-forth motion for 30 seconds and allow to dry completely. If using alcohol or povidone-iodine, clean in concentric circle, moving from insertion site outward with the swab. Allow antiseptic solution to dry completely.
- 5** *Optional:* Apply skin protectant solution to area where you will apply tape or dressing. Allow to dry.
- 6** While securing catheter, apply sterile dressing over site.

Removing stabilization device allows for appropriate skin antisepsis before applying dressing and new stabilization device (INS, 2016a).
Stabilization prevents accidental dislodgement of VAD.

Reduces incidence of catheter-related infections (Alexander, et al., 2014).
Allow any skin antiseptic agent to fully dry for complete antisepsis (INS, 2016a).

Coats the skin with protective solution to maintain skin integrity, prevents irritation from the adhesive, and promotes adhesion of the dressing.

Continued

STEP	RATIONALE
a <i>Manufactured catheter stabilization device:</i> Apply catheter stabilization device.	Use of engineered stabilization devices can reduce risk for VAD complications (i.e., phlebitis, infection, migration) and unintentional loss of access (INS, 2016a).
b <i>Transparent dressing:</i> As directed in Skill 20.	
c <i>Sterile gauze dressing:</i> See Skill 18.	
7 Remove and discard gloves.	Protects catheter insertion site and minimizes risk for infection (Phillips and Gorski, 2014). TSM dressing allows visualization of insertion site and surrounding area for complications (INS, 2016a).
8 <i>Option:</i> Apply site protection device (e.g., I.V. House Ultra Protective Dressing®).	
9 Anchor IV tubing with additional pieces of tape if necessary. When using transparent dressing, avoid placing tape over dressing.	Only use sterile tape under sterile dressing to prevent site contamination.
10 Label dressing per agency policy. Information on label includes date and time of IV insertion, VAD gauge size and length, and your initials.	Gauze dressing obscures observation of insertion site and is changed every 2 days (INS, 2016a).
11 Discard equipment and perform hand hygiene.	Prevents transmission of microorganisms. Reduces risk of VAD dislodgement (INS, 2016a). Prevents accidental displacement of VAD. Communicates type of device and time interval for dressing change and site rotation. Reduces transmission of microorganisms.

STEP**RATIONALE****Discontinuing Peripheral IV Access**

- 1** Explain procedure to patient before you remove catheter.
- 2** Turn IV tubing roller clamp to “off” position or turn electronic infusion device (EID) off and roller clamp to “off” position.
- 3** Perform hand hygiene. Apply clean gloves.
- 4** Carefully remove IV site dressing, and stabilize IV device. Then remove the tape securing the catheter.
- 5** Place clean sterile gauze above insertion site and withdraw catheter, using a slow, steady motion.
- 6** Apply pressure to site for a minimum of 30 seconds until bleeding has stopped.
NOTE: Apply pressure for at least 5 to 10 minutes if patient is taking anticoagulants.
- 7** Inspect catheter for intactness after removal. Note tip integrity and length.
- 8** Apply clean, folded gauze dressing over insertion site and secure with tape.
- 9** Complete postprocedure protocol.

Alleviates anxiety and elicits cooperation.

Reduces the risk of blood exposure.

Promotes homeostasis.

Recording and Reporting

- Record in nurse’s notes in electronic health record (EHR) or chart the time short-peripheral dressing was changed, reason for change, type of dressing material used, patency of system, and description of VAD site.
- Record in nurses’ notes what IV problems the patient knows to report.
- Report to nurse in charge or oncoming nursing shift that dressing was changed and any significant information about integrity of system.
- Report to health care provider and document any complications, interventions, and response to treatment.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 IV catheter is removed or dislodged accidentally.	• Restart new short-peripheral IV line in other extremity or above previous insertion site if continued therapy is necessary.
2 IV solution is not infusing or runs more slowly than ordered.	• Check IV catheter for bending, kinking, or dislodgement because catheter may require replacement. • Check for positional IV site and reposition catheter, applying new dressing if necessary. • Check and adjust height of IV container and for kinking or obstruction of IV tubing.

Peripheral Intravenous Care

Regulating Intravenous Flow Rate, Changing Tubing and Solution

Appropriate regulation of infusion rates reduces complications associated with IV therapy ([Infusion Nurses Society \[INS\], 2016b](#)). Infusion rates can be affected by changes in patient position, flexion of the IV site extremity, occlusion of the IV device, venospasm, venous trauma, or manipulation of the vascular access device (VAD; Alexander et al., 2014). A patient achieves therapeutic outcomes and fewer complications when an intravenous (IV) system and flow rates are assessed systematically (Alexander et al., 2014).

Electronic infusion devices (EIDs) maintain correct flow rates and catheter patency and prevent an unexpected bolus of IV infusion for patient safety ([INS, 2016a](#)). The use of an EID does not absolve a nurse from checking to ensure that the pump is functioning and infusing at the prescribed rate or to detect infiltration or extravasation ([INS, 2016a](#)).

Manual flow-control devices include flow regulators (i.e., dial or barrel-shaped) and mechanical infusion devices without a power source (i.e., elastomeric devices, piston-driven pumps). These may be used when flow rate is not critical (Alexander et al., 2014; [Phillips and Gorski, 2014](#)). They are not recommended for use in infants and children because accuracy cannot be guaranteed (Alexander et al., 2014).

Flow regulators such as volume-control devices deliver small volumes with the aid of gravity. One example of a volume-control device is a calibrated chamber placed between the IV container and the insertion spike and drip chamber of an administration set ([Fig. 55.1](#)). Consistent monitoring is necessary to verify the accurate infusion of the IV solution and detect and prevent complications.

Multifunctional EIDs or “smart pumps” have an embedded computer system with a drug library and are associated with reduced risk for infusion-related medication errors ([Phillips and Gorski, 2014](#)). The use of an EID with the potential reduction in serious medication errors and improved patient outcomes is becoming the standard of care across all settings ([Phillips and Gorski, 2014](#)). Diligence is necessary on your part



Fig. 55.1 Volume-control device.

to assess and monitor patients because use of any EID or controller is not without risk of malfunction, placing a patient at risk for harm or injury.

Delegation Considerations

The skill of regulating IV flow rate, changing infusion tubing, or changing an IV solution cannot be delegated to nursing assistive personnel (NAP). Delegation to licensed practical nurses (LPNs) varies by state Nurse Practice Act. The nurse instructs the NAP to do the following:

- Inform the nurse when the EID alarm signals.
- Inform the nurse when the fluid container is empty.
- Report any patient complaints of discomfort related to infusion such as pain, burning, bleeding, or swelling.

Equipment

Regulating IV Flow Rate

- Watch with second hand
- Calculator, paper, and pencil
- Tape
- Label
- IV solution bag and appropriate administration set
- IV administration set: EID (*optional*)
- Clean gloves

Changing IV Solutions

- IV solution as ordered by health care provider

Changing IV Tubing

- Clean gloves
- Antiseptic wipes (alcohol wipes)
- Label

Continuous IV Infusion

- Microdrip or macrodrip administration set infusion tubing as appropriate
- Add-on device as necessary (e.g., filters, extension set, needleless connector)
- Tubing label

Intermittent Extension Set

- 3- to 5-mL syringe filled with preservative-free normal saline (NS)/0.9% normal saline solution (NSS)
- Short extension tubing (if necessary), injection cap

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Review accuracy and completeness of health care provider's order in patient's medical record for patient name and correct solution: type, volume, additives, rate, and duration of IV therapy. Follow the six rights of medication administration.	Ensures that correct IV fluid is administered. Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).
3 Perform hand hygiene. Inspect IV site for signs and symptoms of IV-related complications such as pain, swelling, or redness.	
4 Observe for patency of IV tubing and VAD.	IV line and VAD must be free of kinks, knots, and clots for fluid to infuse at proper rate.

Continued

STEP

RATIONALE

- 5 Know calibration (drop factor) in drops per milliliter (gtt/mL) of infusion set used by agency:

Microdrip: 60 gtt/mL: Used to deliver rates less than 100 mL/hr

Macrodrop: 10 to 15 gtt/mL (depending on manufacturer): Used to deliver rates greater than 100 mL/hr

- 6 Determine how long each liter of fluid should run. Calculate milliliters per hour (hourly rate) by dividing volume by hours:

a $\text{mL/hr} = \frac{\text{Total infusion (mL)}}{\text{Hours (hr) of infusion}}$

b $1000 \text{ mL} / 8 \text{ hr} = 125 \text{ mL/hr}$
or

If 3 L is ordered for 24 hours:
 $3000 \text{ mL} / 24 \text{ hr} = 125 \text{ mL/hr}$

- 7 Select one of the following formulas to calculate minute flow rate (drops per minute) based on drop factor of infusion set:

a $\text{mL/hr} \div 60 \text{ min} = \text{mL/min}$
Drop factor $\times \text{mL/min} =$
Drops/min

or

b $(\text{mL/hr} \times \text{Drop factor}) \div 60 \text{ min} = \text{Drops/min}$

Calculate minute flow rate for a bag 1 : 1000 mL with 20 mEq KCl at 125 mL/hr.

Microdrip tubing universally delivers 60 gtt/mL. Used when small or very precise volumes are to be infused.

There are different commercial parenteral administration sets for macrodrip tubing. Used when large volumes or fast rates are necessary. Know the drip factor for the tubing being used.

Basis of calculation to ensure infusion of fluid over prescribed hourly rate.

Once you determine hourly rate, these formulas compute correct flow rate.

STEP

Microdrip:

$$125 \text{ mL/hr} \times 60 \text{ gtt/mL} = 7500 \text{ gtt/hr}$$

$$7500 \text{ gtt} \div 60 \text{ min} = 125 \text{ gtt/min}$$

Macro drip:

$$125 \text{ mL/hr} \times 15 \text{ gtt/mL} = 1875 \text{ gtt/hr}$$

$$1875 \text{ gtt} \div 60 \text{ min} = 31\text{--}32 \text{ gtt/min}$$

8 *For use of EID for infusion:*

Follow manufacturer's guidelines for setup of EID.

- a Insert IV tubing into chamber of control mechanism (see manufacturer's directions) (Fig. 55.2).

RATIONALE

When using microdrip, milliliters per hour (mL/hr) always equals drops per minute (gtt/min).

Multiply volume by drop factor and divide product by time (in minutes).

Most electronic infusion pumps use positive pressure to infuse. Infusion pumps propel fluid through tubing by compressing and milking the IV tubing.

Continued



Fig. 55.2 Insert IV tubing into chamber of control mechanism.

STEP

- b Secure part of IV tubing through “air in line” alarm system. Close door and turn on power button, select required drops per minute or volume per hour, close door to control chamber, and press start button. If infusing medication, access the EID library of medications and set appropriate rate and dose limits. If smart pump alarms immediately and shuts down, your settings were outside unit parameters.
 - c Open drip regulator completely while EID is in use.
 - d Monitor infusion rate and IV site for complications according to agency policy. Use watch to verify rate of infusion, even when using EID.
 - e Assess patency of system when alarm signals.
- 9 Regulate gravity infusion.
- a Ensure that IV container is at least 76.2 cm (30 inches) above IV site for adults and increase height for more viscous fluids (Alexander et al., 2014).

RATIONALE

Ensures safe administration of ordered flow rate or medication dose. Smart pumps require additional information such as patient unit and medication. Computer matches pump setting against a drug database.

Ensures that pump freely regulates infusion rate.

Flow controllers and pumps do not replace frequent, accurate nursing evaluation. EIDs can continue to infuse IV solutions after a complication has developed (INS, 2016a).

Alarm indicates some blockage in the system. Empty solution container, tubing kinks, closed clamp, infiltration, clotted catheter, air in the tubing, and/or low battery will all trigger the EID alarm.

Pressure caused by gravity is necessary to overcome venous pressure and resistance from tubing and catheter.

STEP

- b Slowly open roller clamp on tubing until you can see drops in drip chamber. Hold a watch with second hand at same level as drip chamber and count drip rate for 1 minute. Adjust roller clamp to increase or decrease rate of infusion.
- c Monitor drip rate at least hourly.

Hanging New IV Solutions

- 1 Prepare new solution for changing. If using plastic bag, hang on IV pole and remove protective cover from IV tubing port. If using glass bottle, remove metal cap and metal and rubber disks.
- 2 Close roller clamp on existing solution to stop flow rate. Remove tubing from EID (if used). Then remove old IV fluid container from IV pole. Hold container with tubing port pointing upward.
- 3 Quickly remove spike from old solution container and, without touching tip, insert spike into new container.
- 4 Hang new container of solution on IV pole

RATIONALE

Regulates flow to prescribed rate.

Many factors influence drip rate; frequent monitoring ensures IV fluid administration as prescribed.

Permits quick, smooth, and organized change from old to new solution.

Prevents solution remaining in drip chamber from emptying while changing solutions. Prevents solution in bag from spilling.

Reduces risk for solution in drip chamber becoming empty and maintains sterility.

Gravity helps with delivery of fluid into drip chamber.

Continued

STEP

- 5 Check for air in tubing. If air bubbles have formed, remove them by closing roller clamp, stretching tubing downward, and tapping tubing with finger (bubbles rise in fluid to drip chamber).
- 6 Regulate flow to ordered rate by using the roller clamp on the tubing or programming EID.
- 7 Place time label on the side of container, and label with the time hung, the time of completion, and appropriate intervals. If using plastic bags, mark only on the label and not the container.

Changing Infusion Tubing*Existing Continuous IV Infusion*

- 1 Move roller clamp on new IV tubing to “off” position.
- 2 Slow rate of infusion through old tubing to keep vein open (KVO) rate using EID or roller clamp.
- 3 Compress and fill drip chamber of old tubing.
- 4 Invert container, and remove old tubing. Keep spike sterile and upright.
- 5 Place insertion spike of new tubing into new solution container. Hang solution bag on IV pole, compress and release drip chamber on new tubing, and fill drip chamber one-third to one-half full.

RATIONALE

Reduces risk for air entering tubing. Use of an air-eliminating filter also reduces risk.

Maintains measures to restore fluid balance and deliver IV fluid as ordered.

Provides a visual comparison of volume infused compared with prescribed rate of infusion. Ink sometimes leaches into plastic bags (INS, 2011).

Prevents fluid spillage.

Prevents occlusion of VAD.

Ensures fluid chamber remains full until new tubing is changed.

Fluid in drip chamber will continue to run and maintain catheter patency.

Permits drip chamber to fill and promotes rapid, smooth flow of solution through tubing.

STEP

RATIONALE

6 Slowly open roller clamp, remove protective cap from adapter (if necessary), and flush new tubing with solution. Stop infusion, and replace cap. Place end of adapter near patient's IV site. 7 Stop EID or turn roller clamp on old tubing to "off" position. 8 Prepare tubing with extension set or saline lock. a If short extension tubing is needed, use sterile technique to connect the new injection cap to new extension set or tubing. b Swab injection cap with antiseptic swab for at least 15 seconds. Insert syringe with 3 to 5 mL of saline solution, and inject through the injection cap into extension set. 9 Reestablish infusion. a Gently disconnect old tubing from extension tubing (or from IV catheter hub), and quickly insert adapter of new tubing or saline lock into extension tubing connection (or IV catheter hub).	Removes air from tubing and replaces it with IV solution. Equipment is positioned for a quick connection of new tubing. Prevents fluid spillage. Prepares extension set for connecting with IV. Ensures effective disinfection (Phillips and Gorski, 2014). Maintains patency of catheter. Allows smooth transition from old to new tubing, minimizing time system is open.

Continued

STEP	RATIONALE
b For continuous infusion, open roller clamp on new tubing and regulate drip rate using roller clamp or insert tubing into EID, program to desired rate, and push on. c Attach a piece of tape or preprinted label with date and time of tubing change onto tubing below the drip chamber. d Form a loop of tubing, and secure it to patient's arm with a strip of tape. 10 Remove and discard old IV tubing. If necessary, apply new dressing. Remove and dispose of gloves. Perform hand hygiene. 11 Complete postprocedure protocol.	Ensures catheter patency and prevents occlusion. Provides reference to determine next time for tubing change. Avoids accidental pulling against site and stabilizes catheter. Reduces transmission of microorganisms.

Recording and Reporting

- Record on nurse's notes or appropriate flow sheet in electronic health record (EHR) or chart the IV solution, rate of infusion, and integrity and patency of system.
- Record patient response to therapy and unexpected outcomes (e.g., causes of flow rate inaccuracy).
- At change of shift or when leaving on break, report rate of infusion and volume left in infusion to nurse in charge or next nurse assigned to care for patient.
- Record tubing change, type of solution, volume, and rate of infusion on patient's record in the electronic health record (EHR) or chart. Use a special IV therapy flow sheet for parenteral solutions per agency policy.
- Record in nurses' notes what IV problems the patient knows to report.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Sudden infusion of large volume of solution occurs, with patient having symptoms of dyspnea, crackles in lung, and increased urine output, indicating fluid overload. 2 IV fluid container empties with subsequent loss of IV line patency. 3 The IV infusion is slower than ordered.	• Slow infusion rate: KVO rates must have specific rate ordered by licensed independent practitioner (LIP) • Notify health care provider immediately. • Place patient in high-Fowler position. • Anticipate new IV orders. • Administer diuretics if ordered. • Discontinue present IV and restart new short peripheral catheter in new site. • Check for positional change that affects rate, height of IV container, or kinking/obstruction of tubing. • Check VAD site for complications. • Consult health care provider for new order to provide necessary fluid volume.

Peripheral Intravenous Insertion

An intravenous (IV) device provides access to the venous system to deliver solutions and medications or blood and blood products. Reliable venous access for infusion therapy administration is essential. Several vascular access devices (VADs) are available for use in peripheral veins. The commonly used over-the-needle catheters (ONCs) include (1) a metal stylet to pierce the skin; and (2) a catheter made of silicone, polyurethane, polyvinyl chloride, or polytetrafluoroethylene (Teflon) that threads into a vein and remains there for the infusion of fluid. Clinician competence is required for the use, placement, and management of VADs; the ability to recognize signs and symptoms of VAD-related complications; the use of infusion equipment; and knowledge of all aspects of administering infusion therapy ([Infusion Nurses Society \[INS\], 2016a](#)). This includes knowledge of the solution or medication, how to initiate and regulate an infusion and operate and maintain the infusion equipment, and how to identify and correct any infusion-related complications and discontinue an infusion.

Delegation Considerations

The skill of inserting a short-peripheral IV access device cannot be delegated to nursing assistive personnel (NAP). Delegation to licensed practical nurses (LPNs) varies by state Nurse Practice Act. The nurse instructs the NAP to do the following:

- Notify the nurse if the patient complains of any IV site–related complications such as redness, pain, tenderness, swelling, bleeding, drainage, or leaking from under dressing.
- Notify the nurse if the patient’s IV dressing becomes wet.
- Notify the nurse if the level of fluid in the IV bag is low or the electronic infusion device (EID) is alarming.

Equipment

- Short-peripheral IV start kit supplies (available in some agencies): single-use tourniquet, tape, transparent semipermeable membrane (TSM) dressing or sterile gauze and sterile tape, antiseptic wipes (chlorhexidine gluconate [CHG]) solution preferred, povidone-iodine, or 70% alcohol, 2 × 2–inch gauze pads, and label.
- If kit is not available, gather all items separately.

- Appropriate short peripheral IV catheter with safety mechanism for venipuncture (INS, 2016a)
- Clean gloves (latex free for patients with latex allergy); sterile gloves are needed if palpating the site after skin antisepsis (INS, 2016a)
- Single-use hair clippers or scissors for hair removal if indicated
- Short extension tubing with fused needleless connector or separate needleless connector (also called *injection cap*, *saline lock*, *heparin lock*, *IV plug*, *buff cap*, *buffalo cap*, or *intermittent use (PRN) adapter*)
- 5-mL prefilled syringe with preservative-free 0.9% sodium chloride (normal saline [NS]) (INS, 2016a)
- Antiseptic swabs
- Manufactured catheter stabilization device (if available) and skin protectant swab
- Prescribed IV solution or medication.
- IV infusion set (IV tubing), either macrodrip or microdrip, depending on prescribed rate; if using EID, appropriate administration set
- 0.2-micron filter for nonlipid (fat emulsions) solutions (may be incorporated into the infusion set)
- Protective equipment: goggles and mask (optional based on agency policy)
- Electronic infusion device (EID) and IV pole
- Vein visualization device (optional based on agency policy)
- Stethoscope
- Watch with second hand to calculate drip rate
- Special patient gown with snaps at shoulder seams if available (makes removal with IV tubing easier)
- Needle disposal container (*sharps container* or *biohazard container*)

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Review accuracy of health care provider's order: date and time, IV solution, route of administration, volume, rate, duration, and signature of ordering health care practitioner (Phillips and Gorski, 2014). Follow rights of medication administration.

RATIONALE

Before IV therapy, an order from a health care provider is needed (INS, 2016a). Verification that order is complete prevents medication errors.

Continued

STEP

- a Check approved online database, drug reference book, or pharmacist about IV fluids' composition, purpose, potential incompatibilities, and side effects.
- 3 Assess for clinical factors/conditions that will respond to or be affected by administration of IV solutions.
 - a Body weight
 - b Clinical markers of vascular volume:
 - (1) Urine output (decreased, dark yellow)
 - (2) Vital signs: blood pressure, respirations, pulse, temperature

RATIONALE

Ensures safe and correct administration of IV therapy and appropriate selection of VAD.

Provides baseline to determine effectiveness of prescribed therapy. A systems approach is recommended to assess for fluid and electrolyte imbalances (Phillips and Gorski, 2014).

Changes in body weight reflect fluid loss or gain. One kilogram or 2.2 lb of body weight is equivalent to gain or loss of 1 L of fluid (Alexander et al., 2014).

Kidneys respond to extracellular volume (ECV) deficit by reducing urine production and concentrating urine. Kidney disease can also cause oliguria.

Changes in blood pressure may be associated with fluid volume status (fluid volume deficit [FVD]) seen in postural hypotension.

Respirations can be altered in presence of acid-base imbalances.

STEP

RATIONALE

(3) Distended neck veins (Normally veins are full when person is supine and flat when person is upright.) (4) Auscultation of lungs (5) Capillary refill c Clinical markers of interstitial volume: (1) Skin turgor (Pinch skin over sternum or inside of forearm.) (2) Dependent edema (pitting or nonpitting) 1+ indicates barely detectable edema; 4+ indicates deep pitting edema. (3) Oral mucous membrane between cheek and gum	Temperature elevations increase need for fluid requirements (temperature of 38.3° C [101° F] to 39.4° C [103° F] require at least 500 mL of fluid replacement within a 24-h period) (Weinstein and Hagle, 2014). Indicator of fluid volume status: flat or collapsing with inhalation when supine with ECV deficit; full when upright or semi-upright with ECV excess. Crackles or rhonchi in dependent portions of lung may signal fluid buildup caused by ECV excess. Indirect measure of tissue perfusion (sluggish with ECV deficit). Failure of skin to return to normal position after several seconds indicates FVD. (Alexander et al., 2014). Edema is not usually apparent until 4.4–8.8 lb (2–4 kg) of fluid is retained. A weight gain of 2.2 lbs (1 kg) is equivalent to the retention of 1 L of body water (Phillips and Gorski, 2014). More reliable indicator than dry lips or skin. Dry between cheek and gums indicates ECV deficit.

Continued

STEP**RATIONALE**

d Thirst

Occurs with hypernatremia and severe ECV deficit. Not a reliable indicator for older adults (Phillips and Gorski, 2014).

e Behavior and level of consciousness:

- (1) Restlessness and mild confusion
- (2) Decreased level of consciousness (lethargy, confusion, coma)

Occurs with FVD or acid-base imbalance.

Occurs with severe ECV deficit. May occur with osmolality, fluid and electrolyte, and acid-base imbalances.

4 Determine if patient is to undergo any planned surgeries or procedures.

Allows anticipation and placement of appropriate VAD for infusion and avoids placement in an area that will interfere with medical procedures (INS, 2016a).

5 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's medication administration record (MAR) or medical record.

Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2016).

6 Select appropriate-size catheter; open and prepare sterile packages using sterile aseptic technique.

Use smallest-gauge peripheral catheter that will accommodate prescribed therapy and patient need (INS, 2016a).

7 Prepare short extension tubing with fused needleless connector or separate needleless connector (injection cap) to attach to catheter hub.

Needleless connectors protect health care workers by eliminating needles and potential for needlestick injuries when accessing VAD (INS, 2016b).

STEP

- a Remove protective cap from needleless connector. Swab injection cap with antiseptic swab. Attach syringe with sterile 0.9% NS solution, flush and inject through cap into short extension set, keeping syringe attached.
 - b Maintain sterility of end of connector by reapplying end caps, and set aside for attaching to catheter hub after successful venipuncture.
- 8 Prepare IV infusion tubing and solution.
- a Check IV solution using six rights of medication administration and review label for name, dosage and concentration, volume, beyond-use and expiration dates, and sterility state. If using bar code, scan code on patient's wristband and then on IV fluid container. Be sure that prescribed additives such as potassium and vitamins have been added. Check solution for color and clarity. Check bag for leaks.

RATIONALE

Replaces air with NS, preventing air from entering patient's vein later during VAD insertion.

Prevents touch contamination.

Reviewing label for accuracy reduces risk for medication errors (INS, 2016a).

Bar-code system reduces human error (INS, 2016a).

Risk for medication errors can be reduced with safe medication practices, including the following (INS, 2016a):

- Do not add medications to infusing containers of IV solutions (INS, 2016a).
- Do not use IV solutions that are discolored, contain precipitates, or are expired.

Risk for transmission of infection can be reduced by not using leaking bags because integrity has been compromised.

Continued

STEP

- b Open IV infusion set, maintaining sterility.
NOTE: EIDs sometimes have a dedicated administration set; follow manufacturer's instructions.
- c Place roller clamp about 2 to 5 cm (1 to 2 inches) below drip chamber, and move roller clamp to “off” position.
- d Remove protective sheath over IV tubing port on plastic IV solution bag (Fig. 56.1) or top of IV solution bottle while maintaining sterility.

RATIONALE

Prevents touch contamination, which allows microorganisms to enter infusion equipment and bloodstream.

Close proximity of roller clamp to drip chamber allows more accurate regulation of flow rate. Moving clamp to “off” prevents accidental spillage of IV fluid during priming.

Provides access for insertion of infusion tubing into solution using sterile technique.

Fig. 56.1 Removing protective sheath from IV bag port.



STEP	RATIONALE
e Remove protective cap from tubing insertion spike (without touching spike), and insert spike into port of IV bag. Clean rubber stopper on glass-bottled solution with single-use antiseptic, and insert spike into black rubber stopper of IV bottle. Bottles need special vented tubing.	Flat surface on the top of bottled solution may contain contaminants, whereas opening to plastic bag is recessed. Prevents contamination of bottled solution during insertion of spike.

SAFETY ALERT Do not touch spike because it is sterile. If contamination occurs (e.g., spike is accidentally dropped on the floor), discard that IV tubing and obtain new tubing.

f Compress drip chamber and release, allowing it to fill one-third to one-half full.	Creates suction effect; fluid enters drip chamber to prevent air from entering tubing.
g Prime air out of IV tubing by filling with IV solution: Remove protective cover on end of IV tubing (some tubing can be primed without removing protective cover) and slowly open roller clamp to allow fluid to flow from drip chamber to distal end of IV tubing. If tubing has a Y connector, invert Y connector when fluid	Priming ensures that IV tubing is clear of air and filled with IV solution before connecting to VAD. Slowly filling tubing decreases turbulence and chance of bubble formation. Closing clamp prevents accidental loss of fluid. Maintains sterility. Labeling IV tubing allows for recognition of length of time that tubing has been in use and when to change it.

Continued

STEP

- reaches it to displace air. Return roller clamp to “off” position after priming tubing (filled with IV fluid). Replace protective cover on distal end of tubing. Label IV tubing with date according to agency policy and procedure.
- h Be certain tubing is clear of air and air bubbles. To remove small air bubbles, firmly tap IV tubing where air bubbles are located. Check entire length of tubing to ensure that all air bubbles are removed.
 - 9 If using optional long extension tubing (not short tubing in Step 7), remove protective cap and attach it to distal end of IV tubing, maintaining sterility. Then prime long extension tubing.
 - 10 Perform hand hygiene and apply clean gloves. Wear eye protection and mask (see agency policy) if splash or spray of blood is possible.
 - 11 Apply tourniquet around arm above antecubital fossa 10 to 15 cm (4 to 6 inches) above proposed insertion site. Do not apply tourniquet too tightly to avoid injury, bruising skin, or occluding artery. Check for presence of radial pulse.

RATIONALE

Large air bubbles act as emboli (Cook, 2013).

Priming removes air from long extension tubing so it does not enter patient’s vascular system. Facilitates starting infusion as soon as IV site is ready.

Decreases potential risk of microbial contamination and cross-contamination (INS, 2016a).

Tourniquet should be tight enough to impede venous flow while maintaining arterial circulation (INS, 2016a, 2016b).

If patient has fragile veins or bruises easily, tourniquet should be applied loosely or not at all to prevent damage to veins and bruising (INS, 2016a).

STEP	RATIONALE
(<i>Option a:</i> Apply tourniquet on top of a thin layer of clothing such as a gown sleeve to protect fragile or hairy skin.) (<i>Option b:</i> Blood pressure cuff may be used in place of tourniquet: inflate cuff to just below patient's diastolic pressure [less than 50 mg Hg].) 12 Select vein for VAD insertion. Veins on dorsal and ventral surfaces of arms (e.g., cephalic, basilic, or median) are preferred in adults. a Use most distal site in the nondominant arm, if possible. b With your fingertip, palpate vein at intended insertion site by pressing downward. Note resilient, soft, bouncy feeling while releasing pressure. c Select well-dilated vein. Methods to improve venous distention: (1) Position extremity lower than heart, have patient open and close fist slowly, and lightly stroke vein downward. (2) Apply dry heat to extremity for several minutes.	Ensures adequate vein that is easy to puncture and less likely to rupture. Patients with VAD placement in their dominant hand have decreased ability to perform self-care. Fingertip is more sensitive and better for assessing vein location and condition. Increased volume of blood in vein at venipuncture site makes vein more visible. Use of gravity promotes vascular distention (INS, 2016a). Dry heat has been found to increase successful peripheral catheter insertion (INS, 2016a).

Continued

STEP

RATIONALE

13 When selecting a vein:

a Avoid vein selection in:

- (1) Areas with pain on palpation, compromised areas, sites distal to compromised areas (e.g., open wounds, bruising, infection, infiltration, or extravasation) (INS, 2016a).
- (2) Upper extremity on side of breast surgery with axillary node dissection or lymphedema or after radiation, arteriovenous (AV) fistulas/grafts; or affected extremity from cerebrovascular accident (CVA) (INS, 2016a).
- (3) Site distal to previous venipuncture site, sclerosed or hardened veins, infiltrate site, areas of venous valves, or phlebotic vessels.
- (4) Fragile dorsal hand veins in older adults. Veins of lower extremities should not be used for routine IV therapy in adults because of risk of tissue damage and thrombophlebitis (INS, 2016a).

It would be difficult to assess for any signs or symptoms of complications if an IV device were inserted in an area already compromised.

Increases risk for complications such as infection, lymphedema, or vessel damage.

Such sites cause vessel damage and infiltration around newly placed VAD site.

Veins have increased risk for infiltration.

STEP	RATIONALE
(5) Areas of flexion such as wrist or antecubital area (INS, 2016a). (6) Ventral surface of wrist (10–12.5 cm [4–5 inches]) b Choose a site that will not interfere with patient's activities of daily living (ADLs), use of assist devices, or planned procedures. 14 Release tourniquet temporarily and carefully. <i>Option:</i> If hair removal is needed, do not shave area with a razor. Clip hair with scissors or hair clippers to prepare area for application of TSM dressing if necessary (explain to patient). <i>Option:</i> You may apply topical local anesthetic to IV site 30 minutes before insertion. Monitor for allergic reaction. 15 Place adapter end of short infusion tubing or extension/ injection cap for saline lock nearby in sterile package.	Veins have increased risk for infiltration, phlebitis, or dislodgement. Venipuncture in ventral surface of wrist is painful and has potential for nerve damage (INS, 2016a). Keeps patient as mobile as possible. Restores blood flow and prevents venospasm when preparing for venipuncture. Shaving may increase risk of infection (INS, 2016a). Local anesthetic reduces discomfort (must have health care provider order for use of local anesthetic) (Alexander et al., 2014; INS, 2016a). Permits smooth, quick connection of infusion to short peripheral catheter once vein is accessed.

Continued

STEP

- 16 If area of insertion is visibly soiled, clean site with antiseptic soap and water first and dry. Perform skin antisepsis with CHG solution using friction in back-and-forth motion for 30 seconds and allow to dry completely. If using alcohol or povidone-iodine, clean in concentric circle, moving from insertion site outward with swab. Allow drying time between agents if agents are used in combination (alcohol and povidone-iodine).
- 17 Reapply tourniquet 10 to 15 cm (4 to 6 inches) above anticipated insertion site. Check presence of distal pulse.
- 18 Perform venipuncture. Anchor vein below site by placing thumb over vein and gently stretching skin against direction of insertion 4 to 5 cm (1½ to 2 inches) distal to the site (Fig. 56.2). Instruct patient to relax hand.
 - a Warn patient of a sharp stick. Hold VAD with needle bevel up. Align catheter on top of vein at 10- to 30-degree angle. Puncture skin and anterior vein wall.

RATIONALE

Mechanical friction in this pattern allows penetration of antiseptic solution to epidermal layer of skin (Alexander et al., 2014). Reduces incidence of catheter-related infections (Alexander et al., 2014). Allow any skin antiseptic agent to fully dry for complete antisepsis; alcoholic CHG solutions for at least 30 seconds; iodophors for at least 1.5 to 2 minutes (INS, 2016a).

Diminished arterial flow prevents venous filling. The pressure of the tourniquet causes the vein to engorge.

Stabilizes vein for needle insertion and prevents vein from rolling. Skin becomes taut, decreasing drag on insertion of device.

Places needle at a 10- to 30-degree angle to the vein. When vein is punctured, risk for puncturing posterior vein wall is reduced. Superficial veins require a smaller angle. Deeper veins require a greater angle.



Fig. 56.2 Stabilize vein below insertion site.

STEP

RATIONALE

SAFETY ALERT Use each VAD only once for each insertion attempt.

- 19 Observe for blood return in catheter or flashback chamber of catheter, indicating that bevel of needle has entered vein. Advance VAD approximately $\frac{1}{4}$ inch (0.6 cm) into vein and loosen stylet (needle) of ONC. Continue to hold skin taut while stabilizing VAD and, with index finger on push-off tab of VAD, advance catheter off needle into vein until hub rests at venipuncture site. *Do not reinsert stylet into catheter once catheter has been advanced into vein.* Advance catheter while safety device automatically retracts stylet (techniques for retracting stylet vary with different VADs). Place stylet directly into sharps container.

Increased venous pressure from tourniquet causes backflow of blood into catheter and/or flashback chamber. Some VADs have a notch in the stylet, allowing flash of blood into catheter. Stabilizing VAD allows for placement of catheter into vein and advancement of catheter off stylet. Advancing entire stylet into vein may penetrate wall of vein, resulting in hematoma. Advancing catheter with finger on open hub causes contamination (INS, 2016a). Reinsertion of stylet can cause catheter to shear off and embolize into vein. Proper sharps disposal prevents needlestick injury (OSHA, 2012).

Continued

STEP

RATIONALE

SAFETY ALERT A single clinician should not make more than two attempts at initiating IV access and limit total attempts to no more than four (INS, 2016a).

20 Stabilize catheter with nondominant hand and release tourniquet or blood pressure cuff with other. Apply gentle but firm pressure with middle finger of nondominant hand 3 cm (1¼ inches) above insertion site. Keep catheter stable with index finger.

21 Quickly connect Luer-Lok end of prepared extension set, or saline lock of primary administration set, to end of catheter. Do not touch point of entry of connection. Secure connection.

22 Attach prefilled flush syringe of 0.9% sodium chloride to short extension set and aspirate to remove air and assess blood return. Slowly inject NS from prefilled syringe into VAD (Fig. 56.3). Remove syringe and discard.

Permits venous flow and reduces backflow of blood. Digital pressure minimizes blood loss and allows attachment of extension set or needleless connector (INS, 2016b).

Prompt connection of infusion set maintains patency of vein and prevents risk of exposure to blood. Maintains sterility.

Aspirating air prevents air embolism. Blood return that is color and consistency of whole blood confirms placement of catheter in vein (INS, 2016a). Flushing prevents reflux of blood into catheter and occlusion (INS, 2016b).

Initiates flow of fluid through IV catheter, preventing clotting of device.

Swelling indicates infiltration, and catheter would need to be removed.



Fig. 56.3 Flush injection cap.

STEP

Option: To begin primary infusion, swab needleless connector with antiseptic swab and attach Luer-Lok end of IV tubing to needleless connector. Open roller clamp of IV tubing, turn on EID, and program it. Begin infusion at correct rate. If using gravity flow instead of EID, begin infusion by slowly opening roller clamp to regulate rate.

- 23 Observe insertion site for swelling.
- 24 Apply sterile dressing over site.

RATIONALE

Initiates flow of fluid through IV catheter, preventing clotting of VAD.

Swelling indicates infiltration, which requires immediate catheter removal.

Continued

STEP

a TSM dressing:

- (1) Continue to secure catheter with nondominant hand. Remove adherent backing. Apply one edge of dressing and gently smooth remaining dressing over IV insertion site, leaving Luer-Lok connection between tubing and catheter hub uncovered. Gently press dressing to adhere to skin. Remove outer covering and smooth dressing gently over site.
- (2) Place 2.5-cm (2-inch) piece of tape over Luer-Lok connection. *Do not apply tape on top of TSM dressing.*

b Sterile gauze dressing:

- (1) Place 5-cm (2-inch) piece of sterile tape over catheter hub.
- (2) Place 2 × 2-inch gauze pad over insertion site and edge of catheter hub. Secure all edges with tape. Do not place tape over insertion site. Do not cover connection between IV tubing and catheter hub.

RATIONALE

Protects catheter insertion site and minimizes risk for infection (Phillips and Gorski, 2014). Allows visualization of insertion site and surrounding area for complications (INS, 2016a). Access to Luer-Lok connection between tubing and catheter hub facilitates changing tubing if necessary.

Removal of tape from TSM dressing can tear dressing and cause catheter dislodgement. Tape on top of TSM dressing prevents moisture from being carried away from skin.

Stabilizes catheter under gauze dressing.

Use gauze dressings for site drainage, excessive perspiration, or sensitivity/allergic reactions to TSM dressings (INS, 2016a; Phillips and Gorski, 2014).

STEP

RATIONALE

(3) Fold 2 × 2-inch gauze in half and cover with 10-cm (4-inch) or 1 inch-wide tape so about an inch extends on each side. Place under Luer-Lok connection. Secure Luer-Lok connection and tubing to tape on folded gauze with 2.5-cm (1-inch) piece of tape. Avoid applying tape or gauze around arm. Do not use rolled bandages with or without elastic to secure VAD. Taping Luer-Lok connection can be eliminated if engineered stabilization device is to be used.	Tape on top of gauze makes it easier to access hub/tubing junction. Gauze pad elevates hub off skin to prevent pressure area. Prevents back-and-forth motion of catheter. Rolled bandages do not secure VAD adequately, can impair circulation or flow of infusion, and obscure visualization for complications (INS, 2016a).
25 <i>Option:</i> Secure IV catheter using engineered stabilization device (follow manufacturer directions and agency policy).	Use of engineered stabilization devices that allow visual inspection of insertion site can reduce risk of VAD complications (i.e., phlebitis, infection, migration) and unintentional loss of access (INS, 2016a).
a Apply skin protectant to area of skin around IV site and allow to dry completely.	Risk for medical adhesive-related skin injury (MARSI) is increased as result of age, joint movement, and edema; use of skin protectant can decrease risk (INS, 2016a).

Continued

STEP	RATIONALE
- b Align anchoring pads with directional arrow pointing to insertion site. Press device retainer over top of Luer-Lok connection while supporting underneath connection. - c Stabilize catheter and peel off one side of liner and press to adhere to skin. Repeat on other side. - d Monitor for MARS. 26 Loop the short extension tubing or the continuous infusion administration tubing alongside arm, and place second piece of tape directly over tubing and secure. 27 Label dressing per agency policy. Include date and time of IV insertion, VAD gauge size and length, and your initials. 28 Dispose of any remaining sharps in appropriate sharps container. Discard supplies. Remove gloves and perform hand hygiene. 29 Complete postprocedure protocol.	Securing administration set or extension set reduces risk for dislodging catheter if IV tubing is pulled (i.e., loop comes apart before catheter dislodges). Allows for recognition of type of device and length of time that device has been in place. Reduces transmission of microorganisms; prevents accidental needlestick injuries (Occupational Safety & Health Administration [OSHA], 2012).

Recording and Reporting

- Record in nurses' notes in electronic health record (EHR) or chart the number of attempts (successful and unsuccessful) and sites of insertion; precise description of insertion site (e.g., cephalic vein on dorsal surface of right lower arm, 2.5 cm [1 inch] above wrist); flow rate; method of infusion (gravity or EID); size and type, length, and brand of catheter; and time infusion started and

patient's response to insertion. Use an infusion therapy flow sheet when available.

- If using an EID, document type and rate of infusion and device identification number.
- Record patient's status, IV fluid, amount infused, and integrity and patency of system according to agency policy.
- Record patient's level of understanding following instruction in nurses' notes in EHR or chart.
- Report to oncoming nursing staff: type of fluid, flow rate, status of VAD, amount of fluid remaining in present solution, expected time to hang subsequent IV container, and patient condition.
- Report to health care provider any signs and symptoms of IV-related complications.
- Record signs and symptoms of IV-related complications, including interventions and patient response to treatments.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 FVD as manifested by decreased urine output, dry mucous membranes, decreased capillary refill, a disparity in central and peripheral pulses, tachycardia, hypotension, shock.	• Notify health care provider. • Requires readjustment of infusion rate.
2 Fluid volume excess (FVE) as manifested by crackles in the lungs, shortness of breath, edema.	• Reduce IV flow rate if symptoms appear. • Notify health care provider.
3 Electrolyte imbalances indicated by abnormal serum electrolyte levels, changes in mental status, alterations in neuromuscular function, cardiac dysrhythmias, changes in vital signs.	• Notify health care provider. • Adjust additives in IV or type of IV fluid per order.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
4 Infiltration: pain, swelling, coolness to touch, or presence of blanching (white, shiny appearance at or above IV site) or redness (INS, 2016b). 5 Catheter occlusion can occur from bent catheter, positional catheter (catheter resting against catheter wall), kink or knot in infusion tubing, clot formation, or precipitate formation from administration of incompatible medications or solutions (Alexander et al., 2014). 6 Phlebitis (i.e., vein inflammation): pain, redness, warmth, swelling, induration, or presence of palpable cord along course of vein (INS, 2016a). Rate of infusion may be altered (Table 56.1).	• Stop infusion and remove IV catheter at first sign of infiltration (see Skill 54). • Elevate affected extremity. • Avoid applying pressure, which can force solution into contact with more tissue, causing tissue damage. • Use standard scale for assessing and documenting infiltration (INS, 2016a). • Determine cause and consider catheter removal. • Positional catheters can be repositioned to improve IV flow. • Remove occluded IV catheter. Occluded catheters should not be flushed because an embolus can result from dislodging a clot (Alexander et al., 2014). • Notify health care provider. • Determine cause (i.e., chemical, mechanical, bacterial) and consider removal or replacement of VAD. • <i>Chemical phlebitis:</i> Apply heat, elevate limb, consider slowing infusion rate, and determine if catheter removal is necessary (INS, 2016a).

TABLE 56.1 Phlebitis Scale

Grade	Clinical Criteria
0	No symptoms
1	Erythema at access site with or without pain
2	Pain at access site with erythema and/or edema
3	Pain at access site with erythema and/or edema Streak formation Palpable venous cord
4	Pain at access site with erythema and/or edema Streak formation Palpable venous cord >2.5 cm (1 inch) in length Purulent drainage

Modified from Infusion Nurses Society (INS): *Policy and procedures for infusion therapy*, ed 5, Norwood, MA, 2016, INS.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
7 Hematoma is bleeding under skin caused by trauma to vessel wall. It can occur during short peripheral IV insertion if needle punctures either adjacent vessels or posterior vein wall or can be seen with multiple venipuncture attempts (Alexander et al., 2014).	• <i>Mechanical phlebitis:</i> Apply heat, elevate limb, monitor for 24–48 hours, consider catheter removal if signs and symptoms persist (INS, 2016a). • <i>Bacterial phlebitis:</i> Remove IV catheter (INS, 2016a). • Document phlebitis using a standardized scale, including nursing interventions per agency policy and procedure. • Remove IV catheter immediately and apply pressure and dry, sterile gauze pad. Monitor for additional bleeding. Elevate extremity and monitor for circulatory, neurologic, or motor dysfunction (Alexander et al., 2014).

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
8 Catheter-related infection can present as redness, swelling around or above IV site, pain, purulent drainage at insertion site, and body temperature elevations (INS, 2016a).	• Notify health care provider. Obtain order to culture drainage (INS, 2016a). • Remove IV catheter and culture purulent drainage from around IV site (INS, 2016a).

Peripherally Inserted Central Catheter Care

A peripherally inserted central catheter (PICC line) differs from short peripheral or midline catheters in that the farthest tip of the catheter ends in a larger blood vessel in the lower segment of the superior or inferior vena cava at or near the cavoatrial junction. PICC lines have single or multiple lumens. The choice of the number of lumens depends on a patient's condition and prescribed therapy.

Complications associated with PICC lines can include local or systemic infection that may be caused by contamination of the catheter from the skin of the patient or poor infection-prevention practices during insertion, care, and maintenance (Alexander et al., 2014). The implementation of the Institution for Healthcare Improvement (IHI) Central Line Bundle prevents infection. The key components of the IHI Central Line Bundle are: hand hygiene, maximal sterile barrier precautions, chlorhexidine gluconate (CHG) skin antisepsis, optimal catheter site selection, and daily review of the condition of the line and insertion site with prompt removal of unnecessary lines. Care of central vascular access devices (CVADs) requires knowledge of the purpose and function of the devices and prevention of complications.

Delegation Considerations

The skill of managing a PICC line cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Report the following to the nurse immediately: bleeding or swelling around PICC line insertion site; shortness of breath; loosened or soiled dressing; or if the patient has a fever or complains of pain at the site or catheter becomes dislodged.
- Inform nurse if the electronic infusion device (EID) alarm signals or if the fluid level in container is low or empty.
- Help with positioning patient during insertion and care.

Equipment

Site Care and Dressing Change

- CVAD dressing change kit, which includes: sterile gloves, mask, antiseptic swabs for skin disinfection (chlorhexidine solution preferred, povidone-iodine, or 70% alcohol), transparent semipermeable membrane dressing (TSM), 4 × 4-inch gauze pads, tape measure, sterile tape, label

- Engineered stabilization device (if not sutured) for PICC or nontunneled catheters
- Skin protectant swab
- Clean gloves
- Needleless injection cap(s) for each lumen(s)

Blood Sampling

- Clean gloves
- Antiseptic swabs (CHG solution, povidone-iodine, or 70% alcohol)
- 5-mL Luer-Lok syringes
- 10-mL Luer-Lok syringes
- Vacuum system or blood transfer device (see agency policy)
- Blood tubes, including waste tubes, labels
- Needleless injection cap
- Syringe (5 mL or 10 mL; see agency policy) for discarded blood
- 10-mL syringe with 5 to 10 mL preservative-free 0.9% sodium chloride (normal saline [NS])
- 10-mL syringe with heparin flush solution
- Sterile cap to maintain sterility of distal end of IV tubing

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Review accuracy and completeness of health care provider’s order for insertion of CVAD for size and type. Assess treatment schedule: times for administration of IV solutions, medications, and blood sampling. Follow rights of medication administration. Confirm that informed consent has been obtained and witnessed by health care provider who will perform procedure.	Identifies patient’s need for vascular access, evaluates response to therapy, and determines education needs. Insertion of central catheter requires informed consent (Infusion Nurses Society [INS], 2016a).

STEP

- 3 Explain procedure and purpose to patient and family caregiver. Explain to patient that he or she must not move during procedure. Offer opportunity at this time to toilet, and offer pain medication (if needed).
- 4 **Insertion site care and dressing change:**
 - a Position patient in comfortable position with head slightly elevated and have arm extended.
 - b Prepare dressing materials.

Transparent dressing: provide insertion site care every 5 to 7 days and as needed.

Gauze dressing: provide insertion site care every 48 hours and as needed.

Gauze under TSM: change at least every 2 days.
 - c Perform hand hygiene and apply mask. Instruct patient to turn head away from site during dressing change or provide mask for patient.
 - d Apply clean gloves. Remove old TSM dressing by stabilizing catheter with nondominant hand. Remove dressing by pulling up one corner and gently pulling straight out and parallel to skin. Repeat on all sides until dressing has been removed.

RATIONALE

Decreases anxiety, promotes cooperation, and prevents sudden movement during sterile procedure.

Provides access to patient.

TSM dressings have advantage of allowing visualization of intravenous (IV) site. Gauze dressings and TSM are associated with a lower rate of catheter tip infection (Band et al., 2015; [INS 2016a](#)).

Reduces transfer of microorganisms; prevents spread of airborne microorganisms over CVAD insertion site.

Stabilizes catheter as you remove dressing.

Continued

STEP	RATIONALE
e Remove catheter stabilization device if used and requires changing. Must use alcohol to remove adhesive stabilization devices.	Allows visualization of insertion site and allows for appropriate skin antisepsis (INS, 2016a). Use of alcohol minimizes risk for medical adhesive–related skin injury (MARSI) (INS, 2016a).
SAFETY ALERT If sutures are used for initial catheter stabilization and they become loosened or are no longer intact, alternative stabilization measures should be used. Use of an engineered stabilization device is recommended because sutures are associated with increased risk of infection (Alexander et al., 2014; INS, 2016a).	
f Inspect catheter, insertion site, and surrounding skin. Measure external PICC line length and compare to measurement from insertion if dislodgement is suspected. For PICC and midlines, measure upper-arm circumference 10 cm above antecubital fossa if clinically indicated and compare to baseline. g Remove and discard clean gloves; perform hand hygiene. Open CVAD dressing kit using sterile technique, and <i>apply sterile gloves</i>. Area to be cleaned should be same size as dressing. h Cleanse site:	Insertion sites require regular inspection for early detection of signs and symptoms of IV-related complications (INS, 2016a). Measurement of external catheter length provides comparison to determine dislodgement; arm measurement with a 3-cm increase can indicate thrombosis (INS, 2016a). Sterile technique is required to apply new dressing. Reduces incidence of catheter related infections (Alexander, et al., 2014; Centers for Disease Control and Prevention [CDC], 2011a).

STEP

- l** Apply sterile, transparent semipermeable dressing or apply gauze dressing over insertion site (see Skill 56).

- m** Apply label to dressing with date, time, and your initials.

- n** Dispose of soiled supplies and used equipment. Remove gloves and perform hand hygiene.

5 Blood sampling:

- a** Perform hand hygiene. Apply clean gloves.

- b** Turn off all infusions for at least 1 minute before drawing blood. **NOTE:** If you cannot stop infusion, draw blood from peripheral vein.

- c** When drawing through multilumen catheters, the distal lumen (or one recommended by manufacturer) is preferred.

- d** Syringe method:

NOTE: Check agency policy for use of Vacutainer with CVADs.

- (1)** Remove end of IV tubing or injection cap from catheter hub. Keep end of tubing sterile.

RATIONALE

Protects catheter insertion site and minimizes risk for infection (Phillips and Gorski, 2014). Allows for clear visualization of catheter site between dressing changes (INS, 2016b).

Provides information about next dressing change.

Reduces transmission of microorganisms.

Reduces transmission of microorganisms.

Prevents interruption of critical fluid therapy.

Distal lumen typically is largest-gauge lumen (Phillips and Gorski, 2014).

STEP	RATIONALE
(2) Scrub catheter hub with antiseptic swab for at least 15 seconds and allow to dry completely. (3) Attach empty 5-mL syringe, unclamp catheter (if necessary), and withdraw 4 to 5 mL of blood for discard sample. (4) Reclamp catheter (if necessary); remove syringe with blood and discard in appropriate biohazard container. (5) Scrub catheter hub with another antiseptic swab for 15 seconds and allow to dry completely. (6) Attach second syringe(s) to obtain required volume of blood needed for specimen ordered. (7) Unclamp catheter (if necessary) to withdraw blood. (8) Once specimens are obtained, reclamp catheter (if necessary) and remove syringe. (9) Scrub catheter hub with antiseptic swab for 15 seconds and allow to dry completely.	Reduces risk of microorganisms. Discard sample reduces risk of drug concentrations or diluted specimen (Alexander et al., 2014). Drawing specimens for international normalized ratio (INR) studies from heparinized lines is not recommended (INS, 2016b). Valved catheters do not require clamping because clamp opens valve and allows reflux of blood into catheter. Multiple syringes may be required, depending on specimens required and number of blood tubes needed.

Continued

STEP

RATIONALE

(10) Attach prefilled syringe with 10-mL 0.9% sodium chloride (NS) and flush catheter using the appropriate flush/clamp/disconnect sequence based on the type of needleless connector (e.g., neutral, negative or positive pressure displacement). Ensure that clamp is engaged (if available). (11) Remove syringe and discard into appropriate biohazard container. e Transfer blood using transfer vacuum device. f Flush catheter with heparin flush based on type of catheter and agency policy and procedure using appropriate flush/clamp/disconnect sequence. Ensure that clamp is engaged (if available). 6 Complete postprocedure protocol.	Flush with minimum volume of twice the internal volume of catheter with 0.9% NS (INS, 2016a). Refer to agency policy and procedure for flush volume requirements. Reduces risk for catheter clotting after procedure. Reduces transmission of microorganisms. Reduces risk of blood exposure. Prevents clot formation. Heparin flush volume and concentration vary by agency and type of catheter. Valved catheters are flushed with 0.9% NS only and do not require heparin.

Recording and Reporting

- Immediately notify health care provider of signs and symptoms of any complications.
- Document catheter site care in nurses' notes and electronic health record (EHR): size of catheter, change of injection caps, appearance of site, condition and type of securement device, date and time of dressing change.
- Document blood draw in nurses' notes. Include date, time, and sample drawn.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Catheter becomes damaged or breaks.	• Clamp the catheter near insertion site, and place sterile gauze over break or hole until repaired. Use permanent repair kit, if available. • Remove catheter.
2 Catheter becomes occluded by a thrombus, precipitation, or malposition.	• Reposition patient. Have patient cough and deep breathe. Raise patient's arm overhead. Obtain venogram if ordered. • Administer thrombolytics if ordered. • Remove catheter (CVAD requires order). • Obtain x-ray examination as ordered. • If precipitate present, try hydrochloric acid or ethanol solution per orders. • Do not use a 1-mL syringe to instill saline because pressure exceeds 200 psi.
3 Infection and/or sepsis develops at exit site, tunnel, or port pocket.	• Obtain blood cultures first, from peripheral and CVAD if ordered. • Remove catheter (CVAD requires order). • Replace catheter.
4 Catheter becomes dislodged.	• Insert new catheter. • Secure with catheter stabilization device. • Teach patient not to manipulate catheter.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
5 Catheter migration, pinch-off syndrome, port separation, or catheter fracture.	• Reposition under fluoroscopy as ordered. • Remove catheter as ordered. • Stop all fluid administration.
6 Skin erosion, hematomas, cuff extrusion, scar tissue formation over port.	• Remove CVAD as ordered. • Improve nutrition. • Provide appropriate skin care.
7 Infiltration, extravasation.	• Apply cold/warm compresses according to specific vesicant protocol. • Provide emotional support. • Obtain x-ray examination if ordered. • Use antidotes per protocol. • Discontinue IV fluids.
8 Pneumothorax, hemothorax, air emboli, hydrothorax.	• Administer oxygen as ordered. • Elevate feet. Aspirate air, fluid. • If air emboli are suspected, place patient on left side with head elevated slightly. Remove catheter as ordered. • Assist with insertion of chest tubes as ordered.

Preoperative Teaching

Preoperative patient teaching involves helping a patient understand and prepare mentally for the surgical experience. Effective preoperative teaching increases patient satisfaction, promotes psychological well-being, and may decrease complications leading to an increased length of stay (Lewis et al., 2014). Plan to have the patient demonstrate expected postoperative skills to allow for practice and facilitate understanding. By teaching and setting expectations before surgery (pain level, average length of surgery), the patient and the nurse can make a significant contribution to success in the postoperative recovery phase.

Delegation Considerations

The skills of preoperative teaching cannot be delegated to nursing assistive personnel (NAP). NAP can reinforce and help patients perform postoperative exercises. The nurse instructs the NAP about the following:

- Any precautions or safety issues unique to the patient (e.g., fall precautions, mobility limitations, bleeding precautions, weight-bearing issues, dietary concerns)
- Informing the nurse of any identified concerns (e.g., patient is unable to perform the exercises correctly)

Equipment

- Pillow (*optional*; used to splint the incision when coughing to reduce discomfort)
- Incentive spirometer
- Positive expiratory pressure (PEP) device
- Stethoscope

Implementation

STEPS

Assessment

- 1 Identify patient using at least two identifiers (e.g., name and birthday or name and medical record number), according to agency policy.

RATIONALE

Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016).

Continued

STEPS

- 2 Ask about patient's previous experiences with surgery and anesthesia, and determine if patient and family caregiver understand surgery.
- 3 Assess patient's risk for postoperative respiratory complications: identify presence of chronic pulmonary condition (e.g., emphysema, chronic bronchitis, asthma); any condition that affects chest wall movement, such as obesity, advanced pregnancy, thoracic or abdominal surgery; history of smoking; and presence of reduced hemoglobin level.
- 4 Assess patient's anxiety related to surgery.

Implementation

- 1 Perform hand hygiene. Inform patient and family caregiver of date, time, and location of surgery; anticipated length of surgery; additional time in postanesthesia recovery area; and where to wait.
- 2 Answer questions patient and family caregiver ask.

RATIONALE

This allows you to individualize teaching and address specific patient concerns.

This information determines if correction of misunderstanding is necessary.

General anesthesia predisposes patient to respiratory problems because lungs are not fully inflated during surgery, cough reflex is suppressed, and mucus collects within airway passages. After surgery, inadequate lung expansion can lead to atelectasis and pneumonia. Chronic lung conditions create greater risk for developing respiratory complications. Smoking damages ciliary clearance and increases mucus secretion. A reduced hemoglobin level can lead to reduced oxygen delivery.

Directs you to provide additional emotional support and indicates patient's readiness to learn.

Reduces transmission of infection. Accurate information helps reduce stress associated with surgery.

Responding to patient and family caregiver questions helps to decrease anxiety and demonstrates your concern for them.

STEPS

- 3 Instruct patient about preoperative bowel or skin preparations as needed. Check medical orders and agency policy regarding number of preoperative showers and agent to be used for each shower (2% chlorhexidine gluconate is used most often). Following each preoperative shower, instruct patient to rinse the skin thoroughly and dry with a fresh, clean, dry towel. Patient should don clean clothing.
- 4 Instruct patient about extent and purpose of food and fluid restrictions for period specified before surgery (e.g., no clear liquids at least 2 hours before surgery, no light meal [e.g., toast and a clear liquid] 6 hours or more before surgery, no meat or fried foods 8 hours before surgery, unless otherwise specified by surgeon or anesthesiologist (American Society of Anesthesiologists [ASA], 2011).
- 5 Describe perioperative routines (e.g., time-out, site marking, intravenous [IV] therapy, urinary catheterization, enema, hair clipping or removal, laboratory tests, transport to operating room [OR]).

RATIONALE

Proper skin preparation is critical element in preventing surgical site infections (SSIs). Rinsing skin removes residual antiseptic preparation that may cause skin irritation. After use, towels contain microorganisms that can grow in presence of moisture. Using fresh towel after each shower and donning clean clothing minimizes risk of reintroducing microorganisms to clean skin (Association of periOperative Registered Nurses [AORN], 2015; Graling and Vasaly, 2013).

During general anesthesia muscles relax, and gastric contents can reflux into esophagus, leading to aspiration. Anesthetic eliminates patient's ability to gag.

Allows patient to anticipate and recognize routine procedures, reducing anxiety.

Continued

STEPS	RATIONALE
6 Describe planned effect of preoperative medications. 7 Review which routine medications patient needs to discontinue before surgery.	Provides information about what to expect, decreasing anxiety. Some medications are discontinued before surgery to minimize effects that can cause surgical risks. For example, anticoagulants may increase bleeding and are usually discontinued several days before surgery. Insulin dosages are usually adjusted because of reduced intake of food before surgery.
8 Describe what patient will experience after surgery (e.g., where patient will be on awakening, frequent vital signs, catheters, drains, tubes, alternating pressure from sequential compression device, postoperative exercises).	Provides concrete description of what patient can expect after surgery so patient is prepared.
9 Teach turning: a Turn onto right side: Have patient assume supine position and move to side of bed (in this case left side) if permitted by surgery. Instruct patient to move by bending knees and pressing heels against mattress to raise and move buttocks. Top side rails on both sides of bed should be in up position.	Positioning begins on side of bed so turning to other side does not cause patient to roll toward edge of bed. Buttocks lift prevents shearing force against sheets. If patient's bed has a turn-assist feature, use it to help position him or her.

STEPS

- b** Have patient splint incision with right hand or with right hand with pillow over incisional area; keep right leg straight and flex left knee up; grab right side rail with left hand, pull toward right, and roll onto right side. Reverse process to turn to left side.
- c** Instruct patient to turn every 2 hours from side to side while awake. Often patient requires assistance with turning after surgery.

RATIONALE

Supports incision and decreases discomfort while turning.

Reduces risk of vascular, pulmonary, and pressure injury complications.

SAFETY ALERT Some patients, such as those who have had back surgery or vascular repair, are restricted from flexing their legs after surgery. Some patients are restricted from turning or may need help for positioning.

- d** Sit up on right side of bed: Elevate head of bed and have patient turn onto right side. While lying on right side, patient pushes on mattress with left arm and swings feet over edge of bed with nurse's help. To sit up on left side of bed, reverse this process.

Sitting position lowers diaphragm to permit fuller lung expansion.

SAFETY ALERT Caution patient to always ask for assistance, particularly first time sitting up on side of bed, to reduce risk of a fall.

Continued

STEPS

- 10** Teach coughing and deep breathing:
 - a** Help patient to high-Fowler position in bed with knees flexed, or have patient sit on side of bed or chair in upright position.
 - b** Instruct patient to place palms of hands across from one another lightly along lower border of rib cage or upper abdomen (Fig. 58.1).
 - c** Have patient take slow, deep breaths, inhaling through nose. Explain that patient will feel normal downward movement of diaphragm during inspiration. Demonstrate as needed.
 - d** Have patient avoid using chest and shoulder muscles while inhaling.
 - e** Have patient take slow, deep breath; hold for count of 3 seconds; and slowly exhale through mouth as if blowing out candle (pursed lips).
 - f** Have patient repeat breathing exercise three to five times.

RATIONALE

Patient may be unable or reluctant to deep breathe because of weakness or pain, resulting in secretions remaining in bases of lungs. Collection of secretions increases risk of pulmonary atelectasis and pneumonia. Sitting position facilitates diaphragmatic expansion.

This allows patient to feel rise and fall of abdomen during deep breathing (Lewis et al., 2014).

Helps to prevent hyperventilation or panting. Slow, deep breath allows for more complete lung expansion.

Increases unnecessary energy expenditure and does not promote full lung expansion. Resistance during exhalation helps to prevent alveolar collapse.

Repetition reinforces learning.



Fig. 58.1 Patient and nurse practice deep breathing.

STEPS

- g** Have patient take two slow, deep breaths, inhaling through nose and exhaling through pursed lips.
- h** Have patient inhale deeply a third time and hold breath to count of three. Cough fully for two to three consecutive coughs without inhaling between coughs.
- i** Caution patient against just clearing throat.

RATIONALE

Deep breaths expand lungs fully so air moves behind mucus to facilitate coughing.

Deep breathing moves up secretions in respiratory tract to stimulate cough reflex without voluntary effort on part of patient (Lewis et al., 2014).

Clearing throat does not remove mucus from deeper airways.

Continued

STEPS

- j Have patient practice several times. Instruct patient to perform turning, coughing, and deep breathing every 2 hours. Have family caregiver coach patient to exercise.
- 11 Teach use of an incentive spirometer:
 - a Position patient in sitting position in chair or in reclining position with head of bed elevated at least 45 degrees in bed.
 - b Either set or indicate to patient on the incentive spirometer device scale the volume level to be reached with each breath (targeted tidal volume). Use manufacturer directions to set volume.
 - c Explain to patient how to place mouthpiece of incentive spirometer so lips completely cover mouthpiece. Have patient demonstrate until position is correct.
 - d Instruct patient to exhale completely, then position mouthpiece so lips completely cover it, and inhale slowly, maintaining constant flow through unit until reaching goal volume (Fig. 58.2).

RATIONALE

- Ensures mastery of technique. Frequent pulmonary exercises and movement decrease risk of postoperative pneumonia (Lewis et al., 2014).
- Provides visual aid of respiratory effort. Encourages deep breathing to loosen secretions in lung bases.
- Facilitates diaphragm lowering and lung expansion.
- Establishes goal of volume level necessary for adequate lung expansion. Manufacturers determine target on basis of patient height and age.
- Validates patient's understanding of instructions, evaluates psychomotor skills, and lets patient ask questions.
- Promotes complete inflation of lungs and minimizes atelectasis.



Fig. 58.2 Patient demonstrates incentive spirometry.

STEPS

- e** Once maximum inspiration is reached, have patient hold breath for 2 to 3 seconds and exhale slowly.
- f** Instruct patient to breathe normally for short period between each of the 10 breaths taken on incentive spirometer. Repeat every hour while awake.
- 12** Teach PEP therapy and “huff” coughing:
 - a** Set PEP device for setting ordered.
 - b** Instruct patient to assume semi-Fowler or high-Fowler position in bed or to sit in a chair and place nose clip on patient’s nose.

RATIONALE

Promotes alveolar inflation.

Prevents hyperventilation and fatigue.

Higher settings require more effort.

Promotes optimum lung expansion and expectoration of mucus.

Continued

STEPS	RATIONALE
- c Have patient place lips around mouthpiece. Instruct patient to take full breath and exhale 2 or 3 times longer than inhalation. Repeat pattern for 10 to 20 breaths. - d Remove device from mouth and have patient take slow, deep breath and hold for 3 seconds. - e Instruct patient to exhale in quick, short, forced “huffs.” Repeat exercise every 2 hours while awake.	Ensures that patient does all breathing through mouth. Ensures that patient uses device properly. Promotes lung expansion before coughing. “Huff” coughing, or forced expiratory technique, promotes bronchial hygiene by increasing expectoration of secretions.
13 Teach controlled coughing: - a Explain importance of maintaining upright position. - b Demonstrate coughing. Take two slow, deep breaths, inhaling through nose and exhaling through (pursed lips) mouth. - c Inhale deeply a third time and hold breath to count of three. Cough fully for two to three consecutive coughs without inhaling between coughs (Fig. 58.3, A). (Tell patient to push all air out of lungs.)	Deep breaths expand lungs fully so air moves behind mucus and facilitates effective coughing. Position facilitates diaphragm excursion and enhances thorax and abdominal expansion. Consecutive coughs help remove mucus more effectively and completely than one forceful cough. Clearing throat does not remove mucus from deeper airways. Full, forceful cough is most effective in removing mucus.

Continued



Fig. 58.3 A, Techniques for splinting incision when coughing or moving.
B, Another technique for splinting incision when coughing or moving.

STEPS

- d** Caution patient against just clearing throat instead of coughing deeply.
- e** If surgical incision is either thoracic or abdominal, teach patient to place either hands or pillow over incisional area and place hands over pillow to splint incision (Fig. 58.3, B). During breathing and coughing exercises, press gently against incisional area for splinting and support.
- f** Patient continues to practice coughing exercises, splinting imaginary incision. Instruct patient to cough 2 to 3 times every 2 hours while awake.
- g** Instruct patient to examine sputum for consistency, odor, amount, and color changes and notify a nurse if any changes are noted.
- 14** Teach leg exercises:
 - a** Instruct and encourage patient in leg exercises to be performed every 1 to 2 hours while awake: ankle rotation, dorsiflexion and plantar flexion, leg extension and flexion, and straight leg raises.

RATIONALE

Clearing throat does not remove mucus from deeper airways.

Surgical incision cuts through muscles, tissues, and nerve endings. Deep-breathing and coughing exercises place additional stress on suture line and cause discomfort. Splinting incision with hands or pillow provides firm support and reduces incisional pulling and pain.

Deep coughing with splinting effectively expectorates mucus with minimal discomfort.

Sputum consistency, odor, amount, and color changes indicate presence of pulmonary complication such as pneumonia.

Leg exercises facilitate venous return from lower extremities and reduce risk of circulatory complications such as venous thrombus.

STEPS

- b** Position patient supine.
- c** Instruct patient to rotate each ankle in complete circle and draw imaginary circles with big toe five times.
- d** Alternate dorsiflexion and plantar flexion while instructing patient to feel calf muscles tighten and relax. Repeat five times.
- e** Perform quadriceps setting by tightening thigh and bringing knee down toward mattress and relaxing. Repeat five times.
- f** Instruct patient to alternate raising legs straight up from bed surface. Leg should be kept straight. Repeat five times.
- 15** Have patient continue to practice exercises before surgery at least every 2 hours while awake. Teach patient to coordinate turning and leg exercises with diaphragmatic breathing and use of incentive spirometer.
- 16** Complete postprocedure protocol.

RATIONALE

Promotes joint mobility.

Helps maintain joint mobility and promote venous return to prevent thrombus formation.

Quadriceps-setting exercises contract muscles of upper legs, maintain knee mobility, and improve venous return to heart.

Causes quadriceps muscle contraction and relaxation, which help promote venous return (Lewis et al., 2014).

Leg exercises stimulate circulation, which prevents venous stasis to help prevent formation of deep vein thrombosis (DVT) (Lewis et al., 2014).

Recording and Reporting

- Document all preoperative patient and family caregiver teaching in the nurses' notes in the electronic health record (EHR) or chart and their response to teaching.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient identifies incorrect procedure, site, date, or time of surgery. 2 Patient incorrectly performs one of the postoperative exercises.	• Provide correct information verbally and in writing for patient and family caregiver. • Explain and demonstrate correct exercise technique. • Explain importance of the postoperative exercise as it pertains to patient recovery. • Instruct patient to repeat demonstration.

Pressure Bandages (Applying)

A pressure bandage is a temporary treatment to control excessive, sudden, unanticipated bleeding. Hemorrhage may occur during surgical intervention (e.g., cardiac catheterization, arterial puncture, organ biopsy) or after surgery or be a life-threatening occurrence related to accidental trauma (e.g., stabbing, suicide attempt). Pressure dressings are essential to stopping the flow of blood and promoting clotting at the site until definitive action can be taken to stop the source.

Given the emergent nature of an acute bleeding episode, the aseptic techniques considered essential in most dressing applications are secondary to halting the bleeding. A pressure dressing applied in an emergency is usually temporary; the wound can be cleaned and the dressing changed once the bleeding has been controlled.

Delegation and Collaboration

The skill of applying a pressure dressing in an emergency situation cannot be delegated to nursing assistive personnel (NAP). If application requires more than one person, the NAP can help. The nurse directs the NAP to do the following:

- Assist the nurse as directed.
- Observe the pressure dressing during care activities to make sure that it remains in place and that there is no visible bleeding from the site.
- Observe underneath patient for bleeding after dressing has been applied.

Equipment

- Necessary dressings: fine-mesh gauze, abdominal (ABD) pads, hemostatic dressings, roller gauze
- Adhesive tape; hypoallergenic if necessary
- Adhesive remover (*optional*)
- Clean gloves
- Protective gown, goggles, mask (used when spray from wound is a risk)
- Equipment for vital signs

Implementation

STEP	RATIONALE
Phase I: Immediate action—first nurse 1 Identify external bleeding site. Look underneath patients with large abdominal dressings. NOTE: Wounds to groin area also can result in large amounts of blood loss, which is not always visible. 2 Apply immediate manual pressure to bleeding site. 3 Seek assistance.	Quick identification increases response time to stop bleeding. Maintaining asepsis and privacy is considered only if time and severity of blood loss permit. Hemostasis is maintained while supplies are prepared. Bandage must be secured quickly.
Phase II: Applying pressure bandage—second nurse 4 Quickly identify source of bleeding. • <i>Arterial bleeding</i> is bright red and flows in waves, related to heart rate; if vessel is very deep, flow is steady. • <i>Venous bleeding</i> is dark red and flows smoothly. • <i>Capillary bleeding</i> is oozing of dark red blood; self-sealing controls this bleeding. 5 Elevate affected body part (e.g., extremity) if possible.	Determines method of application and which supplies to use. Helps slow rate of hemorrhage.

STEP

- 6 First nurse continues to apply direct pressure as second nurse unwraps roller bandage and places within easy reach. Second nurse quickly cuts three to five lengths of adhesive tape and places them within reach; *do not cleanse wound.*
- 7 In simultaneous coordinated actions:
 - a Rapidly cover bleeding area with multiple thicknesses of gauze compresses. First nurse slips fingers out as other nurse exerts adequate pressure to continue control of bleeding.
 - b Place adhesive strips 7 to 10 cm (3 to 4 inches) beyond width of dressing with even pressure on both sides of fingers as close as possible to central bleeding source. Secure tape on distal end, pull tape across dressing, and keep firm pressure as proximate end of tape is secured.
 - c Remove fingers temporarily and quickly cover center of area with third strip of tape.

RATIONALE

Pressure dressing controls bleeding temporarily. Preparation allows for quick securement of pressure bandage.

Gauze is absorbent. Layers provide bulk against which local pressure can be applied to the bleeding site.

Tape exerts downward pressure, promoting hemostasis. To ensure blood flow to distal tissues and prevent tourniquet effect, adhesive tape must not be continued around entire extremity.

Provides pressure to source of bleeding.

Continued

STEP	RATIONALE
d Continue reinforcing area with tape as each successive strip is overlapped on alternating sides of center strip. Keep applying pressure. e When pressure bandage is on extremity, apply roller gauze: apply two circular turns tautly on both sides of fingers that are pressing gauze. Compress over bleeding site. Simultaneously remove finger pressure and apply roller gauze over center. Continue with figure-eight turns. Secure end with two circular turns and strip of adhesive.	Prevents tape from loosening. Roller gauze acts as pressure bandage, exerting more even pressure over extremity.
SAFETY ALERT Apply pressure bandage in a distal to proximal direction, working toward the heart. If bleeding continues, contact health care provider. 8 Observe dressing for control of bleeding. 9 Evaluate adequacy of circulation (distal pulse rate, skin characteristics). 10 Complete postprocedure protocol.	Effective pressure bandage controls bleeding without blocking distal circulation. Determines level of perfusion to distal body parts.

Recording and Reporting

- Report immediately to health care provider present status of patient's bleeding control, time bleeding was discovered, estimated blood loss, nursing interventions (including effectiveness of applied pressure bandage), apical and distal pulse rates, blood pressure measurements, mental status, signs of restlessness, and need for health care provider to administer to patient without delay.
- Record interventions taken and patient's response in progress notes and vital signs flow sheet.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 There is continued bleeding. Fluid and electrolyte imbalance, tissue hypoxia, confusion, hypovolemic shock, and cardiac arrest develop.	• Notify health care provider. • Reinforce or adjust pressure dressing. • Initiate intravenous (IV) therapy per order. • Place patient in Trendelenburg position. • Provide covers for warmth. • Monitor vital signs every 5 to 15 minutes (apical pulse, distal pulses, and blood pressure).
2 Pressure dressing is too tight and occludes circulation.	• Inspect areas distal to pressure dressing to ensure that circulation has not been occluded. • Adjust dressing as needed. • Notify health care provider.

Pressure Injury Risk Assessment

The goal in preventing the development of pressure injuries is early identification of an at-risk patient and the implementation of prevention strategies. The overall management goals suggested by the Wound, Ostomy and Continence Nurses Society (WOCN, 2016) include the following:

1. Identify individuals at risk for developing pressure injuries and initiate an early prevention program.
2. Implement appropriate strategies/plans to:
 - a. Attain/maintain intact skin.
 - b. Prevent complications.
 - c. Promptly identify or manage complications.
 - d. Involve patient and caregiver in self-management.
3. Implement cost-effective strategies/plans that prevent and treat pressure injuries. The WOCN (2016) panel recommends performing a risk assessment on entry to a health care setting and repeating this on a regularly scheduled basis or when there is a significant change in an individual's condition. Use risk assessment tools such as the Braden Scale or the Norton Scale (WOCN, 2016).
4. Inspect the patient's skin and bony prominences at least daily. Remove devices, shoes, socks, antiembolic stockings, and heel and elbow protectors for the skin inspection. Inspect all bony prominences, including back of head, shoulders, rib cage, elbows, hips, ischium, sacrum, coccyx, knees, ankles, and heels (Fig. 60.1). Palpate any reddened or discolored areas with a gloved finger to determine if the erythema (redness of the skin caused by dilation and congestion of the capillaries) blanches (lightens in color).

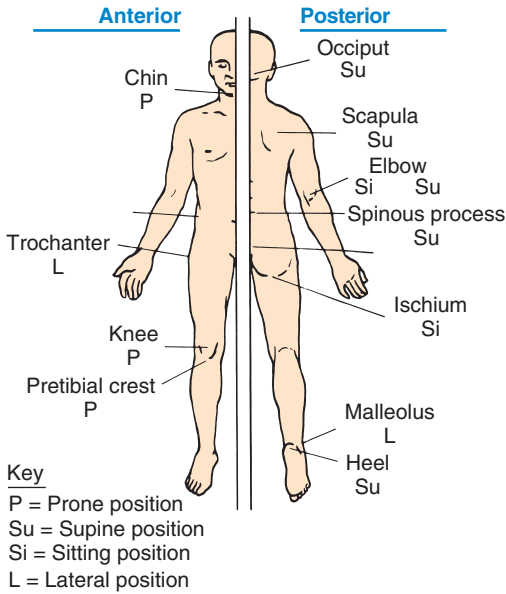
Delegation Considerations

The skill of pressure injury risk assessment cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Frequently change patient's position and specific positions individualized for the patient.
- Report any redness or break in the patient's skin.
- Report any abrasion from medical devices.

Equipment

- Risk assessment tool
- Documentation record



A

Fig. 60.1 A, Bony prominences most frequently underlying pressure sores.

- Pressure-redistribution mattress, bed, and/or chair cushion
- Positioning aids
- Gloves

Implementation

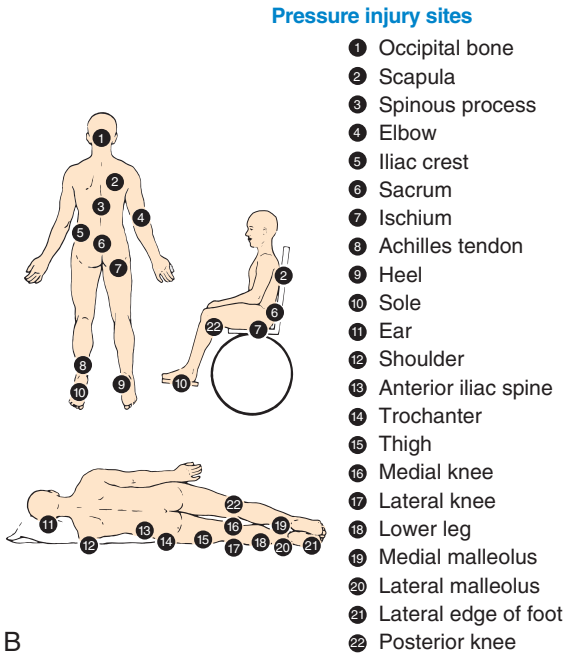
STEP

- 1 Complete preprocedure protocol.
- 2 Assess patient's risk for pressure injury formation:

RATIONALE

Determines need to administer preventive care and identifies specific factors placing patient at risk (National Pressure Ulcer Advisory Panel [NPUAP], European Pressure Ulcer Advisory Panel [EPUAP]), and Pan Pacific Pressure Injury Alliance [PPPIA] 2014).

Continued



B

Fig. 60.1, cont'd B, Pressure injury sites. (From Trelease CC: Developing standards for wound care, *Ostomy Wound Manage* 26:50, 1988. Used with permission of HMP Communications.)

STEP

- a Paralysis or immobilization caused by restrictive devices
- b Sensory loss (e.g., hemiplegia, spinal cord injury)
- c Circulatory disorders (e.g., peripheral vascular diseases, vascular changes from diabetes mellitus, neuropathy)

RATIONALE

Patient is unable to turn or reposition independently to relieve pressure.

Patient is unable to feel discomfort from pressure and does not independently change position.

Reduces perfusion of tissue layers of skin.

STEP	RATIONALE
d Fever	Increases metabolic demands of tissues. Accompanying diaphoresis leaves skin moist.
e Anemia	Decreased hemoglobin level reduces oxygen-carrying capacity of blood and amount of oxygen available to tissues.
f Malnutrition	Inadequate nutrition leads to weight loss, muscle atrophy, and reduced tissue mass. Nutrient deficiencies result in impaired or delayed healing (Stotts, 2016).
g Fecal or urinary incontinence	Skin becomes exposed to moist environment containing bacteria. Excessive moisture macerates skin (Gray et al., 2011).
h Heavy sedation and anesthesia	Patient is not mentally alert and does not turn or change position independently. Sedation alters sensory perception.
i Age	Neonates and very young children are at high risk, with the head being the most common site of pressure ulcer occurrence (WOCN, 2016). There is a loss of dermal thickness in older adults, impairing the ability to distribute pressure (Pieper, 2016).
j Dehydration	Results in decreased skin elasticity and turgor.
k Edema	Edematous tissues are less tolerant of pressure, friction, and shear.

Continued

STEP	RATIONALE
1 Existing pressure injuries	Limit surfaces available for position changes, placing available tissues at increased risk.
m History of pressure injury	Tensile strength of skin from previously healed pressure injury is 80% or less; therefore this area cannot tolerate pressure as well as undamaged skin (Doughty and Sparks-DeFries, 2016).
3 Select an agency-approved risk assessment tool such as the Braden Scale or Norton Scale. Perform risk assessment when patient enters health care setting and repeat on regularly scheduled basis or when there is a significant change in patient's condition (WOCN, 2016).	Valid and reliable risk assessment tools evaluate patient's risk for developing a pressure injury. Identifying risk factors that contribute to the potential for skin breakdown allows you to target specific interventions for decreasing risk for skin breakdown.
4 Assess condition of patient's skin over regions of pressure (see Fig. 60.1). Apply gloves as needed with open and/or draining wounds. Also assess tissue adjacent to medical devices, drainage tubes, and artificial airways.	Body weight against bony prominences places underlying skin at risk for breakdown. Medical devices exert pressure directly on tissue or underlying tissue (Black et al., 2015).
a Inspect for skin discoloration (redness in light-tone skin, purplish or bluish in darkly pigmented skin) and tissue consistency (firm or boggy feel), and/or palpate for abnormal sensations (Nix, 2016).	Indicates that tissue was under pressure; hyperemia is a normal physiologic response to hypoxemia in tissues.

STEP	RATIONALE
b Palpate discolored area, release your fingertip, and look for blanching.	If on palpation an area of redness blanches (lightens in color), this indicates normal reactive hyperemia. The tissue is not at risk for skin breakdown. Tissue that does not blanch when palpated indicates abnormal reactive hyperemia, an indication of possible ischemic injury.
c Inspect for pallor and mottling.	Indicates persistent hypoxia in tissues that were under pressure, which is an abnormal physiologic response.
d Inspect for absence of superficial skin layers.	Represents early pressure injury formation, usually a partial-thickness wound that may have resulted from friction and/or shear.
e Inspect for localized heat, edema, or induration, especially in individual with darkly pigmented skin.	Localized heat, edema, and induration have been identified as warning signs for pressure injury development. Because it is not always possible to see signs of redness on darkly pigmented skin (Box 60.1), these additional signs should be considered during the assessment (NPUAP, EPUAP, PPPIA, 2014).
5 Assess skin around and beneath medical devices every nursing shift for additional areas of potential pressure ulcer resulting from medical devices (Black et al., 2015).	Patients at high risk have multiple sites for pressure necrosis (tissue death), in addition to bony prominences (Coyer et al., 2014; Makic, 2015).

Continued

BOX 60.1 Patient-Centered Care for Skin Assessment of Pressure Injuries: Patients With Darkly Pigmented Skin

Patients with darkly pigmented skin cannot be assessed for pressure injury risk by examining only skin color.

1. Use natural or halogen lighting and avoid fluorescent lighting if possible.
2. Assess localized skin color changes. Any of the following may appear:
 - Color remains unchanged when pressure is applied.
 - Color changes occur at site of pressure, which differ from patient's usual skin color.
 - If patient previously had a pressure injury, that area of skin may be lighter than original color.
 - Localized area of skin may be purple/blue or violet instead of red.
3. Circumscribed area of intact skin may be warm to touch. As tissue changes color, intact skin will feel cool to touch. **NOTE:** Gloves may decrease sensitivity to changes in skin temperature.
 - Localized heat (inflammation) is detected by making comparisons to surrounding skin. Localized area of warmth eventually will be replaced by area of coolness, which is a sign of tissue devitalization.
4. Edema may occur with induration of more than 15 mm in diameter and may appear taut and shiny.
5. Patient complains of discomfort at a site that is predisposed to pressure injury development, (e.g., bony prominence, under medical devices).

Adapted from Nix DP: Skin and wound inspection and assessment. In Bryant RA, Nix DP, editors: *Acute and chronic wounds: current management concepts*, ed 5, St Louis, 2016, Mosby.

STEP

RATIONALE

Pressure points around medical devices (e.g., nares, oxygen cannula and masks, drainage tubing) can cause pressure injury to underlying tissue and become full-thickness pressure ulcers (Black et al., 2015; Pittman et al., 2015; Schallom et al., 2015).

STEP	RATIONALE
a Nares: nasogastric (NG) tube, oxygen cannula	Pressure to nares occurs from tape and other materials used to secure NG tube. Patients' ears and tips of nares are at risk for pressure from nasal cannula (Black et al., 2015; Schallom et al., 2015).
b Tongue and lips: oral airway, endotracheal (ET) tube	Pressure results from artificial airway and materials used to secure airway (Black et al., 2015).
c Ears: oxygen cannula, pillow	Stress and pressure against tissue at exit site or from tubing lying under any part of patient's body (Black et al., 2015).
d Drainage tubes or other tubing	
e Wound drainage	Wound drainage increases risk for skin breakdown because it is caustic to skin and underlying tissues. Tubing from drainage devices (e.g., Jackson-Pratt, Hemovac) causes pressure under device and on adjacent skin (Black et al., 2015).
f Indwelling urethral (Foley) catheter	For female patients, the catheter can put pressure on the labia, especially when edematous. For male patients, pressure from a catheter not properly anchored can put pressure on the tip of the penis and urethra (Black et al., 2015).
g Orthopedic and positioning devices	Improperly fitted or applied devices have the potential to cause pressure on adjacent skin and underlying tissue (Black et al., 2015).

Continued

STEP	RATIONALE
6 Observe patient for preferred positions when in bed or chair.	Preferred positions result in weight of body being placed on certain bony prominences. Presence of contractures may result in pressure exerted in unexpected places.
7 Observe ability of patient to initiate and help with position changes.	Potential for friction and shear increases when patient is completely dependent on others for position changes.
8 Assess patient and caregiver understanding of risks for the development of pressure injuries.	Determines baseline knowledge for pressure injury risk and identifies areas for patient teaching.
9 Implement prevention guidelines adapted from WOCN Society: <i>Guideline for Prevention and Management of Pressure Ulcers</i> (2016).	Reduces patient's risk of developing a pressure injury.
10 If patient has open, draining wounds, apply clean gloves.	Use of standard precautions prevents accidental exposure to body fluids.
11 If immobility, inactivity, or poor sensory perception is a risk factor for patient, consider one of the following interventions:	Immobility and inactivity reduce patient's ability or desire to independently change position. Poor sensory perception decreases patient's ability to feel the sensation of pressure or discomfort.
a Reposition patient on scheduled basis and frequently assess individual's skin condition to help identify early signs of pressure damage. If skin changes occur, reevaluate the plan.	Reduces the duration and intensity of pressure. Some patients may require more frequent repositioning (NPUAP, EPUAP, PPPIA, 2014).
b When patient is in the side-lying position in bed, use the 30-degree lateral position (Fig. 60.2).	Reduces direct contact of the trochanter with the support surface.

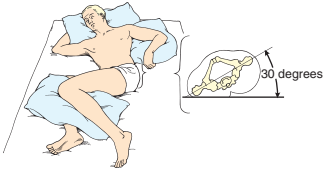


Fig. 60.2 Thirty-degree lateral position.

STEP

RATIONALE

c When necessary, use pillow bridging.	Use of pillows prevents direct contact between bony prominences.
d Place patient (when lying in bed) on a pressure-redistribution surface.	Reduces amount of pressure exerted on tissues.
e Place patient (when in a chair) on a pressure-redistribution device and shift the points under pressure at least every hour (WOCN, 2016).	Reduces the amount of pressure on the sacral and ischial areas.
12 If friction and shear are identified as risk factors, consider the following interventions:	Friction and shear damage underlying skin.
a Use two nurses and a pull sheet to reposition patient. Use a slide board to transfer patient from bed to stretcher.	Proper repositioning of patient prevents dragging along the sheets. Slide board provides slippery surface to reduce friction.
b Ensure that heels are free from the surface of the bed by using a pillow under the calves to elevate the heels.	“Floating” the heels from the bed surface eliminates shear and friction.
c Maintain the head of the bed at 30 degrees.	Decreases potential for patient to slide toward foot of bed and incur a shear injury.

Continued

STEP	RATIONALE
13 If patient receives a low score on a moisture subscale, consider one of the following interventions: - a Apply clean gloves. Apply a moisture barrier ointment to perineum and surrounding skin after each incontinent episode. - b If skin is denuded, use a protective barrier paste after each incontinent episode. - c If moisture source is from wound drainage, consider frequent dressing changes and/or skin protection with protective barriers or collection devices. 14 Educate patient and family caregiver regarding pressure ulcer risk and prevention (WOCN, 2016). 15 Complete postprocedure protocol.	Continual exposure of body fluids on the patient's skin increases the risk for skin breakdown and pressure injury development. Protects the skin from fecal or urinary incontinence. Provides a barrier between the skin and the stool/urine, allowing for healing. Removes the frequent exposure of wound drainage from the skin.

Recording and Reporting

- Record on flow sheet in nurses' notes in electronic health record (EHR) or chart any skin changes, patient's risk score, and skin assessment. Describe positions, turning intervals, pressure-redistribution devices, and other prevention measures. Note patient's response to the interventions.
- Record patient's understanding through teach-back for need for frequent skin and pressure injury assessment.
- Report need for additional consultations for the high-risk patient to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin becomes mottled, reddened, purplish, or bluish.	• Refer patient to wound, ostomy, and continence (WOC) nurse; dietitian; clinical nurse specialist (CNS); and/or physical therapist as necessary. Reevaluate position changes and bed surface.
2 Areas under pressure develop persistent discoloration, induration, or temperature changes.	• Refer patient to WOC nurse, dietitian, CNS, and/or physical therapist as necessary. • Modify patient's positioning and turning schedule.

Pressure Injury Treatment

The principles of managing patients with pressure injuries include systematic support of patients, reduction or elimination of the cause of skin breakdown, and management of the wound that provides an environment conducive to healing. Once you find the cause of the pressure injury, take steps to control or eliminate it. Next, assess the patient's wound-healing abilities.

The best environment for wound healing is moist and free of necrotic tissue and infection. Perform a thorough assessment of the wound and the periwound skin before initiating wound therapy.

Choose wound dressings to meet the characteristics of the wound bed (Rolstad et al., 2016). The choice of a wound dressing depends on the type of wound tissue in the base of the wound, the amount of wound drainage, the presence or absence of infection, the location of the wound, the size of the wound, the ease of use and cost-effectiveness of the dressing, and the comfort of the patient.

Delegation Considerations

The skill of treating pressure injuries and dressing changes cannot be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Report immediately to the nurse pain, fever, or any wound drainage.
- Report immediately to the nurse any change in skin integrity.
- Report any potential contamination to existing dressing such as patient incontinence or dislodgement of the dressing.

Equipment

- Protective equipment: clean gloves, goggles, cover gown (if splash is a risk)
- Sterile gloves (optional)
- Plastic bag for dressing disposal
- Measuring device
- Sterile cotton-tipped applicators (check agency policy for use of sterile applicators)
- Topical agent (as ordered)
- Cleaning agent (as ordered)
- Sterile solution container

- Dressing of choice based on patient wound characteristics
- Hypoallergenic tape (if needed)
- Documentation records
- Scale for assessing wound healing

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Assess patient's level of comfort on a pain scale of 0 to 10. If patient is in pain, determine if an as needed (PRN) pain medication has been ordered and administer. 3 Determine if patient has allergies to topical agents or latex. 4 Review the order for topical agent(s) and/or dressings.	Dressing change should not be a traumatic event for patient; evaluate wound pain before, during, and after wound care management (Hopf et al., 2016). Topical agents could contain elements that cause localized skin reactions. Ensures administration of proper medication and treatment.

SAFETY ALERT Determine if the order is consistent with established wound care guidelines and outcomes for a patient. If the order is not consistent with guidelines or varies from the identified outcome for a patient, review it with the health care team.

5 Perform hand hygiene and apply clean gloves. Position patient to allow dressing removal, and position plastic bag for dressing disposal. Remove and discard old dressing. 6 Assess patient's wounds using wound parameters, and continue ongoing wound assessment per agency policy. NOTE: This may be done during procedure after dressing removal.	Provides an accessible area for dressing change. Proper disposal of old dressing promotes proper handling of contaminated waste. Determines effectiveness of wound care and guides the treatment plan of care (Wound Ostomy and Continence Nurses [WOCN], 2016).

Continued

STEP

- a *Wound location:* Describe the body site where the wound is located.
- b *Stage of wound:* Describe the extent of tissue destruction.
- c *Wound size:* Length, width, and depth of the wound are measured per agency protocol. Use a disposable measuring guide for length and width. Use a cotton-tipped applicator to assess depth (Fig. 61.1).

RATIONALE

Staging is a way of assessing a pressure injury based on depth of tissue destruction. Wounds are documented as unstageable if the wound base is not visible (National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Pan Pacific Pressure Injury Alliance [NPUAP, EPUAP, PPPIA], 2014).

Injury size changes as healing progresses; therefore longest and widest areas of wound change over time. Measuring width and length by measuring consistent areas provides consistent measurement (Nix, 2016).

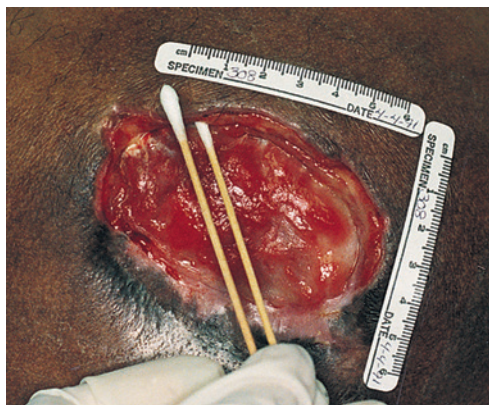


Fig. 61.1 Measuring depth of undermining of skin.

STEP

RATIONALE

d <i>Presence of undermining, sinus tracts, or tunnels:</i> Use a sterile cotton-tipped applicator to measure depth and, if needed, a gloved finger to examine the wound edges. e <i>Condition of wound bed:</i> Describe the type and percentage of tissue in the wound bed. f <i>Volume of exudate:</i> Describe the amount, characteristics, odor, and color. g <i>Condition of periwound skin:</i> Examine the skin for breaks, dryness, and the presence of a rash, swelling, redness, or warmth. Modify assessment based on patient's skin color. h <i>Wound edges:</i> Gives information regarding epithelialization, chronicity, and etiology. 7 Prepare the following necessary equipment and supplies:	Wound depth determines amount of tissue loss. The approximate percentage of each type of tissue in the wound provides critical information on the progress of wound healing and the choice of dressing. A wound with a high percentage of black tissue requires debridement, yellow tissue or slough tissue may indicate the presence of an infection or colonization, and granulation tissue indicates that a wound is moving toward healing. Amount and type of exudate may indicate type and frequency of dressing changes (Bates-Jensen, 2016). Impaired skin condition at the edge of an ulcer indicates progressive tissue damage. Maceration on periwound skin shows a need to alter the choice of wound dressing.

Continued

STEP

RATIONALE

- a Normal saline or other wound-cleansing agent in sterile solution container.
- b Prescribed topical agent:
 - (1) Enzyme debriding agents. (Follow specific manufacturer’s directions for frequency of application.)
 - or
 - (2) Topical antibiotics.
- c Select an appropriate dressing based on pressure injury characteristics, principles of wound management, and patient care setting. Dressing options include:
 - (1) Gauze.
Apply as a moist dressing, as a dry cover dressing when using enzymes or topical antibiotics, or as a means to deliver solution to a wound.
 - (2) Transparent film dressing.
Apply over superficial ulcers with minimal or no exudate and skin subjected to friction.

- Cleans ulcer surface before applying topical agents and a new dressing.
- Enzymes debride dead tissue to clean ulcer surface. Enzymes are not applied to healthy tissue.
- Topical antibiotics are used to decrease bioburden of wound and should be considered for use if no healing is noted after 2 to 4 weeks of optimal care (WOCN, 2016).
- The dressing should maintain a moist environment for the wound while keeping the surrounding skin dry (Rolstad, Bryant, and Nix, 2016).
- Gauze delivers moisture to a wound and is absorptive.
- Maintains a moist environment and offers intact skin protection.

STEP	RATIONALE
(3) Hydrocolloid dressing.	Maintains moist environment to facilitate wound healing while protecting the wound base.
(4) Hydrogel. Available in a sheet or in tube.	Maintains moist environment to facilitate wound healing.
(5) Calcium alginate.	Highly absorbent of wound exudate in heavily draining wounds.
(6) Foam dressing.	Protective and prevents wound dehydration; also absorbs moderate to large amounts of drainage.
(7) Silver-impregnated dressing/gel.	Controls bacterial burden in wound.
(8) Wound filler.	Fills shallow wounds, hydrate, and absorb.
d Obtain hypoallergenic tape or adhesive dressing sheet.	Used to secure nonadherent dressing. Prevents skin irritation and tearing.
8 Assemble needed supplies at bedside. Close room door or bedside curtains. Perform hand hygiene, and apply clean gloves. Open sterile packages and topical solution containers. Wear goggles, mask, and moisture-proof cover gown if potential for contamination from spray exists when cleansing the wound.	Maintains patient privacy. Reduces transmission of microorganisms.
9 Remove bed linen, and arrange patient's gown to expose ulcer and surrounding skin. Keep remaining body parts draped.	Prevents unnecessary exposure of body parts.

Continued

STEP

RATIONALE

- 10 Remove old dressing and discard in appropriate receptacle.
- 11 Perform hand hygiene, and change gloves.
- 12 Clean wound thoroughly with normal saline or prescribed wound-cleansing agent from least contaminated to most contaminated area.
- 13 Perform hand hygiene and apply clean or sterile gloves.
- 14 Apply topical agents to wound using cotton-tipped applicators or gauze as ordered:
 - a **Enzymes**
 - (1) Apply a small amount of enzyme debridement ointment directly to necrotic areas in pressure injury. Do not apply enzyme to surrounding skin.

With each dressing change, note progress of wound healing.

Maintains aseptic technique during cleansing, measuring, and application of dressings. Refer to institutional policy regarding use of clean or sterile gloves.

Cleansing wound removes wound exudates and/or dressing residue and reduces surface bacteria.

Maintains aseptic technique during cleaning, measuring, and applying dressings. Refer to agency policy regarding use of clean or sterile gloves.

Follow manufacturer’s directions for method and frequency of application. Be aware of which solutions inactivate enzymes, and avoid their use in wound cleansing.

Thin layer absorbs and acts more effectively than thick layer. Excess medication irritates surrounding skin (Rolstad et al., 2016). Proper distribution of ointment ensures effective action.

STEP

RATIONALE

(2) Position moist gauze dressing directly over ulcer, and tape in place. Follow specific manufacturer's recommendation for type of dressing material to use to cover a pressure injury when using enzymes. b Antibacterials Examples include bacitracin, metronidazole, and silver sulfadiazine.	Protects wound and prevents removal of ointment during turning or repositioning. Reduce bacterial growth.
15 Apply prescribed wound dressing: a Hydrogel (1) Cover surface of ulcer with a thick layer of amorphous hydrogel, or cut a sheet to fit wound base. (2) Apply secondary dressing such as dry gauze; tape in place. (3) If using impregnated gauze, pack loosely into wound; cover with secondary gauze dressing and tape.	Hydrogel dressings are designed to hydrate and donate moisture to wound (Rolstad et al., 2016). Provides a moist environment to facilitate wound healing. Holds hydrogel against wound surface because amorphous hydrogel (in tube or sheet form) does not adhere to the wound base and requires a secondary dressing to hold it in place. A loosely packed dressing delivers the gel to the wound base and allows any wound debris to be trapped in the gauze.

Continued

STEP	RATIONALE
b Calcium alginate (1) Lightly pack wound with alginate using sterile cotton-tipped applicator or gloved finger. (2) Apply a secondary dressing, and tape in place. c Transparent film dressing; hydrocolloid; and foam dressings (see Skills 19 & 20) 16 Reposition patient comfortably off pressure injury. 17 Observe skin surrounding ulcer for inflammation, edema, and tenderness. 18 Inspect dressings and exposed ulcers, observing for drainage, foul odor, and tissue necrosis. Monitor patient for signs and symptoms of infection: fever and elevated white blood cell (WBC) count. 19 Compare subsequent ulcer measurements, using one of the scales designed to measure wound healing, such as the Pressure Ulcer Scale for Healing (PUSH) tool or the Bates-Jensen Wound Assessment tool (BWAT). 20 Complete postprocedure protocol.	Alginate dressings absorb serous fluid or exudate, forming a nonadhesive hydrophilic gel, which conforms to shape of wound (Rolstad et al., 2016). Use in heavily draining wounds. The dressing swells and increases in size; tight packing can compromise blood flow to the tissues. Holds alginate against wound surface. Prevents pressure to ulcer. Determines progress of wound healing. Ulcers can become infected. Provides a standard method of data collection that demonstrates wound progress or deterioration.

Recording and Reporting

- Record type of wound tissue present in injury, injury measurements, periwound skin condition, character of drainage or exudate, type of topical agent used, dressing applied, and patient's response on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding through teach-back for reasons for frequent observation and measuring of wound.
- Report any deterioration in injury appearance to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin surrounding ulcer becomes macerated.	• Reduce exposure of surrounding skin to topical agents and moisture. • Select a dressing that has increased moisture-absorbing capacity.
2 Ulcer becomes deeper with increased drainage and/or development of necrotic tissue.	• Review current wound care management. • Consult with multidisciplinary team regarding changes in wound care regimen. • Obtain wound cultures.
3 Pressure injury extends beyond original margins.	• Monitor for systemic signs and symptoms of poor wound healing, such as abnormal laboratory results (WBC count, hemoglobin/hematocrit levels, serum albumin and serum prealbumin levels, amount of total proteins), weight loss, and fluid imbalances. • Assess and revise current turning schedule. • Consider further pressure-redistribution devices.

Pulse Oximetry

Pulse oximetry is the noninvasive measurement of arterial blood oxygen saturation, the percent to which hemoglobin is filled with oxygen. A pulse oximeter is a probe with a light-emitting diode (LED) connected by cable to an oximeter. The more hemoglobin is saturated by oxygen, the higher the oxygen saturation. Normally oxygen saturation (SpO₂) is greater than 95%. The measurement of oxygen saturation is simple and painless. It has few of the risks associated with more invasive measurements of oxygen saturation such as arterial blood gas sampling. A vascular, pulsatile area is needed to detect the change in the transmitted light when making measurements with a digit or earlobe probe.

Delegation Considerations

The skill of SpO₂ measurement can be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP by doing the following:

- Communicating specific factors related to the patient that can falsely lower SpO₂
- Informing NAP about appropriate sensor site and probe
- Notifying NAP regarding frequency of SpO₂ measurements for a specific patient
- Instructing to notify nurse immediately of any reading lower than SpO₂ of 95% or value for specific patient
- Instructing to refrain from using pulse oximetry to obtain heart rate because oximeter will not detect an irregular pulse

Equipment

- Oximeter
- Oximeter probe appropriate for patient and recommended by oximeter manufacturer
- Acetone or nail polish remover if needed
- Pen and vital sign flow sheet or electronic health record (EHR)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

STEP

- 2 Assess for signs and symptoms of alterations in oxygen saturation (e.g., altered respiratory rate, depth, or rhythm; adventitious breath sounds; cyanotic nails, lips, mucous membranes, or skin; restlessness; difficulty breathing).
- 3 Assess for factors that influence measurement of SpO₂ (e.g., oxygen therapy, respiratory therapy such as postural drainage and percussion, hemoglobin level, hypotension, temperature, nail polish [Chan et al., 2013], and medications such as bronchodilators).
- 4 Determine most appropriate patient-specific site (e.g., finger, earlobe, bridge of nose, forehead) for sensor probe placement by measuring capillary refill time. If capillary refill time is less than 2 seconds, select alternative site.
 - a Site must have adequate local circulation and be free of moisture.

RATIONALE

Physical signs and symptoms indicate abnormal oxygen saturation.

Allows nurse to assess oxygen saturation variations accurately. Peripheral vasoconstriction related to hypothermia can interfere with SpO₂ determination.

Changes in SpO₂ level are reflected in the circulation of finger capillary beds within 30 seconds and in the capillary beds of earlobes within 5 to 10 seconds.

Finger and earlobe sensors require pulsating vascular bed to identify hemoglobin molecules that absorb emitted light. Forehead sensor detects saturation in low perfusion conditions.

Moisture impedes ability of sensor to detect SpO₂ levels.

Continued

STEP	RATIONALE
b A finger free of nail polish or acrylic is preferred (Chan et al., 2013). c If patient has tremors or is likely to move, use earlobe or forehead. d If patient’s finger is too large for the clip-on probe, as may be the case with obesity or edema, the clip-on probe may not fit properly; obtain a disposable (tape-on) probe. 5 Bring equipment to the bedside and perform hand hygiene. 6 Attach sensor to monitoring site. If using finger, remove fingernail polish from digit with acetone or polish remover. Instruct patient that clip-on probe will feel like a clothespin on the finger but will not hurt.	Research on the influence of nail polish is contradictory. Brown and blue nail polish can falsely lower SpO₂ values, but findings are not clinically significant. Motion artifact is the most common cause of inaccurate readings (Chan et al., 2013). Select sensor site based on peripheral circulation and extremity temperature. Peripheral vasoconstriction alters SpO₂ reading. Pressure of sensor’s spring tension on a finger or earlobe is sometimes uncomfortable.

SAFETY ALERT Do not attach probe to finger, ear, or bridge of nose if area is edematous or skin integrity is compromised. Do not use earlobe and bridge of nose sensors for infants and toddlers because of skin fragility. Do not attach sensors to fingers that are hypothermic. Select ear or bridge of nose if adult patient has a history of peripheral vascular disease. Do not use disposable adhesive sensors if patient has a latex allergy. Do not place sensors on same extremity as electronic blood pressure cuff because blood flow to finger will be temporarily interrupted when cuff inflates and cause inaccurate reading that can trigger alarms (Skirton et al., 2011).

STEP

- 7 Once sensor is in place, turn on oximeter by activating power. Observe pulse waveform/intensity display and audible beep. Correlate oximeter pulse rate with patient's radial pulse rate.
- 8 Leave sensor in place 10 to 30 seconds or until oximeter readout reaches constant value and pulse display reaches full strength during each cardiac cycle. Inform patient that oximeter alarm will sound if sensor falls off or patient moves it. Read SpO₂ value on digital display.
- 9 If you plan to monitor oxygen saturation continuously, verify SpO₂ alarm limits preset by the manufacturer at a low of 85% and a high of 100%. Determine limits for SpO₂ value and pulse rate as indicated by patient's condition. Verify that alarms are activated. Assess skin integrity under sensor probe every 2 hours; relocate sensor at least every 4 hours and more frequently if skin integrity is altered or tissue perfusion compromised.
- 10 If you plan on intermittent or spot-checking of SpO₂ values, remove probe, and turn oximeter power off. Cleanse sensor and store sensor in appropriate location.

RATIONALE

Pulse waveform/intensity display enables detection of valid pulse or presence of interfering signal. Pitch of audible beep is proportional to SpO₂ value. Double-checking pulse rate ensures oximeter accuracy. Reading usually takes 10 to 30 seconds, depending on site selected.

Alarms must be set at appropriate limits and volumes to avoid frightening patients and visitors. Spring tension of sensor or sensitivity to disposable sensor adhesive causes skin irritation and leads to disruption of skin integrity.

Batteries will die if oximeter is left on. Sensors are expensive and vulnerable to damage.

Continued

STEP	RATIONALE
11 Discuss findings with patient. Perform hand hygiene.	Allows nurse to assess for change in patient's condition and presence of respiratory alteration.
12 Compare SpO ₂ reading with patient's previous baseline and acceptable SpO ₂ values.	
13 Complete postprocedure protocol.	

Recording and Reporting

- Record SpO₂ value on vital sign flow sheet, EHR, or nurses' notes; indicate type and amount of oxygen therapy used by patient during assessment.
- Record any signs and symptoms of alterations in oxygen saturation in narrative form in nurses' notes and EHR.
- Report abnormal findings to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 SpO ₂ is less than 90%.	- Verify that oximeter probe is intact and that outside light is not influencing probe. Reposition probe if needed. - Assess for signs and symptoms of decreased oxygenation, including anxiety, restlessness, tachycardia, and cyanosis. - Verify that supplemental oxygen is delivered as ordered and is functioning properly. - Minimize factors that decrease SpO₂ value, such as lung secretions, increased activity, and hyperthermia.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Pulse waveform/intensity display is dampened or irregular.	• Implement measures to reduce energy consumption. • Assist patient to a position that maximizes ventilatory effort; for example, place an obese patient in a high-Fowler position. • Locate different peripheral vascular bed, and reposition pulse oximeter probe. • Use another sensor if available. • Protect sensor from room light by covering sensor site with opaque covering or washcloth.

Rectal Suppository Insertion

Rectal medications exert either local effects on gastrointestinal (GI) mucosa (e.g., promoting defecation) or systemic effects (e.g., relieving nausea or providing analgesia). The rectal route is not as reliable as the oral and parenteral routes in terms of drug absorption and distribution. However, the medications are relatively safe because they rarely cause local irritation or side effects. Rectal medications are contraindicated in patients with recent surgery on the rectum, bowel, or prostate gland; rectal bleeding or prolapse; and very low platelet counts ([Burchum and Rosenthal, 2016](#)).

Rectal suppositories are thinner and more bullet-shaped than vaginal suppositories. The rounded end prevents anal trauma during insertion. When you administer a rectal suppository, placing it past the internal anal sphincter and against the rectal mucosa is important. Improper placement can result in expulsion of the suppository before the medication dissolves and is absorbed into the mucosa. If a patient prefers to self-administer a suppository, give specific instructions so the medication is deposited correctly. Do not cut the suppository into sections to divide the dosage; the active drug may not be distributed evenly within the suppository, and the result may be an inaccurate dose ([Burchum and Rosenthal, 2016](#)).

Delegation Considerations

The skill of rectal medication administration cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Reporting expected fecal discharge or bowel movement to the nurse
- Potential side effects of medications and to report their occurrence to the nurse
- Informing the nurse of any rectal discharge, pain, or bleeding

Equipment

- Rectal suppository
- Water-soluble lubricating jelly
- Clean gloves
- Tissue
- Drape
- Medication administration record (MAR; electronic or printed)

Implementation

STEP

RATIONALE

1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR with health care provider's medication order. Check patient's name, drug name and dosage, route, and time for administration. Clarify incomplete or unclear orders with health care provider before administration. 3 Review patient's medical history for history of rectal surgery or bleeding, cardiac problems, history of allergies, and medication history. 4 Assess patient's ability to hold suppository and to position self to insert medication. 5 Review patient's knowledge of purpose of drug therapy and interest in self-administering suppository. 6 Prepare suppository for administration. Check label of medication against MAR two times. Check expiration date on container. 7 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives correct medications (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013). Certain conditions and medications contraindicate use of suppository. Mobility restriction indicates need for nurse to help with drug administration. Indicates need for health teaching. Level of motivation influences teaching approach. <i>These are the first and second checks for accuracy.</i> Process ensures that right patient receives right medication. Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2016). Some agencies are now using a bar code system to help with patient identification.

Continued

STEP	RATIONALE
8 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.	<i>This is the third check for accuracy</i> and ensures that patient receives correct medication. Confirms patient's allergy history.
9 Perform hand hygiene, arrange supplies at bedside, and apply clean gloves. Close room curtain or door.	Reduces transfer of microorganisms. Maintains privacy and minimizes embarrassment.
10 Help patient assume a left side-lying Sims' position with upper leg flexed upward.	Position exposes anus and relaxes external anal sphincter. Left side-lying Sims' position lessens likelihood of the suppository or feces being expelled.
11 If patient has mobility impairment, help into lateral position. Obtain assistance to turn patient, and use pillows under patient's upper arm and leg.	
12 Keep patient draped with only anal area exposed.	Maintains privacy and facilitates relaxation.
13 Examine condition of anus externally. <i>Option:</i> Palpate rectal walls as needed (e.g., if impaction is suspected). Dispose of gloves by turning them inside out and placing them in proper receptacle if they become soiled.	Determines presence of active rectal bleeding. Palpation determines whether rectum is filled with feces, which interferes with suppository placement. Reduces transmission of infection.
14 Apply new pair of clean gloves (if previous gloves were soiled and discarded).	Minimizes contact with fecal material to reduce transmission of microorganisms.

STEP

- 15 Remove suppository from foil wrapper, and lubricate rounded end with water-soluble lubricant. Lubricate gloved index finger of dominant hand. If patient has hemorrhoids, use liberal amount of lubricant, and touch area gently.
- 16 Ask patient to take slow, deep breaths through mouth and to relax anal sphincter.
- 17 Retract patient's buttocks with nondominant hand. With gloved index finger of dominant hand, insert suppository gently through anus, past internal sphincter, and against rectal wall, 10 cm (4 inches) in adults (Fig. 63.2) or 5 cm (2 inches) in infants and children. You should feel rectal sphincter close around your finger.

RATIONALE

Lubrication reduces friction as suppository enters rectal canal (Fig. 63.1).

Forcing suppository through constricted sphincter causes pain.

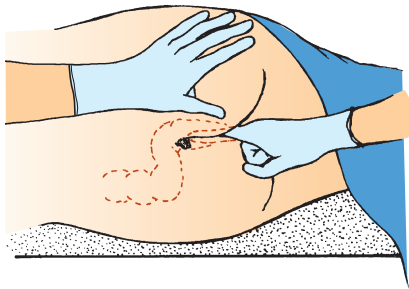
Suppository needs to be against rectal mucosa for eventual absorption and therapeutic action.

Continued



Fig. 63.1 Lubricate tip of suppository.

Fig. 63.2 Insert rectal suppository past sphincter and against rectal wall.



STEP

RATIONALE

SAFETY ALERT Do not insert suppository into a mass of fecal material; this reduces effectiveness of medication.

- 18 *Option:* A suppository may be given through a colostomy (not ileostomy) if ordered. Patient should lie supine. Use small amount of water-soluble lubricant for insertion.
- 19 Withdraw finger, and wipe patient's anal area.
- 20 Ask patient to remain flat or on side for 5 minutes.
- 21 Discard gloves by turning them inside out, and dispose of them and used supplies in appropriate receptacle. Perform hand hygiene.
- 22 If suppository contains laxative or fecal softener, place call light within reach so patient can obtain assistance to reach bedpan or toilet.
- 23 If the suppository was given for constipation, remind the patient *not* to flush the commode after the bowel movement.

Provides comfort.

Prevents expulsion of suppository.

Reduces transfer of microorganisms.

Ability to call for assistance provides patient with sense of control over elimination.

Allows staff to evaluate results of the suppository.

STEP	RATIONALE
24 Perform postprocedure protocol.	
25 Return within 5 minutes to determine if suppository was expelled.	Determines if drug is properly distributed. Reinsertion may be necessary.
26 Evaluate patient for relief of symptoms for which medication was prescribed.	Determines medication's effectiveness.

Recording and Reporting

- Record the drug, dosage, route, and actual time and date of administration on MAR immediately after administration, not before. Include initials or signature.
- Record patient response to medication, patient teaching, and validation of patient understanding and self-administration of suppository on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's symptoms are unrelieved.	• Explore alternative therapy.
2 Patient experiences decreased heart rate during rectal suppository insertion.	• Unintended vagal stimulation may occur, resulting in bradycardia in some patients. • Monitor heart rate of patient. Rectal route may not be suitable for certain cardiac conditions.
3 Patient reports rectal pain during insertion.	• Suppository may need more lubrication. • Rectal route may not be suitable; assess and notify prescriber.

Respiration Assessment

Ventilation is evaluated by observing the rate, depth, and rhythm of respiratory movements. Accurate assessment of respiration depends on recognizing normal thoracic and abdominal movements. Normal breathing is both active and passive. On inspiration, the diaphragm contracts, and the abdominal organs move down to increase the size of the chest cavity. At the same time the ribs and sternum lift outward to promote lung expansion. On expiration, the diaphragm relaxes upward, and the ribs and sternum return to their relaxed position. Expiration is an active process only during exercise, with voluntary hyperventilation, and in the presence of certain disease states.

Delegation Considerations

The skill of counting respirations can be delegated to nursing assistive personnel (NAP) unless the patient is considered unstable (i.e., complains of dyspnea). The nurse instructs the NAP by doing the following:

- Communicating the frequency of measurement and factors related to patient history or risk for increased or decreased respiratory rate or irregular respirations
- Reviewing any unusual respiratory values or significant changes to report to the nurse

Equipment

- Wristwatch with second hand or digital display
- Pen and vital sign flow sheet or electronic health record (EHR)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Assess for signs and symptoms of respiratory alterations such as the following: - a Bluish or cyanotic appearance of nail beds, lips, mucous membranes, and skin	Physical signs and symptoms indicate alterations in respiratory status related to ventilation.

STEP	RATIONALE
- b Restlessness, irritability, confusion, reduced level of consciousness - c Pain during inspiration - d Labored or difficult breathing - e Orthopnea - f Use of accessory muscles - g Adventitious breath sounds - h Inability to breathe spontaneously - i Thick, frothy, blood-tinged, or copious sputum production 3 Assess for factors that influence character of respirations: - a Exercise - b Anxiety - c Acute pain - d Smoking	Allows you to anticipate factors that influence respirations. Respirations increase in rate and depth to meet the need for additional oxygen and rid the body of carbon dioxide. Anxiety causes increase in respiration rate and depth because of sympathetic nervous system stimulation. Pain alters rate and rhythm of respirations; breathing becomes shallow. Patient inhibits or splints chest wall movement when pain is in area of chest or abdomen. Chronic smoking changes pulmonary airways, resulting in an increased respiratory rate at rest when not smoking.

Continued

STEP	RATIONALE
e Medications	Narcotic analgesics, general anesthetics, and sedative hypnotics depress rate and depth; amphetamines and cocaine increase rate and depth; bronchodilators cause dilation of airways, which ultimately slows respiratory rate.
f Body position	Standing or sitting erect promotes full ventilator movement and lung expansion; stooped or slumped posture impairs ventilator movement; lying flat prevents full chest expansion.
g Neurologic injury	Damage to the brainstem impairs the respiratory center and inhibits rate and rhythm.
h Hemoglobin function	Decreased hemoglobin levels lower amount of oxygen carried in blood, which results in increased respiratory rate to increase oxygen delivery.
4 Assess pertinent laboratory values:	
a <i>Arterial blood gases (ABGs):</i> normal ranges are (values vary slightly among agencies): (1) pH, 7.35 to 7.45 (2) PaCO ₂ , 35 to 45 mm Hg (3) HCO ₃ ⁻ , 22 to 28 mEq/L (4) PaO ₂ , 80 to 100 mm Hg (5) SaO ₂ , 95% to 100%	ABG values measure arterial blood pH, partial pressures of oxygen and carbon dioxide, and arterial oxygen saturation, which reflect patient's oxygenation status.

Continued

STEP	RATIONALE
8 Observe complete respiratory cycle (one inspiration and one expiration).	Rate is accurately determined only after nurse has viewed complete respiratory cycle.
9 If rhythm is regular, count number of respirations in 30 seconds and multiply by 2. If rhythm is irregular, less than 12, or greater than 20, count for 1 full minute.	Respiratory rate is equivalent to number of respirations per minute. Suspected irregularities require assessment for at least 1 minute.
10 Note depth of respirations by observing degree of chest wall movement while counting rate. In addition, assess depth by palpating chest wall excursion or auscultating the posterior thorax after you have counted rate. Describe depth as shallow, normal, or deep.	Character of ventilatory movement reveals specific disease states restricting the volume of air from moving into and out of the lungs.
11 Note rhythm of ventilatory cycle. Normal breathing is regular and uninterrupted. Do not confuse sighing with abnormal rhythm.	Character of ventilations shows specific types of alterations. Periodically, people unconsciously take single deep breaths or sighs to expand small airways prone to collapse.
12 If assessing respirations for the first time, establish rate, rhythm, and depth as baseline if within acceptable range.	Used to compare future respiratory assessment.
13 Compare respirations with patient's previous baseline and usual rate, rhythm, and depth.	Allows nurse to assess for changes in patient's condition and for presence of respiratory alterations.
14 Complete postprocedure protocol.	

Recording and Reporting

- Record respiratory rate, depth, and rhythm on vital sign flow sheet or in nurses' notes in electronic health record (EHR) or chart.

- Document measurement of respiratory rate after administration of specific therapies in nurses' notes in EHR or chart.
- Record type and amount of oxygen therapy, if used, in nurses' notes.
- Report abnormal findings to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's respiratory rate is less than 12 breaths/min (bradypnea) or greater than 20 breaths/min (tachypnea). Breathing pattern is sometimes irregular. Depth of respirations increased or decreased. Patient complains of feeling short of breath.	• Assess for related factors, including obstructed airway, abnormal breath sounds, productive cough, restlessness, anxiety, and confusion. • Assist patient to supported sitting position (semi- or high-Fowler) unless contraindicated. • Provide oxygen as ordered. • Assess for environmental factors that influence patient's respiratory rate such as secondhand smoke, poor ventilation, or gas fumes. • Notify health care provider or nurse in charge if alteration continues.
2 Patient demonstrates Kussmaul, Cheyne-Stokes, or Biot's respirations.	• Notify health care provider for additional evaluation and possible medical intervention.

Restraint Application

In hospital settings, restraints are most commonly used to prevent the disruption of therapy. Nurses often pursue orders for restraints when they are concerned that disruption of therapy can significantly injure patients. [The Centers for Medicare and Medicaid Services \(CMS, 2015b\)](#) released revisions to the interpretive guidelines detailing the safe use of restraints in hospitals and defining patients' rights and choices regarding restraints. It requires that a restraint be used only under the following circumstances: (1) to ensure the immediate physical safety of the patient, a staff member, or others; (2) when less restrictive interventions have been ineffective; (3) in accordance with a written modification to the patient's plan of care; (4) when it is the least restrictive intervention that will be effective to protect a patient, staff member, or others from harm; (5) in accordance with safe and appropriate restraint techniques as determined by hospital policies; and (6) when it is discontinued at the earliest possible time.

The use of restraints is associated with serious complications, including pressure injuries, hypostatic pneumonia, constipation, incontinence, and death. Most patient deaths related to restraints in the past have resulted from strangulation from a vest or jacket restraint. Numerous agencies no longer use vest restraints. For these reasons this text does not describe their use.

Delegation Considerations

The skills of assessing a patient's behavior and level of orientation, the need for restraints, the appropriate restraint type, and the ongoing assessments required while a restraint is in place cannot be delegated to nursing assistive personnel (NAP). Applying and routinely checking a restraint can be delegated to NAP. [The Joint Commission \(2014\)](#) requires first aid training for anyone who monitors patients in restraints. The nurse directs the NAP by doing the following:

- Reviewing correct placement of the restraint and how to routinely check the patient's circulation, skin condition, and breathing
- Reviewing when and how to change a patient's position and provide range-of-motion (ROM) exercises, toileting, and skin care
- Instructing NAP to notify the nurse immediately if there is a change in level of patient agitation, skin integrity, circulation of extremities, or patient's breathing

Equipment

- Proper restraint (e.g., belt, wrist, mitten)
- Padding (if needed)

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Assess patient's behavior (e.g., confusion, disorientation, agitation, restlessness, combativeness, repeated removal of tubing or other therapeutic devices, and inability to follow directions).
- 3 Follow agency policies regarding restraints. Check health care provider's order for purpose, type, location, and time or duration of restraint. Determine if signed consent for use of restraint is necessary.

RATIONALE

If patient's behavior continues despite treatment or restraint alternatives, use of restraint is indicated.

A licensed independent health care provider responsible for the care of the patient evaluates the patient in person within 1 hour of the initiation of restraint used for the management of violent or self-destructive behavior that jeopardizes the physical safety of the patient, staff, or others. A registered nurse or a physician assistant may conduct the in-person evaluation if he or she is trained in accordance with the requirements and consults with the health care provider after the evaluation as determined by hospital policy (TJC, 2015). Always use the least restrictive restraint possible (e.g., mitts, elbow extenders) (Agency for Healthcare Research and Quality [AHRQ], 2013b; CMS, 2015b).

Continued

STEP

- 4 Review manufacturer's instructions for correct restraint application and determine most appropriate size restraint.
- 5 Inspect areas where restraint is to be placed. Note if there is any nearby tubing or devices. Assess condition of skin, sensation, adequacy of circulation, and ROM.
- 6 Identify patient using two identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's medication administration record (MAR) or medical record.
- 7 Provide privacy. Explain to patient and family purpose of restraint. Be sure patient is comfortable and in correct anatomic position.
- 8 Pad skin and bony prominences (as necessary) that will be covered by restraint.
- 9 Apply proper size restraint: *Follow manufacturer's directions.*
 - a *Belt restraint:* Have patient in a sitting position. Apply belt over clothes, gown, or pajamas. Make sure to place restraint at waist, not the chest or abdomen.

RATIONALE

You need to be familiar with all devices used for patient care and protection. Incorrect application of restraint device can result in patient injury or death.

Provides baseline to monitor patient's response to restraint. Provides baseline data to monitor patient's skin integrity.

Ensures correct patient. Complies with The [Joint Commission requirements for patient safety](#) (TJC, 2016).

May promote cooperation. Positioning prevents contractures and neurovascular impairment.

Reduces friction and pressure from restraint to skin and underlying tissue.

Restrains center of gravity and prevents patient from rolling off stretcher, from sitting up while on stretcher, or from falling out of bed. Tight application or misplacement

STEP

Remove wrinkles or creases in clothing. Bring ties through slots in belt. Help patient lie down if in bed. Avoid applying the belt too tightly (Fig. 65.1). *Option:* Apply restraint net if intent is to limit patient turning. (Fig. 65.2)

- b *Extremity (ankle or wrist) restraint:* Commercially available limb restraints are composed of sheepskin with foam padding. Wrap limb restraint around wrist or ankle with soft part toward skin and secured snugly (not tightly) in place by Velcro straps. Insert two fingers under secured restraint (Fig. 65.3).

RATIONALE

can interfere with ventilation. This type of restraint may be contraindicated in patient who had abdominal surgery.

Restraint immobilizes one or all extremities to protect patient from fall or accidental removal of therapeutic device (e.g., intravenous [IV] tube, Foley catheter).

Tight application will interfere with circulation and cause neurovascular injury.

SAFETY ALERT Patient with extremity restraints is at risk for aspiration if placed in supine position. Place patient in lateral position rather than supine.

Continued



Fig. 65.1 Roll belt restraint tied to the bed frame.



Fig. 65.2 Restraint net.



Fig. 65.3 Securing an extremity restraint. (Provided courtesy Posey Co., Arcadia, CA.)



Fig. 65.4 Mitten restraint. (Provided courtesy Posey Co., Arcadia, CA.)

STEP	RATIONALE
c <i>Mitten restraint:</i> Thumbless mitten device restrains patient's hands. Place hand in mitten, being sure Velcro strap(s) is (are) around the wrist and not the forearm (Fig. 65.4). d <i>Elbow restraint (freedom splint):</i> Restraint consists of rigidly padded fabric that wraps around arm and is closed with Velcro. Upper end has a clamp that hooks to patient's gown sleeve. Insert patient's arm so elbow joint rests against padded area, keeping joint rigid.	Prevents patients from dislodging invasive equipment, removing dressings, or scratching yet allows greater movement than a wrist restraint. Commonly used with infants and children to prevent elbow flexion (e.g., when IV line is placed in antecubital fossa). May also be used for adults.

STEP

- 10 Attach restraint straps to portion of bed frame that moves when raising or lowering head of bed. Be sure that straps are secure. *Do not attach to side rails.* Restraints can be attached to frame of chair or wheelchair as long as ties are out of patient's reach.
- 11 Secure restraints on bed frame with quick-release buckle (Fig. 65.5). *Do not tie strap in a knot.* Be sure that buckle is out of patient reach.
- 12 Double check and insert two fingers under secured restraint.
- 13 Remove restraints at least every 2 hours (TJC, 2015) or according to agency policy, and assess patient each time. If patient is violent or noncompliant, remove one restraint at a time and/or have staff assist while removing restraints.
- 14 Secure call light or intercom system within reach.

RATIONALE

Patient will be injured if restraint is secured to side rail and side rail is lowered.

Allows for quick release in an emergency.

Checking for constriction prevents neurovascular injury.

Removal provides opportunity to change patient's position, offer nutrients, perform full ROM, toilet, and exercise patient.

Allows patient, family, or caregiver to obtain assistance quickly.

Continued



Fig. 65.5 The Posey quick-release clip. (Provided courtesy Posey Co., Arcadia, CA.)

STEP

RATIONALE

- 15 Leave bed or chair with wheels locked. Keep bed in lowest position.
- 16 Complete postprocedure protocol.

Locked wheels prevent bed or chair from moving if patient tries to get out. Placing bed in lowest position reduces chance of injury if patient falls out of bed.

Recording and Reporting

- Record nursing interventions and restraint alternatives tried on restraint flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Document evaluation of patient learning.
- Record purpose for restraint, type and location, time applied, time ending the restraint, and routine observations made every 15 minutes (e.g., skin color, pulses, sensation, vital signs, behavior) in the flow sheets or nurses' notes.
- Record patient's level of orientation and behavior after restraint application. Record times patient was evaluated, attempts to use alternatives, and patient's response when restraint was removed.

UNEXPECTED OUTCOMES

RELATED INTERVENTIONS

- 1 Patient experiences impaired skin integrity.

- Reassess need for continued use of restraint and determine if you can use alternative measures. If restraint is necessary to protect patient or others from injury, ensure that you applied restraint correctly and provide adequate padding.
- Check skin under restraint for abrasions, and remove restraints more frequently.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient has altered neurovascular status of an extremity (e.g., cyanosis, pallor, and coldness of skin) or complaints of tingling, pain, or numbness. 3 Patient exhibits increased confusion, disorientation, and agitation.	• Institute appropriate skin/wound care. • Change wet or soiled restraints to prevent skin breakdown. • Remove restraint immediately, and notify health care provider. • Evaluate cause for altered behavior, and attempt to eliminate cause. • Provide appropriate sensory stimulation, reorient as needed, attempt restraint alternatives, and involve family.

Restraint-Free Environment

A physical restraint is any manual method, physical or mechanical device (such as full set of side rails), material, or equipment that immobilizes or reduces the ability of a patient to move his or her arms, legs, body, or head freely ([The Joint Commission \[TJC\], 2015](#)). Chemical restraints are medications such as anxiolytics and sedatives used to manage a patient's behavior and are not a standard treatment or dosage for a patient's condition. A restraint does not include devices such as orthopedically prescribed devices, surgical dressings or bandages, protective helmets, or other methods that involve physically holding a patient to conduct routine physical examinations or tests, protecting the patient from falling out of bed, or permitting a patient to participate in activities without the risk of physical harm ([TJC, 2015](#)).

Patients at risk for falls or wandering present special safety challenges. Wandering is the meandering, aimless, or repetitive locomotion that exposes a patient to harm and is often in conflict with boundaries, limits, or obstacles (NANDA-I International [NANDA], 2014). It is a common problem in patients who are confused or disoriented (e.g., patients with dementia). Interrupting a wandering patient can increase his or her distress. Wandering is a persistent problem in long-term care settings. Common strategies to manage wandering include environmental adaptations, use of signaling tags, distraction, social interaction, regular exercise, and circular design of a patient care unit. More frequent observation of patients, involvement of family during visitation, and frequent reorientation are also helpful measures. Creating a restraint-free environment allows interventions to be placed that will reduce wandering and risk of patient falls. *A restraint-free environment is the first goal of care for all patients.*

Delegation Considerations

The skills of assessing patient behaviors and orientation to the environment and determining the type of restraint-free interventions to use cannot be delegated to nursing assistive personnel (NAP). However, actions for promoting a safe environment can be delegated to NAP. The nurse instructs the NAP about the following:

- Using specific diversional or activity measures for making the environment safe
- Applying appropriate alarm devices



Fig. 66.1 Wrap-around belt. (Courtesy Posey Co., Arcadia, CA.)

- Reporting patient behaviors and actions (e.g., confusion, getting out of bed unassisted, combativeness) to the nurse

Equipment

- Visual or auditory stimuli (e.g., calendar, clock, radio, photos, MP3 player, television)
- Diversional activities (e.g., puzzle, game, audio books, DVD)
- Wedge cushion
- Wrap-around belt ([Fig. 66.1](#))
- *Options:* Electronic bracelet or pressure pad alarm sensor; bed enclosure system

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE

Continued

STEP

- 2 Assess patient's behavior (e.g., orientation, ability to understand and follow directions, combative behaviors, restlessness, agitation), balance, gait, vision, hearing, bowel/bladder routine, level of pain, electrolyte and blood count values, and presence of orthostatic hypotension.
- 3 Review over-the-counter (OTC) and prescribed medications for interactions and untoward effects.
- 4 Orient patient and family to surroundings and explain all treatments and procedures.
- 5 Assign same staff to care for patient as often as possible. Encourage family and friends to stay with patient. In some agencies, volunteers are effective companions.
- 6 Place patient in a room that is easily accessible to caregivers, close to nurses' station.
- 7 Provide visual and auditory stimuli meaningful to patient (e.g., clock, calendar, radio/MP3 player [with patient's choice of music], television, and family pictures).
- 8 Anticipate patient's basic needs (e.g., toileting, relief of pain, relief of hunger) as quickly as possible; conduct hourly rounds (TJC, 2014).

RATIONALE

Accurate assessment identifies patients with safety risks and the physiologic causes for patient behaviors that prompt caregivers to use restraints. Ensures proper selection of nonrestraint interventions.

Medication interactions or side effects often contribute to falling or altered mental status.

Promotes patient understanding and cooperation.

Increases familiarity with individuals in patient's environment, decreasing anxiety and restlessness. Companions are often helpful, preventing patient from being alone.

Allows for frequent observation to reduce falls in high-risk patients.

Orients patient to day, time, and physical surroundings. You must individualize stimuli for this to be effective.

Provision of basic needs in a timely fashion decreases patient discomfort, anxiety, and restlessness, and incidence of falls.

STEP**RATIONALE**

9 Provide scheduled ambulation, chair activity, and toileting (e.g., ask patient every hour about toileting needs). Organize treatments so patient has uninterrupted periods throughout the day.	Regular opportunity to void avoids risk of patient trying to reach bathroom alone. Provides for sleep and rest periods. Constant activity overstimulates patients.
10 Position intravenous (IV) catheters, urinary catheters, and tubes/drains out of patient view. Use camouflage by wrapping IV site with bandage or stockinette. Place undergarments on patient with urinary catheter or cover abdominal feeding tubes/drains with loose abdominal binder.	Maintains medical treatment and reduces patient access to tubes/lines.
11 Use stress-reduction techniques, such as backrub, massage, and guided imagery.	Reduced stress allows patient energy to be channeled more appropriately.
12 Use diversional activities such as puzzles, games, music therapy, pet therapy, activity apron, or performance of purposeful activity (e.g., folding towels, drawing, coloring). Be sure that it is an activity in which patient has interest. Involve a family member in the activity.	Meaningful diversional activities provide distraction, help to reduce boredom, and provide tactile stimulation. Minimize occurrences of wandering.
13 Use pressure-sensitive bed or chair pad with alarms: - a Explain use of device to patient and family. - b When in the bed, position device so it is under the patient's mid-to-low back rather than under the buttocks.	Alarms alert staff to patient who is standing or rising without assistance. Alarm activates sooner if placed under back. By the time buttocks are off the sensor, patient may be almost out of bed.

Continued

STEP	RATIONALE
c Test alarm by applying and releasing pressure.	Ensures that alarm is audible through call-light system.
14 Place electronic monitoring bracelet on wrist of patient with dementia.	Tag in bracelet contains radio-frequency circuit that communicates with detection sensor usually installed at an exit door or elevator. Distance between tag and monitor is constantly measured with an alarm, which sounds when predetermined distance is exceeded.
15 Place patient in bed enclosure system.	Restraint alternative that allows patient freedom of movement within a protected environment.
16 Determine need for continuation of invasive treatments and whether you can substitute less invasive treatment.	Eliminates cause and reason for restraint.
17 Complete postprocedure protocol.	

Recording and Reporting

- Record restraint alternatives used, patient behaviors that relate to cognitive status, and interventions to mediate these behaviors in nurses’ notes in electronic health record (EHR) or chart.
- Document evaluation of patient learning.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient displays behaviors that increase risk for injury to self or others.	• Review episodes for a pattern (e.g., activity, time of day); can indicate alternatives that would eliminate behavior. • Discuss with all caregivers alternative interventions.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient sustains an injury or is out of control, placing others at risk for injury.	• Notify health care provider, and complete incident or occurrence report according to agency policy. • Identify alternative measures for safety or behavioral control. • Apply physical restraint only after all other interventions are unsuccessful.
3 Patient wanders away from health care agency.	• Be prepared to follow agency policy, which should include: whom to notify; who will search for patient; which areas will be searched and their priority; who will notify authorities, if necessary; who will notify family members; who will coordinate search efforts.

Seizure Precautions

Seizures are sudden, abnormal, electrical discharges in the brain causing alterations in behavior, sensation, or consciousness. Seizures that appear to begin everywhere in the brain at once are classified as generalized seizures, whereas seizures beginning in one location of the brain are classified as partial seizures ([Johns Hopkins Medicine, 2015](#)). There are three phases to a seizure:

- **Aura**—the start of a partial seizure.
- **Ictus**—meaning *attack*; ictus is another word for the physical seizure involving a series of muscle contractions, called *tonic* and *clonic contractions*.
- **Postictal**—meaning *after the attack*; postictal refers to the aftereffects of a seizure (e.g., arm numbness, altered consciousness, partial paralysis).

Status epilepticus involves 5 minutes or more of either continuous clinical or electrographic (shown on an electroencephalogram [EEG]) seizure activity or recurrent seizure activity without recovery between seizures (Brophy et al., 2012).

Traditionally patients who have a seizure are immediately placed in the side-lying position to prevent aspiration of oral secretions. This is still a standard of practice. However, the patient should be rolled gently into this position and only if possible without injuring any body part (Smith et al., 2015). Refer to your agency policy for positioning guidelines.

Delegation Considerations

The skill of assessing a patient's risk for seizures cannot be delegated to nursing assistive personnel (NAP). However, the skills for making a patient's environment safe and the ongoing care of patients on seizure precautions can be delegated. The nurse instructs NAP about the following:

- The patient's prior seizure history and factors that may trigger a seizure
- Taking immediate action in the event of a seizure by protecting the patient from falling or injury, not trying to restrain the patient, and not placing anything into the mouth
- Informing the nurse immediately when seizure activity develops
- Observing the patient's seizure pattern

Equipment

- Seizure pads for side rails and headboard
- Suction machine and oral Yankauer suction catheter

- Oral airway
- Oxygen via nasal cannula or face mask
- Equipment for vital signs, pulse oximetry, and blood glucose testing
- Equipment for intravenous (IV) insertion
- Emergency antiepileptic medications:
- For emergent condition, IV lorazepam, midazolam for intramuscular (IM) administration (also nasal or buccal), rectal diazepam. For urgent treatment, oral valproate sodium, phenytoin, IV midazolam (Brophy et al., 2012; Smith et al., 2015)
- Clean gloves
- Equipment for vital signs, pulse oximetry, and blood glucose monitoring

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Assess patient's seizure history (e.g., new diagnosis, frequent seizures, seizure within last year) and knowledge of precipitating factors. Ask patient to describe frequency of past seizures, presence and type of aura (e.g., metallic taste, perception of breeze blowing on face, or noxious odor), and body parts affected if known. Use family as resource if necessary.
- 3 Assess for medical and surgical conditions, including history of head trauma, electrolyte disturbances (e.g., hypoglycemia, hyperkalemia), heart disease, excess fatigue, and alcohol or caffeine consumption. Also assess for any bleeding tendencies.

RATIONALE

Knowledge about seizure history enables nurse to anticipate onset of seizure activity and take appropriate safety measures.

Common conditions that lead to seizures or worsen existing seizure condition. Bleeding conditions could predispose patient to injury during seizure.

Continued

STEP

- 4 Assess medication history (e.g., antidepressants and antipsychotics). Assess for patient's adherence to anticonvulsants and for therapeutic drug levels if test results are available.
- 5 Inspect patient's environment for potential safety hazards (e.g., extra furniture) if seizure occurs. Keep bed in low position, side rails up at head of bed.
- 6 For patients with a history of seizures, keep bed in lowest position with side rails up (see agency policy). Pad rails if patient is at risk for head injury. Have oral suction and oxygen equipment ready for use.
- 7 Patient with history of seizures should be in room close to nurses' station or room with video monitor.
- 8 Seizure response
 - a Position patient safely.
 - (1) If patient is standing or sitting, guide him or her to floor and protect head by cradling in your lap or place pillow under head. Position patient to keep head tilted to maximize breathing (if able). Try to position patient on side *but do not force*. Do not lift patient from floor to bed during seizure.

RATIONALE

Certain medications lower seizure threshold. Seizure medications must be taken as prescribed and not stopped suddenly. Stopping or changing dose may precipitate seizure activity.

Protects patient from injury sustained by striking head or body on furniture or equipment.

Modifications to environment minimize risk of injury from seizure activity or related fall. Use padded side rails only when patient is at risk for head injury (Lewis et al., 2014)

Improves likelihood of quick response with emergency equipment.

Position protects patient from aspiration and traumatic injury, especially head injury.

STEP

RATIONALE

- (2) If patient is in bed, turn him or her onto side (*do not force*); raise side rails.
- b Note time seizure began and call for help immediately to have staff member bring emergency cart to bedside and clear surrounding area of furniture. Provide airway protection and gas exchange by positioning head. Have health care provider notified immediately.
- c Keep patient in side-lying position (if possible), supporting head and keeping it flexed slightly forward.
- d If possible, provide privacy. Have staff control flow of visitors in area.
- e Do not restrain patient; if patient is flailing limbs, hold them loosely. Loosen restrictive clothing/gown.
- f *Never force any object, such as fingers, medicine, or tongue depressor, into patient's mouth when teeth are clenched.*

Timing and description of seizure may help in ultimate identification of type of seizure. Establishing and protecting airway when patient loses consciousness must occur in first 2 minutes (Brophy et al., 2012).

Position prevents tongue from blocking airway and promotes drainage of secretions, reducing risk of aspiration.

Embarrassment is common after a seizure, especially if others witnessed it.

Prevents musculoskeletal injury. Promotes free ventilatory movement of chest and abdomen.

Prevents injury to mouth and possible aspiration.

SAFETY ALERT Injury can result from forcible insertion of a hard object into the mouth. Soft objects break and become aspirated. Insert a bite block or oral airway in advance if you recognize the possibility of a generalized seizure.

Continued

STEP	RATIONALE
g Observe sequence and timing of seizure activity. Note type of seizure activity (tonic, clonic, staring, blinking); whether more than one type of seizure occurs; sequence of seizure progression; level of consciousness; character of breathing; presence of incontinence; presence of autonomic nervous system signs such as lip smacking, mastication, grimacing, or rolling of eyes. h As patient regains consciousness, assess vital signs and reorient and reassure him or her. Explain what happened and answer patient's questions. Stay with patient until fully awake. 9 Status epilepticus is a medical emergency. a Follow steps 8a to 8c to stabilize airway and call emergency team. b Assist health care provider with intubation (introduction of endotracheal tube or oral airway) if oxygen saturation is compromised or elevated intracranial pressure is suspected (NOTE: Apply clean gloves if timing allows). Physician on team will intubate patient when jaw is relaxed (between seizure activity).	Continued observation helps to document, diagnose, and treat seizure disorder. Informing patients of type of seizure activity experienced helps them to participate knowledgeably in their care. Some patients remain confused for a period of time after the seizure or become violent. Ensures rapid response and management of airway and breathing. Medical emergency requires rapid response. Airway establishes oxygenation (Brophy et al., 2012; Smith et al., 2015).

STEP

- c Access and administer oxygen; turn on suction equipment; keep airway patent with oral suctioning (if possible).
- d Have another nurse on team measuring blood pressure, heart rate, respirations, and oxygen saturation immediately and then every 2 minutes and have team member perform fingerstick to check blood glucose (Brophy et al., 2012; Smith et al., 2015).
- e Member of team will prepare for and insert IV catheter (if one is not in place) with 0.9% sodium chloride infusing and administer IV antiseizure medications.
- f As seizure begins to subside, suction patient's airway if secretions have accumulated. If oral airway was inserted, be sure that it remains in correct position. Continue oxygen administration.
- g Keep patient in side-lying position of comfort in bed with side rails up and bed in lowest position.

RATIONALE

Maintains oxygenation.

Necessary to monitor and support baseline vital signs and determine if patient is hypoglycemic (common cause of seizure).

Provides route for IV medication to stop seizure and for fluid resuscitation (Brophy et al., 2012; Smith et al., 2015).

Maintains open airway and oxygenation.

Provides for continued safety to reduce risk of aspiration of secretions as patient regains consciousness and lessens risk of fall with injury if patient tries to exit bed.

Continued

STEP

- 10 As patient regains consciousness, reorient and reassure. Explain what happened and provide quiet, nonstimulating environment (e.g., lights low, minimal care interruptions). Place call light or intercom system within reach. Instruct patient not to get out of bed without help.
- 11 Complete postprocedure protocol.

RATIONALE

Provides for continued safety. Patients are often confused and lethargic following seizure (postictal). At risk for falls if they attempt to get out of bed.

Recording and Reporting

- Record in nurses' notes in electronic health record (EHR) or chart what you observed before, during, and after seizure. Provide detailed description of the type of seizure activity and sequence of events (e.g., presence of aura [if any], level of consciousness, vital signs and oxygen saturation, color, movement of extremities, incontinence, patient's status immediately following seizure, and time frame of events).
- Record treatments administered: establishment of IV line, fluid infusing, stabilization of airway.
- Alert health care provider immediately as seizure begins. Status epilepticus is an emergency situation requiring immediate medical therapy.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient suffers traumatic injury.	• Attend to patient's immediate physical needs. • Administer prescribed treatments. • Inform health care provider. • Reassess patient's environment to ensure that environment is free of safety hazards.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient aspirates.	• Turn onto side, insert oral airway (if possible), and apply suction to remove material in oral pharynx and maintain patent airway. • Administer oxygen as needed.

Sequential Compression Device and Elastic Stockings

The development of deep vein thrombosis (DVT) is a hazard of immobility. Common risk factors include conditions that influence the Virchow triad: hypercoagulability (e.g., clotting disorders, fever, dehydration); venous wall abnormalities (e.g., orthopedic surgery, varicose veins, atherosclerosis); and blood flow stasis (e.g., immobility, obesity, pregnancy) (Lewis et al., 2014). Signs of DVT include swelling in the affected leg (rarely swelling in both legs); warm, cyanotic skin; and pain in the leg that often starts in the calf and can feel like cramping or soreness. If a DVT is suspected, keep patient calm and quiet in bed and notify the health care provider.

Anticoagulant medication is the best approach for preventing DVTs; however, early ambulation, wearing compression stockings or intermittent sequential compression devices (SCDs), and using foot pumps are equally important (Agency for Healthcare Research and Quality [AHRQ], 2015; Pai and Douketis, 2016). Compression stockings appear to function more by preventing distention of veins. Reduction of edema and leg pain during the course of the day is accomplished while wearing elastic stockings (Carvalho et al., 2015). (SCDs remove pooled blood and prevent venous stasis. The combination of stockings and foot compression has been shown to be more effective than stockings alone in both DVT and pulmonary embolism incidence (Morris and Woodcock, 2004).

Delegation Considerations

The skill of applying elastic stockings and SCDs may be delegated to nursing assistive personnel (NAP). The nurse initially determines the size of elastic stockings and assesses the patient's lower extremities for any signs and symptoms of DVTs or impaired circulation. The nurse directs the NAP to do the following:

- Remove the SCD sleeves before allowing a patient to get out of bed.
- Report to the nurse if a patient's calf appears larger than the other or is red or hot, or if there are signs of allergic reactions to elastic (redness, itching, irritation).

Equipment

- Tape measure
- Powder or cornstarch (optional)
- Graduated compression stockings
- SCD insufflator with air hoses attached, adjustable Velcro compression stockings/SCD sleeve
- Hygiene supplies

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Explain procedure and reason for applying elastic stockings and SCDs.	Eases patient apprehension and helps ensure compliance with therapy.
3 Position patient in supine position. Elevate head of bed to comfortable level. Use tape measure to measure patient's leg to determine proper elastic stocking or SCD size.	Stockings must be measured according to manufacturer's directions. The choice of length depends on the physician or health care provider's order. However, knee-length stockings are more comfortable for the patient and result in better adherence to therapy. If too large, stockings will not adequately support extremities. If too small, stockings may impede circulation.
4 <i>Option:</i> Apply a small amount of powder or cornstarch to legs provided patient does not have sensitivity.	Helps stockings slide on easier. Increases patient comfort.
5 Applying elastic stockings:	
a Turn elastic stocking inside out by placing one hand into sock, holding toe of sock with other hand, and pulling. Pull until reaching the heel (Fig. 68.1).	Allows easier application of stocking.

Continued



Fig. 68.1 Turn stocking inside out; hold toe and pull through.

STEP

- b** Place patient's toes into foot of elastic stocking up to heel, making sure that sock is smooth (Fig. 68.2).
- c** Slide remaining portion of sock over patient's foot, making sure that the toes are covered. Make sure that foot fits into the toe and heel positions of sock. Sock will now be right side out (Fig. 68.3).
- d** Slide sock up over patient's calf until sock is completely extended. Be sure stocking is smooth and that no ridges or wrinkles are present (Fig. 68.4).
- e** Instruct patient not to roll socks partially down.

RATIONALE

Wrinkles in elastic stocking can cause constrictions and impede circulation to lower region of extremity.

If toes remain uncovered, they will become constricted by elastic, and their circulation can be reduced.

Rolling stocking partially down has a constricting effect and impedes venous return.



Fig. 68.2 Place toes into foot of stocking.



Fig. 68.3 Slide remaining portion of stocking over foot.

STEP

6 Applying SCD sleeves:

- a Remove SCD sleeves from plastic, unfold, and flatten.

RATIONALE

Continued



Fig. 68.4 Slide stocking up leg until completely extended.



Fig. 68.5 Position back of patient's knee with popliteal opening.

STEP

- b** Arrange the SCD sleeve under the patient's leg according to the leg position indicated on inner lining of sleeve (Fig. 68.5).

RATIONALE

Ensures straight and even application.

STEP

- c** Place patient's leg on SCD sleeve. Back of ankle should line up with the ankle marking on inner lining of sleeve.
- d** Position back of knee with the popliteal opening (Fig. 68.5).
- e** Wrap SCD sleeve securely around patient's leg. Check fit of SCD sleeves by placing two fingers between patient's leg and sleeve (Fig. 68.6).
- f** Attach SCD sleeve's connector to plug on mechanical unit. Arrows on connector line up with arrows on plug from mechanical unit (Fig. 68.7).

RATIONALE

Prevents pressure on popliteal artery.

Secure fit needed for adequate compression. Ensures proper fit and prevents constriction, which impedes circulation.

Continued



Fig. 68.6 Check fit of SCD sleeve.



Fig. 68.7 Align arrows when connecting to mechanical unit.

STEP	RATIONALE
g Turn mechanical unit on. Green light indicates unit is functioning. Monitor functioning SCD through one full cycle of inflation and deflation.	Power source initiates sequential compression cycle. Ensures proper functioning of unit and determines if SCD sleeves are too loose or constricting.
7 Complete postprocedure protocol.	
8 Remove elastic stockings or SCD sleeves at least once per shift (e.g., long enough to inspect skin for irritation or breakdown).	Compliance in wearing elastic stockings and SCDs poses an issue when patients find them to be uncomfortable or applied incorrectly. Elastic stockings and SCDs are removed long enough to perform an assessment and/or hygiene measures and replaced as soon as possible.

Recording and Reporting

- Record date and time of application of elastic stockings and/or SCD sleeves in medication administration record (MAR). Include

condition of skin and circulatory status of lower extremities before application, length and size of elastic stockings and SCD sleeves, time stockings/sleeves are removed, and condition of skin and circulatory status after removal. Initial or sign entry.

- Immediately report to health care provider any signs of thrombophlebitis or impeded circulation in lower extremities.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops decreased circulation in lower extremities.	• Assess lower extremities for coolness, cyanosis, decreased pedal pulses, decreased blanching, and numbness or tingling sensation. • Check that elastic stockings are not too small or have wrinkles or folds that impede circulation. • Notify physician immediately; signs and symptoms may indicate obstruction of arterial blood flow.
2 Patient develops deep vein thrombosis.	• Because clinical signs may be vague, an order for more sensitive radiology tests should be obtained from a physician. Doppler compression ultrasonogram (also known as Doppler duplex) or impedance plethysmography may be carried out to rule out the presence of thrombosis. • Do not massage lower extremities because of potential for dislodging thrombus.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient develops pulmonary embolism.	• Signs and symptoms include tachypnea, shortness of breath, anxiety, pleuritic chest pain, cough, hemoptysis, tachycardia, and signs of right ventricular failure (e.g., distended neck veins). • Notify health care provider immediately. • Monitor vital signs. • Administer supplemental oxygen as ordered. • Get a new mechanical unit if a reason cannot be found for alarm.

Specialty Beds

Air-Fluidized, Air-Suspension, and Rotokinetic

Placing a Patient on a Special Bed

The air-suspension bed supports a patient's weight on air-filled cushions. A low-air-loss system minimizes pressure and reduces shear. If a patient has large stage III or IV pressure injuries on multiple turning surfaces of the skin, a low-air-loss bed or air-fluidized bed may be indicated (Doughty and McNichol, 2016).

An air-fluidized bed is a powered device designed to distribute a patient's weight evenly over its support surface (Fig. 69.1). Fluidization is created by forcing a gentle flow of temperature-controlled air upward through a mass of fine ceramic microspheres. The microspheres fluidize and assume the appearance of boiling milk and all the properties of a fluid.

The Rotokinetic bed helps maintain skeletal alignment while providing constant rotation. This bed improves skeletal alignment with constant side-to-side rotation up to 90 degrees (Fig. 69.2).

Delegation Considerations

The skill of placing a patient on a specialty bed can be delegated to nursing assistive personnel (NAP). However, first the nurse completes the assessment, determines the need for a support surface, and selects the specific surface. Some types of support surfaces require that the manufacturer's representative sets up and maintains the support system. The nurse directs the NAP to do the following:

- Notify the nurse of any changes in the patient's skin.
- Continue to turn and reposition the patient regularly and seek help for patient position changes as necessary. This is not always necessary for patients who are placed on a lateral-rotation air-suspension bed.
- Monitor the normal functioning of the air-suspension bed, such as inflation and deflation cycles, and report to the nurse any changes in these cycles.
- Notify the nurse if the patient becomes disoriented or restless or complains of nausea.



Fig. 69.1 Combination air-fluidized, low-air-loss bed. (©2008 Hill-Rom Services. Reprinted with permission. All rights reserved.)

Equipment

- Disposable bed pads, if indicated
- Clean gloves (*optional*)
- Foam positioning wedges, if indicated
- Special sheet (if appropriate, supplied by manufacturer)
- Mechanical lift (if indicated)

Implementation

STEP

- 1 Complete preprocedure protocol.

RATIONALE



Fig. 69.2 Rotokinetic bed. (RotoRest, courtesy Kinetic Concepts, San Antonio, TX.)

STEP

- 2 Determine patient's risk for pressure injury formation using a valid assessment tool (e.g., Braden Scale), and assess for risk factors for pressure injuries, including nutritional deficits, shear stress, friction, alterations in mobility and sensory perception, and hemoglobin levels (see [Skill 60](#)).

RATIONALE

Risk assessment tools provide an objective measure of risk consistent over time ([Doughty and McNichol, 2016](#)).

Continued

STEP

- 3 Inspect condition of skin, especially over dependent sites and bony prominences. Note appearance of existing ulcers and determine stage of ulcer.
- 4 Assess patient's level of comfort using a pain scale of 0 to 10.
- 5 Assess risk for complications from air-fluidized beds:
 - a Dehydration
 - b Aspiration
 - c Difficulty with patient positioning
 - d Level of orientation
- 6 Obtain additional personnel needed to transfer patient to bed.
- 7 Review instructions supplied by bed manufacturer.
- 8 For patients with severe to moderate pain, premedicate approximately 30 minutes before transfer.

RATIONALE

Provides baseline to determine a change in skin integrity or in an existing pressure injury over time.

Provides baseline to determine the patient's comfort needs. Patients usually require less analgesia while on the bed.

Patients may become dehydrated with use of this bed because of insensible fluid loss.

Inability to elevate head of bed is limited to placing foam wedges under patient's head and shoulders.

Repositioning is limited to use of foam wedges.

Patients may be at risk for developing delirium from dehydration and floating sensation with air-fluidized bed.

Reduces risk of injury by ensuring safe patient handling.

Promotes safe and correct use of bed.

Promotes patient's comfort and ability to cooperate during transfer to bed. Decreases patient's energy expenditure (Doughty and McNichol, 2016).

STEP

- 9 Perform hand hygiene and apply clean gloves (if linen or surface is soiled or wet). Get help to position patient and/or mattress as needed.
- 10 Transfer patient to bed using appropriate transfer techniques. Bed surface is sometimes slippery; thus do not attempt transfers without assistance.
- 11 Once patient has been transferred, release Instaflate, fluidize, or activate bed by depressing switch; regulate temperature.
- 12 Position patient for comfort, and perform range-of-motion (ROM) exercises as appropriate.
- 13 To turn patient, position bedpans, or perform other therapies, turn on Instaflate setting. Once you have completed the procedure, release Instaflate. With air-fluidized bed, use foam wedges to position patient as needed.
- 14 Use special features of bed as needed:
 - a Scales
 - b Portable transport units to maintain inflation when primary power is interrupted

RATIONALE

- Reduces transmission of microorganisms. Assistance from other caregivers reduces risk for friction and shear in transfer to new surface.
- Appropriate patient-handling techniques maintain alignment and reduce risk of injury during procedure. Manufacturer's representative adjusts bed to patient's height and weight.
- Releasing Instaflate or activating bed allows pressure cushions to automatically adjust to preset levels to minimize pressure, friction, and shear.
- Promotes comfort and reduces contracture formation.
- Instaflate firms bed surface to facilitate turning and handling patient. Patient does not receive pressure relief while bed is in this mode.
- Facilitates ease of routine weights.
- Provides for continuous pressure reduction.

Continued

STEP

- c Specialty cushions for positioning, providing pressure relief, reducing moisture, preventing patient from sliding down in bed, or relieving weight from orthopedic devices
- d Lateral rotation, which allows approximately 30 degrees of turning

15 Complete postprocedure protocol.

RATIONALE

Reduces pressure, friction, and shearing forces.

Underinflation or improper functioning of certain overlays may result in tissue damage. Likewise, overinflation can result in too firm a surface and create pressure damage.

Recording and Reporting

- Record transfer of patient to bed, amount of help needed for transfer, tolerance of procedure, and condition of skin in nurses' notes in electronic health record (EHR) or chart and/or skin assessment flow sheet. Record any patient teaching and validation of understanding in nurses' notes and EHR.
- Report changes in condition of skin, level of orientation, and electrolyte levels to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Existing areas of skin breakdown or pressure areas fail to heal or increase in size or depth.	• Modify skin-care regimen. • Increase frequency of skin assessment. • Change types of pressure-relief interventions. • Check for proper inflation of support surface. • Revise turning schedule. • Consult with skin-care expert. • Notify health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Patient becomes nauseated.	• Provide short-term antiemetic such as prochlorperazine. If using lateral rotation, obtain antiemetic order around the clock. • If using lateral rotation, decrease cycle frequency. • Notify health care provider.

Sterile Gloving

Sterile gloves help prevent the transmission of pathogens by direct and indirect contact. Nurses apply sterile gloves before performing sterile procedures such as inserting urinary catheters or applying sterile dressings. Sterile gloves do not replace hand hygiene.

It is important to verify whether the patient or health care providers have a latex allergy. When allergies are present, select latex-free gloves. Repeated exposure to latex can lead to a latex allergy, in which case, latex-free gloves would need to be used. [Box 70.1](#) lists risk factors for a latex allergy. Latex proteins enter the body through skin or mucous membranes, intravascularly, or via inhalation. Reactions to latex range from mild to severe ([Box 70.2](#)).

Gloves must be the proper size. The gloves should not stretch so tightly over the fingers that they can tear easily, yet they need to be tight enough that objects can be picked up easily. Sterile gloves are available in various sizes (e.g., 6, 6½, 7). They are also available in “one size fits all” or “small,” “medium,” and “large.”

Delegation Considerations

Assisting with skills that include the application and removal of sterile gloves may be delegated to nursing assistive personnel (NAP). However, many procedures that require the use of sterile gloves cannot be delegated to NAP. The nurse instructs the NAP about the following:

- The reason for using sterile gloves for a specific procedure

Equipment

- Package of proper-size sterile gloves, latex or synthetic nonlatex. If patient has a latex allergy, ensure that gloves are latex-free and powder-free.

Implementation

STEP	RATIONALE
1 Consider the type of procedure to be performed, and consult agency policy on use of sterile gloves.	Ensures proper use of sterile gloves when needed.

BOX 70.1 Individuals at Risk for Latex Allergy

- Spina bifida
- Multiple surgeries or medical procedures
- High latex exposure (e.g., health care workers, housekeepers, food handlers, tire manufacturers, workers in industries that use gloves routinely)
- Rubber industry workers
- Personal or family history of allergies.
- There is a connection between an allergy to latex and an allergy to avocados, bananas, chestnuts, kiwis, and passion fruits. These foods have some of the identical allergens that are found in latex.

Mayo Clinic: Diseases and conditions: latex allergy: 2014, <http://www.mayoclinic.org/diseases-conditions/latex-allergy/basics/risk-factors/con-20024233>. Accessed January 2016.

BOX 70.2 Levels of Latex Reactions

The three types of common latex reactions (in order of severity) are as follows:

1. *Irritant dermatitis*: Skin reaction isolated to the area of contact
 - a. Acute reaction: Red, dry, itchy and irritated
 - b. Chronic reaction: Dry, thick skin, crusting and possibly cracking or peeling, resulting in open sores
2. *Type IV delayed hypersensitivity*: Allergic reaction to chemicals used in latex processing
 - a. Acute reaction: Dry, red, rash, itchy, hives, small blisters
 - b. Chronic reaction Dry, thickened skin, crusting, scabbing sores, vesicles, peeling (appears 4–96 hours after exposure)
3. *Type I immediate hypersensitivity*: Could be life-threatening, and reactions can start as soon as 2–3 minutes after contact up to several hours
 - a. Acute reaction: Hives, swelling, runny nose, nausea, abdominal cramps, dizziness, low blood pressure, bronchospasm, anaphylaxis (shock)

Centers for Disease Control and Prevention. Frequently Asked Questions - Contact Dermatitis and Latex Allergy, 2013, <http://www.cdc.gov/oralhealth/infectioncontrol/faq/latex.htm>. Accessed January 2016.

STEP

- 2 Consider patient's risk for infection (e.g., preexisting condition and size or extent of area being treated).

RATIONALE

Directs you to follow added precautions (e.g., use of additional protective barriers) if necessary.

Continued

STEP

- 3 Select correct size and type of gloves and then examine glove package to determine if it is dry and intact with no water stains.
- 4 Inspect condition of hands for cuts, hangnails, open lesions, or abrasions. In some settings you are allowed to cover any open lesions with a sterile, impervious transparent dressing (check agency policy). In some cases the presence of such lesions may prevent you from participating in a procedure.
- 5 Assess patient for the following risk factors before applying latex gloves:
 - a Previous reaction to the following items within hours of exposure: adhesive tape, dental or face mask, golf club grip, ostomy bag, rubber band, balloon, bandage, elastic underwear, intravenous (IV) tubing, rubber gloves, condom
 - b Personal history of asthma, contact dermatitis, eczema, urticaria, rhinitis
 - c History of food allergies, especially avocado, banana, peach, chestnut, raw potato, kiwi, tomato, papaya
 - d Previous history of adverse reactions during surgery or dental procedure
 - e Previous reaction to latex product

RATIONALE

Torn or wet package is considered contaminated. Signs of water stains on package indicate previous contamination by water.

Cuts, abrasions, and hangnails tend to ooze serum, which possibly contains pathogens. Breaks in skin integrity permit microorganisms to enter and increase the risk of infection for both patient and nurse ([Association of periOperative Registered Nurses \[AORN\], 2016](#)).

Determines level of patient's risk for latex allergy and need to use nonlatex gloves.

Items known to lead to latex allergy.

STEP

RATIONALE

SAFETY ALERT Synthetic nonlatex gloves (latex free/powder free) must be used when patients are at risk or if nurse has sensitivity or allergy to latex.

6 Applying gloves:

- a Perform thorough hand hygiene. Place glove package near work area.
- b Remove outer glove package wrapper by carefully separating and peeling apart sides (Fig. 70.1).
- c Grasp inner package, and lay it on clean, dry, flat surface at waist level. Open package, keeping gloves on inside surface of wrapper (Fig. 70.2).

Reduces number of bacteria on skin surfaces and transmission of infection. Ensures availability before procedure. Prevents inner glove package from accidentally opening and touching contaminated objects.

Sterile object held below waist is contaminated. Inner surface of glove package is sterile.

Continued



Fig. 70.1 Open outer glove package wrapper.

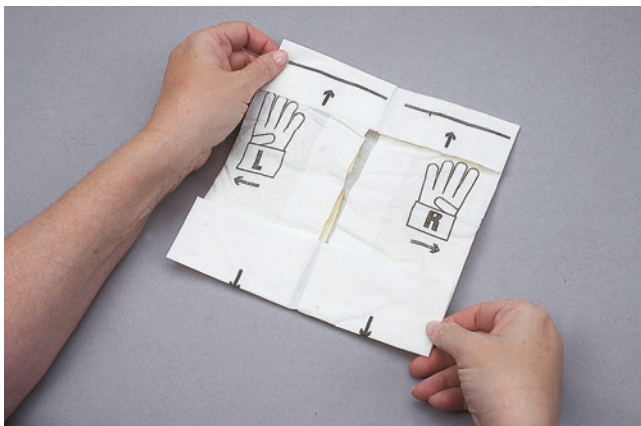


Fig. 70.2 Open inner glove package on work surface.

STEP

- d Identify right and left glove. Each glove has cuff approximately 5 cm (2 inches) wide. Glove dominant hand first.
- e With thumb and first two fingers of nondominant hand, grasp edge of cuff of glove for dominant hand by touching only inside surface (Fig. 70.3).
- f Carefully pull glove over dominant hand, leaving cuff and being sure that cuff does not roll up wrist. Be sure thumb and fingers are in proper spaces.
- g With gloved dominant hand, slip fingers underneath second glove's cuff (Fig. 70.4).

RATIONALE

Proper identification of gloves prevents contamination by improper fit. Gloving of dominant hand first improves dexterity.

Inner edge of cuff will lie against skin and thus is not sterile.

If glove's outer surface touches hand or wrist, it is contaminated.

Cuff protects gloved fingers. Sterile touching sterile prevents glove contamination.



Fig. 70.3 Pick up glove for dominant hand, insert fingers, and pull glove completely over dominant hand (example is for left-handed person).

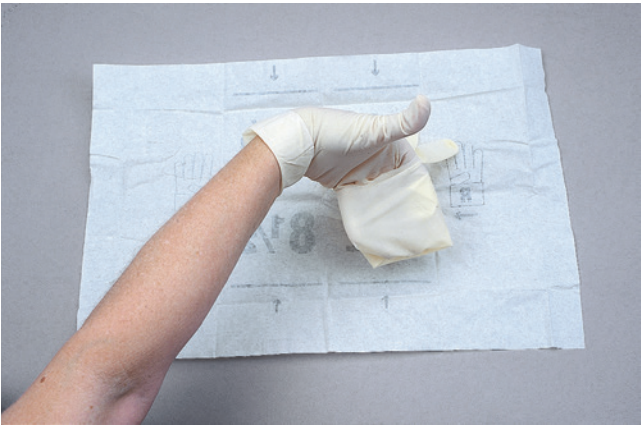


Fig. 70.4 Pick up glove for nondominant hand.

STEP

- h Carefully pull second glove over nondominant hand (Fig. 70.5).

RATIONALE

Contact of gloved hand with exposed hand results in contamination.

Continued



Fig. 70.5 Pull second glove over nondominant hand.

STEP

- i After second glove is on, interlock hands together above waist level. The cuffs usually fall down after application. Be sure to touch only sterile sides.
- 7 Remove gloves:
 - a Grasp outside of one cuff with other gloved hand; avoid touching wrist.
 - b Pull glove off, turning it inside out and placing it in gloved hand (Fig. 70.6).
 - c Take fingers of bare hand and tuck inside remaining glove cuff. Peel glove off inside out and over the previously removed glove (Fig. 70.7). Discard both gloves in receptacle.
- 8 Perform hand hygiene.

RATIONALE

Ensures smooth fit over fingers.

Minimizes contamination of underlying skin.

Outside of glove does not touch skin surface.

Fingers do not touch contaminated glove surface.



Fig. 70.6 Carefully remove first glove by turning it inside out.



Fig. 70.7 Remove second glove by turning it inside out.

Recording and Reporting

- It is not necessary to record application of gloves. Record specific procedure performed and patient’s response and status.
- In the event of a latex allergy reaction, record patient’s response in nurses’ notes, electronic health record (EHR), and vital sign flow sheet. Note type of response and patient’s reaction to emergency treatment.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops localized signs of infection (e.g., urine becomes cloudy or odorous; wound becomes painful, edematous, or reddened with purulent drainage). 2 Patient develops systemic signs of infection (e.g., fever, malaise, increased white blood cell count). 3 Patient develops allergic reaction to latex (see Box 70.2).	• Contact health care provider, and implement appropriate treatments as ordered. • Contact health care provider, and implement appropriate treatments as ordered. • Immediately remove source of latex. • Bring emergency equipment to bedside. Have epinephrine injection ready for administration, and be prepared to initiate IV fluids and oxygen.

Sterile Technique

Donning and Removing Cap, Mask, and Protective Eyewear

Although masks and caps are usually worn in surgical procedure areas (e.g., the operating room [OR]), certain aseptic procedures performed at a patient's bedside require the application of personal protective equipment (PPE) such as mask, cap, eyewear, gown, and gloves. For example, it may be agency policy for a nurse to wear a mask during the changing of a central line dressing or insertion of a peripherally inserted central catheter (PICC). When there is a risk of splattering blood or body fluid, there is also the need to apply protective eyewear ([Occupational Safety & Health Association \[OSHA\], 2012](#)).

Delegation Considerations

The skill of applying and removing cap, mask, and protective eyewear is required of all caregivers when working in sterile areas. All health care providers use clean gloves. The skill of applying PPE can be delegated to nursing assistive personnel (NAP). The nurse instructs the NAP to do the following:

- Be available to hand off equipment or help with patient positioning during a sterile procedure.
- If the procedure is to use sterile technique, educate the NAP regarding the sterile field.
- Perform hand hygiene before and after gloving.

Equipment

- Clean gloves
- Gown (disposable or reusable, check agency policy)
- Surgical mask (different types are available for people with different skin sensitivities)
- Surgical cap (**NOTE:** Use in OR or if agency policy requires. Use to secure hair if there is a possibility of contamination of a sterile field.)
- Hairpins, rubber bands, or both
- Protective eyewear (e.g., goggles or glasses with appropriate side shields)

Implementation

STEP	RATIONALE
1 Review type of sterile procedure to be performed, and consult agency policy for use of mask, cap, and eyewear.	Not all sterile procedures require mask, cap, or protective eyewear. Ensures that patient and nurse are properly protected.
2 If you have symptoms of a cold or respiratory tract infection, either avoid participating in procedure or apply a mask.	A greater number of pathogenic microorganisms reside within the respiratory tract when infection is present.
3 Assess patient's actual or potential risk for infection (e.g., older adult, neonate, or immunocompromised patient).	Some patients are at a greater risk for acquiring an infection; thus use additional barriers.
4 Prepare equipment and inspect packaging for integrity and exposure to sterilization.	Ensures availability of equipment and sterility of supplies before procedure begins.
5 Perform hand hygiene.	Reduces transient microorganisms on skin.
6 Applying cap:	
a If hair is long, comb back behind ears and secure.	Cap must cover all hair entirely.
b Secure hair in place with pins.	Ensures that long hair does not fall down or cause cap to slip and expose hair.
c Apply cap over head as you would apply hairnet. Be sure all hair fits under cap's edges (Fig. 71.1).	Loose hair hanging over sterile field or falling dander will contaminate objects on sterile field.
7 Applying mask:	
a Find top edge of mask, which usually has a thin metal strip along edge.	Pliable metal fits snugly against bridge of nose.
b Hold mask by top two strings or loops, keeping top edge above bridge of nose.	Prevents contact of hands with clean facial portion of mask. Mask will cover all of nose.



Fig. 71.1 Nurse places cap over head, covering all hair.

STEP

- c** Tie two top strings at top of back of head, over cap (if worn), with strings above ears (Fig. 71.2). Alternatively, place loops over ears.
- d** Tie two lower ties snugly around neck with mask well under chin (Fig. 71.3).
- e** Gently pinch upper metal band around bridge of nose.

8 Applying protective eyewear:

- a** Apply protective glasses, goggles, or face shield comfortably over eyes, and check that vision is clear (Fig. 71.4).

RATIONALE

Position of ties at top of head provides tight fit. Strings over ears may cause irritation.

Prevents escape of microorganisms through sides of mask as you talk and breathe.

Prevents microorganisms from escaping around nose and prevents eyeglasses from steaming up.

Positioning affects clarity of vision.

Continued



Fig. 71.2 Tie top strings of mask.



Fig. 71.3 Tie bottom strings of mask.

STEP	RATIONALE
b Be sure that face shield fits snugly around forehead and face.	Ensures that eyes are fully protected.



Fig. 71.4 Place face shield over cap.

STEP

9 Removing protective barriers:

- a** Remove gloves first, if worn (see Skill 70).
- b** Remove eyewear. Avoid any touching of soiled lens with hands. If wearing face shield, remove it before removal of mask. **NOTE:** A combination mask and eyewear is available in some agencies.
- c** Untie bottom strings of mask.
- d** Untie top strings of mask, and remove mask from face, holding ties securely. Discard mask in proper receptacle (Fig. 71.5).

RATIONALE

Prevents contamination of hair, neck, and facial area.

Prevents transmission of microorganisms.

Prevents top part of mask from falling down over the uniform. If mask falls and touches uniform, uniform will be contaminated.

Avoids contact of nurse's hands with contaminated mask.

Continued



Fig. 71.5 A, Untying top mask strings. B, Removing mask from face. C, Discarding mask.

STEP

- e** Grasp outer surface of cap and lift from hair.
- f** Discard cap in proper receptacle and perform hand hygiene.

RATIONALE

Minimizes contact of hands with hair.
Reduces transmission of infection.

Recording and Reporting

- It is unnecessary to document use of PPE.

Subcutaneous Injections

Subcutaneous injections involve depositing medication into the loose connective tissue underlying the dermis. Because subcutaneous tissue does not contain as many blood vessels as muscles, medications are absorbed more slowly than with intramuscular (IM) injections. Physical exercise or application of hot or cold compresses influences the rate of drug absorption by altering local blood flow to tissues. Any condition that impairs blood flow is a contraindication for subcutaneous injections.

Subcutaneous tissue is sensitive to irritating solutions and large volumes of medications. Thus, only small volumes (0.5 to 1.5 mL) of water-soluble medications should be administered subcutaneously to adults. In children, smaller volumes up to 0.5 mL may be given (Hockenberry and Wilson, 2015). Because subcutaneous tissue contains pain receptors, the patient often experiences some discomfort. The best subcutaneous injection sites include the outer aspect of the upper arms, the abdomen from below the costal margins to the iliac crests, and the anterior aspects of the thighs (Fig. 72.1). These areas are easily accessible and are large enough to allow rotating multiple injections within each anatomical location.

Choose an injection site that is free of skin lesions, bony prominences, and large underlying muscles or nerves. Site rotation prevents the formation of lipohypertrophy or lipoatrophy in the skin.

Most patients manage type 1 diabetes mellitus with insulin injections. Anatomic injection site rotation is no longer necessary because newer human insulins carry a lower risk for skin hypertrophy. Patients choose one anatomic area (e.g., the abdomen) and systematically rotate sites within that region, which maintains consistent insulin absorption from day to day. Absorption rates of insulin vary on the basis of the injection site. Insulin is most quickly absorbed in the abdomen and most slowly in the thighs (Burchum and Rosenthal, 2016).

Heparin therapy provides therapeutic anticoagulation to reduce the risk for thrombus formation by suppressing clot formation. Therefore patients receiving heparin are at risk for bleeding, including bleeding gums, hematemesis, hematuria, or melena.

Several new technologies are available for administration of subcutaneous injections. *Injection pens* are a technology that allows patients to self-administer medications (e.g., epinephrine, insulin, or interferon) subcutaneously. Another new technology is a *needleless jet injection system* that administers subcutaneous medications without the use of needles. Needle-free injections use high pressure to penetrate the skin with the medication into the subcutaneous tissue. Another new advance in

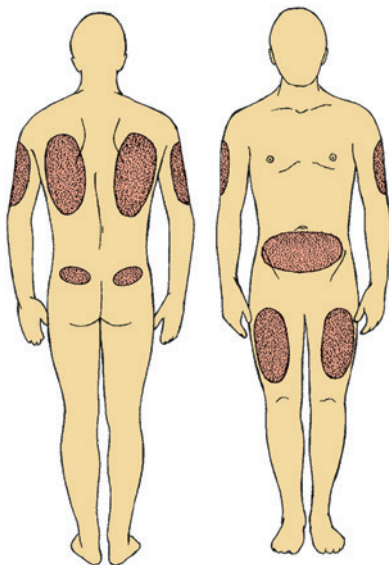


Fig. 72.1 Common sites for subcutaneous injections.

subcutaneous injection is the *subcutaneous injection device* (e.g., insuflon), which is inserted into the subcutaneous tissue; the needle is then removed, leaving the cannula in the tissue to provide an avenue for administering medications for up to 3 days without having to puncture the skin with each injection.

Delegation Considerations

The skill of administering subcutaneous injections cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential medication side effects and to report their occurrence to the nurse

Equipment

- Proper size syringe and sharps with engineered sharps injury protection (SESIP) needle:
 - Subcutaneous: syringe (1- to 3-mL) and needle (25- to 27-gauge, $\frac{1}{8}$ - to $\frac{5}{8}$ -inch)
 - Immunizations: 23- to 25-gauge, $\frac{5}{8}$ -inch needle ([Centers for Disease Control and Prevention \[CDC\], 2015d](#))

- Subcutaneous U-100 insulin: insulin syringe (1 mL) with preattached needle (28- to 31-gauge, $\frac{5}{16}$ - to $\frac{3}{16}$ -inch)
 - Subcutaneous U-500 insulin: 1 mL tuberculin (TB) syringe with needle (25- to 27-gauge, $\frac{1}{2}$ - to $\frac{5}{8}$ -inch)
- Small gauze pad (*optional*)
 - Alcohol swab
 - Medication vial or ampule
 - Clean gloves
 - Medication administration record (MAR) or computer printout
 - Puncture-proof container

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Check accuracy and completeness of each MAR or computer printout with prescriber's written medication order. Check patient's name, medication name and dosage, route of administration, and time of administration. Recopy or reprint any portion of MAR that is difficult to read.	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives the correct medications (Mandrack et al., 2012). Illegible MARs are a source of medication errors (Alassaad et al., 2013).
3 Perform hand hygiene and prepare medication using aseptic technique. Check label of the medication carefully with the MAR or computer printout two times when preparing medication.	Ensures that medication is sterile. <i>These are the first and second checks for accuracy</i> and ensure that correct medication is administered.
4 Identify patient using two patient identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.	Ensures correct patient. Complies with The Joint Commission standards and improves patient safety (TJC, 2016). Some agencies are now using a bar code system to help with patient identification.

STEP

- 5 At patient's bedside, again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- 6 Perform hand hygiene and apply clean gloves. Keep sheet or gown draped over body parts not requiring exposure.
- 7 Select appropriate injection site. Inspect skin surface over sites for bruises, inflammation, or edema. Do not use an area that is bruised or has signs associated with infection.
- 8 Palpate sites; avoid those with masses or tenderness. Be sure that needle is correct size by grasping skinfold at site with thumb and forefinger. Measure fold from top to bottom. Make sure needle is one-half length of fold.
 - a When administering insulin or heparin subcutaneously, use abdominal injection sites first, followed by thigh injection site.
 - b When administering low-molecular-weight heparin (LMWH) subcutaneously, choose a site on the right or left side of the abdomen, at least 5 cm (2 inches) away from the umbilicus.

RATIONALE

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Reduces transfer of microorganisms. Respects patient dignity during injection.

Injection sites are free of abnormalities that interfere with drug absorption. Sites used repeatedly become hardened from lipohypertrophy (increased growth in fatty tissue).

You can mistakenly give subcutaneous injections in muscle, especially in abdomen and thigh sites. Appropriate size of needle ensures that you inject medication into subcutaneous tissue (Hirsch et al., 2012; Ogston-Tuck, 2014a).

Risk for bruising is not affected by site.

Injecting LMWH on side of abdomen helps decrease pain and bruising at injection site (Sanofi-Aventis, 2014).

Continued

STEP

- c Rotate insulin site within an anatomic area (e.g., the abdomen), and systematically rotate sites within that area.
- 9 Help patient into comfortable position. Have him or her relax arm, leg, or abdomen, depending on site selection.
- 10 Cleanse site with antiseptic swab. Apply swab at center of site and rotate outward in circular direction for about 5 cm (2 inches) (Fig. 72.2).
- 11 Hold swab or gauze between third and fourth fingers of nondominant hand.

RATIONALE

Rotating injection sites within the same anatomic site maintains consistency in day-to-day insulin absorption.

Relaxation of site minimizes discomfort.

Mechanical action of swab removes secretions containing microorganisms.

Swab or gauze remains readily accessible for use when withdrawing needle after injection.



Fig. 72.2 Cleansing site with circular motion.

STEP

- 12 Remove needle cap or protective sheath by pulling it straight off.
- 13 Hold syringe between thumb and forefinger of dominant hand; hold as dart (Fig. 72.3).
- 14 Administer injection:
 - a For average-size patient, hold skin across injection site or pinch skin with nondominant hand.
 - b Inject needle quickly and firmly at 45- to 90-degree angle. Release skin, if pinched. *Option:* When using injection pen or giving heparin, continue to pinch skin while injecting medicine.

RATIONALE

Preventing needle from touching sides of cap prevents contamination.

Quick, smooth injection requires proper manipulation of syringe parts.

Needle penetrates tight skin more easily than loose skin. Pinching skin elevates subcutaneous tissue and desensitizes area.

Quick, firm insertion minimizes discomfort. (Injecting medication into compressed tissue irritates nerve fibers.) Correct angle prevents accidental injection into muscle.

Continued



Fig. 72.3 Holding syringe as if grasping a dart.

STEP

- c For obese patient, pinch skin at site and inject needle at 90-degree angle below tissue fold.
- d After needle enters site, grasp lower end of syringe barrel with nondominant hand to stabilize it. Move dominant hand to end of plunger, and slowly inject medication over several seconds (Fig. 72.4). When giving heparin, inject over 30 seconds (Akbari Sari et al., 2014; Sanofi-Aventis, 2014). Avoid moving syringe.

RATIONALE

Obese patients have fatty layer of tissue above subcutaneous layer.

Movement of syringe may displace needle and cause discomfort. Slow injection of medication minimizes discomfort.



Fig. 72.4 Subcutaneous injection.

STEP

RATIONALE

SAFETY ALERT Aspiration after injecting a subcutaneous medication is not necessary. Piercing a blood vessel in a subcutaneous injection is very rare. Aspiration after injecting heparin and insulin is not recommended (Lilley et al., 2012).

e Withdraw needle quickly while placing antiseptic swab or gauze gently over site.	Supporting tissues around injection site minimizes discomfort during needle withdrawal. Dry gauze may minimize patient discomfort associated with alcohol on nonintact skin.
15 Apply gentle pressure to site. <i>Do not massage site.</i> (If heparin is given, hold alcohol swab or gauze to site for 30 to 60 seconds.)	Aids absorption. Massage can damage underlying tissue. Time interval prevents bleeding at site.
16 Help patient to comfortable position.	Gives patient a sense of well-being.
17 Discard uncapped needle or needle enclosed in safety shield and attached syringe into puncture- and leak-proof receptacle.	Prevents injury to patients and health care personnel. Recapping needles increases risk for a needlestick injury (Occupational Safety and Health Administration (OSHA), n.d.).
18 Complete postprocedure protocol.	

Recording and Reporting

- Immediately after administration, record medication, dose, route, site, time, and date given on MAR. Correctly sign MAR according to institutional policy.
- Record patient teaching, validation of understanding, and patient's response to medication in nurses' notes and electronic health record (EHR).
- Report any undesirable effects from medication to patient's health care provider, and document adverse effects in record.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient complains of localized pain, numbness, tingling, or burning at injection site.	• Assess injection site; may indicate potential injury to nerve or tissues. • Notify patient's health care provider, and do not reuse site.
2 Patient displays adverse reaction with signs of urticaria, eczema, pruritus, wheezing, and dyspnea.	• Monitor patient's heart rate, respirations, blood pressure, and temperature. • Follow agency policy or guidelines for appropriate response to allergic reactions (e.g., administration of antihistamine such as diphenhydramine [Benadryl] or epinephrine), and notify patient's health care provider immediately. • Add allergy information to patient's record.
3 Hypertrophy of skin develops from repeated subcutaneous injection.	• Do not use site for future injections. • Instruct patient not to use site for 6 months.

Suctioning

Closed (in-Line)

Endotracheal tubes (ETs) and tracheostomy tubes (TTs) are artificial airways inserted to relieve airway obstruction, provide a route for mechanical ventilation, permit easy access for secretion removal, and protect the airway from gross aspiration in patients with impaired cough or gag reflexes. An ET tube is inserted through the nares (nasal ET tube) or the mouth (oral ET tube) past the epiglottis and vocal cords into the trachea. The length of time that an ET tube remains in place is somewhat controversial; however, in most cases a tracheostomy tube (TT) is inserted if a patient still requires an artificial airway after 2 to 4 weeks ([American Association of Respiratory Care \[AARC\], 2010](#)).

A TT can be temporary or permanent, depending on the patient's condition. It is inserted directly into the trachea through a small incision made in the patient's neck. The use of closed-system suction catheters for suctioning artificial airways has increased in recent years. Use of a closed-system catheter (in-line) allows quicker lower airway suctioning without applying sterile gloves or a mask and does not interrupt ventilation and oxygenation in critically ill patients. With a closed-system method, the patient's artificial airway is not disconnected from the mechanical ventilator; therefore there is no loss of positive end-expiratory pressure (PEEP; Branson et al., 2014).

Delegation Considerations

The skill of airway suction with a closed (in-line) suction catheter cannot be delegated to nursing assistive personnel (NAP). In special situations such as suctioning a well-established permanent tracheostomy, this procedure may be delegated to the NAP. The nurse is responsible for cardiopulmonary assessment and evaluation of the patient. The nurse often collaborates with a respiratory therapist when assessing the patient and performing the suction procedure. The nurse directs the NAP about the following:

- Any individualized aspects of patient care that pertain to suctioning (e.g., position, duration of suction, pressure settings)
- Expected quality, quantity, and color of secretions and to inform the nurse immediately if there are changes
- Patient's anticipated response to suction and to immediately report to the nurse changes in vital signs, complaints of pain, shortness of breath, confusion, or increased restlessness

Equipment

- Closed-system or in-line suction catheter
- Sterile saline solution lavage containers (5 to 10 mL)
- Suction machine/source with regulator
- Connecting tubing (6 feet)
- Two clean gloves
- Oral suction kit/supplies for oropharyngeal suctioning
- Mask, goggles, or face shield; gown if isolation precautions indicate
- Pulse oximeter and stethoscope
- Manual self-inflating resuscitation bag (bag-valve-mask) with appropriate-size mask, while not necessary for the procedure, is safe to have on hand

Implementation

STEPS

- 1 Complete preprocedure protocol and perform assessment.
- 2 Identify patient using at least two identifiers (e.g., name and birthday or name and medical record number) according to agency policy ([The Joint Commission \[TJC\], 2016](#)).
- 3 Explain the procedure to patient and the importance of coughing during the suctioning procedure. Even if patients cannot speak, provide information regarding the procedure.
- 4 Help patient assume a position of comfort, usually semi- or high-Fowler position. Place towel across patient's chest.
- 5 Perform hand hygiene, apply clean gloves and face shield, and attach suction.
 - a In many agencies a respiratory therapist attaches the catheter to the mechanical ventilator circuit. If catheter is not already in place, open suction catheter package using aseptic technique and attach closed-suction catheter to ventilator circuit by removing swivel adapter and placing closed-suction catheter apparatus on ET or TT. Connect Y on mechanical ventilator circuit to closed-suction catheter with flex tubing ([Fig. 73.1](#)).
 - b Connect one end of connecting tubing to suction machine; connect other end to the end of a closed-system or in-line suction catheter. Turn suction device on, set vacuum regulator to appropriate negative pressure, and check pressure. Many closed-system suction catheters require slightly higher suction pressures (consult manufacturer's guidelines).

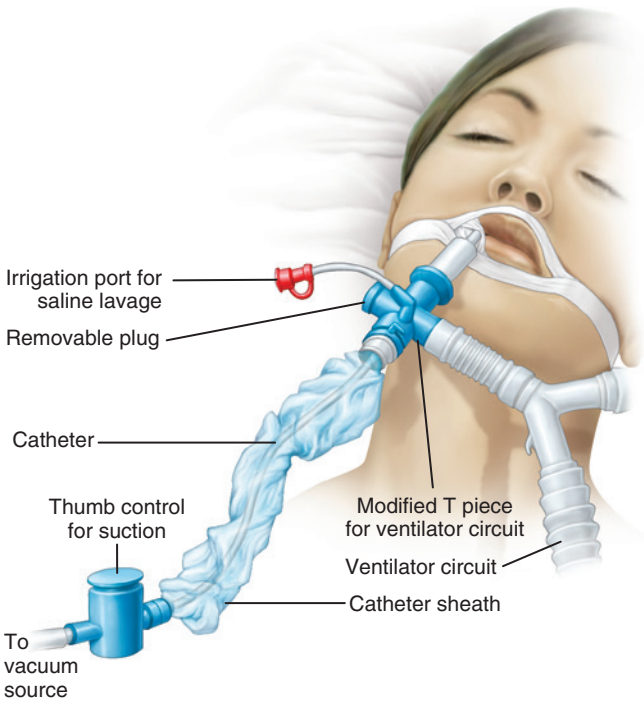
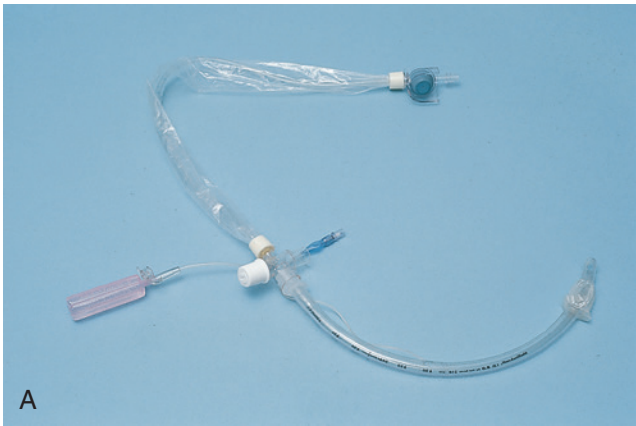


Fig. 73.1 A, Closed-system suction catheter attached to endotracheal tube.
B, Closed-system suction catheter in place.

STEPS

- 6 Hyperoxygenate the patient's lungs (usually 100% oxygen) by adjusting the FiO₂ setting on the ventilator or by using a temporary oxygen-enrichment program available on microprocessor ventilators. Manual ventilation is not recommended.
- 7 Pick up suction catheter enclosed in plastic sleeve with dominant hand.
- 8 Wait until patient inhales to insert catheter. Use a repeating maneuver of pushing catheter and sliding (or pulling) plastic sleeve back between thumb and forefinger until resistance is felt or patient coughs. Pull back 1 cm ($\frac{1}{2}$ inch) before applying suction to avoid tissue damage to carina.
- 9 Encourage patient to cough and apply suction by squeezing on suction control mechanism while withdrawing catheter. **NOTE:** It is difficult to apply intermittent pulses of suction and nearly impossible to rotate the catheter compared to standard catheter. Apply continuous suction for 10 to 15 seconds but no longer than 15 seconds as you remove the suction catheter (AARC, 2010; Branson et al., 2014). Be sure to withdraw catheter completely into plastic sheath and past the tip of the airway so it does not obstruct airflow.
- 10 Reassess cardiopulmonary status, including pulse oximetry and ventilator measures, to determine any complications or need for subsequent suctioning. Repeat Steps 5 to 9 one more time to clear secretions. Allow adequate time (at least 1 full minute) between suction passes for ventilation and reoxygenation.
- 11 When airway is clear, withdraw catheter completely into sheath. Be sure that colored indicator line on catheter is visible in the sheath. Squeeze vial or push syringe while applying suction to rinse inner lumen of catheter. Use at least 5 to 10 mL of saline to rinse the catheter until it is clear of retained secretions, which can cause bacterial growth and increase the risk for infection. Lock suction mechanism if applicable and turn off suction.
- 12 Hyperoxygenate the patient for at least 1 minute by following the same technique used to preoxygenate (Wiegand, 2011).
- 13 If patient requires oral or nasal suctioning, perform Skill 74 with separate standard suction catheter.
- 14 Reposition patient. Remove gloves and face shield, discard into appropriate receptacle, and perform hand hygiene.
- 15 Compare patient's respiratory assessments before and after suctioning, observe airway secretions, and document findings.
- 16 Complete postprocedure protocol.

Recording and Reporting

- Record respiratory assessment findings before and after suctioning; size and route of catheter used; amount, consistency, and color of secretions obtained; frequency of suctioning.
- Report patient's intolerance to procedure or worsening of oxygenation.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Respiratory status worsens.	• Limit length of suctioning. • Determine need for more frequent suctioning, possibly of shorter duration. • Determine need for supplemental oxygen. Supply oxygen between suctioning passes. • Notify physician.
2 Bloody secretions return.	• Determine amount of suction pressure used. Suction pressure may need to be decreased. • Ensure suction is completed correctly using intermittent suction and catheter rotation. • Evaluate suctioning frequency. • Provide more frequent oral hygiene.
3 Paroxysms of coughing occur.	• Administer supplemental oxygen. • Allow patient to rest between passes of suction catheter. • Consult with physician regarding need for inhaled bronchodilators or topical anesthetics.

Suctioning

Nasopharyngeal, Nasotracheal, and Artificial Airway

Oropharyngeal suctioning removes secretions only from the back of the throat. Tracheal airway suctioning extends into the lower airway to remove respiratory secretions and maintain optimum ventilation and oxygenation in patients who are unable to independently remove these secretions. Patient assessment, not routine suctioning, guides the frequency of airway suctioning (Branson et al., 2014; Urden et al., 2016). Patient assessment factors indicating the need for suctioning include oxygen saturation below 90%; visible secretions in the airway; patient's inability to produce an effective, productive cough; auscultation of coarse crackles over the trachea; and acute respiratory distress.

Delegation Considerations

The skills of nasotracheal suction and suctioning a new artificial airway tube cannot be delegated to nursing assistive personnel (NAP). When the patient has an established tracheostomy and is stable, you can delegate suctioning. The nurse directs the NAP about the following:

- Any unique modifications of the skill, such as the need for supplemental oxygen or the use of a clean-versus-sterile suction technique
- Appropriate suction limits for suctioning tracheostomy tubes (TTs) and risks of applying excessive or inadequate suction pressure
- Signs and symptoms of hypoxemia, such as a change in the patient's respiratory status, confusion, and restlessness, and to report these signs immediately to the nurse
- Reporting any change in secretion quality, quantity, and color

Equipment

- Appropriate-size suction catheter, usually 12 to 16 Fr, (smallest diameter that will remove secretions effectively, preferably one that is no more than half of the internal diameter of the artificial airway to minimize decrease in PaO_2) ([American Association of Respiratory Care \[AARC\], 2010](#); Branson et al., 2014)
- Two sterile gloves or one sterile and one clean glove
- Clean towel or paper drape
- Small Y-adaptor (if catheter does not have a suction control port)

- Sterile basin or solution container
- Sterile normal saline solution or water, about 100 mL
- Pulse oximeter, stethoscope, and end-tidal CO₂ detector
- Manual self-inflating manual resuscitation bag-valve device with appropriate-size mask
- Positive end-expiratory pressure (PEEP) valve for resuscitation bag
- Nasal or oral airway (if indicated)
- Two sterile gloves or one sterile and one clean glove
- Clean towel or paper drape
- Suction machine/source
- Mask, goggles, or face shield
- Connecting tubing (6 feet)
- Small Y-adaptor (if catheter does not have a suction control port)
- Water-soluble lubricant
- Sterile basin
- Sterile normal saline solution or water, about 100 mL
- Pulse oximeter and stethoscope

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Assess vital signs and signs and symptoms associated with hypoxia and hypercapnia: decreased pulse oximetry (SpO₂), increased pulse and blood pressure, apprehension, anxiety, lack of concentration, lethargy, decreased level of consciousness, confusion, dizziness, behavioral changes (e.g., irritability), irregular heart pulse, pallor, and cyanosis (a very late sign of hypoxia). Keep pulse oximeter on patient.

Physical signs and symptoms resulting from decreased tissue oxygenation. Provides presuction baseline to measure patient tolerance to suctioning and effectiveness of suctioning on SpO₂ levels.

Continued

STEP	RATIONALE
3 Assess for risk factors for upper or lower airway obstruction including obstructive lung disease, pulmonary infections, impaired mobility, sedation, decreased level of consciousness, seizures, presence of feeding tube, decreased gag or cough reflex, and decreased swallowing ability.	Risk factors can impair patient's ability to clear secretions from airway, increase risk for retaining secretions, and necessitate nasopharyngeal or nasotracheal suctioning (Urden et al., 2016).
4 Assess factors that affect volume and consistency of secretions: a Fluid balance b Lack of humidity c Infection (e.g., pneumonia)	Thickened or copious secretions increase risk for airway obstruction. Fluid overload increases amount of secretions. Dehydration promotes thicker secretions. The environment influences secretion formation and gas exchange. Patients with respiratory tract infections are prone to increased secretions that are thicker and sometimes more difficult to expectorate.
5 Identify contraindications to nasotracheal suctioning (AARC, 2004): occluded nasal passages; nasal bleeding; epiglottitis or croup; acute head, facial, or neck injury or surgery; coagulopathy or bleeding disorder; irritable airway; laryngospasm or bronchospasm; gastric surgery with high anastomosis; myocardial infarction.	

STEP

- 6 Place pulse oximeter on patient's finger. Take reading, and leave oximeter in place.
- 7 Perform hand hygiene, and apply mask, goggles, or face shield if splashing is likely.
- 8 Connect one end of connecting tubing to suction device and place other end in convenient location near patient. Turn suction device on and set suction pressure to as low a level as possible and yet able to effectively clear secretions. This value is typically between 100 and 150 mm Hg in adults (between 60 and 100 mm Hg in neonates) (AARC, 2010). Suction pressure should not exceed 180 mm Hg (Branson et al., 2014). Occlude end of suction tubing to check pressure.
- 9 Prepare suction catheter.
 - a One-time-use catheter:
 - (1) Using aseptic technique, open suction kit or catheter. If sterile drape is available, place it across patient's chest or on the over-bed table. Do not allow the suction catheter to touch any nonsterile surfaces.

RATIONALE

Provides continuous SpO₂ value to determine patient's response to suctioning.

Reduces transmission of microorganisms.

Ensures equipment function. Excessive negative pressure damages tracheal mucosa and induces greater hypoxia (Wiegand, 2011).

Prepares catheter, maintains asepsis, and reduces transmission of microorganisms. Provides sterile surface on which to lay catheter between passes.

Continued

STEP

- (2) Unwrap or open sterile basin, and place on bedside table. Be careful not to touch inside of basin. Fill with about 100 mL of sterile normal saline solution or water (Fig. 74.1).
 - (3) Open lubricant. Squeeze small amount onto open sterile catheter package without touching package. **NOTE:** *Lubricant is not necessary for artificial airway suctioning.*
 - b Closed (in-line) suction catheter: See Skill 73.
- 10 Apply sterile glove to each hand, or apply nonsterile glove to nondominant hand and sterile glove to dominant hand.

RATIONALE

Saline or water is used to clean tubing after each suction pass.

Prepares lubricant while maintaining sterility. Using water-soluble lubricant helps avoid lipoid aspiration pneumonia. Excessive lubricant occludes catheter.

Reduces transmission of microorganisms and maintains sterility of suction catheter.



Fig. 74.1 Pouring sterile saline into tray.

STEP

- 11 Pick up suction catheter with dominant hand without touching nonsterile surfaces. Pick up connecting tubing with nondominant hand. Secure catheter to tubing (Fig. 74.2).
- 12 Place tip of catheter into sterile basin and suction small amount of normal saline solution from basin by occluding suction vent.
- 13 Suction airway:
 - a **Nasopharyngeal and nasotracheal suctioning:**
 - (1) Have patient take deep breaths, if able, or increase oxygen flow rate with delivery device through cannula or mask (if ordered).

RATIONALE

Maintains catheter sterility.
Connects catheter to suction.

Ensures equipment function.
Lubricates internal catheter and tubing.

May help to decrease risks of hypoxemia.

Continued

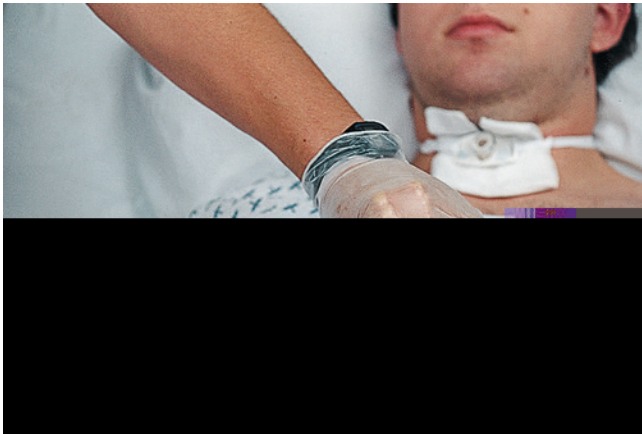


Fig. 74.2 Attaching catheter to suction.

STEP

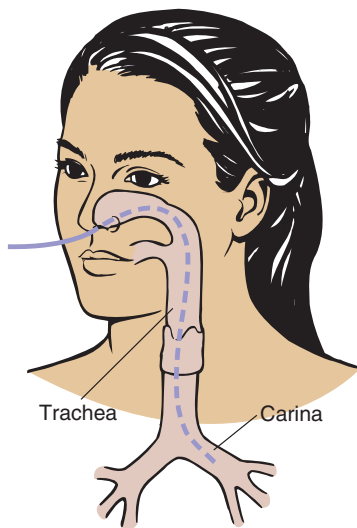
- (2) Lightly coat distal 6 to 8 cm (2 to 3 inches) of catheter with water-soluble lubricant.
- (3) Remove oxygen-delivery device, if applicable, with nondominant hand. Without applying suction and using dominant thumb and forefinger, gently but quickly insert catheter into naris as patient inhales. Do not force through naris (Fig. 74.3).

RATIONALE

Lubricates catheter for easier insertion.

Application of suction pressure while introducing catheter into trachea increases risk for damage to mucosa and increases risk for hypoxia. Passing catheter during inhalation improves likelihood of entering trachea.

Fig. 74.3 Pathway for nasotracheal catheter progression.



STEP

(a) *Nasopharyngeal* (without applying suction): In adults, insert catheter about 16 cm (6.4 inches); in older children, 8 to 12 cm (3 to 5 inches); in infants and young children, 4 to 7.5 cm (1.6 to 3 inches). General rule is to insert catheter distance from tip of nose (or mouth) to angle of mandible. Apply intermittent suction for no more than 15 seconds by placing and releasing nondominant thumb over catheter vent. Slowly withdraw catheter while rotating it back and forth between thumb and forefinger.

RATIONALE

Ensures that catheter tip reaches pharynx for suctioning. Intermittent suction up to 10 to 15 seconds safely removes pharyngeal secretions. Suction time greater than 10 to 15 seconds increases risk for suction-induced hypoxemia (AARC, 2010; Branson et al., 2014).

Continued

STEP	RATIONALE
(b) <i>Nasotracheal</i> (without applying suction): As patient takes deep breath, advance catheter following natural course of naris. Advance catheter slightly slanted and downward to just above entrance into larynx and then trachea. While patient takes deep breath, quickly insert catheter; for adults insert approximately 16 to 20 cm (6 to 8 inches) into trachea. Patient will begin to cough; then pull back catheter 1 to 2 cm ($\frac{1}{2}$ inch) before applying suction. NOTE: In older children, 16 to 20 cm (6 to 8 inches); in infants and young children, 8 to 14 cm (3 to $5\frac{1}{2}$ inches).	Ensures that catheter tip reaches trachea.

STEP

RATIONALE

SAFETY ALERT When there is difficulty passing the catheter, ask patient to cough or say “ahh” or try to advance the catheter during inspiration. Both measures help to open the glottis to permit passage of the catheter into the trachea.

Apply intermittent suction for no more than 10 to 15 seconds by placing and releasing nondominant thumb over catheter vent. Slowly withdraw catheter while rotating it back and forth between thumb and forefinger.

- (4) Positioning: In some instances turning patient’s head helps you suction more effectively. If you feel resistance after insertion of catheter, use caution; it has probably hit the carina. Pull catheter back 1 to 2 cm (1/2 inch) before applying suction (AARC, 2004).

Suction time greater than 15 seconds increases risk for suction-induced hypoxemia (AARC, 2010; Branson et al., 2014). Intermittent suction and rotation of catheter prevents injury to tracheal mucosa. If catheter “grabs” mucosa, remove thumb to release suction.

Turning the patient’s head to side elevates bronchial passage on opposite side. Turning head to right helps with suctioning of left main-stem bronchus; turning head to left helps you suction right main-stem bronchus. Suctioning too deep may cause tracheal mucosa trauma.

SAFETY ALERT Monitor patient’s vital signs and oxygen saturation throughout suction procedure. If the patient’s pulse rate drops more than 20 beats/min or increases more than 40 beats/min, or if SpO₂ falls below 90% or 5% from baseline, stop suctioning.

Continued

STEP

- (5) Rinse catheter and connecting tubing with normal saline or water until cleared.
- (6) Assess for need to repeat suctioning procedure. Do not perform more than two passes with catheter. Observe for alterations in cardiopulmonary status. When possible, allow adequate time (at least 1 minute) between suction passes for ventilation and oxygenation. Encourage patient to deep breathe with oxygen mask in place (if ordered) and cough.

b Artificial airway suctioning:

- (1) When patient has an artificial airway, hyperoxygenate him or her with 100% oxygen for at least 30 to 60 seconds before suctioning by (1) pressing suction hyperoxygenation button on ventilator, or (2) increasing

RATIONALE

Secretions that remain in suction catheter or connecting tubing decrease suctioning efficiency.

Observe for alterations in cardiopulmonary status. Suctioning induces hypoxemia, irregular pulse, laryngospasm, and bronchospasm (AARC, 2010). Hyperoxygenation is recommended before, during, and after open suctioning to reduce suction-induced hypoxemia (Galbiati and Paola, 2015).

Preoxygenation decreases risk of decreased arterial oxygen levels while ventilation or oxygenation is interrupted and volume is lost during suctioning (AARC, 2010). Some models of resuscitation bags do not deliver 100% oxygen; therefore this is not the best way to oxygenate patient (Wiegand, 2011).

STEP

RATIONALE

baseline fraction of inspired oxygen (FiO_2) level on mechanical ventilator, or (3) disconnecting ventilator, attaching self-inflating resuscitation bag-valve-device to tube with nondominant hand (or have assistant do this), and administering 5 to 6 breaths over 30 seconds (or have assistant do this). **NOTE:** Some mechanical ventilators have a button that, when pushed, delivers 100% oxygen for a few minutes and then resets to previous setting.

- (2) If patient is receiving mechanical ventilation, open swivel adapter, or, if necessary, remove oxygen or humidity delivery device with nondominant hand.

Exposes artificial airway.

Continued

STEP

- (3) Advise patient that you are about to begin suctioning. Without applying suction, gently but quickly insert catheter into artificial airway using dominant thumb and forefinger (it is best to try to time catheter insertion into artificial airway with inspiration). Advance catheter until you meet resistance or patient coughs; then pull back 1 cm (0.4 inch) (Wiegand, 2011).
- (4) Apply intermittent suction for 10 to 15 seconds (AARC, 2010; Branson et al., 2014). Apply intermittent suction by placing and releasing nondominant thumb over vent of catheter; slowly withdraw catheter while rotating it back and forth between dominant thumb and forefinger. Do not use suction for greater than 15 seconds. Encourage patient to cough. Watch for respiratory distress.

RATIONALE

Application of suction pressure while introducing catheter into trachea increases risk for damage to tracheal mucosa and increased hypoxia. Pulling back stimulates cough and removes catheter from mucosal wall so catheter is not resting against tracheal mucosa during suctioning. Shallow suctioning is recommended to prevent tracheal mucosa trauma (AARC, 2010; Wiegand, 2011).

Suction time greater than 15 seconds increases risk for suction-induced hypoxemia (AARC, 2010; Branson et al., 2014). Intermittent suction and rotation of catheter prevent injury to tracheal mucosa. If catheter “grabs” mucosa, remove thumb to release suction.

STEP

RATIONALE

- (5) If patient is receiving mechanical ventilation, close swivel adapter, or replace oxygen delivery device. Hyperoxygenate patient for 30 to 60 seconds.
- (6) Rinse catheter and connecting tubing with normal saline until clear. Use continuous suction.
- (7) Assess patient's vital signs, cardiopulmonary status, and ventilator measurements for secretion clearance. Repeat Steps (1) to (6) once or twice more to clear secretions. Allow adequate time (at least 1 full minute) between suction passes.
- (8) When pharynx and trachea are sufficiently cleared of secretions, perform oropharyngeal suctioning to clear mouth of secretions. Do not suction nose again after suctioning mouth.

Reestablishes artificial airway. Helps to decrease risks of hypoxia.

Removes catheter secretions. Secretions left in tubing decrease suctioning efficiency and provide environment for microorganism growth.

Suctioning can induce dysrhythmias, hypoxia, and bronchospasm and impair cerebral circulation or adversely affect hemodynamic stability (Wiegand, 2011).

Removes upper airway secretions. More microorganisms are generally present in mouth. Upper airway is considered "clean" and lower airway is considered "sterile." You can use the same catheter to suction from sterile to clean areas (e.g., tracheal suctioning to oropharyngeal suctioning) but not from clean to sterile areas.

Continued

STEP	RATIONALE
14 Complete postprocedure protocol.	
15 If indicated, readjust oxygen to original level because patient's blood oxygen level should have returned to baseline.	Prevents absorption atelectasis (i.e., tendency for airways to collapse if proximally obstructed by secretions). Prevents oxygen toxicity while allowing patient time to reoxygenate blood.
16 Place unopened suction kit on suction machine table or at head of bed.	Provides immediate access to suction catheter for next procedure.
17 Ask patient if breathing is easier and if congestion is decreased.	Provides subjective confirmation that suctioning procedure has relieved airway.

Recording and Reporting

- Record the amount, consistency, color, and odor of secretions; size of catheter; route of suctioning; and patient's response to suctioning on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record need for hyperoxygenation, type of hyperoxygenation, and % oxygenation used.
- Record patient's and family caregiver's understanding through teach-back.
- Document patient's presuctioning and postsuctioning vital signs, cardiopulmonary status, and ventilation measures on flow sheet in nurses' notes in EHR or chart.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient's respiratory status does not improve.	• Limit length of suctioning. • Determine need for more frequent suctioning, possibly of shorter duration. • Determine need for supplemental oxygen. Supply oxygen between suctioning passes. • Notify health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Bloody secretions are returned after suctioning.	• Determine amount of suction pressure used. May need to be decreased. • Ensure suction completed correctly using proper suction technique and catheter rotation. • Evaluate suctioning frequency. • Provide more frequent oral hygiene.
3 Patient has paroxysms of coughing.	• Administer supplemental oxygen. • Allow patient to rest between passes of suction catheter. • Consult with physician regarding need for inhaled bronchodilators or topical anesthetics.
4 No secretions obtained during suctioning.	• Evaluate patient's fluid status and adequacy of humidification on oxygen delivery device. • Assess for signs of infection. Determine need for chest physiotherapy.

Suprapubic Catheter Care

A suprapubic catheter is a urinary drainage tube inserted surgically into the bladder through the abdominal wall above the symphysis pubis. The catheter may be sutured to the skin, secured with an adhesive material, or retained in the bladder with a fluid-filled balloon similar to an indwelling catheter. Suprapubic catheters are placed when there is blockage of the urethra (e.g., enlarged prostate, urethral stricture, after urologic surgery) and in situations when a long-term urethral catheter causes irritation or discomfort or interferes with sexual functioning.

Delegation and Collaboration

The skill of caring for a newly established suprapubic catheter cannot be delegated to nursing assistive personnel (NAP); however, care of an established suprapubic catheter may be delegated (refer to agency policy). The nurse directs the NAP to do the following:

- Report patient's discomfort related to the suprapubic catheter.
- Empty drainage bag and document urinary output on intake and output (I&O) record.
- Report any change in the amount and character of the urine.
- Report any signs of redness, foul odor, or drainage around catheter insertion site.

Equipment

- Clean gloves (sterile may be needed in some cases, see agency policy)
- Cleaning agent (sterile normal saline solution)
- Sterile cotton-tipped applicators
- Sterile surgical drainage gauze (split gauze)
- Sterile gauze dressing
- Washcloth, towel, soap, and water
- Tape
- Velcro tube holder or tube stabilizer (*optional*)

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol

STEP	RATIONALE
2 Assess urine in drainage bag for amount, clarity, color, odor, and sediment.	Abnormal findings indicate potential complications such as urinary tract infection (UTI), decreased urinary output, and catheter occlusion.
3 Observe dressing for drainage and intactness.	Drainage indicates potential complication such as infection. Dressing may become nonocclusive because of tape choice or drainage.
4 Assess catheter insertion site (may be deferred until you clean site) for signs of inflammation (i.e., pain, erythema, edema, and drainage) and for the growth of over-granulation tissue. Ask patient if there is any pain at site; if so, have him or her rate on scale of 0 to 10.	If insertion is new, slight inflammation may be expected as part of normal wound healing but can also indicate infection. Over-granulation tissue can develop at insertion site as reaction to catheter. In some instances intervention may be needed.
5 Explain procedure to patient.	Reduces anxiety and promotes cooperation.
6 Perform hand hygiene. Apply clean gloves. Loosen tape and remove existing dressing. Note type and presence of drainage. Remove gloves and perform hand hygiene.	Provides baseline for condition of suprapubic wound. Reduces transmission of infection from dressing.
7 Clean insertion site using sterile aseptic technique for newly established catheter (option used less frequently; review agency policy or consider individual patient need).	Catheter site is made surgically and therefore is treated similarly to other incisions, using either aseptic or sterile technique as designated by agency policy.

Continued

STEP

- a Apply sterile gloves.
- b Without creating tension, hold catheter up with nondominant hand while cleaning. Use sterile gauze moistened in saline, and clean skin around insertion site in circular motion, starting near insertion site and continuing in outward widening circles for approximately 5 cm (2 inches) (Fig. 75.1).
- c With fresh, moistened gauze, gently clean base of catheter, moving up and away from site of insertion (proximal to distal).
- d Once insertion site is dry, use sterile gloved hand to apply drain dressing (split gauze) around catheter. Tape in place.

RATIONALE

Moves from area of least contamination to area of most contamination. Tension on catheter may cause discomfort or damage to wall of bladder or catheter to slip out of place.

Removes microorganisms that reside on any drainage that adheres to tubing.

Collects drainage that develops around catheter insertion site.

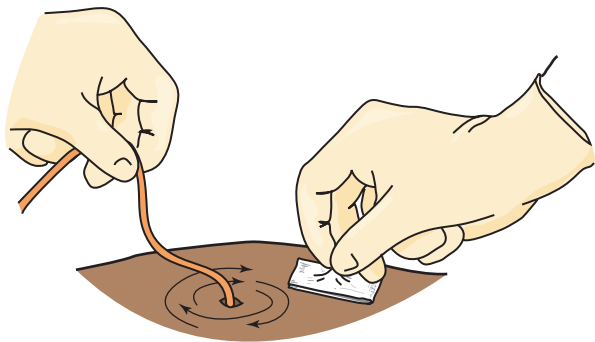


Fig. 75.1 Cleaning around suprapubic catheter in circular pattern.

STEP	RATIONALE
8 Clean using medical aseptic technique for new or established catheter: - Apply clean gloves. - Without creating tension, hold catheter up with nondominant hand while cleaning. Clean with soap and water in circular motion, starting near catheter insertion site and continuing in outward widening circles for approximately 5 cm (2 inches). - With a fresh washcloth or gauze, gently clean base of catheter, moving up and away from site of insertion (proximal to distal). <i>Option:</i> Apply drain dressing (split gauze) around catheter and tape in place. 9 Secure catheter to lateral abdomen with tape or Velcro multipurpose tube holder. 10 Coil excess tubing on bed. Keep drainage bag below level of bladder at all times. 11 Complete postprocedure protocol.	Cleansing and drying suprapubic insertion site requires general hygienic measures; dressing is an option if drainage is not present. Removes microorganisms that reside in any drainage that adheres to tubing. Secures catheter and reduces risk of excessive tension on suture and/or catheter. Maintains free flow of urine, thus decreasing risk for catheter associated urinary tract infections (CAUTI) (Gould et al., 2010).

Recording and Reporting

- Record and report character of urine and type of dressing change, including assessments of insertion site and patient's comfort level with the catheter and dressing change in nurses' notes in the electronic health record (EHR) or chart.

- Record urine output on I&O flow sheet. When there is both a suprapubic and urethral catheter, record outputs from each catheter separately.
- Document your evaluation of patient learning in nurses' notes in EHR or chart.
- Report any signs of urinary tract infection (UTI) or insertion site infection to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient develops symptoms of UTI or catheter site infection.	• Increase fluid intake to at least 2200 mL in 24 hours (unless contraindicated). • Monitor vital signs, I&O; observe amount, color, consistency of urine; assess site.
2 Suprapubic catheter becomes dislodged.	• Notify health care provider. • Cover site with sterile dressing. • Notify health care provider. If newly established catheter, it will need to be reinserted immediately.
3 Skin surrounding catheter exit site becomes red or irritated and/or develops open areas.	• Notify health care provider. • Change dressing (if used) more frequently to keep site dry. • Consult with wound care nurse.

Suture and Staple Removal

The health care provider determines and orders removal of all sutures or staples at one time or removal of every other suture or staple as the first phase, with the remainder removed in the second phase. Sutures and staples are removed generally within 7 to 14 days after surgery if healing is adequate (Whitney, 2016). Retention sutures usually remain in place 14 to 21 days. Timing the removal of sutures and staples is important. They must remain in place long enough to ensure that the initial wound closure has enough strength to support internal tissues and organs. Sutures retained longer than 14 days generally leave suture marks (Whitney, 2016).

Delegation Considerations

The skill of staple and/or suture removal cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Report to the nurse drainage, bleeding, swelling at the site or an elevation in patient's temperature.
- Report to the nurse patient's complaints of pain.
- Provide special hygiene practices following suture removal.

Equipment

- Disposable waterproof biohazard bag
- Sterile suture removal set (forceps and scissors) or sterile staple extractor
- Sterile applicators or antiseptic swabs
- Gauze pads
- Steri-Strips or butterfly adhesive strips
- Clean gloves

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Identify patient with need for suture or staple removal:

Continued

STEP	RATIONALE
- a Check health care provider's order. - b Review specific directions related to suture or staple removal. - c Determine history of conditions that may pose risk for impaired wound healing: advanced age, cardiovascular disease, diabetes, immunosuppression, radiation, obesity, smoking, poor cellular nutrition, very deep wounds, and infection.	Health care provider's order is required for removal of sutures. Indicates specifically which sutures are to be removed (e.g., every other suture). Preexisting health disorders affect speed of healing and sometimes result in dehiscence.
3 Assess patient for history of allergies.	Determines if patient is sensitive to antiseptic or latex.
4 Assess patient's comfort level or pain on a scale of 0 to 10.	Provides baseline of patient's comfort level to determine response to therapy.
5 Assess healing ridge and skin integrity of suture line for uniform closure of wound edges, normal color, and absence of drainage and inflammation.	Indicates adequate wound healing for support of internal structures without continued need for sutures or staples (Whitney, 2016).

SAFETY ALERT If wound edges are separated or signs of infection are present, the wound has not healed properly. Notify the health care provider because sutures or staples may need to remain in place and/or other wound care may need to be initiated.

6 Place cuffed waterproof disposal bag within easy reach. 7 Prepare materials needed for suture/staple removal: - a Open sterile suture removal kit or staple extractor kit.	Provides for easy disposal of contaminated dressings and prevents passing items over sterile work area.

STEP

- b Open sterile antiseptic swabs and place on inside surface of kit.
- c Obtain gloves (sterile gloves if policy indicates).
- 8 Perform hand hygiene.
Apply clean or sterile gloves as required by agency policy.
- 9 Clean sutures or staples and healed incision with antiseptic swabs.

10 Remove staples:

- a Place lower tips of staple extractor under first staple. As you close handles, upper tip of extractor depresses center of staple, causing both ends of staple to be bent upward and simultaneously exit their insertion sites in the dermal layer (Fig. 76.1).
- b Carefully control staple extractor.
- c As soon as both ends of staple are visible, move it away from skin surface, and continue until staple is over refuse bag (Fig. 76.2).

RATIONALE

Reduces transmission of infection.

Removes surface bacteria from incision and sutures or staples.

Avoids excess pressure to suture line and secures smooth removal of each staple.

Avoids suture-line pressure and pain.

Prevents scratching tender skin surface with sharp points of staple, promoting comfort and infection control.

Continued

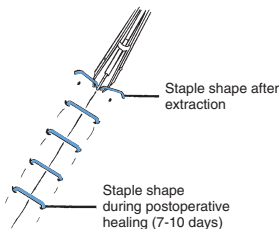
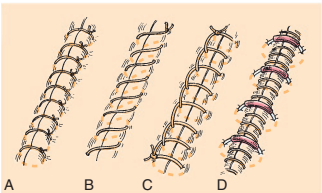


Fig. 76.1 Staple extractor placed under staple.

Fig. 76.2 Metal staple removed by extractor.



Fig. 76.3 Types of sutures. *Left*, Intermittent; *left center*, continuous; *right center*, blanket; *right*, wire.



STEP	RATIONALE
d Release handles of staple extractor, allowing staple to drop into refuse bag. e Repeat Steps a to d until all staples are removed. 11 Remove intermittent sutures (Fig. 76.3): a Place gauze a few inches from suture line. Hold scissors in dominant hand and forceps (clamp) in nondominant hand.	Avoids contaminating sterile field with used staples. Gauze serves as receptacle for removed sutures. Placement of scissors and forceps allows for efficient suture removal.
SAFETY ALERT Placement of scissors and forceps is very important. Avoid pinching the skin around the wound when lifting up the suture. Likewise, avoid cutting the skin around the wound by accident when snipping the suture.	
b Grasp knot of suture with forceps, and gently pull up knot while slipping tip of scissors under suture near skin (Fig. 76.4).	Releases suture.

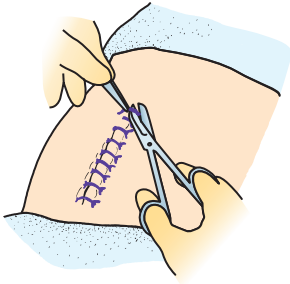


Fig. 76.4 Removal of intermittent suture. Nurse cuts suture as close to skin as possible, away from the knot.

STEP

RATIONALE

- c** Snip suture as close to the skin as possible at end distal to the knot.

SAFETY ALERT Never snip both ends of suture; there will be no way to remove the part of the suture situated below the surface.

- d** Grasp knotted end with forceps, and in one continuous smooth action pull the suture through from the other side. Place removed suture on gauze.
- e** Repeat Steps a through d until you have removed every other suture.
- f** Observe healing level. Based on observations of wound response to suture removal and health care provider's original order, determine whether remaining sutures will be removed at this time. If so, repeat Steps a to d until you have removed all sutures.
- g** If any doubt, stop and notify health care provider.

Smoothly removes suture without additional tension to suture line.

Determines status of wound healing and if suture line will remain closed after all sutures are removed.

Continued

STEP	RATIONALE
12 Remove continuous and blanket stitch sutures: - a Place sterile gauze a few inches from suture line. Grasp scissors in dominant hand and forceps in nondominant hand. - b Snip first suture close to skin surface at end distal to knot. - c Snip second suture on same side. - d Grasp knotted end, and gently pull with continuous smooth action, removing suture from beneath the skin. Place suture on gauze compress. - e Repeat Steps a through d in consecutive order until the entire line is removed. 13 Inspect incision site to make sure that all sutures are removed, and identify any trouble areas. Gently wipe suture line with antiseptic swab to remove debris and cleanse wound. 14 Apply Steri-Strips if <i>any</i> separation greater than two stitches or two staples in width is apparent to maintain contact between wound edges. - a Cut Steri-Strips to allow strips to extend 4 to 5 cm (1½ to 2 inches) on each side of the incision. - b Remove from backing and apply across incision.	Gauze serves as receptacle for removed sutures. Placement of scissors and forceps allows for efficient suture removal. Releases suture. Releases interrupted sutures from knot. Smoothly removes sutures without additional tension to suture line. Prevents pulling of contaminated portion of suture through the skin. Reduces risk for further incision line separation. Supports wound by distributing tension across wound and eliminates closure technique scarring.

STEP	RATIONALE
c Instruct patient to take showers rather than soak in bathtub according to health care provider's preference. 15 Apply light dressing or expose to air if no clothing will come in contact with suture line. Instruct patient about applying own dressing if it will be needed at home. 16 Complete postprocedure protocol.	Steri-Strips are not removed and are allowed to fall off gradually. Healing by primary intention eliminates need for dressing.

Recording and Reporting

- Record the time the sutures or staples were removed and the number of sutures or staples removed; document the cleaning of the suture line, appearance of the wound, level of healing of the wound, and type of dressing applied; document patient's response to suture or staple removal on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding through teach-back about why the sutures were removed today.
- Immediately report to the health care provider if suture line separation, dehiscence, evisceration, bleeding, or purulent drainage occurs.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Retained suture is present.	- Notify health care provider. - Instruct patient to notify health care provider if signs of suture line infection develop following discharge from agency.
2 Patient experiences wound separation or drainage secondary to healing problems.	- Leave remaining sutures or staples in place. - Place supportive butterfly closures across suture line. - Notify health care provider.

Topical Skin Applications

Topical administration of medication involves applying drugs locally to the skin, mucous membranes, or tissues. Topical drugs such as lotions, patches, pastes, and ointments primarily produce local effects; but they can create systemic effects if absorbed through the skin. Apply topical drugs using gloves and applicators to protect from accidental exposure. Always clean the skin or wound thoroughly before applying a new dose of a topical medication. Apply each type of medication, whether an ointment, lotion, powder, or patch, in a specific way to ensure proper penetration and absorption (Lawton, 2013).

Delegation Considerations

The skill of administering most topical medications, including skin patches, cannot be delegated to nursing assistive personnel (NAP). However, some facilities (e.g., long-term care) may allow NAP to apply some forms of topical agents (e.g., skin barriers) to irritated skin or for the protection of the perineum during morning or perineal care. Check agency policies. The nurse instructs the NAP to do the following:

- Report immediately to the nurse any skin irritation, burning, blistering, or increased itching.
- Not apply any dressing over the topical medication unless instructed to do so.

Equipment

- Clean gloves (for intact skin) or sterile gloves (for nonintact skin)
- Cotton-tipped applicators or tongue blades (*optional*)
- Ordered medication (powder, cream, lotion, ointment, spray, patch)
- Basin of warm water, washcloth, towel, nondrying soap
- Sterile dressing, tape
- Felt-tip pen (*optional*)
- Medication administration record (MAR) (electronic or printed)
- Plastic wrap, transparent dressing (if ordered) (*optional*)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

STEP

RATIONALE

- 2 Check accuracy and completeness of each MAR with health care provider's medication order. Check patient's name, drug name and dosage, route of administration, and time for administration. Clarify incomplete or unclear orders with health care provider before administration.
- 3 Assess condition of skin or membrane where medication is to be applied. If there is an open wound, perform hand hygiene and apply clean gloves. First wash site thoroughly with mild, nondrying soap and warm water; then rinse and dry. Also remove any blood, body fluids, secretions, or excretions. Assess for symptoms of skin irritation such as pruritus or burning. Remove gloves when finished.
- 4 Determine amount of topical agent required for application by assessing skin site, reviewing health care provider's order, and reading application directions carefully (a thin, even layer is usually adequate).

The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures that patient receives correct medications (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013). Ensures patient receives correct medication. Handwritten MARs are a source of medication errors ([Institute for Safe Medication Practices \[ISMP\], 2010](#)).

Cleaning site thoroughly promotes a proper assessment of skin surface. Assessment provides baseline to determine change in condition of skin after therapy. Application of certain topical agents can lessen or aggravate these symptoms. Cleaning removes any residual medication from the previous dose, which reduces potential adverse medication reactions or skin irritation ([Cohen, 2013](#)).

An excessive amount of topical agent can chemically irritate skin, negate effectiveness of drug, and/or cause adverse systemic effects such as decreased white blood cell (WBC) counts.

Continued

STEP

- 5 Perform hand hygiene.
If skin is broken (e.g., wound), apply sterile gloves. Otherwise apply clean gloves.

6 Apply topical creams, ointments, and oil-based lotions.

- a Expose affected area while keeping unaffected areas covered.
- b Wash, rinse, and dry affected area before applying medication.
- c If skin is excessively dry and flaking, apply topical agent while skin is still damp.
- d Remove gloves, perform hand hygiene, and apply new clean or sterile gloves.
- e Place required amount of medication in palm of gloved hand and soften by rubbing briskly between hands.

RATIONALE

Reduces transmission of microorganisms.

Provides visualization for application and protects privacy.

Cleaning removes microorganisms from remaining debris and any surface medication (Cohen, 2013).

Increased skin hydration and surface humidity enhance absorption of topical medication (Lawton, 2013).

Sterile gloves are used when applying agents to open, noninfectious skin lesions. Changing gloves prevents cross-contamination of infected or contagious lesions. Gloves also protect you from topical absorption of the medication and subsequent drug effects (Lawton, 2013).

Softening of topical agent makes it easier to spread on skin.

STEP

- f** Tell patient that initial application of agent may feel cold. Once medication is softened, spread it evenly over skin surface, using long, even strokes that follow direction of hair growth. Do not vigorously rub skin. Apply to the thickness specified by manufacturer's instructions.
- g** Explain to patient that skin may feel greasy after application.

7 Apply antianginal (nitroglycerin) ointment.

- a** Remove previous dose paper. Fold used paper containing any residual medication with used sides together and dispose of it in biohazard trash container. Wipe off residual medication with tissue.
- b** Write date, time, and nurse's initials on new application paper.
- c** Antianginal (nitroglycerin) ointments are usually ordered in inches and can be measured on small sheets of paper marked off in 1.25 cm ($\frac{1}{2}$ inch) markings. Unit-dose packages are available. Apply desired number of inches of ointment to paper measuring guide (Fig. 77.1).

RATIONALE

Ensures even distribution and sufficient dosage of medication. Technique prevents irritation of hair follicles.

Ointments often contain oils.

Prevents overdose that can occur with multiple dose papers left in place. Proper disposal protects others from accidental exposure to medication.

Label provides reference to prevent missing doses.

Ensures correct dose of medication.

Continued



Fig. 77.1 Ointment spread in inches over measuring guide.

STEP

- d** Select new application site: Apply nitroglycerin to chest area, back, abdomen, or anterior thigh (Burchum and Rosenthal, 2016). Do not apply on nonintact skin, hairy surfaces, or over scar tissue.
- e** Be sure to rotate application sites.
- f** Apply ointment to skin surface by holding edge or back of the paper measuring guide and placing ointment and wrapper directly on skin. Do not rub or massage ointment into skin (Fig. 77.2).

RATIONALE

Application sites are rotated to reduce skin irritation. Application on nonintact skin may result in increased absorption of medication. Application on hairy surfaces or scar tissue may decrease absorption (Burchum and Rosenthal, 2016).

Minimizes skin irritation.

Minimizes chance of ointment covering gloves and later touching nurse's hands. Medication is designed to absorb slowly over several hours; massaging increases absorption rate.



Fig. 77.2 Nurse applies wrapper with medication to patient's skin.

STEP

- g** Secure ointment and paper with transparent dressing or strip of tape. Apply dressing or plastic wrap only when instructed by pharmacy (Lawton, 2013).

8 Apply transdermal patches (e.g., analgesic, nicotine, nitroglycerin, estrogen).

- a** If old patch is present, remove it and clean area. Be sure to check between skinfolds for patch.

RATIONALE

Prevents staining of clothing or inadvertent removal of medication. Covering topical medications with dressing or plastic wrap increases heat and skin humidity and rate of absorption of medication (Cohen, 2013; Lawton, 2013).

Failure to remove the old patch can result in overdose. Many patches are small, clear, or flesh colored and can be easily hidden between skinfolds. Cleaning removes traces of previous patch.

Continued

STEP	RATIONALE
b Dispose of old patch by folding in half with sticky sides together. Some agencies require patch to be cut before disposal (see agency policy). Dispose of it in biohazard trash bag. c Date and initial outer side of new patch before applying it, and note time of administration. Use a soft-tip or felt-tip marker pen. d Choose a new site that is clean, dry, and free of hair. Some patches have specific instructions for placement locations (e.g., Testoderm patches are placed on scrotum; a scopolamine patch is placed behind the ear; never apply an estrogen patch to breast tissue or waistline). Do not apply patch on skin that is oily, burned, cut, or irritated in any way.	Proper disposal prevents accidental exposure to medication. Visual reminder prevents missing or extra doses. Ballpoint pen damages patch and alters medication delivery. Ensures complete medication absorption. Estrogen patches should never be placed on the breast, genitals, or other reproductive organs. There is a risk for systemic absorption of the hormone, which can increase patient's risk for breast, testicular, or ovarian cancers (Cohen, 2013).
e Carefully remove the patch from its protective covering by pulling off liner. Hold the patch by the edge without touching adhesive edges.	Touching only edges ensures that the patch will adhere and that medication dose has not changed. Removing the protective covering allows the medication to be absorbed through skin.

SAFETY ALERT Never apply heat such as with a heating pad over a transdermal patch because this results in an increased rate of absorption with potentially serious adverse effects (Cohen, 2013; Lawton, 2013).

STEP

RATIONALE

- f** Apply patch. Hold palm of one hand firmly over patch for 10 seconds. Make sure it sticks well, especially around the edges. Apply overlay if provided with patch.
- g** Do not apply to previously used sites for at least 1 week.
- h** Instruct patient that transdermal patches are never to be cut in half; a change in dose would require prescription for new strength of transdermal medication.

Adequate adhesion prevents loss of patch, which results in decreased dose and effectiveness.

Rotation of site reduces skin irritation from medication and adhesive (Lawton, 2013).
Cutting transdermal patch in half would alter intended medication delivery of transdermal system, resulting in inadequate or altered drug levels.

SAFETY ALERT It is recommended to have a daily “patch-free” interval of 10 to 12 hours because tolerance develops if patches are used 24 hours per day every day (Burchum and Rosenthal, 2016). Apply a new patch each morning, leave in place for 12 to 14 hours, and remove in the evening.

9 Administer aerosol sprays (e.g., local anesthetic sprays).

- a** Shake container vigorously. Read container label for distance recommended to hold spray away from area (usually 15 to 30 cm [6 to 12 inches]).
- b** Ask patient to turn face away from spray or briefly cover face with towel while spraying neck or chest.

Mixing ensures delivery of fine, even spray. Proper distance ensures that fine spray hits skin surface. Holding container too close results in thin, watery distribution.

Prevents inhalation of spray.

Continued

STEP	RATIONALE
c Spray medication evenly over affected site (in some cases, time the spray for a period of seconds).	Ensures that affected area of skin is medicated.
10 Apply suspension-based lotion. a Shake container vigorously. b Apply small amount of lotion to small gauze dressing or pad, and apply to skin by stroking evenly in direction of hair growth. c Explain to patient that area will feel cool and dry.	Mixes powder throughout liquid to form well-mixed suspension. Method of application leaves protective film of powder on skin after water base of suspension dries. Technique prevents irritation to hair follicles.
11 Apply powder. a Be sure that skin surface is thoroughly dry. With your nondominant hand, fully spread apart any skinfolds such as between toes or under axilla and dry with towel. b If area of application is near face, ask patient to turn face away from powder or briefly cover face with towel. c Dust skin site lightly with dispenser so area is covered with fine, thin layer of powder. <i>Option:</i> Cover skin area with dressing if ordered by health care provider.	Water evaporates to leave thin layer of powder. Minimizes caking and crusting of powder. Fully exposes skin surface for application. Prevents inhalation of powder. Thin layer of powder has slight lubricating properties, which reduces friction and promotes drying (Burchum and Rosenthal, 2016).
12 Complete postprocedure protocol.	

Recording and Reporting

- Record actual time that each drug was administered, type of agent applied, strength, and site of application in MAR immediately after administration, not before. Include initials or signature.
- Record patient's response to medication, patient teaching, and validation of patient's understanding on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Describe condition of skin before each application on flow sheet or in nurses' notes in EHR or chart.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider. Depending on medication, immediate health care provider notification may be required.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin site appears inflamed and edematous with blistering and oozing of fluid from lesions. 2 Patient is unable to explain information about drug or does not administer as prescribed.	• Hold medication. • Notify health care provider; alternative therapies may be needed. • Identify possible reasons for noncompliance and explore alternative approaches or options.

Tracheostomy Care

A tracheostomy is a surgical or percutaneous creation of a stoma through the neck and into the trachea that allows for the insertion of an artificial airway called a *tracheostomy tube* (TT). A TT offers advantages over long-term endotracheal tube (ET) placement such as decreased risk of laryngeal and tracheal injury, less sedation, shorter ventilator weaning time (time it takes to get a patient off a ventilator) ([Durbin, 2010](#)), and improved comfort for the patient.

TTs are curved and are commonly made of a synthetic material such as polyvinyl chloride (PVC), silicone, or polyurethane. Metal tubes are rarely used because of their increased costs, their rigidity, and their lack of a cuff. A TT is cuffed or uncuffed. Uncuffed tubes allow patients the ability to clear the airway, but they provide no protection from aspiration ([Hess and Altobelli, 2014](#); [Myatt, 2015](#)). Some TTs allow a patient to speak. However, these tubes must be used with caution; only patients who can swallow without aspiration should use them. Nurses also need to monitor for emergency events such as tube obstruction or dislodgment.

Delegation Considerations

The skill of performing tracheostomy care is not routinely delegated to nursing assistive personnel (NAP). In some settings, patients who have well-established tracheostomy tubes may have the care delegated to an NAP. The nurse is responsible for assessing a patient and evaluating for proper artificial airway care. The nurse directs the NAP to do the following:

- Immediately report any changes in patient's respiratory status, level of consciousness, confusion, restlessness, irritability, or level of comfort.
- Immediately report any dislodgment or excessive movement of the tracheostomy tube.
- Immediately report abnormal color of tracheal stoma and drainage.

Equipment

- Bedside table
- Person to help change the tracheostomy tie/holder
- Towel
- Artificial airway suction supplies (see [Skill 74](#))
- Oropharyngeal suction supplies

- Sterile tracheostomy care kit, if available (be sure to collect supplies listed that are not available in kit), or two sterile 4 × 4-inch gauze pads
- Sterile cotton-tipped applicators
- Sterile tracheostomy dressing (precut and sewn surgical dressing)
- Sterile basin
- Sterile normal saline or water
- Small sterile brush (pipe cleaner) (or disposable inner cannula)
- Roll of twill tape, tracheostomy ties, or commercial tracheostomy holder
- Scissors
- Inner cannula that fits the patient's TT
- Pulse oximeter, end-tidal CO₂ detector
- Clean gloves (two pair)
- Personal protective equipment; goggles if concern regarding contact with secretions
- Self-inflating manual resuscitation bag-valve-device and appropriate-size mask
- Extra sterile tracheostomy kit

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.
- 2 Observe for excess peristomal secretions, excess intratracheal secretions, soiled or damp tracheostomy ties, soiled or damp tracheostomy dressing, diminished airflow through tracheostomy tube, or signs and symptoms of airway obstruction requiring suctioning.
- 3 Perform hand hygiene, and apply clean gloves and face shield if applicable.

Indicate need for tracheostomy care caused by presence of secretions at stoma site or within tracheostomy tube. Irritation of mucosa caused by tube itself can also cause increase in secretions (Wiegand, 2011).

Reduces transmission of microorganisms.

Continued

STEP

- 4 Preoxygenate patient for 30 seconds or ask patient to take 5 to 6 deep breaths. Then suction tracheostomy (see Skill 74). Before removing gloves, remove soiled tracheostomy dressing and discard in glove with coiled catheter.
- 5 Perform hand hygiene. Prepare equipment on bedside table.
 - a Open sterile tracheostomy kit. Open two 4 × 4-inch gauze packages using aseptic technique, and pour normal saline on one package. Leave second package dry. Open two cotton-tipped swab packages, and pour normal saline on one package. Do not recap normal saline.
 - b Open sterile tracheostomy dressing package.
 - c Unwrap sterile basin, and pour about 1 to 2 cm ($\frac{1}{2}$ to 1 inch) of normal saline into it.
 - d Open small sterile brush package, and place aseptically into sterile basin.
 - e Prepare TT fixation device:

RATIONALE

Removes secretions to avoid occluding outer cannula while inner cannula is removed. Reduces need for patient to cough.

Allows for smooth, organized completion of tracheostomy care.

Cutting ends of tie on diagonal aids in inserting tie through eyelet.

STEP

RATIONALE

- (1) Prepare length of twill tape long enough to encircle patient's neck two times, about 60 to 75 cm (24 to 30 inches) for an adult. Cut ends on diagonal. Lay aside in dry area.
 - (2) If using commercially available tracheostomy tube holder, open package according to manufacturer's directions.
- 6 Hyperoxygenate patient's lungs using ventilator setting or by applying oxygen source loosely over tracheostomy.
 - 7 Apply sterile gloves. Keep dominant hand sterile throughout procedure.

8 Care of tracheostomy with inner cannula:

- a While touching only the outer aspect of tube, unlock and remove inner cannula with nondominant hand. Drop inner cannula into normal saline basin.
- b Place tracheostomy collar, T tube, or ventilator oxygen source over outer cannula. (NOTE: May not be able to attach T tube and ventilator oxygen devices to all outer cannulas when the inner cannula is removed.)

Required if patient has oxygen saturation levels less than 92%. Helps to reduce amount of oxygen desaturation. Reduces transmission of microorganisms.

Removes inner cannula for cleaning. Normal saline loosens secretions from inner cannula.

Maintains supply of oxygen to patient as needed.

Continued

STEP

- c To prevent oxygen desaturation in affected patients, quickly pick up inner cannula and use small brush to remove secretions inside and outside inner cannula.
- d Hold inner cannula over basin, and rinse with normal saline, using nondominant hand to pour normal saline.
- e Replace inner cannula, and secure “locking” mechanism (Fig. 78.1). Reapply ventilator after hyperventilating the patient’s lungs if needed.

RATIONALE

Tracheostomy brush provides mechanical force to remove thick or dried secretions.

Removes secretions and normal saline from inner cannula.

Secures inner cannula and reestablishes oxygen supply.



Fig. 78.1 Reinserting the inner cannula.

STEP

RATIONALE

9 Tracheostomy with disposable inner cannula:

- a** Remove new cannula from manufacturer's packaging.
- b** While touching only the outer aspect of the tube, withdraw inner cannula, and replace with new cannula. Lock into position.
- c** Dispose of contaminated cannula in appropriate receptacle, and reconnect to ventilator or oxygen supply.

Prevents transmission of infection. Restores oxygen delivery.

- 10** Using normal saline–saturated cotton-tipped swabs and 4 × 4–inch gauze, clean exposed outer cannula surfaces and stoma under faceplate extending 5 to 10 cm (2 to 4 inches) in all directions from stoma. Clean in circular motion from stoma site outward using dominant hand to handle sterile supplies.

Aseptically removes secretions from stoma site. Moving in outward circle pulls mucus and other contaminants from stoma to periphery.

- 11** Using dry 4 × 4–inch gauze, pat lightly at skin and exposed outer cannula surfaces.

Dry surfaces prohibit formation of moist environment for microorganism growth and skin excoriation (Higgins, 2009b).

- 12** Secure tracheostomy.

a Tracheostomy tie method:

- (1)** Instruct assistant, if available, to apply gloves and securely hold tracheostomy tube in place. With

Promotes hygiene and reduces transmission of microorganisms. Secures tracheostomy tube. Reduces risk for incidental extubation.

Continued

STEP	RATIONALE
assistant holding tracheostomy tube, cut old ties.	
SAFETY ALERT Assistant must not release hold on TT until new ties are firmly tied. If working without an assistant, do not cut old ties until new ties are in place and securely tied. When ties are off, this is a good time to clean the back of the patient's neck and assess patient's skin under TT flange and under the ties or tube holder, making sure that skin is intact, free of pressure, and dry before applying securement device.	
(2) Take prepared tie, insert one end of tie through faceplate eyelet, and pull ends even (Fig. 78.2).	Diagonal cuts ensure ease of threading end of tie through holes of eyelet (Wiegand, 2011).



Fig. 78.2 Replacing tracheostomy tube ties. Do not remove old tracheostomy tube ties until new ones are secure.

STEP

- (3) Place narrow end of ties under and through the faceplate eyelets. Pull ends even, and secure with the Velcro closures.
 - (4) Verify that there is space for only one loose or two snug finger widths under neck strap (Fig. 78.3).
- 13 Position patient comfortably, and assess respiratory status.

RATIONALE

Promotes comfort. Some patients require post-tracheostomy care suctioning.



Fig. 78.3 Tracheostomy tube holder in place. (Courtesy Dale Medical Products, Plainville, MA.)

STEP**RATIONALE**

- 14 Be sure that oxygen or humidification delivery sources are in place and set at correct levels.
- 15 Assess fit of new tracheostomy ties and ask patient if tube feels comfortable.
- 16 Inspect inner and outer cannulas for secretions.
- 17 Assess stoma for signs of inflammation, edema, or discolored secretions.
- 18 Complete postprocedure protocol.

Humidification provides moisture for airway, makes it easier to suction secretions, and decreases risk of mucus plugs.

Tracheostomy ties are uncomfortable and place patient at risk for injury when they are too loose or too tight.

Presence of secretions on cannulas indicates need for more frequent tracheostomy care.

Broken skin places patient at risk for infection. Stoma infection necessitates change in tracheostomy skin care plan.

Recording and Reporting

- Record respiratory assessments before and after care; type and size of tracheostomy tube and inner cannula; frequency and extent of care, including inner cannula, dressing and securement device changes; type, color, and amount of secretions; patient tolerance and understanding of procedure; and special care in event of unexpected outcomes in nurses' notes in EHR or chart.
- Record condition of stoma and skin around stoma site and under dressing.
- Record any interventions that were performed to address patient complications.
- Record patient's and family caregiver's understanding through teach-back.
- Report accidental decannulation or respiratory distress to the health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Excessively loose or tight tracheostomy ties/tracheostomy holder. 2 Inflammation of the tracheostomy stoma. 3 Cuff leak develops. 4 Accidental decannulation.	• Adjust ties, or apply new ties/tracheostomy holder. • Increase frequency of tracheostomy care. • Apply topical antibacterial solution, and allow it to dry and provide bacterial barrier. • Apply hydrocolloid or transparent dressing just under stoma to protect skin from breakdown. • Consult with skin care specialist. • Verify position of tube, notify respiratory therapy, and follow agency policy. • Call for assistance. • Replace old tracheostomy tube with new tube. Some experienced nurses or respiratory therapists may be able to quickly reinsert tracheostomy tube. • Keep spare tracheostomy tube of same size and kind at bedside in event of emergency replacement. • Same-size endotracheal (ET) tube can be inserted in stoma in an emergency. • Insert suction catheter to confirm that the new tube is in the trachea.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
5 Respiratory distress from mucous plug in cannula.	• Be prepared to manually ventilate lungs of patients in whom respiratory distress develops with Ambu bag until tracheostomy is replaced. • Notify health care provider. • Remove inner cannula, if applicable, for cleaning, or suction cannula. • Notify health care provider if tracheostomy tube requires replacement.

Urinary Catheter Insertion

Urinary catheterization is the placement of a tube through the urethra into the bladder to remove urine. This is an invasive procedure that requires a medical order and sterile technique (Lo et al., 2014). Urinary catheterization may be short term (2 weeks or less) or long term (more than 2 weeks) (Geng et al., 2012). The steps for inserting an indwelling and a single-use straight catheter are the same. The difference lies in the inflation of a balloon to keep the indwelling catheter in place and the presence of a closed drainage system.

For patients requiring long-term catheterization (i.e., urinary retention or critical illness), catheter changes should be individualized, not routine (Geng et al., 2012). Catheters should be changed for leaking or blockage and before obtaining a sterile specimen for urine culture (Geng et al., 2012). Long-term catheterization should be avoided because of its association with urinary tract infections (UTIs). Every effort should be made to remove catheters as soon as the patient can void (Lo et al., 2014).

An indwelling catheter is attached to a urinary drainage bag to collect the continuous flow of urine. Always hang the bag below the level of the bladder on the bed frame or a chair so urine drains down, out of the bladder. The bag should never touch the floor.

Delegation Considerations

The skill of inserting a straight or indwelling urinary catheter cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Help the nurse with patient positioning, focus lighting for the procedure, maintain privacy, empty urine from collection bag, and help with perineal care.
- Report postprocedure patient discomfort or fever to the nurse.
- Report abnormal color, odor, amount of urine in drainage bag and if the catheter is leaking or causes pain.

Equipment

- Catheter kit containing sterile items: (**NOTE:** Catheter kits vary.)
 - Straight catheterization kit: single-lumen catheter, drapes (one fenestrated—has an opening in the center), sterile gloves,

- lubricant, cleaning solution incorporated in an applicator or to be added to cotton balls, and specimen container
- Indwelling catheterization kit: drapes (one fenestrated—has an opening in the center), gloves, lubricant, antiseptic cleaning solution incorporated in an applicator or to be added to cotton balls, specimen container, and a prefilled syringe with sterile water (to inflate balloon). Some kits contain a catheter with attached drainage bag; others contain only a catheter; others have no catheter.
- Sterile drainage tubing and bag (if not included in indwelling catheter insertion kit)
- Device to secure catheter (catheter strap or other device)
- Extra sterile gloves and catheter (optional)
- Clean gloves
- Basin with warm water, washcloth, towel, and soap for perineal care
- Flashlight or other additional light source
- Bath blanket, waterproof absorbent pad
- Measuring container for urine

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Assess for pain and bladder fullness. Palpate bladder over symphysis pubis, or use bladder scanner (if available).	Palpation of full bladder causes pain and/or urge to void, indicating full or overfull bladder.
3 Perform hand hygiene.	Reduces transmission of microorganisms.
4 Raise bed to appropriate working height. If side rails in use, raise side rail on opposite side of bed and lower side rail on working side.	Promotes good body mechanics. Use of side rails in this manner promotes patient safety.
5 Position patient:	
a Female patient:	
(1) Help to dorsal recumbent position (on back with knees	Exposes perineum and allows hip joints to be externally rotated.

Continued

STEP

RATIONALE

flexed). Ask patient to relax thighs so you can rotate hips.

- (2) Alternate female position: Position patient in side-lying (Sims') position with upper leg flexed at knee and hip. Support patient with pillows if necessary to maintain position.

b Male patient:

- (1) Position supine with legs extended and thighs slightly abducted.

6 Perform perineal care:

a Female patient:

- (1) Drape with bath blanket. Place blanket diamond fashion over patient, with one corner at patient's midsection, side corners over each thigh and abdomen, and last corner over perineum.

b Male patient:

- (1) Drape patient by covering upper part of body with small sheet or towel; drape with separate sheet or bath blanket so that only perineum is exposed.

Alternate position is more comfortable if patient cannot abduct leg at hip joint (e.g., patient has arthritic joints or contractures).

Comfortable position for patient aids in visualization of penis.

Protects patient dignity by avoiding unnecessary exposure of body parts.

STEP

RATIONALE

7 Apply clean gloves. Wash perineal area with soap and water, rinse, and dry. Use gloves to examine patient and identify urinary meatus. Remove and discard gloves. 8 Position light to illuminate genitals, or have assistant available to hold light source to visualize urinary meatus. 9 Open outer wrapping of catheterization kit. Place inner wrapped catheter kit tray on clean, accessible surface such as bedside table or, if possible, between patient's open legs. Patient's size and positioning dictate exact placement. 10 Open inner sterile wrap covering tray containing catheterization supplies, using sterile technique. Fold back each flap of sterile covering one at a time, with the last flap opened toward patient. a Indwelling catheterization open system: Open separate package containing drainage bag, check to make sure that clamp on drainage port is closed, and place drainage bag and tubing in an easily accessible location. Open outer package of sterile catheter, maintaining sterility of inner wrapper.	Hygiene before initiating aseptic catheter insertion removes secretions, urine, and feces that could contaminate sterile field and increase risk for catheter-associated urinary tract infection (CAUTI). Adequate visualization of urinary meatus helps with speed and accuracy of catheter insertion. Provides easy access to supplies during catheter insertion. Sterile wrap serves as sterile field. Open drainage bag systems have separate sterile packaging for sterile catheter, drainage bag and tubing, and insertion kit.

Continued

STEP	RATIONALE
b Indwelling catheterization closed system: All supplies are in sterile tray and are arranged in sequence of use. c Straight catheterization: All needed supplies are in sterile tray that contains supplies and can be used for urine collection. 11 Put on sterile gloves. (Or apply sterile drape with ungloved hands when drape is packed as first item. Touch only edges of drape. Then apply sterile gloves.) 12 Drape perineum, keeping gloves and field sterile.	Closed drainage bag systems have catheter preattached to drainage tubing and bag. Maintains surgical asepsis. Sterile drapes provide sterile field over which you will work during catheterization.
a Drape female: (1) Pick up square sterile drape touching only edges (2.5 cm [1 inch]). (2) Allow drape to unfold without touching unsterile surfaces. Allow top edge of drape (2.5 to 5 cm [1 to 2 inches]) to form cuff over both hands. (3) Place drape with shiny side down on bed between patient's thighs. Slip cuffed edge just under buttocks as you ask patient to lift hips.	When creating the cuff over sterile gloved hands, sterility of gloves and workspace is maintained.

STEP

RATIONALE

Take care not to touch contaminated surfaces with sterile gloves. If gloves are contaminated, remove and apply new pair.

- (4) Pick up fenestrated sterile drape out of tray. Allow drape to unfold without touching unsterile surfaces. Allow top edge of drape to form cuff over both hands. Apply drape over perineum, exposing labia.

b Drape male:

- (1) Use of square sterile drape is optional; you may apply a fenestrated drape instead.
- (2) Pick up edges of square drape and unfold without touching unsterile surfaces. Place over thighs, with shiny side down, just below penis.
- (3) Place fenestrated drape with opening centered over penis.

Opening in drape creates sterile field around labia.

Creates sterile field.

Continued

STEP

- 13 Move tray closer to patient. Arrange remaining supplies on sterile field, maintaining sterility of gloves. Place sterile tray with cleaning medium (premoistened swab sticks or cotton balls, forceps, and solution), lubricant, catheter, and prefilled syringe for inflating balloon (indwelling catheterization only) on sterile drape.
- a If kit contains sterile cotton balls, open package of sterile antiseptic solution and pour over cotton balls. Some kits contain a package of premoistened swab sticks. Open end of package for easy access.
 - b Open sterile specimen container if specimen will be obtained.
 - c For indwelling catheterization, open sterile wrapper of catheter and leave catheter on sterile field. If part of a closed system kit, remove tray with catheter and preattached drainage bag and place on sterile drape. Make sure that clamp on drainage port of bag is closed. If needed and if part of sterile tray, attach catheter to drainage tubing.

RATIONALE

Use of sterile supplies and antiseptic solution reduces risk of CAUTI (Geng et al., 2012; Gould et al., 2010).

Makes container accessible to receive urine from catheter if specimen is needed. Indwelling catheterization trays vary. Some have preattached catheters; others need to be attached but are part of the sterile tray; others do not have catheter or drainage system as part of tray.

STEP

- d Open packet of lubricant and squeeze out on sterile field. Lubricate catheter tip by dipping it into water-soluble gel 2.5 to 5 cm (1 to 2 inches) for women and 12.5 to 17.5 cm (5 to 7 inches) for men.
- 14 Cleanse urethral meatus:
 - a **Female patient:**
 - (1) Separate labia with fingers of nondominant hand (now contaminated) to fully expose urethral meatus.
 - (2) Maintain position of nondominant hand throughout procedure.
 - (3) Holding forceps in dominant hand, pick up one moistened cotton ball or pick up one swab stick at a time. Clean labia and urinary meatus from clitoris toward anus. Use new cotton ball or swab for each area that you clean. Clean by wiping labial fold, near labial fold, and directly over center of urethral meatus.

RATIONALE

Lubrication minimizes trauma to urethra and discomfort during catheter insertion. Male catheter needs enough lubricant to cover length of catheter inserted.

Optimal visualization of urethral meatus is possible.

Closure of labia during cleaning means that area is contaminated and requires cleaning procedure to be repeated.

Front-to-back cleaning moves from area of least contaminated toward highly contaminated area. Follows principles of medical asepsis. Dominant gloved hand remains sterile.

Continued

STEP

b Male patient:

- (1) With nondominant hand (now contaminated) retract foreskin (if uncircumcised) and gently grasp penis at shaft just below glans. Hold shaft of penis at right angle to body. This hand remains in this position for remainder of procedure.
 - (2) Using uncontaminated dominant hand, clean the meatus with cotton balls/swab sticks, using circular strokes, beginning at the meatus and working outward in a spiral motion.
 - (3) Repeat cleansing three times using clean cotton ball/swab stick each time.
- 15 Pick up and hold catheter 7.5 to 10 cm (3 to 4 inches) from catheter tip with catheter loosely coiled in palm of hand. If catheter is not attached to drainage bag, make sure to position urine tray so end of catheter can be placed there once insertion begins.

RATIONALE

When grasping shaft of penis, avoid pressure on dorsal surface to prevent compression of urethra.

Losing grasp during cleaning means that area is contaminated and requires cleaning procedure to be repeated.

Circular cleaning pattern follows principles of medical asepsis.

Holding catheter near tip allows for easier manipulation during its insertion. Coiling catheter in palm prevents distal end from striking nonsterile surface.

STEP

16 Insert catheter: Explain to patient that feeling of burning, pinching, or pressure may be experienced as catheter is inserted into urethra. This sensation is normal and will go away quickly.

a Female patient:

- (1)** Ask patient to bear down gently and slowly; insert catheter through urethral meatus (Fig. 79.1).
- (2)** Advance catheter total of 5 to 7.5 cm (2 to 3 inches) or until urine flows out of catheter. When urine appears, advance catheter another 2.5 to 5 cm (1 to 2 inches). Do not use force to insert catheter.
- (3)** Release labia and hold catheter securely with nondominant hand.

b Male patient:

- (1)** Lift penis to position perpendicular to patient's body, and apply light traction (Fig. 79.2).
- (2)** Ask patient to bear down as if to void and slowly insert catheter through urethral meatus.

RATIONALE

Helps to minimize patient anxiety.

Bearing down may help visualize urinary meatus and promotes relaxation of external urinary sphincter, aiding in catheter insertion.

Urine flow indicates that catheter tip is in bladder or lower urethra.

Prevents accidental expulsion of catheter.

Straightens urethra to ease catheter insertion.

Relaxation of external sphincter aids in insertion of catheter.

Continued

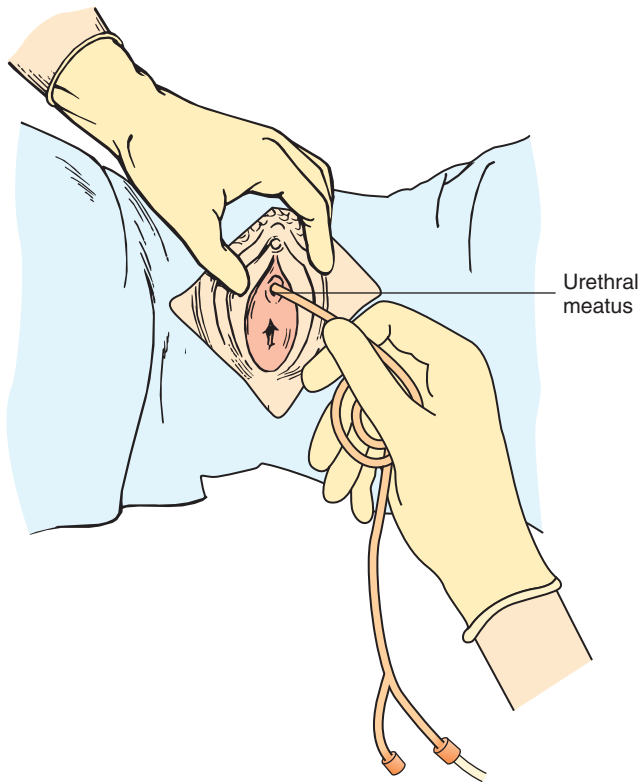


Fig. 79.1 Inserting the catheter.

STEP

(3) Advance catheter 17 to 22.5 cm (7 to 9 inches) or until urine flows out end of catheter.

RATIONALE

There are variations in length of male urethra. Flow of urine indicates that tip of catheter is in bladder or urethra but not necessarily that the balloon portion of an indwelling catheter is in bladder.

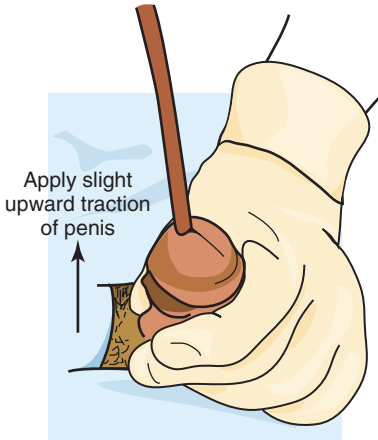


Fig. 79.2 Inserting catheter into male urinary meatus.

STEP

- (4) Stop advancing with a straight catheter. When urine appears in an indwelling catheter, advance it to bifurcation (inflation and deflation ports exposed) (Fig. 79.3).
 - (5) Lower penis, and hold catheter securely in nondominant hand.
- 17 Inflate catheter balloon fully with amount of fluid designated by manufacturer.
- a Continue to hold catheter with nondominant hand.

RATIONALE

Further advancement of catheter to bifurcation of drainage and balloon inflation port ensures that balloon part of catheter is not still in prostatic urethra (Méndez-Probst et al., 2012).

Prevents accidental dislodgment of catheter.

Indwelling catheter balloon should not be underinflated. Underinflation causes balloon distortion and potential bladder damage (Geng et al., 2012).

Holding on to catheter before inflating balloon prevents expulsion of catheter from urethra.

Continued

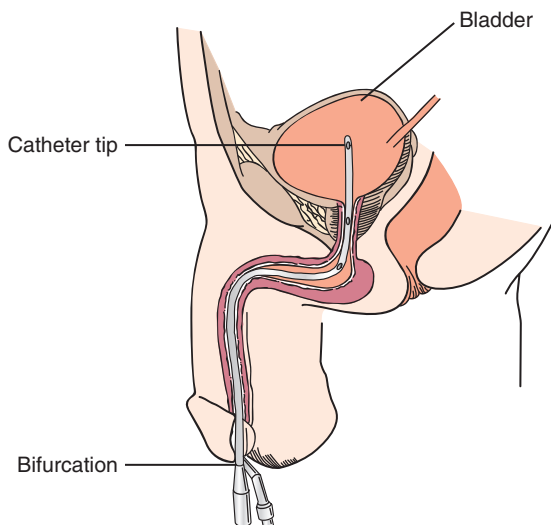


Fig. 79.3 Male anatomy with correct catheter insertion to the bifurcation of the drainage and balloon inflation port.

STEP

- b With free dominant hand, connect prefilled syringe to injection port at end of catheter.
- c Slowly inject total amount of solution.
- d After inflating balloon, release catheter from nondominant hand. Gently pull catheter until resistance is felt. Then advance catheter slightly.
- e Connect drainage tubing to catheter if it is not already preconnected.

RATIONALE

By moving catheter slightly back into bladder, pressure on bladder neck is avoided.

STEP

RATIONALE

SAFETY ALERT If patient complains of sudden pain during inflation of a catheter balloon or resistance is felt when inflating the balloon, stop inflation, allow the fluid from the balloon to flow back into the syringe, advance catheter farther, and reinflate balloon. The balloon may have been inflating in the urethra. If pain continues, remove catheter and notify health care provider.

- 18 Secure indwelling catheter with catheter strap or other securement device. Leave enough slack to allow leg movement. Attach securement device at tubing just above catheter bifurcation.

a Female patient:

- (1) Secure catheter tubing to inner thigh, allowing enough slack to prevent tension.

b Male patient:

- (1) Secure catheter tubing to upper thigh or lower abdomen (with penis directed toward chest). Allow slack in catheter so that movement does not create tension on catheter.
- (2) If retracted, replace foreskin over glans penis.

Securing catheter reduces risk of urethral erosion, CAUTI, or accidental catheter removal (Geng et al., 2012; Gould et al., 2010). Attachment of securement device at catheter bifurcation prevents occlusion of catheter.

Anchoring catheter reduces traction on urethra and minimizes urethral injury (Geng et al., 2012).

Leaving foreskin retracted can cause discomfort and dangerous edema.

Continued

STEP	RATIONALE
19 Clip drainage tubing to edge of mattress. Position drainage bag lower than bladder by attaching to bed frame. Do not attach to side rails of bed.	Drainage bags that are below level of bladder ensure free flow of urine, thus decreasing risk for CAUTI (Geng et al., 2012; Gould et al., 2010). Bags attached to movable objects such as side rail increase risk for urethral trauma because of pulling or accidental dislodgement. Obstruction to flow of urine increases risk for CAUTI (Geng et al., 2012; Gould et al., 2010). Determines if urine is flowing adequately.
20 Check to make sure that there is no obstruction to urine flow. Coil excess tubing on bed, and fasten to bottom sheet with clip or other securement device.	
21 Provide hygiene as needed. Help patient to comfortable position.	
22 Observe character and amount of urine in drainage system.	
23 Complete postprocedure protocol.	

Recording and Reporting

- Record and report the reason for catheterization, type and size of catheter inserted, amount of fluid used to inflate balloon, specimen collection (if applicable), characteristics and amount of urine, patient's response to procedure, and any education in nurses' notes in the electronic health record (EHR) or chart.
- Record amount of urine on intake and output (I&O) flow sheet record in the EHR or chart.
- Report persistent catheter-related pain, inadequate urine output, and discomfort to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Catheter goes into vagina	• Leave catheter in vagina. • Clean urinary meatus again. Using another catheter kit, reinsert sterile catheter into meatus (check agency policy). NOTE: If gloves become contaminated, start procedure over. • Remove catheter in vagina once functional catheter is inserted.
2 Sterility is broken during catheterization by nurse or patient.	• Replace gloves if contaminated and start over. • If patient touches sterile field but equipment and supplies remain sterile, avoid touching that part of sterile field. • If equipment and/or supplies become contaminated, replace with sterile items or start over with new sterile kit.
3 Patient complains of bladder discomfort, and catheter is patent as evidenced by adequate urine flow.	• Check catheter to ensure that there is no traction on it. • Notify health care provider. Patient may be experiencing bladder spasms or symptoms of UTI. • Monitor catheter output for color, clarity, odor, and amount.

Urinary Catheter Care and Removal

Providing regular perineal hygiene, preventing catheter-related trauma, and removing indwelling catheters as soon as possible are important interventions to reduce risk of catheter-associated urinary tract infection (CAUTI) (Gould et al., 2010; Lo et al., 2014; Meddings et al., 2013). Prolonged indwelling catheterization is a major risk factor for CAUTI. When removing an indwelling catheter, it is important to ensure that the catheter balloon is fully deflated to minimize trauma to the urethra. All patients should have their voiding monitored after catheter removal for at least 24 to 48 hours by using a voiding record or bladder diary.

Delegation Considerations

The skill of performing routine catheter care can be delegated to nursing assistive personnel (NAP). The skill of removing an indwelling catheter can be delegated to NAP (see agency policy); however, the nurse must first assess a patient's status and verify the order. The nurse directs the NAP to do the following:

- Report characteristics of the urine (color, clarity, odor, and amount) before and after removal.
- Report the condition of the patient's genital area (e.g., color, rashes, open areas, odor, soiling from fecal incontinence, trauma to tissues around urinary meatus).
- If allowed to remove catheter, check size of balloon and syringe needed to deflate balloon and report if balloon does not deflate and if there is bleeding after removal.
- Report time and amount of first voiding after catheter is removed.
- Report patient complaints of fever, chills, burning, flank pain, back pain, and blood in the urine.
- Report patient complaints of dysuria, hematuria, urgency, frequency, lower abdominal pain, change in mental status, and lethargy.

Equipment

Catheter Care

- Clean gloves
- Waterproof pad
- Bath blanket

- Soap, washcloth, towel, and basin filled with warm water.
- Chlorhexidine 2% cloth (*optional*)

Removing a Catheter

- 10-mL or larger syringe without needle (Information on balloon size [mL] is printed directly on balloon inflation valve.)
- Graduated cylinder to measure urine
- Toilet, bedside commode, urine “hat,” urinal, or bedpan
- Bladder scanner (if indicated)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	
2 Preparation for catheter care:	
a Observe urinary output and urine characteristics.	Reduces transmission of microorganisms. Sudden decrease in urine output may indicate occlusion of catheter. Cloudy, foul-smelling urine associated with other systemic symptoms may indicate CAUTI.
b Assess patient’s knowledge of catheter care.	Determine need for patient education related to catheter care.
c Observe any discharge or redness around urethral meatus.	Indicates inflammatory process and possible infection.
3 Preparation for catheter removal:	
a Assess need for Foley catheter removal. Review patient’s medical record, including health care provider’s order and nurses’ notes. Note length of time catheter was in place.	Catheters in place for more than a few days cause higher risk for catheter encrustation and urinary tract infection (UTI).

Continued

STEP	RATIONALE
- b Determine size of catheter inflation balloon by looking at balloon inflation valve. (See Fig. 80.1.) - c Observe any discharge or redness around urethral meatus.	Determines amount of water to remove from balloon. Indicates inflammatory process and possible infection. Provides information for perineal care after catheter removal.
4 Perform hand hygiene, and apply clean gloves.	Reduces transmission of microorganisms.
5 Position patient with waterproof pad under buttocks and cover with bath blanket, exposing only genital area and catheter. - a Female in dorsal recumbent position. - b Male in supine position.	Shows respect for patient dignity by only exposing genital area and catheter.



Fig. 80.1 Size of balloon printed on catheter inflation valve.

STEP

RATIONALE

6 Catheter care:

a <i>Female:</i> Use nondominant hand to gently separate labia to fully expose urethral meatus and catheter. Maintain position of hand throughout procedure. b <i>Male:</i> Use nondominant hand to retract foreskin if not circumcised and hold penis at shaft just below glans. Maintain hand position throughout procedure. c Provide perineal hygiene using mild soap and warm water. <i>Option:</i> Use chlorhexidine 2% cloth. d Assess urethral meatus and surrounding tissues for inflammation, swelling, and discharge, and ask patient if burning or discomfort is present. e Starting close to urinary meatus, clean catheter in circular motion along its length for about 10 cm (4 inches), moving away from body (Fig. 80.2). Remove all traces of soap. <i>For male patients:</i> Reduce or reposition foreskin after care.	Provides full visualization of urethral meatus. Full separation of labia prevents contamination of meatus during cleaning. Retraction of foreskin provides full visualization of urethral meatus. Antiseptic cleaners have not been proven conclusively to decrease risk for CAUTI (Gould et al., 2010). Use of chlorhexidine poses minimal risk for perineal irritation. Determines frequency and type of ongoing care required. Indicates possibility of CAUTI or catheter erosion through urethra. Reduces presence of secretions or drainage on outside catheter surface.

Continued

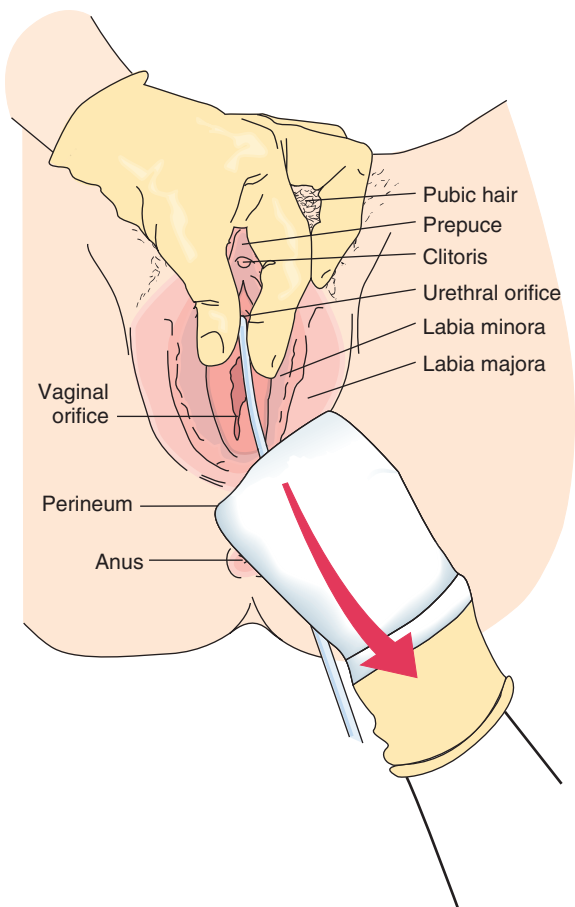


Fig. 80.2 The catheter is cleansed starting at the meatus. About 10 cm (4 inches) of the catheter is cleansed.

STEP

- f** Reapply catheter securement device. Allow slack in catheter so movement does not create tension on it.

RATIONALE

Securing indwelling catheter reduces risk of urethral trauma, urethral erosion, CAUTI, or accidental removal (Cipa-Tatum et al., 2011; Gould et al., 2010).

STEP

RATIONALE

g Check drainage tubing and bag for the following:

(1) Catheter is secured to upper thigh (for women) or abdomen (for men).

(2) Tubing is coiled and secured onto bed linen.

(3) Tubing is not kinked or clamped.

(4) Drainage bag is positioned below level of bladder with urine flowing freely into bag.

(5) Tubing is not looped or positioned above level of bladder.

h Empty collection bag when one-half full.

Maintains unobstructed flow of urine out of bladder (Gould et al., 2010).

Promotes free drainage of urine; prevents dependent loops of tubing and subsequent urine stasis.

Promotes free flow of urine and prevents stasis of urine in bladder, which increases risk for infection.

Urine in collection bag is excellent medium for growth of microorganisms. Having smaller volumes of urine in the collection bag will help to prevent excess trauma/traction on the urethra (Cipa-Tatum, 2011).

7 Catheter removal:

Follow Steps 1 to 6 before catheter removal.

a Move syringe plunger up and down to loosen and then pull it back to 0.5 mL. Insert hub of syringe into inflation valve (balloon port). Allow balloon fluid to drain into syringe by gravity. Syringe

Partially inflated balloon can traumatize urethral wall during removal. Passive drainage of catheter balloon prevents formation of ridges in balloon. These ridges can cause discomfort or trauma during removal.

Continued

STEP	RATIONALE
should fill. Make sure that entire amount of fluid is removed by comparing removed amount to volume needed for inflation. b Pull catheter out smoothly and slowly. Examine it to ensure that it is whole. Catheter should slide out easily. Do not use force. If you note any resistance, repeat Step 7a to remove remaining water. c Wrap contaminated catheter in waterproof pad. Unhook collection bag and drainage tubing from bed. d Empty, measure, and record urine present in drainage bag. e Reposition patient as necessary. Cleanse perineum. Lower level of bed, and position side rails accordingly. 8 Complete postprocedure protocol. 9 Observe time the patient urinates, and measure the urine; assess urine characteristics. 10 Evaluate patient for signs and symptoms of UTI.	Nonwhole catheter means that pieces of catheter may still be in bladder. Notify health care provider immediately. Promotes patient comfort and safety. Documents urinary output. Promotes patient comfort and safety. Urinary retention is a common occurrence after removal of an indwelling Foley catheter. Any patient who has a catheter or has had a catheter removed recently is at risk for UTI.

Recording and Reporting

- Record time for catheter care and appearance of urine; describe condition of meatus and catheter in nurses' notes in the electronic health record (EHR) or chart.
- Record and report time of catheter removal; amount of water removed from balloon; condition of urethral meatus and catheter; the time, amount, and characteristics of first voided urine in nurses notes' in the EHR or chart.
- Record teaching related to catheter care, catheter removal, and fluid intake in nurses notes' in the EHR or chart.
- Report hematuria, fever, dysuria, inability or difficulty voiding, and any new incontinence after a catheter is removed to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Water from inflation balloon does not return into syringe.	• Reposition patient; ensure that catheter is not pinched or kinked. • Remove syringe. Attach new syringe and allow enough time for passive emptying. • Attempt to empty balloon by gently pulling back on syringe plunger. • If catheter balloon does not deflate, <i>do not</i> cut balloon inflation valve to drain water. Notify health care provider.
2 Patient has cloudy urine, foul urine odor, fever, chills, dysuria, flank pain, back pain, hematuria, urgency, frequency, lower abdominal pain, change in mental status, and lethargy (Medline Plus, 2016).	• Assess for bladder distention and tenderness. • Monitor vital signs and urine output. • Report findings to health care provider; signs and symptoms may indicate UTI. • Consult with health care provider for order to remove catheter.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Patient is unable to void after catheter removal, has sensation of not emptying, strains to void, or experiences small voiding amounts with increasing frequency.	• Assess for bladder distention. • Help to normal position for voiding and provide privacy. • Perform bladder ultrasound or scan to assess for excessive urine volume in bladder. • If patient is unable to void within 6 to 8 hours of catheter removal and/or experiences abdominal pain, notify health care provider.

Urinary Catheter Irrigation

To maintain the patency of indwelling catheters, it is sometimes necessary to irrigate or flush a catheter with sterile solution. However, irrigation poses a risk for causing a urinary tract infection and thus must be done maintaining a closed urinary drainage system. In some instances the health care provider will determine that irrigations are needed to keep a catheter patent, such as after genitourinary surgery when there is a high risk for catheter occlusion from blood clots.

Closed catheter irrigation provides intermittent or continuous irrigation of a urinary catheter without disrupting the sterile connection between the catheter and the drainage system (Fig. 81.1). Continuous bladder irrigation (CBI) is an example of a continuous infusion of a sterile solution into the bladder, usually using a three-way irrigation closed system with a triple-lumen catheter.

Delegation Considerations

The skill of closed catheter irrigation cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP to do the following:

- Report if the patient complains of pain, discomfort, or leakage of fluid around the catheter.
- Monitor and record intake and output (I&O); report immediately any decrease in urine output.
- Report any change in the color of the urine, especially the presence of blood clots.

Equipment

- Sterile irrigation solution at room temperature (as prescribed)
- Antiseptic swabs
- Clean gloves

Closed Intermittent Irrigation

- Antiseptic swabs
- Sterile irrigation solution at room temperature as prescribed
- Sterile container
- Syringe to access system: Luer-Lok syringe for needleless access port (per manufacturer instructions)
- Screw clamp or rubber band (used to temporarily occlude catheter as irrigant is instilled)

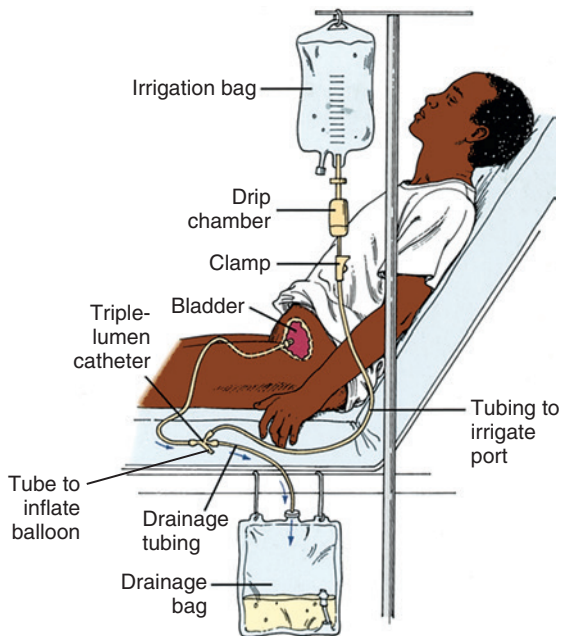


Fig. 81.1 Closed continuous bladder irrigation.

Closed Continuous Irrigation

- Antiseptic swabs
- Sterile irrigation solution at room temperature as prescribed
- Irrigation tubing with clamp to regulate irrigation flow rate
- Y connector (*optional*) to connect irrigation tubing to double-lumen catheter
- Intravenous (IV) pole (closed continuous or intermittent)

Implementation

STEP

- 1 Complete preprocedure protocol.
- 2 Verify in medical record:

RATIONALE

STEP

RATIONALE

a Order for irrigation method (continuous or intermittent), type (sterile saline or medicated solution), and amount of irrigant.	Health care provider's order is required to initiate therapy. Frequency and volume of solution used for irrigation may be in the order or standardized as part of agency policy.
b Type of catheter in place.	Single- and double-lumen catheters are used with open irrigation. Triple-lumen catheters are used for both intermittent and continuous closed irrigation.
3 Observe urine for color, amount, clarity, and presence of mucus, clots, or sediment.	Indicates if patient is bleeding or sloughing tissue, which would require increased irrigation rate or frequency of catheter irrigation.
4 Monitor I&O. If continuous bladder irrigation (CBI) is being used, amount of fluid draining from bladder should exceed amount of fluid infused into bladder.	If output does not exceed irrigant infused, catheter obstruction (i.e., blood clots, kinked tubing) should be suspected, irrigation stopped, and prescriber notified (Lewis et al., 2014).
5 Organize supplies according to type of irrigation prescribed. Apply clean gloves.	Ensures efficient procedure.
6 Closed continuous irrigation: a Close clamp on new irrigation tubing, and hang bag of irrigating solution on IV pole. Insert (spike) tip of sterile irrigation tubing into designated port of irrigation solution bag using aseptic technique.	Prevents air from entering tubing. Air can cause bladder spasms. Technique prevents transmission of microorganisms.

Continued

STEP

- b** Fill drip chamber half full by squeezing chamber; then open clamp and allow solution to flow (prime) through tubing, keeping end of tubing sterile. Once fluid has completely filled tubing, close clamp and recap end of tubing.
- c** Using aseptic technique, connect tubing securely to drainage port of Y connector on double/triple-lumen catheter.
- d** Adjust clamp on irrigation tubing to begin flow of solution into bladder. If set volume rate is ordered, calculate drip rate and adjust rate at roller clamp. If urine is bright red or has clots, increase irrigation rate until drainage appears pink (according to ordered rate or agency protocol).
- e** Observe for outflow of fluid into drainage bag. Empty catheter drainage bag as needed.

7 Closed intermittent irrigation:

RATIONALE

Priming tubing with fluid prevents introduction of air into bladder.

Reduces transmission of microorganisms.

Continuous drainage is expected. It helps to prevent clotting in presence of active bleeding in bladder and flushes clots out of bladder.

Discomfort, bladder distention, and possible injury can occur from overdistention of bladder when bladder irrigant cannot adequately flow from bladder. Bag will fill rapidly and may need to be emptied every 1 to 2 hours.

Fluid is instilled through catheter in a bolus flushing system. Fluid drains out after irrigation is complete.

STEP

RATIONALE

a Pour prescribed sterile irrigating solution in sterile container. b Draw prescribed volume of irrigant (usually 30 to 50 mL) into syringe using aseptic technique. Place sterile cap on tip of needleless syringe. c Clamp catheter tubing below soft injection port with screw clamp (or fold catheter tubing onto itself and secure with rubber band). d Using circular motion, clean catheter port (specimen port) with antiseptic swab. e Insert tip of needleless syringe using twisting motion into port. f Inject solution using slow, even pressure. g Remove syringe and remove clamp (or rubber band), allowing solution to drain into urinary drainage bag. (NOTE: Some medicated irrigants may need to dwell in bladder for prescribed period, requiring catheter to be clamped temporarily before being allowed to drain.) 8 Anchor catheter with catheter securement device (see Skill 79).	Ensures sterility of irrigating fluid. Occluding catheter tubing below the point of injection allows irrigating solution to enter catheter and flow upward toward bladder. Reduces transmission of infection. Ensures that catheter tip enters lumen of catheter. Gentle instillation of solution minimizes trauma to the bladder mucosa. Allows drainage to flow via gravity. Medications must be instilled long enough to be absorbed by lining of bladder. Clamped drainage tubing and bag should not be left unattended. Prevents trauma to urethral tissue.

Continued

STEP	RATIONALE
9 Help patient to safe and comfortable position. Lower bed and place side rails accordingly.	Promotes patient comfort and safety.
10 Inspect urine for blood clots and sediment, and ensure that tubing is not kinked or occluded.	Decrease in blood clots means that therapy is successful in maintaining catheter patency.
11 Complete postprocedure protocol.	

Recording and Reporting

- Record irrigation method, amount and type of irrigation solution, amount returned as drainage, characteristics of output, urine output, and patient tolerance to procedure in nurses’ notes in the electronic health record (EHR) or chart.
- Report catheter occlusion, sudden bleeding, infection, or increased pain to health care provider.
- Record I&O on appropriate flow sheet.
- Document your evaluation of patient learning in nurses’ notes in EHR or chart.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Irrigating solution does not return (intermittent irrigation) or is not flowing at prescribed rate (CBI).	• Examine tubing for clots, sediment, and kinks. • Notify health care provider if irrigant does not flow freely from the bladder, patient complains of pain, or bladder distention occurs.
2 Drainage output is less than amount of irrigation solution infused.	• Examine drainage tubing for clots, sediment, or kinks. • Inspect urine for presence of or increase in blood clots and sediment. • Evaluate patient for pain and distended bladder. • Notify health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
3 Bright-red bleeding with the irrigation (CBI) infusion wide open.	• Assess for hypovolemic shock (vital signs, skin color and moisture, anxiety level). • Leave irrigation infusion wide open and notify health care provider.
4 Patient experiences pain with irrigation.	• Examine drainage tubing for clots, sediment, or kinks. • Evaluate urine for presence of or increase in blood clots and sediment. • Evaluate for distended bladder. • Notify health care provider.

Urinary Diversion

Pouching an Incontinent Urinary Diversion

Because urine flows continuously from an incontinent urinary diversion, placement of the pouch is more challenging than with fecal diversion. In the immediate postoperative period urinary stents extend out from the stoma (Fig. 82.1). A surgeon places the stents to prevent stenosis of the ureters at the site where the ureters are attached to the conduit. The stents will be removed during the hospital stay or at the first postoperative visit with the surgeon. The stoma is normally red and moist. It is made from a portion of the intestinal tract, usually the ileum. It should protrude above the skin. An ileal conduit is usually located in the right lower quadrant. While the patient is in bed, the pouch may be connected to a bedside drainage bag to decrease the need for frequent emptying. When the patient goes home, the bedside drainage bag may be used at night to avoid having to get up to empty the pouch. Each type of urostomy pouch comes with a connector for the bedside drainage bag.

Delegation Considerations

The skill of pouching a new incontinent urinary diversion cannot be delegated to nursing assistive personnel (NAP). In some agencies, care of an established urostomy (4 to 6 weeks or more after surgery) can be delegated to NAP. The nurse directs the NAP about the following:

- Expected appearance of the stoma
- Expected amount and character of the output and when to report changes
- Changes in patient's stoma and surrounding skin integrity that should be reported
- Special equipment needed to complete the procedure

Equipment

- Urinary pouch (with antireflux flap and skin barrier; clear, drainable one- or two-piece, cut-to-fit or precut size) (Fig. 82.2)
- Appropriate adapter for connection to bedside drainage bag
- Measuring guide
- Bedside urinary drainage bag
- Clean gloves
- Washcloth
- Towel or disposable waterproof barrier



Fig. 82.1 Urostomy with stents in place. (Courtesy Jane Fellows.)



Fig. 82.2 Urostomy pouching system with adapter to connect pouch to bedside drainage bag. (Courtesy Hollister Incorporated, Libertyville, IL.)

- Basin with warm tap water
- Scissors
- Adhesive remover
- Absorbent wick made from gauze rolled tightly in the shape of a tampon
- Waterproof bag for disposal of pouch

- Mirror for patient to observe ostomy
- Gown and goggles (used if there is risk of splashing when emptying pouch)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol and apply clean gloves. 2 Observe existing skin barrier and pouch for leakage and length of time in place. Pouch should be changed every 3 to 7 days, not daily (Carmel et al., 2016). If urine is leaking under wafer, change pouch. 3 Observe urine in pouch or bedside drainage bag. Empty pouch if it is more than one-third to one-half full by opening the valve and draining it into a container for measurement. 4 Observe stoma for color, swelling, presence of sutures, trauma, and healing of the peristomal skin. Assess type of stoma. Remove and dispose of gloves. 5 Position patient in a semireclining or supine position. If possible, provide patient a mirror for observation. 6 Perform hand hygiene, and apply clean gloves.	Assesses effectiveness of pouching system and allows for early detection of potential problems. To minimize skin irritation, avoid changing entire pouching system unnecessarily. Repeated leakage may indicate need for different type of pouch to provide a reliable seal. There may be blood or large amounts of mucus in urine after surgery, but this should resolve in the first 1 to 2 weeks after surgery. Weight of pouch can disrupt seal. Urine from ileal conduit will contain mucus because of flow through intestinal segment. Consider stoma characteristics in selecting appropriate pouching system. Convexity in the skin barrier is often necessary with a flush or retracted stoma. When patient is semireclining, there are fewer skin wrinkles, which allows for ease of pouch application. Reduces transmission of microorganisms.

STEP

- 7 Place towel or disposable waterproof barrier under patient and across patient's lower abdomen.
- 8 Remove used pouch and skin barrier gently by pushing skin away from barrier. If stents are present, pull pouch gently around them, and lay towel underneath. Empty each pouch and measure output. Dispose of pouch in appropriate receptacle.
- 9 Place rolled gauze wick at stomal opening. Maintain gauze at the stoma opening continuously during pouch measurement and change.
- 10 While keeping rolled gauze in contact with the stoma, cleanse peristomal skin gently with warm tap water using washcloth; do not scrub skin. If you touch stoma, minor bleeding is normal. Pat the skin dry.
- 11 Measure stoma. Be sure that opening is at least $\frac{1}{8}$ inch larger than stoma to avoid pressure on stoma. Expect size of stoma to change for first 4 to 6 weeks after surgery.
- 12 Trace pattern on pouch backing or skin barrier.
- 13 Cut opening in pouch. If using moldable or shape-to-fit barrier, use fingers to mold shape to fit stoma.

RATIONALE

Protects bed linen; maintains patient's dignity.

Reduces risk for trauma to skin and for dislodging stents. Keeps urine from leaking onto skin. Urine output provides information about renal status and whether volume is within acceptable limits (≥ 30 mL/h).

Using a wick at stoma opening prevents peristomal skin from becoming wet with urine during pouch change.

Avoid soap. It leaves residue on skin, which can irritate it. Pouch does not adhere to wet skin.

Allows for proper fit of pouch that will protect peristomal skin.

Prepares for cutting opening in the pouch.

Customizes pouch to provide appropriate fit over stoma.

Continued

STEP	RATIONALE
14 Remove protective backing from adhesive surface. Remove rolled gauze from stoma.	Prepares pouch for application to skin.
15 Apply pouch. Press firmly into place around stoma and outside edges. Have patient hold hand over pouch 1 to 2 minutes to apply heat to secure seal.	Pouch adhesives are heat activated and will hold more securely at body temperature.
16 Use adapter provided with pouches to connect pouch to bedside urinary bag. Keep tubing below level of bag.	Provides for collection and measurement of urine. Allows patient to rest without frequent emptying of the pouch.
17 Complete postprocedure protocol.	
18 Observe appearance of stoma, peristomal skin, and suture line during pouch change.	Determines condition of stoma and peristomal skin and progress of wound healing.
19 Evaluate character and volume of urinary drainage.	Determines if stoma and/or stents are patent. Character of urine reveals degree of concentration and alterations in renal function.
20 Observe patient's and family caregiver's willingness to view stoma and ask questions about procedure.	Determines level of adjustment and understanding of stoma care and pouch application.

Recording and Reporting

- Record type of pouch, time of change, condition and appearance of stoma/stents and peristomal skin, and character of urine in the electronic health record (EHR) or chart.
- Record urinary output on intake and output form.
- Record patient's and family caregiver's reaction to stoma and level of participation.
- Document your evaluation of patient learning.
- Report abnormalities in stoma or peristomal skin and absence of urinary output to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Skin around stoma is irritated, blistered, or bleeding, or a rash is noted, as a result of chronic exposure to urine.	• Check stoma size and opening in skin barrier. Resize skin barrier opening if necessary. • Remove pouch more carefully. • Consult ostomy care nurse.
2 There is no urine output for several hours, or output is less than 30 mL/hr. Urine has foul odor.	• Increase fluid intake. • Notify health care provider. • Obtain urine specimen for culture and sensitivity as ordered.
3 Patient and family caregiver are unable to observe stoma, ask questions, or participate in care.	• Consult ostomy care nurse. • Allow patient to express feelings. • Encourage family support.

Vaginal Instillations

Vaginal medications are available in foam, jelly, cream, or suppository form. Medicated irrigations or douches can also be given. However, their excessive use can lead to vaginal irritation. Vaginal suppositories are oval shaped and individually packaged in foil wrappers. They are larger and more oval than rectal suppositories. Storage in a refrigerator prevents solid suppositories from melting.

Delegation Considerations

The skill of administering vaginal medications cannot be delegated to nursing assistive personnel (NAP). The nurse directs the NAP about the following:

- Potential side effects of medications and to report their occurrence
- Reporting any change in comfort level or any new or increased vaginal discharge or bleeding to the nurse for further assessment

Equipment

- Vaginal cream, foam, jelly, tablet, or suppository, or irrigating solution
- Applicators (if needed)
- Clean gloves
- Tissues
- Towels and/or washcloths
- Perineal pad; drape or sheet
- Water-soluble lubricants
- Bedpan
- Irrigation or douche container (if needed)
- Medication administration record (MAR) or computer printout
- Gooseneck lamp (*optional*)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Check accuracy and completeness of each MAR with health	The order sheet is the most reliable source and only legal record of medications that patient is to receive. Ensures

STEP

- care provider's medication order. Check patient's name, drug name and dosage, route, and time for administration. Clarify incomplete or unclear orders with health care provider before administration.
- 3 Perform hand hygiene and apply clean gloves. During perineal care inspect condition of vaginal tissues; note if drainage is present. Remove gloves and perform hand hygiene.
 - 4 Assess patient's ability to manipulate applicator, suppository, or irrigation equipment and to properly position self to insert medication (may be done just before insertion).
 - 5 Prepare suppository for administration. Check label of medication against MAR two times. Preparation usually involves taking suppository out of refrigerator and taking to patient room. Check expiration date on container.
 - 6 Identify patient using at least two patient identifiers (e.g., name and birthday or name and account number) according to agency policy. Compare identifiers with information on patient's MAR or medical record.

RATIONALE

that patient receives correct medications (Sulosaari et al., 2011). Handwritten MARs are a source of medication errors (Alassaad et al., 2013).

Prevents transmission of microorganisms. Identifies symptoms of vaginal irritation or infection.

Presence of mobility restrictions indicates need for assistance from nurse.

These are the first and second checks for accuracy. Process ensures that right patient receives right medication.

Ensures correct patient. Complies with The Joint Commission requirements for patient safety (TJC, 2016).

Continued

STEP

- 7 At patient's bedside again compare MAR or computer printout with names of medications on medication labels and patient name. Ask patient if he or she has allergies.
- 8 Discuss purpose of each medication, action, and possible adverse effects. Allow patient to ask any questions about the drugs. Explain procedure if patient plans to self-administer medication.
- 9 Close door or pull curtain. Perform hand hygiene, arrange supplies at bedside, and apply clean gloves.
- 10 Have patient void. Help her lie in dorsal recumbent position. Patients with restricted mobility in knees or hips may lie supine with legs abducted.
- 11 Keep abdomen and lower extremities draped.
- 12 Be sure vaginal orifice is well illuminated by room light. Otherwise, position portable gooseneck lamp.
- 13 Insert suppository:**
 - a Remove suppository from wrapper, and apply liberal amount of water-soluble lubricant to smooth or rounded end. Be sure that

RATIONALE

This is the third check for accuracy and ensures that patient receives correct medication. Confirms patient's allergy history.

Patient has right to be informed, and patient's understanding of each medication improves adherence to drug therapy.

Reduces transfer of microorganisms; helps nurse perform procedure smoothly.

Voiding prevents passing of urine during insertion of suppository. Position provides easy access to and good exposure of vaginal canal. Dependent position also allows suppository to completely dissolve in vagina.

Minimizes patient's embarrassment by limiting exposure.

Proper insertion requires visualization of external genitalia if not self-administered.

Lubrication reduces friction against mucosal surfaces during insertion. Use of petroleum jelly may leave a residue that harbors bacteria and yeast fungi.

STEP

suppository is at room temperature. Lubricate gloved index finger of dominant hand.

b With nondominant gloved hand, gently separate labial folds in the front-to-back direction.

c With dominant gloved hand, insert rounded end of suppository along posterior wall of vaginal canal the entire length of finger (7.5 to 10 cm [3 to 4 inches]) (Fig. 83.1).

d Withdraw finger and discard remaining lubricant from around orifice and labia with tissue or cloth.

14 Apply cream or foam:

a Fill cream or foam applicator following package directions.

RATIONALE

Exposes vaginal orifice.

Proper placement of suppository ensures equal distribution of medication along walls of vaginal cavity.

Maintains comfort.

Dose is based on volume in applicator.

Continued

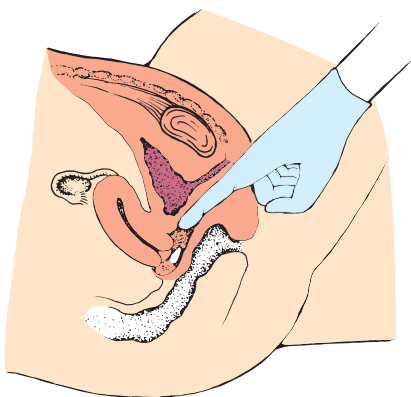


Fig. 83.1 Angle of vaginal suppository insertion.

STEP

- b** With nondominant gloved hand, gently separate labial folds.
- c** With dominant gloved hand, insert applicator approximately 5 to 7.5 cm (2 to 3 inches). Push applicator plunger to deposit medication into vagina (Fig. 83.2).
- d** Withdraw applicator, and place on paper towel. Remove residual cream from labia or vaginal orifice with a tissue or cloth.

15 Administer irrigation and douche:

- a** Place patient on bedpan with absorbent pad underneath.

RATIONALE

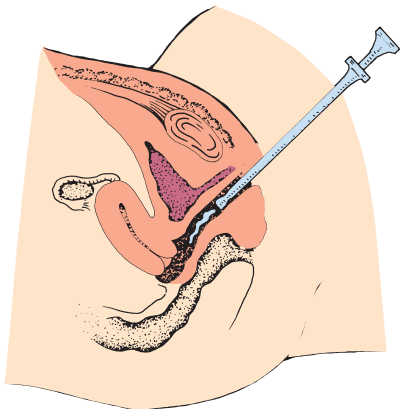
Exposes vaginal orifice.

Allows equal distribution of medication along vaginal walls.

Maintains patient comfort.

Allows hips to be higher than shoulders, and solution reaches posterior wall of vagina. Bedpan collects solution.

Fig. 83.2 Applicator inserted into vaginal canal. Plunger pushed to instill medication.



STEP

- b** Be sure that irrigation or douche fluid is at body temperature. Run fluid through container nozzle (priming the tubing).
 - c** Gently separate labial folds, and direct nozzle toward sacrum, following the floor of the vagina.
 - d** Raise container approximately 30 to 50 cm (12 to 20 inches) above level of vagina. Insert nozzle 7 to 10 cm (3 to 4 inches). Allow solution to flow while rotating nozzle. Administer all irrigating solution.
 - e** Withdraw nozzle, and assist patient to a comfortable sitting position.
 - f** Allow patient to remain on bedpan for a few minutes. Cleanse perineum with soap and water.
 - g** Help patient off bedpan. Dry perineal area.
- 16 Instruct patient who received suppository, cream, or tablet to remain on her back for at least 10 minutes.
 - 17 If using an applicator, wash with soap and warm water, rinse, and store for future use.
 - 18 Offer perineal pad when patient resumes ambulation.

RATIONALE

Body temperature promotes patient comfort. Priming tubing removes air and moistens the nozzle tip.

Correct angle allows nozzle access into the vagina.

Rotating nozzle allows irrigation of all areas in vagina.

Remaining solution drains by gravity.

Ensures all solution drains from vagina. Provides comfort for the patient.

Provides comfort.

Allows melting and spreading of the medication throughout vaginal cavity and prevents loss through the vaginal orifice.

Vaginal cavity is not sterile. Soap and water assist in removal of bacteria and residual cream from applicator.

Provides patient comfort.

Continued

STEP	RATIONALE
19 Complete postprocedure protocol.	Reflects learning of technique.
20 Observe patient demonstrate administration of next dose.	

Recording and Reporting

- Record drug (or solution if vaginal instillation), dose, type of instillation, and time administered on MAR immediately after administration, not before. Include initials or signature.
- Record patient response to medication, patient teaching, and validation of understanding and ability to self-administer medication on flow sheet or in nurses' notes in electronic health record (EHR) or chart.
- Report to health care provider if patient states that symptoms do not disappear or symptoms get worse.
- Report adverse effects/patient response and/or withheld drugs to nurse in charge or health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Patient reports localized pruritus and burning.	• These are symptoms of infection or inflammation, but also may be a possible side effect of some medications (such as miconazole). • Monitor symptoms; report to health care provider.
2 Patient is unable to discuss drug therapy correctly.	• Repeat instructions, or assess whether patient is able to learn. • Include family caregiver when appropriate.
3 Patient is unable to self-administer medications.	• Reinstruction is necessary.

Venipuncture

Collecting Blood Specimens and Cultures by Syringe and Vacutainer Method

Often, nurses are responsible for collecting blood specimens; however, many agencies have specially trained phlebotomists who are responsible for drawing venous blood. Be familiar with agency policies and procedures and the state Nurse Practice Act regarding guidelines for drawing blood samples.

The three methods of obtaining blood specimens are (1) skin puncture, (2) venipuncture, and (3) arterial puncture. Venipuncture is the most common method of obtaining blood specimens. This involves inserting a hollow-bore needle into the lumen of a large vein to obtain a specimen using either a needle and syringe or a Vacutainer device that allows the drawing of multiple samples. Because veins are major sources of blood for laboratory testing and routes for intravenous (IV) fluid or blood replacement, maintaining their integrity is essential. Skill in venipuncture is required to avoid unnecessary injury to veins.

Blood cultures aid in detection of bacteria in the blood. It is important that at least two culture specimens be drawn from two different sites. Because bacteremia may be accompanied by fever and chills, blood cultures should be drawn when the patient is experiencing these clinical signs ([Pagana and Pagana, 2015](#)). Bacteremia exists when both cultures grow the infectious agent. If only one culture grows bacteria, the bacteria are considered contaminated.

Draw cultures before antibiotic therapy begins because the antibiotic may interrupt the organism's growth in the laboratory. If the patient is receiving antibiotics, notify the laboratory of the specific antibiotics the patient is receiving ([Pagana and Pagana, 2015](#)).

Delegation Considerations

The skill of collecting blood specimens by venipuncture can be delegated to specially trained nursing assistive personnel (NAP). In some agencies, phlebotomists obtain the venipuncture samples. Agency and governmental regulations and policies differ regarding personnel who may draw blood specimens. The nurse informs the NAP to do the following:

- Report any patient discomfort or signs of excessive bleeding from the puncture site to the nurse.

Equipment

All Procedures

- Chlorhexidine or antiseptic swab (check agency policy for use of 70% alcohol)
- Clean gloves
- Small pillow or folded towel
- Sterile 2 × 2-inch gauze pads
- Tourniquet
- Adhesive bandage or adhesive tape
- Completed identification labels with proper patient identifiers
- Completed laboratory requisition (appropriate patient identification, date, time, name of test, and source of culture)
- Small plastic biohazard bag for delivery of specimen to laboratory (or container specified by agency)
- Sharps container

Venipuncture With Syringe

- Sterile safety needles (20 to 21 gauge for adults; 23 to 25 gauge for children)
- Sterile 10- to 20-mL Luer-Lok safety syringes
- Needle-free blood transfer device
- Appropriate blood specimen tubes

Venipuncture With Vacutainer

- Vacutainer and safety access device with Luer-Lok adapter
- Sterile double-ended needles (20 to 21 gauge for adults; 23 to 25 gauge for children)
- Appropriate blood specimen tubes

Blood Cultures

- Sterile double needles (20 to 21 gauge for adults; 23 to 25 gauge for children)
- Two 20-mL sterile syringes
- Anaerobic and aerobic culture bottles (check agency policy)

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol.	

STEP

- 2 Determine if special conditions need to be met before specimen collection (e.g., patient allowed nothing by mouth [NPO], specific time for collection in relation to medication given, need to ice specimen).
- 3 Assess patient for possible risks associated with venipuncture: anticoagulant therapy, low platelet count, bleeding disorders (history of hemophilia). Review medication history.
- 4 Assess patient for contraindicated sites for venipuncture: presence of IV fluids, hematoma at potential site, arm on side of mastectomy, or hemodialysis shunt.
- 5 Apply tourniquet so it can be removed by pulling an end with a single motion.
 - a Position tourniquet 5 to 10 cm (2 to 4 inches) above venipuncture site selected (antecubital fossa site is most often used).

RATIONALE

Some tests require meeting specific conditions to obtain accurate measurement of blood elements (e.g., fasting blood glucose, drug peak and trough levels, and timed endocrine hormone levels).

Patient history may include abnormal clotting abilities caused by low platelet count, hemophilia, or medications that increase risk for bleeding and hematoma formation.

Drawing specimens from such sites can result in false test results or may injure patient. Samples taken from vein near IV infusion may be diluted or may contain concentrations of IV fluids. Postmastectomy patient may have reduced lymphatic drainage in arm on operative side, increasing risk for infection from needlesticks. Never use arteriovenous shunt to obtain specimens because of risks of clotting and bleeding. Hematoma indicates existing injury to vessel wall.

Tourniquet blocks venous return to heart from extremity, causing veins to dilate for easier visibility.

Continued

STEP	RATIONALE
b Cross tourniquet over patient's arm. May place tourniquet over gown sleeve to protect skin. c Hold tourniquet between your fingers close to arm. Tuck loop between patient's arm and tourniquet so you can grasp freely end easily.	Older adult's skin is very fragile. Pull free end to release tourniquet after venipuncture.
SAFETY ALERT Palpate distal pulse (e.g., brachial) below tourniquet. If pulse is not palpable, remove tourniquet, wait 60 seconds, and reapply tourniquet more loosely. If tourniquet is too tight, pressure will impede arterial flow.	
6 Do not keep tourniquet on patient longer than 1 minute. 7 Quickly inspect extremity for best venipuncture site, looking for straight, prominent vein without swelling or hematoma. 8 Apply clean gloves. Palpate selected vein with finger (Fig. 84.1). Note if vein is firm and rebounds when palpated or if it feels rigid or cordlike and rolls when palpated. Avoid vigorously slapping vein, which can cause vasospasm. 9 Obtain blood specimen: a Syringe method (1) Have syringe with appropriate needle securely attached.	Prolonged tourniquet application causes stasis, localized acidemia, and hemoconcentration (Pagana and Pagana, 2015). Straight and intact veins are easiest to puncture. Patent, healthy vein is elastic and rebounds on palpation. Thrombosed vein is rigid, rolls easily, and is difficult to puncture. Needle must not dislodge from syringe during venipuncture.

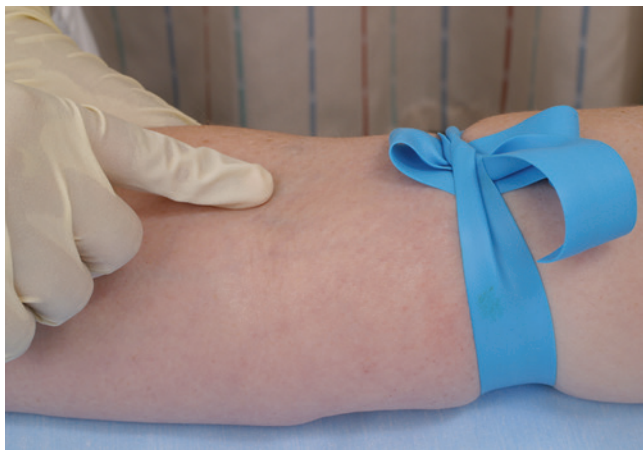


Fig. 84.1 Palpation of vein.

STEP

(2) Cleanse venipuncture site with antiseptic swabs, with first swab moving back and forth on horizontal plane, another swab on vertical plane, and last in circular motion from site outward for about 5 cm (2 inches) for 30 seconds. Allow to dry.

(a) If drawing sample for blood alcohol level or blood cultures, use only antiseptic swab, not alcohol swab.

RATIONALE

Antimicrobial agent cleans skin surface of resident bacteria so organisms do not enter puncture site. Allowing antiseptic to dry completes its antimicrobial task and reduces “sting” of venipuncture. Alcohol left on skin can cause hemolysis of sample and retraction of tissue away from puncture site.

Ensures accurate test results.

Continued

STEP	RATIONALE
(3) Remove needle cover, and inform patient that “stick” lasts only a few seconds.	Patient has better control over anxiety when prepared about what to expect.
SAFETY ALERT Observe needle for defects, such as burrs, which can cause increased discomfort and damage to the patient's vein (McCall and Tankersley, 2012).	
(4) Place thumb or forefinger of nondominant hand 2.5 cm (1 inch) below site, and gently pull skin taut. Stretch skin steadily until vein is stabilized. (5) Hold syringe and needle at 15- to 30-degree angle from patient's arm with bevel up. (6) Slowly insert needle into vein (Fig. 84.2), stopping when “pop” is felt as needle enters vein. (7) Hold syringe securely and pull back gently on plunger. (8) Observe for blood return.	Stabilizes vein and prevents rolling during needle insertion. Reduces chance of penetrating both sides of vein during insertion. Bevel up decreases chance of contamination by not dragging bevel opening over the skin and allows point of needle to first puncture skin, reducing trauma. Prevents puncture through vein to opposite side. Syringe held securely prevents needle from advancing. Pulling on plunger creates vacuum needed to draw blood into syringe. If plunger is pulled back too quickly, pressure may collapse vein. If blood flow fails to appear, needle may not be in vein.



Fig. 84.2 Inserting needle into vein.

STEP

- (9)** Obtain desired amount of blood, keeping needle stabilized.
- (10)** After obtaining specimen, release tourniquet.
- (11)** Apply 2 × 2-inch gauze pad without applying pressure. Quickly but carefully withdraw needle from vein, and apply pressure following removal of needle. Check for hematoma.

RATIONALE

Test results are more accurate when required amount of blood is obtained. You cannot perform some tests without minimum blood requirement. Movement of needle increases discomfort.

Reduces bleeding at site when needle is withdrawn.

Pressure over needle can cause discomfort. Careful removal of needle minimizes discomfort and vein trauma.

Hematoma may cause compression injury (McCall and Tankersley, 2012).

Continued

STEP

RATIONALE

- (12) Activate safety cover and immediately discard needle in appropriate container.
- (13) Attach blood-filled syringe to needle-free blood transfer device. Attach tube and allow vacuum to fill tube to specified level. Remove and fill other tubes as appropriate. Gently rotate each tube back and forth 8 to 10 times.

b Vacutainer method (vacuum tube system method)

- (1) Attach double-ended needle to Vacutainer tube.
- (2) Have proper blood specimen tube resting inside Vacutainer, but do not puncture rubber stopper.
- (3) Clean venipuncture site by following Step 9(2). Allow to dry.
- (4) Remove needle cover and inform patient that “stick” will occur, lasting only a few seconds.
- (5) Place thumb or forefinger of nondominant hand

Prevents needlestick injury.

Additives prevent clotting. Shaking can cause hemolysis of red blood cells (RBCs).

Long end of needle is used to puncture vein. Short end fits into blood tubes. Puncturing causes loss of tube’s vacuum.

Cleans skin surface of resident bacteria so that organisms do not enter puncture site. Drying maximizes effect of antiseptic. Patient has better control over anxiety when prepared about what to expect.

Helps to stabilize vein and prevent rolling during needle insertion.

STEP

RATIONALE

2.5 cm (1 inch)
below site, and
gently pull skin taut.
Stretch skin down
until vein stabilizes.

- (6) Hold Vacutainer
needle at 15- to
30-degree angle
from arm with bevel
up.

- (7) Slowly insert needle
into vein.

- (8) Grasp Vacutainer
securely, and
advance specimen
tube into needle
of holder (do not
advance needle in
vein).

- (9) Note flow of blood
into tube (should be
fairly rapid)
(Fig. 84.3).

- (10) After filling
specimen tube, grasp
Vacutainer firmly,
and remove tube.
Insert additional
specimen tubes
as needed. Gently
rotate each tube
back and forth 8 to
10 times.

- (11) After last tube is
filled and removed
from Vacutainer,
release tourniquet.

Smallest and sharpest point of
needle will puncture skin first.
Reduces chance of penetrating
sides of vein during insertion.
Keeping bevel up causes less
trauma to vein.

Prevents puncture on opposite
side.

Pushing needle through stopper
breaks the vacuum and causes
flow of blood into tube. If
needle in vein advances, vein
may become punctured on
other side.

Failure of blood to appear
indicates that vacuum in tube
is lost or needle is not in vein.

Vacuum in tube stops flow
at amount to be collected.
Grasping prevents needle from
advancing or dislodging. Tube
should fill completely because
additives in certain tubes are
measured in proportion to
filled tube. Ensures proper
mixing with additive to
prevent clotting.

Reduces bleeding at site when
needle is withdrawn.

Continued



Fig. 84.3 Blood flowing into tube.

STEP

- (12) Apply 2 × 2-inch gauze pad over puncture site without applying pressure, and quickly but carefully withdraw needle with Vacutainer from vein.
- (13) Immediately apply pressure over venipuncture site with gauze or antiseptic pad for 2 to 3 minutes or until bleeding stops. Observe for hematoma. Tape gauze dressing securely.

RATIONALE

Pressure over needle can cause discomfort. Careful removal of needle minimizes discomfort and vein trauma.

Direct pressure minimizes bleeding and prevents hematoma formation. A hematoma may cause compression on nerve injury. Pressure dressing controls bleeding.

STEP

c Blood cultures

- (1) Clean venipuncture site as in Step 9(2) with antiseptic swab to follow agency policy. Allow to dry.
 - (2) Clean bottle tops of culture bottles for 15 seconds with agency-approved cleaning solution. Allow to dry.
 - (3) Collect 10 to 15 mL of venous blood using syringe method in 20-mL syringe from two different venipuncture sites.
 - (4) With each specimen, activate safety guard and discard needle. Replace with new sterile needle before injecting blood sample into culture bottle.
 - (5) If both aerobic and anaerobic cultures are needed, fill anaerobic bottle first.
 - (6) Gently mix blood in each culture bottle.
- 10 Check tubes for any sign of external contamination with blood. Decontaminate with 70% alcohol if necessary.

RATIONALE

Antimicrobial agent cleans skin surface so that organisms do not enter puncture site or contaminate culture. Drying ensures complete antimicrobial action and decreases stinging. Ensures that bottle top is sterile.

Two blood cultures must be collected from two different sites to confirm culture growth (Pagana and Pagana, 2015).

Maintains sterile technique and prevents contamination of specimen.

Anaerobic organisms may take longer to grow (Pagana and Pagana, 2015).

Mixes medium and blood.

- Prevents cross-contamination.
- Reduces risk for exposure to pathogens present in blood.

Continued

STEP	RATIONALE
11 Remove gloves and perform hand hygiene after specimen is obtained and any spillage is cleaned.	Reduces risk for exposure to bloodborne pathogens.
12 Perform postprocedure protocol.	

Recording and Reporting

- Record method used to obtain blood specimen, date and time collected, type of test ordered, disposition of specimen, and description of venipuncture site.
- Report any test result requiring immediate attention (STAT) or abnormal test result to health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Hematoma forms at venipuncture site.	• Apply pressure using 2 × 2-inch gauze dressing. • Continue to monitor patient for pain and discomfort.
2 Bleeding at site continues.	• Apply pressure to site; patient may also apply pressure. • Monitor patient. • Notify health care provider.
3 Signs and symptoms of infection at venipuncture site occur.	• Notify health care provider.

Managing Wound Drainage Evacuation

If drainage accumulates in the wound bed, wound healing is delayed. Drainage is removed by using either a closed or an open drain system even if the amount of drainage is small. An open drain system (e.g., a Penrose drain [Fig. 85.1]) removes drainage from the wound and deposits it onto the skin surface. Insert a sterile safety pin through the drain, outside the skin, to prevent the tubing from moving into the wound. To remove the Penrose drain, the health care provider advances the tubing in stages as the wound heals from the bottom up.

A closed drain system, such as the Hemovac drain (Fig. 85.2) or Jackson-Pratt (JP) drain (Fig. 85.3), relies on the presence of a vacuum to withdraw accumulated drainage from around the wound bed into the collection device. The collection device is connected to a clear plastic drain with multiple perforations. Drainage collects in a closed reservoir, or a suction bladder.

Delegation Considerations

The assessment of wound drainage and maintenance of drains and the drainage system cannot be delegated to nursing assistant personnel (NAP). However, you may delegate emptying a closed drainage container or pouch, measuring the amount of drainage, and reporting the amount on the patient's intake and output (I&O) record to NAP. The nurse directs the NAP by doing the following:

- Discussing any increase in frequency of emptying the drain other than once a shift
- Instructing to report to the nurse any change in amount, color, or odor of drainage
- Reviewing the I&O procedure

Equipment

- Graduated measuring cylinder
- Alcohol wipes
- Gauze sponges, including split gauze sponges for drain site
- Dressings
- Clean gloves
- Safety pin(s)
- Protective equipment: goggles, mask, and gown if risk of spray from drain is present
- Disposable drape or barrier
- Normal saline for cleaning insertion site (*optional*)

Fig. 85.1 Penrose drain with a drain-split gauze.

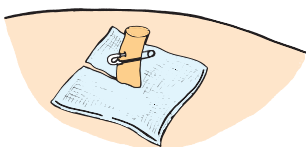


Fig. 85.2 Hemovac contents drained into sterile measuring container.



Fig. 85.3 A, Jackson-Pratt wound drainage system. B, Emptying Jackson-Pratt device.

Implementation

STEP	RATIONALE
1 Complete preprocedure protocol. 2 Identify presence, location, and purpose of closed wound drain and drainage system as patient returns from surgery. Assess drainage present on patient's dressing. 3 Identify number of wound drain tubes and what each one will be draining. Label each drain tube with a number or label.	Drainage tubing is usually placed near wound through small surgical incision. Assigning a labeling system to each drain helps with consistent documentation when patient has multiple drainage tubes.

SAFETY ALERT Attach a safety pin to drainage tubing with tape, and pin to patient's gown so the suction device is below the level of the wound and does not pull on insertion site.

4 Empty Hemovac or ConstaVac: - a Maintain asepsis while opening plug on port indicated for emptying drainage reservoir. (1) Tilt suction container in direction of plug. (2) Slowly squeeze two flat surfaces together, tilting toward measuring container. - b Drain contents into measuring container. - c Hold uncovered alcohol swab in dominant hand. Place suction device on flat surface with open outlet facing upward; continue pressing downward until bottom and top are in contact.	Avoids entry of pathogens. Vacuum will be broken, and reservoir will pull air in until chamber is fully expanded. Drains fluid toward plug. Prevents splashing of contaminated drainage. Contents are counted as fluid output. Compression of surface of Hemovac creates vacuum.

Continued

STEP	RATIONALE
d Holding surfaces together with one hand, and using an alcohol swab, quickly clean opening and plug with other hand and immediately replace plug; secure evacuator on patient's bed. e Check suction device for reestablishment of vacuum, patency of drainage tubing, and absence of stress on tubing.	Cleansing of plug reduces transmission of microorganisms into drainage evacuation. Facilitates wound drainage and prevents tension on drainage tubing.
5 Empty Hemovac with wall suction: a Turn off suction. b Disconnect suction tubing from Hemovac port. c Empty Hemovac as described in Step 4. d Clean port opening and end of suction tubing to open port of Hemovac. e Set suction level as prescribed or on low if health care provider does not specify suction level.	Empties drainage and reestablishes suction to wound bed. Cleaning plug reduces transmission of microorganisms.
6 Empty JP suction drain: a Open port on top of bulb-shaped reservoir (see Fig. 85.3, B). b Tilt bulb in direction of port, and drain toward opening. Empty drainage from suction device into measuring container. Clean end of emptying port and plug with alcohol wipe.	Breaks vacuum for drain. Reduces transmission of microorganisms.

STEP	RATIONALE
c Compress bulb over drainage container. While compressing bulb, replace plug immediately. 7 Place and secure drainage system below site with safety pin on patient's gown. Be sure there is slack in tubing from reservoir to wound. 8 Complete postprocedure protocol.	Reestablishes vacuum. Pinning drainage tubing to patient's gown prevents tension or pulling on tubing and insertion site.

Recording and Reporting

- Record emptying the drainage suction device; reestablishing vacuum in suction device; amount, color, odor of drainage; dressing change to drain site; and appearance of drain insertion site.
- Record amount of drainage on I&O record.
- Immediately report a sudden change in amount of drainage, either output or absence of drainage flow, to the health care provider. Also report pungent odor of drainage or new evidence of purulence, severe pain, or dislodgment of the drainage tube to the health care provider.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Site where tube exits becomes infected.	• Notify health care provider about the presence of signs of infection: purulent drainage, odor, reddened site, increased white blood cell count, and temperature elevation. • Use aseptic technique when changing dressings.

Continued

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
2 Bleeding appears in or around drainage collector.	• Determine amount of bleeding, and notify health care provider if excessive. • Assess for tension on patient's drainage tubing. • Secure tubing to prevent pulling and pain.
3 Patient experiences pain.	• Assess patient's level of pain. • Medicate patient. • Stabilize drainage tubing to reduce tension and pulling against incision. • Notify health care provider if signs of wound infection are present.
4 Drainage suction device is not accumulating drainage.	• Assess drainage tubing for clots. • Assess drainage system for air leaks or kinks. • Notify health care provider.

Wound Irrigation

Wound irrigation cleans surgical or chronic wounds such as pressure injuries (Table 86.1). Introduce the cleaning solution directly into the wound with a syringe, syringe and catheter, pulsed lavage device, or a handheld shower. When using a syringe, the tip remains 2.5 cm (1 inch) above the wound. If a patient has a deep wound with a narrow opening, attach a soft catheter to the syringe to permit the fluid to enter the wound. Pulsed lavage delivers kinetic and mechanical energy and suction (a form of subatmospheric pressure). Ambulatory patients often benefit from the use of a handheld shower for wound cleaning, holding the shower spray approximately 30 cm (12 inches) from the wound.

Delegation Considerations

The skill of wound irrigation cannot be delegated to nursing assistive personnel (NAP). It is the nurse's responsibility to assess and document wound characteristics. The nurse directs the NAP to do the following:

- Notify the nurse when the wound is exposed so an assessment can be completed.
- Report to the nurse: patient pain, presence of blood, drainage.

Equipment

- Irrigant/cleaning solution (volume 1.5 to 2 times the estimated wound volume)
- Irrigation delivery system (per order), depending on amount of pressure desired
- Protective equipment: sterile gloves, gown, and goggles if splash/spray risk exists
- Waterproof underpad, if needed
- Dressing supplies
- Disposable waterproof biohazard bag
- Extra towels and padding (use to protect bed)
- Wound assessment supplies

Implementation

STEP

RATIONALE

- 1 Complete preprocedure protocol.

Continued

TABLE 86.1 Wound Cleansing Considerations

	Mechanical Force	
	High Pressure	Low Pressure
Wound base characteristics	Presence of necrotic tissue (eschar, fibrin slough), debris, or other particulate matter Significant bacterial burden Moderate/large amount of exudates	Presence of granulation tissue or new epithelial cells Nonserous or minimally serous or serosanguineous exudate
Clinical outcomes	Loosen, soften, and remove devitalized tissue from wound Separate eschar from fibrotic tissue/ fibrotic tissue from granulating base	Prevent trauma to viable wound tissue Remove wound care product residue
Solutions	Normal saline Volume of solution depends on size of wound	Normal saline Volume of solution depends on size of wound
Delivery systems	35-mL syringe/19-gauge angiocatheter	Pouring saline directly from a bottle Bulb syringe Piston syringe

Adapted from Spear M: Wound cleansing: solutions and techniques, *Plast Surg Nurs* 31(1):29, 2011.

STEP	RATIONALE
2 If needed, administer analgesic 30 to 45 minutes before starting wound irrigation procedure.	Promotes pain control and permits patient to move more easily and be positioned to facilitate wound irrigation (Krasner, 2016).
3 Close room door or bed curtains, perform hand hygiene, and position patient.	Maintains privacy. Frequent hand hygiene reduces microorganisms.

STEP

- a Position comfortably to permit gravitational flow of irrigating solution over wound and into collection receptacle (Fig. 86.1).
- b Position patient so that wound is vertical to collection basin. Place container of irrigant/ cleansing solution in basin of hot water to warm solution to body temperature.
- 4 Place padding or extra towel on bed under area where irrigation will take place.
- 5 Expose wound only.
- 6 Apply gown and goggles. Apply gloves for Steps 7 and 8, and use sterile precautions.

RATIONALE

Directing solution from top to bottom of wound and from clean to contaminated area prevents further infection. Position patient during planning stage, keeping in mind the bed surfaces needed for later preparation of equipment.

Warmed solution increases comfort and reduces vascular constriction response in tissues.

Protects bedding from becoming wet.

Provides privacy and prevents chilling of patient.

Protects nurse from splashes or sprays of blood and body fluids.

Continued

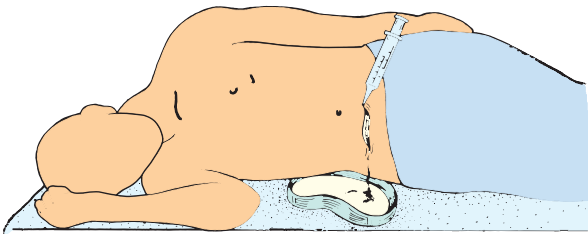


Fig. 86.1 Patient position for wound irrigation.

STEP	RATIONALE
7 Irrigate wound with wide opening: a Fill 35-mL syringe with irrigation solution. b Attach a 19-gauge angiocatheter. c Hold syringe tip 2.5 cm (1 inch) above upper end of wound and over area being cleansed. d Using continuous pressure, flush wound; repeat Steps 7a to 7d until solution draining into basin is clear.	Irrigating wound uses mechanical force, which helps with separation and removal of necrotic debris and surface bacteria (Jaszarowski and Murphree, 2016). Flushing wound helps remove debris and facilitates healing by secondary intention. Catheter lumen delivers ideal pressure for cleaning and removing debris (Ramundo, 2016). Mechanical debridement may include irrigation, which can be done through use of 35-mL syringe with 19-gauge angiocatheter with irrigation pressures delivered between 4 and 15 psi (Wound, Ostomy, and Continence Nurses Society [WOCN], 2016). Prevents syringe contamination. Careful placement of the syringe prevents unsafe pressure of the flowing solution. Clear solution indicates removal of all debris.
8 Irrigate deep wound with very small opening: a Attach soft catheter to filled irrigating syringe. b Gently insert tip of catheter into opening about 1.3 cm (0.5 inch).	Catheter permits direct flow of irrigant into wound. Expect wound to take longer to empty when opening is small. Prevents tip from touching fragile inner wall of wound.

RATIONALE

SAFETY ALERT Do not force catheter into wound because this will cause tissue damage.

c Using slow, continuous pressure, flush wound. d While keeping catheter in place, pinch it off just below syringe. e Remove and refill syringe. Reconnect to catheter and repeat until solution draining into basin is clear. 9 Cleanse wound with handheld shower: a Perform hand hygiene and apply clean gloves. With patient seated comfortably in shower chair, adjust spray to gentle flow; make sure water is warm. b Shower for 5 to 10 minutes with showerhead 30 cm (12 inches) from wound. 10 When indicated, obtain cultures after cleansing with nonbacteriostatic saline. 11 Dry wound edges with gauze; dry patient after shower.	Use of slow mechanical force of stream of solution loosens particulate matter on wound surface and promotes healing (Ramundo, 2016). Useful for patients able to shower with assistance or independently. May be accomplished at home. Ensures wound is thoroughly cleansed. WOCN (2016) recommends using quantitative bacterial cultures (tissue biopsy or swab cultures). Most common type of wound cultures are swab technique, aspirated wound fluid, or tissue biopsy (Stotts, 2016b). Prevents maceration of surrounding tissue from excess

Continued

STEP	RATIONALE
12 Apply appropriate dressing and label with time, date, and nurse's initials.	Maintains protective barrier and healing environment for wound.
13 Complete postprocedure protocol.	

Recording and Reporting

- Record wound assessment before and after irrigation; amount, color, and odor of drainage on dressing removed; amount and type of solution used; irrigation device used; patient's tolerance of the procedure; and type of dressing applied after irrigation on flow sheet in nurses' notes in electronic health record (EHR) or chart.
- Record patient's understanding through teach-back for reasons for wound irrigations.
- Immediately report to the health care provider any evidence of fresh bleeding, sharp increase in pain, retention of irrigant, or signs of shock.

UNEXPECTED OUTCOMES	RELATED INTERVENTIONS
1 Bleeding or serosanguineous drainage appears.	- Flush wound during next irrigation using less pressure. - Notify health care provider of bleeding. - Decrease force of pressure during wound irrigation. - Assess patient for need for additional analgesia before wound care. - Notify health care provider. - Reevaluate amount of pressure to use for next wound irrigation.
2 Increased pain or discomfort occurs.	
3 Suture line opening extends.	

Overview of CDC Hand Hygiene Guidelines

In 2002 the Centers for Disease Control and Prevention (CDC) released recommendations for hand hygiene in health care settings. *Hand hygiene* is a general term that applies to handwashing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis. *Handwashing* refers to washing hands thoroughly with plain soap and water. *Antiseptic hand wash* is defined as washing hands with water and soap containing an antiseptic agent. Antimicrobials effectively reduce bacterial counts on hands and often have residual antimicrobial effects for several hours. An *antiseptic hand rub* is an application of an antiseptic, alcohol-based, waterless product to all surfaces of the hands to reduce the number of microorganisms present. *Surgical hand antisepsis* is an antiseptic hand wash or antiseptic hand rub performed preoperatively by surgical personnel.

Evidence suggests that hand antisepsis, the cleansing of hands with an antiseptic hand rub, is more effective in reducing health care–acquired infections (HAIs) than plain handwashing.

Guidelines in the Care of All Patients

Wash hands—preferably with an antimicrobial soap and water—when hands are visibly dirty, contaminated with proteinaceous material, or visibly soiled with blood or other body fluids. The recommended duration for lathering is *at least 15 seconds*.

- Wash hands with soap and water before eating.
- Wash hands with soap and water after using the restroom.
- Wash hands if exposed to spore-forming organisms such as *Clostridium difficile* or *Bacillus anthracis*. The physical action of washing and rinsing the hands is recommended because alcohols, chlorhexidine, iodophors, and other antiseptic agents have poor activity against spores.

If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating the hands in all of the following clinical situations:

- Before having direct contact with patients
- Before donning sterile gloves
- Before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure
- After contact with a patient's intact skin (e.g., after taking a pulse or blood pressure, after lifting a patient)
- After contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings *if hands are not visibly soiled*

- When moving from a contaminated body site to a clean body site during patient care
- After contact with inanimate objects (e.g., medical equipment) in the immediate vicinity of the patient
- After removing gloves

Note that antiseptic handwashing may be performed in all situations in which an alcohol-based hand rub is indicated. Antimicrobial-impregnated wipes (i.e., towelettes) are not a substitute for using an alcohol-based hand rub or antimicrobial soap.

Methods for Decontaminating Hands

When using an alcohol-based hand rub, apply product to the palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry. Follow the manufacturer's recommendations regarding the volume of product to use.

Guidelines for Surgical Hand Antisepsis

Surgical hand antisepsis reduces the resident microbial count on the hands to a minimum.

- The CDC recommends using an antimicrobial soap and scrubbing hands and forearms for the length of time recommended by the manufacturer, usually 2 to 6 minutes. Long scrub times (e.g., 10 minutes) are not necessary. Refer to agency policy for time required.
- When using an alcohol-based surgical hand-scrub product with persistent activity, follow the manufacturer's instructions. Before applying the alcohol solution, prewash hands and forearms with a nonantimicrobial soap, and dry hands and forearms completely. After application of the alcohol-based product as recommended, allow hands and forearms to dry thoroughly before donning sterile gloves.

General Recommendations for Hand Hygiene

- Use hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or handwashing.
- Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (e.g., those in intensive care units or operating rooms).
- Keep natural nail tips less than ¼ inch long.
- Wear gloves when contact with blood or other potentially infectious materials, mucous membranes, and nonintact skin could occur.

- Remove gloves after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient.
- Change gloves during patient care if moving from a contaminated body site to a clean body site, even when working under isolation precautions.

Data from Centers for Disease Control and Prevention guideline for hand hygiene in healthcare settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/ISDA Hand Hygiene Task Force. MMWR Recomm Rep 51 (RR16):1, 202, www.cdc.gov/handhygiene.

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Postprocedure Protocol

1. Discard all soiled items in proper container.
2. Remove gloves, if used, and perform hand hygiene.
3. Thank patient for cooperation.
4. Make patient comfortable.
5. Return bed to low and locked position.
6. Assist patient with gown, linens, call light, and other applicable items.
7. Discuss patient's response to skill and any findings (if appropriate).
8. Immediately report abnormal findings.
9. Return unused items to proper place (see agency policy).
10. Clean and return reusable items to proper place (see agency policy).
11. Document procedure and patient's response in patient's electronic medical record (EMR).
12. Evaluate patient by returning to patient's bed or chair to measure response to intervention.