chapter 39

Promoting Musculoskeletal Function

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Objectives

Upon completing this chapter, you should be able to:

Theory

1. Discuss the effects of inactivity on respiratory exchange and airway clearance.
2. Describe appropriate care of a cast as it dries.
3. Verbalize the differences among an air-fluidized bed, low air-loss bed, and continuous lateral-rotation bed, listing the reasons for their use.
4. Name at least four pressure relief devices that help prevent skin injury in immobile patients.
5. Describe how to perform a neurovascular assessment on an immobilized extremity.
6. Discuss the use of bandages and slings to immobilize a body part.

Clinical Practice

1. Devise a plan of care for meeting the psychosocial needs of the alert immobile patient.
2. Correctly care for the patient undergoing skin traction.
3. Use lift sheets and roller or slide devices to move immobilized patients.
4. Teach a patient to properly care for a cast after discharge.
5. Correctly apply an elastic bandage to a stump after an amputation.
6. Transfer a patient using a mechanical lift.
7. Assist a patient with the use of each of the following: walker, crutches, cane, brace, prosthesis, and wheelchair.

Skills & Steps

Skill 39-1 Cast Care
Skill 39-2 Care of the Patient in Traction
Skill 39-3 Transferring with a Mechanical Lift

Steps 39-1 Using a Continuous Passive Motion Machine
Steps 39-2 Applying an Elastic Bandage
Steps 39-3 Applying a Triangular Bandage Sling

Key Terms

bivalved (BĪ-vălvd, p. 794)
blanch (BLĂNTCH, p. 798)
cast (CĂST, p. 793)
countertraction force (CŎWN-tĕr-TRĂK-shŭn, p. 793)
dorsum (DŌR-sŭm, p. 798)
external fixator (p. 795)
hemiparesis (hĕm-ē-pă-RĒ-sĭs, p. 798)
hemiplegia (hĕm-ē-PLĒ-jă, p. 798)
hydrotherapy (hī-drō-THĔR-ă-pē, p. 806)
hypostatic pneumonia (hī-pō-STĂT-ĭk nū-MŌ-nē-ă, p. 790)
immobilization (ĭ-mō-bĭl-ī-ZĀ-shŭn, p. 789)
isometric exercises (ī-sō-MĔT-rĭk, p. 791)
kinetic (kĭ-NĔT-ĭk, p. 796)
moleskin (MŌL-skĭn, p. 794)
over-the-bed frame (p. 792)
paraplegics (păr-ă-PLĒ-jĭks, p. 811)
paresthesia (păr-ĕs-THĒ-zē-ă, p. 798)
perfusion (pĕr-FŪ-zhŭn, p. 798)
prosthesis (prŏs-THĒ-sĭs, p. 811)
quadriplegics (kwŏd-rĭ-PLĒ-jĭks, p. 811)
sling (p. 793)
spica casts (SPĪ-kă, p. 794)
splint (p. 792)
traction (p. 789)
trapeze bar (tră-PĒZ, p. 793)

Many conditions require bed rest for the patient to heal and recover. Strokes, chronic debilitating illness, trauma, and neuromuscular disorders all can bring periods of **immobilization** (rendering a part incapable of moving). Problems caused by restriction of normal movement include pressure injuries, pneumonia, loss of bone mass, and permanent loss of function in the immobilized part. Many supportive or corrective measures necessary for treatment, such as **traction** (exertion of a pulling force), casts, or braces, also restrict mobility and may cause the same types of problems (Figure 39-1). Good nursing care is critical in preventing complications for immobilized patients.

SYSTEMIC EFFECT OF IMMOBILIZATION

Decrease in muscle strength, generalized weakness, easy fatigue, stiff joints, abdominal distention, and diminished coordination begin with just a few days of immobility. Pressure ulcers are a frequent consequence of immobility. Table 39-1 presents the more severe problems that may occur when lack of activity continues for a longer time. Pressure ulcer prevention is presented in Chapter 19.

One of the major concerns when a patient's movement is restricted is the development of respiratory complications. Physical activity causes people to breathe more deeply, expanding their lungs and encouraging clearing of secretions. Without adequate physical activity, these secretions can collect in the lower airways, leading to congestion and, ultimately, to respiratory illness, particularly **hypostatic pneumonia** (pneumonia caused by stasis of secretions related to inactivity) or hospital-acquired pneumonia.

Range-of-motion (ROM) exercises (see Chapter 18), frequent turning, and use of deep-breathing exercises can help prevent pneumonia and increase general oxygenation. Patients who are experiencing pain may be reluctant to move and breathe deeply; therefore pain control is essential. However, the medications used to control pain may cause sleepiness and further reduce the patient's desire to move about. Opioid analgesics

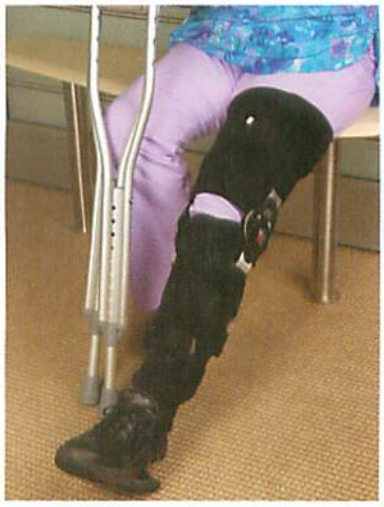


FIGURE 39-1 Patient with a leg brace or splint.

Table 39-1 Effects and Problems of Immobility

BODY PART OR SYSTEM	EFFECT OF IMMOBILITY	PROBLEM OR COMPLICATION
Cardiovascular system	Venous stasis Increased cardiac workload Blood pressure alterations	Thrombus formation Thrombophlebitis Pulmonary embolus Orthostatic hypotension Increased pulse rate
Respiratory system	Stasis of secretions Decreased elastic recoil Decreased vital capacity	Hypostatic pneumonia Bacterial pneumonia Atelectasis Decreased gas exchange
Gastrointestinal tract	Anorexia Metabolic change to catabolism and negative nitrogen balance Decreased peristalsis	Weight loss Protein deficiency Abdominal distention Constipation
Musculoskeletal system	Decreased muscle mass and muscle tension Shortening of muscle Loss of calcium from bone matrix Decrease in bone weight	Fibrosis of connective tissue Atrophy Weakness Joint contracture Osteoporosis Bone pain
Urinary system	Stasis of urine Precipitation of calcium salts Renal stones	Frequency Dysuria Urinary tract infection
Skin	Decreased circulation from pressure Ischemia and necrosis of tissue	Skin breakdown Pressure ulcers
Brain, psychological	Decreased mental activity Decreased sensory input Decreased socialization Decreased independence	Disorientation Confusion Boredom Anxiety Depression Loneliness

such as codeine may depress respirations and further inhibit respiratory clearing (see Chapter 31). Measures to promote respiratory function must be included in the plan of care for the immobile patient.

Circulation is also affected by immobilization. Normal movement assists in venous return as the muscles in motion compress against the venous walls. Healthy, firm muscles provide general support for the venous walls. This is important throughout the body, but especially in the legs, where the force of blood flow is reduced because of the distance from the heart. Various conditions (such as a fracture, trauma, or debilitating illness) and treatments (such as casts, traction, or bed rest) can impair circulation and predispose the patient to pressure injury and permanent loss of function. For these reasons, you must regularly monitor the patient's general circulatory status and blood flow to the affected areas of the body.

Increasing fluids to at least 3000 mL/day, encouraging adequate nutritional intake, and increasing dietary fiber help prevent gastrointestinal system complications. The fluid increase also helps prevent urinary complications. Stool softeners and laxatives are ordered as needed for constipation.

Elder Care Points

- Advanced age compromises the respiratory and circulatory systems, which can lead to even greater risk for complications from immobility.
- Inactivity tends to cause anorexia. Interventions for adequate nutritional care should be added to the care plan of the immobile elderly patient. Frequent small feedings and bedtime nourishments may be needed. Having favorite foods brought in by family and friends can also be helpful.

Performing active or passive ROM exercises to maintain joint mobility and muscle integrity is the standard of practice for bed rest care. Encouraging active movement of the unaffected extremities throughout the day assists in maintaining muscle tone. When the patient is on extended periods of bed rest, **isometric exercises** (exercises performed against resistance) may be appropriate unless contraindicated. Turning the patient every 2 hours, keeping linens smooth and clean, and using pressure relief devices help prevent pressure ulcers. You must keep the skin clean and dry. Perform a skin assessment at least every 8 hours and more frequently for the patient at high risk for skin breakdown.

PSYCHOSOCIAL EFFECTS OF IMMOBILIZATION

Patients faced with movement restriction may experience a variety of emotional responses. Fear can be a major problem for these patients. They may be afraid that they will not be able to return to work and support themselves and those who depend on them. They may fear abandonment by those they love if they cannot function as they did before. Patients who are facing permanent loss may need professional counseling or a support group. This may also be true for significant others affected by the patient's condition. Be supportive, use therapeutic techniques of communication that focus on listening, and allow the patient to verbalize concerns. When you see signs of fear and stress, take time to listen and refer the patient to social services as appropriate.

Another frequent problem for the alert immobile patient is boredom. Not all patients like television or enjoy reading, and even those who do will become bored if they have nothing else to do. Chat with patients about things that interest them while providing their daily care. Some patients may want a diversion through the use of a laptop computer or crossword puzzles, or they may want to do something creative such as crocheting or crafts. Encourage family and friends to space visits so the patient avoids long periods of loneliness. Family members can also help by contacting friends and relatives and asking them to send notes and cards on a regular basis. Cards, letters, phone calls, e-mails, and visits increase the patient's sense of value to others and feelings of self-worth. Positive feelings are known to play an important role in the healing process.

For the immobile patient being cared for at home, it may be helpful to move the bed into the living room or family room. This move reduces social isolation. It may also save many steps for those providing care, especially if the bedrooms are on a separate floor. Visits by home health aides and friends or respite caregivers can provide a chance for the caregiver to get out of the house and do errands or spend some time at leisure.

Remember that the nonalert or comatose patient also needs emotional support. Always assume that patients can hear and understand, even when they cannot respond or they respond inappropriately. Talk to the patient in a kind and caring voice. Explain what is being done before and as it is done, and apologize for any unavoidable pain the care may be causing. Talk to the patient about what is going on in the world. If cards or letters arrive, read them to the patient. Some patients who have recovered from unconscious states have

Elder Care Points

After a stroke, hip fracture, or other condition that causes immobility, elderly patients may worry about becoming a burden to their families. This feeling may be so strong that they think it might be better if they died, and they become depressed. Encouragement and praise from the staff, kindness and patience when they attempt self-care or learn a new task, frequent family visits, and expressions of hope for recovery can help reestablish their sense of self-worth. Consultation with social services may help resolve financial concerns.

described in great detail things that happened while they were unconscious and thanked those staff members who continued to treat them as valuable human beings.

TYPES OF IMMOBILIZATION

SPLINTS

A **splint** is a device that protects an injured part of the body by immobilizing it or limiting its movement. A splint may be used as a first aid measure before a cast or traction is applied to an injured part, or it may be used instead of a cast. Box 39-1 presents the guidelines for applying a splint. Several types of commercial splints are available: molded splints, immobilizers, inflatable splints, cervical collars, and traction splints (Figure 39-2). First aid splints are fashioned from materials at hand and require only some rigid material, padding, and something to secure the splint in place. Inflatable splints help control bleeding as well as immobilize the injured part. The splint should be inflated until fingertips can only indent the device 1½ inches (3.8 cm). Immobilizers are made of cloth and foam with Velcro straps. They are often used on an injured knee to prevent movement while an injury heals or during activity to prevent further injury. Molded splints keep the body part in a functional position to prevent contracture. They are used for chronic disorders. Traction splints are applied and hooked to traction ropes, pulleys, and weights to maintain pull on a fracture.

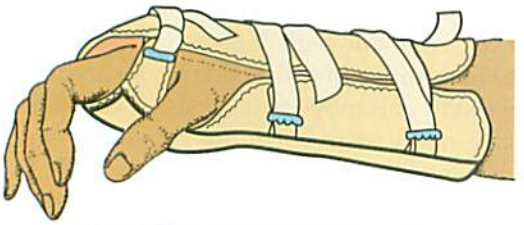


FIGURE 39-2 Wrist and forearm splint.

Box 39-1 Applying a First Aid Splint to an Extremity

When a serious injury or fracture occurs in the home or outdoor setting, it is advisable to render first aid by splinting the injured part. To apply a splint to an extremity:

- Handle the injured part gently and do not change its position in any way. This decreases the chance of nerve injury and further bleeding.
- Cover any open wounds with material as clean as can be found to help prevent infection.
- Use a rigid splinting material to immobilize the injured part. Flat boards, broom handles, rolled-up newspaper, or similar materials are appropriate. The splint should be long enough to span the joint above and below the injury.
- Pad bony prominences with soft material to prevent pressure wounds.
- Secure the splint with wide bands of material to stabilize the injured limb within the splint.
- Elevate the injured part to decrease edema and swelling.
- Check circulation distal to the injury, and loosen the splint ties if tissue becomes pale, cold, or blue.
- Keep the person warm and seek transport to a medical facility.

TRACTION

Traction is the application of a pulling force, which maintains parts of the body in extension and alignment. It may be used to realign bone ends following a fracture and to relieve pain and nerve impairment caused by compression or muscle spasm. There are three types of traction: manual, skin, and skeletal.

The amount of traction is determined by the pull exerted by weights at the end of the traction ropes. The amount of weight is ordered by the physician and often changes over the course of treatment. Initially the muscles tend to be tight and may go into spasm. A heavier weight is required to overcome the muscular pull and allow the body to resume a normal alignment. As times goes on, the muscles tire and relax; the amount of weight is then reduced. The physician will leave orders concerning whether, and how much, the head of the bed may be raised. The head of the bed should be no higher than 20 degrees (unless ordered by the physician) to keep the patient from sliding down in bed and to keep the weights hanging free. A slight Trendelenburg position may be ordered to keep the patient from slipping down in the bed. Tape a sign to the head of the bed indicating any restrictions related to bed positioning. **The weights should swing freely without touching the bed or floor.** The ropes must move freely through the pulleys to prevent injury to the patient and alteration in the effects of the traction. Principles to follow for traction are listed in Table 39-2.

The patient in traction should have an **over-the-bed frame** (rectangular frame to which traction equipment

Table 39-2 Principles of Traction with Nursing Interventions

PRINCIPLE	NURSING INTERVENTION
Ropes and weights must be free of friction.	Keep ropes free of entanglement in the linens.
Maintain the correct line of pull.	Keep the patient centered in the bed with the body in good alignment.
Weight and pull of the traction must be continuous and as ordered by the physician.	Remove or add weights only by physician's order. Do not interrupt the pull of traction to provide care.
Sufficient countertraction must be maintained.	Keep the patient from sliding down in the bed when in leg or back traction. Keep the patient in sidearm traction in the center of the bed.

may be attached) with a **trapeze bar** (overhead bar that patient can grab) attached to the bed (see Figure 18-9, *A*). The patient can grasp the trapeze bar to assist in repositioning. Teach the patient how to tell when body alignment is correct in the bed so that, as he becomes more active, he can place himself in correct alignment to maintain the traction.

Manual Traction

In this form of treatment the health care provider's hands are used to aid in the realignment of fractured bones. This method should be used only on stable, clean fractures or dislocations. Manual traction is typically performed by the physician before placing the affected extremity into a splint or cast.

Skin Traction

In skin traction a Velcro boot (Buck extension), belt, halter, or **sling** (bandage for supporting a part) is applied snugly to the skin, and the traction is attached to the appliance (Figure 39-3). Skin traction has the advantage of being noninvasive, and its main purpose is to decrease muscle spasm that accompanies fractures. Damage from skin traction includes blisters, rashes from irritation by adhesives, and skin tears and tissue injuries from the shearing effects of the lateral pull across the skin surface. The amount of weight that can be applied is limited to a maximum of 15 lb (6.8 kg). Skin traction should not be used if the fracture requires 5 lb (2.3 kg) or more of tractive weight. Check the skin frequently for any indications of injury, and report any problems or skin pain immediately to the physician or the traction technician.

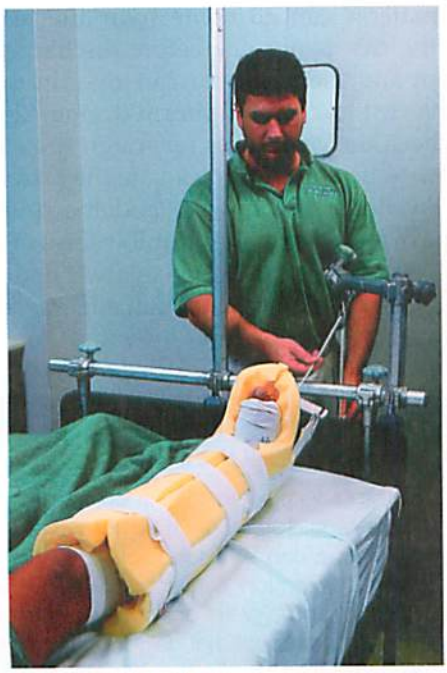


FIGURE 39-3 Buck extension.

Safety Alert

Safety with Immobilization

Whenever a patient is in an immobilization device, be certain to check for adequacy of circulation in the affected part by assessing skin temperature and color, capillary refill when appropriate, and sensation.

Skeletal Traction

Although external fixation is used more often for fractures today, skeletal traction is occasionally used for some injuries. Skeletal traction requires the surgical placement of pins, tongs, screws, or wires that are anchored to or through the bone and, therefore, pierce the skin. Traction is thus applied directly to the bone, which can support more weight than the skin. As much as 30 lb (13.6 kg) of tractive force can be used for this type of traction. An orthopedic technician may set up the traction. The nurse is responsible for maintaining the correct weight and alignment of the traction and for maintaining a balance between traction pull and **countertraction force** (the weight pulling against the weight of the traction). Countertraction is provided by the patient's weight and the position of the bed.

Care of the skin around the openings for the pins, the tongs, or the wires is done according to the physician's order. Sterile technique is used when performing pin care (Box 39-2). After the sites are healed, they may be left open to the air. Clear fluid drainage is expected initially. Follow the physician's order and the facility's policies, and report immediately any indication of infection at the wound or pin sites. Circulation checks are performed every hour for the first 24 hours and every 4 hours thereafter.

Think Critically

What interventions would you use to prevent skin breakdown on the back and buttocks of the patient in traction?

CASTS

Patients may be placed directly into a **cast** (a stiff plaster of Paris, fiberglass, or polyester dressing used to immobilize) after a fracture or a variety of orthopedic

Box 39-2 Guidelines for Pin Care

Always follow the physician's orders for cleansing or antiseptic solution and use or nonuse of antimicrobial ointment.

- Using sterile swabs, cleanse closest to the pin in a circular motion. Use one swab for each circle. Work your way out in succeeding circles until 1½ inches from the pin.
- Apply antimicrobial ointment with a sterile swab if ordered.
- Dress with sterile gauze if ordered.
- Secure ends of wires with cork.
- Monitor for infection, assessing for increased pain, redness, edema, tenderness, or purulent drainage.

procedures, or a cast may be applied after a period in traction. The skin is cleansed and inspected and any wounds are treated before a cast is applied. A layer of stockinette is applied first, followed by a thin layer of cotton or synthetic padding and then the cast material. Most casts are made of fiberglass, polyester resin, or thermoplastic material. Plaster of Paris casts are often applied to a lower extremity because they withstand weight bearing better than the synthetics. Heat may be felt as the casting material is applied, especially with plaster of Paris. Casts made of synthetic material dry quickly (7 to 20 minutes), but plaster casts can take from a few hours to a couple of days to dry and be fully hardened. The synthetic cast may be hardened enough to be durable within 30 minutes. **It is critical to protect the cast from uneven pressure during the drying period because the shape or position can be inadvertently changed.** When handling the cast, use the palm and flat parts of the fingers rather than the fingertips.

Clinical Cues

Dents in the cast can lead to circulatory impairment and pressure injuries, and changes in alignment can alter the position of the healing parts or impede circulation.

Swelling of the tissues is common during the first days after a cast is applied, and if left uncontrolled, this can impair the circulation and cause a pressure injury. A casted extremity should be elevated on pillows. If not padded sufficiently, the edges of the cast may rub or push against bony areas, causing pain and injury. The stockinette may be folded over the outside edge of the cast and taped to protect from chafing, or the cast edge may be "petaled" with waterproof tape. Changing position may relieve the problem, or adding extra padding beneath the edge of the cast may help.

If the cast becomes too tight, it may be **bivalved** (cut in half lengthwise) to relieve the pressure on the tissues. If there is a wound under the cast that needs observation, a window may be cut in the cast over the wound area. When edema has decreased, the cast is secured with outside bandaging or more casting material. Sometimes after edema subsides, the cast is too loose and must be replaced.

Hip **spica** (figure-of-8) **casts** can be particularly challenging for both the patient and the caregiver. Hip spica casts encase a portion of the trunk and part or all of both legs (Figure 39-4). A spreader bar is placed between the legs to maintain the desired angle at the hip and is incorporated into the cast. **Do not use the spreader bar as a handle for lifting and turning the patient. It may be dislodged, ruining the cast and causing pain and possible injury to the patient.** Grasp the cast over the leg to assist in turning. Because of their size and thickness, hip spica casts often take longer to dry. Frequent turning is necessary, including placing the patient in a prone position to ensure complete and uniform drying.

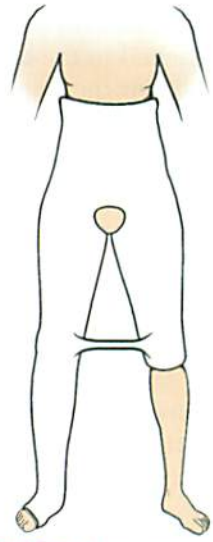


FIGURE 39-4 Hip spica cast.

Clinical Cues

A hair dryer set on low may be used to assist in drying the plaster of Paris cast. Just be certain to uniformly dry all areas of the cast and lightly touch the cast frequently to make certain that it is not becoming so hot that it will burn the patient's skin.

Toileting can be difficult for the patient with a hip spica cast. Ingenuity is needed to protect the cast from soiling. Using disposable plastic wrap around the perineal opening is one method of protection. When elevating a wet cast with pillows, use cloth-covered pillows because plastic-covered ones hamper drying.

Most patients can go home soon after cast placement. If the cast is not dry before discharge, instruct the patient and the family or caregiver in the proper care of the cast to ensure uniform drying. Show them how to check the cast edges for rough spots or crumbling, how to use pillows to elevate the extremity and prevent swelling, and how to pad the rough edges using tape or **moleskin** (thick, durable form of adhesive material). Assess cast condition every 8 hours, checking for cracks, crumbling, or rough edges. A damaged cast may need to be replaced.

Safety Alert

Precautions When the Patient Has a Cast

Caution patients not to place a foreign object under the cast (e.g., wire hanger or stick to scratch an itch). Blowing cool air under the cast with a can of electronic air cleaner may help decrease itching. Discomfort can sometimes be relieved by directing the air of a hair dryer set on "cool" into the cast. Castblast is a commercial product that delivers a soothing layer of talc under the cast.

A major concern for patients with casts is bathing. Plaster casts must be kept dry, or they can disintegrate. Even fiberglass casts are a problem if they become thoroughly wet. The outside material tolerates water, but the padding inside tends to stay wet, causing irritation to the skin. Small casts, such as those that immobilize the forearm or the lower leg, can often be covered with a large plastic bag taped in place to allow the patient to shower. Larger casts, however, usually require that the patient take sponge baths until the cast is removed.

When a child is sent home with a cast, it is important to stress the dangers of placing small items inside the cast. These can cause pressure **necrosis** and infection.

Casts are removed using an oscillating saw. The saw is noisy and may frighten the patient. Reassure the patient that the saw does not cut down to the skin. After the cast material is separated, scissors are used to cut through the stockinette and padding and the cast is removed.

Clinical Cues

Warn the patient that the skin underneath a cast that has just been removed will be dry and appear dirty, with an unpleasant odor. Washing with warm soapy water, rinsing, and applying cream or lotion removes dead skin cells and helps the skin return to normal. Vitamin E or other recommended ointment rubbed over the healed incisions may also improve appearance.

EXTERNAL FIXATORS

An **external fixator** is a metal device, such as a pin, a screw, or a tong, that is inserted into or through one or more bones to stabilize fragments of a fracture while it heals (Figure 39-5). The metal inserts are attached to a metal frame. This type of immobilization allows direct visualization of the wound, and can be adjusted without sending the patient to surgery. External fixators generally allow the patient to be more active during healing while maintaining immobilization of the fractured area. The pins, the screws, or the tongs and the frame should be checked for stability every 4 hours. The insertion of the metal device through the skin provides a break in skin integrity that requires regular pin care to prevent infection, which is a common complication of external fixators (see Box 39-2). Pin care is included in Skill 39-2 later in this chapter.

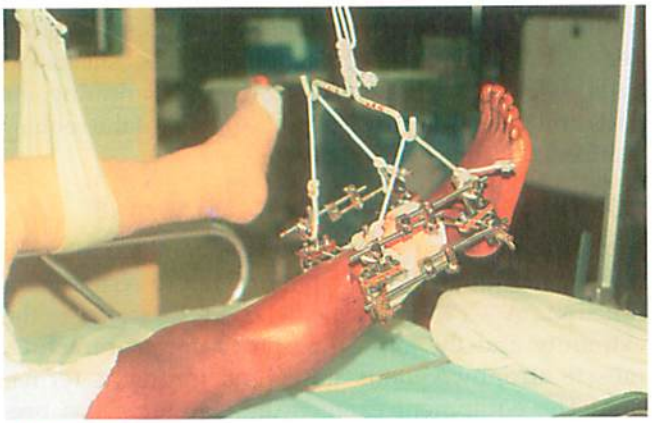


FIGURE 39-5 An external fixator holding fractured bones in place.

DEVICES USED TO PREVENT PROBLEMS OF IMMOBILITY

SPECIALTY BEDS

On occasion, illness or injury may result in long-term or permanent immobility. Pressure ulcers, complications of immobility, and hospital-acquired infections such as pneumonia are serious concerns. In such instances, patients may benefit from the use of specialty beds to try to avoid these complications. Because their use is expensive, thorough ongoing documentation of the need for this type of bed is essential.

Air-Fluidized Beds

Air-fluidized beds have tiny silicone beads contained within the bed under a flexible, air-permeable filter sheet (Figure 39-6). Warmed air passes through the small particles, setting them into motion so that they act as a fluid that suspends the patient free from contact with any stationary, hard surface. The patient's flotation or buoyancy on the air-fluidized beads prevents pressure occlusion of blood vessels and shearing of tissues against the mattress during movement, unlike conventional mattresses. The loose filter sheet reduces friction, and the warm air protects the skin from damage by wetness. Air-fluidized therapy is effective in the prevention of pressure injury and helps reduce generalized body pain common among bedridden patients. The indications for

FIGURE 39-6 Clinitron Elexis air-fluidized therapy unit.

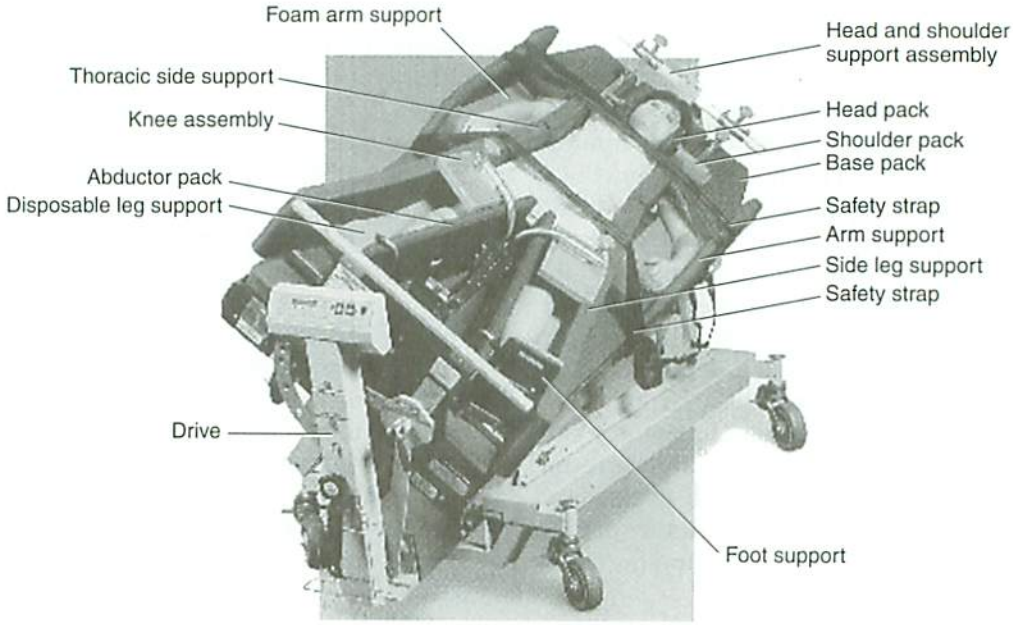


FIGURE 39-7 RotoRest Delta Kinetic Therapy Bed.

use include patients with full-thickness or multiple pressure ulcers, fresh grafts, or flap repairs of injuries and immobile patients whose general condition puts them at high risk for skin breakdown. Air-fluidized therapy is not recommended for patients with unstable spines or patients who are ambulatory. To maximize the beneficial effects of the therapy, the unit should be in the fluidized mode at all times, except during patient transfer in and out of the bed or during nursing procedures that require the patient to be in one stable position.

Low Air-Loss Beds

Low air-loss support is achieved by distributing air through multiple cushions connected in a series. The cushions are calibrated to provide maximum pressure relief for the individual patient. Shear and friction are reduced or eliminated because the cushions give with the patient during movement or rest. A low airflow through the cushion controls moisture on the skin. Segments of cushions may be deflated for patient care. The head of the bed can be raised. This bed is contraindicated for the patient with an unstable spine.

Continuous Lateral-Rotation Beds

Lateral-rotation therapy beds such as the RotoRest bed are believed to decrease the incidence of lung collapse and hospital-acquired pneumonia, facilitate normal urine flow, and reduce the risk for deep vein thrombosis and pulmonary embolism by encouraging venous flow. This intervention may have a significant positive effect on various body systems of the critically ill patient and improve the overall patient outcome. Skin breakdown is reduced by the pressure-reduction foam and gel pack surface. The patient is secured in position on the bed by multiple cushion wedges (Figure 39-7). The bed turns in an arc up to 80 degrees and can be set to pause on either side for up to 30 minutes. The rotation is stopped and the wedge cushions removed as needed for bathing, procedures, or toileting. There is a built-in scale to allow patient weighing.

The degree and rate of movement are programmed to meet the individual patient's requirements. The constant side-to-side movement prevents the accumulation of respiratory secretions and promotes respiratory clearing. Other lateral-rotation beds are combined with low air-loss technology to provide relief of tissue pressure.

? Think Critically

What types of problems, if any, do you think you might encounter when caring for a patient in a **kinetic** (moving) or air-fluidized bed?

PRESSURE RELIEF DEVICES

A variety of accessories aid in the reduction of skin trauma from pressure for patients in standard hospital beds. These include foam and gel pads, sheepskin pads, heel and elbow protectors, and pulsating air pads and water mattresses that lie on top of the regular mattress (Figures 39-8 and 39-9).

CONTINUOUS PASSIVE MOTION MACHINE

After orthopedic surgery to replace a joint, continuous passive motion (CPM) is often ordered to restore joint function. A CPM machine is used to exercise the extremity and the joint, thus preventing contracture, muscle atrophy, venous stasis, and thrombus formation. The equipment extends the extremity to a prescribed angle for a specific time and then releases the

FIGURE 39-8 Alternating air mattress pad.

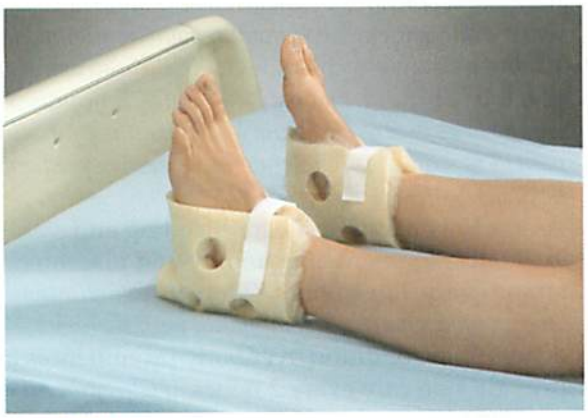


FIGURE 39-9 Heel protectors help prevent skin breakdown.

joint, flexing it again. The machine operates continuously as long as it is switched on. As the degree of joint motion is tolerated, the settings are altered to increase the joint's mobility (Figure 39-10).

Clinical Cues

Assess pain level and medicate with ordered analgesia before initiating treatment with a CPM machine. Closely monitor for the need for more analgesia throughout exercise. The use of the machine is initially painful. **Pain is controlled best when it is treated before it becomes severe.**

Check the dressing for needed reinforcement before attaching the extremity to the machine. The machine is placed in position by two people because it is heavy. Checks for function of the machine and electrical safety are performed before placing the machine on the bed. Follow Steps 39-1 to initiate therapy.

THERAPEUTIC EXERCISE

Physical therapy is often ordered for the patient who is immobilized for an extended time. The physician indicates what the patient's problems are, and the therapist performs an evaluation and then designs an exercise

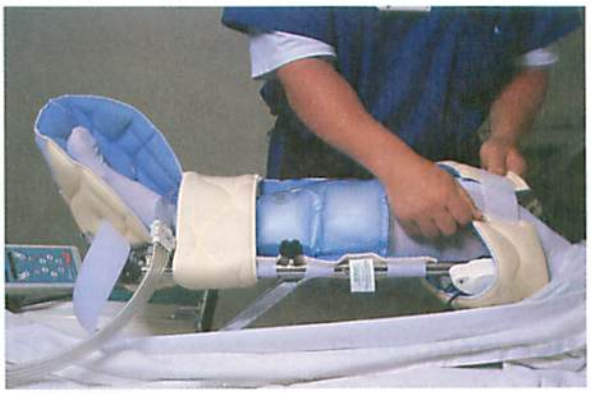


FIGURE 39-10 Continuous passive motion machine for the knee joint.

program to help the patient and to prevent further musculoskeletal problems from occurring. Full ROM exercises should be performed either actively or passively several times a day (see Chapter 18). To prevent joint injury while performing passive ROM exercises, support the limb to be exercised above and below the joint. When the physical therapist is not available, the nurse assists the patient in performing these exercises. A family member or significant other can also be shown how to assist the patient with exercise.

APPLICATION OF THE NURSING PROCESS

Assessment (Data Collection)

When performing head-to-toe assessment of the immobilized patient, be alert to indicators of circulatory impairment such as reddened areas, pale or blue skin, coldness, or diminished or absent pulses. Look for signs of respiratory impairment such as shallow breathing, rapid or depressed respiratory rate, cough, abnormal lung sounds, use of accessory muscles, retractions or grunting, generalized paleness, duskiness, or cyanosis.

In addition to regular assessment, you should determine which activities of daily living the immobilized patient can perform and which require assistance. Incorporate assistance needs into the nursing care plan. Continually assess for pain and discomfort. Assess for cultural beliefs and customs that should be considered in planning care.

Perform a neurovascular assessment for any patient with a cast or traction device (Box 39-3). When the patient is in traction, assess the pulleys and ropes for proper function and free movement. Ensure that the weights are hanging free and the correct amount of weight is applied. Assess the pin, the wire, or the tong insertion sites for indications of infection. For the patient in a cast, sniff at the edges of the cast for a foul or musty odor. Other indicators of infection are an elevated temperature, pus-like drainage, an elevated white blood cell (WBC) count, or increased complaints of pain.

Steps 39-1 Using a Continuous Passive Motion Machine

The most common use of a continuous passive motion (CPM) machine is for the knee following knee replacement surgery. The nurse is responsible for making certain the machine is attached properly and that the settings are what the surgeon ordered.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Check the order for flexion and extension limits and extremity involved. *(Provides data for setting up the machine.)*
2. Place machine on bed directly on sheet-covered mattress. *(Provides a stable surface. No extra mattress pad should be under the machine.)*
3. Connect the control box to the CPM machine and set the limits of flexion and extension. *(Prepares machine for function.)*
4. Set machine speed control to slow or moderate range. *(Speed is ordered by the physician.)*
5. Let machine run through one complete cycle. *(Ensures that the CPM machine is working properly.)*
6. Stop the machine at end of extension. Center the extremity on machine with sheepskin beneath the extremity and adjust the machine to fit the patient. Align the patient's joint with the machine joint and strap the extremity in place. *(Prepares the machine to work on the joint properly. Avoids pressure on the extremity and protects the skin.)*
7. Start the machine. When it reaches full flexion, stop the machine and check the degree of flexion. *(Ensures that machine is not flexing the joint more than desired, preventing complications.)*
8. Set the cycle rate, start the machine, and observe for two full cycles. *(Ensures that machine is functioning correctly. Cycle rate is usually between 2 and 10 cycles per minute.)*
9. Raise side rails of bed to keep machine in place. Keep bed flat with head raised only 20 degrees if necessary. *(Ensures that machine can function as ordered and patient's body will remain in alignment.)*
10. Assess patient's comfort level. *(CPM therapy may be initially painful, and patient should be medicated regularly as ordered for pain. When pain is controlled, patient is more able to tolerate increases in speed and flexion.)*
11. Assess the operative site for bleeding and evaluate alignment of extremity and placement of straps every 2 to 4 hours. *(Prevents complications and promotes patient's compliance with therapy.)*
12. Assess skin condition over bony prominences and provide skin care every 2 hours. *(Helps prevent pressure ulcers.)*

Box 39-3 Neurovascular Assessment

Neurovascular assessment is performed for every patient who has experienced a fracture, whether treated with a cast or traction. It should be performed every hour for the first 24 hours and, once the cast is dry, every 4 to 8 hours. Check agency protocol for specific time schedule.

Skin: Inspect area distal to the injury, noting color. Compare to other extremity. Palpate skin temperature with **dorsum** (back) of the hand; compare with opposite extremity or site.

Movement: Have patient move area distal to the injury, or move it passively. There should be no discomfort.

Sensation: Inquire about feelings of numbness or tingling **(paresthesia).** Check sensation with a paper clip and compare bilaterally. Sensation should be the same.

Pulses: Palpate pulses distal to the injury. Compare bilaterally if possible.

Capillary refill: Using your thumbnail, press the nail beds distal to the injury to **blanch** (turn pale) and judge time for capillary refill to occur after releasing pressure; it should occur within 3 seconds, or within 5 seconds in the elderly.

Pain: Inquire about the degree, the location, the nature, and the frequency of pain, noting any increase in intensity or change in type of pain.

Evaluate any aids to ambulation for structural problems, fit, safety, and the patient's ability to use them correctly. Assess the assistive device for correct length or height in relation to the patient's height and posture. Check the foot of the crutch or the cane for an intact rubber tip or the walker for properly functioning wheels (if present). Observe the patient's gait with the device to determine his stability (Figure 39-11).

Nursing Diagnosis

Common nursing diagnoses for patients with immobility are as follows:

- Impaired physical mobility related to **hemiparesis** (one-sided weakness) or **hemiplegia**, (one-sided paralysis)
- Impaired physical mobility related to fractured extremity in traction or a cast
- Ineffective peripheral tissue **perfusion** (circulation of blood through tissue) related to decreased circulation in the lower extremities
- Impaired tissue integrity related to skin disruption
- Pain related to tissue or bone injury or muscle spasm
- Ineffective airway clearance related to inactivity and bed rest

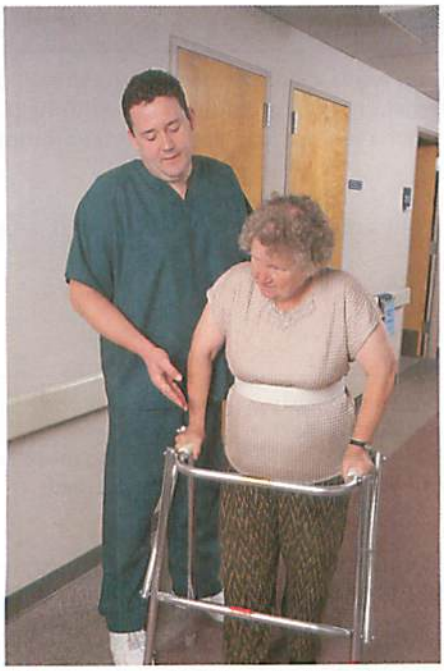


FIGURE 39-11 Assess the gait of the patient learning to use a walker.

- Risk for disuse syndrome
- Risk for peripheral neurovascular dysfunction related to fracture and cast application

Nursing diagnoses related to the psychosocial needs of the immobile person are as follows:

- Social isolation related to immobility
- Disturbed body image related to brace or cast
- Deficient diversional activity related to immobility and bed rest
- Situational low self-esteem related to inability to perform usual roles

Planning

Planning care for the immobile patient requires careful consideration of the time needed to assist the patient with various aspects of activities of daily living, the time needed for treatments, and the time to be spent providing diversional activity and socialization. Expected outcomes for some of the above nursing diagnoses might be that the patient will:

- Demonstrate the ability to cope with physical mobility limitations as evidenced by resumption of as many self-care activities as possible within 10 days
- Remain intact and free of pressure-related injuries
- Have pain controlled with medication and alternative techniques
- Maintain good respiratory status as evidenced by effective airway clearing and normal breath sounds bilaterally
- Not experience contracture or muscle atrophy from immobilization
- Show no evidence of peripheral neurovascular dysfunction from swelling and/or cast application
- Maintain regular contact with significant others, participating in diversional activities
- Maintain interest in events occurring in the outside world
- Evidence self-esteem by positive self-statements and voluntary participation in self-care and attention to grooming

Implementation

Appropriate interventions related to the identified nursing diagnoses include regular turning and positioning, use of pressure relief devices, coughing and deep-breathing exercises, ROM exercises, assisted ambulation, and visitation or activities addressing the patient's psychosocial needs. Nursing Care Plan 39-1 presents interventions for a specific patient.

When caring for a patient in a fresh plaster cast, elevate the cast on pillows if possible. This places a soft, yielding surface against the plaster that is less likely to alter the shape of the cast. Elevating the extremity reduces the likelihood of swelling. Turn the patient hourly so the cast rests on a different area of its surface and will dry evenly. Skill 39-1 on p. 801 presents the points of care for the patient with a cast. For the patient going home with a cast in place, review cast care and assessment of problems with the patient and the caregiver.

Patient Teaching

Fracture and Cast Care

To promote healing of your fracture and care for your cast:

- Keep the casted limb elevated above heart level whenever possible to prevent swelling.
- Call the physician if your fingers or toes become numb, tingle, turn blue, or are cold to the touch.
- Call the physician if you develop a fever, have unusual pain in the casted extremity, or notice a bad odor coming from the cast. These could be signs of infection.
- Regularly perform the exercises your physician or physical therapist has taught you. These will help you retain your muscle strength while the bone heals.
- If the cast becomes loose or slides, call the physician because it probably needs to be changed.
- Do not get a plaster cast wet. Check with your physician about bathing or swimming if you have a synthetic cast.
- Do not insert any object inside the cast to relieve an itch. Doing so may damage the skin and result in an infection.
- Do not bear weight on the cast unless your physician has advised you to do so.

Care of the patient in traction is time consuming because the patient's mobility is severely limited. Skill 39-2 on p. 803 presents the points of care for the patient in traction.

Nursing Care Plan 39-1 Care of the Patient Immobilized by a Stroke

SCENARIO Millie Palmer, age 76, is admitted after suffering an apparent cerebrovascular accident (CVA, stroke). She has left-sided hemiparesis and poor bladder control. She is confused and somewhat groggy. A computed tomography (CT) scan of the brain shows that the problem is from a thrombosis (clot), and she is started on heparin to prevent further thrombi from forming.

***PROBLEM*/NURSING DIAGNOSIS** *Stroke with left sided-weakness*/Impaired physical mobility related to weakness of left extremities.

Supporting Assessment Data *Objective:* Weakness of left arm and left leg; CVA.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will maintain muscle tone in all muscles.	Reposition q 2 hr.	Repositioning prevents pressure ulcers and provides comfort for joints.	*Is muscle tone being maintained?* Some tone to muscle.
Patient will maintain joint mobility in all joints.	Passive ROM to left extremities tid.	Passive ROM will help maintain muscle function and joint mobility.	ROM performed.
	Active ROM to other joints bid.	Active ROM will preserve muscle tone and joint function.	Actively moving other extremities and joints.
	Encourage to perform ADLs as possible.		
	Assess for muscle spasm each shift.	Muscle spasm may occur with hemiparesis and can be painful.	Progressing toward expected outcomes. Continue plan.

***PROBLEM*/NURSING DIAGNOSIS** *Unable to reposition self*/Risk for impaired skin integrity related to decreased mobility and incontinence.

Supporting Assessment Data *Objective:* Left-sided weakness, confusion; incontinent of urine.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Skin will remain intact.	Assess skin each shift and when turning, with special attention to pressure points.	Frequent inspection of skin reveals reddened areas before pressure ulcers form.	*Is skin intact?* Skin remains intact; area of redness over right ankle; heel protector applied to protect ankle.
	Use cushioning devices under pressure points as needed.	Cushioning reduces pressure over bony prominences.	
	Offer bedpan q 2 hr.	Opportunity to void q 2 hr helps prevent incontinence.	
	Check absorbent undergarment frequently and change quickly when wet; clean and dry the skin.	Moisture contributes to skin breakdown. Keeping skin clean and dry prevents breakdown.	Meeting expected outcomes. Continue plan.

***PROBLEM*/NURSING DIAGNOSIS** *Clot interrupting blood flow in brain*/Ineffective cerebral tissue perfusion related to thrombosis.

Supporting Assessment Data *Objective:* Cerebral thrombus demonstrated on CT scan.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Neurologic deficits will not increase.	Perform neurologic assessment and vital signs q 2 hr.	Assessment will reveal deteriorating condition in a timely fashion.	*Are there neurologic deficits?* Left-sided weakness present.
	Administer heparin as ordered.	Heparin will help prevent formation of further thrombi.	No change in neurologic status.
	Monitor INR for therapeutic response to heparin.	INR levels will demonstrate whether heparin dose is sufficient.	Progressing toward outcomes. Continue plan.

Key: *ADLs*, Activities of daily living; *bid*, twice daily; *INR*, International Normalized Ratio; *ROM*, range of motion; *tid*, three times daily.

Nursing Care Plan 39-1 Care of the Patient Immobilized by a Stroke—cont'd

PROBLEM/NURSING DIAGNOSIS *Incontinent of urine*/**Functional urinary incontinence related to CVA.**
Supporting Assessment Data *Objective:* Left-sided weakness, confusion; incontinent of urine.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Patient will regain continence.	Institute bladder training program in 2 days.	Bladder training regimen can reinstitute urinary continence in many stroke patients.	*Is patient continent?* Not completely; some intermittent uncontrolled voiding.
	Offer bedpan q 2 hr.	Opportunity to void q 2 hr helps prevent incontinence.	Voids in bedpan after meals.
	Obtain order for bedside commode.	With hemiparesis it is easier to transfer to the bedside commode than walk to the bathroom to void.	
	Check absorbent undergarment frequently; change when wet.		Progressing toward outcomes. Continue plan.

Critical Thinking Questions

1. How might incontinence affect this patient psychologically?
2. If Mrs. Palmer says that she is too tired to do the exercises and all she feels like doing is sleep, how would you respond?

Skill 39-1 Cast Care

Casts may be applied to almost any area of the body. The larger and thicker the cast, the longer it takes to dry fully. Hip spica and full-body casts may take 1 to 2 days to dry completely. Synthetic material casts dry much more quickly than plaster casts.

Supplies

- Tape or moleskin
- Pen for marking drainage
- Lamb's wool for padding

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

1. Examine the cast for any dents. Handle the cast gently with the flats of the fingers and the palms, not the fingertips. *(Dents may cause compression on underlying tissues. Fingertip pressure more easily dents the cast because the pressure is on a small area rather than spread over a broader surface.)*
2. Examine the cast for any areas where blood may have seeped through. Circle any such areas in ink, and write the date and time on the cast. *(Bloodstains seeping through the cast are common when surgery has preceded the application of a cast. Marking provides a way to judge further bleeding.)*
3. Assess the cast for rough edges and excessive tightness by running a finger along all cast edges and under the edges next to the skin. *(A finger should slip easily under the edge of the cast. Checking helps to discover problem areas.)*

Planning

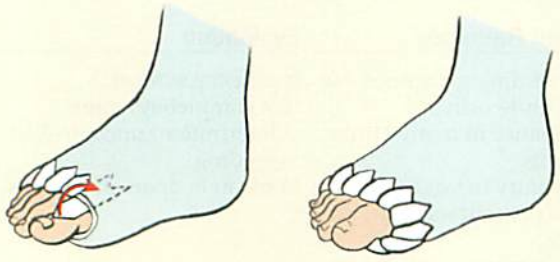
4. Plan to reassess a new cast every hour for the first 24 hours and every 2 to 4 hours thereafter or per agency policy. *(Swelling may occur in the period after injury or surgery and may cause pressure on nerves and vessels.)*

Implementation

5. Pad any rough edges by petaling with 1½ to 2-inch pieces of tape or moleskin. Place lamb's wool beneath cast to pad under rough spots. *(Rough spots cause skin chafing, abrasion, and breakdown.)*

Continued

Skill 39-1 Cast Care—cont'd



Step 5

6. Notify the orthopedic technician or the physician if any area of the cast is too tight. *(The cast may need to be cut to relieve the pressure.)*
7. Elevate the casted extremity so that the hand or foot is at the level of the heart. *(Elevation aids in reducing or preventing swelling.)*
8. For patients in large casts (e.g., hip spica and body), place the bed in a slight Trendelenburg position for the first day or two to help prevent swelling, unless contraindicated by the patient's condition or the physician's orders. *(Patients in large casts may experience swelling in the legs, the thighs, the perineum, the buttocks, and the lower abdomen during the first few days. Placing the bed at an approximate 10-degree angle in a Trendelenburg position helps prevent this swelling.)*
9. Turn the patient at intervals so that all surfaces of the cast are exposed to the air to facilitate even drying and to prevent skin pressure ulcers.
   - When the cast is still wet, turn the patient hourly.
   - As the cast dries, every 2 hours is sufficient unless the patient is uncomfortable.
   - Get adequate help when turning the patient to prevent injury.
   - Use pillows to prop the patient at different angles as the cast dries. *(Air exposure allows moisture to evaporate.)*
10. Instruct patient not to use sharp, pointed, or rigid items to scratch under the cast. *(The skin under the cast often itches. Using such items to scratch can injure the skin. If itching is severe, ask for an order for medication to control it or if appropriate, use Airblast.)*
11. Smell the open edges of the cast to assess for infection under the cast. *(Skin injuries may become infected or necrotic and cause a foul or musty odor.)*

Evaluation

12. Evaluate the cast by inspecting for crumbling or cracks. Ask yourself: Is there any discomfort under the cast? Is the cast rubbing the skin anywhere? Are the edges smooth? Is the cast drying evenly? Is swelling in the tissues subsiding? *(Answers to these questions tell whether the interventions are successful in meeting the expected outcomes.)*

Documentation

13. Document assessment findings and interventions on the daily flow sheet or in the nurse's notes. *(Verifies that assessment has been performed and interventions carried out.)*

Documentation Example

7/29 1015 Received from recovery room alert and stable. Fresh plaster cast encases right leg from mid-thigh to mid-toes. Toes pink, warm, move well; sensation present; capillary refill less than 2 seconds. Edge of cast easily admits fingertip. Leg elevated on pillows. Rates pain as 3 out of 10. Advised to request pain medication if pain increases.

_____
(Nurse's signature)

Special Considerations

- Provide full instructions for cast care for the patient discharged home with a cast.
- Instruct to use a hair dryer only on the "cool" setting to help dry the cast or relieve itching.
- Demonstrate how to wrap a cast in plastic for showering, if appropriate.
- Demonstrate how to handle the extremity when repositioning, supporting the joints.

Critical Thinking Questions

1. What would you do if you notice the edge of the cast is crumbling?
2. What would you tell a patient with a long leg cast who keeps slipping a ruler down in the cast to scratch the skin?

Skill 39-2 Care of the Patient in Traction

Skin traction is mostly used to decrease muscle spasm after a fracture or back muscle injury. Skin traction may be used on small children with a lower extremity fracture.

Supplies

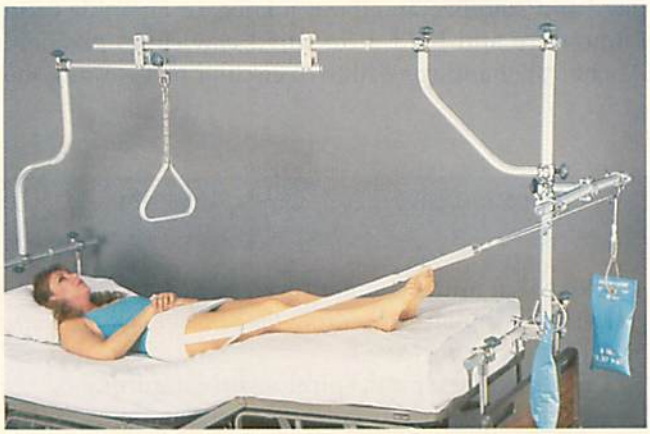
- Clean gloves (if needed)

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

1. Check the physician's order for the desired amount of weight for traction. *(Ensures that the correct amount of weight is applied.)*
2. Assess the boot, the wrap, and the traction appliance. Check that ropes and pulleys are working smoothly and that weights are hanging free. *(Surface of appliance should be smooth and free of wrinkles or gaps to prevent pressure injury to the skin. Appliance should not be rubbing on any skin surface. Traction will not function properly if ropes are hung up in pulleys or weights are resting on the floor or the bed.)*



Step 2

3. Assess the skin, the distal circulation, and sensation. *(Detects signs of complications.)*

Planning

4. Plan times into work schedule to perform assessments, treatments, and activities of daily living (ADLs). *(Care for the immobile patient in traction takes considerable time.)*

Implementation

5. Realign the patient in the bed as needed to maintain optimal traction pull. *(A direct straight line is needed for traction to be completely effective. Patients need to be pulled up in the bed periodically.)*

Evaluation

6. Evaluate for signs of complications. Ask yourself: Is there any sign of irritation where the patient's skin meets the apparatus? Does the patient have a fever? Does the patient complain of pain? Is the traction apparatus functioning correctly? *(Answers to these questions reveal whether the interventions are successful.)*

Documentation

11. Document interventions performed on the activity flow sheet; note any abnormal assessments in the nurse's notes with action taken. *(Verifies performance of traction care, amount of weight applied, and assessment findings.)*

Documentation Example

7/30 1300 Slight irritation and erythema on medial aspect of left leg where traction boot meets skin, lateral aspect is clean and without signs or symptoms of infection. Cleansed both aspects of leg with normal saline and dried with 4 × 4 gauze; thin layer of lamb's wool padding inserted between medial aspect of left leg and traction boot.

_____

(Nurse's signature)

Special Considerations

- It is important to evaluate and medicate the patient in traction for pain, especially in the first few days when muscle spasm occurs.
- Teach family and significant others that they must not tamper with the traction device, the ropes, or the weights.
- A trapeze bar attached to the over-the-bed frame is helpful so that the patient may assist in repositioning; it also provides an opportunity for exercise of the upper extremities.

Critical Thinking Questions

1. What would you say to a nurse who is helping a patient move up in the bed if she lifts the weights attached to the leg traction?
2. What activities might be good for a patient who is confined to bed in traction to combat boredom?

Bandages Used to Support, Apply Pressure, or Immobilize

Elasticized bandages are applied to immobilize a joint or to apply pressure to reduce swelling. They may also be used to support a wound and hold dressings in place. Elastic bandages are made in rolls of varying widths; the heavy stretch material conforms to the body part and provides support (Box 39-4).

Steps 39-2 show the technique for applying an elastic bandage. The same technique is used for gauze roller bandages. Different bandaging techniques are applied depending on the part to be bandaged.

Box 39-4 Guidelines for Applying an Elastic or Roller Bandage

- Elevate the limb and support it while applying the bandage.
- Face the patient and wrap the bandage from the distal to the proximal area.
- Apply even pressure by exerting equal tension throughout the wrapping of the bandage.
- Overlap turns of the bandage equally.
- Smooth the bandage, removing wrinkles, as you wrap it.
- Secure the end of the bandage with self-adherent portion of the bandage, a safety pin, or tape. (If metal clips are used to secure the bandage, place paper tape over the clips to minimize the risk of their coming loose and landing in the bed, injuring the patient.)
- Check the color and sensation of the part distal and proximal to the bandage when finished and at frequent intervals thereafter.
- Remove the bandage for bathing the body part; assess the skin for irritation or breaks; rewrap the bandage at least twice a day.

Circular Turn. Circular turns are used to anchor the bandage and to terminate the wrap. This turn is useful for bandaging the proximal aspect of the finger or wrist. Simply hold the free end of the rolled material in one hand and wrap it about the area, bringing it back to the starting point (Figure 39-12, *A*).

Spiral Turn. This turn is used to bandage parts of the body that are uniform in circumference, such as the upper arm or upper leg. The spiral turn partly overlaps the previous turn. The amount of overlap varies from one half to three fourths of the width of the bandage (Figure 39-12, *B*).

Spiral Reverse Turn. Spiral reverse turns are used to bandage body parts that are not uniform in circumference, such as the lower leg or forearm. After securing the bandage with circular turns, bring the bandage upward at a 30-degree angle. Place the thumb of the free hand on the upper edge of the bandage to hold it in place while it is reversed on itself. Unroll the bandage about 6 inches (15 cm) and turn the hand so that the bandage falls over itself. Continue the bandage around the extremity, overlapping each previous turn by two-thirds the width of the bandage. Make each turn at the same position on the extremity so that the turns of the bandage are all aligned (Figure 39-12, *C*). Take care not to apply undue pressure over a major blood vessel.

Figure-of-8 Turn. Figure-of-8 turns are used to bandage and stabilize an elbow, a knee, or an ankle or to immobilize and hold a fractured clavicle in position. Anchor the bandage with two circular turns. Bring the

Steps 39-2 Applying an Elastic Bandage

The type and size of the bandage used depend on the area to be bandaged and the purpose of the bandage. The physician usually orders the type of bandage.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Wash and dry the area to be bandaged. *(Helps prevent infection by removing microorganisms.)*
2. Elevate the extremity to be bandaged; ask an assistant to help if necessary. *(Elevation encourages venous return and helps prevent swelling. It is easier to wrap the bandage properly if someone else supports the extremity.)*
3. Stand in front of the patient and unroll the end of the bandage slightly; anchor it in place with the thumb of the nondominant hand on the anterior part of the extremity to be bandaged. *(Secures the bandage while it is being wrapped.)*
4. Make two initial circular turns to anchor the bandage in place. *(Securing the bandage end prevents it from becoming loose.)*
5. Use a circular, spiral, spiral reverse, figure-of-8, recurrent turn, or thumb spica bandaging technique as appropriate for the area to be bandaged. *(The body part to be bandaged determines which style of bandaging is best.)*
6. Apply the bandage smoothly and evenly with light to moderate tension. *(Smoothness helps prevent pressure areas; adequate tension is necessary for the bandage to stay in place.)*
7. Secure the bandage with self-adherent portion of bandage, tape, or a safety pin. *(The bandage must be secured to remain in place.)*
8. Assess the bandage for fit and circulation distal to the area bandaged. *(A bandage applied too tightly impedes circulation; a loose bandage falls off.)*

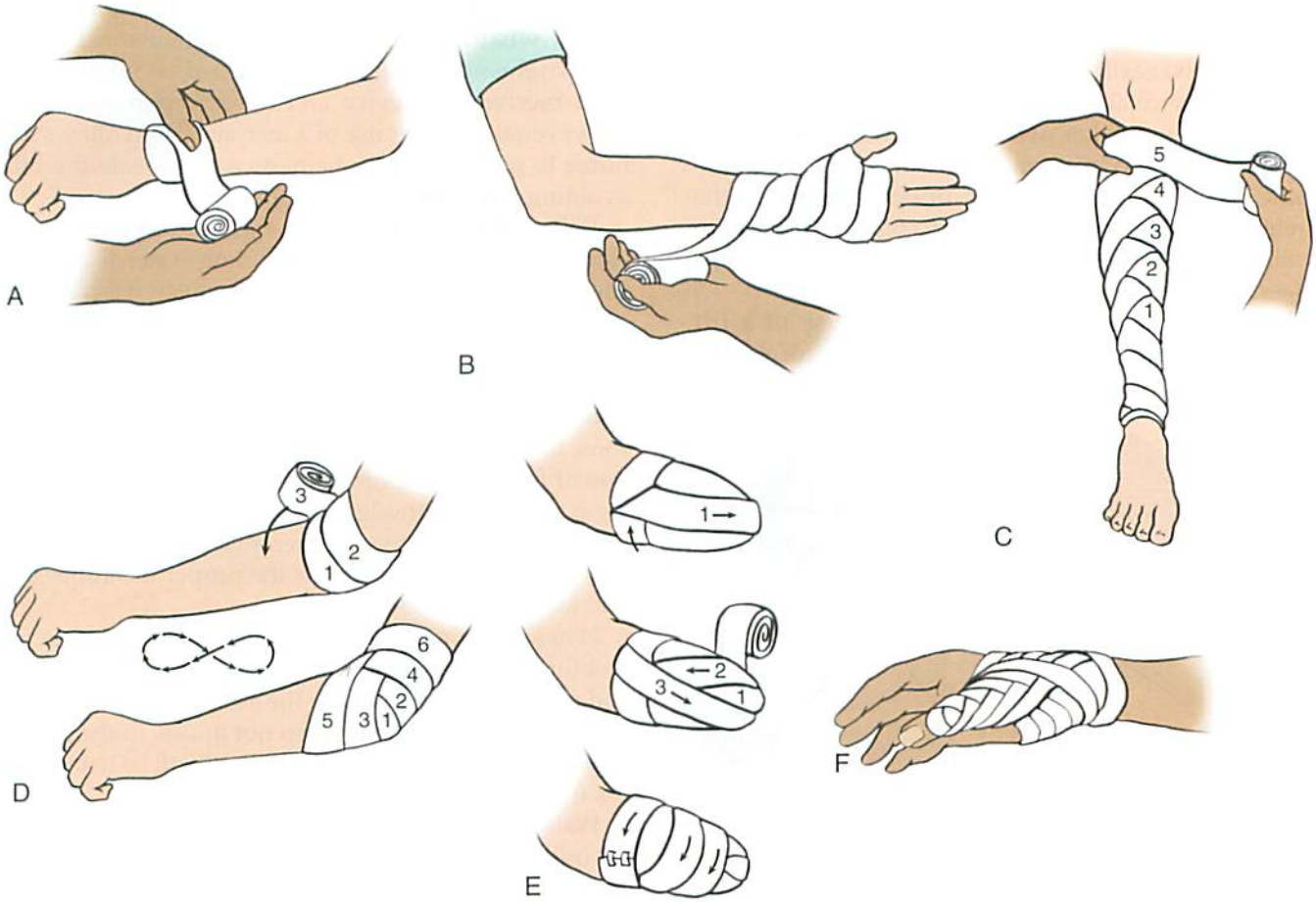


FIGURE 39-12 Applying an elastic bandage: **A,** Starting a bandage with circular turns. **B,** Bandaging with spiral turns. **C,** Bandaging with spiral reverse turns. **D,** Bandaging a joint with figure-of-8 turns. **E,** Recurrent turn bandaging. **F,** Thumb spica bandaging.

bandage above the joint, around it, and then below it, making a figure-of-8. Continue bandaging above and below the joint, overlapping the previous turn by one-third to two-thirds the width of the bandage (Figure 39-12, *D*). Secure the bandage above the joint with two circular turns and fasten it.

Recurrent Turn. This turn is used to cover distal parts of the body, such as the end of a finger, the skull, or the stump left by amputation. Anchor the bandage by two circular turns. Then fold it back on itself and bring it centrally over the distal end to be covered. Hold it in place with the other hand and bring the bandage back over the end to the right of the center bandage but overlapping it by two-thirds the width of the bandage. Then bring the bandage back on the left side, overlapping the first turn by two-thirds the width of the bandage. Continue alternating bandaging right and left until the area is well covered. Terminate the bandage with two circular turns and secure the end appropriately (Figure 39-12, *E*).

Thumb Spica. This is a variation of the figure-of-8 bandage used to support the thumb in neutral position after a sprain or other injury. The technique can also be used to bandage the hip or shoulder. For the thumb, secure the bandage with two circular turns around the wrist. Bring the bandage down to the distal aspect of the thumb and encircle the thumb. If possible, leave the tip of the thumb exposed. Take the bandage back up and around the wrist, and then back down and around the thumb, overlapping the previous turn by two-thirds the width of the bandage. Repeat the above steps, working up the thumb and hand until the thumb is covered (Figure 39-12, *F*).

Immobilizing and Supporting with a Sling

A sling may be used to support and immobilize an injured wrist, elbow, or shoulder. The sling holds the extremity in an elevated position to avoid edema of the hand and minimize pain, discomfort, and fatigue. A commercially made arm sling can be placed about the arm and the straps adjusted about the neck. If this type of support is not available, a triangular bandage sling may be used to support the injured upper extremity (Figure 39-13, Steps 39-3).

Using a Mechanical Lift to Transfer the Immobile Patient

Lifts can be used to move immobile patients from the bed to a stretcher (gurney), a chair, or a wheelchair and back again. Mechanical lifts consist of a sturdy metal

frame with a wide base of support from which a canvas sling is suspended. The lift is on wheels and, when empty, can be easily moved by one person. A hydraulic pump device allows one nurse to lift the weight of the patient, but it takes two people to use a mechanical lift safely—one to raise and move the lift and one to guide the patient into the chair or onto the bed or the stretcher. Such lifts are also used to place patients into a tub or a whirlpool bath for bathing or **hydrotherapy** (massage or débridement by moving water).

Never leave a patient requiring the use of a lift unattended while in the lift, in the tub, or in the whirlpool bath. When using a lift, explain to the patient exactly what is being done. Many patients feel somewhat frightened being lifted off the bed or out of a chair by a mechanical device and may need reassurance. However, the proper use of a mechanical lift allows the nurse to move weak or helpless patients safely while avoiding self-injury (Skill 39-3).

Before placing a patient on the sling, be certain the skin is clean and dry. Protect the sling as needed with a sheet or bath blanket. If the sling is soiled, wash it with a disinfectant solution before using it again.

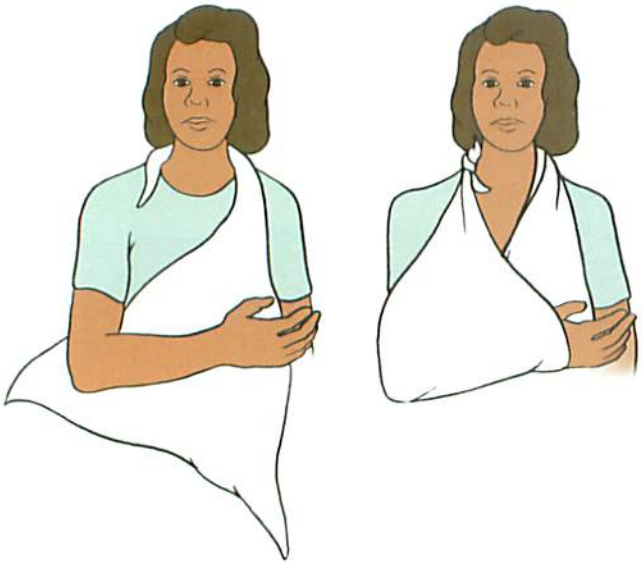


FIGURE 39-13 A triangular sling bandage.

Assisting with Aids to Mobilization

Patients require aids to mobility for a variety of reasons, including recent trauma, corrective surgery, and loss of function as a result of stroke or other debilitating conditions. Although the use of ambulatory aids is often taught by a physical therapist or kinesiologist, it is important for you to know the proper techniques so that learning can be reinforced.

Whenever a patient is using an assistive device for mobility, it is important to keep floors clear of clutter and pathways well lit. Place the assistive device within easy reach of the patient when not in use. In the home, assess the main pathways the patient will be using and ask for assistance in removing any hazards.

Walkers. A walker is frequently the first mechanical aid used when training an individual to walk following a loss of function or a surgical procedure such as a hip or knee replacement. It is particularly helpful for patients who are weak or tend to lose their balance because it offers a broad base of support.

Steps 39-3 Applying a Triangular Bandage Sling

When a commercial arm support is not available, use a triangular bandage to form a sling. This will support the upper extremity.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Place one end of the triangle over the shoulder on the uninjured side. *(Positions the sling properly.)*
2. Position the point of the triangle toward the elbow. Ask the patient to bend the injured arm horizontally across the body with the thumb toward the body. Place the bandage under the arm flat against the chest. *(Forms the sling support.)*
3. Bring the other end over the injured arm and shoulder while the patient keeps the elbow bent at right angles across the lower chest. The hand should be about 4 inches higher than the elbow. *(Finishes forming the sling support. Elevating the hand prevents the fingers from swelling.)*
4. Tie the two ends at one side of the neck in a square knot. *(Secures the sling; the knot at the side prevents discomfort when the patient lies down and decreased pull on the back of the neck when the arm is in the sling.)*
5. Fold the point of the triangle neatly over the elbow toward the front and secure it with a safety pin. *(Keeps the elbow and sling from slipping back and forth.)*
6. Check the circulation in the fingers, comparing color of the nail beds and temperature of the hand with the other hand. *(Fingers should be pink and warm; cold or bluish fingers indicate impaired circulation.)*

Skill 39-3 Transferring with a Mechanical Lift

Mechanical lifts allow immobile patients to be moved safely between two points some distance apart. A lift may also be used to elevate helpless patients while the bed is changed under them.

Supplies

- Mechanical lift with sling
- Bath blanket or sheet
- Chair, wheelchair, stretcher, or clean tub (to receive patient)

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

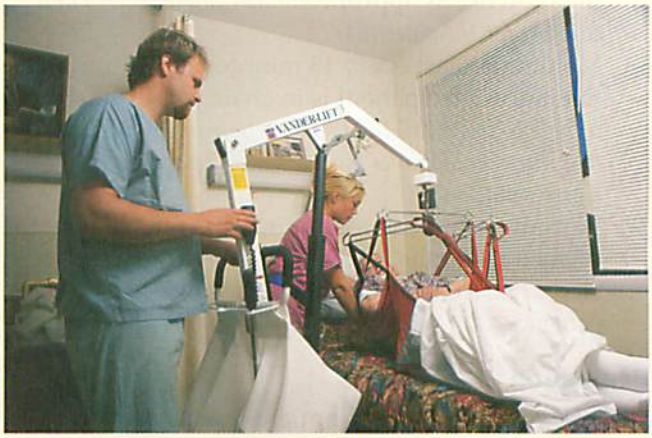
1. Determine that lift is functioning correctly and that the sling is clean. *(Promotes smooth, safe use of the lift.)*
2. Assess patient's readiness to be transferred. *(Patient will experience less anxiety if prepared for the procedure.)*

Planning

3. Obtain the assistance of a second person. *(Two people are needed to safely transfer a patient using a lift.)*

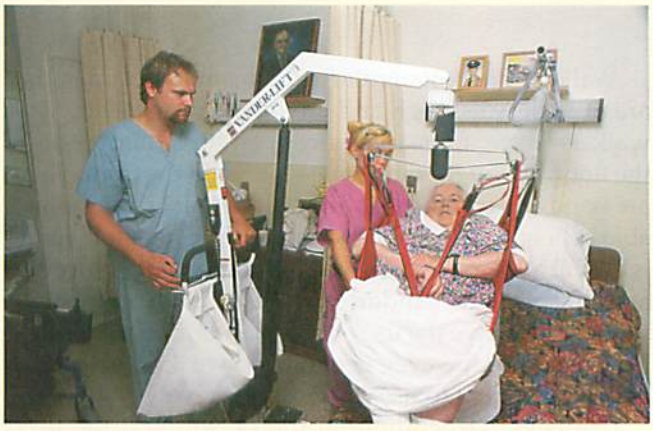
Implementation

4. Position the chair, the wheelchair, or the stretcher correctly, clearing away any obstructions; set the brakes if applicable. *(A clear floor is needed to maneuver the lift. Setting the brakes prevents the chair or stretcher from moving while transferring the patient.)*
5. Raise the far side rail, adjust the bed to working height, and lock the wheels. *(Bed adjustment allows proper use of body mechanics and decreases the risk of injury to the patient and the nurse. Locked wheels prevent the bed from moving while transferring.)*
6. Roll the patient onto the side. Instruct patient to hold onto the side rail if possible. Place the sling on the bed positioned from back of the head or the shoulders to mid-thigh; roll patient onto the sling. Assist or have the patient roll to other side so that the sling can be safely unrolled. Assist or have the patient lie supine on the sling. *(Supports entire trunk and positions patient in sling for transfer; allows for correct position of sling before attempting to activate the lift.)*
7. Position the lift: Widen the stance of the base of the lift and lock it into place. Position the base under the bed so hooks for the sling are over the patient and in line with the hook openings on the sling. *(Correct positioning prevents the lift from tipping during the transfer. Allows for easy attachment of the hooks to the sling.)*
8. Lower the sling hooks in a controlled manner, and attach them to the sling. Be certain hooks will not press into the patient's skin when sling is elevated. *(Controlling the hooks prevents them from striking the patient. Checking hook location prevents pressure damage to the patient's skin.)*
9. Ask the patient to fold the arms over the chest; support the patient's head. *(Head must be supported if sling is not long enough to do so. One person supports the patient's head and guides the sling as the other operates the lift.)*



Step 9

10. Using the lift mechanism, elevate the patient in the sling until it clears the bed by several inches. *(Allows unimpeded transfer of the patient to the chair or stretcher.)*



Step 10

Continued

Skill 39-3 Transferring with a Mechanical Lift—cont'd

11. Roll the lift away from the bed while the second helper safely guides the patient over the chair or stretcher. *(Keeps the patient secure and safe. Positions the sling for the transfer.)*
12. Use the pressure release valve to lower the patient slowly into the chair or onto the stretcher while the helper guides the patient's body. Lower only enough to allow unhooking the sling. *(Safely transfers the patient.)*
13. Unhook the sling, elevate the lift, and roll it away from the patient. *(Prevents the hook assembly from striking the patient.)*
14. Position the patient in good alignment. Smooth the sling or remove it. *(The patient is correctly and safely transferred and made comfortable.)*
15. Cover the patient with a blanket or a sheet; place call light and needed items within reach. Secure the patient in the chair with a security vest or on the stretcher as appropriate. *(Promotes safety and comfort for the patient.)*
16. Monitor at least every 15 minutes for sitting tolerance if the patient is in chair. *(If patient is unable to use a call light, place chair where it is visible to a nurse at all times, such as in the hallway near the nurse's station.)*
17. With the help of an assistant, return the patient to the bed using the lift and following the same steps. *(An assistant helps prevent injury to the patient.)*

Evaluation

18. Ask yourself: Was the patient transferred smoothly and without injury? Was the patient excessively frightened? Did the lift work correctly? *(Answers to these questions provide data to evaluate the effectiveness of the interventions.)*

Documentation

19. Document the procedure, noting the use of an assistant. Include the patient's tolerance of the procedure. *(Notes transfer of patient and tolerance of procedure.)*

Documentation Example

7/30 0945 Smooth transfer from bed to wheelchair using mechanical lift and an assistant. Seatbelt in place; chair positioned next to nurse's station.

_____
(Nurse's signature)

7/30 1020 Up in chair × 30 minutes. Returned to bed, assisted into position of comfort, call light within reach. Stated "it felt good to be out of the bed" and rated pain as 2 out of 10.

_____
(Nurse's signature)

Special Considerations

- Allow patient to see how the lift works before attempting transfer if at all possible.
- In home situation, instruct caregivers thoroughly in use of lift. Use the lift to transfer the caregiver to check the function of the lift and to acquaint caregiver with the process.

Critical Thinking Questions

1. How would you handle the situation if your patient, who is to be transferred from the bed to a chair with a lift for the first time, is frightened of this procedure?
2. Why do you think it is essential that the sling for the lift be attached exactly according to the directions that come with it?

Walkers are rectangular tubular metal frames that are at least waist high and are open on one side. Most walkers have four rubber-capped tips that rest on the floor, although some have wheels on the front. There are handgrips on the side crossbars. Walkers are adjustable in height. The height is correct if the person's elbow is bent at a 15- to 30-degree angle while standing upright and grasping the handgrips. To use a walker, the individual must have the use of both hands and arms and at least one leg. However, generalized weakness may still allow the patient to use a walker effectively.

Crutches. Depending on the person and the need for assistance with ambulation, the use of crutches may follow the use of a walker or be the first aid to ambulation (Figure 39-14).

Crutches come in a variety of styles of crutches, but three basic types are most commonly seen: axillary, Lofstrand, and Canadian crutches. Lofstrand and Canadian crutches are shorter and are designed for patients who permanently need crutches for mobility. Axillary crutches are commonly used for short-term needs. They are adjustable to a variety of heights and are relatively easy to use. They do present one real danger: **resting the body's weight on the axillary bar puts pressure on vital nerves and can occlude blood vessels in the axilla, causing temporary or permanent damage,**

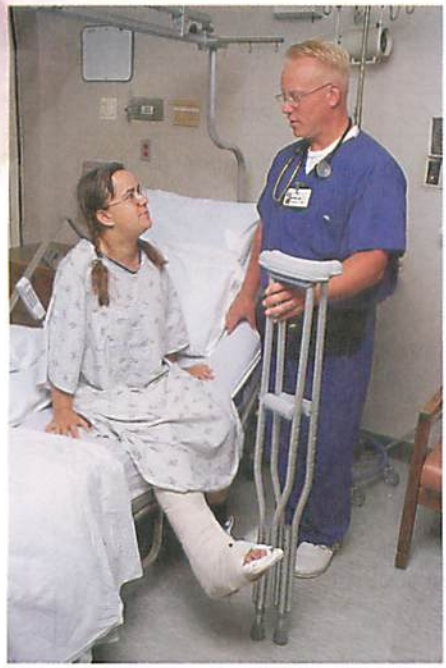


FIGURE 39-14 A patient receiving the beginning of instruction in crutch walking.

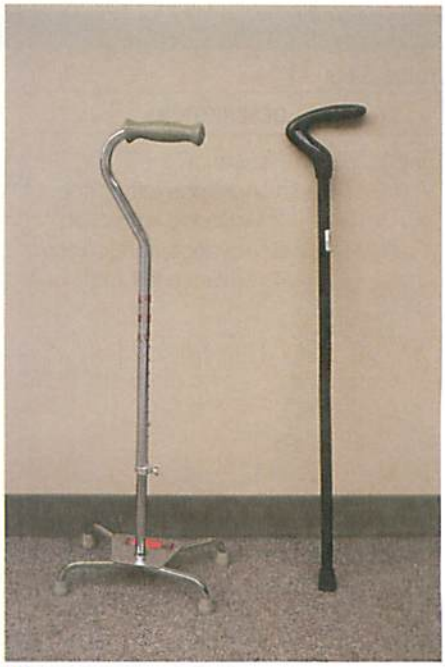


FIGURE 39-15 A regular cane *(right)* provides support, whereas a quad cane *(left)* provides support and stability because of its broad base.

Box 39-5 Guidelines for Teaching Crutch Walking

- The head is held up and the eyes look ahead, as in normal walking.
- The crutches are placed slightly ahead of the patient's feet and to the outside of each foot.
- The hands, not the axillae, are used to support the body's weight.
- The back should be kept straight, and the patient should bend at the hips.
- The crutches and affected foot or leg should be moved forward together (at the same time), except when using a swinging gait.
- A smooth, easy rhythm should be achieved in shifting the weight from the crutches to the unaffected (good) leg and then to the crutches again.
- The crutches should be of the proper length and equipped with heavy rubber suction tips to prevent slipping.
- The gait used depends on the weight-bearing status of the lower extremities and the patient's abilities.

Box 39-6 Guidelines for Using a Cane

Instruction for walking with a cane includes ensuring the following:

- The cane has an intact rubber tip.
- The patient uses the cane on the unaffected side unless directed by the therapist or physician to use it on the other side for balance.
- The patient does not lean on or bear full weight on the affected leg.
- The caregiver walks beside the patient on the affected side to provide support in case the patient begins to fall.
- The handgrip is at hip level and the person's elbow is bent at a 15- to 30-degree angle when placing weight on the cane.
- The cane's tip is placed 6 to 10 inches (15 to 25 cm) to the side and 6 inches (15 cm) in front of the near foot.
- The patient looks straight ahead while walking.

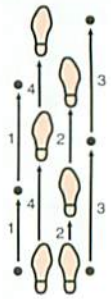
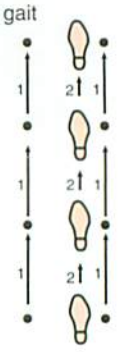
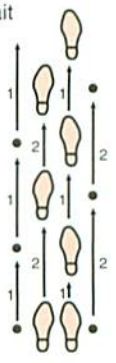
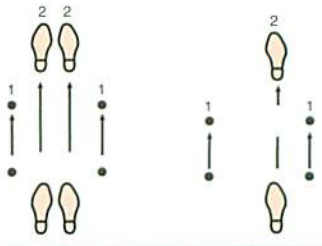
including paralysis. For this reason, it is critical that crutches be adjusted to the proper height and the patient be instructed to avoid resting the body's weight on the axillary bar.

Crutches need to adjust both in overall length and from the axillary bar to the handgrip. Measure with the patient standing or supine. If the patient is standing, be certain he is wearing shoes. For standing measurement, position the crutches with tips at a point 4 to 6 inches (10 to 15 cm) to the side and 4 to 6 inches in front of the patient's feet. The pads should be ½ to 2 inches (1.3 to 5 cm) below the axilla. For supine measurement, position the tips 6 inches (15 cm) lateral to the patient's heel. The pad should be 3 or 4 finger breadths under the axilla. Adjust handgrips for both measurements so that the elbow is flexed 15 or 20 degrees when the palms of the hands are resting on the handgrips. When walking, the patient needs to straighten the elbow and the wrist during weight bearing. This should allow the axilla to pass freely over the axillary bar during forward movement (Box 39-5).

Canes. The most commonly used canes are the standard (one-point) and the quad (four-point) cane (Figure 39-15). An advantage of a quad cane is that it stands up by itself (Box 39-6).

Patient Teaching

Common Crutch Gaits

GAIT	DESCRIPTION	PATTERN
Four-point gait	*Sequence:* 1. Advance left crutch. 2. Advance right foot. 3. Advance right crutch. 4. Advance left foot.	Four-point gait 
Three-point gait	*Sequence:* 1. Advance both crutches forward with the affected leg and shift weight to crutches. 2. Advance unaffected leg and shift weight onto it. *Advantages:* Allows the affected leg to be partially or completely free of weight bearing. *Requirements:* Full weight bearing on one leg, balance, and upper body strength.	Three-point gait 
Two-point gait	*Sequence:* 1. Advance left crutch and right foot. 2. Advance right crutch and left foot. *Advantages:* Faster version of the four-point gait, more normal walking pattern (arms and legs moving in opposition). *Requirements:* Partial weight bearing on both legs, balance.	Two-point gait 
Swing-through gait	*Sequence:* 1. Move both crutches forward. 2. Move both legs forward beyond or even with crutches. Or keep weight on good foot and move other foot forward and then move good foot forward.	Swing-through gait 

Patient Teaching

Special Maneuvers on Crutches

MANEUVER	DESCRIPTION
Walking upstairs	1. Stand at foot of stairs with weight on good leg and crutch. 2. Put weight on the crutch handles, and lift the good leg up onto the first step of the stairs. 3. Put weight on the good leg, and lift other leg and the crutches up to that step. 4. Repeat for each stair step.
Walking downstairs	1. Stand at top of stairs with weight on good leg and crutches. 2. Shift weight completely onto the good leg, and put the crutches down on the next step. 3. Put weight on the crutch handles, and transfer injured leg down on the step with the crutches. 4. Bring good leg down to that step. 5. Repeat for each stair step.
Sitting down	1. Crutch walk to the chair. 2. Turn around slowly so that back is to the chair and the backs of the legs touch the seat of the chair. 3. Transfer both crutches to the side with the injured leg, and grasp both hand grips with the one hand. 4. As weight is supported on the crutches and good leg, reach back with free hand and grasp the arm of the chair. 5. Lower slowly onto the chair seat, using the support of both the crutches and the chair. 6. Sit back in the chair and elevate the leg, but not to an angle greater than 90 degrees at the hip. 7. Keep the knee slightly flexed when elevated because too much extension can decrease the circulation. 8. To get up, bring both crutches along the side of the injured leg, and grasp the hand grips firmly. Make certain the crutch tips are firmly on the floor. Place the other hand on the arm of the chair, and push up. 9. After becoming upright, transfer one crutch to the other hand for walking.

Wheelchairs. Wheelchairs are used for patients who are not able to ambulate either independently or with aids, such as crutches or a walker. Many **paraplegics** (those without use of the legs), **quadriplegics** (those without use of both arms and legs), amputees, and individuals with severe hemiparesis or respiratory problems depend on wheelchairs for movement from place to place. Patients who are wheelchair dependent over the long term need chairs that are made specifically to their body measurements. When a patient brings a wheelchair to the hospital, see that it is clearly labeled with the owner's name, and never borrow it for someone else.

When moving someone into or out of a wheelchair, always set the brakes. Be certain the person's feet are correctly placed on the footrests and that clothing or lap robes are tucked safely away from the wheels. Shoes, slippers, or bed socks protect the feet from direct contact with the footrests. To prevent accidents, keep patients in wheelchairs well away from stairwells, elevators, and doorways if left to sit stationary. **Always lock the brakes when the chair is not in motion.**

Braces, Splints, and Prostheses for Stabilization. Braces and splints are used to strengthen and support areas of the body affected by weakness or paralysis, such as the legs or back. They may also be used after surgery or trauma to immobilize a part while it heals. Braces and splints are generally made of plastic or metal pieces with padding and straps for attachment. A leg brace may be combined with a shoe. A back brace has metal staves sewn into the fabric; the fabric may be elasticized to provide more support.

A wrist splint is a padded device with an inner metal frame. It is often used to relieve or prevent carpal tunnel syndrome, which may occur with repetitive hand movements, to immobilize a sprained wrist, and to treat tendonitis.

A **prosthesis** (artificial substitute for a body part) is used to replace a body part that is missing, either from birth or amputation. It is specially fashioned to fit the particular patient and assist with lost function. It takes considerable time for a patient to adjust to the use of a prosthesis.

All braces, splints, and prostheses have the potential to irritate and injure the tissues and must be monitored closely. The skin should be carefully evaluated during the initial assessment and then reassessed regularly throughout the hospital stay or at home. Any problems must be both noted in the chart and reported

promptly to the physician. Handle prosthetic devices carefully, since they are made for the specific individual, are expensive, and take many weeks to obtain. Label all the devices with the patient's name and do not allow them out of the room unless in place on the patient.

Rehabilitation

As patients recover from immobilization or from serious illness that restricts usual activity, an exercise prescription may be written to improve muscle tone, joint flexibility, and/or cardiovascular fitness. Parameters for exercise are determined by a target heart rate during activity that is based on age and condition. In a healthy person the target heart rate for aerobic activity is a minimum of 60% of the age-predicted maximum heart rate (subtract the current age from 220 and multiply by the percentage). The ideal training target is 80% of the age-predicted maximum heart rate.

Patients who have had a joint immobilized are often sent to an outpatient physical therapy facility for an individual exercise program to regain maximum strength and mobility of the joint and extremity.

Evaluation

Evaluation is performed daily by considering whether the specific expected outcomes have been met. Does the skin remain healthy, or are there signs of breakdown? Evaluate the breath sounds, and note any developing cough or signs of dyspnea. Observe the patient's emotional status, including the attitude toward therapy or visitors. Is the patient alert and active in social interactions or withdrawn, hostile, or depressed? If nursing interventions are not achieving the expected outcomes, the care plan needs to be changed.

Evaluation statements indicating that some of the expected outcomes stated earlier are being met might be as follows:

- Independently performing sponge bath, mouth care, and grooming tasks except for left foot.
- Skin is clean, dry, and without redness or abrasion.
- Respirations even and unlabored with clear breath sounds bilaterally.
- Family and friends visit daily with pleasant interactions.
- Patient is knitting and working on crossword puzzles daily.
- Watching television news show several times a day and discussing events with visitors.
- Asking if a haircut is possible and wants to wear own clothes.

Documentation

Each member of the health care team must maintain a written record of the treatments provided and its effects. Charting should include any changes in skin integrity, respiratory status, or signs of peripheral circulatory changes. Many assessment aspects can be recorded on an activity/assessment flow sheet. For proper reimbursement, it is vital to document data that indicate a continuing need for use of equipment and ambulation aids.

Get Ready for the NCLEX® Examination!

Key Points

- It is essential to include measures to prevent the complications of immobility in the nursing care plan (see Table 39-1).
- Pay particular attention to respiratory and circulatory function.
- Active or passive exercise is extremely important for the immobilized patient.
- Special beds and a variety of pressure relief devices are available to prevent pressure ulcers and other complications of immobility.
- Frequent visitors and inclusion of the home patient in family life are important to prevent social isolation.
- The elderly patient is at higher risk for the complications of immobility and may suffer more psychosocial problems.
- Splints are used for immobilization of an injury or for stabilization of an area with paralysis or weakness.
- Traction is used to treat muscle spasm and fractures. For traction to be effective, the body must be correctly aligned, ropes and pulleys must not be impeded, and weights must hang free.
- Skin traction is applied with a Velcro boot, adhesive strips, slings, or wraps; it is noninvasive.
- External fixators may be used to stabilize a fracture, rather than using a cast, so the patient can be more active during healing.
- Casts are applied to immobilize a particular body part to allow bone healing. They must be handled gently while drying.
- Inspect casts every shift for cracks, crumbling, pressure problems, and signs of infection beneath them. If they become too tight, they may be bivalved.
- The CPM machine is used to exercise the joint after joint replacement surgery.
- Assessment of neurovascular status, of function of an immobilizing device, and of body systems for complications is performed each shift.
- Nursing diagnoses are related to impaired physical mobility, altered tissue perfusion, the risk of complications, and psychosocial problems.

- Elastic bandages are applied to immobilize a joint or to reduce swelling. Perform neurovascular assessments while they are in place.
- To transfer a patient safely with a mechanical lift, two people should perform the procedure. Always follow the facility's policy.
- Never leave a patient alone while suspended in the sling of the lift.
- Aids to mobilization include walkers, crutches, canes, wheelchairs, braces, and prostheses.
- For walkers and canes, the patient's elbows should be at a 15- to 30-degree angle while the hands are gripping the device.
- There should be at least two finger breadths of space between the top of the crutch and the axilla when the patient's hands are gripping the crutches.
- Crutches, canes, and walkers should have rubber tips on the feet of the device (except for some walkers that have wheels).
- Wheelchairs are placed in locked position when transferring patients in or out of them and whenever the patient is stationary.
- Braces and prostheses must be handled gently and kept with the patient. Skin under the device should be assessed before application and when the device is removed.
- Evaluation data are collected to determine whether expected outcomes of the nursing care plan have been met.
- Documentation is vital for proper reimbursement for equipment and specialty beds. It is essential to document assessment data and interventions instituted for any problems found.

Additional Learning Resources

SG Go to your Study Guide for additional learning activities to help you master this chapter content.

Evolve Go to your Evolve website (http://evolve.elsevier.com/deWit/fundamental) for the following FREE learning resources:

- Animations
- Answer Guidelines for Think Critically boxes and Critical Thinking Questions and Activities
- Answers and Rationales for Review Questions for the NCLEX® Examination
- Glossary with pronunciations in English and Spanish
- Interactive Review Questions for the NCLEX® Examination and more!

Review Questions for the NCLEX® Examination

*Choose the **best** answer for each question.*

1. A 56-year-old woman sustained a fracture of the right femur in an automobile accident. She is in Buck extension. Immobility causes negative effects on the cardiovascular system. The venous stasis that occurs with immobility can lead to the complication of _____ _____. *(Fill in the blank.)*

2. You are to perform range-of-motion exercises three times a day with your patient who is immobilized. Range-of-motion exercise promotes circulation by:
   1. thinning the blood so that it will move freely.
   2. releasing the one-way valves in the veins and arteries.
   3. contracting the muscles surrounding a vein, forcing blood to move toward the heart.
   4. raising the temperature of the tissues, thereby decreasing blood viscosity so it flows more freely.

3. Passive range-of-motion exercises are performed to prevent the problem of:
   1. formation of a thrombus in the leg.
   2. sluggish circulation in the extremities.
   3. skin breakdown over pressure points.
   4. decreased joint mobility.

4. In addition to good skin care and frequent turning, measures that may help prevent development of pressure ulcers in an immobilized patient are: *(Select all that apply.)*
   1. have family encourage the patient to perform active ROM exercises on unaffected extremities.
   2. restrict calories to reduce weight gain while immobile.
   3. encourage adequate nutritional and fluid intake.
   4. keep the patient's skin clean and dry.

5. When assessing the patient with a new cast on the lower arm, if you find that the cast is tight and almost flush to the skin, you would *first:*
   1. immediately call the orthopedic technician to come and check the cast.
   2. elevate the extremity on two pillows, making certain it is higher than heart level.
   3. report the finding to the charge nurse on the unit.
   4. question the patient as to whether the arm has been kept in an elevated position.

6. A cast that is too tight can directly cause: *(Select all that apply.)*
   1. pressure on nerves and nerve damage.
   2. constriction of blood vessels, decreasing circulation.
   3. blood clot formation.
   4. numbness and tingling in the extremity.

7. The amount of weight exerted by traction is determined by:
   1. the amount of weight exerted at the end of traction ropes.
   2. the height of the weight off the floor.
   3. the ratio of the patient's weight to traction weight.
   4. the position of the patient on the bed.

8. When caring for traction pins and wires, it is most important to:
   1. be very gentle when cleaning around them.
   2. use strict aseptic technique to prevent infection.
   3. rinse the areas cleansed with normal saline.
   4. move them slightly so they do not attach to the bone.

9. You notice that an incision on the knee is opening each time the CPM is at its maximum angle. The patient is also complaining of tightness around the sutures. You should:
   1. pad the portion of the machine that the heel rests on.
   2. stop the machine and notify the physician.
   3. reassess the area in 8 hours.
   4. increase the angle of flexion of the joint to change the pressure on the heel.

10. After applying an elastic bandage to an ankle, you know it is too tight if:
    1. the toes are pink and warm.
    2. the patient complains of pain in the ankle.
    3. there is swelling in the toes and lower foot.
    4. the toes are bluish and cool to the touch.

Critical Thinking Activities

Read each clinical scenario and discuss the questions with your classmates.

Scenario A

Margaret Thies, age 47, received multiple injuries in an automobile accident. She underwent surgery for a lacerated spleen, and her right leg is in balanced traction because of two fractures. She will be on bed rest for an extended period.

1. For which complications of immobility do you think Margaret is most at risk?
2. For each complication you identified, list the signs and symptoms that might indicate the complication is occurring.
3. What nursing interventions could you use to help prevent each of the complications listed?

Scenario B

Josh Polaski, age 21, has been treated in the outpatient clinic for a fractured ulna. A short-arm fiberglass cast has been applied.

1. Explain to Josh what he can and cannot do while the cast is in place.
2. Teach Josh how to care for the cast and how to assess for complications.
3. How would teaching differ if the patient were sent home with a plaster cast?

Scenario C

Oscar Nuñez, age 38, is in traction for a fractured femur incurred in a motorcycle accident. He has been hospitalized for 4 days and is bored and restless.

1. What assessments would you make to determine whether his restlessness has a physical cause?
2. If his restlessness seems to be psychological, *what* activities might you suggest to help him occupy the time and his mind?