

Chapter 39

Promoting Musculoskeletal Function

Lesson 39.1

Overview of Immobilization Problems

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.

Lesson 39.1

Overview of Immobilization Problems

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.

Immobilization

- Bed rest may be required when patients are recovering from a variety of conditions
 - Stroke, trauma
 - Neuromuscular disorder
 - Chronic debilitating illness
- Complications caused by immobilization
 - Pressure injuries, pneumonia
 - Bone loss
 - Loss of function in the immobilized part

Systemic Effect of Immobilization (Slide 1 of 7)

- Cardiovascular system

- Effect

- Venous stasis, increased cardiac workload, blood pressure alterations

- Problems/complications

- Thrombus formation
- Thrombophlebitis
- Pulmonary embolus
- Orthostatic hypotension
- Increased pulse rate

Systemic Effect of Immobilization (Slide 2 of 7)

- Respiratory system

- Effect

- Stasis of secretions, decreased elastic recoil, decreased vital capacity

- Problems/complications

- Hypostatic pneumonia
- Bacterial pneumonia
- Atelectasis
- Decreased gas exchange

Systemic Effect of Immobilization (Slide 3 of 7)

- Gastrointestinal (GI) tract
 - Effect
 - Anorexia, metabolic change to catabolism and negative nitrogen balance, decreased peristalsis
 - Problems/complications
 - Weight loss
 - Protein deficiency
 - Abdominal distention
 - Constipation

Systemic Effect of Immobilization (Slide 4 of 7)

- Musculoskeletal system

- Effect

- Decreased muscle mass and muscle tension, shortening of muscle, loss of calcium from the bone matrix, decrease in bone weight

- Problems/complications

- Fibrosis of connective tissue
- Atrophy
- Weakness
- Joint contracture
- Osteoporosis, bone pain

Systemic Effect of Immobilization (Slide 5 of 7)

- Urinary system
 - Effect
 - Stasis of urine, urinary tract infection, renal stones
 - Problems/complications
 - Precipitation of calcium salts
 - Frequency of urination
 - Dysuria

Systemic Effect of Immobilization (Slide 6 of 7)

- Skin
 - Effect
 - Decreased circulation from pressure, ischemia, and necrosis of tissue
 - Problems/complications
 - Skin breakdown
 - Pressure ulcers

Systemic Effect of Immobilization (Slide 7 of 7)

- Brain/psychological

- Effect

- Decreased mental activity, decreased sensory input, decreased socialization, decreased independence

- Problems/complications

- Disorientation, confusion
- Boredom, anxiety
- Depression, loneliness

Preventing Physical Complications of Immobilization

- Encourage increasing fluid intake to 3 L/day
- Encourage adequate nutritional intake
- Encourage increased fiber in diet
- Administer stool softeners and laxatives (as ordered)
- Encourage passive/active ROM exercises
- Encourage isometric exercises
- Turn every 2 hours
- Keep skin clean and dry, use pressure-relief devices

Psychosocial Effects of Immobilization

- Effects
 - Fear, abandonment, loss, etc.
- For children, diversionary activities such as games, movies, story reading
- For adults
 - Television, reading, crafts
 - Crossword puzzles
 - Frequent visitors
- Nonalert and comatose patients may also need support

Types of Immobilization

- Splints
- Traction
 - Skin
 - Skeletal
- Casts
- External fixators

Splints

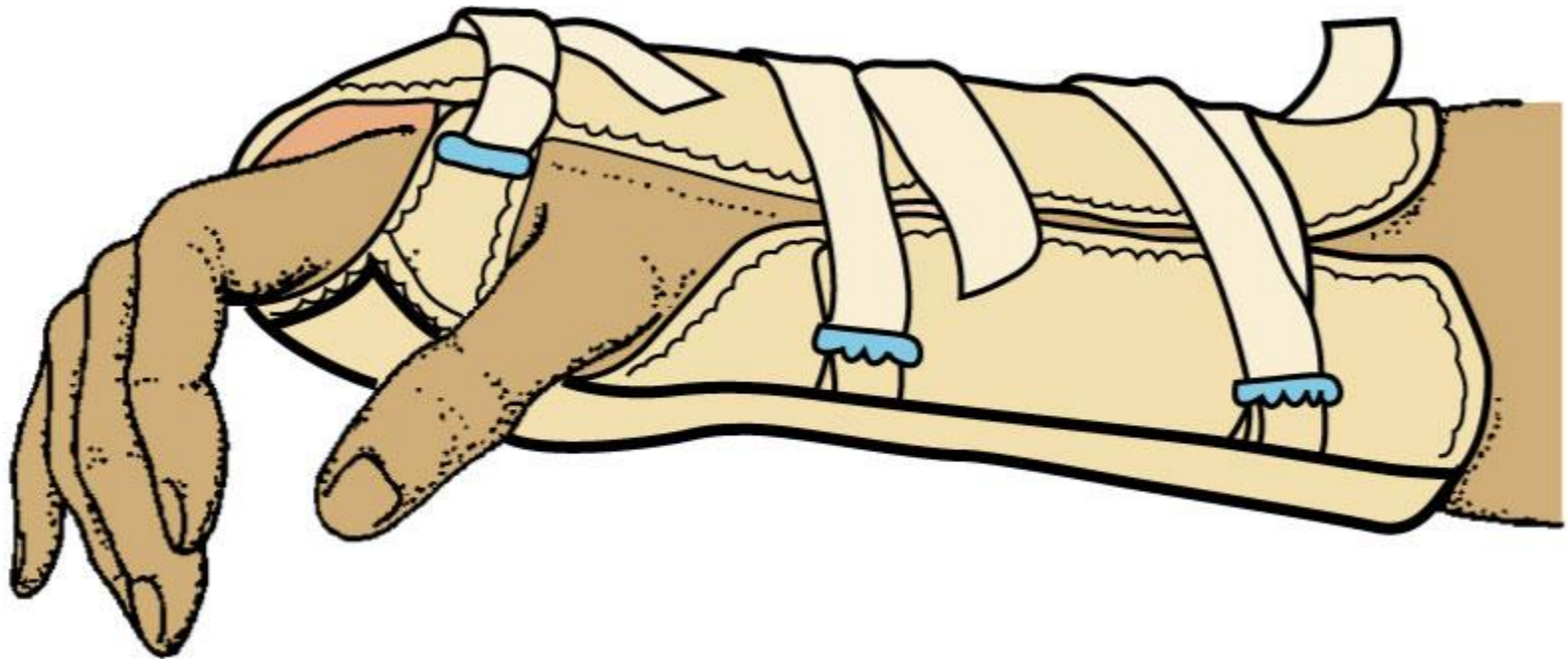
- Protect injured parts by immobilizing them
- May be used as first aid before cast application
- Types available
 - Molded splints, immobilizers, inflatable splints, cervical collars, traction splints
 - Inflatable splints may be used to control bleeding; they should be inflated until they can be indented 1½ inches by fingertips
 - Immobilizers are made of cloth, foam, and Velcro

Figure 39.1: Patient with a leg brace or splint



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Figure 39.2: Wrist and forearm splint



From deWit, S.C. (2009). *Medical-Surgical Nursing: Concepts and Practice* Philadelphia: Saunders.

Traction

(Slide 1 of 3)

- A pulling force used to maintain body alignment, maintain fracture alignment, and relieve pain and muscle spasm
- Can be skin traction or skeletal traction
 - Patients in traction should have an overhead frame and trapeze bar
 - Weights should swing freely without touching bed or floor

Traction

(Slide 2 of 3)

- Skin traction
 - Uses Velcro boots, belts, halters, and slings
 - Applied snugly to the skin
 - Main purpose is to decrease spasm accompanying fractures
 - Weight is generally limited to 5 to 10 lb
 - Complaints of skin pain must be reported

Traction

(Slide 3 of 3)

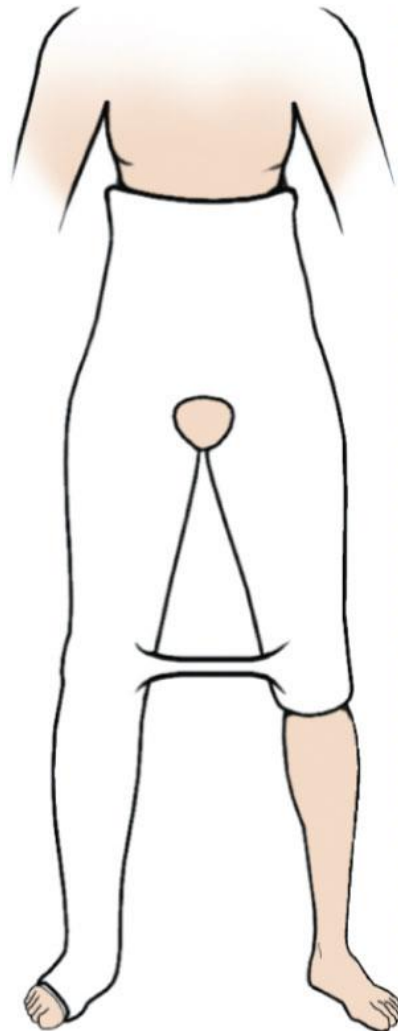
- Skeletal traction
 - Requires surgical placement of pins, tongs, screws, or wires anchored to the bone
 - Can support more weight than skin traction
 - Nurse is responsible for maintaining correct weight, alignment, and balance
 - Clear fluid drainage around pins is expected
 - Any sign of infection must be reported immediately
 - Circulation checks are performed every hour for the first 24 hours, then every 4 hours thereafter

Cast

(Slide 1 of 2)

- Used to immobilize an extremity following a fracture or orthopedic procedure
 - Skin is protected by a layer of stockinette, followed by a layer of padding
 - Cast is then applied (can be plaster or fiberglass)
 - Cast must be protected during drying to prevent dents and uneven pressure, which can cause circulatory impairment and pressure injuries

Figure 39.4: Hip spica cast



Courtesy Zimmer, Inc., Warsaw, IN.

Cast

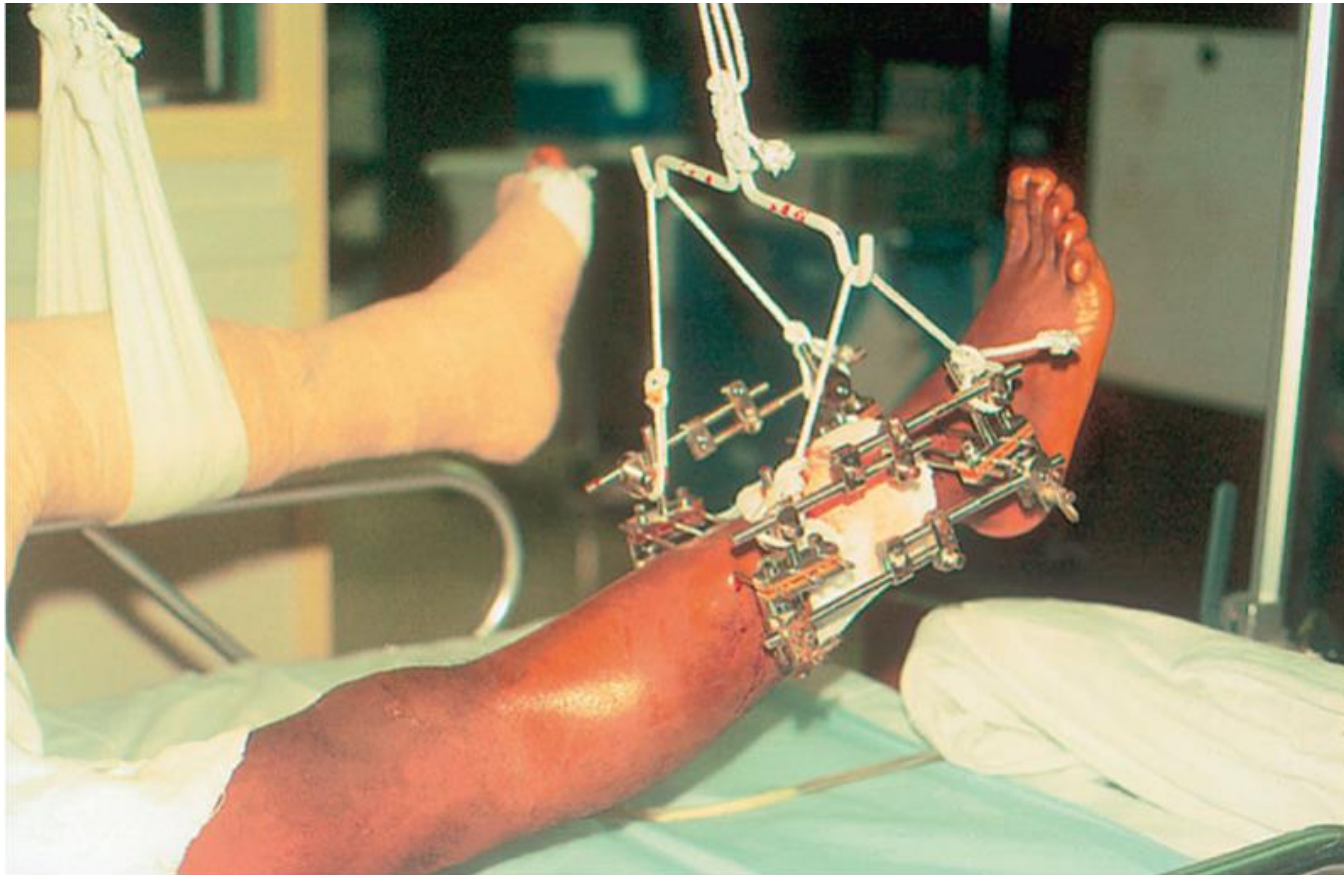
(Slide 2 of 2)

- When handling a cast, use the palms of the hands and the flat part of the fingers
- Swelling is common and, if left uncontrolled, can cause circulatory impairment and pressure injury
- Cast edges should be padded
- Tight cast may be bivalved
- Bars on hip spica cast should not be used for lifting or turning

External Fixators

- Pins, screws, or tongs inserted through one or more bones to stabilize fragments during healing
 - Metal inserts are attached to an external frame
 - Fixators allow patient to be more active
 - Device needs to be checked for stability every 4 hours
 - Pin care is required to prevent infection

Figure 39.5: An external fixator holding fractured bones in place



From McCance, Kathryn L. (2009). *Pathophysiology: The Biologic Basis for Disease in Adults and Children* (6th ed.). St Louis: Mosby

Devices Used to Prevent Problems of Immobility

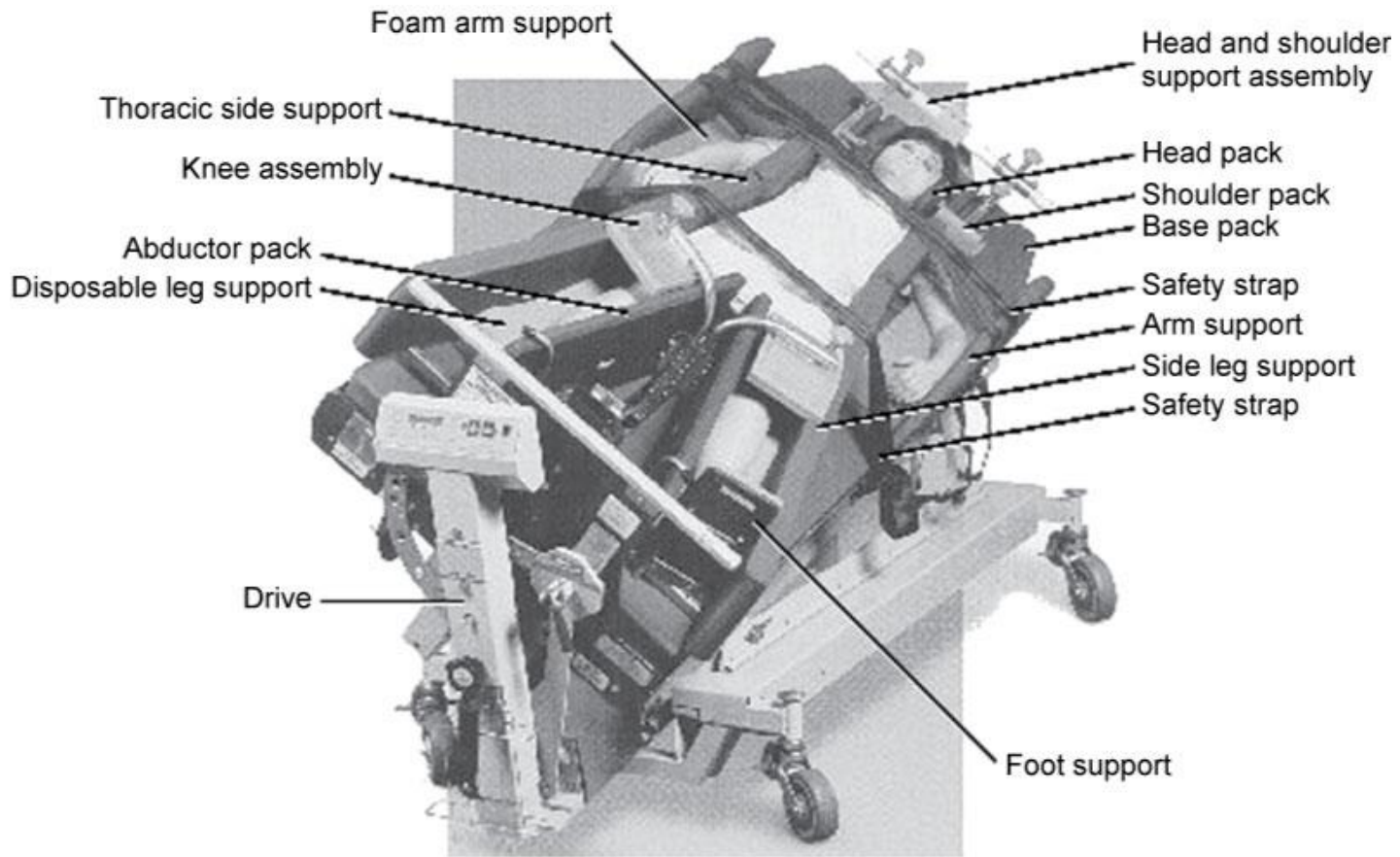
- Air-fluidized beds
 - Tiny silicone beads contained within the bed under a flexible, air-permeable filter sheet
- Low air-loss beds
 - Achieved by distributing air through multiple cushions connected in a series
- Continuous lateral-rotation beds
 - Bed turns in an arc up to 80 degrees and can be set to pause on either side for up to 30 minutes

Figure 39.6: Clinitron-Elexis air-fluidized therapy unit



From deWit, S.C. (2009). *Medical-Surgical Nursing: Concepts and Practice* Philadelphia: Saunders. Copyright 2011 Hill-Rom Service, Inc., reprinted with permission. All rights reserved.

Figure 39.7: Roto-Rest Delta kinetic therapy bed



RotoRest™ Delta Advanced Kinetic Therapy™ System, Courtesy KCI Licensing, Inc.

Devices Used to Prevent Problems of Immobility (Slide 2 of 3)

- Pressure-relief devices
 - Aid in reducing skin trauma from pressure for patients in standard hospital beds
 - Foam and gel pads
 - Sheepskin pads
 - Heel and elbow protectors
 - Pulsating air pads
 - Water mattresses that lie on top of the regular mattress

Figure 39.8: Alternating air mattress pad

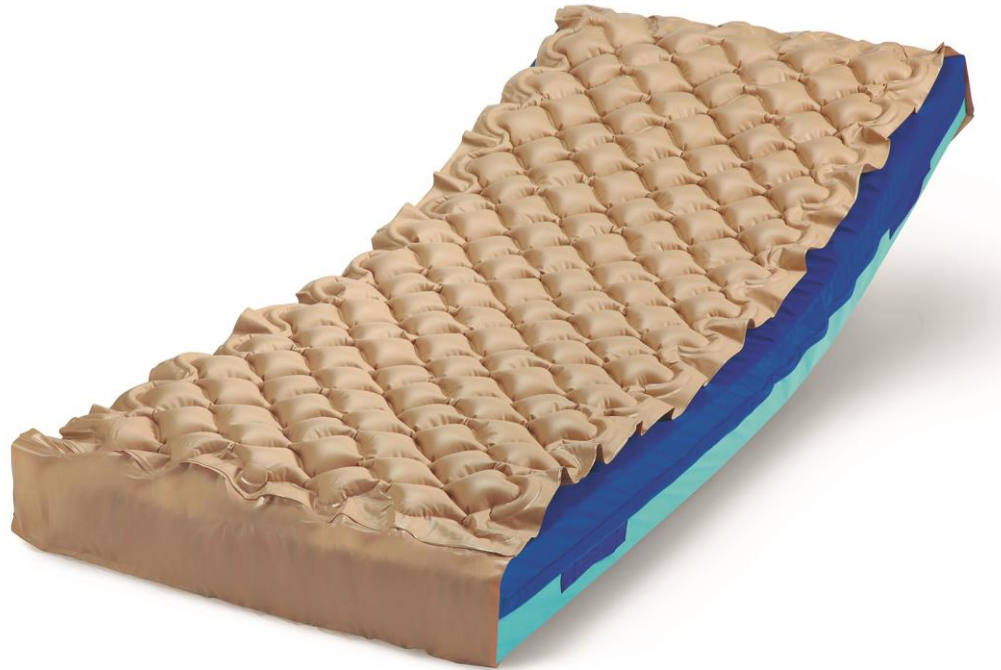


Figure 39.9: Heel protector helps prevent skin breakdown



Devices Used to Prevent Problems of Immobility (Slide 3 of 3)

- Continuous passive motion machine
 - Often ordered to restore joint function after orthopedic surgery to replace a joint
 - Used to exercise the extremity and joint, thus preventing contracture, muscle atrophy, venous stasis, and thrombus formation

Figure 39.10: Continuous passive motion machine for the knee joint



Therapeutic Exercise

- Physical therapy often ordered for patient who is immobilized for an extended period of time
- Full ROM exercises should be performed either actively or passively several times a day
- To prevent joint injury while performing passive ROM exercises, support the limb to be exercised above and below the joint

Question 1

Sharon's patient has had restricted movement for a long time. One major complication Sharon's patient might develop is:

- 1) hypostatic pneumonia.
- 2) aspiration pneumonia.
- 3) paresthesia.
- 4) generalized weakness.

Question 2

Sharon's patient has a continuous passive motion machine. This machine is used to:

- 1) turn the patient every 2 hours.
- 2) have her cough and deep-breathe.
- 3) provide immobilization to a fractured area.
- 4) exercise the joint after a joint replacement surgery.

Question 3

Sharon is working on an orthopedic floor. How often should she inspect casts for cracks, crumbling, pressure problems, and infections?

- 1) Every 2 hours
- 2) Every 4 hours
- 3) Every 6 hours
- 4) Every shift

Lesson 39.2

Assisting the Immobilized Patient

(Slide 1 of 2)

Theory

- 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.

Lesson 39.2

Assisting the Immobilized Patient

(Slide 2 of 2)

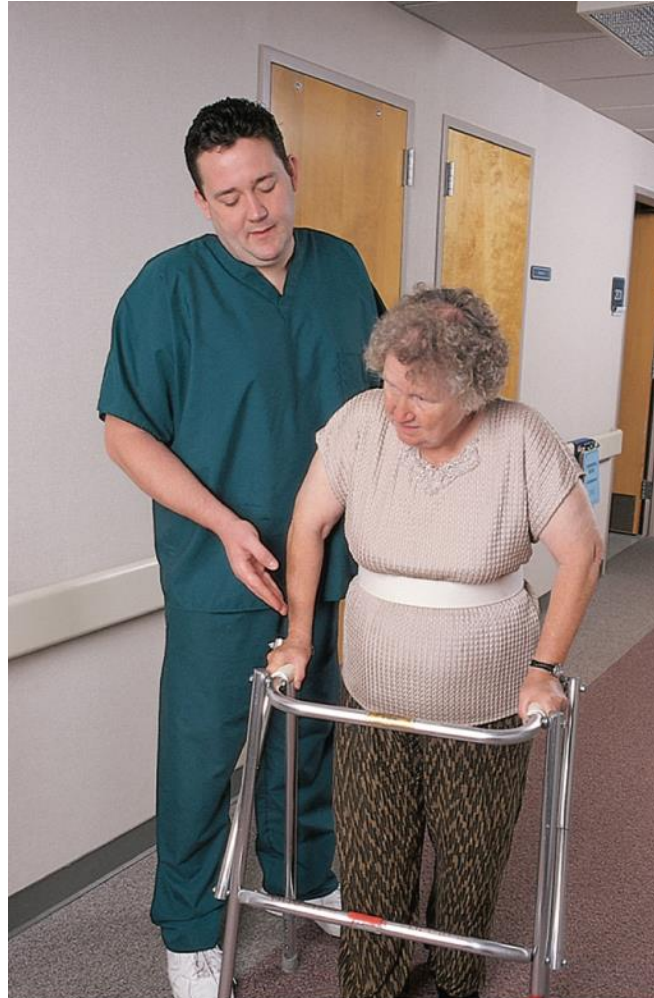
Clinical Practice

- 4) Teach a patient to properly care for a cast following 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.

Assessing the Immobilized Patient

- Assess for indicators of circulatory impairment
- Look for signs of respiratory impairment
- Determine which activities of daily living the immobilized patient can perform
- Perform a neurovascular assessment for any patient with a cast or traction device
- Assess for cultural beliefs and customs
- Assess traction pulleys and ropes for proper function and free movement
- Assess any aids to ambulation for structural problems, fit, and safety
- Assess patient's gait to determine stability

39.11: Assess the gait of the patient learning to use a walker



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Nursing Diagnosis/ Problem Identification

- Altered mobility r/t hemiparesis or hemiplegia (one-sided weakness/one-sided paralysis)
- Altered physical mobility r/t fractured extremity in traction or a cast
- Altered peripheral tissue perfusion (circulation of blood through tissue) r/t decreased circulation in the lower extremities
- Altered skin integrity r/t skin disruption
- Acute pain r/t tissue or bone injury, or muscle spasm
- Alteration in airway clearance r/t inactivity and bed rest
- Potential for disuse syndrome
- Potential for impaired neurological function r/t fracture and cast application

Bandages Used to Support, Apply Pressure, or Immobilize

- Applying elasticized bandages
 - Elevate and support limb while applying
 - Wrap from distal to proximal; apply even pressure while wrapping
 - Overlap turns equally; smooth out wrinkles
 - Secure the end with safety pin, tape, or clips supplied with bandage
 - Check neurovascular status
 - Remove and rewrap at least twice a day

Bandage Wrapping Techniques (Slide 1 of 2)

- Circular turn
 - Used to anchor the bandage and to terminate the wrap
- Spiral turn
 - Used to bandage parts of the body that are uniform in circumference
- Spiral reverse turn
 - Used to bandage body parts not uniform in circumference
- Figure-of-eight turn
 - Used to bandage and stabilize an elbow, knee, or ankle, or to immobilize and hold a fractured clavicle in position

Figure 39.12A: Applying an elastic bandage—circular turns



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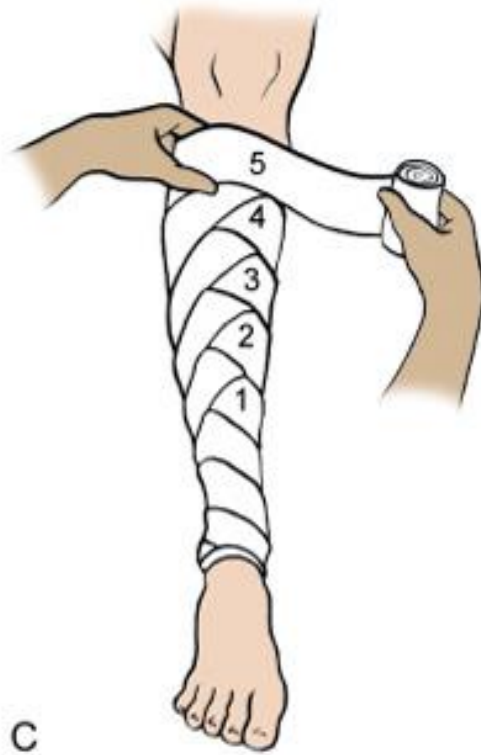
Figure 39.12B: Applying an elastic bandage—spiral turns



B

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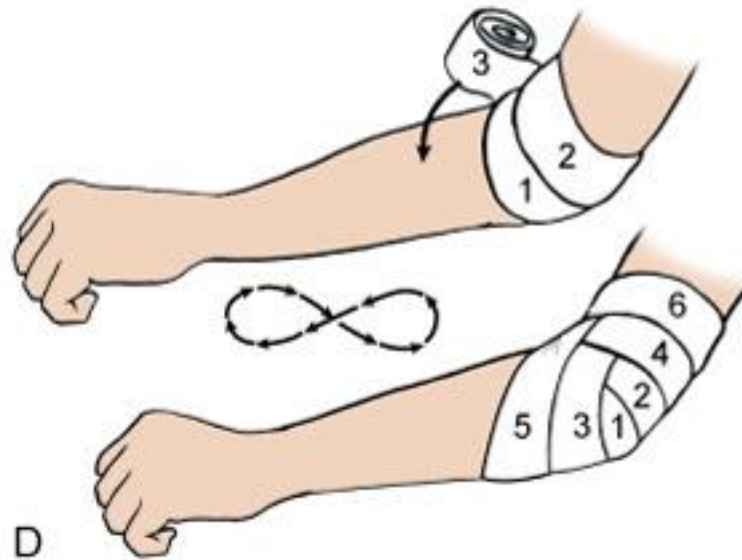
Figure 39.12C: Applying an elastic bandage—spiral reverse turns



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Figure 39.12D: Applying an elastic bandage—figure-of-eight turns



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Bandage Wrapping Techniques (Slide 2 of 2)

- Recurrent turn
 - Used to cover distal parts of the body
- Thumb spica
 - A variation of the figure-of-8 bandage used to support the thumb in neutral position following a sprain or other injury
- Sling
 - Holds extremity in an elevated position to avoid edema of the hand, pain and discomfort, and fatigue

Figure 39.12E: Applying an elastic bandage—recurrent turn bandaging



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Figure 39.12F: Applying an elastic bandage—thumb spica bandaging



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Figure 39.13: A triangular bandage sling



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Using a Mechanical Lift to Transfer Immobile Patients

- Can be used to move a patient from bed to chair or stretcher and back again
 - Hydraulic pump allows one nurse to lift patient
 - It takes two people to use the lift safely
 - Patient must never be left unattended in the lift
 - Also used to place patients into a tub or whirlpool bath for bathing or hydrotherapy

Aids to Mobilization

(Slide 1 of 2)

- Walkers
 - Frequently the first mechanical aid used when training an individual to walk following a loss of function
- Crutches
 - May follow the use of a walker or be the first aid to ambulation
- Canes
 - Most commonly used canes are the standard (one-point) and the quad (four-point) cane

Aids to Mobilization

(Slide 2 of 2)

- Wheelchairs
 - Used for patients who are not able to ambulate either independently or with aids
- Braces, splints, and prostheses for stabilization
 - Prostheses are used to replace missing body parts

Figure 39.16: Regular cane (right) and quad cane (left)



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Rehabilitation

- Exercise prescription to improve muscle tone, joint flexibility, and/or cardiovascular fitness
- Parameters for exercise determined by target heart rate during activity that is based on age and condition

Question 4

When discharging a patient on crutches, it is imperative that he know there should be how much space between the top of the crutch and the axilla when his hands are gripping the crutches?

- 1) 4 inches
- 2) 12 inches
- 3) Two finger-breadths
- 4) Four finger-breadths

Question 5

Tim's patient needs a lift to help him get into hydrotherapy. When using a lift, all of the following are true *except*:

- 1) one person can safely move a weak patient this way.
- 2) you should never leave the patient unattended.
- 3) you should protect the lift with a sheet or bath blanket.
- 4) if a lift is soiled, you should use a disinfectant solution before using it again.