

## FRACTURES

A *fracture* is a discontinuity or break in a bone. There are more than 150 fracture classifications. Five major ones are as follow:

1. *Incomplete*: Fracture involves only a portion of the cross-section of the bone. One side breaks; the other usually just bends (greenstick).
2. *Complete*: Fracture line involves entire cross-section of the bone, and bone fragments are usually displaced.
3. *Closed*: The fracture does not extend through the skin.
4. *Open*: Bone fragments extend through the muscle and skin, which is potentially infected.
5. *Pathological*: Fracture occurs in diseased bone (such as cancer, osteoporosis), with no or only minimal trauma.

Stable fractures are usually treated with casting. Unstable fractures that are unlikely to reduce may require surgical fixation.

### CARE SETTING

Most fractures are managed at the community level. Although a number of the interventions listed here are appropriate for this population, this plan of care addresses more complicated injuries encountered on an inpatient acute medical-surgical unit.

### RELATED CONCERNS

Craniocerebral trauma (acute rehabilitative phase)  
Pneumonia: microbial  
Psychosocial aspects of care  
Renal failure: acute  
Spinal cord injury (acute rehabilitative phase)  
Surgical intervention  
Thrombophlebitis: deep vein thrombosis

## Patient Assessment Database

Symptoms of fracture depend on the site, severity, type, and amount of damage to other structures.

### ACTIVITY/REST

**May report:** Weakness, fatigue  
Gait and/or mobility problems

**May exhibit:** Restricted/loss of function of affected part (may be immediate, because of the fracture, or develop secondarily from tissue swelling, pain)  
Weakness (e.g., affected extremity or generalized)

### CIRCULATION

**May exhibit:** Hypertension (occasionally seen as a response to acute pain/anxiety) or hypotension (severe blood loss)  
Tachycardia (stress response, hypovolemia)  
Pulse diminished/absent distal to injury in extremity  
Delayed capillary refill, pallor of affected part  
Tissue swelling, bruising, or hematoma mass at site of injury

### ELIMINATION

**May exhibit:** Hematuria, sediment in urine, changes in output, acute renal failure (ARF) (with major skeletal muscle damage)

### NEUROSENSORY

**May report:** Loss of/impaired motion or sensation  
Muscle spasms, worsening over time

**May exhibit:** Numbness/tingling (paresthesias)  
Local musculoskeletal deformities, e.g., abnormal angulation, posture changes, shortening of limbs, rotation, crepitation (grating sound with movement or touch), muscle spasms, visible weakness/loss of function  
Giving way/collapse or locking of joints; dislocations  
Agitation (may be related to pain/anxiety or other trauma)  
Range-of-motion (ROM) deficits

#### PAIN/DISCOMFORT

**May report:** Sudden severe pain at the time of injury (may be localized to the area of tissue/skeletal damage and then become more diffuse; can diminish on immobilization); absence of pain suggests nerve damage  
Muscle aching pain, spasms/cramping (after immobilization)

**May exhibit:** Guarding/distraction behaviors, restlessness  
Self-focus

#### SAFETY

**May report:** Circumstances of incident that do not support type of injury incurred (suggestive of abuse)

**May exhibit:** Skin lacerations, tissue avulsion, bleeding, color changes  
Localized swelling (may increase gradually or suddenly)  
Use of alcohol or other drugs  
Presence of fall-risk factors, e.g., age, osteoporosis, dementia, arthritis, other chronic conditions; preexisting (unrecognized) fracture

#### TEACHING/LEARNING

**May report:** Use of multiple medications (prescribed and over-the-counter [OTC]) with interactive effects

**Discharge plan** **DRG projected mean length of inpatient stay: femur 9.0 days; hip/pelvis, 6.7 days; all other, 2.5–5.0 if hospitalization required**

**considerations:** May require temporary assistance with transportation, self-care activities, and homemaker/maintenance tasks  
May require additional therapy/rehabilitation post discharge, or possible placement in assisted-living/extended-care facility for a period of time  
**Refer to section at end of plan for postdischarge considerations.**

#### DIAGNOSTIC STUDIES

**X-ray examinations:** Determines location and extent of fractures/trauma, may reveal preexisting and yet undiagnosed fracture(s).

**Bone scans, tomograms, computed tomography (CT)/magnetic resonance imaging (MRI) scans:** Visualizes fractures, bleeding, and soft-tissue damage; differentiates between stress/trauma fractures and bone neoplasms.

**Arteriograms:** May be done when occult vascular damage is suspected.

**Complete blood count (CBC):** Hematocrit (Hct) may be increased (hemoconcentration) or decreased (signifying hemorrhage at the fracture site or at distant organs in multiple trauma). Increased white blood cell (WBC) count is a normal stress response after trauma.

**Urine creatinine (Cr) clearance:** Muscle trauma increases load of Cr for renal clearance.

**Coagulation profile:** Alterations may occur because of blood loss, multiple transfusions, or liver injury.

#### NURSING PRIORITIES

1. Prevent further bone/tissue injury.
2. Alleviate pain.
3. Prevent complications.
4. Provide information about condition/prognosis and treatment needs.

#### DISCHARGE GOALS

1. Fracture stabilized.
2. Pain controlled.
3. Complications prevented/minimized.

4. Condition, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

<p><b>NURSING DIAGNOSIS: Trauma, risk for [additional]</b></p> <p><b>Risk factors may include</b> Loss of skeletal integrity (fractures)/movement of bone fragments</p> <p><b>Possibly evidenced by</b> [Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Bone Healing (NOC)</b> Maintain stabilization and alignment of fracture(s). Display callus formation/beginning union at fracture site as appropriate.</p> <p><b>Risk Control (NOC)</b> Demonstrate body mechanics that promote stability at fracture site.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Positioning (NIC)</b></p> <p><b>Independent</b></p> <p>Maintain bed rest/limb rest as indicated. Provide support of joints above and below fracture site, especially when moving/turning.</p> <p>Place a bedboard under the mattress or place patient on orthopedic bed.</p> <p><b>Cast Care: Wet (NIC)</b></p> <p>Support fracture site with pillows/folded blankets. Maintain neutral position of affected part with sandbags, splints, trochanter roll, footboard.</p> <p>Use sufficient personnel for turning. Avoid using abduction bar for turning patient with spica cast.</p> <p>Evaluate splinted extremity for resolution of edema.</p>	<p>Provides stability, reducing possibility of disturbing alignment/muscle spasms, which enhances healing.</p> <p>Soft or sagging mattress may deform a wet (green) plaster cast, crack a dry cast, or interfere with pull of traction.</p> <p>Prevents unnecessary movement and disruption of alignment. Proper placement of pillows also can prevent pressure deformities in the drying cast.</p> <p>Hip/body or multiple casts can be extremely heavy and cumbersome. Failure to properly support limbs in casts may cause the cast to break.</p> <p>Coaptation splint (e.g., Jones-Sugar tong) may be used to provide immobilization of fracture while excessive tissue swelling is present. As edema subsides, readjustment of splint or application of plaster/fiberglass cast may be required for continued alignment of fracture.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Traction/Immobilization Care (NIC)</b></p> <p><b>Independent</b></p> <p>Maintain position/integrity of traction (e.g., Buck, Dunlop, Pearson, Russell).</p> <p>Ascertain that all clamps are functional. Lubricate pulleys and check ropes for fraying. Secure and wrap knots with adhesive tape.</p> <p>Keep ropes unobstructed with weights hanging free; avoid lifting/releasing weights.</p> <p>Assist with placement of lifts under bed wheels if indicated.</p> <p>Position patient so that appropriate pull is maintained on the long axis of the bone.</p> <p>Review restrictions imposed by therapy, e.g., not bending at waist/sitting up with Buck traction or not turning below the waist with Russell traction.</p> <p>Assess integrity of external fixation device.</p>	<p>Traction permits pull on the long axis of the fractured bone and overcomes muscle tension/shortening to facilitate alignment and union. Skeletal traction (pins, wires, tongs) permits use of greater weight for traction pull than can be applied to skin tissues.</p> <p>Ensures that traction setup is functioning properly to avoid interruption of fracture approximation.</p> <p>Optimal amount of traction weight is maintained. <i>Note:</i> Ensuring free movement of weights during repositioning of patient avoids sudden excess pull on fracture with associated pain and muscle spasm.</p> <p>Helps maintain proper patient position and function of traction by providing counterbalance.</p> <p>Promotes bone alignment and reduces risk of complications (e.g., delayed healing/nonunion).</p> <p>Maintains integrity of pull of traction.</p> <p>Hoffman traction provides stabilization and rigid support for fractured bone without use of ropes, pulleys, or weights, thus allowing for greater patient mobility/comfort and facilitating wound care. Loose or excessively tightened clamps/nuts can alter the compression of the frame, causing misalignment.</p>
<p><b>Collaborative</b></p> <p>Review follow-up/serial x-rays.</p> <p>Administer alendronate (Fosamax) as indicated.</p> <p>Initiate/maintain electrical stimulation if used.</p>	<p>Provides visual evidence of proper alignment or beginning callus formation/healing process to determine level of activity and need for changes in/additional therapy.</p> <p>Acts as a specific inhibitor of osteoclast-mediated bone resorption, allowing bone formation to progress at a higher ratio, promoting healing of fractures/decreasing rate of bone turnover in presence of osteoporosis.</p> <p>May be indicated to promote bone growth in presence of delayed healing/nonunion.</p>

**NURSING DIAGNOSIS: Pain, acute**

**May be related to**

Muscle spasms  
Movement of bone fragments, edema, and injury to the soft tissue  
Traction/immobility device  
Stress, anxiety

**Possibly evidenced by**

Reports of pain  
Distraction; self-focusing/narrowed focus; facial mask of pain  
Guarding, protective behavior; alteration in muscle tone; autonomic responses

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Pain Level (NOC)**

Verbalize relief of pain.  
Display relaxed manner; able to participate in activities, sleep/rest appropriately.

**Pain Control (NOC)**

Demonstrate use of relaxation skills and diversional activities as indicated for individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Pain Management (NIC)</b>	
<b>Independent</b>	
Maintain immobilization of affected part by means of bed rest, cast, splint, traction. (Refer to ND: Trauma, risk for [additional].)	Relieves pain and prevents bone displacement/extension of tissue injury.
Elevate and support injured extremity.	Promotes venous return, decreases edema, and may reduce pain.
Avoid use of plastic sheets/pillows under limbs in cast.	Can increase discomfort by enhancing heat production in the drying cast.
Elevate bed covers; keep linens off toes.	Maintains body warmth without discomfort due to pressure of bedclothes on affected parts.
Evaluate/document reports of pain/discomfort, noting location and characteristics, including intensity (0–10 scale), relieving and aggravating factors. Note nonverbal pain cues (changes in vital signs and emotions/behavior). Listen to reports of family member/SO regarding patient’s pain.	Influences choice of/monitors effectiveness of interventions. Many factors, including level of anxiety, may affect perception of/reaction to pain. <i>Note:</i> Absence of pain expression does not necessarily mean lack of pain.
Encourage patient to discuss problems related to injury.	Helps alleviate anxiety. Patient may feel need to relive the accident experience.
Explain procedures before beginning them.	Allows patient to prepare mentally for activity and to participate in controlling level of discomfort.
Medicate before care activities. Let patient know it is important to request medication before pain becomes severe.	Promotes muscle relaxation and enhances participation.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Pain Management (NIC)</b></p> <p><b>Independent</b></p> <p>Perform and supervise active/passive ROM exercises.</p> <p>Provide alternative comfort measures, e.g., massage, back rub, position changes.</p> <p>Provide emotional support and encourage use of stress management techniques, e.g., progressive relaxation, deep-breathing exercises, visualization/guided imagery; provide Therapeutic Touch.</p> <p>Identify diversional activities appropriate for patient age, physical abilities, and personal preferences.</p> <p>Investigate any reports of unusual/sudden pain or deep, progressive, and poorly localized pain unrelieved by analgesics.</p>	<p>Maintains strength/mobility of unaffected muscles and facilitates resolution of inflammation in injured tissues.</p> <p>Improves general circulation; reduces areas of local pressure and muscle fatigue.</p> <p>Refocuses attention, promotes sense of control, and may enhance coping abilities in the management of the stress of traumatic injury and pain, which is likely to persist for an extended period.</p> <p>Prevents boredom, reduces muscle tension, and can increase muscle strength; may enhance coping abilities.</p> <p>May signal developing complications; e.g., infection, tissue ischemia, compartmental syndrome. (Refer to ND: Peripheral Neurovascular, dysfunction, risk for following.)</p>
<p><b>Collaborative</b></p> <p>Apply cold/ice pack first 24–72 hr and as necessary.</p> <p>Administer medications as indicated: narcotic and nonnarcotic analgesics, e.g., morphine, meperidine (Demerol), hydrocodone (Vicodin); injectable and oral nonsteroidal anti-inflammatory drugs (NSAIDs), e.g., ketorolac (Toradol), ibuprofen (Motrin); and/or muscle relaxants, e.g., cyclobenzaprine (Flexeril), carisoprodol (Soma), diazepam (Valium). Administer analgesics around the clock for 3–5 days.</p> <p>Maintain/monitor IV patient-controlled analgesia (PCA) using peripheral, epidural, or intrathecal routes of administration. Maintain safe and effective infusions/equipment.</p>	<p>Reduces edema/hematoma formation, decreases pain sensation. <i>Note:</i> Length of application depends on degree of patient comfort and as long as the skin is carefully protected.</p> <p>Given to reduce pain and/or muscle spasms. Studies of ketorolac (Toradol) have proved it to be effective in alleviating bone pain, with longer action and fewer side effects than narcotic agents.</p> <p>Routinely administered or PCA maintains adequate blood level of analgesia, preventing fluctuations in pain relief with associated muscle tension/spasms.</p>

**NURSING DIAGNOSIS: Peripheral Neurovascular, dysfunction, risk for**

**Risk factors may include**

Reduction/interruption of blood flow  
Direct vascular injury, tissue trauma, excessive edema, thrombus formation  
Hypovolemia

**Possibly evidenced by**

[Not applicable; presence of signs and symptoms establishes an *actual* diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Tissue Perfusion: Peripheral (NOC)**

Maintain tissue perfusion as evidenced by palpable pulses, skin warm/dry, normal sensation, usual sensorium, stable vital signs, and adequate urinary output for individual situation.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Circulatory Precautions (NIC)</b></p> <p><b>Independent</b></p> <p>Remove jewelry from affected limb.</p> <p>Evaluate presence/quality of peripheral pulse distal to injury via palpation/Doppler. Compare with uninjured limb.</p> <p>Assess capillary return, skin color, and warmth distal to the fracture.</p>	<p>May restrict circulation when edema occurs.</p> <p>Decreased/absent pulse may reflect vascular injury and necessitates immediate medical evaluation of circulatory status. Be aware that occasionally a pulse may be palpated even though circulation is blocked by a soft clot through which pulsations may be felt. In addition, perfusion through larger arteries may continue after increased compartment pressure has collapsed the arteriole/venule circulation in the muscle.</p> <p>Return of color should be rapid (3–5 sec). White, cool skin indicates arterial impairment. Cyanosis suggests venous impairment. <i>Note:</i> Peripheral pulses, capillary refill, skin color, and sensation may be normal even in presence of compartmental syndrome because superficial circulation is usually not compromised.</p>
<p><b>Circulatory Care: Arterial [or] Venous Insufficiency (NIC)</b></p> <p>Maintain elevation of injured extremity(ies) unless contraindicated by confirmed presence of compartmental syndrome.</p> <p>Assess entire length of injured extremity for swelling/edema formation. Measure injured extremity and compare with uninjured extremity. Note appearance/spread of hematoma.</p>	<p>Promotes venous drainage/decreases edema. <i>Note:</i> In presence of increased compartment pressure, elevation of the extremity actually impedes arterial flow, decreasing perfusion.</p> <p>Increasing circumference of injured extremity may suggest general tissue swelling/edema but may reflect hemorrhage. <i>Note:</i> A 1-in increase in an adult thigh can equal approximately 1 unit of sequestered blood.</p>

ACTIONS/INTERVENTIONS	RATIONALE
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<p><b>Circulatory Care: Arterial [or] Venous Insufficiency (NIC)</b></p> <p><b>Independent</b></p> <p>Note reports of pain extreme for type of injury or increasing pain on passive movement of extremity, development of paresthesia, muscle tension/tenderness with erythema, and change in pulse quality distal to injury. Do not elevate extremity. Report symptoms to physician at once.</p> <p>Investigate sudden signs of limb ischemia, e.g., decreased skin temperature, pallor, and increased pain.</p> <p>Encourage patient to routinely exercise digits/joints distal to injury. Ambulate as soon as possible.</p> <p>Investigate tenderness, swelling, pain on dorsiflexion of foot (positive Homans' sign).</p> <p>Monitor vital signs. Note signs of general pallor/cyanosis, cool skin, changes in mentation.</p> <p>Test stools/gastric aspirant for occult blood. Note continued bleeding at trauma/injection site(s) and oozing from mucous membranes.</p> <p><b>Pressure Management (NIC)</b></p> <p>Perform neurovascular assessments, noting changes in motor/sensory function. Ask patient to localize pain/discomfort.</p> <p>Test sensation of peroneal nerve by pinch/pinprick in the dorsal web between the first and second toe, and assess ability to dorsiflex toes if indicated.</p> <p>Assess tissues around cast edges for rough places/pressure points. Investigate reports of "burning sensation" under cast.</p> <p>Monitor position/location of supporting ring of splints or sling.</p>	<p>Continued bleeding/edema formation within a muscle enclosed by tight fascia can result in impaired blood flow and ischemic myositis or compartmental syndrome, necessitating emergency interventions to relieve pressure/restore circulation. <i>Note:</i> This condition constitutes a medical emergency and requires immediate intervention.</p> <p>Fracture dislocations of joints (especially the knee) may cause damage to adjacent arteries, with resulting loss of distal blood flow.</p> <p>Enhances circulation and reduces pooling of blood, especially in the lower extremities.</p> <p>There is an increased potential for thrombophlebitis and pulmonary emboli in patients immobile for several days. <i>Note:</i> The absence of a positive Homans' sign is not a reliable indicator in many people, especially the elderly because they often have reduced pain sensation.</p> <p>Inadequate circulating volume compromises systemic tissue perfusion.</p> <p>Increased incidence of gastric bleeding accompanies fractures/trauma and may be related to stress or occasionally reflects a clotting disorder requiring further evaluation.</p> <p>Impaired feeling, numbness, tingling, increased/diffuse pain occur when circulation to nerves is inadequate or nerves are damaged.</p> <p>Length and position of peroneal nerve increase risk of its injury in the presence of leg fracture, edema/compartmental syndrome, or malposition of traction apparatus.</p> <p>These factors may be the cause of or be indicative of tissue pressure/ischemia, leading to breakdown/necrosis.</p> <p>Traction apparatus can cause pressure on vessels/nerves, particularly in the axilla and groin, resulting in ischemia and possible permanent nerve damage.</p>
<p><b>ACTIONS/INTERVENTIONS</b></p> <p><b>Circulatory Care: Arterial [or] Venous Insufficiency (NIC)</b></p>	<p><b>RATIONALE</b></p>

<p><b>Collaborative</b></p> <p>Apply ice bags around fracture site for short periods of time on an intermittent basis for 24–72 hr.</p> <p>Monitor hemoglobin (Hb)/hematocrit (Hct), coagulation studies, e.g., prothrombin time (PT) levels.</p> <p>Administer IV fluids/blood products as needed.</p> <p>Administer warfarin sodium (Coumadin) if indicated.</p> <p>Apply antiembolic hose/sequential pressure hose as indicated.</p> <p><b>Pressure Management (NIC)</b></p> <p>Split/bivalve cast as needed.</p> <p>Assist with/monitor intracompartmental pressures as appropriate.</p> <p>Review electromyography (EMG)/nerve conduction velocity (NCV) studies.</p> <p>Prepare for surgical intervention (e.g., fibulectomy/fasciotomy) as indicated.</p>	<p>Reduces edema/hematoma formation, which could impair circulation. <i>Note:</i> Length of application of cold therapy is usually 20–30 min at a time.</p> <p>Assists in calculation of blood loss and needs/effectiveness of replacement therapy. Coagulation deficits may occur secondary to major trauma, presence of fat emboli, or anticoagulant therapy.</p> <p>Maintains circulating volume, enhancing tissue perfusion.</p> <p>May be given prophylactically to reduce threat of deep venous thrombus.</p> <p>Decreases venous pooling and may enhance venous return, thereby reducing risk of thrombus formation.</p> <p>May be done on an emergency basis to relieve restriction and improve impaired circulation resulting from compression and edema formation in injured extremity.</p> <p>Elevation of pressure (usually to 30 mm Hg or more) indicates need for prompt evaluation and intervention. <i>Note:</i> This is not a widespread diagnostic tool, so special interventions and training may be required.</p> <p>May be performed to differentiate between true nerve dysfunction/muscle weakness and reduced use due to secondary gain.</p> <p>Failure to relieve pressure/correct compartmental syndrome within 4–6 hr of onset can result in severe contractures/loss of function and disfigurement of extremity distal to injury or even necessitate amputation.</p>
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**NURSING DIAGNOSIS: Gas Exchange, risk for impaired**

**Risk factors may include**

Altered blood flow; blood/fat emboli

Alveolar/capillary membrane changes: interstitial, pulmonary edema, congestion

**Possibly evidenced by**

[Not applicable; presence of signs and symptoms establishes an *actual* diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Respiratory Status: Gas Exchange (NOC)**

Maintain adequate respiratory function, as evidenced by absence of dyspnea/cyanosis; respiratory rate and arterial blood gases (ABGs) within patient's normal range.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Respiratory Monitoring (NIC)</b></p> <p><b>Independent</b></p> <p>Monitor respiratory rate and effort. Note stridor, use of accessory muscles, retractions, development of central cyanosis.</p> <p>Auscultate breath sounds, noting development of unequal, hyperresonant sounds; also note presence of crackles/rhonchi/wheezes and inspiratory crowing or croupy sounds.</p> <p>Handle injured tissues/bones gently, especially during first several days.</p> <p>Instruct and assist with deep-breathing and coughing exercises. Reposition frequently.</p> <p>Note increasing restlessness, confusion, lethargy, stupor.</p> <p>Observe sputum for signs of blood.</p> <p>Inspect skin for petechiae above nipple line; in axilla, spreading to abdomen/trunk; buccal mucosa, hard palate; conjunctival sacs and retina.</p>	<p>Tachypnea, dyspnea, and changes in mentation are early signs of respiratory insufficiency and may be the only indicator of developing pulmonary emboli in the early stage. Remaining signs/symptoms reflect advanced respiratory distress/impending failure.</p> <p>Changes in/presence of adventitious breath sounds reflects developing respiratory complications, e.g., atelectasis, pneumonia, emboli, adult respiratory distress syndrome (ARDS). Inspiratory crowing reflects upper airway edema and is suggestive of fat emboli.</p> <p>This may prevent the development of fat emboli (usually seen in first 12–72 hr), which are closely associated with fractures, especially of the long bones and pelvis.</p> <p>Promotes alveolar ventilation and perfusion. Repositioning promotes drainage of secretions and decreases congestion in dependent lung areas.</p> <p>Impaired gas exchange/presence of pulmonary emboli can cause deterioration in patient's level of consciousness as hypoxemia/acidosis develops.</p> <p>Hemoptysis may occur with pulmonary emboli.</p> <p>This is the most characteristic sign of fat emboli, which may appear within 2–3 days after injury.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Respiratory Monitoring (NIC)</b></p> <p><b>Collaborative</b></p> <p>Assist with incentive spirometry.</p> <p>Administer supplemental oxygen if indicated.</p> <p>Monitor laboratory studies, e.g.: Serial ABGs;</p> <p>Hb, calcium, erythrocyte sedimentation rate (ESR), serum lipase, fat screen, platelets, as appropriate.</p> <p>Administer medications as indicated: Low-molecular-weight heparin or heparinoids, e.g., enoxaparin (Lovenox), dalteparin (Fragmin), ardeparin (Normiflo);</p> <p>Corticosteroids.</p>	<p>Increases available O<sub>2</sub> for optimal tissue oxygenation.</p> <p>Decreased Pao<sub>2</sub> and increased Paco<sub>2</sub> indicate impaired gas exchange/developing failure.</p> <p>Maximizes ventilation/oxygenation and minimizes atelectasis.</p> <p>Anemia, hypocalcemia, elevated ESR and lipase levels, fat globules in blood/urine/sputum, and decreased platelet count (thrombocytopenia) are often associated with fat emboli.</p> <p>Used for prevention of thromboembolic phenomena, including deep vein thrombosis and pulmonary emboli.</p> <p>Steroids have been used with some success to prevent/treat fat embolus.</p>

<p><b>NURSING DIAGNOSIS: Mobility, impaired physical</b></p> <p><b>May be related to</b> Neuromuscular skeletal impairment; pain/discomfort; restrictive therapies (limb immobilization) Psychological immobility</p> <p><b>Possibly evidenced by</b> Inability to move purposefully within the physical environment, imposed restrictions Reluctance to attempt movement; limited ROM Decreased muscle strength/control</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Mobility Level (NOC)</b> Regain/maintain mobility at the highest possible level. Maintain position of function. Increase strength/function of affected and compensatory body parts. Demonstrate techniques that enable resumption of activities.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Bed Rest Care (NIC)</b></p> <p><b>Independent</b></p> <p>Assess degree of immobility produced by injury/treatment and note patient's perception of immobility.</p> <p>Encourage participation in diversional/recreational activities. Maintain stimulating environment, e.g., radio, TV, newspapers, personal possessions/pictures, clock, calendar, visits from family/friends.</p> <p>Instruct patient in/assist with active/passive ROM exercises of affected and unaffected extremities.</p> <p>Encourage use of isometric exercises starting with the unaffected limb.</p> <p>Provide footboard, wrist splints, trochanter/hand rolls as appropriate.</p> <p>Place in supine position periodically if possible, when traction is used to stabilize lower limb fractures.</p> <p>Instruct in/encourage use of trapeze and "post position" for lower limb fractures.</p> <p>Assist with/encourage self-care activities (e.g., bathing, shaving).</p> <p>Provide/assist with mobility by means of wheelchair, walker, crutches, canes as soon as possible. Instruct in safe use of mobility aids.</p> <p>Monitor blood pressure (BP) with resumption of activity. Note reports of dizziness.</p>	<p>Patient may be restricted by self-view/self-perception out of proportion with actual physical limitations, requiring information/interventions to promote progress toward wellness.</p> <p>Provides opportunity for release of energy, refocuses attention, enhances patient's sense of self-control/self-worth, and aids in reducing social isolation.</p> <p>Increases blood flow to muscles and bone to improve muscle tone, maintain joint mobility; prevent contractures/atrophy and calcium resorption from disuse.</p> <p>Isometrics contract muscles without bending joints or moving limbs and help maintain muscle strength and mass. <i>Note:</i> These exercises are contraindicated while acute bleeding/edema is present.</p> <p>Useful in maintaining functional position of extremities, hands/feet, and preventing complications (e.g., contractures/footdrop).</p> <p>Reduces risk of flexion contracture of hip.</p> <p>Facilitates movement during hygiene/skin care and linen changes; reduces discomfort of remaining flat in bed. "Post position" involves placing the uninjured foot flat on the bed with the knee bent while grasping the trapeze and lifting the body off the bed.</p> <p>Improves muscle strength and circulation, enhances patient control in situation, and promotes self-directed wellness.</p> <p>Early mobility reduces complications of bed rest (e.g., phlebitis) and promotes healing and normalization of organ function. Learning the correct way to use aids is important to maintain optimal mobility and patient safety.</p> <p>Postural hypotension is a common problem following prolonged bed rest and may require specific interventions (e.g., tilt table with gradual elevation to upright position).</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Bed Rest Care (NIC)</b></p> <p><b>Independent</b></p> <p>Reposition periodically and encourage coughing/deep-breathing exercises.</p> <p>Auscultate bowel sounds. Monitor elimination habits and provide for regular bowel routine. Place on bedside commode, if feasible, or use fracture pan. Provide privacy.</p> <p>Encourage increased fluid intake to 2000–3000 mL/day (within cardiac tolerance), including acid/ash juices.</p> <p>Provide diet high in proteins, carbohydrates, vitamins, and minerals, limiting protein content until after first bowel movement.</p> <p>Increase the amount of roughage/fiber in the diet. Limit gas-forming foods.</p>	<p>Prevents/reduces incidence of skin and respiratory complications (e.g., decubitus, atelectasis, pneumonia).</p> <p>Bed rest, use of analgesics, and changes in dietary habits can slow peristalsis and produce constipation. Nursing measures that facilitate elimination may prevent/limit complications. Fracture pan limits flexion of hips and lessens pressure on lumbar region/lower extremity cast.</p> <p>Keeps the body well hydrated, decreasing risk of urinary infection, stone formation, and constipation.</p> <p>In the presence of musculoskeletal injuries, nutrients required for healing are rapidly depleted, often resulting in a weight loss of as much as 20/30 lb during skeletal traction. This can have a profound effect on muscle mass, tone, and strength. <i>Note:</i> Protein foods increase contents in small bowel, resulting in gas formation and constipation. Therefore, gastrointestinal (GI) function should be fully restored before protein foods are increased.</p> <p>Adding bulk to stool helps prevent constipation. Gas-forming foods may cause abdominal distension, especially in presence of decreased intestinal motility.</p>
<p><b>Collaborative</b></p> <p>Consult with physical/occupational therapist and/or rehabilitation specialist.</p> <p>Initiate bowel program (stool softeners, enemas, laxatives) as indicated.</p> <p>Refer to psychiatric clinical nurse specialist/therapist as indicated.</p>	<p>Useful in creating individualized activity/exercise program. Patient may require long-term assistance with movement, strengthening, and weight-bearing activities, as well as use of adjuncts, e.g., walkers, crutches, canes; elevated toilet seats; pickup sticks/reachers; special eating utensils.</p> <p>Done to promote regular bowel evacuation.</p> <p>Patient/SO may require more intensive treatment to deal with reality of current condition/prognosis, prolonged immobility, perceived loss of control.</p>

**NURSING DIAGNOSIS: Skin/Tissue Integrity, impaired: actual/risk for  
May be related to**

Puncture injury; compound fracture; surgical repair; insertion of traction pins, wires, screws  
Altered sensation, circulation; accumulation of excretions/secretions  
Physical immobilization

**Possibly evidenced by (actual)**

Reports of itching, pain, numbness, pressure in affected/surrounding area  
Disruption of skin surface; invasion of body structures; destruction of skin layers/tissues

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Tissue Integrity: Skin & Mucous Membranes (NOC)**

Verbalize relief of discomfort.  
Demonstrate behaviors/techniques to prevent skin breakdown/facilitate healing as indicated.  
Achieve timely wound/lesion healing if present.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Skin Surveillance (NIC)</b></p> <p><b>Independent</b></p> <p>Examine the skin for open wounds, foreign bodies, rashes, bleeding, discoloration, duskiness, blanching.</p> <p>Massage skin and bony prominences. Keep the bed linens dry and free of wrinkles. Place water pads/other padding under elbows/heels as indicated.</p> <p>Reposition frequently. Encourage use of trapeze if possible.</p> <p>Assess position of splint ring of traction device.</p>	<p>Provides information regarding skin circulation and problems that may be caused by application and/or restriction of cast/splint or traction apparatus, or edema formation that may require further medical intervention.</p> <p>Reduces pressure on susceptible areas and risk of abrasions/skin breakdown.</p> <p>Lessens constant pressure on same areas and minimizes risk of skin breakdown. Use of trapeze may reduce risk of abrasions to elbows/heels.</p> <p>Improper positioning may cause skin injury/breakdown.</p>
<p><b>Cast Care: Wet (NIC)</b></p> <p>Plaster cast application and skin care:</p> <p>    Cleanse skin with soap and water. Rub gently with alcohol and/or dust with small amount of a zinc or stearate powder;</p> <p>    Cut a length of stockinette to cover the area and extend several inches beyond the cast;</p> <p>    Use palm of hand to apply, hold, or move cast and support on pillows after application;</p>	<p>Provides a dry, clean area for cast application. <i>Note:</i> Excess powder may cake when it comes in contact with water/perspiration.</p> <p>Useful for padding bony prominences, finishing cast edges, and protecting the skin.</p> <p>Prevents indentations/flattening over bony prominences and weight-bearing areas (e.g., back of heels), which would cause abrasions/tissue trauma. An improperly shaped or dried cast is irritating to the underlying skin and may lead to circulatory impairment.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Cast Care: Wet (NIC)</b></p> <p><b>Independent</b></p> <p>Trim excess plaster from edges of cast as soon as casting is completed;</p> <p>Promote cast drying by removing bed linen, exposing to circulating air;</p> <p>Observe for potential pressure areas, especially at the edges of and under the splint/cast;</p> <p>Pad (petal) the edges of the cast with waterproof tape;</p> <p>Cleanse excess plaster from skin while still wet, if possible;</p> <p>Protect cast and skin in perineal area. Provide frequent perineal care;</p> <p>Instruct patient/SO to avoid inserting objects inside casts;</p> <p>Massage the skin around the cast edges with alcohol;</p> <p>Turn frequently to include the uninvolved side, back, and prone positions (as tolerated) with patient's feet over the end of the mattress.</p>	<p>Uneven plaster is irritating to the skin and may result in abrasions.</p> <p>Prevents skin breakdown caused by prolonged moisture trapped under cast.</p> <p>Pressure can cause ulcerations, necrosis, and/or nerve palsies. These problems may be painless when nerve damage is present.</p> <p>Provides an effective barrier to cast flaking and moisture. Helps prevent breakdown of cast material at edges and reduces skin irritation/excoriation.</p> <p>Dry plaster may flake into completed cast and cause skin damage.</p> <p>Prevents tissue breakdown and infection by fecal contamination.</p> <p>“Scratching an itch” may cause tissue injury.</p> <p>Has a drying effect, which toughens the skin. Creams and lotions are not recommended because excessive oils can seal cast perimeter, not allowing the cast to “breathe.” Powders are not recommended because of potential for excessive accumulation inside the cast.</p> <p>Minimizes pressure on feet and around cast edges.</p>
<p><b>Traction/Immobilization Care (NIC)</b></p> <p>Skin traction application and skin care:</p> <p>Cleanse the skin with warm, soapy water;</p> <p>Apply tincture of benzoin;</p> <p>Apply commercial skin traction tapes (or make some with strips of moleskin/adhesive tape) lengthwise on opposite sides of the affected limb;</p> <p>Extend the tapes beyond the length of the limb;</p> <p>Mark the line where the tapes extend beyond the extremity;</p> <p>Place protective padding under the leg and over bony prominences;</p>	<p>Reduces level of contaminants on skin.</p> <p>“Toughens” the skin for application of skin traction.</p> <p>Traction tapes encircling a limb may compromise circulation.</p> <p>Traction is inserted in line with the free ends of the tape.</p> <p>Allows for quick assessment of slippage.</p> <p>Minimizes pressure on these areas.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Traction/Immobilization Care (NIC)</b></p> <p><b>Independent</b></p> <p>Wrap the limb circumference, including tapes and padding, with elastic bandages, being careful to wrap snugly but not too tightly;</p> <p>Palpate taped tissues daily and document any tenderness or pain;</p> <p>Remove skin traction every 24 hr, per protocol; inspect and give skin care.</p> <p>Skeletal traction/fixation application and skin care: Bend wire ends or cover ends of wires/pins with rubber or cork protectors or needle caps;</p> <p>Pad slings/frame with sheepskin, foam.</p> <p><b>Pressure Management (NIC)</b></p> <p><b>Collaborative</b></p> <p>Provide foam mattress, sheepskins, flotation pads, or air mattress as indicated.</p> <p>Monovalve, bivalve, or cut a window in the cast, per protocol.</p>	<p>Provides for appropriate traction pull without compromising circulation.</p> <p>If area under tapes is tender, suspect skin irritation, and prepare to remove the bandage system.</p> <p>Maintains skin integrity.</p> <p>Prevents injury to other body parts.</p> <p>Prevents excessive pressure on skin and promotes moisture evaporation that reduces risk of excoriation.</p> <p>Because of immobilization of body parts, bony prominences other than those affected by the casting may suffer from decreased circulation.</p> <p>Allows the release of pressure and provides access for wound/skin care.</p>

<p><b>NURSING DIAGNOSIS: Infection, risk for</b></p> <p><b>Risk factors may include</b> Inadequate primary defenses: broken skin, traumatized tissues; environmental exposure Invasive procedures, skeletal traction</p> <p><b>Possibly evidenced by</b> [Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Infection Status (NOC)</b> Achieve timely wound healing, be free of purulent drainage or erythema, and be afebrile.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Infection Prevention (NIC)</b></p> <p><b>Independent</b></p> <p>Inspect the skin for preexisting irritation or breaks in continuity.</p> <p>Assess pin sites/skin areas, noting reports of increased pain/burning sensation or presence of edema, erythema, foul odor, or drainage.</p> <p>Provide sterile pin/wound care according to protocol, and exercise meticulous handwashing.</p> <p>Instruct patient not to touch the insertion sites.</p> <p>Line perineal cast edges with plastic wrap.</p> <p>Observe wounds for formation of bullae, crepitation, bronze discoloration of skin, frothy/fruity-smelling drainage.</p> <p>Assess muscle tone, reflexes, and ability to speak.</p> <p>Monitor vital signs. Note presence of chills, fever, malaise, changes in mentation.</p> <p>Investigate abrupt onset of pain/limitation of movement with localized edema/erythema in injured extremity.</p> <p>Institute prescribed isolation procedures.</p>	<p>Pins or wires should not be inserted through skin infections, rashes, or abrasions (may lead to bone infection).</p> <p>May indicate onset of local infection/tissue necrosis, which can lead to osteomyelitis.</p> <p>May prevent cross-contamination and possibility of infection.</p> <p>Minimizes opportunity for contamination.</p> <p>Damp, soiled casts can promote growth of bacteria.</p> <p>Signs suggestive of gas gangrene infection.</p> <p>Muscle rigidity, tonic spasms of jaw muscles, and dysphagia reflect development of tetanus.</p> <p>Hypotension, confusion may be seen with gas gangrene; tachycardia and chills/fever reflect developing sepsis.</p> <p>May indicate development of osteomyelitis.</p> <p>Presence of purulent drainage requires wound/linen precautions to prevent cross-contamination.</p>
<p><b>Collaborative</b></p> <p>Monitor laboratory/diagnostic studies, e.g.:</p> <ul style="list-style-type: none"> <li>Complete blood count (CBC);</li> <li>ESR;</li> <li>Cultures and sensitivity of wound/serum/bone;</li> <li>Radioisotope scans.</li> </ul> <p>Administer medications as indicated, e.g.:</p> <ul style="list-style-type: none"> <li>IV/topical antibiotics;</li> </ul>	<p>Anemia may be noted with osteomyelitis; leukocytosis is usually present with infective processes.</p> <p>Elevated in osteomyelitis.</p> <p>Identifies infective organism and effective antimicrobial agent(s).</p> <p>Hot spots signify increased areas of vascularity, indicative of osteomyelitis.</p> <p>Wide-spectrum antibiotics may be used prophylactically or may be geared toward a specific microorganism.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Infection Prevention (NIC)</b></p> <p><b>Independent</b></p> <p>Tetanus toxoid.</p> <p>Provide wound/bone irrigations and apply warm/moist soaks as indicated.</p> <p>Assist with procedures, e.g., incision/drainage, placement of drains, hyperbaric oxygen therapy.</p> <p>Prepare for surgery, as indicated.</p>	<p>Given prophylactically because the possibility of tetanus exists with any open wound. <i>Note:</i> Risk increases when injury/wound(s) occur in “field conditions” (outdoor/rural areas, work environment).</p> <p>Local debridement/cleansing of wounds reduces microorganisms and incidence of systemic infection. Continuous antimicrobial drip into bone may be necessary to treat osteomyelitis, especially if blood supply to bone is compromised.</p> <p>Numerous procedures may be carried out in treatment of local infections, osteomyelitis, gas gangrene.</p> <p>Sequestrectomy (removal of necrotic bone) is necessary to facilitate healing and prevent extension of infectious process.</p>

<p><b>NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding condition, prognosis, treatment, self-care, and discharge needs</b></p> <p><b>May be related to</b></p> <p>Lack of exposure/recall Information misinterpretation/unfamiliarity with information resources</p> <p><b>Possibly evidenced by</b></p> <p>Questions/request for information, statement of misconception Inaccurate follow-through of instructions, development of preventable complications</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Knowledge: Treatment Regimen (NOC)</b></p> <p>Verbalize understanding of condition, prognosis, and potential complications. Correctly perform necessary procedures and explain reasons for actions.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Teaching: Disease Process (NIC)</b></p>	
<p><b>Independent</b></p>	
<p>Review pathology, prognosis, and future expectations.</p>	<p>Provides knowledge base from which patient can make informed choices. <i>Note:</i> Internal fixation devices can ultimately compromise the bone's strength, and intramedullary nails/rods or plates may be removed at a future date.</p>
<p>Discuss dietary needs.</p>	<p>A low-fat diet with adequate quality protein and rich in calcium promotes healing and general well-being.</p>
<p>Discuss individual drug regimen as appropriate.</p>	<p>Proper use of pain medication and antiplatelet agents can reduce risk of complications. Long-term use of alendronate (Fosamax) may reduce risk of stress fractures. <i>Note:</i> Fosamax should be taken on an empty stomach with plain water because absorption of drug may be altered by food and some medications (e.g., antacids, calcium supplements).</p>
<p>Reinforce methods of mobility and ambulation as instructed by physical therapist when indicated.</p>	<p>Most fractures require casts, splints, or braces during the healing process. Further damage and delay in healing could occur secondary to improper use of ambulatory devices.</p>
<p>Suggest use of a backpack.</p>	<p>Provides place to carry necessary articles and leaves hands free to manipulate crutches; may prevent undue muscle fatigue when one arm is casted.</p>
<p>List activities patient can perform independently and those that require assistance.</p>	<p>Organizes activities around need and who is available to provide help.</p>
<p>Identify available community services, e.g., rehabilitation teams, home nursing/homemaker services.</p>	<p>Provides assistance to facilitate self-care and support independence. Promotes optimal self-care and recovery.</p>
<p>Encourage patient to continue active exercises for the joints above and below the fracture.</p>	<p>Prevents joint stiffness, contractures, and muscle wasting, promoting earlier return to independence in activities of daily living (ADLs).</p>
<p>Discuss importance of clinical and therapy follow-up appointments.</p>	<p>Fracture healing may take as long as a year for completion, and patient cooperation with the medical regimen facilitates proper union of bone. Physical therapy (PT)/occupational therapy (OT) may be indicated for exercises to maintain/strengthen muscles and improve function. Additional modalities such as low-intensity ultrasound may be used to stimulate healing of lower-forearm or lower-leg fractures.</p>
<p>Review proper pin/wound care.</p>	<p>Reduces risk of bone/tissue trauma and infection, which can progress to osteomyelitis.</p>
<p>Recommend cleaning external fixator regularly.</p>	<p>Keeping device free of dust/contaminants reduces risk of infection.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Teaching: Disease Process (NIC)</b></p> <p><b>Independent</b></p> <p>Identify signs/symptoms requiring medical evaluation, e.g., severe pain, fever/chills, foul odors; changes in sensation, swelling, burning, numbness, tingling, skin discoloration, paralysis, white/cool toes or fingertips; warm spots, soft areas, cracks in cast.</p> <p>Discuss care of “green” or wet cast.</p> <p>Suggest the use of a blow-dryer to dry small areas of dampened casts.</p> <p>Demonstrate use of plastic bags to cover plaster cast during wet weather or while bathing. Clean soiled cast with a slightly dampened cloth and some scouring powder.</p> <p>Emphasize importance of not adjusting clamps/nuts of external fixator.</p> <p>Recommend use of adaptive clothing.</p> <p>Suggest ways to cover toes, if appropriate, e.g., stockinette or soft socks.</p> <p>Discuss postcast removal instructions:            Instruct patient to continue exercises as permitted;</p> <p>Inform patient that the skin under the cast is commonly mottled and covered with scales or crusts of dead skin;</p> <p>Wash the skin gently with soap, povidone-iodine (Betadine), or pHisoDerm, and water. Lubricate with a protective emollient;</p> <p>Inform patient that muscles may appear flabby and atrophied (less muscle mass). Recommend supporting the joint above and below the affected part and the use of mobility aids, e.g., elastic bandages, splints, braces, crutches, walkers, or canes;</p> <p>Elevate the extremity as needed.</p>	<p>Prompt intervention may reduce severity of complications such as infection/impaired circulation. <i>Note:</i> Some darkening of the skin (vascular congestion) may occur normally when walking on the casted extremity or using casted arm; however, this should resolve with rest and elevation.</p> <p>Promotes proper curing to prevent cast deformities and associated misalignment/skin irritation. <i>Note:</i> Placing a “cooling” cast directly on rubber or plastic pillows traps heat and increases drying time.</p> <p>Cautious use can hasten drying.</p> <p>Protects from moisture, which softens the plaster and weakens the cast. <i>Note:</i> Fiberglass casts are being used more frequently because they are not affected by moisture. In addition, their light weight may enhance patient participation in desired activities.</p> <p>Tampering may alter compression and misalign fracture.</p> <p>Facilitates dressing/grooming activities.</p> <p>Helps maintain warmth/protect from injury.</p> <p>Reduces stiffness and improves strength and function of affected extremity.</p> <p>It will be several weeks before normal appearance returns.</p> <p>New skin is extremely tender because it has been protected beneath a cast.</p> <p>Muscle strength will be reduced and new or different aches and pains may occur for awhile secondary to loss of support.</p> <p>Swelling and edema tend to occur after cast removal.</p>

**POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on patient’s age, physical condition/presence of complications, personal resources, and life responsibilities)**

In addition to surgical considerations:

Trauma, risk for—loss of skeletal integrity, weakness, balancing difficulties, reduced muscle coordination, lack of safety precautions, history of previous trauma.

Mobility, impaired physical—neuromuscular skeletal impairment; pain/discomfort, restrictive therapies (limb immobilization); psychological immobility.

Self-Care deficit—musculoskeletal impairment, decreased strength/endurance, pain.

Infection, risk for—inadequate primary defenses: broken skin, traumatized tissues; environmental exposure; invasive procedures, skeletal traction.