

MUSCULOSKELETAL · ORTHOPEDIC NURSING

Skeletal *Traction*

Pin & Wire Traction — Types, Care, & NCLEX Priorities

NGN NCLEX 2026

5 MAJOR TYPES

HIGH-YIELD

NCJMM SCENARIO

1

Definition & Overview

What it is

Direct application of pulling force to a **bone** through pins, wires, screws, or tongs surgically inserted under sterile technique.

Why we use it

To **reduce & immobilize** fractures, **reduce muscle spasm**, correct deformity, and maintain bone alignment during healing.

Skin vs Skeletal

Skin = 5–10 lb, short-term, non-invasive. **Skeletal = 15–30 lb**, long-term (weeks–months), **invasive** (pins/wires).



How Traction *Works*

STEP 1

Pin/wire surgically inserted into bone distal to fracture



STEP 2

Rope attached to pin runs through pulley system



STEP 3

Free-hanging weights apply continuous pulling force



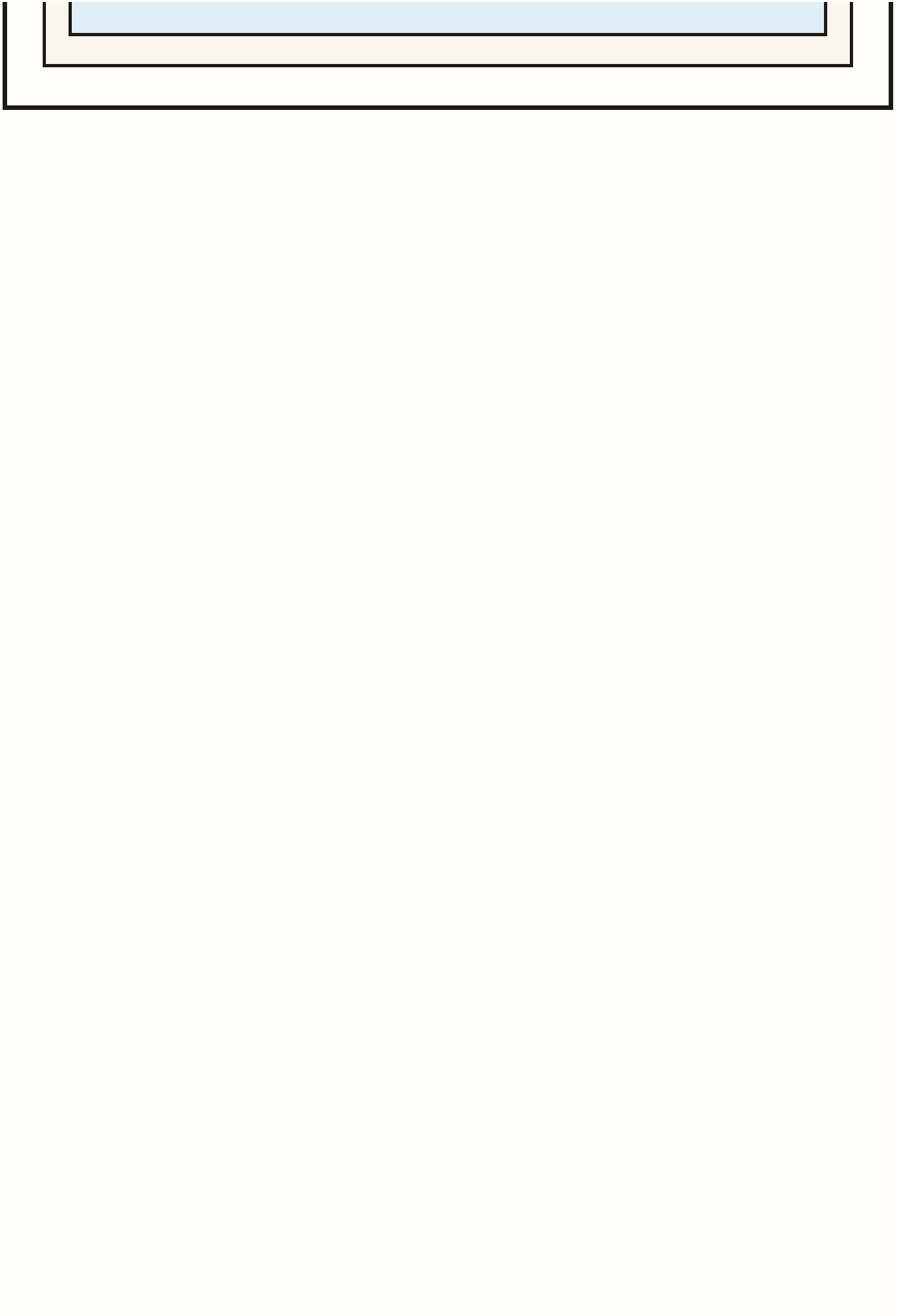
STEP 4

Patient's body weight provides **counter-traction**



STEP 5

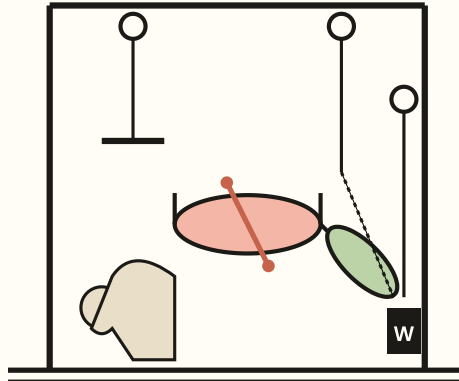
Bone fragments aligned & muscle spasm relaxed



3 Types of Skeletal Traction — *with Nursing Care*

Balanced Suspension — *Thomas Splint + Pearson Attachment*

FEMUR
FRACTURE



Indications

- Femur or hip fractures in adults; complex lower-extremity fx

Key Features

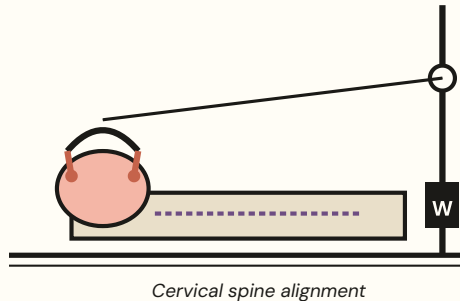
- Thomas splint supports thigh; Pearson attachment supports lower leg
- Leg is **suspended in a sling** — patient can move slightly without altering line of pull

Nursing Care

- **Pin care q8h** with sterile technique (per facility)
- Encourage **trapeze use** to lift hips for skin/bedpan care
- Heels off the bed; foot in neutral (prevent **foot drop**)
- Inspect groin/perineum for skin breakdown from splint ring
- Weights hang free — never resting on floor or bed

Cervical Skull Tongs — *Crutchfield / Gardner-Wells / Vinke*

CERVICAL
SPINE



Indications

- Unstable cervical spine fractures or dislocations; SCI immobilization

Key Features

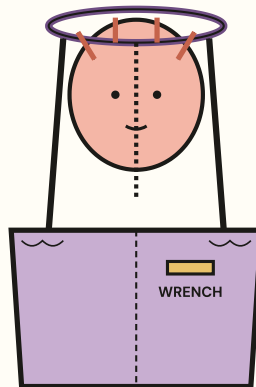
- Pins screwed directly into **outer table of skull**
- Rope and weights apply linear pull along the spine
- Patient is on **strict bed rest, supine**

Nursing Care

- **Pin care q8h** — assess for redness, drainage, looseness
- **NEVER lift or release weights** — would cause spinal cord damage
- **Log-roll only** as a unit; maintain cervical alignment
- Neuro checks (motor/sensory all 4 extremities) every shift
- Specialty bed (kinetic/Stryker) to prevent pressure injuries
- Eye care, mouth care, breathing exercises (immobility complications)

Halo Traction / Halo Vest — *Ambulatory* *Cervical Immobilization*

CERVICAL SPINE ·
MOBILE



Indications

- Stable cervical fractures; post-fusion; allows **ambulation**

Key Features

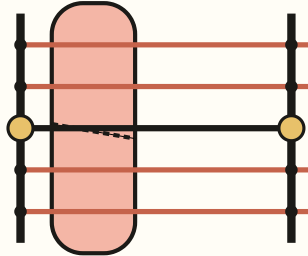
- Halo ring fixed to skull by 4 pins; uprights attach to a rigid vest
- Patient can sit, stand, walk — but spine is fully immobilized

Nursing Care

- 🇨🇷 **Tape the wrench to the front of the vest at all times** (for emergency CPR removal)
- **NEVER use the halo bars to lift, turn, or reposition** the patient
- Pin site care q8h with sterile technique
- Check skin under the vest daily; use sheepskin/cotton liners
- Watch for vest pressure → impaired ventilation, skin breakdown
- Teach wide stance for balance; pivot the whole body, not just the head

External Fixation — *External Frame (Ex-Fix)*

COMPLEX / OPEN
FX



Pins through bone · External frame

Indications

- Compound/open fractures, severe soft tissue injury, infected fractures, limb lengthening

Key Features

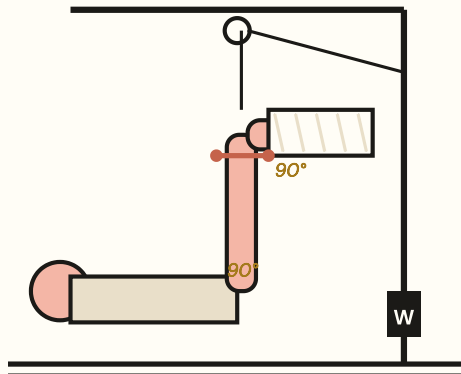
- Pins go through bone, anchored to a rigid **external metal frame**
- No suspended weights — frame itself provides stability & alignment

Nursing Care

- **Pin care q8–12h** per protocol; assess each site for infection
- Watch for **osteomyelitis** (#1 long-term complication): pain, fever, drainage, redness
- Elevate extremity to reduce swelling; **neurovascular checks q1–2h × 24h**, then q4h
- Reassure patient that the device looks alarming but allows early mobility
- Weight-bearing & ambulation **only as ordered** by HCP

90-90 Traction — *Pediatric Femur Traction*

PEDIATRIC · FEMUR



Indications

- Femur fracture in children (typically ages 2–10 or weighing < 70 lb)

Key Features

- Hip flexed to **90°**, knee flexed to **90°**
- Pin in distal femur; lower leg supported in a **short leg cast** or boot

Nursing Care

- Maintain both 90° angles — reposition disrupts alignment
- **Neurovascular check (CSM): color, sensation, motion** of foot q1–2h initially
- Pin site care; assess cast for tightness, hot spots, drainage
- Engage parents; provide age-appropriate diversion & education
- Monitor buttocks/sacrum for breakdown (child sits in pelvic sling)

4

What to Monitor — *Signs of Complications*

Early Warning Signs

- Increasing pain unrelieved by analgesics
- Numbness, tingling, paresthesias distal to fracture
- Pale or cool extremity; capillary refill > 3 sec
- Decreased pulse distal to traction
- Pin site redness, swelling, or serous drainage
- Anxiety, low-grade temp

Late / Severe Complications

- **Compartment syndrome:** severe deep pain, pallor, pulselessness, paresthesia, paralysis (the 5 P's)
- **Pin site infection / osteomyelitis:** purulent drainage, fever, bone pain
- **Fat embolism (12–72 hr after long-bone fx):** dyspnea, chest pain, **petechiae on chest/axilla**, altered LOC
- **DVT/PE:** calf swelling, warmth, sudden SOB
- **Foot drop** from peroneal nerve pressure

RED FLAGS — Notify HCP Immediately

- **Sudden severe pain** + pallor + diminished pulse → suspect compartment syndrome
- **Petechiae** on chest/axilla + dyspnea + confusion → suspect fat embolism
- **Sudden SOB / pleuritic chest pain** → suspect PE
- **Loss of motor / sensory function** distal to fracture
- **Pin loosening, displacement,** or purulent drainage at pin site

5 Priority Nursing *Interventions*

1 Maintain continuous traction. Never lift, release, or remove weights — even briefly. Doing so allows muscle spasm to return and can displace fragments or injure the spinal cord.

2 Weights hang freely. Verify ropes are in the pulleys, knots are intact and not touching pulleys, and weights are off the floor and off the bed at all times.

3 Maintain body alignment. Patient's body provides counter-traction — keep them centered in bed; do not let them slide down toward the foot.

4 Neurovascular checks (CSM) distal to the injury: **q1–2h × first 24 hr**, then q4h. Assess color, sensation, motion, pulses, cap refill, edema, and pain.

5 Pin site care q8–12h per facility policy with sterile technique; assess for redness, drainage, loosening, and tenderness.

6 Prevent foot drop. Keep foot in neutral position with a foot board, splint, or high-top sneaker; encourage active dorsiflexion.

7 Prevent immobility complications. Incentive spirometry, trapeze use, isometric exercises of uninvolved limbs, anticoagulation as ordered, increased fluids and fiber, scheduled skin assessments.

8 Pain management. Administer scheduled analgesics; reassess pain. Sudden uncontrolled pain is a red flag — investigate, do not just medicate.

9 Halo specifically: tape the wrench to the front of the vest; never lift patient by the halo bars.

10

Cervical tongs specifically: log-roll only; perform neuro checks every shift; never disturb the tongs.



Pharmacology *Highlights*

Drug / Class	Why Used	Key Side Effects	Nursing Pearls
Opioid analgesics (<i>morphine, oxycodone</i>)	Fracture pain, post-pin insertion	Respiratory depression, constipation, sedation, hypotension	Monitor RR & sedation; bowel program; pair with non-opioid; keep naloxone available.
Muscle relaxants (<i>cyclobenzaprine, methocarbamol, diazepam</i>)	Relieve muscle spasm around fracture	Drowsiness, dizziness, dry mouth	Fall risk — keep call light close; avoid CNS depressants; teach not to drive.
NSAIDs (<i>ibuprofen, ketorolac</i>)	Mild–moderate pain + inflammation	GI bleed, renal injury, ↑ bleeding risk	Give with food; monitor BUN/Cr; ketorolac max 5 days IV/IM.
Anticoagulants (<i>enoxaparin, heparin</i>)	VTE prophylaxis during immobility	Bleeding, HIT (heparin), bruising	Monitor platelets (heparin); check stool/urine for blood; SQ in abdomen for enoxaparin.
Antibiotics (<i>cefazolin, vancomycin</i>)	Prophylaxis or treatment of pin site infection / osteomyelitis	Allergic rxn, GI upset, vanc → "red man syndrome," nephrotoxicity	Verify allergies; obtain trough levels (vanc); infuse vanc over ≥ 60 min.
Stool softeners / laxatives (<i>docusate, senna</i>)	Prevent immobility & opioid constipation	Cramping, diarrhea (overuse)	Encourage fluids ≥ 2 L/day if not restricted; high-fiber diet.
Calcium & Vitamin D	Support bone healing	Constipation (calcium), hypercalcemia w/ excess	Adequate weight-bearing once cleared; avoid hypercalcemia with thiazides.

7

NCLEX Test Traps ⚠️

✗ WRONG

"Briefly lift the weights to reposition the patient up in bed."

✓ RIGHT

Never lift or release traction weights. Use the trapeze and pull the patient up with the traction intact.

✗ WRONG

"Use the halo ring or bars to help the patient sit up."

✓ RIGHT

Never use the halo as a handle. Support the trunk; the wrench stays taped to the vest for emergencies.

✗ WRONG

"Increasing pain → just give more pain medication."

✓ RIGHT

Sudden, unrelieved, escalating pain = assess for compartment syndrome **before** medicating.

✗ WRONG

"Weights resting on the bed frame are still working fine."

✓ RIGHT

Weights must hang **freely**; if they rest on anything, there is no traction force.

✗ WRONG

"Pin site has slight serous drainage — apply antibiotic ointment and cover."

✓ RIGHT

Document and follow facility protocol (typically chlorhexidine or sterile saline). Notify HCP for purulent drainage, redness, fever, or loosening.

✗ WRONG

"Petechiae on the chest 24 hr after femur fracture — bruising from injury."

✓ RIGHT

Petechiae on chest/axilla + dyspnea + altered LOC = classic **fat embolism**. Notify HCP STAT.

✗ WRONG

"Skeletal and skin traction use the same amount of weight."

✓ RIGHT

Skin = 5–10 lb max (or skin breaks down); **skeletal = 15–30 lb** because force goes through bone.

8

Patient & Family Education

About the Traction

- Explain purpose: holds bones aligned so they can heal correctly
- Do not adjust ropes, knots, weights, or pins yourself
- Notify staff if anything looks different or feels loose

Comfort & Activity

- Use the trapeze to lift hips for skin care and bedpan
- Active exercises for unaffected limbs to prevent stiffness
- Ask for pain medication **before** pain becomes severe

Skin & Hygiene

- Report any redness, blisters, or numbness over pressure points
- Keep heels off the bed; report skin irritation under splints/vest
- Daily skin assessment at all pin sites and bony prominences

Halo Vest Specific

- Wrench stays taped to the front of the vest at all times
- Sponge bathe only; do not get vest liner wet
- Turn your whole body, not just your head, to look around
- Wear loose clothing that buttons in front; flat, supportive shoes

Nutrition & Hydration

- High-protein, high-calcium, high-fiber diet to support healing & bowel function
- Fluids 2–3 L/day unless contraindicated
- Adequate vitamin D and vitamin C intake

Call HCP or 911

- Sudden severe pain, numbness, or coldness in the extremity
- Fever, chills, or pus-like drainage at pin sites
- Sudden shortness of breath, chest pain, or coughing blood
- Loosened, displaced, or visibly bent pins



Memory *Boosters*

T·R·A·C·T·I·O·N

Temperature (check site & for systemic infection)

Ropes hang freely

Alignment maintained

Circumference of extremity / Circulation checks

Type and location of fracture

Increase fluids, fiber, & movement of uninvolved limbs

Overhead trapeze & Output (bowel/bladder)

No weights on the bed/floor — and Never release weights

5 P's of Compartment Syndrome

Pain (severe, out of proportion, unrelieved)

Pallor (pale, cool extremity)

Pulselessness (late sign)

Paresthesia (numbness, tingling)

Paralysis (late, often irreversible)

→ *Notify HCP immediately. Do not elevate above heart; remove constrictive dressings.*

"Pin Care: SCAR"

Sterile technique every time

Cleanse from pin outward

Assess: redness, drainage, looseness, tenderness

Report early signs of infection before they progress to osteomyelitis

"Fat Embolism: PCD"

Petechiae on chest, axilla, soft palate (12–72 hr post long-bone fx)

Confusion / altered LOC

Dyspnea + chest pain

→ *Classic triad after femur or pelvic fractures.*

10

NCJMM Clinical Judgment Scenario

SCENARIO

A 28-year-old male was admitted 48 hours ago with a closed mid-shaft right femur fracture sustained in a motorcycle crash. He is in balanced suspension traction with a Thomas splint and Pearson attachment, with 20 lb of skeletal traction. The nurse enters the room and finds the client diaphoretic and restless, reporting "deep, burning pain" in the right thigh that is "way worse than before" and not relieved by the scheduled morphine given 30 minutes ago. Right foot is pale and cool; capillary refill is 4 seconds; dorsalis pedis pulse is faintly palpable. The client cannot wiggle his right toes.

1

Recognize Cues

- Severe pain disproportionate to injury, unrelieved by opioid
- Pale, cool right foot; cap refill > 3 sec
- Diminished pulse distal to fracture
- Loss of motor function (cannot wiggle toes)
- Diaphoresis and restlessness

2

Analyze Cues

- Clustered findings match the **5 P's of compartment syndrome**: Pain, Pallor, Paresthesia, Paralysis, decreased Pulse
- Most likely cause: rising tissue pressure within the fascial compartment of the right thigh compromising perfusion
- Less likely but still consider: traction too tight, malpositioned splint, DVT

3

Prioritize Hypotheses

- **Top priority: acute compartment syndrome** — limb-threatening within 4–6 hr if untreated
- Second: fat embolism (also urgent — assess respiratory status & chest/axilla for petechiae)
- Third: pin site infection (later progression)

4

Generate Solutions

- Notify HCP immediately — surgical emergency, anticipate fasciotomy
- Do not elevate the limb above heart level (worsens perfusion); keep at heart level
- Loosen any constrictive dressings or bandages; do not adjust traction without an order
- Apply oxygen; maintain IV access with a patent line
- Hold further opioids until HCP evaluation — pain is a key assessment finding
- Prepare for stat labs (CK, CMP), compartment pressure measurement, and possible OR

5

Take Action

- Call the HCP/surgeon STAT using SBAR; report 5 P's findings
- Reassess neurovascular status every 15 minutes
- NPO in case of emergent fasciotomy; ensure consent process
- Provide reassurance to the client; explain plan to family
- Document time of onset, interventions, and HCP notification accurately

6

Evaluate Outcomes

- Expected: compartment pressure reduced; pulse and color return; sensation and motor function restored
- Unexpected: persistent pulselessness or paralysis → escalate; risk of rhabdomyolysis (monitor CK, urine for myoglobin)
- Long-term: monitor for permanent neuromuscular damage, infection, and adjustment to surgical wound after fasciotomy

NGN NCLEX 2026 Visual Study Library · Skeletal Traction · For nursing education review only — not for clinical decision-making in lieu of facility protocols.