

NGN NCLEX 2026 · VISUAL STUDY LIBRARY

Casts — *Nursing Care & Teaching*

Plaster & fiberglass immobilization for fracture healing — assessment priorities, complication recognition, and the patient teaching that prevents skin breakdown, infection, and limb loss.

MUSCULOSKELETAL

SAFETY

NEUROVASCULAR

PATIENT EDUCATION



SECTION ONE

1 Definition & Overview

A **cast** is a rigid external device that immobilizes a fractured bone, dislocated joint, or injured soft tissue so healing can occur in proper alignment. Casts are temporary and must be monitored closely for circulatory, neurologic, and integumentary complications.

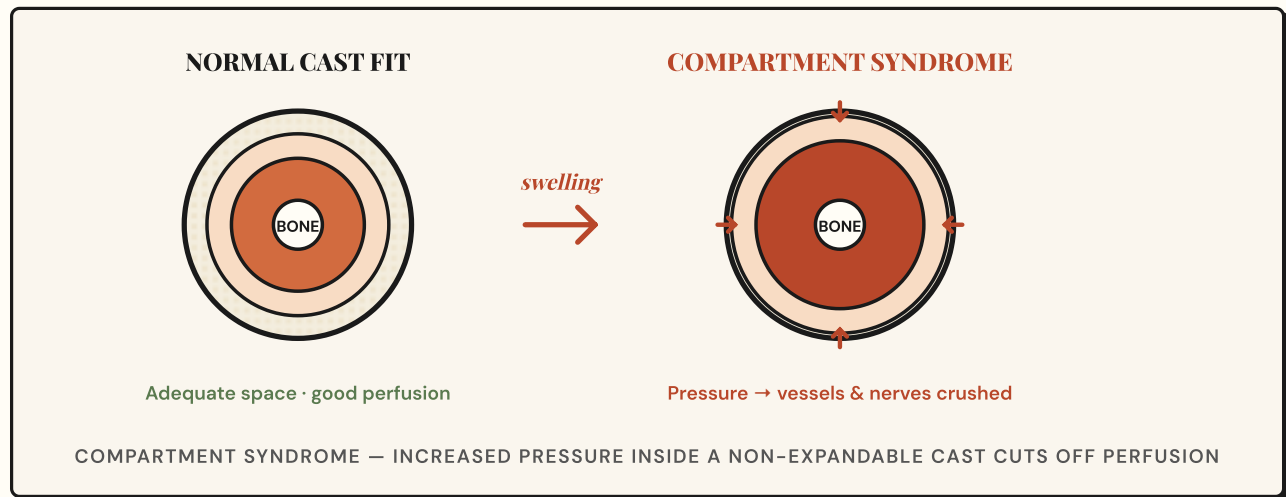
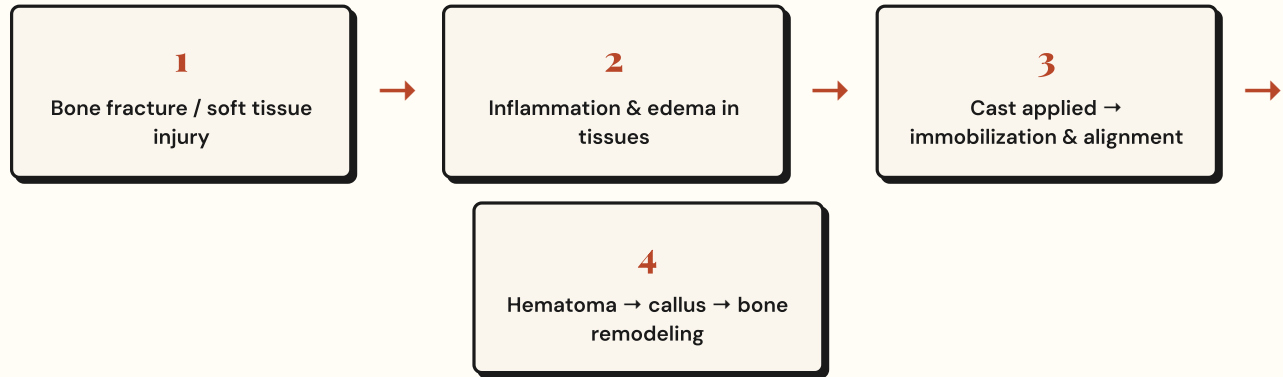
- ▶ **Plaster of Paris** — heavy, takes **24–72 hours to fully dry**, cannot get wet, indents if pressed with fingertips.
- ▶ **Fiberglass (synthetic)** — lightweight, water-resistant, dries in **~30 minutes**, more durable; preferred for most extremities.
- ▶ **Why it matters:** A cast applied over a swelling extremity can act like a tourniquet → **compartment syndrome**, a true surgical emergency.

2

SECTION TWO

Pathophysiology — Healing & The Risk

A cast supports fracture healing — but the same rigidity that protects the bone can endanger the limb if swelling rises inside the cast.



3

SECTION THREE

Signs & Symptoms

Expected / Early Findings

- ▶ Mild swelling relieved by elevation
- ▶ Discomfort relieved by ordered analgesics
- ▶ Itching under cast (cool air only — never insert objects)
- ▶ Warm sensation while plaster is curing (chemical exothermic reaction)
- ▶ Capillary refill < 3 seconds; toes/fingers pink & warm
- ▶ Able to wiggle digits with normal sensation

Abnormal / Late Findings

- ▶ Pain **unrelieved** by opioids or elevation
- ▶ Pain on **passive stretch** of digits (hallmark)
- ▶ Cool, pale, cyanotic, or mottled digits
- ▶ Numbness, tingling, paresthesia
- ▶ Diminished or absent distal pulse
- ▶ Inability to move digits (late, irreversible)
- ▶ Foul odor, drainage stain, "hot spot" on cast
- ▶ Fever, ↑ WBC → infection beneath cast
- ▶ Dyspnea, petechiae, ↓ LOC → **fat embolism** (long-bone fx)



RED FLAG — The 6 P's of Compartment Syndrome

- ▶ **Pain** — severe, deep, throbbing, out of proportion, unrelieved by opioids
- ▶ **Pallor** — pale, dusky, or cyanotic distal extremity
- ▶ **Paresthesia** — numbness, tingling, "pins and needles"
- ▶ **Pulselessness** — diminished or absent distal pulse (late)
- ▶ **Paralysis** — loss of motor function (late, often irreversible)
- ▶ **Poikilothermia** — cool extremity that matches room temperature

⚠ **Compartment syndrome = SURGICAL EMERGENCY. Fasciotomy within 4–6 hours to prevent permanent nerve damage / amputation.**

4

SECTION FOUR

Priority Nursing Interventions

First 24–48 Hours

- ▶ **Neurovascular checks (CMS) every 1–2 h × 24 h**, then q4h: Circulation, Movement, Sensation, pulse, cap refill, color, temp, pain
- ▶ **Elevate above heart level** on pillows to ↓ edema
- ▶ Apply **ice packs over the cast** (not direct skin) × first 24 h
- ▶ Allow plaster cast to **air-dry uncovered** — no blankets, no heat lamps, no hair dryer on hot
- ▶ Handle wet plaster with **palms of hands only** (fingertips cause indentations → pressure ulcers)
- ▶ Turn the patient q2h to dry cast evenly & prevent skin breakdown
- ▶ Support with pillows under the entire length

Ongoing Care

- ▶ **Petal rough cast edges** with tape or moleskin to prevent skin irritation
- ▶ Inspect skin at cast edges every shift for breakdown
- ▶ Smell the cast for odor; inspect for stains / "hot spots"
- ▶ Encourage **isometric exercises** & ROM of unaffected joints
- ▶ Encourage fluids, fiber, & mobility to ↓ constipation & DVT
- ▶ Assess for **fat embolism** first 24–72 h after long-bone fx
- ▶ If compartment syndrome suspected: **position at heart level** (NOT above), loosen ace wraps, notify HCP **STAT**, prepare for bivalve / fasciotomy
- ▶ Cast removal: warn the patient the cast saw **vibrates but does not cut skin**; the limb will look thin, pale, & weak

5

SECTION FIVE

Pharmacology

DRUG / CLASS	PURPOSE	KEY SIDE EFFECTS	NURSING PEARLS
Acetaminophen	Mild pain	Hepatotoxicity > 4 g/day	Monitor LFTs; check OTC combos
NSAIDs (ibuprofen, ketorolac)	Pain + inflammation	GI bleed, renal injury, ↑ BP	Take with food; limit ketorolac to ≤ 5 days
Opioids (morphine, oxycodone, hydrocodone)	Severe acute fracture pain	Sedation, respiratory depression, constipation	Pain <i>unrelieved</i> by opioid → suspect compartment syndrome
Muscle relaxants (cyclobenzaprine, methocarbamol)	Muscle spasm	Drowsiness, dry mouth, dizziness	Fall precautions; avoid alcohol & CNS depressants
LMWH (enoxaparin)	DVT prophylaxis (immobility)	Bleeding, thrombocytopenia (HIT)	Monitor platelets; do NOT aspirate or massage site
Stool softeners (docusate)	Prevent constipation from immobility + opioids	Mild GI cramping	↑ Fluids & fiber alongside
Calcium + Vitamin D	Support bone healing	Constipation, hypercalcemia	Take separately from iron / thyroid meds

6

SECTION SIX

NCLEX Test Traps !

✗ WRONG

"Use a heat lamp or hair dryer to speed up cast drying."

✓ RIGHT

Air-dry uncovered; heat causes uneven drying & **burns** the underlying skin.

✗ WRONG

"Pick up the wet cast with my fingertips for a firm grip."

✓ RIGHT

Use the **palms of both hands** — fingertips leave indentations that become pressure ulcers.

✗ WRONG

"Elevate the limb above the heart when compartment syndrome is suspected."

✓ RIGHT

Position at **heart level** — elevation worsens perfusion. Notify HCP STAT, prepare for bivalving / fasciotomy.

✗ WRONG

"Slide a coat hanger or pencil under the cast to scratch an itch."

✓ RIGHT

Cool air from a hair dryer on the cool setting; never insert objects (skin trauma → infection).

✗ WRONG

"Pain that is relieved by opioids is the hallmark of compartment syndrome."

✓ RIGHT

Pain **unrelieved** by opioids — and pain on **passive stretch** — is the classic finding.

✗ WRONG

"A foul odor or warm spot on the cast is a normal part of healing."

✓ RIGHT

Odor + hot spot = **infection / skin breakdown** beneath the cast → notify HCP.

✗ WRONG

"Cover the wet plaster cast with a blanket to keep the patient warm."

✓ RIGHT

Leave the cast **uncovered**; covering traps moisture and prevents drying.

✗ WRONG

"The cast saw will cut the patient's skin during removal."

✓ RIGHT

The oscillating saw **vibrates** — it cuts the cast but stops on soft tissue. Reassure the patient.

7

SECTION SEVEN

Patient & Family Education

Daily Cast Care

- ▶ Keep cast clean & **dry** — cover with plastic bag & tape for showers (plaster); fiberglass may allow water but check with HCP
- ▶ Elevate the limb on pillows for the first **24–48 hours** to reduce swelling
- ▶ Apply ice **over** the cast for the first 24 hours (towel between cast & ice pack)
- ▶ Wiggle fingers/toes frequently and exercise unaffected joints
- ▶ Do not stick anything inside the cast — use **cool air** from a hair dryer for itching
- ▶ Inspect cast edges & skin daily for redness, cracks, or breakdown

When to Call the HCP

- ▶ Severe pain not relieved by medication or elevation
- ▶ Numbness, tingling, or inability to move fingers/toes
- ▶ Fingers/toes that turn pale, blue, gray, or cold
- ▶ Foul odor, drainage, or a "hot spot" on the cast
- ▶ Fever > 100.4 °F (38 °C)
- ▶ Cracks, softening, or a loose cast
- ▶ Skin irritation or sores at the cast edge
- ▶ Sudden shortness of breath or chest pain (suspect PE / fat embolism)

8

SECTION EIGHT

Memory Boosters & Mnemonics

6 P's

COMPARTMENT SYNDROME

- Pain (severe, unrelieved)
- Pallor
- Paresthesia
- Pulselessness
- Paralysis
- Poikilothermia (cool)

CMS

NEUROVASCULAR CHECK

- Circulation — pulse, cap refill, color, temp
- Movement — wiggle digits
- Sensation — touch, paresthesia

RICE

FIRST 24–48 HOURS

- Rest the extremity
- Ice over the cast
- Compression (the cast itself)
- Elevation above heart

"Hot spot, bad spot"

CAST INFECTION CUE

- Warm area on cast surface = infection brewing beneath
- Pair with odor + drainage stain + fever
- → Notify HCP, do not ignore

PALMS

HANDLING A WET PLASTER CAST

- Palms only — no fingertips
- Air-dry uncovered
- Lift the entire length on pillows
- Monitor for indentations
- Support, turn q2h to dry evenly

FES

FAT EMBOLISM SYNDROME — LONG BONE FX

- First 24–72 hours post-fracture
- Early: dyspnea, ↓ SpO₂, tachycardia
- Skin: petechiae across chest, axilla, conjunctiva

9

SECTION NINE

NCJMM Clinical Judgment Scenario

Scenario: A 24-year-old male is admitted after a motorcycle crash with a closed right tibial fracture. A fiberglass long-leg cast was applied 6 hours ago. He now reports right calf pain rated **9/10** that is not relieved after two doses of IV morphine. On assessment: right toes are pale and cool, capillary refill 5 seconds, pedal pulse weak, sensation diminished, and he cries out when you passively dorsiflex his toes. VS: BP 142/88, HR 118, RR 22, SpO₂ 96%, T 99.1 °F.

STEP 1 Recognize Cues

Relevant cues: severe pain 9/10 unrelieved by 2 doses of opioid; pain on passive stretch (dorsiflexion); pale, cool toes; cap refill 5 sec (delayed); weak pedal pulse; diminished sensation; tachycardia (HR 118); recent tibial fracture with circumferential cast 6 hours old. **Irrelevant:** T 99.1 °F (low-grade, expected early post-injury), SpO₂ 96%.

STEP 2 Analyze Cues

This cluster — pain unrelieved by opioids, pain with passive stretch, pallor, coolness, paresthesia, delayed cap refill, weak pulse — is the textbook presentation of **acute compartment syndrome**. The tibial fracture site is the most common location for compartment syndrome. The cast is preventing the swelling tissues from expanding, raising intracompartmental pressure above capillary perfusion pressure. Without intervention within 4–6 hours, ischemic muscle and nerve damage becomes permanent.

STEP 3 Prioritize Hypotheses

#1 Priority — Acute compartment syndrome (highest acuity; limb-threatening within hours). Secondary considerations: fat embolism syndrome (would also explain tachycardia but expect dyspnea, petechiae, ↓ SpO₂, altered LOC), poorly managed pain, DVT (different presentation — unilateral swelling, Homans sign), and cast that is too tight without ischemia. Compartment syndrome takes precedence.

STEP 4 Generate Solutions

Goals: restore perfusion, prevent permanent nerve/muscle damage, control pain, prepare for emergency surgical decompression. Expected actions: keep limb at **heart level** (not elevated), **do not** apply ice, notify HCP STAT, prepare for cast **bivalving** or fasciotomy, anticipate compartment pressure measurement (> 30 mmHg or within 30 mmHg of diastolic = surgical threshold), maintain NPO for OR, IV fluids, oxygen, continuous neurovascular checks, hold further opioids until evaluated (do not mask worsening pain).

STEP 5 Take Action

1 Notify the HCP / Rapid Response immediately. **2** Position the limb at **heart level**, remove any constrictive coverings. **3** Anticipate orders to **bivalve / split the cast** at the bedside. **4** Establish/verify IV access; maintain NPO; prepare for emergency fasciotomy in OR. **5** Continuous CMS checks every 15 minutes. **6** Reassure the patient and family; document time of onset and all assessments. **7** Apply oxygen if SpO₂ falls. **Do NOT:** elevate above heart, apply ice, or give additional opioids before evaluation.

STEP 6 Evaluate Outcomes

Improving: pain decreases after bivalving, toes warm and pink, cap refill < 3 sec, pulse strong, sensation restored, ability to move toes returns, HR trending down. **Worsening / not resolving:** persistent severe pain, paralysis, absent pulse, cyanosis — requires immediate fasciotomy. **Long-term:** monitor for Volkmann contracture, myoglobinuria from

rhabdomyolysis (dark "tea-colored" urine, ↑ CK, ↑ K⁺ → cardiac dysrhythmia), and renal injury. Document response to each intervention.

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