

NGN NCLEX 2026 • IV THERAPY COMPLICATIONS

Phlebitis **vs** Infiltration **vs** Extravasation

The three IV emergencies every nurse must differentiate at the bedside — fast.



Phlebitis = FIRE



Infiltration = ICE



Extravasation = BURN

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Definition & Overview

PHLEBITIS

Inflammation of the vein

Inflammation of the **inner lining (intima)** of the vein — caused by mechanical trauma, chemical irritation, or bacteria. Vein still has IV fluid **inside** it.



RED + WARM

INFILTRATION

IV fluid leaks into tissue

Catheter dislodges or punctures the vein → **non-vesicant** IV fluid leaks into surrounding subcutaneous tissue. **No tissue damage**, just swelling.



COOL + PALE

EXTRAVASATION

Vesicant leaks into tissue

Same mechanism as infiltration — BUT the leaked solution is a **vesicant or irritant** (chemo, vasopressor, hypertonic). Causes **tissue necrosis**.



BURN + NECROSIS

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Pathophysiology (Simplified)



Phlebitis Cascade

Mechanical /
chemical / bacterial
irritation



Endothelial injury
inside vein



Inflammatory
response



Heat, redness, pain,
streak



Infiltration Cascade

Catheter tip
dislodges or
punctures vein wall



IV fluid escapes
vein lumen



Fluid pools in
subcutaneous
tissue



Cool, pale, swollen,
hard site



Extravasation Cascade

Same dislodgement
— but vesicant
solution leaks



Direct cellular
toxicity



Blistering,
sloughing, ischemia



Tissue necrosis
(hours to days)

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Signs & Symptoms – Side-by-Side

Feature	Phlebitis	Infiltration	Extravasation
Skin Color	RED / erythematous	PALE / blanched	Pale → dusky → blackened
Skin Temp	WARM / HOT	COOL	Cool initially, then burning
Swelling	Mild, along vein	Hard, swollen, taut	Hard, swollen + blisters
Pain	Tenderness, throbbing	Discomfort, tightness	SEVERE BURNING 🔥
Streak	Red streak along vein 🔥	None	None
Blood Return	Usually present	ABSENT	ABSENT
Infusion Rate	Normal	Slowed / stopped	Slowed / stopped
Late Findings	Palpable cord, induration	Resolves with removal	Necrosis, ulceration, eschar 🔥



Phlebitis Severity Scale (INS)

Grade	Clinical Findings
0	No symptoms
1	Erythema at site, with or without pain
2	Pain at site + erythema and/or edema
3	Pain + erythema + streak formation + palpable venous cord
4	Grade 3 + palpable cord >1 inch + purulent drainage 🔥

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Priority Nursing Interventions

A

Airway / Allergic check

- Assess for systemic reaction (hives, wheezing)
- Especially with vesicants & antibiotics

B

Bleeding & Blood return

- Check blood return BEFORE every infusion
- Absent return = STOP

C

Circulation / Compare

- Compare bilateral extremities
- Check distal pulses, cap refill, sensation

PHLEBITIS Step-by-step actions

- 1 **STOP** the infusion and **discontinue** the IV catheter immediately.
- 2 Apply **WARM**, moist compress to the affected area (vasodilation, comfort).
- 3 Elevate the extremity to reduce edema.
- 4 Restart the IV in the **opposite extremity** with new tubing and supplies.
- 5 Document onset, INS phlebitis grade, interventions, and patient response.
- 6 Notify provider if grade ≥ 3 or if purulent drainage is present.

INFILTRATION Step-by-step actions

- 1 **STOP** the infusion immediately.
- 2 **Discontinue** the IV — non-vesicant fluids do not require antidote.
- 3 Elevate the extremity above heart level.
- 4 Apply **WARM** compress for isotonic / non-irritant solutions (*check facility policy — cold may be used for some hypertonic/irritant fluids*).
- 5 Restart IV in a **different extremity**, proximal to the failed site.
- 6 Document using INS infiltration scale (0–4); reassess every 1–2 hours.

EXTRAVASATION Step-by-step actions (TIME-CRITICAL)

- 1 **STOP** the infusion immediately — but **DO NOT remove the catheter yet**.
- 2 **Disconnect tubing** and attempt to **aspirate** residual drug from the catheter (5–10 mL).
- 3 **Notify provider STAT** — many vesicants have time-sensitive antidotes.

- 4 Administer prescribed **antidote** through the catheter or by SQ injection around the site.
- 5 Apply warm OR cold compress per drug-specific protocol (see Pharmacology section).
- 6 Remove catheter **after** aspiration and antidote delivery.
- 7 Elevate extremity, mark margins of affected area, and **photograph** the site.
- 8 Document drug, volume, time, interventions, and patient response. Continue assessing for days — necrosis can develop late.

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Pharmacology – Antidotes & Vesicants

Phentolamine (Regitine)

ANTIDOTE FOR

Vasopressor extravasation (norepinephrine, dopamine, epinephrine, phenylephrine)

COMPRESS

WARM (promote drug uptake & vasodilation)

MECHANISM

Alpha-adrenergic blocker → reverses vasoconstriction → restores blood flow

WATCH FOR

Hypotension, reflex tachycardia

Hyaluronidase (Hyalenex / Vitrase)

ANTIDOTE FOR

Vinca alkaloids (vincristine, vinblastine), aminoglycosides, hyperosmolar fluids, calcium

COMPRESS

WARM (vincristine), COLD for most others

MECHANISM

Breaks down hyaluronic acid → disperses extravasated drug → speeds absorption

WATCH FOR

Localized urticaria, rare anaphylaxis

Dexrazoxane (Totect) & DMSO (topical)

ANTIDOTE FOR

Anthracycline chemo extravasation (doxorubicin/Adriamycin, daunorubicin)

COMPRESS

COLD (vasoconstriction limits drug spread)

MECHANISM

Iron-chelating; reduces free radical tissue damage

WATCH FOR

Myelosuppression with dexrazoxane; never give DMSO with dexrazoxane

⚠ Common Vesicants (high-yield NCLEX list)

Chemo: Doxorubicin (Adriamycin)

Chemo: Vincristine, Vinblastine

Chemo: Daunorubicin, Mitomycin

Vasopressors: Norepinephrine, Dopamine

Vasopressors: Epinephrine, Phenylephrine

Electrolytes: Calcium chloride/gluconate

Electrolytes: Concentrated potassium (KCl)

Hyperosmolar: D₅₀W, TPN, mannitol

Other: Phenytoin (Dilantin)

Other: Promethazine (Phenergan)

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NCLEX Test Traps

✗ TRAP: "Remove the catheter immediately" for extravasation

Right answer: STOP the infusion first, then ASPIRATE the residual vesicant from the catheter BEFORE removing it. Pulling the catheter immediately removes your only route to deliver antidote.

✗ TRAP: Confusing infiltration with phlebitis

Quick rule: Cool + pale + swollen = ICE = infiltration. Warm + red + streak = FIRE = phlebitis. If the question describes a "red streak going up the arm" — phlebitis. If "the site is hard and the arm feels cool" — infiltration.

✗ TRAP: "Slow the rate" for any IV complication

Right answer: Slowing the rate is a **circulatory overload** intervention. For phlebitis, infiltration, or extravasation — STOP the infusion completely. Don't slow it down.

✗ TRAP: "Continue infusion in same site after restart"

Right answer: ALWAYS restart the IV in a **DIFFERENT extremity** when possible — and if same extremity, choose a site **PROXIMAL** to the original (above the failed site, never below).

✗ TRAP: Same compress for every extravasation

Right answer: Compress choice depends on the **drug**. **Vasopressors** → **WARM** (open vessels, disperse drug). **Anthracycline chemo** → **COLD** (constrict vessels, limit spread). Always check facility/drug-specific protocol.

✗ TRAP: "Blood return present = no infiltration possible"

Right answer: Absent blood return is suggestive but **not diagnostic**. A catheter can be partially infiltrated and still show some return. **Always assess the site** — color, temp, swelling, pain — not just the flashback.

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NCJMM Clinical Judgment Scenario

Scenario: A 64-year-old client is receiving IV norepinephrine through a peripheral 20-gauge catheter in the left forearm for septic shock. The nurse notes the site is **cool, pale, hard**, and the client reports **severe burning pain**. Blood return is absent. BP is 88/52 mm Hg.

1 RECOGNIZE CUES

Cool, pale, hard site + absent blood return + **severe burning pain** + vesicant drug (norepinephrine) infusing.

2 ANALYZE CUES

Pattern fits **extravasation** — not phlebitis (no warmth/redness) and worse than simple infiltration (vesicant + severe pain).

3 PRIORITIZE HYPOTHESES

Tissue necrosis is imminent. Priority = stop drug delivery + preserve tissue + maintain hemodynamics.

4 GENERATE SOLUTIONS

Stop infusion, aspirate residual drug, notify provider, prepare **phentolamine** antidote, plan central line for ongoing pressor.

5 TAKE ACTION

Stop pump → disconnect tubing → aspirate 5 mL → call provider → administer SQ phentolamine around site → apply **warm** compress → remove catheter → start new pressor line.

6 EVALUATE OUTCOMES

Reassess site q15 min × 1 hr, then q1h. Watch for tissue restoration of color, decreased pain, no blistering. Photograph at 24, 48, 72 hours.

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Patient & Family Education

What to report immediately

- ✓ Burning, stinging, or sudden pain at the IV site
- ✓ Swelling, hardness, or "tight" feeling
- ✓ Skin that looks red, pale, or has a streak
- ✓ The IV pump alarming repeatedly
- ✓ Wet dressing or fluid leaking from site

How to protect the IV

- ✓ Avoid bending or putting pressure on the site
- ✓ Keep the arm elevated when resting
- ✓ Do not pull on the tubing when getting up
- ✓ Tell the nurse before showering or transferring
- ✓ Don't adjust the pump or clamp yourself

After IV is removed

- ✓ Apply pressure for 2–3 minutes; longer if on anticoagulants
- ✓ Keep site clean and dry for 24 hours
- ✓ Bruising is normal; redness/streaking is NOT
- ✓ Report fever, increasing pain, or pus

If extravasation occurred

- ✓ Tissue damage may take days to fully appear
- ✓ Photographs help track healing
- ✓ Follow up with provider as scheduled
- ✓ Surgical debridement may be needed for deep necrosis

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Memory Boosters & Mnemonics

PHLEBITIS = FIRE

F I R E

Flushed (red)

Inflammation along the vein

Raised red streak

Elevated temp at site (warm)

INFILTRATION = ICE

I C E

Infusion slowed/stopped, no blood return

Cool, pale, hard skin

Edema and tightness around site

EXTRAVASATION = "STOP & ASPIRATE"

S A N D

Stop the infusion (do NOT pull catheter)

Aspirate residual drug + give Antidote

Notify provider + Note margins/photo

Discontinue catheter AFTER aspiration & antidote

Pattern Recognition Cheat Codes

"Red streak running up the arm" → Phlebitis

"Site is cool, hard, swollen, pale" → Infiltration

"Severe burning + vesicant drug" → Extravasation

"Crackles, JVD, bounding pulse" → Circulatory overload (NOT a local complication)

Vasopressor extravasation → Phentolamine + WARM compress

Anthracycline chemo extravasation → Dexrazoxane + COLD compress

One-Liner Recall

Phlebitis = vein is inflamed (fluid still inside vein) · **Infiltration** = non-vesicant fluid leaks out · **Extravasation** = vesicant fluid leaks out + tissue dies. STOP the infusion first — every time.