

 NGN NCLEX 2026 · HIGH YIELD

Neutropenia *Visual Study Guide*

The silent immune crisis — where fever is often the *only* sign of life-threatening infection.

Master ANC thresholds, neutropenic precautions, and the 1-hour antibiotic rule.

 Hematology

 Immune

 Oncology

 Safety Priority

DEFINITION & OVERVIEW

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What Is Neutropenia?

Core Definition

- ▶ An **abnormally low absolute neutrophil count (ANC)** — below 1,500 cells/mm³
- ▶ Neutrophils = the body's **first-line defense** against bacterial & fungal infections
- ▶ Without enough neutrophils, the immune system **cannot mount a normal inflammatory response**

Why It Matters

- ⚠ **Life-threatening infection risk** — even minor exposures can trigger sepsis
- ⚠ Classic infection signs (pus, redness, swelling) are **BLUNTED or ABSENT**
- ⚠ **Fever may be the ONLY sign** of serious infection
- ⚠ Neutropenic fever = **medical emergency** requiring antibiotics within 1 hour

ANC Severity Classifications

Classification	ANC (cells/mm ³)	Infection Risk	Clinical Implication
Normal	≥ 2,500	Low (baseline)	No special precautions
Mild Neutropenia	1,000 – 1,500	Minimal increase	Monitor; basic hygiene education
Moderate Neutropenia	500 – 1,000	Moderate	Initiate infection precautions
Severe Neutropenia	< 500	HIGH 🚨	Strict neutropenic precautions
Profound Neutropenia	< 100	CRITICAL 🚨🚨	Protective isolation; bacteremia imminent

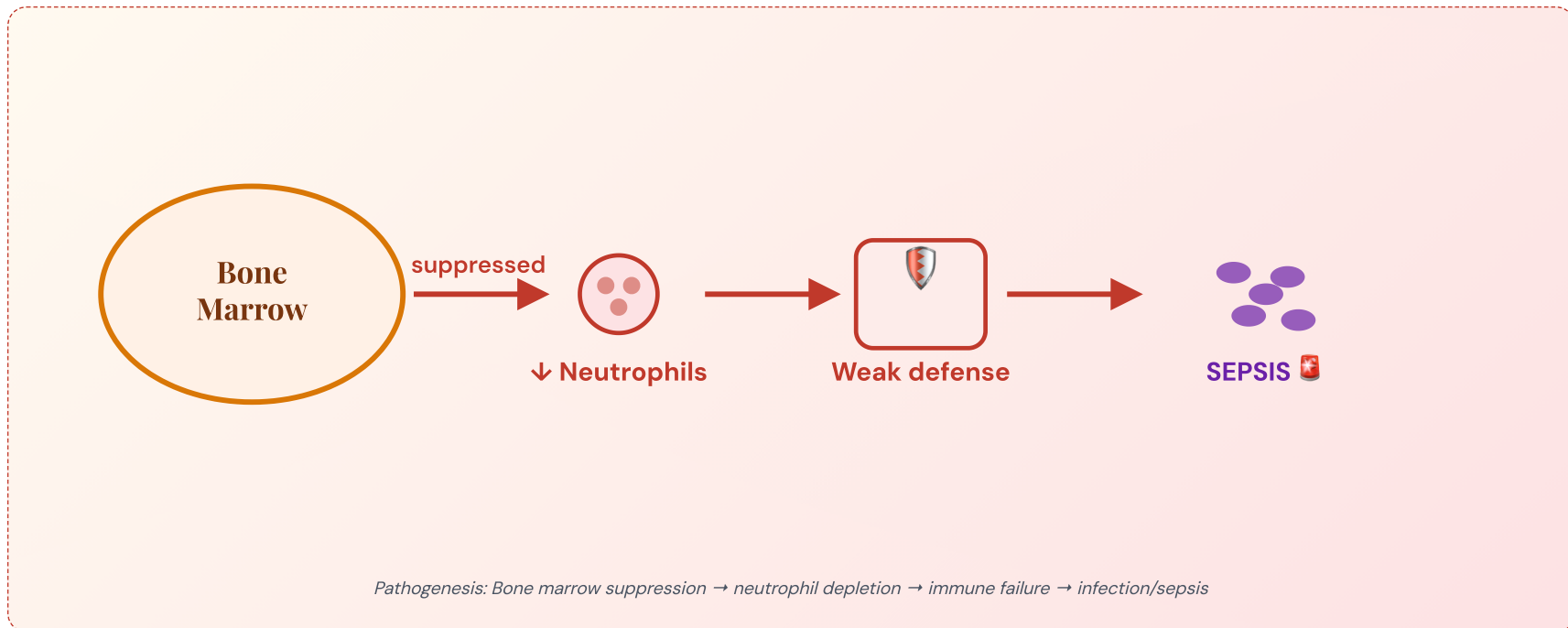
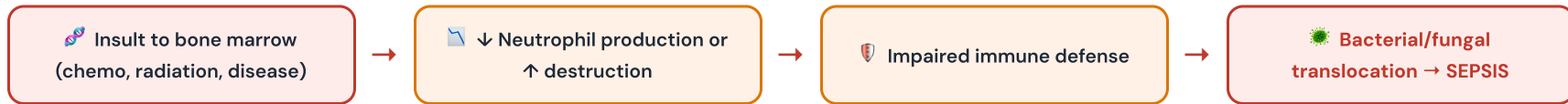
💡 **ANC Formula:** $ANC = WBC \times (\% \text{ neutrophils} + \% \text{ bands}) \div 100$

PATHOPHYSIOLOGY

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Why Does It Happen?

Neutropenia results from **decreased production**, **increased destruction**, or **sequestration** of neutrophils — leaving the body defenseless against pathogens.



Common Causes

Treatment-Induced

- ▶ **Chemotherapy (#1 cause)** — nadir typically 7–14 days post-infusion
- ▶ Radiation therapy
- ▶ Immunosuppressants

Disease States

- ▶ Leukemia & lymphoma
- ▶ Aplastic anemia
- ▶ Myelodysplastic syndromes
- ▶ HIV/AIDS

Drug-Induced

- ▶ Clozapine (antipsychotic)
- ▶ Methimazole (hyperthyroid)
- ▶ Sulfonamides
- ▶ Phenytoin

▶ Autoimmune disorders

▶ Chloramphenicol

SIGNS & SYMPTOMS

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What to Watch For

🚨 THE CARDINAL RULE

In neutropenia, classic infection signs (pus, redness, swelling, purulent drainage) are **often ABSENT** because there are no neutrophils to form them. **FEVER may be the ONLY sign of serious infection.** Never dismiss a low-grade fever in a neutropenic client!

🟡 Early / Subtle Signs

- ▶ **Low-grade fever** (may be the *only* finding)
- ▶ Fatigue, malaise, weakness
- ▶ Mouth sores / oral ulcers / stomatitis
- ▶ Sore throat or mild cough
- ▶ Subtle skin changes (small break, slight warmth)
- ▶ Dysuria (burning with urination)
- ▶ Perirectal discomfort

🚨 Late / Red Flag Signs

- ⚠️ **Temp $\geq 100.4^{\circ}\text{F}$ (38°C) = NEUTROPENIC FEVER — EMERGENCY**
- ⚠️ Shaking chills / rigors
- ⚠️ Hypotension (SBP < 90)
- ⚠️ Tachycardia (HR > 100)
- ⚠️ Tachypnea (RR > 20)
- ⚠️ Altered mental status / confusion
- ⚠️ Signs of septic shock
- ⚠️ Cool, clammy skin or flushing

🔥 **Single oral temp $\geq 38.3^{\circ}\text{C}$ (101°F), OR $\geq 38.0^{\circ}\text{C}$ (100.4°F) for ≥ 1 hour, PLUS ANC < 500 = NEUTROPENIC FEVER — SEPSIS EMERGENCY**

PRIORITY NURSING INTERVENTIONS

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What the Nurse Does

THE 1-HOUR RULE

Suspected neutropenic fever? **Blood cultures × 2 sites → Broad-spectrum IV antibiotics within 1 HOUR.** Do NOT wait for cultures to result. Delay = death.

Neutropenic Precautions (Protective Isolation)

- ✓ **Private room** — positive pressure if available
- ✓ **Strict hand hygiene** before every contact
- ✓ Limit visitors; screen for illness
- ✓ No sick contacts, no children with recent illness
- ✓ Dedicated equipment (thermometer, BP cuff, stethoscope)
- ✓ Mask when transporting outside room
- ✓ HEPA filtration for high-risk patients

What to AVOID

- ✗ **NO fresh flowers or live plants** (fungi, bacteria in soil/water)
- ✗ **NO raw fruits/vegetables** (bacteria on skin)
- ✗ **NO rectal temps, suppositories, enemas** (tears mucosa → bacteria entry)
- ✗ **NO live vaccines** (MMR, varicella, nasal flu)
- ✗ No invasive procedures if avoidable
- ✗ No urinary catheters unless necessary
- ✗ Avoid crowds, construction zones

Assessment Priorities (A-B-C-Safety)

- ▶ **Temperature** q4h (or more often) — *oral or tympanic only*
- ▶ Vital signs, including SpO₂
- ▶ Mental status changes
- ▶ Full skin assessment (IV sites, perianal area, mouth)
- ▶ Lung sounds, cough, dyspnea
- ▶ Urinary symptoms, stool changes
- ▶ Monitor CBC with differential daily

Actions for Suspected Infection

1. **Obtain blood cultures × 2** (peripheral + central line if present)
2. Urine, sputum, wound cultures as indicated
3. **Administer broad-spectrum antibiotics within 1 hour**
4. IV fluids for hypotension
5. Acetaminophen (NOT aspirin / NSAIDs — platelet risk)
6. Notify HCP; prepare for possible ICU transfer
7. Administer G-CSF (filgrastim) as ordered

 Low-Bacterial (Neutropenic) Diet

AVOID: raw fruits/vegetables, unpasteurized dairy, soft cheeses, deli meats, sushi, raw eggs, undercooked meat, well water, fresh-squeezed juice, raw honey, pepper sprinkled on food.

ALLOWED: thoroughly cooked foods, pasteurized dairy, canned fruit, fruits that can be peeled (banana, orange) — some facilities permit; follow institutional policy.

PHARMACOLOGY

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Key Medications

Filgrastim (Neupogen)

G-CSF — Granulocyte Colony-Stimulating Factor

Mechanism: Stimulates bone marrow to produce more neutrophils → ↑ ANC

Route/Dose: SubQ or IV; daily dosing 24 hrs after chemo completion

Side Effects: *Bone pain (classic!)*, fever, injection site reactions, splenomegaly (rare)

Nursing: Monitor CBC, treat bone pain with acetaminophen/loratadine; rotate injection sites; DO NOT give within 24 hr of chemo

Pegfilgrastim (Neulasta)

Long-Acting G-CSF

Mechanism: Same as filgrastim; pegylated → longer half-life

Route/Dose: SubQ; **single dose** per chemo cycle (24 hr after chemo)

Side Effects: Bone pain, myalgia, fatigue

Nursing: Given as on-body injector OR prefilled syringe; do NOT give in 14 days before chemo

Broad-Spectrum Antibiotics

Empiric Therapy for Febrile Neutropenia

Examples: Piperacillin-tazobactam (Zosyn), cefepime, meropenem, vancomycin (if MRSA suspected)

Timing: *Must be given within 1 HOUR* of suspected neutropenic fever

Nursing: Obtain cultures FIRST (if possible without delay), monitor for allergic reactions, renal function, therapeutic drug levels

Antifungals / Antivirals

Adjunct Therapy (Prophylaxis or Targeted)

Antifungals: Fluconazole, voriconazole, amphotericin B (for invasive fungal infection)

Antivirals: Acyclovir (HSV/VZV prophylaxis), valganciclovir (CMV)

Nursing: Monitor liver/kidney function; watch for infusion reactions (especially amphotericin B — "shake & bake")

NCLEX TEST TRAPS

6 Commonly Missed Distinctions ⚠️

🎯 Trap #1: Missing Classic Infection Signs

Trap: Student looks for pus, redness, purulent drainage to diagnose infection.

Truth: Neutropenic patients can't make pus or mount inflammation. **Fever alone = infection until proven otherwise.**

🎯 Trap #2: "Reverse" vs "Standard" Isolation

Trap: Confusing neutropenic precautions with airborne/contact isolation.

Truth: Neutropenic = **PROTECTIVE** isolation — protects the patient FROM the environment, not staff from the patient.

🎯 Trap #3: Rectal Route Error

Trap: Administering rectal suppositories, enemas, or taking rectal temps.

Truth: NEVER — tears mucosa → direct bacterial entry. Use oral/tympanic temps only.

🎯 Trap #4: Priority Patient on Assignment

Trap: Assigning the neutropenic patient to a nurse also caring for a C. diff or infectious patient.

Truth: Neutropenic patient should be **FIRST on rounds**, assigned to a nurse without infectious patients.

🎯 Trap #5: Roommate Selection

Trap: Pairing the neutropenic client with "any" stable patient.

Truth: PRIVATE ROOM is preferred. Never room with someone who has infection, open wounds, or recent live vaccines.

🎯 Trap #6: Fever Treatment Choice

Trap: Giving aspirin or NSAIDs for fever.

Truth: Use **acetaminophen** — many chemo patients also have thrombocytopenia; aspirin/NSAIDs increase bleeding risk.

🎯 Trap #7: Flowers, Plants, & Fruit

Trap: Allowing family to bring fresh flowers or fresh fruit to cheer the patient.

Truth: Soil & standing water harbor fungi/bacteria. **NO fresh flowers, plants, or raw produce.**

🎯 Trap #8: Ignoring a "Low" Fever

Trap: Dismissing a temp of 100.5°F because "it's barely elevated."

Truth: ≥100.4°F (38°C) IS the emergency threshold. Cultures + antibiotics within 1 hour.

PATIENT & FAMILY EDUCATION

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Keeping the Client Safe at Home

Hygiene & Self-Care

- ✓ Wash hands frequently, especially before eating & after bathroom
- ✓ Daily shower with mild soap
- ✓ Use **soft toothbrush**; avoid flossing if gums bleed
- ✓ No razors — use electric shaver
- ✓ Good perineal care after BMs
- ✓ Gentle skin moisturizer to prevent cracks

Food Safety

- ✓ Thoroughly cook all meats, fish, eggs
- ✓ Wash fruits/vegetables thoroughly OR avoid raw
- ✓ Pasteurized dairy only
- ✓ Avoid deli/lunch meats, soft cheeses, sushi
- ✓ Drink bottled or boiled water if well water
- ✓ Check expiration dates; don't eat leftovers >24 hrs

Environment

- ✓ Avoid crowds & sick people
- ✓ Wear mask in public/medical settings
- ✓ No gardening, digging, or handling soil
- ✓ No cleaning of pet waste/litter boxes/birdcages
- ✓ No fresh flowers or live plants in home
- ✓ Avoid construction & renovation dust

Medical Avoidance

- ✗ NO live vaccines (MMR, varicella, nasal flu, yellow fever)
- ✗ NO elective dental work
- ✗ NO aspirin or NSAIDs unless prescribed
- ✗ NO rectal thermometers or suppositories
- ✗ Avoid swimming in lakes, hot tubs, ponds

When to Call HCP

- ⚠ **Temp $\geq 100.4^{\circ}\text{F}$ (38°C)** — CALL IMMEDIATELY
- ⚠ Chills, shaking, rigors
- ⚠ New cough, sore throat, mouth sores
- ⚠ Burning with urination or perianal pain
- ⚠ Any cut, burn, or break in skin
- ⚠ Diarrhea, vomiting, or new abdominal pain
- ⚠ Confusion, severe fatigue,

Family Education

- ✓ Stay home if sick — especially with fever, cough, flu, cold, GI illness
- ✓ Strict hand hygiene before visiting
- ✓ No children with recent live vaccines for 2 wks
- ✓ Annual flu shot (inactivated/injectable only) recommended for caregivers
- ✓ Keep thermometer accessible; know baseline

dizziness

MEMORY BOOSTERS

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Mnemonics & Quick Associations



"NEUTROPENIC" — Precautions Checklist

N

No fresh flowers
or live plants

E

Eat no raw
fruits/veggies/meat

U

Use mask in
public areas

T

Temp $\geq 100.4^{\circ}\text{F}$
→ call HCP

R

Rigorous hand
hygiene

O

Only cooked
foods allowed

P

Private room,
protective
isolation

E

Early signs may
be the only signs

N

No rectal
temps/suppositories

I

Isolation from
sick contacts

C

Cultures +
antibiotics in 1
hour



The "5-5-1" Rule

ANC < 500 = Severe neutropenia → strict precautions

Temp $\geq 100.4^{\circ}\text{F}$ (or $38^{\circ}\text{C} \times 1 \text{ hr}$) = Fever emergency

1 HOUR from fever → Cultures + IV antibiotics



"FEVER" — Red Flags

F — Fever $\geq 100.4^{\circ}\text{F}$

E — Exhaustion / malaise

V — Vitals unstable ($\downarrow\text{BP}$, $\uparrow\text{HR}$)

E — Elevated WBC is NOT expected (no response)

R — Rigors / chills



Quick Pattern Tips

- ▶ **Chemo nadir** = 7–14 days post-infusion (lowest ANC)
- ▶ **Filgrastim** → **bone pain** — marrow is working!
- ▶ **"NEUPogen"** → makes "NEU"trophils
- ▶ **Fever in neutropenia = infection** until proven otherwise
- ▶ **No pus, no redness** ≠ no infection



"PROTECT" Your Patient

- ▶ Private room
- ▶ Restrict visitors (no sick!)
- ▶ Oral or tympanic temps only
- ▶ Thoroughly cooked food
- ▶ End all invasive procedures if possible
- ▶ Clean hands before every contact

▶ Temp check q4h

NCJMM CLINICAL JUDGMENT SCENARIO

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Apply the Framework

Clinical Scenario:

A 58-year-old client with acute myeloid leukemia (AML) is on day 10 post-induction chemotherapy. Morning labs: **WBC 0.8, ANC 280 cells/mm³, platelets 45,000**. Client reports feeling "a little tired" and has a temperature of **100.8°F (38.2°C)**. BP 102/64, HR 108, RR 20, SpO₂ 95% on RA. No obvious source of infection. What does the nurse do?

STEP 1 · RECOGNIZE

Recognize Cues

- Severe neutropenia (ANC 280 < 500)
- Post-chemo nadir period (day 10)
- Fever ≥ 100.4°F
- Tachycardia (HR 108)
- Borderline-low BP
- Thrombocytopenia present

STEP 2 · ANALYZE

Analyze Cues

This is **neutropenic fever** — a medical emergency. Despite "feeling tired," the client is at high risk of rapid progression to septic shock. No classic infection signs are expected due to lack of neutrophils. Must act *before* deterioration.

STEP 3 · PRIORITIZE

Prioritize Hypothesis

Priority: **Sepsis risk / neutropenic fever**. Apply the 1-hour rule: obtain blood cultures and administer broad-spectrum IV antibiotics within 60 minutes. Maintain protective isolation. Monitor for septic shock.

STEP 4 · TAKE ACTION

Generate Solutions / Actions

- Notify HCP immediately
- Obtain blood cultures × 2 (peripheral + central line)
- Urine, sputum cultures
- Start broad-spectrum IV antibiotics within 1 hour
- IV fluids for BP support
- Acetaminophen (NOT aspirin — low platelets)
- Continuous monitoring

STEP 5 · EVALUATE

Evaluate Outcomes

- Temp trending downward
- BP stabilizing, HR returning to baseline
- Mental status intact
- Cultures identify organism → de-escalate antibiotics
- ANC recovering with filgrastim
- No progression to septic shock

💡 **NGN Key Insight:** The NCLEX loves this scenario because students often miss the urgency. A patient who "feels fine" with just a low-grade fever is still a sepsis emergency if neutropenic. **Never delay cultures or antibiotics to wait for more symptoms — they won't come.**

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Core takeaway: *In neutropenia, fever is infection until proven otherwise. Cultures + antibiotics within 1 hour. Protective isolation. No raw food, no flowers, no rectal route.*