

IMMUNOLOGY • INFECTIOUS DISEASE

HIV & AIDS

Human Immunodeficiency Virus — a retrovirus that destroys CD4+ T-helper cells, progressively crippling cell-mediated immunity. Untreated, it advances to AIDS and opportunistic infection.

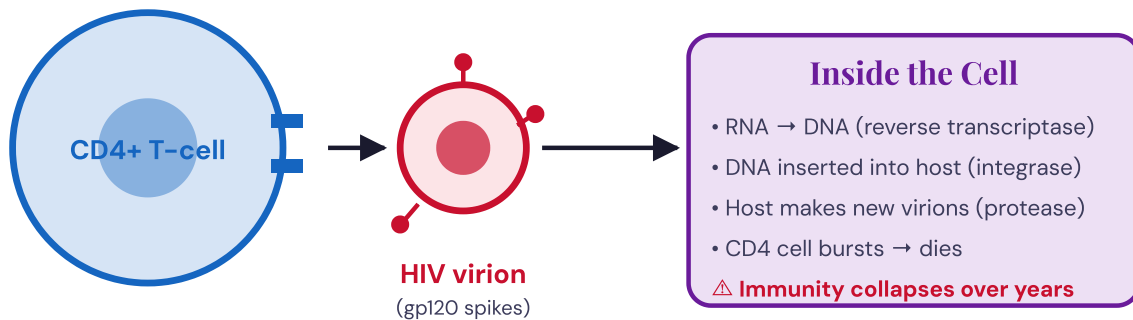
Diane's NGN NCLEX 2026 Study Series

1 Definition & Overview

- ▶ **HIV** is a retrovirus that infects and destroys CD4+ T-helper lymphocytes — the conductors of the immune response.
- ▶ **AIDS** is the late stage: CD4 count < 200 cells/mm³ OR presence of an AIDS-defining opportunistic infection.
- ▶ Transmission: **blood, semen, vaginal/rectal fluids, breast milk, perinatal**. NOT spread by casual contact, sweat, tears, saliva, or insect bites.
- ▶ Standard precautions (not Contact or Airborne) are the cornerstone for all HIV-positive patients.

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Pathophysiology — How HIV Destroys Immunity



HIV binds the CD4 receptor → enters cell → reverse-transcribes RNA into DNA → integrates → replicates → kills the host T-cell.

1 HIV binds **CD4 receptor** + co-receptor (CCR5/CXCR4)

2 Viral RNA enters & **reverse transcriptase** makes viral DNA

3 **Integrase** splices viral DNA into host genome

4 Host cell builds new virions; **protease** assembles them

5 Virions bud off → CD4 cell dies → immunity falls

CD4 Count Staging

Stage 1 — Acute/Early

CD4 > 500

Asymptomatic or mild flu-like illness. Immunity largely intact.
Highly contagious (high viral load).

Stage 2 — Chronic

CD4 200 – 499

Symptomatic. Thrush, weight loss, persistent lymphadenopathy, recurrent infections. Begin opportunistic infection prophylaxis.

Stage 3 — AIDS

CD4 < 200

AIDS-defining illness: PCP, Kaposi sarcoma, CMV, toxoplasmosis, wasting syndrome. **Life-threatening.**

3 Signs & Symptoms — Acute vs. Late

● Acute / Early (2–4 wk post-exposure)

- ✓ Flu-like illness ("seroconversion syndrome")
- ✓ Fever, sore throat, myalgia, headache
- ✓ Generalized lymphadenopathy
- ✓ Maculopapular **rash** on trunk
- ✓ Night sweats, fatigue, GI upset
- ✓ Often mistaken for mono or flu

● Late / AIDS (CD4 < 200)

- △ Opportunistic infections — PCP, TB, candidiasis
- △ Kaposi sarcoma — purple skin lesions
- △ Severe weight loss / **wasting syndrome**
- △ Persistent diarrhea > 1 month
- △ AIDS dementia / encephalopathy
- △ CMV retinitis, toxoplasmosis (brain)
- △ Recurrent bacterial pneumonia

🚨 RED FLAGS — Report Immediately

Fever + new dry cough + shortness of breath in an AIDS patient = suspect *Pneumocystis jirovecii pneumonia* (PCP), the #1 opportunistic infection. Other priority cues: new neurologic deficits (toxoplasmosis), visual changes (CMV retinitis), severe oral thrush extending to esophagus (candidiasis).

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Priority Nursing Interventions (ABCs + Safety)

- ▶ **A — Airway:** Monitor respiratory status closely (PCP & TB risk). Auscultate lungs, watch SpO₂, position semi-Fowler's for dyspnea.
- ▶ **B — Breathing:** Assess for tachypnea, dry cough, accessory muscle use. Administer prescribed oxygen and prophylactic **Bactrim (TMP-SMX)** if CD4 < 200.
- ▶ **C — Circulation:** Monitor for sepsis (fever, hypotension, tachycardia). Trend CBC for anemia/neutropenia from ART side effects.
- ▶ **Standard Precautions for ALL patients** — gloves, gown, mask, eye protection as indicated. Add *Airborne* isolation if active TB.
- ▶ **Protect from infection:** Private room if neutropenic, no fresh flowers/raw fruits/standing water, strict hand hygiene, neutropenic diet.
- ▶ **Monitor labs:** CD4 count (target ↑), viral load (target undetectable), CBC, LFTs, lipids, renal function.
- ▶ **Promote medication adherence** — missed ART doses → drug resistance. Use pill boxes, alarms, written schedules.
- ▶ **Nutrition:** High-protein, high-calorie, small frequent meals. Avoid raw/undercooked foods (listeria, salmonella).
- ▶ **Skin:** Inspect daily for Kaposi lesions, herpes, seborrheic dermatitis; gentle cleansing, no shared razors.
- ▶ **Psychosocial:** Assess for depression, suicidal ideation, stigma; refer to support groups; protect confidentiality.
- ▶ **Needlestick exposure:** Wash with soap and water, report immediately, start **PEP (post-exposure prophylaxis) within 72 hours** — sooner is better.

5 Pharmacology — Antiretroviral Therapy (ART/HAART)

Treatment combines drugs from **at least 2 different classes** to suppress viral replication at multiple steps. Goal: undetectable viral load. ART is **lifelong**.

Class	Examples	Mechanism	Key Side Effects / Nursing Considerations
NRTIs Nucleoside reverse transcriptase inhibitors	Zidovudine (AZT), Tenofovir, Emtricitabine, Lamivudine, Abacavir	Block reverse transcriptase — stop viral RNA → DNA conversion	Bone marrow suppression (AZT), lactic acidosis , hepatotoxicity, peripheral neuropathy. Abacavir → hypersensitivity (test HLA-B*5701 first).
NNRTIs Non-nucleoside RT inhibitors	Efavirenz, Nevirapine, Rilpivirine	Bind & inactivate reverse transcriptase directly	Vivid dreams, CNS effects, rash (Stevens–Johnson with nevirapine), hepatotoxicity. Take Efavirenz at bedtime on empty stomach.
PIs Protease inhibitors (end in “-navir”)	Ritonavir, Atazanavir, Darunavir, Lopinavir	Block protease — prevent assembly of mature virions	Hyperglycemia, hyperlipidemia, lipodystrophy , GI upset, drug interactions (CYP450). Monitor glucose & lipids.
INSTIs Integrase inhibitors (end in “-tegravir”)	Dolutegravir, Raltegravir, Bictegravir	Block integrase — viral DNA can't insert into host genome	Generally well tolerated. Insomnia, headache, weight gain. Preferred first-line agents.
Entry / Fusion inhibitors	Enfuvirtide, Maraviroc	Block HIV from binding/fusing with CD4 cell	Injection site reactions (enfuvirtide SQ). Reserved for resistant cases.
OI Prophylaxis	TMP-SMX (Bactrim), Azithromycin, INH	Prevent opportunistic infections	Bactrim → PCP prophylaxis when CD4 < 200 . Azithromycin → MAC when CD4 < 50. INH → latent TB.
PrEP (pre-exposure) PEP (post-exposure)	Truvada, Descovy (PrEP); 3-drug regimen × 28 days (PEP)	Prevent infection in HIV-negative people	PrEP: daily, HIV-negative high-risk individuals. PEP within 72 hr of exposure; continue 28 days.

6 NCLEX Test Traps — Don't Get Fooled

✗ WRONG

Place HIV patient in **Contact** or **Airborne** isolation by default.



✓ RIGHT

Use **Standard Precautions**. Add Airborne *only* if active TB; Contact only for resistant organisms or open lesions.

✗ WRONG

Tell the patient's family the diagnosis "because they need to know."



✓ RIGHT

Protect **confidentiality**. HIV status is shared only with the patient's consent (and partners via public-health notification protocols).

✗ WRONG

Recommend the patient "skip a dose if they feel nauseated."



✓ RIGHT

Emphasize **strict adherence** — missed doses cause *drug resistance*. Manage nausea instead.

✗ WRONG

"HIV-positive moms can safely breastfeed in the U.S."



✓ RIGHT

In the U.S., HIV-positive mothers are advised to **formula-feed** — HIV is transmitted via breast milk.

✗ WRONG

After needlestick: "Squeeze the wound, wash with bleach."



✓ RIGHT

Wash with **soap and water**, report to employee health, start **PEP within 72 hr**. Do not squeeze or use bleach.

✗ WRONG

Single negative HIV test rules out infection right after exposure.



✓ RIGHT

Window period can be up to 3 months. Retest at 6 weeks, 3 months, and 6 months for definitive result.

✗ WRONG

Prioritize Kaposi sarcoma skin lesion over new shortness of breath.



✓ RIGHT

ABCs first. New dyspnea + dry cough = suspect PCP — a life-threatening AIDS-defining illness.

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Patient & Family Education



ART Adherence

Take medications at the **same time every day**. Never skip doses — resistance develops quickly. Set alarms, use pill organizers.



Prevent Transmission

Use **condoms every time**. Never share needles, razors, or toothbrushes. Cover open wounds. Disclose status to partners.



Pregnancy

ART throughout pregnancy reduces vertical transmission to <1%. Plan elective C-section if viral load is high. **No breastfeeding** in the U.S.



Infection Prevention

Frequent hand hygiene, avoid sick contacts, avoid live vaccines (MMR, varicella, live flu), get pneumococcal & inactivated flu vaccines.



Nutrition & Food Safety

High-protein, high-calorie diet. Avoid raw eggs, sushi, unpasteurized dairy, undercooked meat (listeria, salmonella risk).



Avoid Pet Hazards

Don't change cat litter (toxoplasmosis), avoid reptiles (salmonella), avoid bird droppings (cryptococcus/histoplasmosis).



Routine Follow-Up

Labs every 3–6 months (CD4, viral load). Annual TB screen, STI testing, cervical/anal cancer screening, mental-health check-ins.



When to Call Provider

New fever, persistent diarrhea, dry cough, vision changes, severe headache, weight loss, oral thrush, new skin lesions.

8 Memory Boosters & Mnemonics

HIV Transmission

B • S • V • B

B – Blood

S – Semen

V – Vaginal/rectal fluids

B – Breast milk

NOT spread by sweat, tears, saliva, toilet seats, or mosquitoes.

Drug Class Suffixes

-navir → Protease inhibitor

-tegravir → Integrase inhibitor

-virine → NNRTI

-vudine / -dine → NRTI

"200 = AIDS"

CD4 < **200** = AIDS diagnosis

CD4 < **200** = start **Bactrim** for PCP

CD4 < **50** = start **Azithromycin** for MAC

"At 200 the door (D) opens to AIDS & PCP prophylaxis."

"72 Hour Rule"

After needlestick or sexual exposure, **PEP must start within 72 hours** — sooner is better. Continue for 28 days.

"SACRED" — Acute HIV Symptoms

S – Sore throat

A – Aches (myalgia)

C – Cervical/generalized lymphadenopathy

R – Rash (maculopapular)

E – Elevated temp (fever)

D – Diarrhea / GI upset

Top Opportunistic Infections

P – PCP (pneumonia) ← #1

C – Candidiasis (thrush)

K – Kaposi sarcoma

T – TB & Toxoplasmosis

C – CMV retinitis

M – MAC (CD4 < 50)

9 NCJMM Clinical Judgment Scenario

THE SCENARIO

A 38-year-old male with a 6-year history of HIV presents to the ED. He stopped his ART 2 months ago because of "stomach problems." Today he reports a 3-week worsening dry cough, fever 101.8°F (38.8°C), increasing shortness of breath, and unintentional 12-lb weight loss. Vital signs: BP 102/64, HR 118, RR 28, SpO₂ 88% on room air. Lungs: diffuse fine crackles bilaterally. CD4 count: **112 cells/mm³**. Viral load: **248,000 copies/mL**.

1 RECOGNIZE CUES

Hypoxia (SpO₂ 88%), tachypnea (RR 28), tachycardia, fever, dry cough × 3 wk, weight loss, CD4 < 200, viral load high, ART non-adherence × 2 months.

2 ANALYZE CUES

Profile fits **Pneumocystis jirovecii pneumonia (PCP)** — the #1 AIDS-defining opportunistic infection in an immunocompromised host (CD4 < 200). Dry cough + hypoxia + diffuse crackles is the classic triad. Off ART → viral load surge → CD4 collapse.

3 PRIORITIZE HYPOTHESES

Highest priority: **PCP with acute respiratory failure**. Differentials to consider: TB, bacterial pneumonia, Kaposi pulmonary involvement. Airway/Breathing trumps all other concerns.

4 GENERATE SOLUTIONS

Apply oxygen to maintain SpO₂ ≥ 92%, place in semi-Fowler's, obtain ABG, draw blood/sputum cultures, prepare for chest X-ray and induced sputum/bronchoscopy. Anticipate IV **high-dose TMP-SMX** (Bactrim) ± corticosteroids if PaO₂ < 70. Restart ART after OI stabilized. Isolate (private room) and screen for TB.

5 TAKE ACTION

(1) Apply O₂ + position semi-Fowler's. (2) Establish IV access, draw labs/cultures. (3) Administer prescribed IV TMP-SMX promptly. (4) Continuous SpO₂ & cardiac monitor. (5) Address ART non-adherence — identify barriers, arrange social work consult. (6) Provide emotional support and confidentiality.

6 EVALUATE OUTCOMES

Goals: SpO₂ ≥ 92%, RR 12–20, afebrile within 48–72 hr, improved breath sounds, decreasing viral load with restarted ART, patient verbalizes plan for adherence, no signs of secondary infection. Re-check CD4 in 4–6 weeks.