Day 7 · NCLEX-RN Pharmacology Mastery

TB Drugs (RIPE) · HIV/ART Classes · PEP & PrEP · Opportunistic-Infection Meds · Amphotericin B

2026 NCLEX-RN Test Plan Aligned | Pharm & Parenteral · Reduction of Risk · Safety/Infection | NCJMM: Cues → Action → Evaluate

23 advanced cards + NGN + case study

1 23 Advanced Flashcards · Click to flip

Each card: mechanism → indication → must-assess → labs → adverse effects → hold/notify → antidote → teaching → NGN cue → priority Q with rationale → test-taking tip.

High-risk / Black Box | Emergency / Antidote | Commonly tested | Teaching-heavy

HIGH-RISK · HEPATOTOXIC

Isoniazid (INH)

Antimycobacterial · First-line TB

> **Mechanism:** Inhibits mycolic-acid synthesis in M. tuberculosis cell wall (bactericidal).

Why given: Active TB (in RIPE), latent TB (mono therapy 6–9 months), TB prophylaxis after exposure.

Most dangerous: Hepatotoxicity (highest risk >35 y, alcohol use), peripheral neuropathy, optic neuritis, lupus-like syndrome.

Isoniazid (INH)

MUST-ASSESS

Baseline LFTs, hepatitis history, alcohol use, neuropathy risk (diabetes, malnutrition, pregnancy, HIV), pregnancy status.

KEY LABS

AST, ALT, bilirubin baseline + monthly.

COMMON SE

GI upset, rash, fatigue.

HOLD / NOTIFY

AST/ALT >3× ULN with symptoms or >5× without; new jaundice; numbness/tingling; vision change.

ANTIDOTE / REVERSAL

Pyridoxine (B_6) for neuropathy and overdose seizures; N-acetylcysteine for hepatotoxicity.

TEACHING

Take 1 hr before or 2 hr after meals. Avoid alcohol entirely. Take with B_6. Avoid tyramine-rich foods (aged cheese, cured meats, fermented soy) — can cause hypertensive reaction. Report yellow eyes/skin, dark urine, numbness, vision change.

NURSING ACTION

Confirm B_6 co-prescribed. DOT (directly observed therapy) is the gold standard. Monthly LFTs.

NGN CUE

Week 6 of INH/rifampin: ALT 280, AST 240, RUQ pain, nausea → drug-induced hepatitis.

PRIORITY Q:

A client on INH for active TB reports tingling in both feet at the 6-week visit. The MAR lists isoniazid 300 mg PO daily. What is the priority nursing action?

▸ Reveal answer

HIGH-RISK · CYP450 INDUCER

Rifampin

Rifamycin · First-line TB · CYP inducer

> **Mechanism:** Inhibits bacterial DNA-dependent RNA polymerase → blocks transcription. Strong CYP3A4 inducer.

Why given: Active TB (part of RIPE), latent TB (alone or combo, shorter regimens), N. meningitidis prophylaxis, MRSA combination therapy.

Most dangerous: Hepatotoxicity, thrombocytopenia, hemolytic anemia, flu-like syndrome with intermittent dosing.

Rifampin

MUST-ASSESS

Baseline LFTs, CBC, INR if anticoagulated. Review entire med list for CYP-substrates: OCPs, warfarin, methadone, dolutegravir, protease inhibitors, digoxin, corticosteroids, β-blockers, statins.

KEY LABS

AST, ALT, bilirubin, CBC, INR monthly.

COMMON SE

Red-orange staining of urine, sweat, tears, sputum; GI upset.

HOLD / NOTIFY

AST/ALT >3× ULN with symptoms, platelets <100K, severe rash.

ANTIDOTE / REVERSAL

None — discontinue; supportive care.

TEACHING

'Your urine, tears, and sweat will turn red-orange — this is harmless and expected.' Permanent staining of soft contact lenses (wear glasses). Take on empty stomach. **Hormonal contraceptives are unreliable** — use barrier or non-hormonal back-up. Avoid alcohol.

NURSING ACTION

Reconcile all home meds for CYP interactions. Confirm pregnancy status and contraceptive plan in any client of childbearing potential.

NGN CUE

Client on rifampin reports vaginal bleeding and a positive pregnancy test 2 weeks into therapy → OCP failure from CYP induction.

PRIORITY Q:

A nurse is teaching a 28-year-old woman starting RIPE therapy. She uses combined oral contraceptives. Which statement is essential?

▸ Reveal answer

HEPATOTOXIC + GOUT RISK

Pyrazinamide (PZA)

Antimycobacterial · First-line TB

> **Mechanism:** Disrupts plasma membrane and energy metabolism of M. tuberculosis (especially intracellular bacilli).

Why given: Initial 2-month intensive phase of active TB treatment (RIPE).

Most dangerous: Hepatotoxicity, hyperuricemia → acute gout, photosensitivity, GI upset.

Pyrazinamide (PZA)

MUST-ASSESS

Baseline LFTs, uric acid, gout history, renal function. Pregnancy: used cautiously; benefit outweighs in active TB.

KEY LABS

AST, ALT, uric acid monthly.

COMMON SE

Nausea, joint pain (non-gouty arthralgia in 40%).

HOLD / NOTIFY

AST/ALT >3× ULN with symptoms, uric acid >10 with arthritis, severe rash.

ANTIDOTE / REVERSAL

None — discontinue.

TEACHING

Push fluids (≥2 L/day) to reduce uric-acid crystallization. Use sunscreen and protective clothing. Report joint pain, especially a hot/swollen great toe (classic gout).

NURSING ACTION

Distinguish non-gouty arthralgia (common, can continue with NSAIDs) from true gout flare (consider holding).

NGN CUE

Week 3 of RIPE: uric acid 11, painful swollen 1st MTP joint, low-grade fever → acute gouty arthritis from PZA.

PRIORITY Q:

A 50-year-old client in week 3 of RIPE therapy presents with a hot, swollen, exquisitely tender right great toe. Uric acid 11.2 mg/dL. Which intervention is most appropriate?

▸ Reveal answer

VISION-TOXIC

Ethambutol

Antimycobacterial · First-line TB

> **Mechanism:** Inhibits arabinosyl transferase → disrupts mycobacterial cell-wall synthesis.

Why given: Initial phase of active TB (RIPE) until drug-susceptibility is confirmed (then often dropped).

Most dangerous: Optic neuritis — decreased visual acuity, decreased red-green color discrimination, central scotoma.

Ethambutol

MUST-ASSESS

Baseline visual acuity (Snellen) and color discrimination (Ishihara). Renal function (dose adjust in CKD). Children too young for vision testing — relative contraindication.

KEY LABS

BUN/Cr; monthly vision and color tests.

COMMON SE

GI upset, headache.

HOLD / NOTIFY

Any visual change or new red-green deficit.

ANTIDOTE / REVERSAL

None — discontinue; vision usually recovers slowly if caught early.

TEACHING

'Report any change in your vision or color perception immediately — do not wait for your next visit.' Routine eye exams monthly.

NURSING ACTION

Document monthly vision check. Avoid in children too young to reliably report vision changes when alternatives exist.

NGN CUE

Week 8 ethambutol: client says 'red and green look the same now' → drug-induced optic neuritis. Stop drug.

PRIORITY Q:

A client receiving RIPE therapy reports difficulty distinguishing red traffic lights from green. Which medication is most likely responsible?

▸ Reveal answer

QT-PROLONGING · RESISTANT TB

Bedaquiline

Diarylquinoline · MDR-TB

> **Mechanism:** Inhibits mycobacterial ATP synthase → energy failure of M. tuberculosis.

Why given: Multi-drug-resistant TB (MDR-TB), as part of combination regimens; not first-line for drug-susceptible TB.

Most dangerous: QT prolongation → torsades, hepatotoxicity, headache.

Bedaquiline

MUST-ASSESS

Baseline ECG (QTc), electrolytes, LFTs. Med list for QT-prolonging drugs (azoles, fluoroquinolones, methadone, ondansetron).

KEY LABS

ECG baseline, 2-, 12-, and 24-week; K^+, Mg^{2+}, LFTs.

COMMON SE

Nausea, arthralgia, headache.

HOLD / NOTIFY

QTc >500 ms or >60 ms above baseline; AST/ALT >3× ULN with symptoms.

ANTIDOTE / REVERSAL

None — discontinue; treat torsades (magnesium IV, defib if unstable).

TEACHING

Take with food (↑ absorption). Avoid alcohol. Report palpitations, fainting, yellowing.

NURSING ACTION

Coordinate with infectious-disease and pharmacy; reserved for documented MDR-TB.

NGN CUE

Week 12 bedaquiline: QTc 520, vomiting → impending torsades — hold drug + replete K^+/Mg^{2+}.

PRIORITY Q:

A nurse caring for a client on bedaquiline for MDR-TB notes QTc of 510 ms on the morning ECG (baseline 430 ms). What is the priority action?

▸ Reveal answer

RENAL + BONE TOXICITY (TDF)

Tenofovir / Emtricitabine (TDF/FTC, TAF/FTC)

NRTI backbone · ART · PrEP · PEP

> **Mechanism:** Nucleotide / nucleoside reverse-transcriptase inhibitors — incorporate into viral DNA, terminate the chain.

Why given: HIV ART backbone, PrEP, PEP, chronic HBV (tenofovir).

Most dangerous: Tenofovir disoproxil (TDF): nephrotoxicity (Fanconi syndrome), decreased BMD. TAF: less renal/bone toxicity, slight weight gain and lipid effect. Class effect: lactic acidosis, hepatic steatosis.

Tenofovir / Emtricitabine (TDF/FTC, TAF/FTC)

MUST-ASSESS

Baseline renal function (TDF — nephrotoxic), bone density risk, HBV status (rebound hepatitis if abruptly stopped), pregnancy (TAF preferred in third trimester per some guidelines).

KEY LABS

BUN/Cr, eGFR, urine protein, phosphate, calcium, DEXA if long-term; HBV serology.

COMMON SE

GI upset, headache, fatigue.

HOLD / NOTIFY

eGFR <30 (for TDF), severe lactic acidosis, hepatitis flare on discontinuation.

ANTIDOTE / REVERSAL

None — discontinue; treat lactic acidosis (bicarbonate, supportive).

TEACHING

Take consistently — even one missed daily dose ↓ effectiveness, especially for PrEP. Report bone pain, dark urine, ↓ urine output. Do not abruptly stop in HBV co-infection.

NURSING ACTION

Annual renal labs (more frequent on TDF). For PrEP: confirm HIV negative q3 months before refills.

NGN CUE

Year 2 on TDF/FTC: serum creatinine 1.7 (was 1.0), urine phosphate ↑, glucose ↑ → Fanconi syndrome → switch to TAF.

PRIORITY Q:

A nurse reviews labs for a client on tenofovir disoproxil-emtricitabine for HIV. Cr has risen from 1.0 to 1.7 over 6 months. Urinalysis: glycosuria, proteinuria, phosphaturia. What does the nurse recognize?

▸ Reveal answer

FATAL HYPERSENSITIVITY · BLACK BOX

Abacavir

NRTI · ART

> **Mechanism:** Guanosine nucleoside RTI — terminates viral DNA chain.

Why given: HIV ART (often in fixed-dose combinations).

Most dangerous: Hypersensitivity reaction (fever, rash, GI, respiratory, malaise) — potentially fatal on rechallenge. Possible ↑ MI risk.

Abacavir

MUST-ASSESS

HLA-B*5701 genotype must be NEGATIVE before first dose. Cardiovascular risk (debated MI association).

KEY LABS

HLA-B*5701, LFTs, lipid panel.

COMMON SE

Headache, nausea.

HOLD / NOTIFY

Any constellation of fever + rash + GI/respiratory symptoms in first 6 weeks → STOP immediately and NEVER rechallenge.

ANTIDOTE / REVERSAL

None — supportive care; epinephrine and hydrocortisone if anaphylactoid features.

TEACHING

Carry a hypersensitivity warning card. Never restart abacavir if discontinued for hypersensitivity. Report any flu-like symptoms.

NURSING ACTION

Confirm HLA-B*5701 negative result in chart before administering the first dose. Document the verification.

NGN CUE

Day 9 abacavir: T 38.6, rash, nausea, dyspnea → suspect hypersensitivity → STOP and never restart.

PRIORITY Q:

A nurse is preparing to give the first dose of abacavir-lamivudine. The HLA-B*5701 result is not in the chart. What is the priority action?

▸ Reveal answer

NEUROPSYCHIATRIC · TERATOGENIC (HISTORICAL)

Efavirenz

NNRTI · ART

> **Mechanism:** Non-nucleoside reverse-transcriptase inhibitor — binds RT directly.

Why given: HIV ART (older first-line, now displaced by INSTIs).

Most dangerous: CNS effects (vivid dreams, dizziness, depression, suicidal ideation), rash including SJS, hepatotoxicity, false-positive cannabinoid urine screen.

Efavirenz

MUST-ASSESS

Psychiatric history (depression, suicidality), pregnancy status (historically Cat D — now considered safer than once thought, but INSTIs preferred), liver function.

KEY LABS

LFTs, lipid panel, pregnancy test, mental-status check.

COMMON SE

Vivid/abnormal dreams in 50% (often improves over 4 weeks).

HOLD / NOTIFY

Suicidal ideation, severe depression, psychosis, AST/ALT >5× ULN, SJS rash.

ANTIDOTE / REVERSAL

None — discontinue; switch regimen.

TEACHING

Take at bedtime on an empty stomach — sleep through the CNS effects. Avoid alcohol. Use reliable contraception. Report mood changes, suicidal thoughts, rash.

NURSING ACTION

Screen for depression at every visit. Coordinate psychiatry if high-risk.

NGN CUE

Week 4 efavirenz: client says 'I keep thinking about not waking up' → STOP, mental-health crisis evaluation, change ART.

PRIORITY Q:

A client newly started on efavirenz reports vivid dreams and morning grogginess. What teaching is most appropriate?

▸ Reveal answer

FIRST-LINE · DRUG INTERACTIONS

Dolutegravir / Bictegravir / Raltegravir

Integrase strand-transfer inhibitor (INSTI) · ART

> **Mechanism:** Blocks HIV integrase enzyme → prevents viral DNA integration into host genome.

Why given: HIV ART backbone — first-line in most modern regimens. PEP (raltegravir or dolutegravir + TDF/FTC).

Most dangerous: Weight gain, insomnia, headache, hepatotoxicity, lactic acidosis (rare), hypersensitivity.

Dolutegravir / Bictegravir / Raltegravir

MUST-ASSESS
Baseline labs, pregnancy status, concurrent metformin (dolutegravir ↑ metformin levels), polyvalent cations (antacids, iron, calcium ↓ absorption).

KEY LABS
VL, CD4, LFTs, lipid panel, A1c, weight.

COMMON SE
Headache, insomnia, weight gain.

HOLD / NOTIFY
AST/ALT >5× ULN, lactate >4 with symptoms, severe rash.

ANTIDOTE / REVERSAL
None — discontinue.

TEACHING
Separate from antacids, iron, calcium, multivitamins by at least 2 hours before or 6 hours after (chelation). Adherence is critical — INSTIs lose efficacy rapidly with missed doses. Monitor weight.

NURSING ACTION
Dolutegravir + metformin — reduce metformin dose to ≤1000 mg/day. Coordinate with PCP for diabetes regimen review.

NGN CUE
Client on dolutegravir + metformin: lactate 5, Kussmaul respirations, AMS → lactic acidosis → hold both, IV fluids, supportive care.

PRIORITY Q:
A client newly started on dolutegravir asks why the nurse warns them about taking calcium-containing antacids. Which response is most accurate?

▸ Reveal answer

METABOLIC · STRONG CYP3A4 INHIBITOR

Ritonavir-boosted Protease Inhibitors (e.g., darunavir/ritonavir, atazanavir/ritonavir)

Protease inhibitor · ART

> **Mechanism:** Blocks HIV protease, preventing maturation of viral particles. Ritonavir is added as a CYP3A4 inhibitor to 'boost' co-administered PI levels.

Why given: HIV ART when INSTIs cannot be used; salvage therapy.

Most dangerous: Hyperlipidemia, hyperglycemia, lipodystrophy, hepatotoxicity, pancreatitis, PR/QT prolongation, nephrolithiasis (atazanavir).

Ritonavir-boosted Protease Inhibitors (e.g., darunavir/ritonavir, atazanavir/ritonavir)

MUST-ASSESS
Lipid panel, A1c, baseline LFTs, complete med reconciliation — ritonavir interacts with countless drugs.

KEY LABS
LFTs, lipids, A1c, bilirubin (atazanavir → hyperbilirubinemia/jaundice).

COMMON SE
Diarrhea, GI upset, hyperbilirubinemia (atazanavir = scleral icterus).

HOLD / NOTIFY
AST/ALT >5× ULN, pancreatitis, severe rash.

ANTIDOTE / REVERSAL
None — discontinue.

TEACHING
Take with food. Maintain hydration (especially atazanavir → kidney stones). Disclose every new med to pharmacist (ritonavir interactions). Lipid-lowering diet; some statins are contraindicated (simvastatin, lovastatin).

NURSING ACTION
Run every new medication through the drug-interaction checker.

NGN CUE
Client on atazanavir/ritonavir reports flank pain + hematuria → kidney stones (atazanavir crystallization).

PRIORITY Q:
A nurse is reviewing medications for a client on darunavir/ritonavir. The client also takes simvastatin. Which action is appropriate?

▸ Reveal answer

SPECIALTY AGENTS

Maraviroc / Enfuvirtide

Entry inhibitors · ART (specialty / salvage)

> **Mechanism:** Maraviroc blocks CCR5 co-receptor; enfuvirtide blocks gp41 fusion.

Why given: Maraviroc — only after CCR5 tropism testing (CCR5-tropic virus). Enfuvirtide — salvage therapy, SQ injection BID.

Most dangerous: Maraviroc: hepatotoxicity (with eosinophilia, rash). Enfuvirtide: severe injection-site reactions (98% of patients), increased pneumonia risk.

Maraviroc / Enfuvirtide

MUST-ASSESS
Tropism assay before maraviroc; injection-site rotation plan for enfuvirtide.

KEY LABS
LFTs.

COMMON SE
Injection-site nodules (enfuvirtide); cough, dizziness (maraviroc).

HOLD / NOTIFY
Hepatotoxicity, anaphylaxis.

ANTIDOTE / REVERSAL
None.

TEACHING
Rotate injection sites for enfuvirtide. Report rash + jaundice with maraviroc.

NURSING ACTION
Specialty agents — verify pharmacy preparation and tropism status.

NGN CUE
Enfuvirtide site nodules over abdomen, painful induration → rotate sites, ice, document.

PRIORITY Q:
Before starting maraviroc, which test must the nurse confirm has been completed?

▸ Reveal answer

HIV-NEGATIVE PREVENTION

PrEP (Pre-Exposure Prophylaxis)

TDF/FTC (Truvada) · TAF/FTC (Descovy) · long-acting cabotegravir

> **Mechanism:** NRTI/NRTI combination (or INSTI for long-acting injectable) that prevents establishment of HIV infection after exposure.

Why given: HIV-negative adults at substantial risk: serodifferent partner with detectable VL, multiple partners + inconsistent condom use, IV drug use, recent STI.

Most dangerous: Same as TDF/FTC class — nephrotoxicity, ↓ BMD (TDF); slight weight gain (TAF).

PrEP (Pre-Exposure Prophylaxis)

MUST-ASSESS
Confirm HIV-negative status before starting and every 3 months. Renal function, HBV status (TDF treats HBV — sudden stop may rebound), pregnancy.

KEY LABS
HIV antibody/antigen baseline + q3 months; eGFR baseline + q6 months; HBV serology; STI screen q3–6 months.

COMMON SE
GI upset, headache (often improves).

HOLD / NOTIFY
Acute HIV seroconversion symptoms — must convert to full ART, not PrEP.

ANTIDOTE / REVERSAL
N/A — preventive medication.

TEACHING
Adherence is everything — daily dosing is highly effective. Continue condom use to prevent other STIs. Return q3 months for HIV testing.

NURSING ACTION
Schedule q3-month follow-ups before each refill. Counsel on signs of acute HIV (fever, rash, lymphadenopathy) — would require switch to full ART.

NGN CUE
PrEP client at 3-month visit: fever, sore throat, diffuse rash, lymph nodes, HIV antigen positive → acute seroconversion → switch to full ART.

PRIORITY Q:
A nurse is counseling a client about to start PrEP. Which statement reflects correct understanding?

▸ Reveal answer

TIME-CRITICAL · 72-HOUR WINDOW

PEP (Post-Exposure Prophylaxis)

TDF/FTC + dolutegravir or raltegravir × 28 days

> **Mechanism:** Triple ART regimen halts HIV replication before viral integration is established.

Why given: Occupational (needlestick from HIV+ source), non-occupational (sexual assault, condom failure, shared needles).

Most dangerous: Same as component drugs (TDF/FTC + INSTI). Most clients complete the 28-day course.

PCP / TOXO PROPHYLAXIS

TMP-SMX (Bactrim) — PCP prophylaxis dosing

Sulfa antibiotic (OI prophylaxis use)

> **Mechanism:** Sequential blockade of folate synthesis (sulfamethoxazole + trimethoprim).

Why given: Primary OI prophylaxis: PCP if CD4 <200 or oral candidiasis; toxoplasmosis if CD4 <100 with positive Toxo IgG. Treatment of active PCP at much higher doses.

Most dangerous: SJS/TEN, hyperkalemia, marrow suppression, hepatotoxicity, kernicterus in neonates.

PEP (Post-Exposure Prophylaxis)

MUST-ASSESS

Time since exposure (must be ≤72 hours), source HIV/HBV/HCV status if available, baseline pregnancy, renal function, HBV serology.

KEY LABS

Baseline HIV, HBV, HCV, BMP, CBC, pregnancy. Repeat HIV at 6 wk, 12 wk, 6 mo.

COMMON SE

GI upset, fatigue, headache.

HOLD / NOTIFY

Severe intolerance — switch agents to ensure completion.

ANTIDOTE / REVERSAL

N/A.

TEACHING

Take all 28 days even if you feel fine. Use barrier protection during testing window. Do not donate blood/organs/sperm until cleared at 6 months. Report fever, rash, or flu-like symptoms (could be acute HIV).

NURSING ACTION

Start ASAP — every hour counts. Counsel on emotional response and provide referral resources.

NGN CUE

Needlestick at 0900; PEP not started until 0900 next day (24 h) — still within window. At 90 h post-exposure — too late, PEP not indicated.

PRIORITY Q:

A nurse sustained a deep needlestick from a known HIV-positive source 4 hours ago. Which action by the employee-health nurse is most appropriate?

▸ Reveal answer

TMP-SMX (Bactrim) — PCP prophylaxis dosing

MUST-ASSESS

Sulfa allergy, G6PD deficiency, renal/hepatic function, pregnancy (avoid near term — kernicterus), folate status.

KEY LABS

CBC (cytopenias), K^+ (hyperkalemia), creatinine (interferes with secretion), LFTs.

COMMON SE

Rash, GI upset, photosensitivity.

HOLD / NOTIFY

Any rash with blistering or mucosal involvement, ANC <500, K^+ >5.5, severe acute renal injury.

ANTIDOTE / REVERSAL

None — discontinue.

TEACHING

Push fluids (≥2 L/day). Use SPF and protective clothing. Report rash immediately (especially if it involves mouth, eyes, or blisters). Take same time daily.

NURSING ACTION

Verify CD4 trend; continue prophylaxis until CD4 >200 for 3+ months on ART.

NGN CUE

Day 12 TMP-SMX: target rash on trunk, mucosal ulcers, T 39 → SJS → STOP and emergent admit.

PRIORITY Q:

A nurse is preparing to administer TMP-SMX DS to a client with HIV and a documented sulfa allergy (rash only, no anaphylaxis). What is the priority action?

▸ Reveal answer

GLUCOSE + PANCREAS + QT

Pentamidine

Antiprotozoal (PCP treatment / 2nd-line prophylaxis)

> **Mechanism:** Disrupts protozoal DNA, RNA, phospholipid synthesis.

Why given: PCP treatment (IV) when TMP-SMX cannot be used. Aerosolized prophylaxis monthly via nebulizer.

Most dangerous: Pancreatitis, severe hypoglycemia → later hyperglycemia/diabetes, nephrotoxicity, QT prolongation, bronchospasm (aerosol), neutropenia.

MAC PREVENTION

Azithromycin (MAC prophylaxis)

Macrolide · OI prophylaxis

> **Mechanism:** Inhibits bacterial 50S ribosomal protein synthesis.

Why given: Mycobacterium avium complex (MAC) prophylaxis when CD4 <50 (typically 1200 mg PO weekly). Also bacterial pneumonias, STIs, otitis.

Most dangerous: QT prolongation, hepatotoxicity, ototoxicity (rare).

Pentamidine

MUST-ASSESS
Baseline glucose, lipase, ECG (QTc), renal function, pregnancy.

KEY LABS
Glucose (q6h during IV), lipase, BUN/Cr, electrolytes, ECG.

COMMON SE
Injection-site pain, GI upset, taste alteration.

HOLD / NOTIFY
Lipase >3× ULN, BG <50 or >300 unmanaged, QTc >500.

ANTIDOTE / REVERSAL
None — discontinue; D50 for hypoglycemia.

TEACHING
Aerosolized form: pre-treat with bronchodilator. IV form: report epigastric pain, dizziness, fainting.

NURSING ACTION
IV: infuse slowly, supine, monitor BP continuously (orthostatic hypotension). Pre-treat aerosolized form with albuterol.

NGN CUE
Day 4 IV pentamidine: BG 38 mg/dL, confusion → severe hypoglycemia → D50, hold next dose.

PRIORITY Q:
A client receiving IV pentamidine for PCP has a fingerstick glucose of 42 mg/dL and is diaphoretic and confused. Which action is the priority?

▸ Reveal answer

Azithromycin (MAC prophylaxis)

MUST-ASSESS
QTc, hepatic function, hearing baseline if long-term.

KEY LABS
LFTs, ECG if at risk.

COMMON SE
GI upset, diarrhea.

HOLD / NOTIFY
QTc >500, signs of hepatotoxicity.

ANTIDOTE / REVERSAL
None.

TEACHING
Take consistently. Report palpitations, hearing changes. Avoid concurrent fluoroquinolones if possible (additive QT).

NURSING ACTION
Continue until CD4 >100 sustained ≥3 months on ART. Clarithromycin alternative has many more drug interactions (CYP3A4).

NGN CUE
Client on azithromycin + ondansetron + ciprofloxacin: QTc 530 → multiple QT-prolongers stacked → reduce/discontinue.

PRIORITY Q:
A client with HIV and CD4 of 35 is started on azithromycin 1200 mg PO weekly. The nurse understands the purpose is to prevent which infection?

▸ Reveal answer

MARROW TOXICITY · LEUCOVORIN RESCUE

Pyrimethamine + Sulfadiazine + Leucovorin

Toxoplasmosis treatment

> **Mechanism:** Pyrimethamine + sulfadiazine block sequential steps in folate synthesis. Leucovorin (folinic acid) rescues human marrow without rescuing the parasite.

Why given: Toxoplasmic encephalitis in HIV (treatment); prophylaxis when CD4 <100 with positive Toxo IgG (often TMP-SMX used preferentially).

Most dangerous: Bone-marrow suppression (megaloblastic anemia, neutropenia, thrombocytopenia), SJS, crystalluria/nephrotoxicity.

Pyrimethamine + Sulfadiazine + Leucovorin

MUST-ASSESS
CBC at baseline, sulfa allergy, hydration, renal function.

KEY LABS
CBC weekly (cytopenias common), BUN/Cr, LFTs.

COMMON SE
GI upset, rash, oral ulcers.

HOLD / NOTIFY
ANC <500, platelets <50K, severe rash.

ANTIDOTE / REVERSAL
Leucovorin (must continue with pyrimethamine to protect marrow).

TEACHING
Push fluids (sulfadiazine crystals). Take leucovorin exactly as prescribed — it is what allows you to tolerate the regimen.

NURSING ACTION
Verify leucovorin is on the MAR before giving pyrimethamine. Adjust dose based on weekly CBC.

NGN CUE
Week 2 pyrimethamine/sulfa: WBC 1.8, platelets 60 → marrow toxicity → check leucovorin dose, hold and reassess.

PRIORITY Q:
A client with AIDS-related toxoplasmosis is prescribed pyrimethamine and sulfadiazine. Which additional medication is essential to prevent marrow toxicity?

▸ Reveal answer

MARROW TOXIC · VESICANT IV

Ganciclovir / Valganciclovir

Antiviral (CMV)

> **Mechanism:** Inhibits viral DNA polymerase (CMV, HSV).

Why given: CMV retinitis, colitis, esophagitis in AIDS or post-transplant. Valganciclovir is oral prodrug.

Most dangerous: Neutropenia, thrombocytopenia, anemia, nephrotoxicity, seizures, mutagenic/teratogenic.

Ganciclovir / Valganciclovir

MUST-ASSESS
Baseline CBC (ANC, platelets, Hgb), renal function, pregnancy (Cat C/D — teratogenic, embryotoxic).

KEY LABS
CBC twice weekly initially; BUN/Cr.

COMMON SE
Fever, headache, GI upset.

HOLD / NOTIFY
ANC <500 or platelets <25K.

ANTIDOTE / REVERSAL
G-CSF (filgrastim) for severe neutropenia.

TEACHING
Reliable contraception for males and females for 90 days after stopping. IV must be infused in central line or large vein — vesicant. Hand-wash carefully; wear gloves to handle pills.

NURSING ACTION
Chemo precautions — double-glove, gown, dispose in cytotoxic waste. Verify central access or large peripheral IV for IV form. Monitor ANC at every visit.

NGN CUE
Week 2 IV ganciclovir: ANC 380, T 38.5 → febrile neutropenia → hold ganciclovir, blood cultures, broad-spectrum antibiotics, G-CSF.

PRIORITY Q:
A client with CMV retinitis is receiving IV ganciclovir. Today's ANC is 410 cells/µL (was 1,200 last week). Which action is the priority?

▸ Reveal answer

"AMPHO-TERRIBLE" · NEPHROTOXIC

Amphotericin B (deoxycholate, conventional)

Polyene antifungal · IV

> **Mechanism:** Binds ergosterol in fungal cell membrane → forms pores → leakage → fungal death. Some affinity for human cholesterol → mammalian toxicity.

Why given: Severe systemic mycoses: invasive aspergillosis, cryptococcal meningitis induction, mucormycosis, severe histoplasmosis, blastomycosis, leishmaniasis.

Most dangerous: Infusion reactions (fever, rigors, hypotension), nephrotoxicity, hypokalemia, hypomagnesemia, anemia (↓ EPO), phlebitis.

LESS TOXIC ALTERNATIVE

Liposomal Amphotericin B (AmBisome)

Polyene antifungal · lipid formulation · IV

> **Mechanism:** Same fungal-membrane mechanism; lipid encapsulation reduces uptake by renal tubule cells.

Why given: Invasive fungal infections in clients with renal injury or intolerance to conventional amphotericin; first-line for cryptococcal meningitis induction (with flucytosine) and mucormycosis in many guidelines.

Most dangerous: Lower rates of infusion reactions and AKI; still possible. Anemia, hypokalemia, hepatic enzyme elevation, hyperbilirubinemia.

Amphotericin B (deoxycholate, conventional)

MUST-ASSESS

Baseline BUN/Cr, K^+, Mg^{2+}, Na^+, CBC, LFTs. Hydration status. Concurrent nephrotoxins (NSAIDs, aminoglycosides, contrast).

KEY LABS

Daily K^+, Mg^{2+}, Cr, BUN, CBC; LFTs 2× weekly.

COMMON SE

Chills, fever, headache, GI upset, anemia.

HOLD / NOTIFY

Cr ↑ 0.5 above baseline or doubled; K^+ <3.0; severe infusion reaction; signs of CHF.

ANTIDOTE / REVERSAL

None per se — supportive: meperidine for rigors, hydrocortisone for severe reaction, fluids/electrolytes, switch to liposomal form.

TEACHING

'You may have chills and fever with the infusion — we'll give you medicine to prevent this. Drink fluids. Report decreased urination, muscle cramps (low K^+), and any chest pain.'

NURSING ACTION

Mix in D5W only (NS precipitates). Pre-medicate 30 minutes before with APAP + diphenhydramine ± hydrocortisone. Infuse over 2–6 hr via pump with 1-micron in-line filter. Monitor VS q15 min × 1 hr then q30 min. Run normal saline bolus (500 mL pre and post) to reduce nephrotoxicity. Replace K^+ and Mg^{2+} aggressively.

NGN CUE

Day 5 amphotericin: Cr 2.4 (was 1.0), K^+ 2.8, urine output 350 mL/24 h → AKI + hypokalemia → switch to liposomal.

PRIORITY Q:

A nurse is preparing to administer the second dose of amphotericin B deoxycholate. The morning labs show K^+ 2.9 and Cr 1.8 (baseline 1.0). Which action is the priority?

▸ Reveal answer

Liposomal Amphotericin B (AmBisome)

MUST-ASSESS

Same as conventional — baseline labs, hydration, concurrent nephrotoxins.

KEY LABS

BUN/Cr, K^+, Mg^{2+} daily; CBC, LFTs.

COMMON SE

Headache, GI upset.

HOLD / NOTIFY

Same thresholds as conventional.

ANTIDOTE / REVERSAL

None — supportive.

TEACHING

Same — premedication may still be needed initially; report fevers, decreased urine, cramping.

NURSING ACTION

Do not interchange formulations — different doses (mg/kg) between products. Verify exact product name on label vs MAR before hanging.

NGN CUE

Order says 'amphotericin' without specifying — verify product (conventional vs liposomal vs lipid complex) before dispensing.

PRIORITY Q:

A nurse receives an order for 'amphotericin B 5 mg/kg IV daily.' What is the priority action before administration?

▸ Reveal answer

VISUAL + QT + CYP3A4

Voriconazole

Azole antifungal (extended spectrum)

> **Mechanism:** Inhibits fungal CYP-dependent ergosterol synthesis.

Why given: Drug of choice for invasive aspergillosis; serious Scedosporium, Fusarium, esophageal candidiasis.

Most dangerous: Visual disturbances (photopsia, altered color perception) in 30%, hepatotoxicity, QT prolongation, skin cancer with chronic use, photosensitivity, periostitis with long-term use.

Voriconazole

MUST-ASSESS
Baseline LFTs, K^+, Mg^{2+}, ECG (QTc), pregnancy, comprehensive med reconciliation.

KEY LABS
LFTs weekly initially, electrolytes, ECG, voriconazole trough levels.

COMMON SE
Visual disturbances, headache, rash.

HOLD / NOTIFY
AST/ALT >5× ULN, QTc >500, severe rash.

ANTIDOTE / REVERSAL
None — discontinue.

TEACHING
'You may see bright lights or color changes — usually improves; do not drive at night until you know how it affects you.' Use SPF 30+ daily and protective clothing — skin cancer risk. Take 1 hr before/after meals (PO).

NURSING ACTION
Therapeutic drug monitoring (trough 1–5.5 mcg/mL). Avoid co-administration with rifampin, carbamazepine (strong inducers ↓ voriconazole). Avoid with sirolimus (↑↑ levels).

NGN CUE
Week 1 voriconazole: 'I see flashing lights when I close my eyes' → typical reversible visual effect; reassure but document and check trough.

PRIORITY Q:
A client started on voriconazole for invasive aspergillosis reports seeing 'flashes of bright light.' Which response by the nurse is appropriate?

▸ Reveal answer

SAFER ALTERNATIVE

Caspofungin (Echinocandins)

Echinocandin antifungal · IV

> **Mechanism:** Inhibits β-1,3-D-glucan synthase — disrupts fungal cell wall (uniquely targets fungal wall, not human cells).

Why given: Invasive candidiasis (first-line in many guidelines), aspergillosis salvage, empiric therapy in febrile neutropenia.

Most dangerous: Histamine-like infusion reactions (flushing, rash, less common), hepatotoxicity, hypokalemia.

Caspofungin (Echinocandins)

MUST-ASSESS
Baseline LFTs (rifampin and other inducers ↑ caspofungin clearance — dose adjust).

KEY LABS
LFTs, electrolytes.

COMMON SE
Headache, GI upset, infusion-site phlebitis.

HOLD / NOTIFY
AST/ALT >5× ULN.

ANTIDOTE / REVERSAL
None.

TEACHING
Report rash or facial flushing during infusion. Most clients tolerate well.

NURSING ACTION
Infuse over 1 hour. Compatible with NS or D5W. Adjust dose with rifampin co-administration. No renal dose adjustment.

NGN CUE
Caspofungin + rifampin: subtherapeutic exposure → fungal breakthrough → increase caspofungin dose.

PRIORITY Q:
A client with invasive candidiasis is switched from amphotericin B to caspofungin. The advantage of caspofungin includes:

▸ Reveal answer

2 5 "Must Not Miss" Safety Rules

Rule 1 — Isoniazid + Pyridoxine (Vitamin B_6): Always co-administer vitamin B_6 (25–50 mg) with INH to prevent peripheral neuropathy. *NCLEX trap:* if a client on INH reports tingling/numbness in feet, the nurse confirms B_6 is on the MAR before assuming worsening neuropathy.

Rule 2 — Rifampin turns body fluids red-orange & eats oral contraceptives: A potent CYP450 inducer — it inactivates OCPs, warfarin, methadone, protease inhibitors, dolutegravir, and corticosteroids. Counsel sexually active clients to use a non-hormonal back-up method (condoms, IUD). Permanent staining of soft contact lenses.

Rule 3 — Amphotericin B = "Ampho-terrible": Pre-medicate (acetaminophen + diphenhydramine ± hydrocortisone ± meperidine) 30 minutes before infusion to blunt fever, rigors, and hypotension. Infuse over 2–6 hours via pump. Strict I/O — nephrotoxicity is dose-limiting. Replace K^+ and Mg^{2+} aggressively; baseline + daily BUN/Cr, K^+, Mg^{2+}, CBC.

Rule 4 — Never start abacavir without HLA-B*5701 testing: A positive result = absolute contraindication. Hypersensitivity (fever, rash, GI, dyspnea) is potentially fatal on re-challenge. Verify the genetic test was done and is negative *before* administering the first dose.

Rule 5 — Post-exposure prophylaxis (PEP) is time-critical: Initiate within **72 hours** of exposure (ideally <2 hours), continue for 28 days. Baseline HIV, HBV, HCV, pregnancy, renal function. Standard regimen: TDF/FTC + raltegravir or dolutegravir. Repeat HIV testing at 6 weeks, 12 weeks, 6 months.

3 5 Medication Calculation & Dosage-Safety Questions

Calc 1 — Pediatric Isoniazid (DOT regimen).
A 6-year-old (weight 22 kg) is prescribed isoniazid 10 mg/kg PO daily (max 300 mg/day) for latent TB. The available concentration is 50 mg/5 mL syrup. How many mL per dose?

▾ Reveal answer + work

22 mL PO daily.

Dose: 22 kg × 10 mg/kg = 220 mg/day · 220 mg ÷ 50 mg = 4.4 doses · 4.4 × 5 mL = 22 mL. Within max (300 mg). Give once daily with pyridoxine. Take 1 hour before or 2 hours after meals (food ↓ absorption).

Calc 2 — Rifampin oral preparation.
An adult with active TB weighs 60 kg. Rifampin is ordered 10 mg/kg PO daily (max 600 mg). Available: 150 mg capsules. How many capsules per dose?

▾ Reveal answer + work

4 capsules PO daily.

60 kg × 10 mg/kg = 600 mg/day → 600 ÷ 150 = 4 capsules. Give on an empty stomach. Counsel: red-orange tears/sweat/urine; will permanently stain soft contacts. Verify OCP use → advise non-hormonal back-up.

Calc 3 — Amphotericin B IV infusion rate.
Amphotericin B lipid complex 250 mg in 500 mL D5W ordered to infuse over 4 hours. The IV pump rate setting in mL/hr is?

▾ Reveal answer + work

125 mL/hr.

500 mL ÷ 4 hr = 125 mL/hr. Always use a pump. Pre-medicate 30 min before. Monitor VS q15 min × 1 hr then q30 min. Stop infusion for rigors, fever >1.5 °C above baseline, or SBP drop >20 mmHg → call provider, give meperidine for rigors per protocol.

Calc 4 — Ganciclovir induction dose (CMV retinitis).
A client with AIDS-related CMV retinitis is prescribed ganciclovir 5 mg/kg IV q12h. Weight 70 kg. Available: 500 mg in 100 mL NS infused over 1 hour. How many mL/hr and how many mg/dose?

▾ Reveal answer + work

350 mg/dose; pump at 70 mL/hr.

70 kg × 5 mg/kg = 350 mg per dose. 350 mg ÷ 500 mg × 100 mL = 70 mL diluent volume — but bag is fixed at 100 mL → run full bag over 1 hr = 100 mL/hr if entire bag dispensed; if pharmacy dispenses 70 mL (350 mg), run at 70 mL/hr. Monitor ANC and platelets (neutropenia, thrombocytopenia are common — may need G-CSF). Pregnancy category D; double-glove and use chemo precautions when handling.

Calc 5 — TMP-SMX (PCP prophylaxis) — verify safe single-strength dosing.

A client with HIV (CD4 = 180) is prescribed TMP-SMX SS (80/400) one tab PO daily for PCP prophylaxis. The pharmacy delivers TMP-SMX DS (160/800). What action by the nurse is correct?

▾ Reveal answer + rationale

Hold the dose. Call pharmacy and prescriber to clarify — DS = 2× the ordered strength.

SS = 80 mg TMP / 400 mg SMX. DS = 160 mg TMP / 800 mg SMX. Giving DS would double the TMP/SMX dose. DS three times weekly is also a valid PCP prophylaxis regimen — clarify which the prescriber intends. *Never split a DS to half just to make it equal SS without clarification.*

4 5 NGN-Style Items (Mixed Formats)

NGN 1 (Matrix) — Match each RIPE drug to its hallmark toxicity.

For each medication, select the toxicity that is *most specific*.

Drug	Hepatotoxicity	Optic neuritis	Hyperuricemia	Red-orange fluids	Peripheral neuropathy
Isoniazid	✓				✓
Rifampin	✓			✓	
Pyrazinamide	✓		✓		
Ethambutol		✓			

▸ Reveal rationale

NGN 2 (SATA) — Amphotericin B pre-infusion preparation.

A nurse is preparing to administer the first amphotericin B dose to a client with invasive aspergillosis. Which actions are appropriate? Select all that apply.

A. Pre-medicate with acetaminophen and diphenhydramine 30 minutes before the infusion ✓
B. Draw baseline BUN, creatinine, potassium, magnesium, and CBC ✓
C. Mix amphotericin in 0.9% NS to ensure compatibility
D. Use an infusion pump and a 1-micron in-line filter ✓
E. Plan to flush the line with NS before and after the infusion
F. Have meperidine and hydrocortisone available for breakthrough rigors ✓

▾ Reveal rationale

Correct: A, B, D, F.

- **C is wrong** — amphotericin precipitates in saline; it must be mixed in *D5W*.
- **E is wrong** — flush with *D5W only*, not NS, for the same reason.
- Standard premedication ↓ infusion reactions. Baseline labs and daily K^+/Mg^{2+}/Cr drive replacement decisions. Pump + filter prevent rapid infusion and aggregate delivery.

NGN 3 (Bow-Tie) — HIV in pregnancy.

A 26-year-old at 10 weeks gestation, newly diagnosed HIV+, viral load 38,000 copies/mL, CD4 410. Build the bow-tie:

Actions to take (choose 2)	Condition most likely	Parameters to monitor (choose 2)
☐ Start dolutegravir-based ART after 1st trimester (or use alternative INSTI) ☐ Discuss elective C-section if viral load >1,000 near term ☐ Recommend breastfeeding for immunity ☐ Avoid efavirenz throughout pregnancy	**Vertical HIV transmission risk requiring antepartum ART, intrapartum IV zidovudine if VL >1,000, and 4–6 weeks neonatal zidovudine**	☐ Viral load every 4 weeks until undetectable, then every 3 months ☐ Maternal weight loss ☐ CD4 count baseline and q3 months ☐ Neonatal heel-stick glucose only

▾ Reveal rationale

Actions: Start ART (dolutegravir is now preferred in all trimesters per updated guidelines, though older test items may still mark "after 1st trimester" — know both); plan IV ZDV intrapartum if VL ≥1,000.
Monitor: Viral load (drives transmission risk) and CD4 trend.
Avoid: Breastfeeding is contraindicated in resource-rich settings — formula feed. Efavirenz historically caused neural-tube defects; current guidance has loosened but dolutegravir-based regimens are first-line.

NGN 4 (Ordered Response) — Amphotericin B acute infusion reaction.

30 minutes into the second amphotericin B infusion, the client develops shaking chills, T 39.4 °C, HR 132, BP 92/54. Place the nursing actions in priority order.

1. Stop the amphotericin infusion
2. Maintain IV access with D5W at KVO
3. Assess airway, breathing, vital signs
4. Notify the provider
5. Administer ordered meperidine 25 mg IV for rigors
6. Document reaction, time stopped, and interventions

▾ Reveal answer + rationale

Correct order: 1 → 3 → 2 → 5 → 4 → 6.

- *Stop the offending agent first.* Reassess ABCs immediately — amphotericin reactions can include hypotension and bronchospasm.
- Maintain access with D5W (NS will precipitate residual drug in the line).
- Meperidine is specifically used for amphotericin-induced rigors (acts on shivering pathway).
- Notify provider for further orders (additional hydrocortisone, slower re-challenge).
- Documentation last — but always required.

NGN 5 (Drop-down Cloze) — Post-exposure prophylaxis.

A nurse sustained a deep needlestick from a known HIV-positive source 90 minutes ago. The employee-health RN must initiate PEP within **[1]**; the standard regimen typically includes **[2]** for 28 days; HIV testing is repeated at **[3]**; and the most important nursing teaching is to **[4]**.

[1] 24 h · 72 h · 7 days [2] TDF/FTC + dolutegravir or raltegravir · TMP-SMX · azithromycin [3] 1 wk · 6 weeks, 12 weeks, 6 months · once at 1 yr [4] use barrier protection & do not donate blood until cleared · stop ART after 14 days · resume normal sexual activity immediately

▾ Reveal answers + rationale

[1] 72 hours · [2] TDF/FTC + dolutegravir or raltegravir · [3] 6 weeks, 12 weeks, 6 months · [4] use barrier protection & do not donate blood until cleared.

```
PEP efficacy drops sharply after 72 h and is essentially absent after 7 days. Modern preferred
PEP = tenofovir–emtricitabine + an INSTI (dolutegravir or raltegravir). Serial testing detects
seroconversion. Barrier protection prevents secondary transmission during the window period.
```

5 NCJMM Case Study — Newly Diagnosed Active Pulmonary TB

Scenario: A 42-year-old immigrant from a high-prevalence region presents to an outpatient clinic with 6 weeks of productive cough, night sweats, 8-lb unintentional weight loss, and intermittent low-grade fever. Three sputum AFB smears are positive; NAAT confirms *M. tuberculosis*. CXR: right upper-lobe cavitation. Vitals: T 38.1 °C, HR 98, BP 124/76, RR 22, SpO_2 95% RA. CD4 status pending. Baseline labs: AST 28, ALT 32, uric acid 5.8, vision intact, weight 60 kg. RIPE therapy is started today. Pyridoxine 25 mg PO daily is added.

STEP 1 Recognize Cues

Relevant cues: Cavitary disease + smear-positive = *highly contagious*. Country of origin raises MDR-TB index of suspicion. Pre-treatment LFTs and uric acid are normal — baseline for monitoring INH/rifampin/PZA. Vision intact — baseline for ethambutol. Weight 60 kg — drives weight-based dosing. CD4 status pending — could be co-infected with HIV (DDI alert with rifampin).

STEP 2 Analyze Cues

The client requires **airborne precautions** in a single, negative-pressure room (AIIR) with N95 use by all entering staff. RIPE introduces four hepatotoxic agents simultaneously — risk of additive liver injury. Ethambutol's optic neuritis is dose-dependent. Rifampin will lower the efficacy of any concurrent OCP, warfarin, methadone, or protease inhibitors. If HIV+ is confirmed, rifabutin commonly replaces rifampin (fewer DDIs with ART), and ART initiation timing depends on CD4.

STEP 3 Prioritize Hypotheses

1. Transmission risk to staff and family (highest priority — airborne).
2. Hepatotoxicity from combined RIPE.
3. Adherence — DOT (directly observed therapy) is the gold standard; non-adherence drives MDR-TB.
4. Drug interactions (rifampin CYP induction).
5. Specific organ toxicities — eye, peripheral nerves, joints/uric acid.

STEP 4 Generate Solutions

- Place in negative-pressure room; staff don N95 (fit-tested); door closed; transport with mask on client only when necessary.
- Initiate DOT — public-health nurse observes every dose.
- Schedule LFTs at baseline, 2 weeks, 4 weeks, then monthly.
- Monthly visual acuity + red-green color test for ethambutol; monthly uric acid for PZA.
- Reconcile all medications and counsel on rifampin interactions (back-up barrier contraception, INR monitoring if anticoagulated).
- Continue B_6 daily; teach client to take INH on an empty stomach.
- Educate household contacts on TST/IGRA screening and possible window prophylaxis.

STEP 5 Take Action

The nurse rooms the client in an AIIR, dons an N95, hangs signage, and confirms negative pressure with the daily air-flow check. Administers the first DOT dose under observation. Reviews "do not take antacids within 2 hours of INH"; "rifampin may stain tears — remove soft contacts"; "report any yellow skin, dark urine, RUQ pain, or vision changes immediately." Faxes household contact list to the local health department.

STEP 6 Evaluate Outcomes

Expected outcomes at 2 weeks: Decreased cough and night sweats; weight stable or improving. **At 4–8 weeks:** Three consecutive negative sputum AFB smears → may discontinue airborne precautions if also clinically improved. **At 2 months:** Convert to continuation phase (INH + rifampin × 4 more months = 6-month standard course). LFTs remain <3×

ULN. Vision and color discrimination unchanged. CD4 result returned and HIV status integrated into plan. **Red-flag deviation:** AST 240, ALT 280 at week 4 → hold all hepatotoxic RIPE drugs, notify provider, reintroduce one at a time when LFTs normalize.

6 Red-Flag Board — Stop / Hold / Notify / Antidote

INH/Rifampin/PZA — ALT or AST > 3× ULN with symptoms (or >5× without)
Hold all hepatotoxic drugs. Notify provider. Reintroduce sequentially after LFTs normalize.

Ethambutol — decreased visual acuity or red-green deficit
Stop drug immediately. Refer to ophthalmology. Optic neuritis is often reversible only with early discontinuation.

Abacavir — fever + rash + GI/respiratory symptoms
STOP and NEVER rechallenge. HLA-B*5701 hypersensitivity is fatal on re-exposure.

Amphotericin B — rigors, T spike >1.5 °C, SBP drop >20 mmHg
Stop infusion. Reassess ABCs. Give meperidine for rigors; hydrocortisone per protocol.

Amphotericin B — K^+ < 3.0 or rising creatinine >0.5 above baseline
Hold next dose; aggressive electrolyte replacement; consider switch to liposomal form.

Ganciclovir — ANC < 500 or platelets < 25,000
Hold drug. Consider G-CSF. Notify provider — risk of life-threatening neutropenia/thrombocytopenia.

Efavirenz — suicidal ideation, severe depression, psychosis
Hold drug; notify provider. Switch regimen. Avoid in clients with active psychiatric disease.

Dolutegravir + metformin together — lactic acidosis signs
Dolutegravir ↑ metformin levels. Reduce metformin dose. Hold both for lactate >4, Kussmaul respirations, AMS.

Pyrazinamide — acute gouty arthritis or uric acid >10
Hold PZA; consult provider. Allopurinol generally *not* effective (PZA causes tubular reabsorption of urate).

PEP missed window (>72 h post-exposure)
PEP no longer recommended. Begin baseline HIV testing schedule and counseling for risk reduction.

7 Confusing Drugs Side-by-Side

Isoniazid

- Mono drug = latent TB
- Hepatotoxic + B_6 deficiency neuropathy
- Take on empty stomach
- Avoid tyramine-rich foods (MAOI-like)
- Not a CYP inducer

Rifampin

- Always part of multi-drug RIPE
- Hepatotoxic + orange body fluids
- Take on empty stomach
- **Potent CYP450 inducer** — OCPs, warfarin, methadone, PIs, dolutegravir
- Stains soft contact lenses permanently

PrEP

- **HIV-NEGATIVE** at high risk
- TDF/FTC (Truvada) or TAF/FTC (Descovy)
- Daily; injectable cabotegravir q2 mo option
- HIV test q3 months
- Counsel on adherence + ongoing risk reduction

PEP

- **HIV-NEGATIVE** with recent exposure
- TDF/FTC + dolutegravir or raltegravir × 28 days
- Must start within **72 hours**
- HIV testing baseline, 6 wk, 12 wk, 6 mo
- Use barrier protection, no blood donation until cleared

NRTIs (e.g., tenofovir, emtricitabine, abacavir)

- Nucleoside/-tide reverse transcriptase inhibitors
- Class effect: lactic acidosis + hepatic steatosis
- Tenofovir → renal & bone
- Abacavir → HLA-B*5701 fatal hypersensitivity
- Backbone of nearly every ART regimen

INSTIs (dolutegravir, bictegravir, raltegravir)

- Integrase strand-transfer inhibitors
- First-line in most modern regimens
- Side effects: weight gain, insomnia, vivid dreams
- ↑ metformin levels (dolutegravir)
- Rapid VL suppression — good in pregnancy

Amphotericin B deoxycholate ("conventional")

- Cheap; severe infusion reactions
- High nephrotoxicity
- K^+ and Mg^{2+} wasting
- Mix in **D5W only**
- Pre-medicate; meperidine for rigors

Liposomal Amphotericin B (AmBisome)

- Same antifungal spectrum
- Markedly fewer infusion reactions and AKI
- Preferred in renal impairment / critical illness
- Still requires K^+/Mg^{2+} monitoring
- Costly — formulary-restricted

Fluconazole

- PO/IV, well tolerated
- Candida (oral, esophageal, systemic), cryptococcal meningitis maintenance
- QT prolongation; LFT monitoring
- CYP inhibitor — many DDIs
- (Day 6 card)

Voriconazole

- Drug of choice for invasive aspergillosis
- Visual disturbances (photopsia) — common, usually reversible
- Hepatotoxic; QT prolongation
- Many DDIs via CYP3A4
- Photosensitivity — high SPF

TMP-SMX (Bactrim) — for PCP prophylaxis

- First-line prophylaxis if CD4 < 200
- SS daily or DS three times weekly
- SJS, hyperkalemia, marrow suppression

Pentamidine — for PCP (alternative)

- Aerosolized prophylaxis or IV treatment
- Pancreatitis, hypoglycemia → hyperglycemia, QT
- Use when sulfa-allergic or TMP-SMX intolerant

- Sulfa allergy = contraindication
- Push fluids

- Monitor glucose closely
- Bronchospasm with aerosol — pre-treat with bronchodilator

8 Day 7 Standalone Infographic Summary

RIPE — First-Line TB Therapy at a Glance

Drug	Mnemonic	Hallmark Toxicity	Key Teaching	Monitor
Rifampin	"**R**ed-orange"	Hepatotoxic, CYP450 induction	Stains fluids, ↓OCP efficacy, empty stomach	LFTs, INR, CBC
Isoniazid (INH)	"**I**njury to nerves & liver"	Hepatotoxic, peripheral neuropathy	Take with B_6; avoid alcohol & tyramine	LFTs, B_6 status
Pyrazinamide	"**P**ainful joints"	Hepatotoxic, hyperuricemia → gout	Push fluids; report joint pain	LFTs, uric acid
Ethambutol	"**E**yes"	Optic neuritis, red-green color blindness	Monthly Snellen + Ishihara	Vision tests

HIV Care — Mental Map

GOAL
Undetectable viral load (U = U)

BACKBONE
2 NRTIs + 1 INSTI

MONITOR
VL, CD4, CBC, LFTs, renal, lipids, A1c

PREGNANCY
Continue ART; avoid breastfeeding; intrapartum ZDV if VL ≥1,000

PREP
HIV-negative · TDF/FTC daily · q3-mo HIV test

PEP
Within 72 h · TDF/FTC + INSTI × 28 days

OI THRESHOLD
CD4 <200 → PCP px (TMP-SMX) · CD4 <100 → toxo px · CD4 <50 → MAC px (azithromycin)

RED FLAG CLASS
Abacavir → HLA-B*5701 must be negative

Amphotericin B — Survival Checklist

MIX IN
D5W only (NS precipitates)

PRE-MEDS
APAP + diphenhydramine ± hydrocortisone

INFUSE
Pump, in-line filter, 2–6 hr

RIGORS
Meperidine 25–50 mg IV

LABS DAILY
BUN, Cr, K^+, Mg^{2+}, CBC

REPLACE
K^+ & Mg^{2+} aggressively

SWITCH TO
Liposomal form if renal injury

HOLD FOR
Cr ↑ 0.5 over baseline, K^+ < 3.0

Opportunistic-Infection Prophylaxis (CD4-Driven)

CD4 (cells/µL)	Infection	Prophylaxis	Key nursing pearl
< 200	*Pneumocystis* pneumonia (PCP)	TMP-SMX (1st) · dapsone · atovaquone · pentamidine	Check sulfa allergy; monitor K^+ & ANC

< 100	Toxoplasmosis	TMP-SMX or pyrimethamine + sulfadiazine + leucovorin	Leucovorin *must* accompany pyrimethamine to rescue marrow
< 50	*Mycobacterium avium* complex (MAC)	Azithromycin weekly or clarithromycin daily	Watch QT; clarithromycin has many DDIs
any low	CMV retinitis	Ganciclovir / valganciclovir	Bone-marrow toxic; monitor ANC, platelets

Quick Recall — Day 7 Acronyms

RIPE
Rifampin · Isoniazid · Pyrazinamide · Ethambutol

SLIPE / RIPES
Add Streptomycin for MDR-TB or 2nd-line

"AMPHO-TERRIBLE"
Pre-med, D5W, filter, watch K^+/Mg^{2+}/Cr

HIV: 2+1
2 NRTIs + 1 INSTI (or PI / NNRTI)

U = U
Undetectable = Untransmittable (sexual)

72 / 28 / 6+12+6
PEP start window / duration / serial testing months