NCLEX · PHARMACOLOGY · 2026 TEST PLAN

Sulfonamides & Trimethoprim

Antibiotic sulfa drugs that block bacterial folic acid synthesis. Prototype: **Trimethoprim-Sulfamethoxazole (TMP-SMX, Bactrim®, Septra®)**.

CLASS: Sulfonamide Antibiotics | SYSTEM: Infectious Disease | HIGH-ALERT: Allergy · SJS · Renal

01 Drug Overview — Why We Give It

- 1ST-LINE Uncomplicated UTIs (E. coli)
- Otitis media (pediatric)
- Traveler's diarrhea (Shigella)
- Ulcerative colitis / RA (sulfasalazine)
- 1ST-LINE Pneumocystis jirovecii pneumonia (PCP) — treatment & prophylaxis in HIV/immunocompromised
- Community-acquired MRSA skin/soft-tissue infection
- Toxoplasmosis (sulfadiazine + pyrimethamine)
- Burns (topical silver sulfadiazine)

TMP-SMX

BACTRIM® · SEPTRA®

Most tested. UTI, PCP, MRSA, otitis media. DS tab = double-strength.

Sulfasalazine

AZULFIDINE®

IBD & RA. Cleaved in colon → 5-ASA (anti-inflammatory).

Silver Sulfadiazine

SILVADENE®

Topical burns. Prevents wound infection — do NOT use in sulfa allergy or G6PD.

02 ⚙️ Mechanism of Action — Simplified

Sulfamethoxazole → inhibits **dihydropteroate synthase** → blocks PABA → folic acid

Trimethoprim → inhibits **dihydrofolate reductase** → blocks folic acid → tetrahydrofolate (THF)

→ Sequential blockade of folate pathway → bacteria can't make DNA/RNA/proteins

BACTERIOSTATIC alone → BACTERICIDAL when combined

🔑 **Humans get folate from diet; bacteria must synthesize it** — that's why this selectively kills bacteria. But in folate-deficient patients, the drug can cause bone marrow suppression.

03 ✨ Therapeutic Effects — How You Know It's Working

- ↓ Fever within 48–72 hrs
- Resolution of urinary symptoms (dysuria, urgency, frequency)
- Improved O_2 sat & respiratory effort in PCP
- Negative repeat culture (test of cure)
- ↓ WBC count trending toward normal
- Clear urine on follow-up culture
- Healing skin lesion / ↓ erythema in MRSA cellulitis
- Patient reports feeling "better" — subjective improvement

04 ⚠ Side Effects & Adverse Reactions

🟢 COMMON (Expected)

- Nausea, vomiting, anorexia
- Diarrhea
- Headache
- Mild rash / itching
- **Photosensitivity** — sunburn risk ↑↑
- Crystalluria (if under-hydrated)
- Metallic taste / oral candidiasis

🚨 SERIOUS / LIFE-THREATENING

- **Stevens-Johnson Syndrome / TEN** — mucocutaneous sloughing
- **Anaphylaxis** / angioedema
- **Acute kidney injury** — crystalluria → obstruction
- **Hemolytic anemia** in G6PD deficiency
- **Bone marrow suppression** — agranulocytosis, thrombocytopenia, aplastic anemia
- **Hyperkalemia** (TMP blocks renal K^+ excretion)
- **Kernicterus** in neonates (displaces bilirubin)
- Hepatotoxicity / *C. difficile* colitis

05 Priority Nursing Considerations

ASSESS	**Allergy history FIRST** — sulfa allergy absolute contraindication. Ask about prior rash, swelling, SOB.
ASSESS	Pregnancy status (Cat. D in 3rd trimester), breastfeeding, G6PD status.
MONITOR	CBC with diff, BUN/Cr, K^+, LFTs — baseline & periodic. Urine output ≥ 30 mL/hr.
MONITOR	Skin every shift for rash, blisters, mucosal involvement (mouth/eyes/genitals).
HOLD IF	ANY rash, oral blisters, fever + sore throat, severe bruising, platelets < 100K, Cr rising, K^+ > 5.0.
AVOID	Pregnancy (3rd trimester), infants < 2 mo, severe renal/hepatic failure, G6PD deficiency, megaloblastic anemia.
NOTIFY HCP	Rash, fever, sore throat, easy bruising, flank pain, decreased urine output, jaundice.
TEACH	Push fluids 2–3 L/day, finish full course, SPF 30+ & protective clothing, report ANY skin changes.

KEY DRUG INTERACTIONS

Warfarin ↑ INR/bleeding · **Methotrexate** ↑ toxicity · **Sulfonylureas** ↑ hypoglycemia · **Phenytoin** ↑ level · **ACE-I / ARBs / spironolactone / K^+-sparing diuretics** ↑ hyperkalemia · **Oral contraceptives** ↓ efficacy (use backup)

06 Labs & Diagnostics

LAB	CRITICAL VALUE	WHAT IT MEANS
WBC / ANC	**WBC < 4K · ANC < 1.5K**	Bone marrow suppression — infection risk; hold drug
Platelets	**< 100,000**	Thrombocytopenia — bleeding precautions, hold drug
Hgb / Hct	**Hgb < 10 g/dL, ↓ Hct**	Hemolytic anemia (esp. G6PD) or aplastic anemia
BUN / Creatinine	**Cr > 1.3 · BUN > 20**	AKI from crystalluria — push fluids, hold drug
Potassium (K^+)	**> 5.0 mEq/L**	Hyperkalemia — check ECG for peaked T-waves
LFTs (AST/ALT)	**> 3× ULN**	Hepatotoxicity — watch for jaundice
Urinalysis	**Crystals, ↑ protein**	Crystalluria → tubular obstruction
Culture & Sensitivity	Before 1st dose	Confirms appropriate antibiotic coverage

07 Administration & Safety

ROUTE & TIMING

PO or IV. Give PO with a **FULL glass of water (8 oz)**. IV form for severe infection or PCP. Space doses evenly (q12h typical).

HYDRATION RULE

Push **2–3 L fluids/day** to prevent crystalluria and AKI. Maintain urine output ≥ 30 mL/hr / 1200 mL/24h.

WITH FOOD?

Take with food if GI upset, but empty stomach increases absorption. Avoid antacids within 2 hr.

HIGH-ALERT PRECAUTIONS

Sulfa allergy = **DO NOT GIVE**. Cross-reactivity low but possible with loop/thiazide diuretics, sulfonylureas, celecoxib — verify before first dose.

IV INFUSION

Dilute in D5W (NOT saline alone). Infuse over 60–90 min. **Do NOT mix** with other drugs — precipitates.

COURSE LENGTH

UTI: 3 days · Complicated UTI: 7–14 days · PCP: 21 days. Complete full course even if feeling better.

08 🗣️ Patient Education — What They MUST Know

💧
HYDRATE AGGRESSIVELY
Drink 8–10 glasses of water daily to prevent kidney crystals.

☀️
SUN PROTECTION
SPF 30+, long sleeves, hat. Severe sunburn can occur in minutes.

🚨
STOP & CALL IF RASH
Any rash, blisters, mouth sores, peeling skin = ER immediately (SJS).

🤒
REPORT INFECTION SIGNS
Sore throat, fever, unusual bruising/bleeding → lab check needed.

💊
FINISH THE BOTTLE
Complete entire course even if symptoms resolve — prevents resistance & relapse.

🤰
PREGNANCY/BF ALERT
Tell HCP if pregnant or breastfeeding. Use backup contraception.

🧂
WATCH SALT SUBSTITUTES
"NoSalt" contains KCl — can cause dangerous hyperkalemia with TMP-SMX.

🍷
AVOID ALCOHOL
Disulfiram-like reaction possible; also worsens liver strain.

📅
FOLLOW-UP CULTURE
Return for test-of-cure urine/sputum as ordered.

09 NCLEX Test Traps

⚠ **Sulfa ≠ Penicillin allergy.** Don't assume one means the other. But a sulfa allergy CAN cross-react with sulfonylureas (glyburide, glipizide), thiazides, loops, and celecoxib — verify carefully.

⚠ **Rash = STOP the drug, DON'T medicate through it.** The trap answer says "give diphenhydramine." The correct answer is **hold the drug and notify HCP** — could be early SJS.

⚠ **TMP-SMX causes HYPERkalemia, not hypokalemia.** Teaching point: avoid salt substitutes (KCl) and combining with ACE-I/ARB/spironolactone.

⚠ **PUSH fluids** with sulfa drugs — opposite of restriction teaching used for other drugs (e.g., SIADH, CHF). If question asks "what teaching is priority," fluid intake wins.

⚠ **Contraindicated in late pregnancy & neonates < 2 mo** → kernicterus (displaces bilirubin from albumin). Very popular NCLEX question.

⚠ **G6PD deficiency** → hemolytic anemia. Assess ethnic background: Mediterranean, African, Middle Eastern, Southeast Asian.

⚠ **Throat pain + fever** on sulfa = NOT just a cold. Think **agranulocytosis** → get a CBC, hold drug.

⚠ **Priority sequencing:** In SJS scenario → **AIRWAY first**, then stop drug, then IV fluids, then transfer to burn unit.

⚠ **"Take on empty stomach"** vs "with food" — either is acceptable; **the non-negotiable is the full glass of water**. That's the tested answer.

10 🧠 Memory Boosters

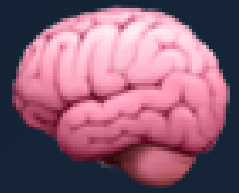
"S-U-L-F-A" — Side Effect Recall

S	**S**tevens-Johnson Syndrome & **S**kin photosensitivity
U	**U**rinary crystals → push fluids, prevent AKI
L	**L**ow blood counts — agranulocytosis, thrombocytopenia, aplastic anemia
F	**F**olate deficiency & **F**etal risk (kernicterus in 3rd trimester)
A	**A**llergy (cross with sulfonylureas, thiazides) & hemolytic **A**nemia in G6PD

- ✓ **"Sulfa drugs need SUN protection & WATER"** — covers photosensitivity + crystalluria in one phrase.
- ✓ **"Bactrim Breaks Blood"** — all 3 cell lines can drop (RBC/WBC/platelets).
- ✓ **"Folic acid Fighters harm Fetuses"** — avoid in pregnancy & neonates.
- ✓ **T.M.P. = "Too Much Potassium"** — trimethoprim causes hyperkalemia.
- ✓ **Class pattern:** All sulfa-containing drugs (antibiotics, thiazides, loops, sulfonylureas, celecoxib, acetazolamide) share the same allergy risk — ask about sulfa allergy before ANY of them.

FINAL SECTION · NGN CLINICAL JUDGMENT

Clinical Judgment Snapshot



The three questions every NGN item on sulfonamides is testing. Memorize these answers.

#1 PRIORITY RISK

Stevens-Johnson Syndrome / TEN — a *life-threatening mucocutaneous emergency* with fever, rash progressing to blisters, and mucosal sloughing. Mortality up to 30%.

WHAT HARMS THE PATIENT FIRST

An *allergic/hypersensitivity reaction* — angioedema or anaphylaxis can occlude the airway within minutes of the first dose.

FIRST NURSING ACTION IF RASH APPEARS

***STOP the drug*, assess airway & vitals, then notify provider. Never "push through" a rash on a sulfa drug.**

FIRST ACTION IN SUSPECTED ANAPHYLAXIS

Stop infusion · maintain airway · *administer IM epinephrine* · call rapid response · elevate legs / Trendelenburg · O_2.

BEFORE GIVING THE FIRST DOSE

Verify *no sulfa allergy*, check pregnancy status, review baseline CBC / BUN / Cr / K^+, confirm *culture was drawn*, and teach the hydration + sun protection rules.

NCLEX-RN 2026 · **SULFONAMIDES HIGH-YIELD REVIEW** · PREPARED FOR RAPID REVIEW — ALWAYS CROSS-CHECK WITH YOUR PRIMARY SOURCE