ONCOLOGY PHARMACOLOGY · SYSTEM: HEMATOLOGY / MULTI-SYSTEM

Chemo*therapy* Agent Toxicities

A high-yield visual study guide for NGN NCLEX 2026 prep — recognize drug-specific toxicities, prioritize nursing action, and master the patterns examiners love to test.

NCLEX 2026
VISUAL STUDY GUIDE
SERIES · ONCOLOGY
NCJMM FRAMEWORK

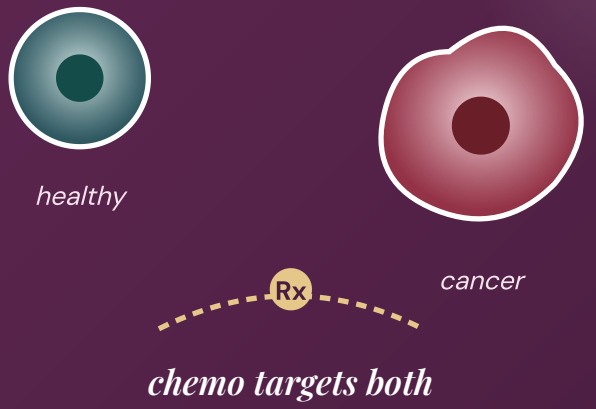
01 Definition & Overview

FOUNDATION

Cytotoxic drugs are *non-selective* — they damage the cancer cell, and every rapidly dividing healthy cell in their path.

That non-selectivity is why chemotherapy produces predictable, drug-specific organ toxicities. Knowing **which drug hurts which organ** is the heart of safe oncology nursing care.

- Every chemotherapy agent has a **signature target organ** it damages.
- Bone marrow suppression (anemia, neutropenia, thrombocytopenia) is the **universal toxicity** of nearly all cytotoxic agents.
- Nurses must recognize toxicity **early** — many effects are irreversible if missed.



02 Pathophysiology — How Toxicity Happens

MECHANISM

Chemotherapy targets **rapidly dividing cells**. Healthy tissues with high turnover (bone marrow, GI lining, hair, gonads) are collateral damage — and each drug also has its own **organ-specific toxicity**.

01	→	02	→	03	→	04	→	05
Cytotoxic drug		**Targets dividing cells**		**DNA/cell damage**		**Organ-specific hit**		**Clinical toxicity**
Given IV/PO — circulates systemically		Cancer cells + marrow, GI, hair		Apoptosis of rapidly dividing tissue		Heart, lungs, bladder, nerves, kidneys		Signs & symptoms appear — *nurse must recognize*

03 Signs & Symptoms

ASSESSMENT

EXPECTED · GENERALLY REVERSIBLE

Common Chemo Side Effects

- **Alopecia** — hair loss (grows back)
- **Nausea & vomiting** — often premedicated
- **Stomatitis / mucositis** — mouth sores
- **Fatigue** — from anemia + systemic effect
- **Myelosuppression** — low WBC, RBC, platelets (nadir day 7–14)

RED FLAGS · DRUG-SPECIFIC TOXICITY

Priority — Report Immediately

- **Hematuria / pink urine** → Cytoxan hemorrhagic cystitis
- **SOB, dry cough, crackles** → Bleomycin pulmonary fibrosis
- **Dyspnea, edema, HF signs** → Adriamycin cardiotoxicity
- **Foot drop, paresthesia, absent bowel sounds** → Vincristine/Cisplatin neuropathy & paralytic ileus
- **Hearing loss, tinnitus** → Cisplatin ototoxicity
- **Temp >100.4°F (38°C)** with neutropenia → medical emergency

04 The 7 High-Yield Chemo Agents

PHARMACOLOGY

Cytoxan

cyclophosphamide

TARGET: BLADDER

⚠ Hemorrhagic Cystitis

- **Push fluids** (3 L/day)
- Monitor for **hematuria**
- Give **Mesna** as protective agent
- Void frequently — especially at bedtime

Adriamycin

doxorubicin

TARGET: HEART

⚠ Cardiotoxicity (irreversible)

- Baseline + serial **EKG / echo**
- Watch for **HF signs:** dyspnea, edema, JVD
- Urine turns **red** — harmless
- Vesicant — prevent extravasation

Bleomycin

bleomycin sulfate

TARGET: LUNGS

⚠ Pulmonary Fibrosis

- Baseline **PFTs** before tx
- Auscultate lungs — listen for **crackles**
- Report **dry cough, dyspnea**
- Avoid **high FiO_2** — worsens toxicity

Methotrexate

MTX

TARGET: ALMOST EVERYTHING

⚠ Multi-organ (spares heart)

- **NEVER** give with **aspirin / NSAIDs** — ↑ toxicity
- Rescue with **Leucovorin** (folinic acid)
- Monitor **LFTs, BUN/Cr, CBC**
- Push fluids + alkalinize urine

Cisplatin

cisplatin

TARGET: NERVES · EARS · KIDNEYS

⚠ Neuropathy · Ototoxicity

- Assess **hearing** & **balance**
- Watch for **numbness, foot drop**
- Monitor **BUN, creatinine**
- Constipation → paralytic ileus risk

Vincristine

vincristine sulfate

TARGET: PERIPHERAL NERVES

⚠ Peripheral Neuropathy · Ileus

- Assess **DTRs, gait, foot drop**
- Auscultate **bowel sounds** q shift
- Stool softeners + fiber for ileus prevention
- **IV only** — fatal if intrathecal

DTIC-Dome

dacarbazine

TARGET: SYSTEMIC

⚠ Flu-like Syndrome

- Expect **fever, myalgia, malaise**
- Premedicate with **antipyretics**
- Rule out true infection if neutropenic
- Vesicant — protect IV site

Quick Pattern

Memorize the **drug → organ** link. On NCLEX the question will almost always give the drug and ask you to recognize the red flag:

- **Cytoxan** → Bladder
- **Adriamycin** → Heart
- **Bleo** → Lungs
- **Vincristine / Cisplatin** → Nerves
- **Methotrexate** → Everything (not heart)

05 Priority Nursing Interventions

ACTION

Airway · Breathing

Monitor Respiratory Status (Bleomycin)

Auscultate lungs every shift. Report **dry cough, dyspnea, crackles** immediately — pulmonary fibrosis is irreversible. Keep oxygen **low-flow** (high FiO_2 worsens bleomycin toxicity).

Circulation

Assess Cardiac Function (Adriamycin)

Baseline EKG + serial echo for ejection fraction. Watch for **HF**: dyspnea, edema, JVD, weight gain. Stop the drug at the first signs — damage is **irreversible**.

Safety

Neutropenic Precautions

Any temp **≥ 100.4°F (38°C)** in a chemo patient = emergency. Private room, strict hand hygiene, no fresh flowers/raw produce, avoid crowds, report sore throat or chills.

Safety

Bleeding Precautions

Platelets < 50,000 → **soft toothbrush, electric razor, no IM injections, no aspirin/NSAIDs**. Monitor for bruising, petechiae, melena, hematuria.

Elimination

Hydration & Bladder Protection

Push fluids to 3 L/day for Cytoxan — dilutes metabolites and prevents hemorrhagic cystitis. Monitor urine color. Give **Mesna** as ordered. Void at bedtime.

Neuro · GI

Assess for Neuropathy & Ileus

For Vincristine / Cisplatin: check DTRs, gait, sensation. Auscultate **bowel sounds q shift** — absent = paralytic ileus. Stool softeners, fiber, fluids prophylactically.

Nutrition

Manage Nausea & Mucositis

Premedicate with **ondansetron**. Use **soft-bristle toothbrush**, avoid commercial mouthwash (alcohol stings), rinse with saline/baking soda. Cool bland foods tolerate best.

Assessment

Drug-Specific Labs

Methotrexate: LFTs, BUN/Cr, CBC — and keep **Leucovorin** available as rescue. Cisplatin: renal function + audiology. All chemo: CBC at **nadir (day 7–14)**.

06 NCLEX Test Traps

EXAM STRATEGY

01

~~WRONG THINKING~~

~~"Red urine after Adriamycin — call the provider STAT for bleeding."~~

RIGHT ANSWER

Red/orange urine after Adriamycin is HARMLESS — it's the drug's color. The REAL red flag is CARDIOTOXICITY: dyspnea, edema, HF signs.

02

~~WRONG THINKING~~

~~"Chemo patient on Methotrexate has a headache — give aspirin."~~

RIGHT ANSWER

NEVER give aspirin or NSAIDs with methotrexate — they displace it from protein-binding sites and DRAMATICALLY INCREASE toxicity. Use acetaminophen.

03

~~WRONG THINKING~~

~~"Constipation on Vincristine — just give a stool softener and move on."~~

RIGHT ANSWER

Vincristine constipation is NEUROTOXICITY → PARALYTIC ILEUS, not just slow gut. Auscultate bowel sounds. ABSENT BOWEL SOUNDS = EMERGENCY.

04

~~WRONG THINKING~~

~~"Patient on Bleomycin is short of breath — turn O_2 up to 6 L."~~

RIGHT ANSWER

HIGH FIO_2 WORSENS BLEOMYCIN PULMONARY TOXICITY. Use the LOWEST O_2 concentration that maintains sats. Notify provider.

05

~~WRONG THINKING~~

~~"Neutropenic patient has a temp of 100.5°F — monitor and recheck in 2 hours."~~

RIGHT ANSWER

In a neutropenic chemo patient, ANY TEMP ≥ 100.4°F (38°C) IS A MEDICAL EMERGENCY. Cultures & broad-spectrum antibiotics within 1 hour.

06

~~WRONG THINKING~~

~~"Vincristine can be given IV or intrathecally."~~

RIGHT ANSWER

Vincristine is *IV ONLY*. Intrathecal administration is *FATAL* — a classic sentinel event in oncology nursing.

07 NCJMM Clinical Judgment Scenario

NGN 2026

> *"A 58-year-old female with ovarian cancer is on day 3 of a Cytoxan + Cisplatin regimen. She reports pink-tinged urine, burning with urination, numbness in her toes, and states her hearing 'sounds muffled.' Temp 100.6°F, HR 102, BP 108/64."*

Step 01

Recognize Cues

Pink urine + burning → Cytoxan hemorrhagic cystitis. **Toe numbness + muffled hearing** → Cisplatin neuro- & ototoxicity. **Temp >100.4°F** with chemo → febrile neutropenia risk.

Step 02

Analyze Cues

Three concurrent toxicities. The **fever with potential neutropenia** is life-threatening (sepsis risk). Hemorrhagic cystitis risks hemorrhage + clots. Ototoxicity is irreversible but not immediately deadly.

Step 03

Prioritize · Act

1st: Blood cultures + broad-spectrum antibiotics within 1 hour (ABCs — infection). **2nd**: Push IV fluids + notify provider re: Cytoxan/Mesna. **3rd**: Hold next Cisplatin dose pending audiology & neuro eval.

Step 04

Evaluate Outcomes

Temp < 100.4°F within 24 h, urine clearing, WBC trending up, neuropathy not progressing, hearing stable. Reinforce teaching on fever, bleeding, and safety precautions before the next cycle.

08 Patient & Family Education

TEACHING

Report Any Fever ≥ 100.4°F

Infection Precautions

Drink Fluids — 3 L / day

Even mild fever is an emergency when you're on chemo. Call your provider — do not wait it out.

Avoid crowds, sick contacts, raw produce, fresh flowers, pet waste. Wash hands constantly. Get a thermometer and use it daily.

Especially with Cytoxan. Void before bed. Call if urine turns pink, red, or burns.

No Aspirin / NSAIDs

Use acetaminophen for pain/fever. Aspirin raises bleeding risk and dangerously boosts methotrexate toxicity.

Hair & Body Changes

Alopecia is temporary — hair regrows in 2–3 months, sometimes a different color/texture. Gentle shampoo, no dyes, soft brush.

Take Anti-Nausea On Schedule

Don't wait for nausea to start — premedicate. Eat small, bland, cool meals. Ginger and peppermint can help.

09 Memory Boosters & Mnemonics

REVIEW

High-yield mnemonics to lock drug–organ pairings into long-term memory:

CABBV

DRUG-ORGAN MATCH — "A BAD CHEMO HAS VICIOUS EFFECTS"

- **C** Cytoxan → Cystitis (hemorrhagic) 🩸
- **A** Adriamycin → affects the heArt 💔
- **B** Bleomycin → Breathing (pulmonary fibrosis) 🫁
- **B** Both Vincristine & Cisplatin → Body nerves 🦶
- **V** Vincristine → Vein only (never intrathecal!) 💉

HAPPEN

CHEMO RED FLAGS TO REPORT — "WHAT'S HAPPENING?"

- **H** Hematuria (Cytoxan)
- **A** Absent bowel sounds (Vincristine/Cisplatin)
- **P** Pulmonary changes — cough, SOB (Bleomycin)
- **P** Pumping heart failure (Adriamycin)
- **E** Ear / hearing changes (Cisplatin)
- **N** Neutropenic fever ≥ 100.4°F

DRY & COLD

METHOTREXATE WATCH-OUTS

NADIR

WHEN COUNTS HIT BOTTOM — DAYS 7–14

D	Don't give aspirin
R	Rescue with Leucovorin
Y	Your labs: LFTs, BUN/Cr, CBC
C	Check mucositis
L	Liver + kidney toxic
D	Dehydration = worse toxicity

N	Neutrophils drop (infection risk)
A	Anemia develops (fatigue, pallor)
D	Draw CBC to monitor
I	Infection precautions essential
R	Report temp ≥ 100.4°F immediately