💊 PROSTAGLANDIN DERIVATIVES

Drug Class | Prostaglandin Analogs / Synthetic Prostaglandins

Systems: GI • OB/Reproductive • Ophthalmic • Cardiovascular/Pulmonary • Neonatal

NGN NCLEX-RN Infographic • 2026 Test Plan • Rapid Review <60 sec

1. DRUG OVERVIEW — Why We Give It

Key Indications by Drug:

- **Misoprostol (Cytotec):** NSAID-induced ulcer prevention; cervical ripening; labor induction; postpartum hemorrhage; medical abortion
- **Dinoprostone (Cervidil / Prepidil):** Cervical ripening at term; second-trimester pregnancy termination
- **Carboprost (Hemabate):** Postpartum hemorrhage due to uterine atony (after oxytocin/methylergonovine fail)
- **Latanoprost / Bimatoprost / Travoprost:** Open-angle glaucoma and ocular hypertension (↓ intraocular pressure)
- **Alprostadil (Prostin VR):** Maintains patent ductus arteriosus (PDA) in neonates with ductal-dependent congenital heart defects; erectile dysfunction
- **Epoprostenol / Iloprost / Treprostinil:** Pulmonary arterial hypertension (PAH)

High-Yield Clinical Use Patterns:

- GI: Protect stomach lining in chronic NSAID users (especially elderly, RA patients)
- OB: Soften cervix → induce labor → control postpartum bleeding
- Eye: First-line for open-angle glaucoma (better than beta-blockers, once-daily dosing)
- Neonate: 'Keep the duct open' in cyanotic CHDs until surgery
- Lungs: Vasodilate pulmonary vessels in PAH

2. MECHANISM OF ACTION (Simplified)

Core Concept:

Synthetic prostaglandins mimic natural PG receptors (EP, FP, IP) to produce targeted physiologic effects.

GI (Misoprostol) — PGE_1 analog:

↓ Gastric acid secretion → ↑ mucus + bicarbonate → ↑ mucosal blood flow → STOMACH PROTECTION

OB (Misoprostol / Dinoprostone / Carboprost):

Bind uterine PG receptors → soften/ripen cervix → stimulate uterine contractions → LABOR / EXPULSION / HEMOSTASIS

Eye (Latanoprost — $PGF_2\alpha$ analog):

↑ Uveoscleral outflow of aqueous humor → ↓ intraocular pressure

Neonate (Alprostadil — PGE_1):

Relaxes ductal smooth muscle → keeps ductus arteriosus OPEN → maintains systemic or pulmonary blood flow

Lung (Epoprostenol — PGI_2/prostacyclin):

Pulmonary vasodilation + platelet aggregation inhibition → ↓ pulmonary vascular resistance

3. THERAPEUTIC EFFECTS — Signs It's Working

- **Misoprostol (GI):** Absence of ulcer symptoms; no epigastric pain; no GI bleeding in chronic NSAID user
- **Misoprostol/Dinoprostone (OB):** Bishop score ↑; effacement/dilation of cervix; regular contractions
- **Carboprost (PPH):** Firm fundus; ↓ lochia; stable BP; no boggy uterus
- **Latanoprost (Eye):** Intraocular pressure <21 mmHg (goal often <18)
- **Alprostadil (Neonate):** ↑ SpO_2; ↓ cyanosis; palpable peripheral pulses; improved perfusion
- **Epoprostenol (PAH):** Improved exercise tolerance; ↓ dyspnea; ↓ pulmonary artery pressure

4. SIDE EFFECTS & ADVERSE REACTIONS

COMMON (Class-wide):

- Diarrhea, abdominal cramping (Misoprostol — very common, dose-limiting)
- Nausea, vomiting, headache, flushing
- Uterine cramping, vaginal bleeding (OB uses)
- Eye: burning, stinging, redness, blurred vision (ophthalmic drops)

SERIOUS / LIFE-THREATENING:

- **Misoprostol — PREGNANCY LOSS / TERATOGEN:** Category X. Causes abortion, preterm labor, fetal death in a wanted pregnancy
- **Uterine Tachysystole / Hyperstimulation:** >5 contractions in 10 min, or contractions lasting >90 sec → fetal distress, uterine rupture
- **Carboprost — BRONCHOSPASM:** CONTRAINDICATED IN ASTHMA — can cause fatal bronchoconstriction
- **Alprostadil — APNEA:** 10–12% of neonates; have intubation equipment at bedside
- **Epoprostenol — REBOUND PAH:** Abrupt discontinuation → acute pulmonary HTN crisis → death (half-life 3–5 min)
- **Latanoprost — PERMANENT IRIS PIGMENTATION:** Brown pigment in blue/green eyes (irreversible); eyelash elongation/darkening
- **Hypotension:** All PGs cause vasodilation — watch in PAH and PDA neonates

5. PRIORITY NURSING CONSIDERATIONS

→ ASSESS (Before Administration):

- Pregnancy status before giving misoprostol for ulcers — NEGATIVE βhCG required
- Asthma history — absolute contraindication for carboprost
- Fetal heart tones & contraction pattern before and during dinoprostone/misoprostol induction
- Baseline vital signs, especially BP (vasodilation risk)
- Intraocular pressure baseline before starting latanoprost

→ MONITOR:

- Continuous fetal monitoring during cervical ripening (required)
- Uterine contraction frequency, duration, intensity every 15–30 min

- Fundal tone, lochia, and VS q15 min × 1 hr after carboprost
- SpO_2 and respiratory rate continuously on alprostadil (apnea!)
- Central line integrity for epoprostenol (continuous infusion, never interrupt)

→ HOLD / STOP the drug if:

- **Uterine tachysystole:** >5 contractions in 10 min or contraction >90 sec
- **Non-reassuring FHR:** late decels, bradycardia <110, loss of variability
- **Wheezing/bronchospasm:** during carboprost → stop immediately
- **Apnea in neonate:** on alprostadil → ready to intubate
- **Chest pain, severe hypotension:** on epoprostenol

CONTRAINDICATIONS:

- **Misoprostol:** PREGNANCY (unless inducing labor/abortion); prior C-section (uterine rupture risk)
- **Carboprost:** ASTHMA, active pulmonary/cardiac/renal/hepatic disease
- **Dinoprostone:** Prior C-section or uterine surgery; grand multiparity; fetal distress
- **Latanoprost:** Active intraocular inflammation

KEY DRUG INTERACTIONS:

- Misoprostol + oxytocin → additive uterine stimulation
- Any PG + oxytocin → wait 4+ hours between agents (uterine hyperstimulation)
- Epoprostenol + anticoagulants → ↑ bleeding (PG inhibits platelets)

6. LABS & DIAGNOSTICS

- **β-hCG (pregnancy test):** MUST be negative before misoprostol for ulcer prevention
- **CBC / H&H:** Monitor for blood loss during OB use (hemorrhage vs therapeutic effect)
- **Coagulation panel (PT/INR/aPTT):** Before and during epoprostenol (bleeding risk)
- **ABG / SpO_2:** Neonates on alprostadil — confirm improved oxygenation
- **Intraocular Pressure:** Target <21 mmHg on latanoprost (checked at each eye visit)
- **Right heart cath / Echo:** Track PAH response to epoprostenol
- **Bishop Score:** Evaluates cervical readiness before induction (>8 favorable)

Critical Value Alerts:

- **FHR <110 bpm:** Bradycardia → stop cervical ripening agent
- **Hgb drop >2 g/dL postpartum:** Ongoing hemorrhage
- **SpO_2 <85% on alprostadil:** Despite infusion → apnea vs. worsening CHD

7. ADMINISTRATION & SAFETY — HIGH ALERT

Routes & Timing:

- **Misoprostol:** PO (with food, for ulcers) or vaginal/sublingual/buccal (OB)
- **Dinoprostone:** Intravaginal gel or insert — patient REMAINS SUPINE 30 min–2 hr after insertion
- **Carboprost:** DEEP IM (gluteal) — may repeat q15–90 min (max 8 doses / 2 mg total)
- **Latanoprost:** 1 drop to affected eye(s) at BEDTIME (nighttime dosing preferred)
- **Alprostadil:** Continuous IV infusion via central line; titrate to lowest effective dose
- **Epoprostenol:** Continuous IV via permanent central line — NEVER INTERRUPT (half-life 3–5 min)

HIGH-ALERT PRECAUTIONS:

- Misoprostol is TERATOGENIC — store separately, verify non-pregnancy before dispensing

- Dinoprostone insert has a RETRIEVAL STRING — pull to remove if hyperstimulation
- Two nurses verify oxytocin start AFTER PG removal + minimum 30-min wait (facility-specific: 30 min for insert, 4 hr for gel)
- Carboprost: pre-medicate with antiemetic + antidiarrheal (common GI effects)
- Alprostadil: have intubation equipment at bedside BEFORE starting
- Epoprostenol: BACKUP PUMP and MEDICATION always available — any interruption = emergency

Storage:

- Dinoprostone: refrigerate; bring to room temp before insertion
- Epoprostenol: reconstituted; keep on ice packs during infusion (cold chain required)
- Latanoprost: refrigerate unopened; room temp once opened × 6 weeks

8. PATIENT EDUCATION

Misoprostol (Ulcer Prevention):

- Take WITH FOOD to minimize diarrhea
- Use reliable contraception — pregnancy must be avoided
- Do NOT share medication with pregnant women (can cause miscarriage)
- Report severe diarrhea, abdominal pain, or unusual bleeding

Latanoprost / Bimatoprost (Eye Drops):

- Instill 1 drop at BEDTIME (once daily — more is not better)
- Wait 5+ minutes between different eye drops
- Remove contact lenses before use; wait 15 min to reinsert
- Eye color may permanently darken (blue/green → brown)
- Eyelashes may grow longer, thicker, darker
- Apply punctal pressure 1 min after drop to reduce systemic absorption

OB Patient (Cervical Ripening):

- Remain lying on left side for 30 min–2 hr after insertion
- Report immediately: strong/frequent contractions, leaking fluid, vaginal bleeding, decreased fetal movement

PAH Patient (Epoprostenol):

- NEVER stop infusion abruptly — carry backup pump & cassette at all times
- Inspect central line daily for infection (fever, redness, drainage)
- Keep emergency contact card with drug info visible

⚠ Seek Help Immediately If:

- Severe abdominal pain, heavy bleeding, chest pain, difficulty breathing
- Signs of pregnancy while on misoprostol
- Eye pain, vision changes, severe redness (latanoprost)
- Pump alarm or line problem (epoprostenol) — this is a medical emergency

9. NCLEX TEST TRAPS ⚠

- **TRAP 1 — The Misoprostol + Pregnancy Trap:** Never give for ulcers to a woman of childbearing age without a negative pregnancy test. 'Take with meals' is not the priority — PREGNANCY STATUS is.

- **TRAP 2 — Carboprost in the Asthmatic Mother:** Postpartum hemorrhage + history of asthma? DO NOT give carboprost. Choose methylergonovine (if no HTN) or oxytocin. NCLEX loves this one.
- **TRAP 3 — 'Baby's lips are pink now, stop the drip':** Alprostadil must continue until surgical repair. Stopping = closed duct = death.
- **TRAP 4 — Methylergonovine vs Carboprost vs Oxytocin:** Oxytocin first line for PPH → methylergonovine (avoid in HTN) → carboprost (avoid in asthma). Know the sequence and contraindications.
- **TRAP 5 — Latanoprost 'missed a dose':** Take when remembered, but if close to next dose, SKIP — do not double-dose. More drops ≠ lower pressure.
- **TRAP 6 — Uterine Hyperstimulation Priority:** Remove dinoprostone insert FIRST, then position left lateral, O_2, IV fluids, call provider. NOT call provider first.
- **TRAP 7 — Epoprostenol line disconnect:** Reconnect/restart IMMEDIATELY — don't stop to call the doctor. Action before notification when death is minutes away.
- **TRAP 8 — 'Prostaglandin' vs 'PG inhibitor':** NSAIDs INHIBIT prostaglandins (cause ulcers) — misoprostol REPLACES them (prevents ulcers). Opposite mechanisms.
- **TRAP 9 — Prior C-section + induction:** Prostaglandins CONTRAINDICATED — risk of uterine rupture. Use mechanical methods.
- **TRAP 10 — 'Eye color change is harmful':** Latanoprost iris pigmentation is cosmetic and expected, NOT a reason to stop therapy.

10. MEMORY BOOSTERS & MNEMONICS

'PROSTA' — Class-wide effects:

- **P** — Pregnancy effects (contractions, abortion, induction)
- **R** — Relaxes smooth muscle (vascular, ductal, GI)
- **O** — Opens ductus arteriosus (alprostadil)
- **S** — Stomach protection (misoprostol)
- **T** — Tears and pressure in the eye ↓ (latanoprost)
- **A** — Asthma = AVOID carboprost

'MISO = MISCARRIAGE':

- MISOprostol can cause MIScarriage → never in pregnant patients (unless inducing)

'Latanoprost = Lashes + LATE in day (bedtime)':

- Given at bedtime → causes Longer Lashes + possible iris color change

Suffix Pattern — '-prost':

- Most prostaglandin drugs end in -prost: misoprost-ol, dinoproston-e, carboprost, latanoprost, bimatoprost, travoprost, epoprostenol, iloprost, treprostinil, alprostadil

'PPH Ladder' — Postpartum hemorrhage drugs:

- 1 Oxytocin (first)
- 2 Methylergonovine (NOT if HTN)
- 3 Carboprost (NOT if asthma)
- 4 Misoprostol (backup option)
- 5 TXA (antifibrinolytic)

'Keep the Duct Open' (Neonatal CHD):

- Alprostadil = 'A-LIFELINE' → opens the ductus arteriosus in cyanotic babies until surgery
- Compare: INDOMETHACIN closes the duct in preemies (opposite drug, opposite goal)

⭐ MOST TESTED DRUGS IN THIS CLASS — Quick Compare

DRUG	USE	#1 NURSING PRIORITY	ROUTE	KEY CONTRAINDICATION
Misoprostol (Cytotec)	NSAID ulcer prevention; cervical ripening; PPH	Pregnancy test — TERATOGEN (Cat X)	PO / vaginal / SL / buccal	Pregnancy (unless inducing); prior C-section
Dinoprostone (Cervidil)	Cervical ripening at term	Continuous fetal monitoring; hold for tachysystole	Vaginal insert / gel	Prior C-section; grand multiparity
Carboprost (Hemabate)	Postpartum hemorrhage (atony)	Pre-medicate for diarrhea; watch for bronchospasm	Deep IM	ASTHMA (absolute)
Latanoprost (Xalatan)	Open-angle glaucoma	Bedtime dosing; punctal pressure 1 min	Ophthalmic drops	Active eye inflammation
Alprostadil (Prostin VR)	Keep PDA open in neonatal CHD	Intubation equipment at bedside — APNEA	Continuous IV	Hyaline membrane disease
Epoprostenol (Flolan)	Pulmonary arterial hypertension	NEVER interrupt infusion — rebound PAH kills	Continuous central IV	Heart failure (LV); pulmonary edema

🧠 CLINICAL JUDGMENT SNAPSHOT — The NGN Bottom Line

#1 PRIORITY RISK PER DRUG:

- **Misoprostol:** TERATOGENICITY / unintended pregnancy loss + uterine rupture
- **Dinoprostone:** UTERINE TACHYSYSTOLE → fetal distress → rupture
- **Carboprost:** BRONCHOSPASM (asthma patient)
- **Alprostadil:** APNEA in neonate
- **Epoprostenol:** Abrupt discontinuation → REBOUND pulmonary HTN crisis → death
- **Latanoprost:** Permanent iris pigmentation (cosmetic) — systemic absorption minimal

WHAT WILL HARM THE PATIENT FIRST?

Airway and circulation complications — bronchospasm (carboprost), apnea (alprostadil), and hemodynamic collapse (epoprostenol interruption) kill in minutes. Uterine hyperstimulation harms BOTH mother AND fetus within the same timeframe.

FIRST NURSING ACTION IN A SCENARIO:

- **Uterine tachysystole during induction →** REMOVE the dinoprostone insert / STOP misoprostol → reposition left lateral → O_2 via mask → IV fluids → notify provider
- **Wheezing after carboprost →** STOP the drug → administer O_2 → bronchodilator (albuterol) → notify provider
- **Apnea on alprostadil →** Stimulate neonate → bag-mask ventilation → prepare to intubate (do NOT stop PGE_1 drip unless stable alternative)
- **Epoprostenol line disconnect →** RESTART infusion IMMEDIATELY with backup — don't stop to call
- **PPH with asthma history →** SKIP carboprost → use oxytocin/misoprostol/methylergonovine (if normotensive)
- **Misoprostol ordered for ulcer in 28-y/o female →** HOLD dose → verify negative pregnancy test & contraception plan BEFORE administering

REMEMBER: On NGN items, the correct priority action is almost always REMOVE/STOP the offending agent FIRST, then support ABCs, then notify.