clindamycin (klin-da-**mye**-sin)

Cleocin

Classification

Therapeutic: anti-infectives

Pregnancy Category B

Indications

PO, IM, IV: Treatment of: Skin/skin structure infections, Respiratory tract infections, Septicemia, Intra-abdominal infections, Gynecologic infections, Osteomyelitis. **Vag:** Bacterial vaginosis.

Action

Inhibits protein synthesis in susceptible bacteria at the level of the 50S ribosome. **Therapeutic Effects:** Bactericidal or bacteriostatic action, depending on susceptibility/concentration. **Spectrum:** Active against most gram-positive aerobic cocci, including: Staphylococci, *Streptococcus pneumoniae* and other streptococci (not *Enterococcus*). Also active against many anaerobic bacteria, including *Bacteroides fragilis*.

Pharmacokinetics

Absorption: Well absorbed after PO/IM administration. Minimal absorption after topical/vaginal use.
Distribution: Widely distributed. Does not significantly cross blood-brain barrier. Crosses the placenta; enters breast milk.
Metabolism and Excretion: Mostly metabolized by the liver.
Half-life: 2–3 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	rapid	45 min	6–8 hr
IM	rapid	1.3 hr	6–8 hr
IV	rapid	end of infusion	6–8 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Previous pseudomembranous colitis. Severe liver impairment. Diarrhea. Known alcohol intolerance (topical solution/suspension).
Use Cautiously in: Pregnancy or lactation (safety not established for systemic and topical; vaginal approved for use in 3rd trimester of pregnancy).

Adverse Reactions/Side Effects

CNS: dizziness, headache, vertigo. **CV:** arrhythmias, hypotension. **GI:** PSEUDOMEMBRANOUS COLITIS, diarrhea, bitter taste (IV only), nausea, vomiting. **Derm:** rashes. **Local:** phlebitis at IV site.

Interactions

Drug-Drug: Kaolin/pectin may decrease GI absorption. May enhance the action of **neuromuscular blocking agents**.

Route/Dosage

PO (Adults): *Most infections*—150–300 mg q 6 hr. *Pneumocystis carinii* pneumonia—1200–1800 mg/day in divided doses with 15–30 mg primaquine/day (unlabeled). *CNS toxoplasmosis*—1200–2400 mg/day in divided doses with pyrimethamine 50–100 mg/day (unlabeled).
PO (Children >1 mo): 2–5 mg/kg q 6 hr or 2.7–6.7 mg/kg q 8 hr. (Children ≤10 kg should receive at least 37.5 mg q 8 hr).
IM, IV (Adults): *Most infections*—300–600 mg q 6–8 hr or 900 mg q 8 hr (up to 4.8 g/day IV has been used; single IM doses of >600 mg are not recommended). *P. carinii* pneumonia—2400–2700 mg/day in divided doses with primaquine (unlabeled). *Toxoplasmosis*—1200–4800 mg/day in divided doses with pyrimethamine.
IM, IV (Children >1 mo): 3.75–10 mg/kg (87.5–112.5 mg/m²) q 6 hr or 5–13.3 mg/kg (116.7–150 mg/m²) q 8 hr (300 mg/day minimum; up to 7.5 mg/kg q 6 hr for bone infections).
IM, IV (Infants <1 mo): 3.75–5 mg q 6 hr or 5–6.7 mg/kg q 8 hr.
Vag (Adults and Adolescents): 1 applicatorful (5 g) hs for 3 or 7 days (7 days in pregnant patients) *or* 1 suppository (100 mg) at bedtime for 3 nights.

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent.

clonazepam (kloe-**na**-ze-pam)

Klonopin, ♣Rivotril, ♣Syn-Clonazepam

Classification

Therapeutic: anticonvulsants
Pharmacologic: benzodiazepines

Schedule IV

Pregnancy Category C

Indications

Prophylaxis of petit mal, petit mal variant, akinetic, and myoclonic seizures. Management of panic disorder. **Unlabeled uses:** Uncontrolled leg movements during sleep. Neuralgias. Sedation.

Action

Anticonvulsant effects may be caused by presynaptic inhibition. Produces sedative effects in the CNS, probably by stimulating inhibitory GABA receptors. **Therapeutic Effects:** Prevention of seizures.

Pharmacokinetics

Absorption: Well absorbed from the GI tract.
Distribution: Probably crosses blood-brain barrier and placenta.
Metabolism and Excretion: Mostly metabolized by the liver.
Half-life: 18–50 hr.

TIME/ACTION PROFILE (anticonvulsant activity)

ROUTE	ONSET	PEAK	DURATION
PO	20–60 min	1–2 hr	6–12 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity to clonazepam or other benzodiazepines. Severe liver disease.
Use Cautiously in: Narrow-angle glaucoma; Chronic respiratory disease; History of porphyria; Pregnancy, lactation, or children (chronic use during pregnancy may result in withdrawal in the neonate; safety not established).

Adverse Reactions/Side Effects

CNS: behavioral changes, drowsiness. **EENT:** abnormal eye movements, diplopia, nystagmus. **Resp:** increased secretions. **CV:** palpitations. **GI:** constipation, diarrhea, hepatitis. **GU:** dysuria, nocturia, urinary retention. **Hemat:** anemia, eosinophilia, leukopenia, thrombocytopenia. **Neuro:** ataxia, hypotonia. **Misc:** fever, physical dependence, psychological dependence, tolerance.

Interactions

Drug-Drug: Alcohol, antidepressants, antihistamines, other benzodiazepines, and **opioid analgesics**—concurrent use results in additive CNS depression. **Cimetidine, disulfiram, fluoxetine, isoniazid, ketoconazole, metoprolol, hormonal contraceptives, propoxyphene, propranolol**, or **valproic acid** may decrease the metabolism of clonazepam, enhancing its actions. May decrease efficacy of **levodopa**. **Barbiturates** or **rifampin** may increase the metabolism and decrease effectiveness of clonazepam. Sedative effects may be decreased by **theophylline**. May increase serum **phenytoin** levels. **Phenytoin** may decrease serum clonazepam levels.
Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression.

Route/Dosage

PO (Adults): 0.5 mg 3 times daily; may increase by 0.5–1 mg q third day. Total daily maintenance dose not to exceed 20 mg. *Panic disorder*—0.125 mg twice daily, increase after 3 days toward target dose of 1 mg/day (some patients may require up to 4 mg/day).
PO (Children <10 yr or 30 kg): Initial daily dose 0.01–0.03 mg/kg/day (not to exceed 0.05 mg/kg/day) given in 2–3 equally divided doses; increase

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent.

NURSING IMPLICATIONS

Assessment

- Assess patient for infection at beginning and throughout therapy.
- Obtain specimens for culture and sensitivity before initiating therapy. First dose may be given before receiving results.
- Monitor bowel elimination. Diarrhea, abdominal cramping, fever, and bloody stools should be reported promptly as a sign of pseudomembranous colitis. May begin up to several weeks after cessation of therapy.

Potential Nursing Diagnoses

Risk for infection (Indications, Side Effects)
Diarrhea (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **PO:** Administer with a full glass of water or with meals. Shake liquid preparations well. Do not refrigerate. Stable for 14 days at room temperature.
- **IM:** Do not administer >600 mg in a single IM injection.
- **Intermittent Infusion:** Do not administer as an undiluted IV bolus. Dilute 300 or 600 mg with at least 50 ml and 900 or 1200 mg with at least 100 ml of D5W, D10W, D5/0.45% NaCl, D5/0.9% NaCl, D5/Ringer's injection, 0.9% NaCl, or lactated Ringer's injection. Stable for 24 hr at room temperature. Crystals may occur if refrigerated but dissolve when warmed to room temperature. Do not administer solution with undissolved crystals. ***Rate:*** Administer each 300 mg over a minimum of 10 min. Do not give more than 1200 mg in a single 1-hr infusion.
- **Continuous Infusion:** May also administer at an infusion rate of 10–20 mg/min for 30 min, followed by continuous infusion of 0.75–1.25 mg/min.

Patient/Family Teaching

- Instruct patient to take medication around the clock at evenly spaced times and to finish completely as directed. Take missed doses as soon as possible unless almost time for next dose. Do not double doses. Advise patient that sharing of this medication may be dangerous.
- Instruct patient to notify health care professional immediately if diarrhea, abdominal cramping, fever, or bloody stools occur and not to treat with antidiarrheals without consulting health care professional.
- Advise patient to report signs of superinfection (furry overgrowth on the tongue, vaginal or anal itching or discharge).
- Notify health care professional if no improvement within a few days.
- **Vag:** Instruct patient on use of vaginal applicator. Insert high into vagina at bedtime. Instruct patient to remain recumbent for at least 30 min after insertion. Advise patient to use sanitary napkin to prevent staining of clothing or bedding. Continue therapy during menstrual period.
- Advise patient to refrain from vaginal sexual intercourse during therapy.
- Caution patient that cream may weaken latex contraceptive devices. Do not use within 72 hr of vaginal cream.

Evaluation/Desired Outcomes

- Resolution of the signs and symptoms of infection. Length of time for complete resolution depends on the organism and site of infection.

Why was this drug prescribed for your patient?

by no more than 0.25–0.5 mg q third day until therapeutic blood levels are reached (not to exceed 0.2 mg/kg/day).

NURSING IMPLICATIONS

Assessment

- Observe and record intensity, duration, and location of seizure activity.
- Assess degree and manifestations of anxiety and mental status prior to and periodically during therapy.
- Assess patient for drowsiness, unsteadiness, and clumsiness. These symptoms are dose related and most severe during initial therapy; may decrease in severity or disappear with continued or long-term therapy.
- ***Lab Test Considerations:*** Patients on prolonged therapy should have CBC and liver function test results evaluated periodically. May cause an ↑ in serum bilirubin, AST, and ALT.
- May cause ↓ thyroidal uptake of sodium iodide, ^{123}I, and ^{131}I.
- ***Toxicity and Overdose:*** Therapeutic serum concentrations are 20–80 mg/ml.

Potential Nursing Diagnoses

Risk for injury (Indications, Side Effects)

Implementation

- Do not confuse clonazepam with clonidine or clorazepate.
- Institute seizure precautions for patients on initial therapy or undergoing dose manipulations.
- **PO:** Administer with food to minimize gastric irritation. Tablets may be crushed if patient has difficulty swallowing.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed. Take missed doses within 1 hr or omit; do not double doses. Abrupt withdrawal of clonazepam may cause status epilepticus, tremors, nausea, vomiting, and abdominal and muscle cramps.
- Medication may cause drowsiness or dizziness. Advise patient to avoid driving or other activities requiring alertness until response to drug is known.
- Caution patient to avoid taking alcohol or other CNS depressants concurrently with this medication.
- Advise patient to notify health care professional of medication regimen prior to treatment or surgery.
- Instruct patient and family to notify health care professional of unusual tiredness, bleeding, sore throat, fever, clay-colored stools, yellowing of skin, or behavioral changes.
- Patient on anticonvulsant therapy should carry identification at all times describing disease process and medication regimen.
- Emphasize the importance of follow-up exams to determine effectiveness of the medication.

Evaluation/Desired Outcomes

- Decrease or cessation of seizure activity without undue sedation. Dose adjustments may be required after several months of therapy.
- Decrease in frequency and severity of panic attacks.
- Relief of leg movements during sleep.
- Decrease in pain from neuralgia.

Why was this drug prescribed for your patient?

clonidine (klon-i-deen)

Catapres, Catapres-TTS, ♣Dixarit

Classification

Therapeutic: antihypertensives
Pharmacologic: adrenergics (centrally acting)

Pregnancy Category C

Indications

PO, Transdermal: Management of mild to moderate hypertension.

Action

Stimulates alpha-adrenergic receptors in the CNS; which results in decreased sympathetic outflow inhibiting cardioacceleration and vasoconstriction centers. **Therapeutic Effects:** Decreased blood pressure.

Pharmacokinetics

Absorption: Well absorbed from the GI tract and skin.
Distribution: Widely distributed; enters CNS. Crosses the placenta readily; enters breast milk in high concentrations.
Metabolism and Excretion: Mostly metabolized by the liver; 40–50% eliminated unchanged in urine.
Half-life: *Plasma*—12–22 hr; *CNS*—1.3 hr.

TIME/ACTION PROFILE (effect on blood pressure)

ROUTE	ONSET	PEAK	DURATION
PO	30–60 min	2–4 hr	8–12 hr
Transdermal	2–3 days	unknown	7 days*

*8 hr after removal of patch

Contraindications/Precautions

Contraindicated in: Hypersensitivity.

Use Cautiously in: Serious cardiac or cerebrovascular disease; Renal insufficiency; Geriatric patients (dosage reduction may be required); Pregnancy or lactation (safety not established).

Adverse Reactions/Side Effects

CNS: drowsiness, depression, dizziness, nervousness, nightmares. **CV:** bradycardia, hypotension, palpitations. **GI:** dry mouth, constipation, nausea, vomiting. **GU:** impotence. **Derm:** rash, sweating. **F and E:** sodium retention. **Metab:** weight gain. **Misc:** withdrawal phenomenon.

Interactions

Drug-Drug: Additive sedation with **CNS depressants**, including **alcohol**, **antihistamines**, **opioid analgesics**, and **sedative/hypnotics**. Additive hypotension with other **antihypertensives** and **nitrates**. Additive bradycardia with **myocardial depressants**, including **beta blockers**. **Beta blockers**, **prazosin**, or **tricyclic antidepressants** may decrease antihypertensive effect. Withdrawal phenomenon may be increased by discontinuation of **beta blockers**. May decrease effectiveness of **levodopa**. Increased risk of adverse cardiovascular reactions with **verapamil**.

Route/Dosage

PO (Adults): *Hypertension (initial dose)*—0.1 mg bid, increase 0.1–0.2 mg/day q 2–4 days. *Usual maintenance dose*—0.2–0.6 mg/day in 2–3 divided doses (up to 2.4 mg/day). *Urgent treatment*—0.2 mg loading dose, then 0.1 mg q hr until blood pressure is controlled or 0.8 mg total has been administered; follow with maintenance dosing.
PO (Geriatric Patients): 0.1 mg at bedtime initially, increased as needed.
PO (Children): 0.05–0.4 mg twice daily.
Transdermal (Adults): *Hypertension*—transdermal system delivering 0.1–0.3 mg/24 hr, system applied every 7 days. Initiate with 0.1 mg/24 hr system; dosage increments may be made q 1–2 wk.

clopidogrel (kloh-pid-oh-grel)

Plavix

Classification

Therapeutic: antiplatelet agents
Pharmacologic: platelet aggregation inhibitors

Pregnancy Category B

Indications

Reduction of atherosclerotic events (MI, stroke, vascular death) in patients at risk for such events including recent MI, acute coronary syndrome (unstable angina/non–Q-wave MI), stroke, or peripheral vascular disease.

Action

Inhibits platelet aggregation by irreversibly inhibiting the binding of adenosine triphosphate (ATP) to platelet receptors. **Therapeutic Effects:** Decreased occurrence of atherosclerotic events in patients at risk.

Pharmacokinetics

Absorption: Well absorbed after oral administration, but rapidly metabolized to an active antiplatelet compound. Parent drug has no antiplatelet activity.
Distribution: Unknown.
Metabolism and Excretion: Rapidly and extensively converted by the liver to its active metabolite, which is then eliminated 50% in urine and 45% in feces.
Half-life: 8 hr (active metabolite).

TIME/ACTION PROFILE (effects on platelet function)

ROUTE	ONSET	PEAK	DURATION
PO	within 24 hr	3–7 days	5 days†

†After discontinuation

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Pathologic bleeding (peptic ulcer, intracranial hemorrhage). Lactation.
Use Cautiously in: Patients at risk for bleeding (trauma, surgery, or other pathologic conditions); History of GI bleeding or ulcer disease; Severe hepatic impairment; Pregnancy or children (safety not established; use in pregnancy only if clearly indicated).

Adverse Reactions/Side Effects

Incidence of adverse reactions similar to those of aspirin **CNS:** depression, dizziness, fatigue, headache. **EENT:** epistaxis. **Resp:** cough, dyspnea. **CV:** chest pain, edema, hypertension. **GI:** GI BLEEDING, abdominal pain, diarrhea, dyspepsia, gastritis. **Derm:** pruritus, purpura, rash. **Hemat:** BLEEDING, NEUTROPENIA, THROMBOTIC THROMBOCYTOPENIC PURPURA. **Metab:** hypercholesterolemia. **MS:** arthralgia, back pain. **Misc:** fever, hypersensitivity reactions.

Interactions

Drug-Drug: Concurrent **abciximab**, **eptifibatide**, **tirofiban**, **aspirin**, **NSAIDs**, **heparin**, **heparanoids**, **thrombolytic agents**, **ticlopidine**, or **warfarin** may ↑ risk of bleeding. May ↓ metabolism and ↑ effects of **phenytoin**, **tolbutamide**, **tamoxifen**, **torsemide**, **fluvastatin**, and many **NSAIDs**.
Drug-Natural Products: ↑ bleeding risk with **anise**, **arnica**, **chamomile**, **clove**, **fenugreek**, **feverfew**, **garlic**, **ginger**, **ginkgo**, **Panax ginseng**, and others.

Route/Dosage

Recent MI, stroke, or peripheral vascular disease

PO (Adults): 75 mg once daily.

Acute coronary syndrome

PO (Adults): 300 mg initially, then 75 mg once daily; aspirin 75–325 mg once daily should be given concurrently.

NURSING IMPLICATIONS

Assessment

- Monitor intake and output ratios and daily weight, and assess for edema daily, especially at beginning of therapy.
- Monitor BP and pulse frequently during initial dosage adjustment and periodically throughout therapy. Report significant changes.

Potential Nursing Diagnoses

Risk for injury (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Do not confuse Catapres (clonidine) with Cataflam (diclofenac).
- Do not confuse clonidine with clonazepam (Klonopin).
- In the perioperative setting, continue clonidine up to 4 hr prior to surgery and resume as soon as possible thereafter. Do not interrupt *transdermal clonidine* during surgery. Monitor blood pressure carefully.
- **PO:** Administer last dose of the day at bedtime.
- **Topical:** Apply transdermal system once every 7 days to any hairless site. Avoid cuts or calluses. Absorption increased on chest or upper arm and decreased on thigh. Rotate sites. Wash area with soap and water; dry before application. Apply firm pressure over patch to ensure contact with skin, especially around edges. Remove old system and discard. System includes adhesive overlay to be applied over patch to ensure adhesion if patch loosens.

Patient/Family Teaching

- Instruct patient to take clonidine at the same time each day, even if feeling better. Clonidine controls but does not cure hypertension. If a dose is missed, take as soon as remembered. If more than 1 oral dose in a row is missed or if transdermal system is late being changed by 3 or more days, consult physician. All routes of clonidine should be gradually discontinued over 2–4 days to prevent rebound hypertension.
- Encourage patient to comply with additional interventions for hypertension (weight reduction, low-sodium diet, discontinuation of smoking, moderation of alcohol consumption, regular exercise, and stress management). Patient should also avoid excessive amounts of tea, coffee, and cola.
- Instruct patient and family on proper technique for BP monitoring. Advise them to check BP at least weekly and report significant changes.
- May cause drowsiness; usually diminishes with continued use. Advise patient to avoid driving and other activities requiring alertness until response to medication is known.
- Caution patient to decrease orthostatic hypotension by avoiding sudden changes in position. Use of alcohol, standing for long periods, exercising, and hot weather may increase orthostatic hypotension.
- If dry mouth occurs, frequent mouth rinses, good oral hygiene, and sugarless gum or candy may decrease effect. If dry mouth continues for more than 2 wk, consult health care professional.
- Caution patient to avoid concurrent use of alcohol or other CNS depressants.
- Advise patient to consult health care professional before taking any cough, cold, or allergy remedies.
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- **Topical:** Instruct patient on proper application of transdermal system. Do not cut or trim unit. May remain in place during bathing or swimming.

Evaluation/Desired Outcomes

- Decrease in BP.

Why was this drug prescribed for your patient?

NURSING IMPLICATIONS

Assessment

- Assess patient for symptoms of stroke, peripheral vascular disease, or MI periodically during therapy.
- ***Lab Test Considerations:*** Monitor bleeding time throughout therapy. Prolonged bleeding time, which is time- and dose-dependent, is expected.
- Monitor CBC with differential and platelet count periodically during therapy. Neutropenia and thrombocytopenia may rarely occur.
- May cause ↑ serum bilirubin, hepatic enzymes, total cholesterol, nonprotein nitrogen (NPN), and uric acid concentrations.

Potential Nursing Diagnoses

Risk for injury (Indications, Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Discontinue clopidogrel 5–7 days before planned surgical procedures.
- **PO:** Administer once daily without regard to food.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed. Missed doses should be taken as soon as possible unless it is almost time for next dose; do not double doses.
- Advise patient to notify health care professional promptly if fever, chills, sore throat, or unusual bleeding or bruising occur.
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- Instruct patient to avoid taking OTC medications containing aspirin or NSAIDs without consulting health care professional.

Evaluation/Desired Outcomes

- Prevention of stroke, MI, and vascular death in patients at risk.

Why was this drug prescribed for your patient?

High Alert

codeine (koe-deen)

♣Paveral

Classification

Therapeutic: allergy, cold, and cough remedies, antitussives, opioid analgesics

Pharmacologic: opioid agonists

Schedule II, III, IV, V (depends on content)

Pregnancy Category C

Indications

Management of mild to moderate pain. Antitussive. **Unlabeled uses:** Antidiarrheal.

Action

Binds to opiate receptors in the CNS—alters perception of and response to painful stimuli.: Produces CNS depression. **Therapeutic Effects:** Decreased pain. Suppression of the cough reflex. Relief of diarrhea.

Pharmacokinetics

Absorption: 50% absorbed from the GI tract. Completely absorbed from IM sites. Oral and parenteral doses are not equal.

Distribution: Widely distributed. Crosses the placenta; enters breast milk.

Metabolism and Excretion: Mostly metabolized by the liver; 10% converted to morphine; 5–15% excreted unchanged in urine.

Half-life: 2.5–4 hr.

TIME/ACTION PROFILE (analgesia)

ROUTE	ONSET	PEAK	DURATION
PO	30–45 min	60–120 min	4 hr
IM	10–30 min	30–60 min	4 hr
Subcut	10–30 min	unknown	4 hr

♣ = Canadian drug name

Contraindications/Precautions

Contraindicated in: Hypersensitivity.

Use Cautiously in: Head trauma; Increased intracranial pressure; Severe renal, hepatic, and pulmonary disease; Hypothyroidism; Adrenal insufficiency; Alcoholism; Geriatric or debilitated patients (dosage reduction required; more susceptible to CNS depression, constipation); Undiagnosed abdominal pain; Prostatic hypertrophy; Has been used during labor, but respiratory depression may occur in the newborn; Pregnancy or lactation (avoid chronic use).

Adverse Reactions/Side Effects

CNS: confusion, sedation, dysphoria, euphoria, floating feeling, hallucinations, headache, unusual dreams. **EENT:** blurred vision, diplopia, miosis. **Resp:** respiratory depression. **CV:** hypotension, bradycardia. **GI:** constipation, nausea, vomiting. **GU:** urinary retention. **Derm:** flushing, sweating. **Misc:** physical dependence, psychological dependence, tolerance.

Interactions

Drug-Drug: Use with extreme caution in patients receiving monoamine oxidase (MAO) inhibitors (reduce initial dose to 25% of usual). Additive CNS depression with **alcohol, antidepressants, antihistamines**, and **sedative/hypnotics**. **Partial antagonists (buprenorphine, butorphanol, nalbuphine**, or **pentazocine)** may precipitate opioid withdrawal in physically dependent patients. **Nalbuphine** or **pentazocine** may decrease analgesia.

Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression.

Route/Dosage

PO (Adults): *Analgesic*—15–60 mg q 3–6 hr as needed. *Antitussive*—10–20 mg q 4–6 hr as needed (not to exceed 120 mg/day). *Antidiarrheal*—30 mg up to 4 times daily.

* CAPITALS indicates life-threatening, underlines indicate most frequent

CONTINUED

codeine

- When combined with nonopioid analgesics (aspirin, acetaminophen) #2 = 15 mg, #3 = 30 mg, #4 = 60 mg codeine. Codeine as an individual drug is a Schedule II substance. In combination with other drugs, tablet form is Schedule III, liquid is Schedule IV, and elixir or cough suppressant is Schedule V.
- **PO:** Oral doses may be administered with food or milk to minimize GI irritation.
- **IM Subcut:** Do not administer solution that is more than slightly discolored or contains a precipitate.
- **Direct IV:** Codeine is usually administered IM or subcut, but slow IV injection has been used.
- **Syringe Compatibility:** glycopyrrolate, hydroxyzine.

Patient/Family Teaching

- Instruct patient on how and when to ask for pain medication.
- Codeine may cause drowsiness or dizziness. Advise patient to call for assistance when ambulating or smoking. Caution ambulatory patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to change positions slowly to minimize orthostatic hypotension.
- Caution patient to avoid concurrent use of alcohol or other CNS depressants with this medication.
- Encourage patient to turn, cough, and breathe deeply every 2 hr to prevent atelectasis.
- Advise patient that good oral hygiene, frequent mouth rinses, and sugarless gum or candy may decrease dry mouth.

Evaluation/Desired Outcomes

- Decrease in severity of pain without a significant alteration in level of consciousness or respiratory status.
- Suppression of cough.
- Control of diarrhea.

Why was this drug prescribed for your patient?

♣ = Canadian drug name

* CAPITALS indicates life-threatening, underlines indicate most frequent

PO (Children 6–12 yr): *Analgesic*—0.5 mg/kg (15 mg/m²) q 4–6 hr (up to 4 times daily) as needed. *Antitussive*—5–10 mg q 4–6 hr as needed (not to exceed 60 mg/day). *Antidiarrheal*—0.5 mg/kg up to 4 times daily.
PO (Children 2–5 yr): *Analgesic*—0.5 mg/kg (15 mg/m²) q 4–6 hr (up to 4 times daily) as needed. *Antitussive*—0.25 mg/kg up to 4 times daily. *Antidiarrheal*—0.5 mg/kg up to 4 times daily.
IM, IV, Subcut: (Adults): *Analgesic*—15–60 mg q 4–6 hr as needed.
IM, IV, Subcut: (Infants and Children): *Analgesic*—0.5 mg/kg (15 mg/m²) q 4–6 hr as needed.

NURSING IMPLICATIONS

Assessment

- Assess blood pressure, pulse, and respirations before and periodically during administration. If respiratory rate is < 10/min, assess level of sedation. Physical stimulation may be sufficient to prevent significant hypoventilation. Dose may need to be decreased by 25–50%. Initial drowsiness will diminish with continued use.
- Assess bowel function routinely. Prevention of constipation should be instituted with increased intake of fluids, bulk, and laxatives to minimize constipating effects. Stimulant laxatives should be administered routinely if opioid use exceeds 2–3 days, unless contraindicated.
- **Pain:** Assess type, location, and intensity of pain before and 1 hr (peak) after administration. When titrating opioid doses, increases of 25–50% should be administered until there is either a 50% reduction in the patient's pain rating on a numerical or visual analog scale or the patient reports satisfactory pain relief. A repeat dose can be safely administered at the time of the peak if previous dose is ineffective and side effects are minimal.
- An equianalgesic chart (see Appendix B) should be used when changing routes or when changing from one opioid to another.
- Prolonged use may lead to physical and psychological dependence and tolerance. This should not prevent patient from receiving adequate analgesia. Most patients who receive codeine for pain do not develop psychological dependence. If progressively higher doses are required, consider conversion to a stronger opioid.
- **Cough:** Assess cough and lung sounds during antitussive use.
- ***Lab Test Considerations:*** May cause ↑ plasma amylase and lipase concentrations.
- ***Toxicity and Overdose:*** If an opioid antagonist is required to reverse respiratory depression or coma, naloxone (Narcan) is the antidote. Dilute the 0.4-mg ampule of naloxone in 10 ml of 0.9% NaCl and administer 0.5 ml (0.02 mg) by direct IV push every 2 min. For children and patients weighing <40 kg, dilute 0.1 mg of naloxone in 10 ml of 0.9% NaCl for a concentration of 10 mcg/ml and administer 0.5 mcg/kg every 2 min. Titrate dose to avoid withdrawal, seizures, and severe pain.

Potential Nursing Diagnoses

Acute pain (Indications)
Disturbed sensory perception (visual, auditory) (Side Effects)
Risk for injury (Side Effects)

Implementation

- ***High Alert:*** Accidental overdosage of opioid analgesics has resulted in fatalities. Before administering, clarify all ambiguous orders; have second practitioner independently check dose calculations and route of administration.
- ***High Alert:*** Do not confuse codeine with Cardene (nicardipine) or Lodine (etodolac).
- Explain therapeutic value of medication before administration to enhance the analgesic effect.
- Regularly administered doses may be more effective than prn administration. Analgesic is more effective if given before pain becomes severe.
- Coadministration with nonopioid analgesics may have additive analgesic effects and permit lower doses.
- Medications should be discontinued gradually after long-term use to prevent withdrawal symptoms.

CONTINUED

High Alert

colchicine (**kol**-chi-seen)

Classification
Therapeutic: antigout agents

Pregnancy Category C

Indications
Treatment of acute attacks of gouty arthritis (larger doses). Prevention of recurrences of gout (smaller doses).

Action
Interferes with the functions of WBCs in initiating and perpetuating the inflammatory response to monosodium urate crystals. **Therapeutic Effects:** Decreased pain and inflammation in acute attacks of gout and prevention of recurrence.

Pharmacokinetics
Absorption: Absorbed from the GI tract, then re-enters GI tract from biliary secretions. More absorption may then occur.
Distribution: Concentrates in WBCs.
Metabolism and Excretion: Partially metabolized by the liver. Secreted in bile back into GI tract; eliminated in the feces. Small amount excreted in the urine.
Half-life: 20 min (plasma), 60 hr (WBCs).

TIME/ACTION PROFILE (anti-inflammatory activity)

ROUTE	ONSET	PEAK	DURATION
PO	12 hr	24–72 hr	unknown
IV	within 6–12 hr	unknown	unknown

Contraindications/Precautions
Contraindicated in: Hypersensitivity. Severe renal (CCr <10 ml/min) or GI disease. Pregnancy.

Use Cautiously in: Geriatric or debilitated patients (toxicity may be cumulative); Renal impairment (dosage reduction suggested if CCr <50 ml/min; total IV dose not >2 mg); Lactation or children (safety not established).

Adverse Reactions/Side Effects
GI: diarrhea, nausea, vomiting, abdominal pain. **GU:** anuria, hematuria, renal damage. **Derm:** alopecia. **Hemat:** AGRANULOCYTOSIS, APLASTIC ANEMIA, leukopenia, thrombocytopenia. **Local:** phlebitis at IV site. **Neuro:** peripheral neuritis.

Interactions
Drug-Drug: Additive bone marrow depression may occur with **bone marrow depressants** or **radiation therapy.** Additive adverse GI effects with **NSAIDs**. May cause reversible malabsorption of **vitamin B_{12}**.

Route/Dosage
PO (Adults): *Treatment of acute attacks*—0.5–1.2 mg, then 0.5–0.6 mg q 1–2 hr or 1–1.2 mg q 2 hr until relief, GI side effects, or a total cumulative dose of 6 mg is achieved. *Prophylaxis*—0.5–0.6 mg daily (may be used up to 3 times daily or as little as 1–4 times weekly). If surgery is planned, give 3 times daily for 3 days before and 3 days after procedure.
IV (Adults): *Treatment of acute attack*—2 mg initially, then 0.5 mg q 6 hr or 1 mg q 6–12 hr until relief or cumulative dose of 4 mg has been given. Other regimens may use lower doses. *Prophylaxis*—0.5–1 mg 1–2 times daily. Other regimens may use lower doses.

NURSING IMPLICATIONS

Assessment
- ***High Alert:*** Assess patient for toxicity (weakness, abdominal discomfort, nausea, vomiting, diarrhea, delerium, seizures, sense of suffocation, dilated pupils, difficulty swallowing, ascending paralysis, oliguria), withhold drug and report symptoms immediately.
- Assess involved joints for pain, mobility, and edema throughout therapy. During initiation of therapy, monitor for drug response every 1–2 hr.
- Monitor intake and output ratios. Fluids should be encouraged to promote a urinary output of at least 2000 ml/day.

CORTICOSTEROIDS (INHALATION)

beclomethasone
(be-kloe-**meth**-a-sone)
♣Beclodisk, ♣Becloforte, QVAR

budesonide
(byoo-**dess**-oh-nide)
Pulmicort

flunisolide
(floo-**niss**-oh-lide)
AeroBid, AeroBid-M, ♣Bronalide

fluticasone
(floo-**ti**-ka-sone)

mometasone
(mo-**met**-a-sone)
Asmanex, Flovent

triamcinolone
(trye-am-**sin**-oh-lone)
Azmacort, Azmacort HFA

Classification
Therapeutic: antiasthmatics, corticosteroids
Pharmacologic: corticosteroids (inhalation)

Pregnancy Category B (budesonide), C (all others)

Indications
Asthma (maintenance/prophylactic; long-term control). May decrease the need for systemic corticosteroids and delay lung damage associated with asthma.

Action
Potent, locally acting anti-inflammatory and immune modifier. **Therapeutic Effects:** ↓ frequency and severity of asthma attacks. Prevention of lung damage due to asthma.

Pharmacokinetics
Absorption: *Beclomethasone*—20%; *budenoside*—39%; *flunisolide*—40%; *fluticasone*—30% (aerosol), 13.5% (powder); *triamcinolone*—25%. Action is primarily local.
Distribution: 10–25% deposited in airways if a spacer device is not used. With a spacer, more drug may reach the respiratory tract. All cross the placenta and enter breast milk in small amounts.
Metabolism and Excretion: *Beclomethasone*—after inhalation, beclomethasone dipropionate is converted to beclomethasone monopropionate, an active metabolite that adds to its potency, <10% excreted in feces and urine; *budenoside, flunisolide, fluticasone* and *triamcinolone*—metabolized by the liver after absorption from lungs *Budenoside*—60% excreted in urine, smaller amounts in feces; *flunisolide*—50% excreted in urine, 50% in feces; *fluticasone*—<5% excreted in urine and feces; *triamcinolone*—40% excreted in urine, 60% in feces.
Half-life: *Beclomethasone*—0.5 hr; *budesonide*—2–3 hr; *flunisolide*—1.8 hr; *fluticasone*—7.8 hr; *triamcinolone*—88 min.

TIME/ACTION PROFILE (improvement in symptoms)

ROUTE	ONSET	PEAK	DURATION
Inhalation	within 24 hr	1–4 wk‡	unknown

‡Improvement in pulmonary function; decreased airway responsiveness may take longer

Contraindications/Precautions
Contraindicated in: Some products contain chlorofluorocarbon (CFC) propellants, alcohol, propylene, or polyethylene glycol and should be avoided in patients with known hypersensitivity or intolerance. In many products, CFC propellants are being replaced by hydrofluoroalkane (HFA) propellants. Acute attack of asthma/status asthmaticus. Lactation.
Use Cautiously in: Active untreated infections; Diabetes or glaucoma; Underlying immunosuppression (due to disease or concurrent therapy); Systemic corticosteroid therapy (should not be abruptly discontinued; addi-

- ***Lab Test Considerations:*** In patients receiving prolonged therapy, monitor baseline and periodic CBC; report significant decrease in values. May cause decreased platelet count, leukopenia, aplastic anemia, and agranulocytosis.
- May cause an increase in AST and alkaline phosphatase.
- May cause false-positive results for urine hemoglobin.
- May interfere with results of urinary 17-hydroxycorticosteroid concentrations.
- ***Toxicity and Overdose:*** Assess patient for toxicity (weakness, abdominal discomfort, nausea, vomiting, diarrhea). If these symptoms occur, discontinue medication and notify physician or other health care professional. Opioids may be needed to treat diarrhea.

Potential Nursing Diagnoses

Acute pain (Indications)
Impaired walking (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- ***High Alert:*** Colchicine overdose can be fatal. Cumulative dose by any route should not exceed 4mg. Limit IV doses to a maximum of 1-2 mg in patients who have recently received oral colchicine. Cumulative dose should not exceed 2 mg in geriatric and renal patients. After dosing limit has been reached, do not give any additional colchicine by any route for 21 days. Do not administer oral and IV colchicine concurrently.
- Intermittent therapy with 3 days between courses may be used to decrease risk of toxicity.
- **PO:** Administer oral doses with food to minimize gastric irritation.
- **IV:** Avoid extravasation, which may cause necrosis of skin and soft tissue.
- **Direct IV:** May be administered undiluted. If a lower concentration is desired, may dilute to a volume of 10–20 ml with sterile water or 0.9% NaCl for injection. Do not administer solutions that are turbid. ***Rate:*** Administer slowly over 2–10 min. Rapid administration may cause cardiac arrhythmias.
- **Y-Site Incompatibility:** Do not dilute colchicine with or inject into IV tubing containing D5W, solutions containing a bacteriostatic agent, or any other solution that might change the pH of the colchicine solution because precipitation will occur.

Patient/Family Teaching

- Review medication administration schedule. If dose is missed, take as soon as remembered unless it is almost time for next dose. Do not double doses.
- Instruct patients taking prophylactic doses not to increase to therapeutic doses during an acute attack to prevent toxicity. An NSAID or corticosteroid, preferably via intrasynovial injection, should be used to treat acute attacks.
- Advise patient to follow recommendations of health care professional regarding weight loss, diet, and alcohol consumption.
- Instruct patient to report nausea, vomiting, abdominal pain, diarrhea, unusual bleeding, bruising, sore throat, fatigue, malaise, or rash promptly. Medication should be withheld if gastric symptoms, indicative of toxicity, occur.
- Surgery may precipitate an acute attack of gout. Advise patient to confer with health care professional regarding dose 3 days before surgical or dental procedures.

Evaluation/Desired Outcomes

- Decrease in pain and swelling in affected joints within 12 hr and relief within 24–48 hr.
- Prevention of recurrent gout attacks.

Why was this drug prescribed for your patient?

tional corticosteroids needed in stress or trauma); Pregnancy or children <6 yr for beclomehasone, budesonide, flunisolide, triamcinolone) or <12 yr for fluticasone and mometasone (safety not established; prolonged or high-dose therapy may lead to complications).

Adverse Reactions/Side Effects

CNS: *budesonide, fluticasone*— headache; *Fluticasone*— agitation, depression, fatigue, insomnia, restlessness. **EENT:** dysphonia, hoarseness, oropharyngeal fungal infections, cataracts; *Fluticasone*— nasal stuffiness/sinusitis. **Resp:** bronchospasm, cough, wheezing. **GI:** dry mouth, esophageal candidiasis; *Budesonide*—dyspepsia, gastroenteritis; *Fluticasone*—nausea. **Endo:** adrenal suppression (increased dose, long-term therapy only). **MS:** *budesonide*— back pain; *Fluticasone*— muscle soreness. **Misc:** *budesonide*— flu-like syndrome.

Interactions

Drug-Drug: Ketoconazole ↓ metabolism and ↑ levels of budesonide and fluticasone. **Ritonavir** ↑ levels of fluticasone; avoid concurrent use.

Route/Dosage

Beclomethasone

Inhaln (Adults and adolescents): *Previous control on bronchodilators alone*— 40 – 80 mcg twice daily; *previous control on inhaled corticosteroids*— 40 – 160 mcg twice daily (up to 320 mcg twice daily).
Inhaln (Children 5–11 yr): 40 mcg twice daily (up to 80 mcg twice daily).

Budesonide

Inhaln (Adults [Pulmicort turbuhaler dose form]): *Previous control on bronchodilators alone*—1–2 inhalations twice daily (200 mcg/inhalation); *previous control on other inhaled corticosteroids*—1–2 inhalations twice daily (up to 4 inhalations twice daily); *previous control on oral corticosteroids*—2–4 inhalations twice daily (up to 4 inhalations twice daily).
Inhaln (Children ≥6 yr [Pulmicort Turbhaler dose form]): *Previous control on bronchodilators alone*—1–2 inhalations twice daily (200 mcg/inhalation); *previous control on other inhaled corticosteroids*—1–2 inhalations twice daily; *previous control on oral corticosteroids*—Not to exceed 2 inhalations twice daily.
Inhaln (Children 12 mos–8 yr [Pulmicort Respules dose form]): —*Previous control on bronchodilators alone*—0.25 mg/day as a single dose or twice daily in divided doses; *previous control on other inhaled corticosteroids*—0.5 mg/day as a single dose or twice daily in divided doses; *previous control on oral corticosteroids*—1 mg/day as a single dose or twice daily in divided doses.

Flunisolide

Inhaln (Adults and Children >6 yr): 2 inhalations twice daily (250 mcg/inhalation; not to exceed 8 inhalations/day in adults or 4 inhalations/day in children).

Fluticasone (Aerosol Inhaler)

Inhaln (Adults and Adolescents): *Previous control on bronchodilators alone*—88 mcg twice daily initially, may be increased up to 440 mcg twice daily; *Previous control on inhaled corticosteroids*—88–220 mcg twice daily initially, up to 440 mcg twice daily; *Previous control on systemic corticosteroids*—880 mcg twice daily.

Fluticasone (Dry Powder Inhaler)

Inhaln (Adults and adolescents): *Previous control on bronchodilators alone*—100 mcg twice daily initially, may be increased up to 500 mcg twice daily; *Previous control on other inhaled corticosteroids*—100–250 mcg twice daily initially, up to 500 mcg twice daily; *Previous control on systemic corticosteroids*—1000 mcg twice daily.
Inhaln (Children 4 yr–11 yr): 50 mcg twice daily initially, may be increased up to 100 mcg twice daily.

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CORTICOSTEROIDS (INHALATION)

Triamcinolone

Inhaln (Adults and Children >12 yr): 2 inhalations 3–4 times daily or 4 inhalations twice daily (100 mcg/inhalation; not to exceed 16 metered inhalations/day).

Inhaln (Children 6–12 yr): 1–2 inhalations 3–4 times daily or 2–4 inhalations twice daily (100 mcg/inhalation; not to exceed 12 metered inhalations/day).

NURSING IMPLICATIONS

Assessment

- Monitor respiratory status and lung sounds. Pulmonary function may be assessed periodically during and for several months after a transfer from systemic to inhalation corticosteroids.
- Assess patients changing from systemic corticosteroids to inhalation corticosteroids for signs of adrenal insufficiency (anorexia, nausea, weakness, fatigue, hypotension, hypoglycemia) during initial therapy and periods of stress. If these signs appear, notify physician or other health care professional immediately; condition may be life-threatening.
- Monitor for withdrawal symptoms (joint or muscular pain, lassitude, depression) during withdrawal from oral corticosteroids.
- ***Lab Test Considerations:*** Periodic adrenal function tests may be ordered to assess degree of hypothalamic-pituitary-adrenal (HPA) axis suppression in chronic therapy. Children and patients using higher than recommended doses are at highest risk for HPA suppression.
- May cause ↑ serum and urine glucose concentrations if significant absorption occurs.

Potential Nursing Diagnoses

Ineffective airway clearance (Indications)
Risk for infection (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- After the desired clinical effect has been obtained, attempts should be made to decrease dose to lowest amount required to control symptoms. Gradually decrease dose every 2–4 wk as long as desired effect is maintained. If symptoms return, dose may briefly return to starting dose.
- When switching from other beclomethasone inhalers containing CFCs to *QVAR*, start at 1/2 the dose of the CFC inhaler, because of smaller particle size and increased delivery. **Inhaln:** Allow at least 1 min between inhalations of aerosol medication.

Patient/Family Teaching

- Advise patient to take medication as directed. Take missed doses as soon as remembered unless almost time for next dose. Advise patient not to discontinue medication without consulting health care professional; gradual decrease is required.
- Advise patients using inhalation corticosteroids and bronchodilator to use bronchodilator first and to allow 5 min to elapse before administering the corticosteroid, unless otherwise directed by health care professional.
- Advise patient that inhalation corticosteroids should not be used to treat an acute asthma attack but should be continued even if other inhalation agents are used.
- Patients using inhalation corticosteroids to control asthma may require systemic corticosteroids for acute attacks. Advise patient to use regular peak flow monitoring to determine respiratory status.
- Caution patient to avoid smoking, known allergens, and other respiratory irritants. Patients who have not been immunized should also avoid exposure to chickenpox or measles; immunization should be considered during high dose long-term therapy.

CORTICOSTEROIDS (SYSTEMIC)

SHORT-ACTING CORTICOSTEROIDS

cortisone (**kor**-ti-sone)*h4♣Cortone, Cortone Acetate

hydrocortisone (hye-droe-**kor**-ti-sone)
A-hydroCort, Cortef, Hydrocortone, Solu-Cortef

INTERMEDIATE-ACTING CORTICOSTEROIDS

methylprednisolone (meth-ill-pred-**niss**-oh-lone)
A-Methapred, depMedalone, Depoject, Depopred, Depo-Predate, Duralone, Medralone, Medrol, Meprolone, Rep-Pred, Solu-Medrol

prednisolone (pred-**niss**-oh-lone)
Articulose, Delta-Cortef, Hydeltrasol, Key-Pred, OrapredPediapred, Predaject, Predate, Predicort, Prelone

prednisone (**pred**-ni-sone)
Deltasone, Liquid Pred, Meticorten, Orasone, Panasol-S, Prednicen-M, Sterapred, Winpred

triamcinolone (trye-am-**sin**-oh-lone)
Amcort, Aristocort, Aristospan, Articulose LA, Cenocort, Cinonide, Kenacort, Kenaject, Kenalog, Triam-A, Triam-Forte, Triamolone, Triamolone, Triamonide, Tri-Kort, Trilog, Trilone, Tristoject

LONG-ACTING CORTICOSTEROIDS

betamethasone (bay-ta-**meth**-a-sone)
♣Betnelan, ♣Betnesol, Celestone, ♣Selestoject

budesonide (byoo-**des**-oh-nide)
Entocort EC

dexamethasone (dex-a-**meth**-a-sone)
AK-Dex, Dalalone, Decadrol, Decadron, Decaject, Dexacen, Dexasone, Dexone, Hexadrol, Mymethasone, Solurex

Classification
Therapeutic: antiasthmatics, corticosteroids
Pharmacologic: corticosteroids (systemic)

Pregnancy Category C (prednisolone), UK (all others)

Indications

Cortisone, hydrocortisone: Management of adrenocortical insufficiency; chronic use in other situations is limited because of mineralocorticoid activity. **Betamethasone, dexamethasone, prednisolone, prednisone, methylprednisolone, triamcinolone:** Used systemically and locally in a wide variety of chronic diseases including: Inflammatory, Allergic, Hematologic, Neoplastic, Autoimmune disorders, With other immunosuppressants in the prevention of organ rejection in tranplatation surgery. Asthma. Some agents are suitable for alternate-day dosing in the management of chronic illness (methylprednisolone, prednisolone, prednisone, triamcinolone). Replacement therapy in adrenal insufficiency (not dexamethasone). **Budesonide:** Treatment of mild to moderate Crohn's disease invbolving the ileum and/or the ascending colon. **Dexamethasone:** Management of cerebral edema. Diagnostic agent in adrenal disorders. **Unlabeled uses:** Short-term administration to high-risk mothers before delivery to prevent respiratory distress syndrome in the newborn (betamethasone, dexamethasone). Adjunctive therapy of hypercalcemia. Management of acute spinal cord injury (methylprednisolone). Adjunctive management of nausea and vomiting from chemotherapy.

Action

In pharmacologic doses, all agents suppress inflammation and the normal immune response. All agents have numerous intense metabolic effects (see Adverse Reactions and Side Effects). Suppresses adrenal function at chronic doses of *betamethasone*—0.6 mg/day; *cortisone, hydrocortisone*—20 mg/day; *dexamethasone*—0.75 mg/day; *methylprednisolone*—4 mg/day; *prednisone, prednisolone*—5 mg/day; *triamcinolone*—4 mg/day. **Cortisone, hydrocortisone:** Replaces endogenous cortisol in de-

- Advise patient to notify physician if sore throat or sore mouth occurs.
- Instruct patient whose systemic corticosteroids have been recently reduced or withdrawn to carry a warning card indicating the need for supplemental systemic corticosteroids in the event of stress or severe asthma attack unresponsive to bronchodilators.
- Inform patient that beclomethasone aerosol may have different taste and sensation than inhalers containing CFC propellant.
- **Metered-Dose Inhaler:** Instruct patient in the proper use of the metered-dose inhaler. Most inhalers require priming before first use. There are 3 methods of using a metered-dose inhaler. Shake inhaler well. (1) Take a drink of water to moisten the throat; place the inhaler mouthpiece 2 finger-widths away from mouth; tilt head back slightly; while activating inhaler, take a slow, deep breath for 3–5 sec, hold the breath for 10 sec, and breathe out slowly. (2) Exhale, close lips firmly around mouthpiece, administer during 2nd half of inhalation, and hold breath for as long as possible to ensure deep instillation of medication. (3) Use a spacer. Consult health care professional to determine method desired before instruction. Allow 1–2 min between inhalations. Rinse mouth with water or mouthwash after each use to minimize fungal infections, dry mouth and hoarseness. Wash inhalation assembly at least daily in warm running water.
- **Pulmicort Turbuhaler (budesonide):** Advise patient to follow instructions supplied. Before first-time use, prime unit by turning cover and lifting off; hold upright with mouthpiece up and twist brown grip fully to right, then to left; repeat. To administer dose, hold upright, twist brown grip fully to right, then to left, listening for click. Turn head away from inhaler and exhale (do not blow into inhaler). Do not shake. Place mouthpiece between lips and inhale forcefully. Repeat procedure if 2nd dose required. Replace cover; rinse mouth with water (do not swallow).
- **Flovent Rotadisk:** Advise patient to follow instructions for the administration of the contents of each blister via breath-activated Diskhaler device.
- **Asmanex Twisthaler:** Advise patient to discard twisthaler 45 days from opening or when dose counter reads "00"—whichever comes first. Follow instructions on Patient's Instructions for Use for administration.

Evaluation/Desired Outcomes

- Management of the symptoms of chronic asthma.
- Prevention of pulmonary damage that results from chronic asthma.

Why was this drug prescribed for your patient?

ficiency states. Also have potent mineralocorticoid (sodium-retaining) activity. **Prednisone, prednisolone:** Have minimal mineralocorticoid activity. **Betamethasone, dexamethasone, methylprednisolone, triamcinolone:** Have negligible mineralocorticoid activity. **Budesonide:** local anti-inflammatory activity in the lumen of the GI tract. **Therapeutic Effects:** Suppression of inflammation and modification of the normal immune response. Replacement therapy in adrenal insufficiency. *Budesonide*—improved symtoms/sequelae of Crohn's disease (decreased diarrhea, abdominal pain).

Pharmacokinetics

Absorption: Well absorbed following oral administration. *Budesonide*—9–12% absorbed following oral administration. Sodium phosphate and sodium succinate salts are rapidly absorbed following IM administration. Acetate, acetonide, diacetate, hexacetonide, tebutate salts are slowly but completely absorbed following IM administration. Absorption from local sites (intra-articular, intralesional) is slow but complete. At least 20% absorbed from rectal mucosa (up to 50% if mucosa is inflamed).

Distribution: All are widely distributed, cross the placenta, and probably enter breast milk.

Metabolism and Excretion: All are mostly metabolized by the liver. *Cortisone* is converted by the liver to hydrocortisone. *Prednisone* is converted by the liver to prednisolone, which is then metabolized by the liver. Budesonide is extensively metabolized on first pass through the liver by CYP3A4 enzyme system to inactive metabolites.

Half-life: *Betamethasone*—3–5 hr (plasma), 36–54 hr (tissue); adrenal suppression lasts 3.25 days. *Budesonide*—2.0–3.6 hr. *Cortisone*—0.5 hr (plasma), 8–12 hr (tissue); adrenal suppression lasts 1.25–1.5 days. *Dexamethasone*—3–4.5 hr (plasma), 36–54 hr (tissue); adrenal suppression lasts 2.75 days. *Hydrocortisone*—1.5–2 hr (plasma), 8–12 hr (tissue); adrenal suppression lasts 1.25–1.5 days. *Methylprednisolone*—>3.5 hr (plasma), 18–36 hr (tissue); adrenal suppression lasts 1.25–1.5 days. *Prednisolone*—2.1–3.5 hr (plasma), 18–36 hr (tissue); adrenal suppression lasts 1.25–1.5 days. *Prednisone*—3.4–3.8 hr (plasma), 18–36 hr (tissue); adrenal suppression lasts 1.25–1.5 days. *Triamcinolone*—2–>5 hr (plasma), 18–36 hr (tissue); adrenal suppression lasts 2.25 days.

TIME/ACTION PROFILE (anti-inflammatory activity)

ROUTE	ONSET	PEAK	DURATION
Betamethasone PO	unknown	1–2 hr	3.25 days
Betamethasone sodium phosphate IM, IV	rapid	unknown	unknown
Betamethasone acetate/sodium phosphate IM	1–3 hr	unknown	1 wk
Cortisone PO	rapid	2 hr	1.25–1.5 days
Cortisone IM	slow	20–48 hr	1.25–1.5 days
Dexamethasone PO	unknown	1–2 hr	2.75 days
Dexamethasone IM, IV (phosphate)	rapid	unknown	2.75 days
Dexamethasone IM (acetate)	8 hr	unknown	6 days
Hydrocortisone PO	unknown	1–2 hr	1.25–1.5 days
Hydrocortisone sodium succinate IM	rapid	1 hr	variable
Hydrocortisone IV	rapid	unknown	unknown
Methylprednisolone PO	unknown	1–2 hr	1.25–1.5 days
Methylprednisolone IM (acetate)	6–48 hr	4–8 days	1–4 wk
Methylprednisolone IM, IV (succinate)	rapid	unknown	unknown
Prednisolone PO	unknown	1–2 hr	1.25–1.5 days
Prednisolone IM, IV (phosphate)	rapid	1 hr	unknown
Prednisolone IM (acetate)	slow	unknown	unknown
Prednisone PO	1–2 hr	unknown	1.25–1.5 days
Triamcinolone PO	unknown	1–2 hr	2.25 days

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CONTINUED

CORTICOSTEROIDS (SYSTEMIC)

Triamcinolone IM (acetonide)	24–48 hr	unknown	1–6 wk
Triamcinolone IM (diacetonide)	slow	unknown	4 days–4 wk

Contraindications/Precautions

Contraindicated in: Active untreated infections (may be used in patients being treated for tuberculous meningitis). Known alcohol, bisulfite, or tartrazine hypersensitivity or intolerance (some products contain these and should be avoided in susceptible patients). Lactation (avoid chronic use).
Use Cautiously in: Chronic treatment (will lead to adrenal suppression; use lowest possible dose for shortest period of time); Children (chronic use will result in decreased growth; use lowest possible dose for shortest period of time); Stress (surgery, infections); supplemental doses may be needed; Potential infections (may mask signs [fever, inflammation]); Pregnancy (safety not established).

Adverse Reactions/Side Effects

Adverse reactions/side effects are much more common with high-dose/long-term therapy **CNS:** depression, euphoria, headache, increased intracranial pressure (children only), personality changes, psychoses, restlessness. **EENT:** cataracts, increased intraocular pressure. **CV:** hypertension. **GI:** PEPTIC ULCERATION, anorexia, nausea, vomiting. **Derm:** acne, decreased wound healing, ecchymoses, fragility, hirsutism, petechiae. **Endo:** adrenal suppression, hyperglycemia. **F and E:** fluid retention (long-term high doses), hypokalemia, hypokalemic alkalosis. **Hemat:** THROMBOEMBOLISM, THROMBOPHLEBITIS. **Metab:** weight gain, weight loss. **MS:** muscle wasting, osteoporosis, aseptic necrosis of joints, muscle pain. **Misc:** cushingoid appearance (moon face, buffalo hump), increased susceptibility to infection.

Interactions

Drug-Drug: ↑ risk of hypokalemia with **thiazide** and **loop diuretics**, **amphotericin B**, , **piperacillin**, or **ticarcillin**. Hypokalemia may ↑ risk of **digoxin** toxicity. May increase requirement for **insulin** or **oral hypoglycemic agents. Phenytoin**, **phenobarbital**, and **rifampin** ↑ metabolism; may ↓ effectiveness. **Hormonal contraceptives** may ↓ metabolism. ↑ risk of adverse GI effects with **NSAIDs** (including aspirin). At chronic doses that suppress adrenal function, may ↓ antibody response to and ↑ risk of adverse reactions from **live-virus vaccines.** May ↑ risk of tendon rupture from **fluoroquinolones.** Concurrent use may ↓ the response to **somatrem** or **somatropin** at doses of 12.5–18.8 mg/m²/day of oral cortisone. **Antacids** ↓ absorption of prednisone and dexamethasone. **Ketoconazole**, **itraconazole**, **ritonavir**, **indinavir**, **saquinavir**, and **erythromycin** ↑ blood levels and effects (dosage reduction budesonide and methylprednisolone may be necessary). May decrease **salicylate** and **isoniazid** levels and effectiveness. May antagonize the effects of **anticholinesterases** in myastenia gravis.
Drug-Food: Grapefruit juice ↑ serum levels and effects of methylprednisolone and budesonide (avoid concurrent use).

Route/Dosage

Betamethasone

PO (Adults): 0.6 mg–7.2 mg/day as single daily dose or in divided doses.
PO (Children): *Adrenocortical insufficiency*—17.5 mcg/kg (500 mcg/m²)/day in 3 divided doses. *Other uses*—62.5–250 mcg/kg (1.875–7.5 mg/m²)/day in 3 divided doses.
IM, IV (Adults): Up to 9 mg of betamethasone sodium phosphate or 0.5–9 mg IM as betamethasone sodium phosphate/acetate suspension. *Preven-*

CONTINUED

CORTICOSTEROIDS (SYSTEMIC)

IM, IV (Adults): *Most uses: methylprednisolone sodium succinate*—10–40 mg. *High-dose "pulse" therapy: methylprednisolone sodium succinate*—30 mg/kg IV q 4–6 hr for up to 72 hr. *Multiple sclerosis: methylprednisolone sodium succinate*—160 mg/day for 7 days, then 64 mg every other day for 1 mo. *Adjunctive therapy of* Pneumocystis carinii—30 mg twice daily for 5 days, then 30 mg once daily for 5 days, 15 mg once daily for 10 days. *Acute spinal cord injury: methylprednisolone sodium succinate*—30 mg/kg over 15 min initially, followed 45 min later with 5.4 mg/kg/hr for 23 hr (unlabeled).
IM, IV (Children): *Adrenocortical insufficiency: methylprednisolone sodium succinate*—117 mcg/kg (3.33 mg/m²)/day in 3 divided doses. *Acute spinal cord injury: methylprednisolone sodium succinate*—30 mg/kg over 15 min initially, then 45 min later initiate continuous infusion of 5.4 mg/kg/hr for 23 hr (unlabeled). *Other uses: methylprednisolone sodium succinate*—139–835 mcg/kg (4.16–25 mg/m²) q 12–24 hr.
IM (Adults): *Methylprednisolone acetate*—40–120 mg daily, weekly, or every 2 wk.

Prednisolone

PO (Adults): *Most uses*—5–60 mg/day single dose or divided doses. *Multiple sclerosis*—200 mg/day for 7 days, then 80 mg every other day for 1 month.
PO (Children): *Adrenocortical insufficiency*—0.14 mg/kg (4 mg/m²)/day in 3 divided doses. *Other uses*—0.5–2 mg/kg (15–60 mg/m²)/day in 3–4 divided doses.
IM, IV (Adults): *Prednisolone sodium phosphate*—4–60 mg/day.
IM (Children): *Adrenocortical insufficiency: prednisolone sodium phosphate/acetate*—0.14 mg/kg (4 mg/m²)/day in 3 divided doses q 3 days or 0.046–0.07 mg/kg (1.33–2 mg/m²) once daily. *Other uses*—0.166–1 mg/kg (5–30 mg/m²) q 12–24 hr.
IM (Adults): *Prednisolone acetate*—4–60 mg/day. *Prednisolone sodium acetate/phosphate*—25–100 mg (total); may repeat q 3 days–4 wk.

Prednisone

PO (Adults): *Most uses*—5–60 mg/day single dose or divided doses. *Multiple sclerosis*—200 mg/day for 1 wk, then 80 mg every other day for 1 month. *Adjunctive therapy of* Pneumocystis carinii *pneumonia in AIDS patients*—40 mg twice daily for 5 days, then 40 mg once daily for 5 days, then 20 mg once daily for 10 days.
PO (Children ≥10 yr): *Nephrosis*—20 mg 4 times daily initially.
PO (Children 4–10 yr): *Nephrosis*—15 mg 4 times daily initially.
PO (Children 18 mo–4 yr): *Nephrosis*—7.5–10 mg 4 times daily initially.

Triamcinolone

PO (Adults): *Adrenocortical insufficiency*—4–12 mg/day as a single dose or in divided doses. *Other uses*—4–48 mg/day (up to 60 mg/day) as a single dose or in divided doses.
PO (Children): *Adrenocortical insufficiency*—117 mcg/kg/day (3.3 mg/m²/day) as a single dose or in divided doses. *Other uses*—416 mcg–1.7 mg/kg/day (12.5–50 mg/m²/day) as a single dose or in divided doses. Some conditions may require up to 2 mg/kg/day.
IM (Adults): *Triamcinolone acetonide*—40–80 mg q 4 wk. *Triamcinolone diacetate*—40 mg weekly.
IM (Children): *Triamcinolone acetonide*—40 mg q 4 wk or 30–200 mcg/kg (1–6.25 mg/m²) q 1–7 days. *Triamcinolone diacetate*—40 mg weekly.

tion of respiratory distress syndrome in newborn—12 mg IM/day for 2–3 days before delivery.
IM (Children): *Adrenocortical insufficiency*—17.5 mcg/kg (500 mcg/m²)/day in 3 divided doses every third day or 5.8–8.75 mcg/kg (166–250 mcg/m²)/day as a single dose. *Other uses*—20.8–125 mcg/kg (0.625–3.75 mg/m²) of the base q 12–24 hr.

Budesonide
PO (Adults): 9 mg once daily for up to 8 wk; can be tapered to 6 mg/day for 2 wk prior to discontinuing. Course may be repeated.

Cortisone
PO (Adults): 25–300 mg/day as a single dose or in divided doses.
PO (Children): *Adrenocortical insufficiency*—0.7 mg/kg (20–25 mg/m²)/day in divided doses. *Other uses*—2.5–10 mg/kg (75–300 mg/m²)/day as a single dose or in divided doses.
IM (Adults): 20–300 mg/day.
IM (Children): *Adrenocortical insufficiency*—0.7 mg/kg (37.5 mg/m²) q 3 days or 0.23–0.35 mg/kg (12.5 mg/m²)/day. *Other uses*—0.83–5 mg/kg (25–150 mg/m²) q 12–24 hr.

Dexamethasone

Adrenocortical Insufficiency/Anti-Inflammatory/Most Other Uses
PO (Adults): 0.5–9 mg daily in single or divided doses.
PO (Children): *Adrenocortical insufficiency*—23.3 mcg/kg (670 mcg/m²/day) in 3 divided doses. *Other uses*—83.3–333.3 mcg/kg (2.5–10 mg/m²)/day in 3–4 divided doses. *Asthma*—0.6 mg/kg/day for 2 days. *Croup (unlabeled)*—0.6 mg/kg single dose.
IV (Adults): *Dexamethasone phosphate*—0.5–24 mg/day (up to 1 mg/kg as a single dose has been used).
IM (Children): *Croup (unlabeled)*—0.6 mg/kg single dose.
IM (Adults): *Dexamethasone acetate*—8–16 mg q 1–3 wk.

Cerebral Edema
PO (Adults): 2 mg q 8–12 hr.
IM, IV (Adults): *Dexamethasone phosphate*—10 mg initially IV, 4 mg q 6 hr, may be decreased to 2 mg q 8–12 hr, then change to PO.

Dexamethasone Suppression Test
PO (Adults): 1 mg at 11 PM or 0.5 mg q 6 hr for 48 hr.

Hydrocortisone
PO (Adults): 20–240 mg/day in 1–4 divided doses.
PO (Children): *Adrenocortical insufficiency*—0.56 mg/kg (15–20 mg/m²)/day as a single dose or in divided doses. *Other uses*—2–8 mg/kg/day (60–240 mg/m²/day) as a single dose or in divided doses.
IM, IV (Adults): *Hydrocortisone sodium succinate/sodium phosphate*—100–500 mg q 2–6 hr (range 100–8000 mg/day). Hydrocortisone sodium phosphate may also be given subcut.
IM, IV (Children): *Adrenocortical insufficiency: hydrocortisone sodium succinate/sodium phosphate*—0.186–0.28 mg/kg/day (10–12 mg/m²/day) in 3 divided doses. *Other uses: hydrocortisone sodium succinate/sodium phosphate*—0.666–4 mg/kg (20–120 mg/m²) q 12–24 hr (phosphate or succinate). Hydrocortisone sodium phosphate may also be given subcut.

Methylprednisolone
PO (Adults): *Multiple sclerosis*—160 mg/day for 7 days, then 64 mg every other day for 1 month. *Other uses*—4–48 mg/day as a single dose or in divided doses.
PO (Children): *Adrenocortical insufficiency*—117 mcg/kg (3.33 mg/m²)/day in 3 divided doses. *Other uses*—0.417 mg/kg–1.67 mg/kg (12.5–50 mg/m²)/day in 3–4 divided doses.
Rect (Adults): 40 mg 3–7 times weekly for at least 2 wk.
Rect (Children): 0.5–1 mg/kg (15–30 mg/m²) daily or every other day for at least 1 wk.

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NURSING IMPLICATIONS

Assessment
- These drugs are indicated for many conditions. Assess involved systems before and periodically during therapy.
- Assess patient for signs of adrenal insufficiency (hypotension, weight loss, weakness, nausea, vomiting, anorexia, lethargy, confusion, restlessness) before and periodically during therapy.
- Monitor intake and output ratios and daily weights. Observe patient for peripheral edema, steady weight gain, rales/crackles, or dyspnea. Notify physician or other health care professional if these occur.
- Children should have periodic evaluations of growth.
- **Cerebral Edema:** Assess patient for changes in level of consciousness and headache during therapy.
- **Budesonide:** Assess signs of Crohn's disease (diarrhea, crampy abdominal pain, fever, bleeding from rectum) during therapy.
- ***Lab Test Considerations:*** Monitor serum electrolytes and glucose. May cause hyperglycemia, especially in persons with diabetes. May cause hypokalemia. Patients on prolonged courses of therapy should routinely have hematologic values, serum electrolytes, and serum and urine glucose evaluated. May decrease WBCs. May cause hyperglycemia, especially in persons with diabetes. May ↓ serum potassium and calcium and ↑ serum sodium concentrations.
- Guaiac-test stools. Promptly report presence of guaiac-positive stools.
- May ↑ serum cholesterol and lipid values. May decrease uptake of thyroid ^{123}I or ^{131}I.
- Suppress reactions to allergy skin tests.
- Periodic adrenal function tests may be ordered to assess degree of hypothalamic-pituitary-adrenal axis suppression in systemic and chronic topical therapy. **Dexamethasone Suppression Test:** To diagnose Cushing's syndrome: Obtain baseline cortisol level; administer dexamethasone at 11 PM and obtain cortisol levels at 8 AM the next day. Normal response is a decreased cortisol level.
- Alternative method: Obtain baseline 24-hr urine for 17-hydroxycorticosteroid (OHCS) concentrations, then begin 48-hr administration of dexamethasone. Second 24-hr urine for 17-OHCS is obtained after 24 hr of dexamethasone.

Potential Nursing Diagnoses
Risk for infection (Side Effects)
Disturbed body image (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation
- **Do not confuse prednisone with methylprednisolone or primidone.**
- If dose is ordered daily or every other day, administer in the morning to coincide with the body's normal secretion of cortisol.
- **PO:** Administer with meals to minimize GI irritation.
- Tablets may be crushed and administered with food or fluids for patients with difficulty swallowing.
- Use calibrated measuring device to ensure accurate dosage of liquid forms.
- **Subcut IM:** Shake suspension well before drawing up. IM doses should not be administered when rapid effect is desirable. Do not dilute with other solution or admix. Do not administer suspensions IV.

Betamethasone
- **Direct IV:** Only betamethasone sodium phosphate may be given IV. Administer undiluted. ***Rate:*** Administer over at least 1 min.
- **Intermittent Infusion:** May be administered as infusion in D5W, 0.9% NaCl, Ringer's solution, D5/Ringer's solution, or D5/LR.

Dexamethasone
- **Direct IV:** May be given undiluted. Do not administer suspension IV. ***Rate:*** Administer over 1 min.

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CONTINUED

CORTICOSTEROIDS (SYSTEMIC)

- **Intermittent Infusion:** May be added to D5W or 0.9% NaCl solution. Administer infusions at prescribed rate. Diluted solution should be used within 24 hr.

Hydrocortisone

- **Direct IV:** Reconstitute with provided solution (i.e., Act-O-Vials) or 2 ml of bacteriostatic water or saline for injection. ***Rate:*** Administer each 100 mg over at least 30 sec. Doses 500 mg and larger should be infused over at least 10 min.
- **Continuous Infusion:** May be added to 50–1000 ml of D5W, 0.9% NaCl, or D5/0.9% NaCl. Administer infusions at prescribed rate. Diluted solutions should be used within 24 hr.

Methylprednisolone

- **Direct IV:** Reconstitute with provided solution (Act-O-Vials, Univials, ADD-Vantage vials) or 2 ml of bacteriostatic water (with benzyl alcohol) for injection. ***Rate:*** May be administered by direct IV push over 1 to several minutes.
- **Continuous Infusion:** May be diluted further in D5W, 0.9% NaCl, or D5/0.9% NaCl and administered as intermittent or continuous infusion at the prescribed rate. Solution may form a haze upon dilution.

Prednisolone

- **Direct IV:** Do not use the acetate form of this drug for IV administration. ***Rate:*** Prednisolone sodium phosphate IV may be administered direct IV push at a rate of no more than 10 mg/min.
- **Intermittent Infusion:** May be added to 50–1000 ml of D5W or 0.9% NaCl. Stable for 24 hr. ***Rate:*** Administer infusions at prescribed rate.

Patient/Family Teaching

- Instruct patient on correct technique of medication administration. Advise patient to take medication as directed. Take missed doses as soon as remembered unless it is almost time for next dose. Do not double doses. Stopping the medication suddenly may result in adrenal insufficiency (anorexia, nausea, weakness, fatigue, dyspnea, hypotension, hypoglycemia). If these signs appear, notify health care professional immediately. This can be life-threatening.
- Corticosteroids cause immunosuppression and may mask symptoms of infection. Instruct patient to avoid people with known contagious illnesses and to report possible infections immediately.
- Caution patient to avoid vaccinations without first consulting health care professional.
- Review side effects with patient. Instruct patient to inform health care professional promptly if severe abdominal pain or tarry stools occur. Patient should also report unusual swelling, weight gain, tiredness, bone pain, bruising, nonhealing sores, visual disturbances, or behavior changes.
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- Discuss possible effects on body image. Explore coping mechanisms.
- Instruct patient to inform health care professional if symptoms of underlying disease return or worsen.
- Advise patient to carry identification describing disease process and medication regimen in the event of emergency in which patient cannot relate medical history.
- Explain need for continued medical follow-up to assess effectiveness and possible side effects of medication. Periodic lab tests and eye exams may be needed.
- **Long-Term Therapy:** Encourage patient to eat a diet high in protein, calcium, and potassium and low in sodium and carbohydrates. Alcohol should be avoided during therapy.

cyclobenzaprine (sye-kloe-**ben**-za-preen)

Flexeril

Classification

Therapeutic: skeletal muscle relaxants (centrally acting)

Pregnancy Category B

Indications

Management of acute, painful musculoskeletal conditions associated with muscle spasm. **Unlabeled uses:** Management of fibromyalgia.

Action

Reduces tonic somatic muscle activity at the level of the brainstem. Structurally similar to tricyclic antidepressants. **Therapeutic Effects:** Reduction in muscle spasm and hyperactivity without loss of function.

Pharmacokinetics

Absorption: Well absorbed from the GI tract.
Distribution: Unknown.
Metabolism and Excretion: Mostly metabolized by the liver.
Half-life: 1–3 days.

TIME/ACTION PROFILE (skeletal muscle relaxation)

	ONSET	PEAK†	DURATION
PO	within 1 hr	3–8 hr	12–24 hr

†Full effects may not occur for 1–2 wk

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Should not be used within 14 days of MAO inhibitor therapy. Period immediately after MI. Severe or symptomatic cardiovascular disease. Cardiac conduction disturbances. Hyperthyroidism.

Use Cautiously in: Cardiovascular disease; Pregnancy, lactation, or children <15 yr (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, confusion, fatigue, headache, nervousness. **EENT:** dry mouth, blurred vision. **CV:** arrhythmias. **GI:** constipation, dyspepsia, nausea, unpleasant taste. **GU:** urinary retention.

Interactions

Drug-Drug: Additive CNS depression with other **CNS depressants**, including **alcohol**, **antihistamines**, **opioid analgesics**, and **sedative/hypnotics**. Additive anticholinergic effects with **drugs possessing anticholinergic properties**, including **antihistamines**, **antidepressants**, **atropine**, **disopyramide**, **haloperidol**, and **phenothiazines**. Avoid use within 14 days of **monoamine oxidase (MAO) inhibitors** (hyperpyretic crisis, seizures, and death may occur). May blunt the response to **guanadrel**.
Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression.

Route/Dosage

PO (Adults): *Acute painful musculoskeletal conditions*—10 mg 3 times daily (range 20–40 mg/day in 2–4 divided doses); not to exceed 60 mg/day. *Fibromyalgia syndrome*—5–40 mg at bedtime (unlabeled).

NURSING IMPLICATIONS

Assessment

- Assess patient for pain, muscle stiffness, and range of motion before and periodically throughout therapy.

Potential Nursing Diagnoses

Acute pain (Indications)
Impaired physical mobility (Indications)
Risk for injury (Side Effects)

Evaluation/Desired Outcomes

- Decrease in presenting symptoms with minimal systemic effects.
- Suppression of the inflammatory and immune responses in autoimmune disorders, allergic reactions, and neoplasms.
- Decrease in intracranial pressure.
- Management of symptoms in adrenal insufficiency.
- Improvement of symptoms/sequelae of Crohn's disease (decreased frequency of liquid stools, decreased abdominal complaints, improved sense of well being).

Why was this drug prescribed for your patient?

Implementation

- Do not confuse cyclobenzaprine with cyproheptadine.
- **PO:** May be administered with meals to minimize gastric irritation.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed; do not take more than the prescribed amount. Missed doses should be taken within 1 hr of time ordered; otherwise return to normal dosage schedule. Do not double doses.
- Medication may cause drowsiness, dizziness, and blurred vision. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid concurrent use of alcohol or other CNS depressants with this medication.
- If constipation becomes a problem, advise patient that stool softeners and increased fluid intake and bulk in diet may alleviate this condition.
- Advise patient to notify health care professional if symptoms of urinary retention (distended abdomen, feeling of fullness, overflow incontinence, voiding small amounts) occur.
- Inform patient that good oral hygiene, frequent mouth rinses, and sugarless gum or candy may help relieve dry mouth.

Evaluation/Desired Outcomes

- Relief of muscular spasm in acute skeletal muscle conditions. Maximum effects may not be evident for 1–2 wk. Use is usually limited to 2–3 wk; however, has been effective for at least 12 wk in the management of fibromyalgia.

Why was this drug prescribed for your patient?

High Alert

cyclophosphamide (sye-kloe-**fos**-fa-mide)

Cytoxan, Neosar, ♣Procytox

Classification

Therapeutic: antineoplastics, immunosuppressants
Pharmacologic: alkylating agents

Pregnancy Category D

Indications

Alone/with other modalities in the management of Hodgkin's disease, Malignant lymphomas, Multiple myeloma, Leukemias, *Mycosis fungoides*, Neuroblastoma, Ovarian carcinoma, Breast carcinoma, Other tumors. Minimal change nephrotic syndrome (children only).

Action

Interferes with protein synthesis (cell-cycle phase—nonspecific). **Therapeutic Effects:** Death of rapidly replicating cells, particularly malignant ones. Also has immunosuppressant action in smaller doses.

Pharmacokinetics

Absorption: Inactive parent drug is well absorbed from the GI tract.
Distribution: Widely distributed. Crosses placenta; enters breast milk.
Metabolism and Excretion: Converted to active drug by the liver; 30% eliminated unchanged by the kidneys.
Half-life: 4–6.5 hr.

TIME/ACTION PROFILE (effects on blood counts)

ROUTE	ONSET	PEAK	DURATION
PO, IV	7 days	10–14 days	21 days

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Pregnancy or lactation.
Use Cautiously in: Active infections; Bone marrow depression; Chronic debilitating illnesses; Patients with childbearing potential.

Adverse Reactions/Side Effects

Resp: PULMONARY FIBROSIS. **CV:** MYOCARDIAL FIBROSIS, hypotension. **GI:** anorexia, nausea, vomiting. **GU:** HEMORRHAGIC CYSTITIS, hematuria. **Derm:** alopecia. **Endo:** gonadal suppression, syndrome of inappropriate secretion of antidiuretic hormone (SIADH). **Hemat:** LEUKOPENIA, thrombocytopenia, anemia. **Metab:** hyperuricemia. **Misc:** secondary neoplasms.

Interactions

Drug-Drug: Phenobarbital or **rifampin** may increase toxicity. Concurrent **allopurinol** or **thiazide diuretics** may increase bone marrow depression. May prolong effects of **succinylcholine**. Cardiotoxicity may be additive with other **cardiotoxic agents (cytarabine, daunorubicin, doxorubicin)**. May decrease serum **digoxin** levels. Additive bone marrow depression with other **antineoplastics** or **radiation therapy**. May potentiate the effects of **warfarin**. May decrease antibody response to **live-virus vaccines** and increase the risk of adverse reactions. Prolongs the effects of **cocaine**.

Route/Dosage

Many other regimens are used.
PO (Adults): 1–5 mg/kg/day.
PO (Children): *Induction*—2–8 mg/kg/day (60–250 mg/m²/day) in divided doses for 6 days or longer. *Maintenance*—2–5 mg/kg (50–150 mg/m²) twice weekly.
IV (Adults): 40–50 mg/kg in divided doses over 2–5 days *or* 10–15 mg/kg q 7–10 days *or* 3–5 mg/kg twice weekly *or* 1.5–3 mg/kg/day.
IV (Children): *Induction*—2–8 mg/kg/day (60–250 mg/m²/day) in divided doses for 6 days or longer; may also be given as a single weekly dose. *Maintenance*—10–15 mg/kg every 7–10 days or 30 mg/kg q 3–4 wk.

NURSING IMPLICATIONS

Assessment

- Monitor urinary output frequently. To reduce risk of hemorrhagic cystitis, fluid intake should be > 3000 ml/day for adults; 1000–2000 ml/day for children. Alkalinization of the urine may decrease uric acid nephropathy. May be administered with mesna.

CYCLOSPORINE (**sye**-kloe-spor-een)

Sandimmune, Neoral, Gengraf

Classification

Therapeutic: immunosuppressants, antirheumatics (DMARD)
Pharmacologic: polypeptides (cyclic)

Pregnancy Category C

Indications

PO, IV: Prevention/treatment of rejection in renal, cardiac, and hepatic transplantation (with corticosteroids). **PO:** Treatment of severe active rheumatoid arthritis. **PO:** Treatment of severe recalcitrant psoriasis in adult non-immunocompromised patients. **Unlabeled uses:** Treatment of recalcitrant ulcerative colitis.

Action

Inhibits normal immune responses (cellular and humoral) by inhibiting interleukin-2, a factor necessary for initiation of cytotoxic T-cell activity. **Therapeutic Effects:** Prevention of rejection reactions. Slowed progression of rheumatoid arthritis/psoriasis.

Pharmacokinetics

Absorption: 10–60% absorbed after PO administration. Microemulsion (Neoral) has better bioavailability.
Distribution: Widely distributed. Crosses the placenta; enters breast milk.
Metabolism and Excretion: Extensively metabolized by the liver, excreted in bile; small amounts excreted unchanged in urine.
Half-life: *Children*—7 hr; *Adults*—19 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	unknown†	3.5 hr	unknown
IV	unknown	end of infusion	unknown

†Onset of action in rheumatoid arthritis is 4–8 wk and may last 4 wk after discontinuation; for psoriasis onset is 2–6 wk and lasts 6 wk after discontinuation

Contraindications/Precautions

Contraindicated in: Hypersensitivity to cyclosporine or polyoxyethylated castor oil (vehicle for IV form). Known alcohol intolerance (oral solution and IV forms contain alcohol). Pregnancy/lactation.
Use Cautiously in: Severe hepatic impairment (dosage reduction recommended); Renal impairment; Acute infection; Children (larger/more frequent doses may be required).

Adverse Reactions/Side Effects

CNS: SEIZURES, tremor, confusion, flushing, headache, psychiatric problems. **CV:** hypertension. **GI:** diarrhea, hepatotoxicity, nausea, vomiting, abdominal discomfort, anorexia. **GU:** nephrotoxicity. **Derm:** hirsutism, acne. **F and E:** hyperkalemia, hypomagnesemia. **Hemat:** anemia, leukopenia, thrombocytopenia. **Metab:** hyperlipidemia, hyperuricemia. **Neuro:** hyperesthesia, paresthesia. **Misc:** gingival hyperplasia, hypersensitivity reactions, infections.

Interactions

Drug-Drug: ↑ blood levels and/or risk of toxicity with **amphotericin B, aminoglycosides, amiodarone, anabolic steroids**, some **calcium channel blockers, cimetidine, colchicine, danazol, erythromycin, fluconazole, fluoroquinolones, ketoconazole, itraconazole, metoclopramide, methotrexate, miconazole, NSAIDs, melphalan**, or **hormonal contraceptives.** ↑ immunosuppression with other **immunosuppressants** (cyclophosphamide, azathioprine, corticosteroids). **Quinupristin/dalfopristin** ↑ cyclosporine levels. **Barbiturates, pheny-**

- Assess for fever, chills, sore throat, and signs of infection. Notify physician or other health care professional if these symptoms occur.
- Assess for bleeding. Avoid IM injections and taking rectal temperatures. Apply pressure to venipuncture sites for 10 min.
- Assess nausea, vomiting, and appetite. Weigh weekly. Antiemetics may be given ½ hr before administration of medication to minimize GI effects.
- May cause pulmonary and cardiac toxicity; assess for dyspnea, rales/crackles, weight gain, and edema.
- ***Lab Test Considerations:*** Monitor CBC and differential before and throughout therapy. The nadir of leukopenia occurs in 7–12 days (recovery in 17–21 days). The nadir of thrombocytopenia occurs in 10–15 days.
- Urinalysis should be performed before and frequently during therapy to detect hematuria or change in specific gravity indicative of SIADH.

Potential Nursing Diagnoses

Risk for infection (Side Effects)
Disturbed body image (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- ***High Alert:*** Fatalities have occurred with incorrect administration of chemotherapeutic agents. Before administering, clarify all ambiguous orders; double check single, daily, and course-of-therapy dose limits; have second practitioner independently double check original order, calculations and infusion pump settings. Do not confuse cyclophosphamide with cyclosporine. Do not confuse Cytoxan (cyclophosphamide) with Cytozar (cytarabine) or Cytotec (misoprostol).
- **PO:** Administer medication on an empty stomach. If severe gastric irritation develops, medication may be given with food.
- **IV:** Prepare solutions in a biologic cabinet. Wear gloves, gown, and mask while handling. Discard IV equipment in specially designated containers.
- Dilute each 100 mg with 5 ml of sterile or bacteriostatic water for injection containing parabens. Shake solution gently and allow to stand until clear.
- **Direct IV:** Administer at a rate of 100 mg over 1 min.
- **Intermittent Infusion:** May dilute further in up to 250 ml of D5W, 0.9% NaCl, D5/0.9% NaCl, 0.2% NaCl, LR, or dextrose/Ringer's solution.

Patient/Family Teaching

- Instruct patient to take dose in early morning. Emphasize adequate fluids and frequent voiding for 72 hr after therapy. Report hematuria promptly.
- Instruct patient to notify health care professional promptly if fever; sore throat; signs of infection; lower back or side pain; difficult or painful urination; sores in the mouth or on the lips; yellow discoloration of skin or eyes; bleeding gums; bruising; petechiae; blood in urine, stool, or emesis; unusual swelling; joint pain; shortness of breath; or confusion occurs. Caution patient to avoid crowds and persons with infections. Instruct patient to use soft toothbrush and electric razor and to avoid falls. Caution not to drink alcohol or to take products containing aspirin or NSAIDs; may precipitate GI hemorrhage.
- Advise patient that, although this medication may cause sterility, contraception should continue for at least 4 mo after completion of therapy.
- Discuss with patient the possibility of hair loss. Explore methods of coping.
- Patients should avoid vaccinations without advice of health care professional.

Evaluation/Desired Outcomes

- Decrease in size or spread of malignant tumors.
- Improvement of hematologic status in patients with leukemia. Maintenance therapy is instituted if leukocyte count remains between 2500 and 4000/mm^3 and if patient does not demonstrate serious side effects.
- Management of minimal change nephrotic syndrome in children.

Why was this drug prescribed for your patient?

toin, **rifampin**, **rifabutin carbamazepine**, or **sulfonamides** may ↓ effect of cyclosporine. ↑ risk of hyperkalemia with **potassium-sparing diuretics**, **potassium supplements**, or **ACE inhibitors**. ↑ serum levels/risk of toxicity from **digoxin** (↓ digoxin dose by 50%). Prolongs the action of **neuromuscular blocking agents.** ↑ risk of seizures with **imipenem/cilastatin**. May ↓ antibody response to **live-virus vaccines** and ↑ risk of adverse reactions. ↑ risk of rhabdomyolysis with **HMG-CoA reductase inhibitors**. Concurrent use with **tacrolimus** should be avoided. **Orlistat** ↓ absorption; avoid concurrent use.
Drug-Natural Products: Concomitant use with, **echinacea**, and **melatonin** may interfere with immunosuppression. Use with **St. John's wort** may cause ↓ serum levels and organ rejection for transplant patients. Some **HIV protease inhibitos** may ↑ blood levels and the risk of toxicity.
Drug-Food: Concurrent ingestion of **grapefruit or grapefruit juice** ↑ absorption and should be avoided. **Food** ↓ absorption of microemulsion products (Neoral).

Route/Dosage

Prevention of Transplant Rejection

PO (Adults and Children): 12–15 mg/kg/day (first dose before transplant) for 1–2 wk, taper by 5% weekly to 5–10 mg/kg/day. Children may require larger/ more frequent dosing.
IV (Adults and Children): 2–6 mg/kg/day (33% of PO dose) initially, change to PO as soon as possible. Children may require larger or more frequent dosing.

Rheumatoid Arthritis

PO (Adults): 2.5 mg/kg/day given in 2 divided doses; may increase by 0.5–0.75 mg/kg/day after 8 and 12 up to 4 mg/kg/day. Decrease by 25–50% if adverse reactions occur.

Severe Psoriasis

PO (Adults): 2.5 mg/kg/day given in 2 divided doses; for at least 4 wk; then may increase by 0.5 mg/kg/day q 2 wk; up to 4 mg/kg/day. Decrease by 25–50% if adverse reactions occur.

NURSING IMPLICATIONS

Assessment

- Monitor intake and output ratios, daily weight, and blood pressure during therapy. Report significant changes.
- **Prevention of Transplant Rejection:** Assess for symptoms of organ rejection during therapy.
- **IV:** Monitor patient for signs and symptoms of hypersensitivity (wheezing, dyspnea, flushing of face or neck). Oxygen, epinephrine, and equipment for treatment of anaphylaxis should be available with each IV dose.
- **Arthritis:** Assess pain and limitation of movement before and during administration.
- **Psoriasis:** Assess skin lesions before and during therapy.
- ***Lab Test Considerations:*** Nephrotoxicity may occur; monitor BUN and serum creatinine levels periodically. Report significant increases. May also cause ↓ serum magnesium levels.
- May cause hepatotoxicity; monitor for ↑ AST, ALT, alkaline phosphatase, amylase, and bilirubin levels.
- May cause ↑ serum potassium, uric acid, and lipid levels.

Potential Nursing Diagnoses

Risk for infection (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **Do not confuse cyclosporine with cyclophosphamide or cycloserine.**
- Given with other immunosuppressive agents. Protect transplant patients from staff and visitors who may carry infection. Maintain protective isolation as indicated.
- Microemulsion products (Neoral) and other products (Sandimmune) are not interchangeable.

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CYCLOSPORINE

- **PO:** Draw up the oral solution in the pipette provided with the medication. Mix with milk, chocolate milk, or orange juice, preferably at room temperature. Stir well and drink at once. Use a glass container and rinse with more diluent to ensure that total dose is taken. Administer with meals. Wipe pipette dry; do not wash after use.
- **Intermittent Infusion:** Dilute each 1 ml (50 mg) of IV concentrate immediately before use with 20–100 ml of D5W or 0.9% NaCl for injection. Solution is stable for 24 hr in D5W. In 0.9% NaCl, stable for 6 hr in a polyvinyl chloride container and 12 hr in a glass container at room temperature. ***Rate:*** Infuse slowly over 2–6 hr via infusion pump.
- **Y-Site Compatibility:** gatifloxacin, linezolid, propofol, sargramostim.
- **Y-Site Incompatibility:** amphotericin B cholesteryl sulfate.
- **Continuous Infusion:** Administer as a continuous infusion over 24 hr.

Patient/Family Teaching

- Instruct patient to take medication at the same time each day and with regard to food, as directed. Do not skip doses or double missed doses. Take missed doses as soon as remembered within 12 hr. Do not discontinue without advice of health care professional.
- Reinforce the need for lifelong therapy to prevent transplant rejection. Review symptoms indicating rejection of transplanted organ, and stress the need to notify health care professional immediately if symptoms occur.
- Instruct patient to avoid grapefruit and grapefruit juice to prevent interaction with cyclosporine.
- Teach patient the correct method for monitoring blood pressure. Instruct patient to report significant changes in blood pressure or if hematuria, frequency, cloudy urine, decreased urine output, fever, sore throat, tiredness, or unusual bruising occur.
- Instruct patient on proper oral hygiene. Meticulous oral hygiene and dental examinations every 3 mo for teeth cleaning and plaque control will help decrease gingival inflammation and hyperplasia.
- Instruct patient to consult health care professional before taking any OTC medications or receiving any vaccinations.
- Advise patient to notify health care professional if pregnancy is planned or suspected.
- Emphasize the importance of follow-up exams and lab tests.

Evaluation/Desired Outcomes

- Prevention of rejection of transplanted tissues.
- Decrease in severity of pain
- Increased ease of joint movement.
- Decrease in progression of psoriasis.

Why was this drug prescribed for your patient?

daclizumab (da-kliz-yoo-mab)

Zenapax

Classification

Therapeutic: immunosuppressants
Pharmacologic: monoclonal antibodies

Pregnancy Category C

Indications

Prevention of acute organ rejection during renal transplantation (with cyclosporine and corticosteroids).

Action

Binds specifically to interleukin-2 (IL-2) receptor sites on activated lymphocytes, acting as an IL-2 receptor antagonist. This prevents further activation of lymphocytes and allograft rejection. **Therapeutic Effects:** Prevention of renal allograft rejection.

Pharmacokinetics

Absorption: IV administration results in complete bioavailability.
Distribution: Crosses the placenta.
Metabolism and Excretion: Binds to lymphocytes.
Half-life: 20 days.

TIME/ACTION PROFILE (saturation of IL-2 receptors)

ROUTE	ONSET	PEAK	DURATION
IV	rapid	120 days†	after 5 doses

†Post-transplant

Contraindications/Precautions

Contraindicated in: Hypersensitivity.

Use Cautiously in: Geriatric patients; Pregnancy, lactation, or children (has been used in children, increased risk of hypertension and dehydration).

Adverse Reactions/Side Effects

CNS: dizziness, fatigue, headache, insomnia. **Resp:** PULMONARY EDEMA, coughing, dyspnea. **CV:** chest pain, edema, hypertension (↑ in children), hypotension, tachycardia. **GI:** abdominal discomfort, constipation, diarrhea (↑ in children), dyspepsia, epigastric pain, nausea, pyrosis, vomiting (↑ in children). **GU:** dysuria, oliguria, renal tubular necrosis. **Derm:** acne, impaired wound healing, pruritus (↑ in children). **Hemat:** thrombosis. **MS:** arthralgia, back pain, musculoskeletal pain. **Neuro:** tremor. **Misc:** Allergic reactions including ANAPHYLAXIS, fever (↑ in children), post-operative pain (↑ in children), urinary and respiratory tract infection (↑ in children).

Interactions

Drug-Drug: None known.
Drug-Natural Products: Concomitant use with **astragalus, echinacea,** and **melatonin** may interfere with immunosuppression.

Route/Dosage

IV (Adults and Children): 1 mg/kg, with 1st dose given no more than 24 hr before transplantation, then q 2 wk for a total of 5 doses.

NURSING IMPLICATIONS

Assessment

- **Assess for fluid overload (monitor weight and intake and output, assess for edema and rales/crackles). Notify physician if patient has experienced 3% or more weight gain in the previous week. Obtain chest x-ray within 24 hr before beginning therapy. Fluid-overloaded patients are at high risk of developing pulmonary edema. Monitor vital signs and breath sounds closely.**
- **Monitor for signs of anaphylactic or hypersensitivity reactions (hypotension, bronchospasms, wheezing, laryngeal edema, pul-**

monary edema, cyanosis, hypoxia, respiratory arrest, cardiac arrhythmia, cardiac arrest, peripheral edema, loss of consciousness, fever, rash, urticaria, diaphoresis, pruritus, and/or injection site reactions) at each dose. Resuscitation equipment should be readily available. If a severe hypersensitivity reaction occurs, therapy with daclizumab should be permanently discontinued.

- Monitor for infection (fever, chills, rash, sore throat, purulent discharge, dysuria). Notify physician immediately if these symptoms occur; may necessitate discontinuation of therapy.

Potential Nursing Diagnoses

Risk for infection (Side Effects)
Excess fluid volume (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Daclizumab is usually administered concurrently with cyclosporine and corticosteroids.
- Daclizumab should be used only by physicians experienced in the management of organ transplantation.
- **Intermittent Infusion:** Dilute daclizumab with 50 ml of 0.9% NaCl. Gently invert bag to mix; do not shake to avoid foaming. Solution is clear and colorless; do not administer solutions that are discolored or contain particulate matter. Discard unused portion. Administer within 4 hr or may be refrigerated for up to 24 hr. Discard after 24 hr. ***Rate:*** Administer over 15 min via peripheral or central line.
- **Compatibility:** Do not admix; do not administer in IV line containing other medications. If line must be used for other medications, flush with 0.9% NaCl before and after daclizumab.

Patient/Family Teaching

- Explain purpose of medication to patient. Explain that patient will need to resume lifelong therapy with other immunosuppressive drugs after completion of daclizumab course.
- May cause dizziness. Caution patient to avoid driving or other activities requiring alertness until response is known.
- Instruct patient to continue to avoid crowds and persons with known infections, as this drug also suppresses the immune system.
- Instruct patient not to receive any vaccinations and to avoid contact with persons receiving oral polio vaccine without advice of health care professional.

Evaluation/Desired Outcomes

- Prevention of acute organ rejection.

Why was this drug prescribed for your patient?

darbepoetin (dar-be-**poh**-e-tin)

Aranesp

Classification

Therapeutic: antianemics
Pharmacologic: hormones (rDNA)

Pregnancy Category C

Indications

Anemia associated with chronic renal failure. Chemotherapy-induced anemia in patients with non-myeloid malignancies.

Action

Stimulates erythropoiesis (production of red blood cells). **Therapeutic Effects:** Maintains and may elevate red blood cell counts, decreasing the need for transfusions.

Pharmacokinetics

Absorption: 30–50% following subcut administration; IV administration results in complete bioavailability.
Distribution: Confined to the intravascular space.
Metabolism and Excretion: Unk.
Half-life: *subcut*—49 hr; *IV*—21 hr.

TIME/ACTION PROFILE (increase in RBCs)

ROUTE	ONSET	PEAK	DURATION
IV, subcut	2–6 wks	unknown	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Uncontrolled hypertension.
Use Cautiously in: History of hypertension; Underlying hematologic diseases, including hemolytic anemia, sickle-cell anemia, thalassemia and porphyria (safety not established); Pregnancy, lactation or children (safety not established).

Adverse Reactions/Side Effects

CNS: SEIZURES, dizziness, fatigue, headache, weakness. **Resp:** cough, dyspnea, bronchitis. **CV:** ARRHYTHMIAS, CHF, MI, STROKE, THROMBOTIC EVENTS (especially with hemoglobin >12 g/dL), edema, hypertension, hypotension, chest pain, transient ischemic attack, thrombotic events. **GI:** abdominal pain, nausea, diarrhea, vomiting, constipation. **Derm:** pruritus. **Hemat:** pure red cell aplasia. **MS:** myalgia, arthralgia, back pain, limb pain. **Misc:** fever, allergic reactions, flu-like syndrome, sepsis.

Interactions

Drug-Drug: None reported.

Route/Dosage

Anemia due to Chronic Renal Failure

IV, Subcut: (Adults): *Starting treatment with darbepoetin (no previous epoetin)*—0.45 mcg/kg once weekly; adjust dose to attain target hemoglobin of 12 g/dl. Dosage adjustments should be made monthly in increments or decrements of 25% of current dose. Some patients may dosed every 2 weeks. *Conversion from epoetin to darbepoetin*—weekly epoetin dose <2500 units = 6.25 mcg/week darbepoetin, weekly epoetin dose 2500-4999 units = 12.5 mcg/week darbepoetin, weekly epoetin dose 5000-10,999 units = 25 mcg/week darbepoetin, weekly epoetin dose 11,000-17,999 units = 40 mcg/week darbepoetin, weekly epoetin dose 18,000-33,999 units = 60 mcg/week darbepoetin, weekly epoetin dose 34,000-89,999 units = 100 mcg/week darbepoetin, weekly epoetin dose >90,000 units = 200 mcg/week darbepoetin.

Anemia due to Chemotherapy

Subcut: (Adults): 2.25 mcg/kg initially. Adjust dose to attain target hemoglobin. If hemoglobin increases by <1.0 g/dL after 6 weeks of therapy, dose should be increased up to 4.5 mcg/kg. If hemoglobin increases by >1.0 g/dL

Why was this drug prescribed for your patient?

CONTINUED

darbepoetin

Patient/Family Teaching

- Explain rationale for concurrent iron therapy (increased red blood cell production requires iron).
- Discuss possible return of menses and fertility in women of childbearing age. Patient should discuss contraceptive options with health care professional.
- Discuss ways of preventing self-injury in patients at risk for seizures. Driving and activities requiring continuous alertness should be avoided.
- Stress importance of compliance with dietary restrictions, medications, and dialysis. Foods high in iron and low in potassium include liver, pork, veal, beef, mustard and turnip greens, peas, eggs, broccoli, kale, blackberries, strawberries, apple juice, watermelon, oatmeal, and enriched bread. Darbepoetin will result in increased sense of well-being, but it does not cure underlying disease.
- **Home Care Issues:** Home dialysis patients determined to be able to safely and effectively administer darbepoetin should be taught proper dosage, administration technique, and disposal of equipment. *Information for Patients and Caregivers* should be provided to patient along with medication.

Evaluation/Desired Outcomes

- Increase in hemoglobin not to exceed 12 g/dl with improvement in symptoms of anemia in patients with chronic renal failure.

in 2 weeks or if the hemoglobin >12 g/dL, decrease dose by approximately 25%. If the hemoglobin >13 g/dL, temporarily withhold until hemoglobin falls to 12 g/dL. Restart at a dose approximately 25%<the previous dose.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure before and during therapy. Inform physician or other health care professional if severe hypertension is present or if blood pressure begins to increase. Additional antihypertensive therapy may be required during initiation of therapy.
- Monitor response for symptoms of anemia (fatigue, dyspnea, pallor).
- Monitor dialysis shunts (thrill and bruit) and status of artificial kidney during hemodialysis. May need to increase heparin dose to prevent clotting. Monitor patients with underlying vascular disease for impaired circulation.
- Monitor for allergic reactions (rash, utricaria). Discontinue darbepoetin if signs of anaphylaxis (dyspnea, laryngeal swelling) occur.
- **Lab Test Considerations:** May cause ↑ in WBCs and platelets. May ↓ bleeding times.
- Monitor serum ferritin, transferrin, and iron levels prior to and during therapy to assess need for concurrent iron therapy. Transferrin saturation should be at least 20% and ferritin should be at least 100 ng/ml.
- Monitor hemoglobin before and weekly during initial therapy, for 4 wk after a change in dose, and regularly after target range has been reached and maintenance dose is determined. Monitor other hematopoietic parameters (CBC with differential and platelet count) before and periodically during therapy. Hemoglobin increases of more than 1.0 g/dl in any 2-week period or hemoglobin >12 g/dL, increase the likelihood of cardiac arrest, neurologic events (seizures, stroke), hypertensive reactions, CHF, vascular thrombosis/ischemia/infarction, acute MI, and fluid overload/edema. Decrease dose by 25% and monitor hemoglobin weekly for 4 wk. If hemoglobin continues to increase, temporarily withhold until hemoglobin begins to decrease; then reinitiate at a dose 25% lower than previous dose.
- If increase in hemoglobin is less than 1 g/dl over 4 wks and iron stores are adequate, dose may be increased by 25% of previous dose.
- Monitor renal function studies and electrolytes closely; resulting increased sense of well-being may lead to decreased compliance with other therapies for renal failure.

Potential Nursing Diagnoses

Activity intolerance (Indications)

Implementation

- Transfusions are still required for severe symptomatic anemia. Supplemental iron should be initiated with darbepoetin and continued during therapy. Correct deficiencies of folic acid or vitamin B_{12} prior to therapy.
- Institute seizure precautions in patients who experience greater than a 1.0 g/dl increase in hemoglobin in a 2-wk period or exhibit any change in neurologic status.
- *For conversion from epoetin alfa to darbepoetin*, if epoetin was administered 2-3 times/wk administer darbepoetin once a week. If patient was receiving epoetin once/wk, darbepoetin may be administered once every 2 wks. Route of administration should remain consistent.
- Dose adjustments should not be more frequent than once/month.
- Do not shake vial; inactivation of medication may occur. Do not administer vials containing solution that is discolored or contains particulate matter. Discard vial immediately after withdrawing dose. Do not pool unused portions.
- **Subcut:** This route is often used for patients not requiring dialysis.
- **Direct IV:** Administer undiluted. ***Rate:*** May be administered as direct injection or bolus into IV tubing or via venous line at end of dialysis session.
- **Y-Site Incompatibility:** Do not administer in conjunction with other drugs or solutions.

CONTINUED

desloratadine (dess-lor-a-ta-deen)

Clarinex

Classification

Therapeutic: allergy, cold, and cough remedies, antihistamines
Pharmacologic: piperidines

Pregnancy Category C

Indications

Nasal and non-nasal symptoms of allergic rhinitis (seasonal and perennial). Chronic idiopathic urticaria.

Action

Blocks peripheral effects of histamine released during allergic reactions. **Therapeutic Effects:** Decreased symptoms of allergic reactions (nasal stuffiness, red swollen eyes). Decreased pruritus, reduction in number and size of hives in chronic idiopathic urticaria.

Pharmacokinetics

Absorption: Well absorbed; absorption for orally disintegrating tablets and oral tablets is identical.
Distribution: Enters breast milk.
Metabolism and Excretion: Extensively metabolized to 3-hydroxydesloratadine, an active metabolite; small percentage of patients may be slow metabolizers.
Half-life: 27 hr.

TIME/ACTION PROFILE (antihistaminic effects)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	3 hr	24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity, Lactation.
Use Cautiously in: Patients with hepatic or renal impairment (↓ dose to 5 mg every other day); Dosing for the elderly should consider ↓ hepatic, renal, or cardiac function, concomitant diseases, other drug therapy and ↑ risk of adverse reactions; Children <6 mo (safety not established).

Adverse Reactions/Side Effects

CNS: drowsiness (rare). **EENT:** pharyngitis. **GI:** dry mouth. **Misc:** allergic reactions including ANAPHYLAXIS.

Interactions

Drug-Drug: The following interactions may occur, but are less likely to occur with desloratidine than with more sedating antihistamines. **MAO inhibitors** may intensify and prolong effects of antihistamines. ↑ CNS depression may occur with other **CNS depressants** including **alcohol**, **antidepressants**, **opioids**, and **sedative/hypnotics**.

Route/Dosage

PO (Adults and Children ≥12 yr): 5 mg once daily.

Hepatic/Renal Impairment

PO (Adults and Children ≥12 yr): 5 mg every other day.
PO (Children 6–11 yr): 2.5 mg once daily.
PO (Children 12 mo–5 yr): 1.25 mg once daily.
PO (Children 6–12 mo): 1 mg once daily.

NURSING IMPLICATIONS

Assessment

- Assess allergy symptoms (rhinitis, conjunctivitis, hives) before and periodically during therapy.
- Assess lung sounds and character of bronchial secretions. Maintain fluid intake of 1500–2000 ml/day to decrease viscosity of secretions.
- ***Lab Test Considerations:*** May cause false-negative result on allergy skin testing.

diazepam (dye-az-e-pam)

♣Apo-Diazepam, Diastat, ♣Diazemuls, Dizac, D-Val, ♣Novodipam, ♣PMS-Diazepam, Valium, ♣Vivol

Classification

Therapeutic: antianxiety agents, anticonvulsants, sedative/hypnotics, skeletal muscle relaxants (centrally acting)
Pharmacologic: benzodiazepines

Schedule IV

Pregnancy Category D

Indications

Adjunct in the management of Anxiety, Preoperative sedation, Conscious sedation, Provides light anesthesia and anterograde amnesia. Treatment of status epilepticus acute seizures. Skeletal muscle relaxant. Management of the symptoms of alcohol withdrawal.

Action

Depresses the CNS, probably by potentiating gamma-aminobutyric acid, an inhibitory neurotransmitter. Produces skeletal muscle relaxation by inhibiting spinal polysynaptic afferent pathways. Has anticonvulsant properties because of enhanced presynaptic inhibition. **Therapeutic Effects:** Relief of anxiety. Sedation. Amnesia. Skeletal muscle relaxation. Decreased seizure activity.

Pharmacokinetics

Absorption: Rapidly absorbed from the GI tract. Absorption from IM sites may be slow and unpredictable. Also absorbed from rectal mucosa.
Distribution: Widely distributed. Crosses the blood-brain barrier. Crosses the placenta; enters breast milk.
Metabolism and Excretion: Highly metabolized by the liver. Some products of metabolism are active as CNS depressants.

Half-life: 20–70 hr (up to 200 hr for metabolites).

TIME/ACTION PROFILE (sedation)

ROUTE	ONSET	PEAK	DURATION
PO	30–60 min	1–2 hr	up to 24 hr
IM	within 20 min	0.5–1.5 hr	unknown
IV	1–5 min	15–30 min	15–60 min*
Rect	unknown	1–2 hr	4–12 hr

*In status epilepticus, anticonvulsant duration is 15–20 min

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with other benzodiazepines may exist. Comatose patients. Pre-existing CNS depression. Uncontrolled severe pain. Narrow-angle glaucoma. Some products contain alcohol, propylene glycol, or tartrazine and should be avoided in patients with known hypersensitivity or intolerance. Pregnancy or lactation.
Use Cautiously in: Hepatic dysfunction; Severe renal impairment; History of suicide attempt or drug dependence; Geriatric or debilitated patients (dosage reduction required); Children (dose should not exceed 0.25 mg/kg).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, lethargy, depression, hangover, headache, paradoxical excitation. **EENT:** blurred vision. **Resp:** respiratory depression. **CV:** hypotension (IV only). **GI:** constipation, diarrhea (increased with rectal use), nausea, vomiting. **Derm:** rashes. **Local:** pain (IM), phlebitis (IV), venous thrombosis. **Misc:** physical dependence, psychological dependence, tolerance.

Interactions

Drug-Drug: Alcohol, **antidepressants**, **antihistamines**, and **opioid analgesics**—concurrent use results in additive CNS depression. **Cimetidine**, **disulfiram**, **fluoxetine**, **isoniazid**, **ketoconazole**, **metoprolol**, **hormonal contraceptives**, **propoxyphene**, **propranolol**, or **valproic**

Potential Nursing Diagnoses

Ineffective airway clearance (Indications)
Risk for injury (Adverse Reactions)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **PO:** May be administered without regard to meals.
- *For rapidly disintegrating tablets (Reditabs):* Place on tongue. Tablet disintegrates rapidly. May be taken with or without water. Administer immediately after opening the blister.

Patient/Family Teaching

- Instruct patients to take desloratidine as directed. Do not increase dose or frequency; does not increase effectiveness and may increase side effects.
- May rarely cause drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid taking alcohol or other CNS depressants concurrently with this drug.
- Advise patient that good oral hygiene, frequent rinsing of mouth with water, and sugarless gum or candy may minimize dry mouth. Patient should notify dentist if dry mouth persists >2 wk.

Evaluation/Desired Outcomes

- Decrease in allergic symptoms.

Why was this drug prescribed for your patient?

acid may decrease the metabolism of diazepam, enhancing its actions. May decrease efficacy of **levodopa**. **Barbiturates** or **rifampin** may increase the metabolism and decrease effectiveness of diazepam. Sedative effects may be decreased by **theophylline**.
Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression.

Route/Dosage

Antianxiety/Anticonvulsant

PO (Adults): 2–10 mg 2–4 times daily.
PO (Children >6 mo): 1–2.5 mg 3–4 times daily; may be increased.

Precardioversion

IV (Adults): 5–15 mg 5–10 min precardioversion.

Pre-Endoscopy

IV (Adults): 2.5–20 mg.
IM (Adults): 5–10 mg 30 min pre-endoscopy.

Status Epilepticus

IV (Adults): 5–10 mg, may repeat q 10–15 min total of 30 mg, may repeat regimen again in 2–4 hr (IM route may be used if IV route unavailable; larger doses may be necessary).
IM, IV (Children ≥5 yr): 1 mg q 2–5 min total of 10 mg, repeat q 2–4 hr.
IM, IV (Children 1 mo–5 yr): 0.2–0.5 mg q 2–5 min to maximum of 5 mg.
Rect (Adults and Children >12 yr): 0.2 mg/kg; may repeat 4–12 hr later.
Rect (Children 6–11 yr): 0.3 mg/kg; may repeat 4–12 hr later.
Rect (Children 2–5 yr): 0.5 mg/kg; may repeat 4–12 hr later.

Skeletal Muscle Relaxation

PO (Adults): 2–10 mg 3–4 times daily or 15–30 mg of extended-release form once daily.
PO (Geriatric Patients or Debilitated Patients): 2–2.5 mg 1–2 times daily initially.
PO (Children): 1–2.5 mg 3–4 times daily.
IM, IV (Adults): 5–10 mg; may repeat in 2–4 hr (larger doses may be required for tetanus).
IM, IV (Geriatric Patients or Debilitated Patients): 2–5 mg; may repeat in 2–4 hr (larger doses may be required for tetanus).
IM, IV (Children ≥5 yr): *Tetanus*—5–10 mg q 3–4 hr.
IM, IV (Children >1 mo): *Tetanus*—1–2 mg q 3–4 hr.

Alcohol Withdrawal

PO (Adults): 10 mg 3–4 times in first 24 hr, decrease to 5 mg 3–4 times daily (larger/more frequent doses have been used).
IM, IV (Adults): 10 mg initially, then 5–10 mg in 3–4 hr as needed.

Psychoneurotic Reactions

IM, IV (Adults): 2–10 mg, may be repeated in 3–4 hr.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure, pulse, and respiratory rate before and periodically throughout therapy and frequently during IV therapy.
- Assess IV site frequently during administration; diazepam may cause phlebitis and venous thrombosis.
- Prolonged high-dose therapy may lead to psychological or physical dependence. Restrict amount of drug available to patient. Observe depressed patients closely for suicidal tendencies.
- **Anxiety:** Assess degree of anxiety and level of sedation (ataxia, dizziness, slurred speech) before and periodically throughout therapy.
- **Seizures:** Observe and record intensity, duration, and location of seizure activity. The initial dose of diazepam offers seizure control for 15–20 min after administration. Institute seizure precautions.
- **Muscle Spasms:** Assess muscle spasm, associated pain, and limitation of movement before and throughout therapy.

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CONTINUED

diazepam

- **Alcohol Withdrawal:** Assess patient experiencing alcohol withdrawal for tremors, agitation, delirium, and hallucinations. Protect patient from injury.
- ***Lab Test Considerations:*** Hepatic and renal function and CBC should be evaluated periodically throughout course of prolonged therapy.

Potential Nursing Diagnoses

Anxiety (Indications)
Impaired physical mobility (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)
Risk for injury (Side Effects)

Implementation

- **Do not confuse diazepam with lorazepam or ditropan.**
- Patient should be kept on bedrest and observed for at least 3 hr following parenteral administration.
- If opioid analgesics are used concurrently with parenteral diazepam, decrease opioid dose by ½ and titrate dose to effect.
- **PO:** Tablets may be crushed and taken with food or water if patient has difficulty swallowing. **Swallow sustained-release capsules whole; do not crush, break, or chew.**
- Mix Intensol preparation with liquid or semisolid food such as water, juices, soda, applesauce, or pudding. Administer entire amount immediately. Do not store.
- **IM:** IM injections are painful and erratically absorbed. If IM route is used, inject deeply into deltoid muscle for maximum absorption.
- **IV:** Resuscitation equipment should be available when diazepam is administered IV.
- **Direct IV:** For IV administration do not dilute or mix with any other drug. If direct IV push is not feasible, administer IV push into tubing as close to insertion site as possible. Continuous infusion is not recommended because of precipitation in IV fluids and absorption of diazepam into infusion bags and tubing. Injection may cause burning and venous irritation; avoid small veins. ***Rate:*** Administer slowly at a rate of 5 mg over at least 1 min. Infants and children should receive total dose over a minimum of 3–5 min. Rapid injection may cause apnea, hypotension, bradycardia, or cardiac arrest.
- **Syringe Compatibility:** cimetidine.
- **Syringe Incompatibility:** doxapram, glycopyrrolate, heparin, hydromorphone, nalbuphine, sufentanil.
- **Y-Site Compatibility:** dobutamine, nafcillin, quinidine gluconate, sufentanil.
- **Y-Site Incompatibility:** amphotericin B cholesteryl sulfate complex, atracurium, cefepime, diltiazem, fluconazole, foscarnet, heparin, hydromorphone, meropenem, pancuronium, potassium chloride, propofol, vecuronium, vitamin B complex with C.
- **Sterile emulsion for injection (Dizac):** For IV use only. Use strict aseptic technique. Do not dilute, ampule is for single use; discard unused portion. Do not use filters >5 microns; restricts flow and causes breakdown of emulsion. Administer within 6 hr of drawing up, flush line at end of administration and after 6 hr to remove residual.
- **Incompatibility:** • glycopyrrolate • morphine.
- **Rect:** Do not repeat *Diastat* rectal dose more than 5 times/mo or 1 episode every 5 days. Round dose up to next available dose unit.
- Diazepam injection has been used for rectal administration. Instill via catheter or cannula fitted to the syringe or directly from a 1-ml syringe inserted 4–5 cm into the rectum. A dilution of diazepam injection with propylene glycol containing 1 mg/ml has also been used.
- Do not dilute with other solutions, IV fluids, or medications.

DICLOFENAC (dye-**kloe**-fen-ak)

diclofenac potassium

Cataflam, ♣Voltaren Rapide

diclofenac sodium

♣Apo-Diclo, ♣Novo-Difenac, ♣Novo-Difenac SR, ♣Nu-Diclo, Voltaren, ♣Voltaren-SR

Classification

Therapeutic: nonopioid analgesics, nonsteroidal anti-inflammatory agents

Pregnancy Category B (first trimester)

Indications

Management of Rheumatoid arthritis, Osteoarthritis, Ankylosing spondylitis. Acute pain. Mild to moderate dysmenorrhea.

Action

Inhibits prostaglandin synthesis. **Therapeutic Effects:** Suppression of pain and inflammation.

Pharmacokinetics

Absorption: Well absorbed after oral administration. Diclofenac sodium is delayed-release; diclofenac potassium is immediate-release.
Distribution: Crosses the placenta; enters breast milk.
Protein Binding: >99%.
Metabolism and Excretion: ≥50% metabolized by the liver.
Half-life: 1.2–2 hr.

TIME/ACTION PROFILE

	ONSET	PEAK	DURATION
PO (inflammation)	few days–1 wk	2 wk or more	unknown
PO (pain)	30 min	unknown	up to 8 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity may occur with other NSAIDs including aspirin. GI bleeding/ulcer disease.
Use Cautiously in: Severe cardiovascular/renal/hepatic disease; Porphyria; Ulcer disease; Cardiovascular disease or risk factors for cardiovascular disease (may ↑ risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, especially with prolonged use); Geriatric patients (↓ doses recommended); Bleeding tendency/concurrent anticoagulant therapy; Pregnancy, lactation, children (safety not established; not recommended during second half of pregnancy).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, headache. **CV:** hypertension. **GI:** GI BLEEDING, abdominal pain, dyspepsia, heartburn, diarrhea, hepatotoxicity. **GU:** renal failure, dysuria, frequency, hematuria, nephritis, proteinuria. **Derm:** EXFOLIATIVE DERMATITIS, STEVENS-JOHNSON SYNDROME, TOXIC EPIDERMAL NECROLYSIS, eczema, photosensitivity, rashes. **F and E:** edema. **Hemat:** prolonged bleeding time. **Misc:** allergic reactions including ANAPHYLAXIS.

Interactions

Drug-Drug: Concurrent use with **aspirin** may ↓ effectiveness. ↑ adverse GI effects with **aspirin**, other **NSAIDs**, **colchicine**, **corticosteroids**, or **alcohol.** Chronic **acetaminophen** may ↑ adverse renal reactions. May ↓ effectiveness of **diuretics**, **antihypertensives**, **insulins**, or **hypoglycemic agents.** ↑ **digoxin** levels (dosage adjustment may be necessary). May ↑ levels/risk of toxicity from **cyclosporine**, **lithium**, or **methotrexate.** **Probenecid** ↑ risk of toxicity from diclofenac. ↑ risk of bleeding with some **cephalosporins**, **thrombolytic agents**, **antiplatelet agents** or **anticoagulants.** ↑ risk of adverse hematologic reactions with **antineoplastics** or **radiation therapy.** Concurrent use with **potassium-sparing diuretics** ↑ risk of hyperkalemia. Concurrent use with **gold compounds** may ↑ risk of adverse renal reactions.

Route/Dosage

PO (Adults): Diclofenac Potassium: *Analgesic/antidysmenorrheal*—100 mg initially, then 50 mg 3 times daily; *rheumatoid arthritis*—50 mg 3–4 times daily, after initial resopnse reduce to lowest dose (usual mainte-

Patient/Family Teaching

- Instruct patient to take medication exactly as directed and not to take more than prescribed or to increase dose if less effective after a few weeks without checking with health care professional. Abrupt withdrawal of diazepam may cause insomnia, unusual irritability or nervousness, and seizures. Advise patient that sharing of this medication may be dangerous.
- Medication may cause drowsiness, clumsiness, or unsteadiness. Advise patient to avoid driving or other activities requiring alertness until response to medication is known.
- Caution patient to avoid taking alcohol or other CNS depressants concurrently with this medication.
- Advise patient to notify professional if pregnancy is suspected or planned.
- Emphasize the importance of follow-up examinations to determine effectiveness of the medication.
- **Seizures:** Patients on anticonvulsant therapy should carry identification describing disease process and medication regimen at all times.
- Carefully review patient/caregiver package insert for Diastat rectal gel before administration.

Evaluation/Desired Outcomes

- Decrease in anxiety level. Full therapeutic antianxiety effects occur after 1–2 wk of therapy.
- Decreased recall of surgical or diagnostic procedures.
- Control of seizures.
- Decrease in muscle spasms.
- Decreased tremulousness and more rational ideation when used for alcohol withdrawal.

Why was this drug prescribed for your patient?

nance dose 25 mg 3 times daily); *osteoarthritis*—50 mg 2–3 times daily, after initial response reduce to lowest dose; *ankylosing spondylitis*—25 mg 4–5 times daily, after initial response reduce to lowest dose that controls symptoms; **Diclofenac Sodium:** *Rheumatoid arthritis*—50 mg 3–4 times daily, after initial resopnse reduce to lowest dose (usual maintenance dose 25 mg 3 times daily).

NURSING IMPLICATIONS

Assessment

- Patients who have asthma, aspirin-induced allergy, and nasal polyps are at increased risk for developing hypersensitivity reactions.
- **Pain:** Assess pain and limitation of movement; note type, location, and intensity before and 30–60 min after administration.
- **Arthritis:** Assess arthritic pain (note type, location, intensity) and limitation of movement before and periodically during therapy.
- ***Lab Test Considerations:*** Diclofenac has minimal effect on bleeding time and platelet aggregation.
- Monitor liver function tests within 8 wk of initiating diclofenac therapy and periodically during therapy. May cause elevated serum alkaline phosphatase, LDH, AST, and ALT concentrations.
- Monitor BUN, serum creatinine, and electrolytes periodically during therapy. May cause increased BUN, serum creatinine, and electrolytes.

Potential Nursing Diagnoses

Acute pain (Indications)
Impaired physical mobility (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **Do not confuse Cataflam (diclofenac) with Catapres (clonidine).**
- Administration in higher than recommended doses does not provide increased effectiveness but may cause increased side effects. Use lowest effective dose for shortest period of time.
- **PO:** Administer after meals, with food, or with an antacid to minimize GI irritation. May take first 1–2 doses on an empty stomach for more rapid onset. **Do not crush or chew enteric-coated or sustained-release tablets.**
- **Dysmenorrhea:** Administer as soon as possible after the onset of menses. Prophylactic treatment has not been shown to be effective.

Patient/Family Teaching

- **PO:** Instruct patient to take diclofenac with a full glass of water and remain upright for 15–30 min after administration. Take missed doses as soon as possible within 1–2 hr if taking once or twice/day or unless almost time for next dose if taking more than twice/day. Do not double doses.
- Caution patient to avoid concurrent use of alcohol, aspirin, acetaminophen, other NSAIDs, or OTC drugs without consulting health care professional.
- May cause drowsiness or dizziness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Instruct patient to notify health care professional of medication regimen before treatment or surgery.
- Caution patient to wear sunscreen and protective clothing to prevent photosensitivity reactions.
- Advise patient to consult health care professional if rash, itching, visual disturbances, tinnitus, weight gain, edema, black stools, persistent headache, or influenza-like syndrome (chills, fever, muscle aches, pain) occur.

Evaluation/Desired Outcomes

- Decrease in severity of mild-or–moderate pain
- Increased ease of joint movement. Patients who do not respond to one NSAID may respond to another. May require 2 wk or more for maximum effects.

Why was this drug prescribed for your patient?

High Alert

digoxin (di-jox-in)

Digitek, Lanoxicaps, Lanoxin

Classification

Therapeutic: antiarrhythmics, inotropics

Pharmacologic: digitalis glycosides

Pregnancy Category C

Indications

Treatment of CHF. Tachyarrhythmias.: Atrial fibrillation and atrial flutter (slows ventricular rate), Paroxysmal atrial tachycardia.

Action

Increases the force of myocardial contraction. Prolongs refractory period of the AV node. Decreases conduction through the SA and AV nodes. **Therapeutic Effects:** Increased cardiac output (positive inotropic effect) and slowing of the heart rate (negative chronotropic effect).

Pharmacokinetics

Absorption: 60–80% absorbed after oral administration of tablets; 70-85% absorbed after administration of elixir. Absorption from liquid-filled capsules is 90–100%; 80% absorbed from IM sites (IM route not recommended due to pain/irritation).
Distribution: Widely distributed; crosses placenta and enters breast milk.
Metabolism and Excretion: Excreted almost entirely unchanged by the kidneys.
Half-life: 36–48 hr (increased in renal impairment).

TIME/ACTION PROFILE (antiarrhythmic or inotropic effects, provided that a loading dose has been given)

ROUTE	ONSET	PEAK	DURATION
Digoxin–PO	30–120 min	2–8 hr	2–4 days†
Digoxin–IM	30 min	4–6 hr	2–4 days†
Digoxin–IV	5–30 min	1–4 hr	2–4 days†

†Duration listed is that for normal renal function; in impaired renal function, duration will be longer

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Uncontrolled ventricular arrhythmias. AV block. Idiopathic hypertrophic subaortic stenosis. Constrictive pericarditis. Known alcohol intolerance (elixir only).
Use Cautiously in: Electrolyte abnormalities (hypokalemia, hypercalcemia, and hypomagnesemia may predispose to toxicity); Hypothyroidism; Geriatric patients (very sensitive to toxic effects, dose adjustments required for age-related decrease in renal function and body weight); MI; Renal impairment (dose reduction required); Obesity (dose should be based on ideal body weight); **OB** Pregnancy (although safety has not been established, has been used during pregnancy without adverse effects on the fetus); **Lactation:** Similar concentrations in serum and breast milk result in subtherapeutic levels in infant, use with caution).

Adverse Reactions/Side Effects

CNS: fatigue, headache, weakness. **EENT:** blurred vision, yellow or green vision. **CV:** ARRHYTHMIAS, bradycardia, ECG changes, A-V block, S-A block. **GI:** anorexia, nausea, vomiting, diarrhea. **Endo:** gynecomastia. **Hemat:** thrombocytopenia. **Metab:** hyperkalemia with acute toxicity.

Interactions

Drug-Drug: Thiazide and **loop diuretics** , **piperacillin**, **ticarcillin**, **amphotericin B**, and **corticosteroids**, and excessive use of **laxatives** may cause hypokalemia which may increase the risk of toxicity. **Amiodarone**, some **benzodiazepines**, **cyclosporine**, **diphenoxylate**, **indomethacin**, **itraconazole**, **propafenone**, **propantheline**, **quinidine**, **quinine**, **spironolactone** and **verapamil** may increase serum levels and may lead to toxicity (serum level monitoring/dose reduction may be required).

CONTINUED

digoxin

PO (Infants—full term): *Digitalizing dose*—25–35 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—6–10 mcg/kg given daily in 2 divided doses.
PO (Infants—premature): *Digitalizing dose*—20–30 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—5–7.5 mcg/kg given daily in 2 divided doses.

NURSING IMPLICATIONS

Assessment

- Monitor apical pulse for 1 full min prior to administering. Withhold dose and notify physician if pulse rate is <60 bpm in an adult, <70 bpm in a child, or <90 bpm in an infant. Also notify physician or health care professional promptly of any significant changes in rate, rhythm, or quality of pulse.
- Monitor blood pressure periodically in patients receiving IV digoxin.
- Monitor ECG throughout IV administration and periodically during therapy. Notify physician or health care professional if bradycardia or new arrhythmias occur.
- Observe IV site for redness or infiltration; extravasation can lead to tissue irritation and sloughing.
- Monitor intake and output ratios and daily weights. Assess for peripheral edema, and auscultate lungs for rales/crackles throughout therapy.
- Before administering initial loading dose, determine whether patient has taken any digitalis preparations in the preceding 2–3 wk.
- ***Lab Test Considerations:*** Serum electrolyte levels (especially potassium, magnesium, and calcium) and renal and hepatic functions should be evaluated periodically during therapy. Notify physician or other health care professional prior to giving dose if patient is hypokalemic. Hypokalemia, hypomagnesemia, or hypercalcemia may make the patient more susceptible to digitalis toxicity.
- ***Toxicity and Overdose:*** Therapeutic serum digoxin levels range from 0.5–2 ng/ml. Serum levels may be drawn 4–10 hr after a dose is administered, although they are usually drawn immediately prior to the next dose: Observe patient for signs and symptoms of toxicity. In adults and older children, the first signs of toxicity usually include abdominal pain, anorexia, nausea, vomiting, visual disturbances, bradycardia, and other arrhythmias. In infants and small children, the first symptoms of overdose are usually cardiac arrhythmias. If these appear, withhold drug and notify physician or health care professional immediately. If signs of toxicity occur and are not severe, discontinuation of digitalis glycoside may be all that is required. If hypokalemia is present and renal function is adequate, potassium salts may be administered. Do not administer if hyperkalemia or heart block exists. Correction of arrhythmias due to digitalis toxicity may be attempted with lidocaine, procainamide, quinidine, propranolol, or phenytoin. Temporary ventricular pacing may be useful in advanced heart block. Treatment of life-threatening arrhythmias may include administration of digoxin immune Fab (Digi bind), which binds to the digitalis glycoside molecule in the blood and is excreted by the kidneys.

Potential Nursing Diagnoses

Decreased cardiac output (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- ***High Alert:*** Digoxin has a narrow therapeutic range. Medication errors associated with digoxin include miscalculation of pediatric dosages and insufficient monitoring of digoxin levels in chronic or subacute use. Have second practitioner independently check original order and dose calculations. Monitor therapeutic drug levels.
- For rapid digitalization, the initial dose is higher than the maintenance dose; 25–50% of the total digitalizing dose is given initially. The remainder of the dose will be administered in 25% increments at 4–8 hr intervals.

Blood levels may be decreased by oral **aminoglycosides**, some **antineoplastics (bleomycin, carmustine, cyclophosphamide, cytarabine, doxorubicin, methotrexate, procarbazine, vincristine)**, **activated charcoal, cholestyramine, colestipol, kaolin/pectin, metoclopramide, penicillamine, rifampin** or **sulfasalazine**. In a small percentage (10%) of patients gut bacteria metabolize digoxin to inactive compounds; **gatifloxacin, macrolide anti-infectives (erythromycin, azithromycin, clarithromycin), tetracyclines**, by killing these bacteria, will cause increased digoxin levels and toxicity; dose may need to be decreased for up to 9 weeks. Additive bradycardia may occur with **beta blockers** and other **antiarrhythmics (quinidine, disopyramide)**. Concurrent use of **sympathomimetics** may increase the risk of arrthythmias. **Thyroid hormones** may decrease therapeutic effects.

Drug-Natural Products: Licorice and stimulant natural products (**aloe**) may increase the risk of potassium depletion. **St. John's wort** may decrease digoxin levels and effect.

Drug-Food: Concurrent ingestion of a **high-fiber meal** may decrease absorption. Administer digoxin 1 hour before or 2 hours after such a meal.

Route/Dosage

For rapid effect, a larger initial loading/digitalizing dose should be given in several divided doses over 12–24 hr. Maintenance doses are determined for digoxin by renal function. All dosing must be evaluated by individual response. In general, doses required for atrial arrhythmias are higher than those for inotropic effect. When determining dose, consider that bioavailability of gelatin capsules (Lanoxicaps) is greater than that of tablets.

IV (Adults): *Digitalizing dose*—0.5–1 mg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Children >10 yr): *Digitalizing dose*—8–12 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Children 5–10 yr): *Digitalizing dose*—15–30 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Children 2–5 yr): *Digitalizing dose*—25–35 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Children 1–24 mo): *Digitalizing dose*—30–50 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Infants—full term): 20–30 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

IV (Infants—premature): *Digitalizing dose*—15–25 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals.

PO (Adults): *Digitalizing dose*—0.75–1.5 mg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6–12 hr intervals. *Maintenance dose*—0.125–0.5 mg/day as tablets or 0.350–0.5 mg/day as gelatin capsules, depending on patient's lean body weight, renal function, and serum level.

PO (Geriatric Patients): Daily dosage should not exceed 0.125 mg except when treating atrial fibrillation.

PO (Children >10 yr): *Digitalizing dose*—10–15 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—2.5–5 mcg/kg given daily as a single dose.

PO (Children 5–10 yr): *Digitalizing dose*—20–35 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—5–10 mcg/kg given daily in 2 divided doses.

PO (Children 2–5 yr): *Digitalizing dose*—30–40 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—7.5–10 mcg/kg given daily in 2 divided doses.

PO (Children 1–24 mo): *Digitalizing dose*—35–60 mcg/kg given as 50% of the dose initially and one quarter of the initial dose in each of 2 subsequent doses at 6-12 hr intervals. *Maintenance dose*—10–15 mcg/kg given daily in 2 divided doses.

CONTINUED

- When changing from parenteral to oral dosage forms, dosage adjustments may be necessary because of pharmacokinetic variations in percentage of digoxin absorbed: 100 mcg (0.1 mg) digoxin injection or 100 mcg (0.1 mg) liquid-filled capsule = 125 mcg (0.125 mg) tablet or 125 mcg (0.125 mg) of elixir.
- **PO:** Oral preparations can be administered without regard to meals. Tablets can be crushed and administered with food or fluids if patient has difficulty swallowing. Use calibrated measuring device for liquid preparations. Do not alternate between dosage forms; bioavailability of capsules is not equal to that of tablets or elixir.
- **IM:** Administer deep into gluteal muscle and massage well to reduce painful local reactions. Do not administer more than 2 ml of digoxin in each IM site. IM administration is not generally recommended.
- **Direct IV:** IV doses may be given undiluted or each 1 ml may be diluted in 4 ml of sterile water, 0.9% NaCl, D5W, or LR for injection. Less diluent will cause precipitation. Use diluted solution immediately. Do not use solution that is discolored or contains precipitate. ***Rate:*** Administer each dose through Y-site injection over a minimum of 5 min.
- **Syringe Compatibility:** heparin, milrinone.
- **Y-Site Compatibility:** ciprofloxacin, cisatracurium, diltiazem, famotidine, inamrinone, meperidine, meropenem, midazolam, milrinone, morphine, potassium chloride, remifentanil, tacrolimus, vitamin B complex with C.
- **Y-Site Incompatibility:** amphotericin B cholesteryl sulfate complex, fluconazole, foscarnet, propofol.
- **Additive Incompatibility:** Manufacturer recommends that digoxin not be admixed with other drugs.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed, at the same time each day. Missed doses should be taken within 12 hr of scheduled dose or not taken at all. Do not double doses. Consult health care professional if doses for 2 or more days are missed. Do not discontinue medication without consulting health care professional.
- Teach patient to take pulse and to contact health care professional before taking medication if pulse rate is <60 or >100.
- Review signs and symptoms of digitalis toxicity with patient and family. Advise patient to notify health care professional immediately if these or symptoms of CHF occur. Inform patient that these symptoms may be mistaken for those of colds or flu.
- Instruct patient to keep digoxin tablets in their original container and not to mix in pill boxes with other medications, because they may look similar and may be mistaken for other medications.
- Advise patient that sharing of this medication can be dangerous.
- Caution patient to avoid concurrent use of OTC medications without consulting health care professional. Advise patient to avoid taking antacids or antidiarrheals within 2 hr of digoxin.
- Advise patient to notify health care professional of this medication regimen prior to treatment.
- Patients taking digoxin should carry identification at all times describing disease process and medication regimen.
- ***High Alert:*** Emphasize the importance of routine follow-up exams to determine effectiveness and to monitor for toxicity.

Evaluation/Desired Outcomes

- Decrease in severity of CHF.
- Increase in cardiac output.
- Decrease in ventricular response in atrial tachyarrhythmias.
- Termination of paroxysmal atrial tachycardia.

Why was this drug prescribed for your patient?

dinoprostone (dye-noe-**prost**-one)

Cervidil Vaginal Insert, Prepidil Endocervical Gel

Classification

Therapeutic: cervical ripening agents
Pharmacologic: oxytocics, prostaglandins

Pregnancy Category C

Indications

Induction of labor at term (ripens cervix).

Action

Initiates softening, effacement, and dilation of the cervix ("ripening").
Therapeutic Effects: Initiation of labor.

Pharmacokinetics

Absorption: Rapidly absorbed.
Distribution: Unknown. Action is mostly local.
Metabolism and Excretion: Metabolized by enzymes in lung, kidneys, spleen, and liver tissue.
Half-life: Unknown.

TIME/ACTION PROFILE

ROUTE	ONSET	PEAK	DURATION
Cervical ripening (gel)	rapid	30–45 min	unknown
Cervical ripening (insert)	rapid	unknown	12 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity to prostaglandins or additives in the gel or suppository. Previous cesarean section or uterine surgery. Cephalopelvic disproportion. Traumatic delivery or difficult labor. Multiparity (≥6 term pregnancies). Hyperactive or hypertonic uterus. Fetal distress (if delivery is not imminent). Unexplained vaginal bleeding. Placenta previa. Vasa praevia. Active herpes genitalis. Obstetric emergency requiring surgical intervention. Situations in which vaginal delivery is contraindicated. Acute pelvic inflammatory disease. Ruptured membranes. Concurrent oxytocic therapy (wait for 30 min after removing insert before using oxytocin).
Use Cautiously in: Uterine scarring; Asthma; Hypotension; Cardiac disease; Adrenal disorders; Anemia; Jaundice; Diabetes mellitus; Epilepsy; Glaucoma; Pulmonary, renal, or hepatic disease; Multiparity (up to 5 term pregnancies).

Adverse Reactions/Side Effects

GU: uterine hyperstimulation, uterine rupture, warm feeling in vagina. **MS:** back pain. **Misc:** fever.

Interactions

Drug-Drug: Augments the effects of other **oxytocics.**

Route/Dosage

Cervical Ripening

Vag (Adults): *Endocervical gel*—0.5 mg; if response is unfavorable, may repeat in 6 hr (not to exceed 1.5 mg/24 hr). *Vaginal insert*—one 10-mg insert.

NURSING IMPLICATIONS

Assessment

- **Cervical Ripening:** Monitor uterine activity, fetal status, and dilation and effacement of cervix continuously throughout therapy. Assess for hypertonus, sustained uterine contractility, and fetal distress. Insert should be removed at the onset of active labor.

Potential Nursing Diagnoses

Deficient knowledge, related to medication regimen (Patient/Family Teaching)

diphenhydramine (dye-fen-**hye**-dra-meen)

♣Allerdryl, Allergy Medication, AllerMax, Banophen, Benadryl Dye-Free Allergy, Benadryl Allergy, Benadryl, Compoz, Compoz Nighttime Sleep Aid, Diphen AF, Diphen Cough, Diphenhist, Dormin, Genahist, 40 Winks, Hyrexin-50, ♣Insomnal, Maximum Strength Nytol, Maximum Strength Sleepinal, Midol PM, Miles Nervine, Nighttime Sleep Aid, Nytol, Scot-Tussin Allergy DM, Siladril, Silphen, Sleep-Eze 3, Sleepwell 2-night, Sominex, Snooze Fast, Sominex, Tusstat, Twilite, Unisom Nighttime Sleep-Aid

Classification

Therapeutic: allergy, cold, and cough remedies, antihistamines, antitussives

Pregnancy Category B

Indications

Relief of allergic symptoms including Anaphylaxis, Rhinitis, Dermatoses. Parkinson's disease/dystonic reactions. Mild nighttime sedation. Prevention of motion sickness. Antitussive (syrup only).

Action

Antagonizes effects of histamine at H_1-receptors; does not bind to or inactivate histamine. Significant CNS depressant and anticholinergic effects.
Therapeutic Effects: Decreased symptoms of histamine excess (sneezing, rhinorrhea, nasal/ocular pruritus, ocular tearing/redness, urticaria). Relief of acute dystonia. Decreased motion sickness. Decreased cough.

Pharmacokinetics

Absorption: Well absorbed after PO/IM administration.
Distribution: Widely distributed. Crosses the placenta; enters breast milk.
Metabolism and Excretion: 95% metabolized by the liver.
Half-life: 2.4–7 hr.

TIME/ACTION PROFILE (antihistaminic effects)

ROUTE	ONSET	PEAK	DURATION
PO	15–60 min	1–4 hr	4–8 hr
IM	20–30 min	1–4 hr	4–8 hr
IV	rapid	unknown	4–8 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Acute asthma. Known alcohol intolerance (some liquid products). Lactation.
Use Cautiously in: Geriatric patients (↑ risk of adverse reactions; ↓ dose recommended); Severe liver disease; Narrow-angle glaucoma; Seizures; Prostatic hypertrophy; Pregnancy (safety not established).

Adverse Reactions/Side Effects

CNS: drowsiness, dizziness, headache, paradoxical excitation (↑ in children). **EENT:** blurred vision, tinnitus. **CV:** hypotension, palpitations. **GI:** anorexia, dry mouth, constipation, diarrhea. **GU:** dysuria, urinary frequency, urinary retention. **Derm:** photosensitivity. **Local:** pain at IM site.

Interactions

Drug-Drug: ↑ risk of CNS depression with other **antihistamines, alcohol, opioid analgesics,** and **sedative/hypnotics.** ↑ anticholinergic effects with **tricyclic antidepressants, quinidine,** or **disopyramide. MAO inhibitors** intensify and prolong the anticholinergic effects of antihistamines.
Drug-Natural Products: Concomitant use of **kava, valerian,** or **chamomile** can ↑ CNS depression.

Route/Dosage

PO (Adults): *Antihistaminic/antiemetic/antivertigo*—25–50 mg q 4–6 hr. *Antitussive*—25 mg q 4 hr. *Antidyskinetic*—25 mg 3 times daily (up to 200 mg/day). *Sedative/hypnotic*—50 mg 20–30 min before bedtime.
PO (Children 6–12 yr): *Antihistaminic*—12.5–25 mg q 4–6 hr. *Antiemetic/antivertigo*—1–1.5 mg/kg q 4–6 hr (up to 300 mg/day). *Antitussive*—12.5 mg q 12 hr (not to exceed 75 mg/24 hr).

Implementation

- **Vaginal Insert:** Place vaginal insert transversely in the posterior vaginal fornix immediately after removing from foil package. Sterile conditions or warming of insert are not required. Use only vaginal insert with a retrieval system. Use minimal amount of water-soluble lubricant during insertion; avoid excess as it may hamper release of dinoprostone from insert. Patient should remain supine for 2 hr after insertion, then may ambulate.
- Vaginal insert delivers dinoprostone 0.3 mg/hr over 12 hr. Remove insert at the onset of active labor, before amniotomy, or after 12 hr.
- Oxytocin should not be used during or less than 30 min after removal of insert.
- **Endocervical Gel:** Determine degree of effacement before insertion of the endocervical catheter. Do not administer above the level of the internal os. Use the 20-mm endocervical catheter if no effacement is present and the 10-mm catheter if the cervix is 50% effaced.
- Use caution to prevent contact of dinoprostone gel with skin. Wash hands thoroughly with soap and water after administration.
- Bring gel to room temperature just before administration. Do not force warming with external sources (water bath, microwave). Remove peel-off seal from end of syringe, then remove the protective end cap, and insert end cap into plunger stopper assembly in barrel of syringe. Aseptically remove catheter from package. Firmly attach catheter hub to syringe tip; click is evidence of attachment. Fill catheter with sterile gel by pushing plunger to expel air from catheter before administration to patient. Gel is stable for 24 mo if refrigerated.
- Patient should be in dorsal position with cervix visualized using a speculum. Introduce gel with catheter into cervical canal using sterile technique. Administer gel by gentle expulsion from syringe and then remove catheter. Do not attempt to administer small amount of gel remaining in syringe. Use syringe for only 1 patient; discard syringe, catheter, and remaining package contents after using.
- Patient should remain supine for 15–30 min after administration to minimize leakage from cervical canal.
- Oxytocin may be administered 6–12 hr after desired response from dinoprostone gel. If no cervical/uterine response to initial dose of dinoprostone is obtained, repeat dose may be administered in 6 hr.

Patient/Family Teaching

- Explain purpose of medication and vaginal exams.
- **Cervical Ripening:** Inform patient that she may experience a warm feeling in her vagina during administration.
- Advise patient to notify health care professional if contractions become prolonged.

Evaluation/Desired Outcomes

- Cervical ripening and induction of labor.

Why was this drug prescribed for your patient?

PO (Children <6 yr): *Antihistaminic*—6.25–12.5 mg q 4–6 hr. *Antiemetic/antivertigo*—1–1.5 mg/kg q 4–6 hr (up to 300 mg/day). *Antitussive 2–6 yr*—6.25 mg q 4 hr (not to exceed 25 mg/24hr).
IM, IV (Adults): 10–50 mg q 2–3 hr (up to 100-mg/dose or 400 mg/day).
IM, IV (Children): 1.25 mg/kg (37.5 mg/m²) 4 times daily (not to exceed 300 mg/day).

NURSING IMPLICATIONS

Assessment

- **Prevention and Treatment of Anaphylaxis:** Assess for urticaria and for patency of airway.
- **Allergic Rhinitis:** Assess nasal stuffiness, rhinorrhea, and sneezing.
- **Parkinsonism and Acute Dystonic Reactions:** Assess movement disorder before and after administration.
- **Insomnia:** Assess sleep patterns.
- **Motion Sickness:** Assess nausea and vomiting before and after administration.
- **Antitussive:** Assess cough (frequency, nature, amount, and type of sputum) and lung sounds. Unless contraindicated, maintain fluid intake of 1500–2000 ml/day to decrease viscosity of bronchial secretions.
- **Pruritus:** Assess degree of itching and skin rash and inflammation.

Potential Nursing Diagnoses

Disturbed sleep pattern (Indications)
Risk for injury (Side Effects)

Implementation

- **Do not confuse Benadryl (diphenhydramine) with Benylin (dextromethorphan).**
- When used for insomnia, administer 20 min before bedtime and schedule activities to minimize interruption of sleep.
- When used for prophylaxis of motion sickness, administer at least 30 min and preferably 1–2 hr before exposure to conditions that may precipitate motion sickness.
- **PO:** Administer with meals or milk to minimize GI irritation. Capsule may be emptied and contents taken with water or food.
- **IM:** Administer into well-developed muscle. Avoid subcut injections.
- **Direct IV:** May give undiluted. May be further diluted in 0.9% NaCl, 0.45% NaCl, D5W, D10W, D5/0.9% NaCl, D5/0.45% NaCl, D5/0.25% NaCl, Ringer's solution, LR, and dextrose/Ringer's combinations. ***Rate:*** Inject 25 mg over at least 1 min.
- **Syringe Compatibility:** atropine, butorphanol, chlorpromazine, cimetidine, dimenhydrinate, droperidol, fentanyl, fluphenazine, glycopyrrolate, hydromorphone, hydroxyzine, meperidine, metoclopramide, midazolam, morphine, nalbuphine, pentazocine, perphenazine, prochlorperazine, promethazine, ranitidine, scopolamine, sufentanil.
- **Syringe Incompatibility:** haloperidol, pentobarbital, thiopental.
- **Y-Site Compatibility:** acyclovir, aldesleukin, amifostine, aztreonam, ciprofloxacin, cisatracurium, cisplatin, cladribine, cyclophosphamide, cytarabine, docetaxel, doxorubicin, doxorubicin liposome, etoposide phosphate, famotidine, fentanyl, filgrastim, fluconazole, fludarabine, gatifloxacin, gemcitabine, granisetron, heparin, hydrocortisone, hydromorphone, idarubicin, linezolid, melphalan, meperidine, meropenem, methadone, methotrexate, morphine, ondansetron, paclitaxel, piperacillin/tazobactam, potassium chloride, propofol, remifentanil, sargramostim, sufentanil, tacrolimus, teniposide, thiotepa, vinorelbine, vitamin B complex with C.
- **Y-Site Incompatibility:** allopurinol, amphotericin B cholesteryl sulfate, cefepime, foscarnet.

Patient/Family Teaching

- Instruct patient to take medication as directed; do not exceed recommended amount. Caution patient not to use oral OTC diphenhydramine products with any other product containing diphenhydramine, including products used topically.
- May cause drowsiness. Advise patient to avoid driving or other activities requiring alertness until response to drug is known.
- Inform patient that this drug may cause dry mouth. Frequent oral rinses, good oral hygiene, and sugarless gum or candy may minimize this effect. Notify dentist if dry mouth persists for more than 2 wk.
- Advise patient to use sunscreen and protective clothing to prevent photosensitivity reactions.

CONTINUED

CONTINUED

diphenhydramine

- Caution patient to avoid use of alcohol and other CNS depressants concurrently with this medication.
- Advise patients taking diphenhydramine in OTC preparations to notify health care professional if symptoms worsen or persist for more than 7 days.

Evaluation/Desired Outcomes

- Prevention of or decreased urticaria in anaphylaxis or other allergic reactions.
- Decreased dyskinesia in parkinsonism and extrapyramidal reactions.
- Sedation when used as a sedative/hypnotic.
- Prevention or decrease in nausea and vomiting caused by motion sickness.
- Decrease in frequency and intensity of cough without eliminating patient's cough reflex.

Why was this drug prescribed for your patient?

diphenoxylate/atropine (dye-fen-**ox**-i-late/**a**-troe-peen)

Logen, Lomanate, Lomotil, Lonox

difenoxin/atropine (dye-fen-**ox**-in/**a**-troe-peen)

Motofen

Classification

Therapeutic: antidiarrheals
Pharmacologic: anticholinergics

Schedule V (diphenoxylate/atropine), IV difenoxin/atropine)

Pregnancy Category C

Indications

Adjunctive therapy in the treatment of diarrhea.

Action

Inhibits excess GI motility. Structurally related to opioid analgesics but has no analgesic properties. Atropine added to discourage abuse. **Therapeutic Effects:** Decreased GI motility with subsequent decrease in diarrhea.

Pharmacokinetics

Absorption: Well absorbed from the GI tract.
Distribution: Enters breast milk.
Metabolism and Excretion: *Diphenoxylate*—mostly metabolized by the liver with some conversion to an active antidiarrheal compound (difenoxin). *Difenoxin*—metabolized by the liver. Minimal excretion in urine.
Half-life: *Diphenoxylate*—2.5 hr; *Difenoxin*—4.5 hr.

TIME/ACTION PROFILE

ROUTE	ONSET	PEAK	DURATION
Difenoxin–PO	45–60 min	2 hr	3–4 hr
Diphenoxylate–PO	45–60 min	2 hr	3–4 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Severe liver disease. Infectious diarrhea (caused by *Escherichia coli*, *Salmonella*, or *Shigella*). Diarrhea associated with pseudomembranous colitis. Dehydrated patients. Narrow-angle glaucoma. Children <2 yr. Some liquid products contain alcohol and should be avoided in patients with known intolerance.
Use Cautiously in: Patients physically dependent on opioids; Inflammatory bowel disease; Geriatric patients (more sensitive to effects); Children (more sensitive to effects, espcially Down's syndrome patients); Prostatic hypertrophy; Pregnancy, lactation, or children <12 yr (safety not established for difenoxin/atropine in children <12 yr; dipehoxylate/atropine should not be used in children <2 yr).

Adverse Reactions/Side Effects

CNS: dizziness, confusion, drowsiness, headache, insomnia, nervousness. **EENT:** blurred vision, dry eyes. **CV:** tachycardia. **GI:** constipation, dry mouth, epigastric distress, ileus, nausea, vomiting. **GU:** urinary retention. **Derm:** flushing.

Interactions

Drug-Drug: Additive CNS depression with other **CNS depressants** including **alcohol**, **antihistamines**, **opioid analgesics**, and **sedative/hypnotics**. Additive anticholinergic properties with other **drugs having anticholinergic properties**, including **tricyclic antidepressants** and **disopyramide**. Use with **MAO inhibitors** may result in hypertensive crisis.
Drug-Natural Products: Increased anticholinergic effects with **angel's trumpet, jimson weed,** and **scopolia.**

Route/Dosage

Difenoxin/Atropine

Doses given are in terms of difenoxin—each tablet contains 1 mg difenoxin with 0.025 mg of atropine.

PO (Adults): 2 tablets initially, then 1 tablet after each loose stool or every 3–4 hr as needed (not to exceed 8 tablets/day).

Diphenoxylate/Atropine

Adult doses given are in terms of diphenoxylate—each tablet contains 2.5 mg diphenoxylate with 0.025 mg of atropine; pediatric doses are given in mg/kg diphenoxylate; each 5 ml of liquid contains 2.5 mg diphenoxylate with 0.025 mg of atropine.

PO (Adults): 5 mg 3–4 times daily initially, then 5 mg once daily as needed (not to exceed 20 mg/day).

PO (Children): *use liquid only*—0.3–0.4 mg/kg/day in 4 divided doses.

NURSING IMPLICATIONS

Assessment

- Assess frequency and consistency of stools and assess bowel sounds before and throughout therapy.
- Assess patient's fluid and electrolyte balance and skin turgor for dehydration.
- ***Lab Test Considerations:*** Liver function should be evaluated periodically during prolonged therapy.
- Diphenoxylate/atropine may cause increased serum amylase concentrations.

Potential Nursing Diagnoses

Diarrhea (Indications)
Constipation (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Do not confuse Lomotil with Lamictal (lamontrigine) or Lamisil (terbinafine).
- Risk of dependence increases with high-dose, long-term use. Atropine has been added to discourage abuse.
- **PO:** May be administered with food if GI irritation occurs.
- Diphenoxylate/atropine tablets may be crushed and administered with fluid of choice. Use calibrated measuring device for liquid preparations.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed. Do not take more than the prescribed amount because drug has habit-forming potential.
- Medication may cause drowsiness. Advise patient to avoid driving and other activities requiring alertness until response to drug is known.
- Advise patient that frequent mouth rinses, good oral hygiene, and sugarless gum or candy may relieve dry mouth.
- Caution patient to avoid consuming alcohol and taking other CNS depressants concurrently with this medication.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Instruct patient to notify health care professional if diarrhea persists or if fever, abdominal pain, or palpitations occur.

Evaluation/Desired Outcomes

- Decrease in diarrhea. Treatment of acute diarrhea should be continued for 24–36 hr before it is considered ineffective.

Why was this drug prescribed for your patient?

dipyridamole (dye-peer-id-a-mole)

♣Apo-Dipyridamole, Dipridacot, ♣Novodipiradol, Persantine, Persantine IV

Classification

Therapeutic: antiplatelet agents, diagnostic agents (coronary vasodilators)
Pharmacologic: platelet adhesion inhibitors

Pregnancy Category B

Indications

PO: Used in combination with anticoagulants (warfarin) to prevent thromboembolism in patients with prosthetic heart valves. Used in combination with other antiplatelet agents (aspirin) to maintain patency after surgical grafting procedures, including coronary artery bypass. **IV:** Used as a diagnostic agent in lieu of exercise during thallium myocardial perfusion imaging in patients who cannot exercise.

Action

PO: Decreases platelet aggregation by inhibiting the enzyme phosphodiesterase. **IV:** Produces coronary vasodilation by inhibiting adenosine uptake. **Therapeutic Effects: PO:** Inhibition of platelet aggregation and subsequent thromboembolic events. **IV:** In diagnostic thallium imaging, dipyridamole dilates normal coronary arteries, reducing flow to vessels that are narrowed and causing abnormal thallium distribution.

Pharmacokinetics

Absorption: Moderately absorbed (30–60%) after oral administration.
Distribution: Widely distributed. Crosses the placenta; enters breast milk.
Metabolism and Excretion: Metabolized by the liver, excreted in the bile.
Half-life: 10 hr.

TIME/ACTION PROFILE (PO = blood levels; IV = coronary vasodilation)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	75 min	unknown
IV	unknown	6.5 min‡	30 min

‡From start of infusion

Contraindications/Precautions

Contraindicated in: Hypersensitivity.
Use Cautiously in: Hypotensive patients; Patients with platelet defects; Pregnancy (although safety not established, has been used without harm during pregnancy); Lactation or children <12 yr (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, headache, syncope; *IV*— transient cerebral ischemia, weakness. **Resp:** *IV only*— bronchospasm. **CV:** *IV only*— MI, hypotension, arrhythmias, flushing. **GI:** nausea, diarrhea, GI upset, vomiting. **Derm:** rash.

Interactions

Drug-Drug: Additive effects with **aspirin** on platelet aggregation. Risk of bleeding may be increased when used with **cefoperazone**, **cefotetan**, **heparins**, **NSAIDs**, **sulfinpyrazone**, **thrombolytic agents**, **ticlopidine**, **clopidogrel**, **abciximab**, **tirofibam**, **eptifibatide** or **valproic acid**. Increased risk of hypotension with **alcohol**. **Theophylline** may negate the effects of dipyridamole during diagnostic thallium imaging.

Route/Dosage

PO (Adults): 225–400 mg/day in 3–4 divided doses.
IV (Adults): 570 mcg/kg.

NURSING IMPLICATIONS

Assessment

- **PO:** Monitor BP and pulse before instituting therapy and regularly during period of dosage adjustment.

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

DIURETICS (LOOP)

bumetanide (byoo-met-a-nide)

Bumex

furosemide (fur-oh-se-mide)

♣Apo-Furosemide, ♣Furoside, Lasix, ♣Lasix Special, ♣Myrosemide, ♣Novosemide, ♣Uritol

torsemide (tore-se-mide)

Demadex

Classification

Therapeutic: diuretics
Pharmacologic: loop diuretics

Pregnancy Category B (torsemide), C (bumetanide, furosemide)

Indications

Edema due to CHF, Hepatic or renal disease. Hypertension. **Unlabeled uses: Furosemide:** Hypercalcemia of malignancy.

Action

Inhibit the reabsorption of sodium and chloride from the loop of Henle and distal renal tubule. Increase renal excretion of water, sodium, chloride, magnesium, hydrogen, and calcium. May have renal and peripheral vasodilatory effects. Effectiveness persists in impaired renal function. **Therapeutic Effects:** Diuresis and subsequent mobilization of excess fluid (edema, pleural effusions). Decreased blood pressure.

Pharmacokinetics

Absorption: *Bumetanide*—well absorbed after oral or IM administration. *Furosemide*—60–75% absorbed following oral administration; also absorbed from IM sites. *Torsemide*—80% absorbed following oral administration.
Distribution: *Furosemide*—crosses the placenta; enters breast milk.
Protein Binding: All are >91%.
Metabolism and Excretion: *Bumetanide*—partially metabolized by the liver; 50% eliminated unchanged by the kidneys, 20% excreted in feces. *Furosemide*—some metabolism by liver (30–40%), some nonhepatic metabolism, and some renal excretion as unchanged drug. *Torsemide*—80% metabolized by liver, 20% excreted in urine.
Half-life: *Bumetanide*—60–90 min (6–15 hr in neonates); *furosemide*—30–60 min (↑ in renal impairment and neonates, markedly ↑ in hepatic impairment); *torsemide*—210 min.

TIME/ACTION PROFILE (diuretic effect)

ROUTE	ONSET	PEAK	DURATION
Bumetanide–PO	30–60 min	1–2 hr	3–6 hr
Bumetanide–IM	40 min	1–2 hr	4–6 hr
Bumetanide–IV	within min	15–45 min	3–6 hr
Furosemide–PO	30–60 min	1–2 hr	6–8 hr
Furosemide–IM	10–30 min	unknown	4–8 hr
Furosemide–IV	5 min	30 min	2 hr
Torsemide–PO	within 60 min	60–120 min	6–8 hr
Torsemide–IV	within 10 min	within 60 min	6–8 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with thiazides and sulfonamides may occur. Pre-existing electrolyte imbalance, hepatic coma, or anuria. Some liquid furosemide products may contain alcohol and should be avoided in patients with known intolerance.
Use Cautiously in: Severe liver disease(may precipitate hepatic coma; concurrent use with potassium-sparing diuretics may be necessary); Electrolyte depletion; Geriatric patients (difficulty assessing hearing status; increased risk of hypotension); Diabetes mellitus; Increasing azotemia; Pregnancy, lactation, or children <18 yr (safety not established; furosemide has been used in children, bumetanide is a potent displacer of bilirubin and should be used cautiously in critically ill or jaundiced neonates due to risk of kernicterus).

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

- **IV:** Monitor vital signs during and for 10–15 min after infusion. Obtain ECG in at least one lead. If severe chest pain or bronchospasm occurs, administer IV aminophylline 50–250 mg at a rate of 50–100 mg over 30–60 sec. If hypotension is severe, place patient in a supine position with head tilting down. If chest pain is unrelieved with aminophylline 250 mg, administer nitroglycerin SL. If chest pain is still unrelieved, treat as MI.
- ***Lab Test Considerations:*** Bleeding time should be monitored periodically throughout therapy.

Potential Nursing Diagnoses

Decreased cardiac output (Indications)
Acute pain (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **PO:** Administer with a full glass of water at least 1 hr before or 2 hr after meals for faster absorption. If GI irritation occurs, may be administered with or immediately after meals. Tablets may be crushed and mixed with food if patient has difficulty swallowing. Pharmacist may make a suspension.
- **Intermittent Infusion:** Dilute in at least a 12 ratio of 0.45% NaCl, 0.9% NaCl, or D5W for a total volume of 20–50 ml. Undiluted dipyridamole may cause venous irritation. ***Rate:*** Infuse dose over 4 min.

Patient/Family Teaching

- **PO:** Instruct patient to take medication at evenly spaced intervals as directed. If a dose is missed, take as soon as remembered unless the next scheduled dose is within 4 hr. Do not double doses. Benefit of medication may not be apparent to patient; encourage patient to continue taking medication as directed.
- Caution patient to change position slowly to minimize orthostatic hypotension.
- Advise patient to avoid the use of alcohol, as it may potentiate the hypotensive effects. Tobacco products should also be avoided because nicotine causes vasoconstriction.
- Advise patient to consult health care professional before taking OTC medications concurrently with this medication. Aspirin should be taken only if directed and only in dose prescribed. Advise patient to discuss alternatives for pain relief or fever.
- Instruct patient to notify health care professional if unusual bleeding or bruising occurs. Concurrent use of aspirin or warfarin may increase risk of bleeding, but is commonly used with specific indications.
- Advise patient to notify health care professional of medication regimen and whether using concurrent aspirin or warfarin therapy.
- **IV:** Instruct patient to notify health care professional immediately if dyspnea or chest pain occurs.

Evaluation/Desired Outcomes

- Prevention of postoperative thromboembolic complications associated with prosthetic heart valves.
- Maintenance of patency after surgical graft procedures.
- Coronary vasodilation in thallium myocardial perfusion imaging.

Why was this drug prescribed for your patient?

Adverse Reactions/Side Effects

CNS: dizziness, encephalopathy (↑ with bumetanide, furosemide), headache, insomnia (↑ with torsemide), nervousness (increased with torsemide). **EENT:** hearing loss, tinnitus. **CV:** hypotension. **GI:** constipation, diarrhea, dry mouth, dyspepsia, nausea, vomiting. **GU:** excessive urination. **Derm:** photosensitivity, rashes. **Endo:** hyperglycemia. **F and E:** dehydration, hypochloremia, hypokalemia, hypomagnesemia, hyponatremia, hypovolemia, metabolic alkalosis. **Hemat:** blood dyscrasias (furosemide only). **Metab:** hyperglycemia, hyperuricemia. **MS:** arthralgia (↑ with torsemide), muscle cramps, myalgia (↑ with torsemide). **Misc:** increased BUN.

Interactions

Drug-Drug: ↑ hypotension with **antihypertensives**, **nitrates**, or acute ingestion of **alcohol.** ↑ hypokalemia with other **diuretics**, **piperacillin**, **amphotericin B**, **stimulant laxatives**, and **corticosteroids**. Hypokalemia may increase **digoxin** toxicity. Decrease **lithium** excretion, may cause toxicity. ↑ risk of ototoxicity with **aminoglycosides.** May ↑ the effectiveness of **warfarin**, **thrombolytic agents**, or **anticoagulants**.

Route/Dosage

Bumetanide

PO (Adults): 0.5–2 mg/day as a single dose. Up to 2 additional doses may be given during the day q 4–5 hr (up to 10 mg/day). Alternate-day or q 2–3 day regimens may also be used.
IM, IV (Adults): 0.5–1 mg, may be repeated q 2–3 hr as needed (up to 10 mg/day).

Furosemide

PO (Adults): *Edema*—20–80 mg/day as a single dose initially, may repeat in 6–8 hr; may increase dose by 20–40 mg q 6–8 hr until desired response. Maintenance doses may be given once or twice daily or intermittently for 2–4 days/week (doses up to 2.5 g/day have been used in patients with CHF or renal disease). *Hypertension*—40 twice daily initially (when added to regimen, decrease dose of other antihypertensives by 50%); adjust further dosing based on response; *Hypercalcemia*—4120 mg/day in 1–3 doses.
PO (Children): 2 mg/kg as a single dose; may be increased by 1–2 mg/kg q 6–8 hr (1–2 mg/kg/day initially, up to 5–6 mg/kg/day). Longer dosage intervals are recommended in neonates.
IM, IV (Adults): *Edema*—20–40 mg, may repeat in 2 hr and increase by 20 mg every 2 hr until response is obtained, maintenance dose may be given once-twice daily; *acute pulmonary edema*—40 mg, after 1 hr may give additional 80 mg (in CHF and renal failure, daily doses of up to 2.5 g have been used); *hypercalcemia*—80–120 mg, may repeat every 1–4 hr, titrate by response.).
IM, IV (Children): 1 mg/kg, may increase by 1 mg/kg q 2 hr (not to exceed 6 mg/kg).

Torsemide

PO, IV (Adults): *CHF*—10–20 mg once daily. *Chronic renal failure*—20 mg once daily; dose may be doubled until desired effect is obtained. *Hepatic cirrhosis*—5–10 mg once daily (with aldosterone antagonist or potassium-sparing diuretic); dose may be doubled until desired effect is obtained. *Hypertension*—5 mg once daily, may be increased to 10 mg once daily after 4–6 wk (if still not effective, add another agent).

NURSING IMPLICATIONS

Assessment

- Assess fluid status during therapy. Monitor daily weight, intake and output ratios, amount and location of edema, lung sounds, skin turgor, and mucous membranes. Notify physician or other health care provider if thirst, dry mouth, lethargy, weakness, hypotension, or oliguria occurs.
- Monitor blood pressure and pulse before and during administration. Monitor frequency of prescription refills to determine compliance in patients treated for hypertension.
- Assess patients receiving digoxin for anorexia, nausea, vomiting, muscle cramps, paresthesia, and confusion. Patients taking digoxin are at increased risk of digoxin toxicity because of the potassium-depleting effect of the diuretic. Potassium supplements or potassium-sparing diuretics may be used concurrently to prevent hypokalemia.
- Assess patient for tinnitus and hearing loss. Audiometry is recommended for patients receiving prolonged high-dose IV therapy. Hearing loss is

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DIURETICS (LOOP)

most common following rapid or high-dose IV administration in patients with decreased renal function or those taking other ototoxic drugs.
- Assess for allergy to sulfonamides.
- ***Lab Test Considerations:*** Monitor electrolytes, renal and hepatic function, serum glucose, and uric acid levels prior to and periodically during therapy. May cause ↓ serum potassium, calcium, and magnesium concentrations. May also cause ↑ BUN, serum glucose, creatinine, and uric acid levels.
- *Bumetanide* may cause an ↑ in urinary phosphate concentrations.
- *Torsemide* may cause ↑ in total plasma cholesterol and lipids during initial therapy. Those elevations usually return to normal with chronic therapy.

Potential Nursing Diagnoses

Excess fluid volume (Indications)
Risk for deficient fluid volume (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **Do not confuse furosemide with torsemide. Do not confuse Bumex (bumetanide) with Buprenex (buprenorpine).**
- Administer medication in the morning to prevent disruption of sleep cycle.
- IV is preferred over IM for parenteral administration.
- **PO:** Administer orally with food or milk to minimize gastric irritation. *Torsemide* may be administered without regard to meals. *Furosemide* tablets may be crushed if patient has difficulty swallowing.
- Do not administer discolored *furosemide* solution or tablets.

Bumetanide

- **Direct IV:** Administer undiluted. ***Rate:*** Administer slowly over 2 min.
- **Intermittent Infusion:** Dilute in D5W, 0.9% NaCl, or LR. Use reconstituted solution within 24 hr. ***Rate:*** May be administered over 12 hr for patients with renal impairment.
- **Y-Site Compatibility:** allopurinol sodium, amifostine, aztreonam, cefepime, cisatracurium, cladribine, diltiazem, docetaxel, etoposide, filgrastim, gemcitabine, granisetron, lorazepam, melphalan, meperidine, milrinone, morphine, piperacillin/tazobactam, propofol, remifentanil, teniposide, thiotepa, vinorelbine.
- **Y-Site Incompatibility:** midazolam.

Furosemide

- When using furosemide for hypercalcemia, replace extracellular volume and NaCl to maintain fluid volume and increase calcium excretion effectively.
- **Direct IV:** Administer undiluted. ***Rate:*** Administer slowly over 1–2 min.
- **Intermittent Infusion:** Dilute large doses in D5W, D10W, D20W, D5/0.9% NaCl, D5/LR, 0.9% NaCl, 3% NaCl, 1/6 M sodium lactate, or LR. Use reconstituted solution within 24 hr. ***Rate:*** Administer at a rate not to exceed 4 mg/min in adults to prevent ototoxicity. Use an infusion pump to ensure accurate dosage.
- **Syringe Compatibility:** bleomycin, cisplatin, cyclophosphamide, fluorouracil, heparin, leucovorin calcium, methotrexate, mitomycin.
- **Syringe Incompatibility:**, doxapram, doxorubicin, droperidol, metoclopramide, milrinone, vinblastine, vincristine.
- **Y-Site Compatibility:**, allopurinol, amifostone, amikacin, amphotericin B cholesteryl sulfate, aztreonam, bleomycin, cefepime, cisplatin, cladribine, cyclophosphamide, cytarabine, docetaxel, doxorubicin liposome, epinephrine, etoposide, fentanyl, fludarabine, fluorouracil, foscarnet, granisetron, heparin, hydrocortisone sodium succinate, hydromorphone, indomethacin, kanamycin, leucovorin calcium, linezolid, lorazepam, melphalan, meropenem, methotrexate, mitomycin, nitroglycerin, norepinephrine, paclitaxel, piperacillin/tazobactam, potassium

DIURETICS (POTASSIUM-SPARING)

amiloride (a-**mill**-oh-ride)
Midamor

spironolactone (speer-oh-no-**lak**-tone)
Aldactone, ♣Novospiroton

triamterene (trye-**am**-ter-een)
Dyrenium

Classification
Therapeutic: diuretics
Pharmacologic: potassium-sparing diuretics

Pregnancy Category B (amiloride, triamterene), UK (spironolactone)

Indications

Counteract potassium loss caused by other diuretics. Commonly used with other agents (thiazides) to treat edema or hypertension. Hyperaldosteronism (spironolactone only). **Unlabeled uses: Spironolactone:** Management of congestive heart failure (CHF) (low doses).

Action

Cause loss of sodium bicarbonate and calcium while saving potassium and hydrogen ions. **Therapeutic Effects:** Weak diuretic and antihypertensive response when compared with other diuretics. Conservation of potassium.

Pharmacokinetics

Absorption: *Amiloride*—15–25% absorbed from the GI tract; *spironolactone*—>90% absorbed; *triamterene*—30–70% absorbed.
Distribution: *Amiloride* and *triamterene*—widely distributed; *spironolactone*—crosses the placenta; enters breast milk.
Metabolism and Excretion: *Amiloride*—50% eliminated unchanged in urine, 40% excreted unabsorbed in the feces; *spironolactone*—converted by the liver to its active diuretic compound (canrenone); *triamterene*—partially metabolized by the liver, some excretion of unchanged drug.
Half-life: *Amiloride*—6–9 hr; *spironolactone*—13–24 hr (canrenone); *triamterene*—100–150 min.

TIME/ACTION PROFILE (diuretic effect)

ROUTE	ONSET	PEAK	DURATION
Amiloride	2 hr†	6–10 hr†	24 hr†
Spironolactone	unknown	2–3 days‡	2–3 days‡
Triamterene	2–4 hr†	1–several days‡	7–9 hr†

†Single dose
‡Multiple doses

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Hyperkalemia.
Use Cautiously in: Hepatic dysfunction; Geriatric or debilitated patients or patients with diabetes mellitus (increased risk of hyperkalemia, presence of age-related renal dysfunction; dosage adjustments may be necessary); Renal insufficiency (BUN >30 mg/dl or CCr <30 ml/min); History of gout or kidney stones (triamterene only); Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness; *spironolactone only*— clumsiness, headache. **CV:** arrhythmias. **GI:** *amiloride*—constipation, GI irritation (increased with spironolactone). **GU:** impotence, *triamterene*—bluish urine, nephrolithiasis. **Derm:** *triamterene*— photosensitivity. **Endo:** *spironolactone*— gynecomastia. **F and E:** hyperkalemia, hyponatremia. **Hemat:** *spironolactone and triamterene*— dyscrasias. **MS:** muscle cramps. **Misc:** allergic reactions.

Interactions

Drug-Drug: ↑ hypotension with acute ingestion of **alcohol**, other **antihypertensives**, or **nitrates.** Use with **ACE inhibitors, angiotensin II**

chloride, propofol, ranitidine, remifentanil, sargramostim, tacrolimus, teniposide, thiotepa, tobramycin, tolazoline, vitamin B complex with C.
- **Y-Site Incompatibility:**, ciprofloxacin, diltiazem, droperidol, esmolol, filgrastim, fluconazole, gatifloxacin, gemcitabine, gentamicin, hydralazine, idarubicin, levofloxacin, metoclopramide, midazolam, milrinone, ondansetron, quinidine gluconate, thiopental, vecuronium, vinblastine, vincristine, vinorelbine.

Torsemide
- **Direct IV:** Administer undiluted. Do not administer if solution is discolored or contains particulate matter. ***Rate:*** Administer slowly over 2 min.
- May also be administered as a continuous infusion.
- **Syringe Incompatibility:** Information unavailable. Do not mix with other drugs or solutions.

Patient/Family Teaching
- Instruct patient to take medication exactly as directed. Take missed doses as soon as possible; do not double doses.
- Caution patient to make position changes slowly to minimize orthostatic hypotension. Caution patient that the use of alcohol, exercise during hot weather, or standing for long periods during therapy may enhance orthostatic hypotension.
- Instruct patient to consult health care professional regarding a diet high in potassium.
- Advise patient to consult health care professional before taking OTC medication or herbal products concurrently with this therapy.
- Instruct patient to notify health care professional of medication regimen prior to treatment or surgery.
- Caution patient to use sunscreen and protective clothing to prevent photosensitivity reactions.
- Advise patient to contact health care professional immediately if muscle weakness, cramps, nausea, dizziness, numbness, or tingling of extremities occurs.
- Advise patient taking *furosemide* tablets not to change brands when refilling prescription; bioavailability among brands is variable.
- Advise diabetic patients to monitor blood sugar closely, because *torsemide* may cause increased blood sugar levels.
- Emphasize the importance of routine follow-up examinations.
- **Hypertension:**
- Advise patients on antihypertensive regimen to continue taking medication, even if feeling better. Medication controls but does not cure hypertension.
- Reinforce the need to continue additional therapies for hypertension (weight loss, exercise, restricted sodium intake, stress reduction, regular exercise, moderation of alcohol consumption, cessation of smoking).

Evaluation/Desired Outcomes
- Decrease in edema.
- Decrease in abdominal girth.
- Increase in urinary output.
- Decrease in blood pressure.
- Decrease in serum calcium when used to manage hypercalcemia.

Why was this drug prescribed for your patient?

receptor antagonists, **indomethacin**, **potassium supplements**, or **cyclosporine** ↑ risk of hyperkalemia. ↓ **lithium** excretion. Effectiveness may be ↓ by **NSAIDs**. Spironolactone may ↑ effects of **digoxin**. Triamterene ↓ effects of **folic acid** (leucovorin should be used). Triamterene may ↑ risk of toxicity from **amantadine**.

Route/Dosage

Amiloride
PO (Adults): 5–10 mg/day (up to 20 mg).

Spironolactone
PO (Adults): 25–400 mg/day as a single dose or 2–4 divided doses. *CHF*—12.5–25 mg/day (unlabeled use).
PO (Children): 1–3 mg/kg/day (30–90 mg/m²/day as a single dose or 2–4 divided doses (not to exceed 3 times initial dose).

Triamterene
PO (Adults): 100 mg twice daily (not to exceed 300 mg/day; lower doses in combination products).
PO (Children): 2–4 mg/kg/day (120 mg/m²/day) in divided doses given daily or every other day (not to exceed 6 mg/kg/day or 300 mg/day).

NURSING IMPLICATIONS

Assessment
- Monitor intake and output ratios and daily weight during therapy.
- If medication is given as an adjunct to antihypertensive therapy, monitor blood pressure before administering.
- Monitor response of signs and symptoms of hypokalemia (weakness, fatigue, U wave on ECG, arrhythmias, polyuria, polydipsia). Assess patient frequently for development of hyperkalemia (fatigue, muscle weakness, paresthesia, confusion, dyspnea, cardiac arrhythmias). Patients who have diabetes mellitus or kidney disease and geriatric patients are at increased risk of developing these symptoms.
- Periodic ECGs are recommended in patients receiving prolonged therapy.
- ***Lab Test Considerations:*** Serum potassium levels should be evaluated before and routinely during therapy. Withhold drug and notify physician or other health care professional if patient becomes hyperkalemic.
- Monitor BUN, serum creatinine, and electrolytes before and periodically during therapy. May cause ↑ serum magnesium, uric acid, BUN, creatinine, potassium, plasma renin activity, and urinary calcium excretion levels. May also cause ↓ sodium levels.
- Discontinue potassium-sparing diuretics 3 days before a glucose tolerance test because of risk of severe hyperkalemia.
- *Spironolactone* may cause false ↑ of plasma cortisol concentrations. Spironolactone should be withdrawn 4–7 days before test.
- Monitor platelet count and total and differential leukocyte count periodically during therapy in patients taking *triamterene*.

Potential Nursing Diagnoses
Excess fluid volume (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation
- **PO:** Administer in AM to avoid interrupting sleep pattern.
- Administer with food or milk to minimize gastric irritation and to increase bioavailability.
- *Triamterene* capsules may be opened and contents mixed with food or fluids for patients with difficulty swallowing.

Patient/Family Teaching
- Emphasize the importance of continuing to take this medication, even if feeling well. Instruct patient to take medication at the same time each day. Take missed dosesas soon as remembered unless almost time for next dose. Do not double doses.
- Caution patient to avoid salt substitutes and foods that contain high levels of potassium or sodium unless prescribed by health care professional.

CONTINUED

CONTINUED

DIURETICS (POTASSIUM-SPARING)

- May cause dizziness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to consult with health care professional before taking any OTC decongestants, cough or cold preparations, or appetite suppressants concurrently with this medication because of potential for increased blood pressure.
- Advise patients taking *triamterene* to use sunscreen and protective clothing to prevent photosensitivity reactions.
- Instruct patient to notify health care professional of medication regimen before treatment or surgery.
- Inform patient that *triamterene* may cause bluish-colored urine.
- Advise patient to notify health care professional if muscle weakness or cramps; fatigue; or severe nausea, vomiting, or diarrhea occurs.
- Emphasize the need for follow-up exams to monitor progress.
- **Hypertension:** Reinforce need to continue additional therapies for hypertension (weight loss, restricted sodium intake, stress reduction, moderation of alcohol intake, regular exercise, and cessation of smoking). Medication helps control but does not cure hypertension.
- Teach patient and family the correct technique for checking blood pressure weekly.

Evaluation/Desired Outcomes

- Increase in diuresis and decrease in edema while maintaining serum potassium level in an acceptable range.
- Decrease in blood pressure.
- Prevention of hypokalemia in patients taking diuretics.
- Treatment of hyperaldosteronism.

Why was this drug prescribed for your patient?

DIURETICS (thiazide)

chlorothiazide (klor-oh-**thye**-a-zide)
Diuril

chlorthalidone (thiazide–like) (klor-**thal**-i-doan)
♣Apo-Chlorthalidone, Hygroton, Thalitone, ♣Uridon

hydrochlorothiazide (hye-droe-klor-oh-**thye**-a-zide)
♣Apo-Hydro, Esidrex, HCTZ, Hydro-chlor, Hydro-D, HydroDIURIL, Microzide, ♣Neo-Codema, Novo-Hydrazide, Oretic, ♣Urozide

Classification
Therapeutic: antihypertensives, diuretics
Pharmacologic: thiazide diuretics, thiazide-like diuretics

Pregnancy Category B

Indications

Management of mild to moderate hypertension. Treatment of edema associated with Congestive heart failure, Renal dysfunction, Cirrhosis, Corticosteroid therapy, Estrogen therapy.

Action

Increases excretion of sodium and water by inhibiting sodium reabsorption in the distal tubule. Promotes excretion of chloride, potassium, magnesium, and bicarbonate. May produce arteriolar dilation. **Therapeutic Effects:** Lowering of blood pressure in hypertensive patients and diuresis with mobilization of edema.

Pharmacokinetics

Absorption: All are rapidly absorbed after oral administration.
Distribution: Widely distributed; cross placenta; enter breast milk.
Metabolism and Excretion: Mainly excreted unchanged renally.
Half-life: *Chlorothiazide*—1–2 hr; *chlorthalidone*—35–50 hr; *hydrochlorothiazide*—6–15 hr.

TIME/ACTION PROFILE (diuretic effect)

ROUTE	ONSET	PEAK	DURATION
Chlorothiazide	2 hr	4 hr	6–12 hr
Chlorthalidone	2 hr	2 hr	48–72 hr
Hydrochlorothiazide†	2 hr	3–6 hr	6–12 hr

†Onset of antihypertensive effect is 3–4 days and does not become maximal for 7–14 days of dosing

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with other thiazides/sulfonamides may exist. Some products contain tartrazine (avoid in patients with intolerance). Anuria. Lactation.
Use Cautiously in: Renal or severe hepatic impairment; Pregnancy (jaundice or thrombocytopenia may be seen in the newborn).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, lethargy, weakness. **CV:** hypotension. **GI:** anorexia, cramping, hepatitis, nausea, vomiting. **Derm:** photosensitivity, rashes. **Endo:** hyperglycemia. **F and E:** hypokalemia, dehydration, hypercalcemia, hypochloremic alkalosis, hypomagnesemia, hyponatremia, hypophosphatemia, hypovolemia. **Hemat:** blood dyscrasias. **Metab:** hyperuricemia, elevated lipids. **MS:** muscle cramps. **Misc:** pancreatitis.

Interactions

Drug-Drug: ↑ hypotension with other **antihypertensives**, acute ingestion of **alcohol**, or **nitrates.** ↑ hypokalemia with **corticosteroids**, **amphotericin B**, **stimulant laxatives**, **piperacillin**, or **ticarcillin**. ↓ the excretion of **lithium**. **Cholestyramine / colestipol** ↓ absorption. Hypokalemia ↑ risk of **digoxin** toxicity. **NSAIDs** may ↓ effectiveness. **Allopurinol** may ↑ the risk of hypersensitivity reactions.
Drug-Natural Products: Licorice and **aloe** may ↑ risk of potassium depletion. Concomitant use with **ginkgo** may ↓ antihypertensive effects.

Route/Dosage

For diuretic use in adults, may be given every other day or 2–3 days/week.

Chlorothiazide

PO (Adults): 250 mg–1 g/day single dose or in divided doses.
PO (Children ≥6 mos): 10–20 mg/kg/day single dose or in 2 divided doses.
IV (Adults): *Diuretic*—250 mg q 6–12 hr. *Antihypertensive*—500 mg–1 g/day single dose or 2 divided doses.

Chlorthalidone

PO (Adults): 25–100 mg once daily.
PO (Children): 2 mg/kg (60 mg/m²)/day.

Hydrochlorothiazide

PO (Adults): 12.5–100 mg/day in 1–2 doses (up to 200 mg/day; not to exceed 50 mg/day for hypertension).
PO (Children >6 mo): 1–2 mg/kg (30–60 mg/m²/day) in 1–2 divided doses.
PO (Children <6 mo): Up to 3 mg/kg/day.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure, intake, output, and daily weight and assess feet, legs, and sacral area for edema daily.
- Assess patient, especially if taking digitalis glycosides, for anorexia, nausea, vomiting, muscle cramps, paresthesia, and confusion. Notify physician or other health care professional if these signs of electrolyte imbalance occur. Patients taking digoxin are at risk of digoxin toxicity because of the potassium-depleting effect of the diuretic.
- Assess patient for allergy to sulfonamides.
- **Hypertension:** Monitor blood pressure before and periodically throughout therapy.
- Monitor frequency of prescription refills to determine compliance.
- ***Lab Test Considerations:*** Monitor electrolytes (especially potassium), blood glucose, BUN, serum creatinine, and uric acid levels before and periodically throughout therapy.
- May cause increase in serum and urine glucose in diabetic patients.
- May cause an increase in serum bilirubin, calcium, creatinine, and uric acid, and a decrease in serum magnesium, potassium, sodium, and urinary calcium concentrations.
- May cause decreased serum protein-bound iodine (PBI) concentrations.
- May cause increased serum cholesterol, low-density lipoprotein, and triglyceride concentrations.

Potential Nursing Diagnoses

Excess fluid volume (Indications)
Risk for deficient fluid volume (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Administer in the morning to prevent disruption of sleep cycle.
- Intermittent dose schedule may be used for continued control of edema.
- **PO:** May give with food or milk to minimize GI irritation. Tablets may be crushed and mixed with fluid to facilitate swallowing.
- **Intermittent Infusion:** Reconstitute chlorothiazide with at least 18 ml of sterile water for injection for a concentration of 25 mg/ml. Shake to dissolve. Stable for 24 hr at room temperature. May be diluted further with D5W or 0.9% NaCl.

Patient/Family Teaching

- Instruct patient to take this medication at the same time each day. If a dose is missed, take as soon as remembered but not just before next dose is due. Do not double doses.
- Instruct patient on use of calibrated dropper for measuring hydrochlorothiazide concentrated oral solution.

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CONTINUED

DIURETICS (thiazide)

- Instruct patient to monitor weight biweekly and notify health care professional of significant changes.
- Caution patient to change positions slowly to minimize orthostatic hypotension. This may be potentiated by alcohol.
- Advise patient to use sunscreen and protective clothing to prevent photosensitivity reactions.
- Instruct patient to discuss dietary potassium requirements with health care professional.
- Instruct patient to notify health care professional of medication regimen before treatment or surgery.
- Advise patient to report muscle weakness, cramps, nausea, vomiting, diarrhea, or dizziness to health care professional.
- Emphasize the importance of routine follow-up exams.
- **Hypertension:** Advise patients to continue taking the medication even if feeling better. Medication controls but does not cure hypertension.
- Encourage patient to comply with additional interventions for hypertension (weight reduction, low-sodium diet, regular exercise, smoking cessation, moderation of alcohol consumption, and stress management).
- Instruct patient and family in correct technique for monitoring weekly blood pressure.
- Advise patient to consult health care professional before taking OTC medication, especially cough or cold preparations, concurrently with this therapy.

Evaluation/Desired Outcomes

- Decrease in blood pressure.
- Increase in urine output
- Decrease in edema.

Why was this drug prescribed for your patient?

High Alert

dobutamine (doe-**byoo**-ta-meen)

Dobutrex

Classification

Therapeutic: inotropics
Pharmacologic: adrenergics

Pregnancy Category B

Indications

Short-term (<48 hr) management of heart failure caused by depressed contractility from organic heart disease or surgical procedures.

Action

Stimulates beta$_1$ (myocardial)-adrenergic receptors with relatively minor effect on heart rate and peripheral blood vessels. **Therapeutic Effects:** Increased cardiac output without significant increase in heart rate.

Pharmacokinetics

Absorption: IV administration results in complete bioavailability.
Distribution: Unknown.
Metabolism and Excretion: Metabolized by the liver and other tissues.
Half-life: 2 min.

TIME/ACTION PROFILE (inotropic effects)

ROUTE	ONSET	PEAK	DURATION
IV	1–2 min	10 min	brief (minutes)

Contraindications/Precautions

Contraindicated in: Hypersensitivity to dobutamine or bisulfites. Idiopathic hypertrophic subaortic stenosis.
Use Cautiously in: History of hypertension (increased risk of exaggerated pressor response); Myocardial infarction; Atrial fibrillation (pretreatment with digitalis glycosides recommended); History of ventricular atopic activity (may be exacerbated); Hypovolemia (correct before administration); Pregnancy or lactation, and children (safety not established); Children (has been used safely in children, though risk of tachycardia is increased).

Adverse Reactions/Side Effects

CNS: headache. **Resp:** shortness of breath. **CV:** hypertension, premature ventricular contractions, increased heart rate, angina pectoris, arrhythmias, hypotension, palpitations. **GI:** nausea, vomiting. **Local:** phlebitis. **Misc:** hypersensitivity reactions including skin rash, fever, bronchospasm or eosinophilia, nonanginal chest pain.

Interactions

Drug-Drug: Use with **nitroprusside** may have a synergistic effect on increasing cardiac output. **Beta blockers** may negate the effect of dobutamine. Increased risk of arrhythmias or hypertension with some **anesthetics (cyclopropane, halothane), MAO inhibitors, oxytocics,** or **tricyclic antidepressants**.

Route/Dosage

IV (Adults and Children): Start with low infusion rates (0.5–1 mcg/kg/min), titrated at intervals of a few minutes, guided by the patient's response (range 2–20 mcg/kg/min, up to 40 mcg/kg/min).

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure, heart rate, ECG, pulmonary capillary wedge pressure (PCWP), cardiac output, central venous pressure (CVP), and urinary output continuously during the administration. Report significant changes in vital signs or arrhythmias. Consult physician for parameters for pulse, blood pressure, or ECG changes for adjusting dosage or discontinuing medication.
- Palpate peripheral pulses and assess appearance of extremities routinely throughout dobutamine administration. Notify physician if quality of pulse deteriorates or if extremities become cold or mottled.
- ***Lab Test Considerations:*** Monitor potassium concentrations during therapy; may cause hypokalemia.
- Monitor electrolytes, BUN, creatinine, and prothrombin time weekly during prolonged therapy.

- ***Toxicity and Overdose:*** If overdose occurs, reduction or discontinuation of therapy is the only treatment necessary because of the short duration of dobutamine.

Potential Nursing Diagnoses

Decreased cardiac output (Indications)
Ineffective tissue perfusion (Indications)

Implementation

- ***High Alert:*** IV vasoactive medications are potentially dangerous. Have second practitioner independently check original order, dosage calculations and infusion pump settings. Do not confuse dobutamine with dopamine.
- Correct hypovolemia with volume expanders before initiating dobutamine therapy.
- Administer into a large vein and assess administration site frequently. Extravasation may cause pain and inflammation.
- **IV:** Reconstitute 250-mg vial with 10 ml of sterile water or D5W for injection. If not completely dissolved, add another 10 ml of diluent. Dilute in at least 50 ml of D5W, 0.9% NaCl, sodium lactate, 0.45% NaCl, D5/0.45% NaCl, D5/0.9% NaCl, D5/LR, or LR. Standard concentrations range from 250 mcg/ml to 1000 mcg/ml. Concentrations should not exceed 5 mg of dobutamine per ml. Slight pink color of solution does not alter potency. Solution is stable for 24 hr at room temperature.
- **Continuous Infusion:** Administer via infusion pump. Rate of administration is titrated according to patient response (heart rate, presence of ectopic activity, blood pressure, urine output, CVP, PCWP, cardiac output). Dose should be titrated so heart rate does not increase by >10% of baseline.
- **Y-Site Compatibility:** amifostine, amiodarone, atracurium, aztreonam, calcium chloride, calcium gluconate, ciprofloxacin, cisatracurium, cladribine, diazepam, diltiazem, docetaxel, dopamine, doxorubicin liposome, enalaprilat, epinephrine, etoposide, famotidine, fentanyl, fluconazole, gatifloxacin, gemcitabine, granisetron, haloperidol, hydromorphone, inamrinone, insulin, labetalol, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, meperidine, milrinone, morphine, nitroglycerin, nitroprusside, norepinephrine, pancuronium, potassium chloride, propofol, ranitidine, remifentanil, streptokinase, tacrolimus, theophylline, thiotepa, tolazoline, vecuronium, verapamil, zidovudine.
- **Y-Site Incompatibility:** acyclovir, alteplase, aminophylline, amphotericin B cholesteryl sulfate, cefepime, foscarnet, indomethacin, phytonadione, piperacillin/tazobactam, thiopental, warfarin.

Patient/Family Teaching

- Explain to patient the rationale for instituting this medication and the need for frequent monitoring.
- Advise patient to inform health care professional immediately if chest pain, dyspnea, numbness, tingling, or burning of extremities occurs.
- Instruct patient to notify health care professional immediately of pain or discomfort at the site of administration.
- **Home Care Issues:** Instruct caregiver on proper care of IV equipment.
- Instruct caregiver to report signs of worsening congestive heart failure (shortness of breath, orthopnea, decreased exercise tolerance), abdominal pain, and nausea or vomiting to health care professional promptly.

Evaluation/Desired Outcomes

- Increase in cardiac output.
- Improved hemodynamic parameters.
- Increased urine output.

Why was this drug prescribed for your patient?

High Alert

docetaxel (doe-se-**tax**-el)

Taxotere

Classification

Therapeutic: antineoplastics
Pharmacologic: taxoids

Pregnancy Category D

Indications

Breast cancer (locally advanced/metastatic breast cancer or with doxorubicin and cyclophosphamide as adjuvant treatment of node-positive disease). Non–small-cell lung cancer (locally advanced / metastatic) after failure on platinum regimen or with platinum as initial therapy). Advanced metastatic hormone-refractory prostate cancer (with prednisone).

Action

Interferes with normal cellular microtubule function required for interphase and mitosis. **Therapeutic Effects:** Death of rapidly replicating cells, particularly malignant ones.

Pharmacokinetics

Absorption: IV administration results in complete bioavailability.
Distribution: Unknown.
Metabolism and Excretion: Extensively metabolized by the liver.
Half-life: 11.1 hr.

TIME/ACTION PROFILE (effect on blood counts)

	ONSET	PEAK	DURATION
IV	rapid	5–9 days	7 days

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Hypersensitivity to polysorbate 80. Known alcohol intolerance. Neutrophil count $<1500/mm^3$. Liver impairment (serum bilirubin >upper limit of normal, ALT and/or AST >1.5 times upper limit of normal, with alkaline phosphatase >2.5 times upper limit of normal). Pregnancy or lactation.
Use Cautiously in: Patients with childbearing potential.

Adverse Reactions/Side Effects

CNS: fatigue, weakness. **Resp:** bronchospasm. **CV:** ASCITES, CARDIAC TAMPONADE, PERICARDIAL EFFUSION, PULMONARY EDEMA, peripheral edema, edema. **GI:** diarrhea, nausea, stomatitis, vomiting. **Derm:** alopecia, rashes, dermatitis, desquamation, erythema, nail disorders. **Hemat:** anemia, thrombocytopenia, leukopenia. **Local:** injection site reactions. **MS:** myalgia, arthralgia. **Neuro:** neurosensory deficits, peripheral neuropathy. **Misc:** hypersensitivity reactions, including ANAPHYLAXIS.

Interactions

Drug-Drug: ↑ bone marrow depression may occur with other **antineoplastics** or **radiation therapy. Cyclosporine**, **ketoconazole**, **erythromycin**, or **troleandomycin** may significantly alter effects.

Route/Dosage

IV (Adults): *Breast cancer*—60–100 mg/m² every 3 wk; *Breast cancer adjuvant therapy*—75 mg/m² every 3 wk for 6 cycles (with doxorubicin and cyclophosphamide); *Non–small-cell lung cancer*—75 mg/m² every 3 wk (alone or with platinum); *Prostate cancer*—75 mg/m² every 3 wk (with oral prednisone).

NURSING IMPLICATIONS

Assessment

- Monitor vital signs before and after administration.

CONTINUED

docetaxel

- **Y-Site Compatibility:** acyclovir, amifostine, amikacin, aminophylline, ampicillin, ampicillin/sulbactam, aztreonam, bumetanide, buprenorphine, butorphanol, calcium gluconate, cefazolin, cefepime, cefoperazone, cefotaxime, cefotetan, cefoxitin, ceftazidime, ceftizoxime, ceftriaxone, cefuroxime, chlorpromazine, cimetidine, ciprofloxacin, clindamycin, dexamethasone sodium phosphate, diphenhyrdamine, dobutamine, dopamine, doxycycline, droperidol, enalaprilat, famotidine, fluconazole, furosemide, ganciclovir, gemcitabine, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, hydromorphone, imipenem/cilastatin, leucovorin, lorazepam, LR, magnesium sulfate, mannitol, meperidine, meropenem, mesna, metoclopramide, metronidazole, minocycline, morphine, ofloxacin, ondansetron, piperacillin, piperacillin/tazobactam, potassium chloride, prochlorperazine, promethazine, ranitidine, sodium bicarbonate, ticarcillin, ticarcillin/clavulanate, tobramycin, trimethoprim/sulfamethoxazole, vancomycin, zidovudine.
- **Y-Site Incompatibility:** amphotericin B, doxorubicin liposome, methylprednisolone, nalbuphine.
- **Additive Incompatibility:** Information unavailable. Do not admix with other drugs or solutions.

Patient/Family Teaching

- Advise patient to notify health care professional if fever >101°F; chills; sore throat; signs of infection; bleeding gums; bruising; petechiae; or blood in urine, stool, or emesis occur. Caution patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor.
- Patient should be cautioned not to drink alcoholic beverages or take products containing aspirin or NSAIDs.
- Fatigue is a frequent side effect of docetaxel. Advise patient that frequent rest periods and pacing of activities may minimize fatigue.
- Instruct patient to notify health care professional if abdominal pain, yellow skin, weakness, paresthesia, gait disturbances, swelling of the feet, or joint or muscle aches occur.
- Instruct patient to inspect oral mucosa for redness and ulceration. If mouth sores occur, advise patient to use sponge brush and rinse mouth with water after eating and drinking.
- Discuss with patient the possibility of hair loss. Complete hair loss usually begins after 1 or 2 treatments and is reversible after discontinuation of therapy. Explore coping strategies.
- Instruct patient not to receive any vaccinations without advice of health care professional.
- Emphasize the need for periodic lab tests to monitor for side effects.

Evaluation/Desired Outcomes

- Decrease in size or spread of malignancy in women with advanced breast cancer.
- Decrease in size or spread of malignancy in locally advanced or metastatic non–small-cell lung cancer.
- Decreased size or spread of advanced metastatic hormone-refractory prostate cancer.

Why was this drug prescribed for your patient?

- Assess infusion site for patency. Docetaxel is not a vesicant. If extravasation occurs, discontinue docetaxel immediately and aspirate the IV needle. Apply cold compresses to the site for 24 hr.
- Monitor for hypersensitivity reactions continuously during infusion. These are most common after the first and second doses of docetaxel. Reactions may consist of bronchospasm, hypotension, and/or erythema. Mild to moderate reactions may be treated symptomatically and infusion slowed or stopped until reaction subsides. Severe reactions require discontinuation of therapy and symptomatic treatment. Do not readminister docetaxel to patients with previous severe reactions. Severe edema may also occur. Weigh patients before each treatment. Fluid accumulation may result in edema, ascites, and pleural or pericardial effusions. Pretreatment with corticosteroids (such as dexamethasone 8 mg PO twice daily for 5 days, starting 1 day before docetaxel) is recommended to minimize edema and hypersensitivity reactions. PO furosemide may be used to treat edema.
- Monitor for bone marrow depression. Assess for bleeding (bleeding gums, bruising, petechiae; guaiac stools, urine, and emesis) and avoid IM injections and taking rectal temperatures if platelet count is low. Apply pressure to venipuncture sites for 10 min. Assess for signs of infection during neutropenia. Anemia may occur. Monitor for increased fatigue, dyspnea, and orthostatic hypotension.
- Assess patient for rash. May occur on feet or hands but may also occur on arms, face, or thorax, usually with pruritus. Rash usually occurs within 1 wk after infusion and resolves before next infusion.
- Assess for development of neurosensory deficit (paresthesia, dysesthesia, pain, burning). May also cause weakness. Pyridoxine may be used to minimize symptoms. Severe symptoms may require dose reduction or discontinuation.
- Assess patient for arthralgia and myalgia, which are usually relieved by nonopioid analgesics but may be severe enough to require treatment with opioid analgesics.
- ***Lab Test Considerations:*** Monitor CBC and differential before each treatment. Frequently causes neutropenia (<2000 neutrophils/mm^3); may require dose adjustment. If the neutrophil count is less than 1500/mm^3, dose should be held. Neutropenia is reversible and not cumulative. The nadir is 8 days, with a duration of 7 days. May also cause thrombocytopenia and anemia.
- Monitor liver function studies (AST, ALT, alkaline phosphatase, bilirubin) before each cycle. Doses are usually held if levels are elevated.

Potential Nursing Diagnoses

Risk for infection (Adverse Reactions)
Risk for injury (Adverse Reactions)

Implementation

- ***High Alert:*** Fatalities have occurred with chemotherapeutic agents. Before administering, clarify all ambiguous orders; double check single, daily, and course-of-therapy dose limits; have second practitioner independently double check original order, calculations and infusion pump settings. Do not confuse Taxotere (docetaxel) with Taxol (paclitaxel).
- Solution should be prepared in a biologic cabinet. Wear gloves, gown, and mask while handling medication. Discard IV equipment in specially designated containers.
- **Continuous Infusion:** Before dilution, allow vials to stand at room temperature for 5 min. Withdraw entire contents of diluent vial and transfer to vial of docetaxel. Rotate vial gently for 15 sec to mix. Do not shake. Solution should be clear but may contain foam at top. Allow to stand for a few minutes to allow foam to dissipate. All foam need not dissipate before continuing preparation. To prepare the solution for infusion, withdraw the required amount of 10 mg/ml solution into syringe and inject into 250 ml of 0.9% NaCl or D5W for a concentration of 0.3–0.9 mg/ml. Rotate infusion container to mix infusion thoroughly. Do not administer solutions that are cloudy or contain a precipitate. Solution does not require an in-line filter. Dilute solutions are stable for 8 hr if refrigerated or at room temperature. ***Rate:*** Administer over 1 hr.

CONTINUED

DOCUSATE (**dok**-yoo-sate)

docusate calcium

DC Softgels, Dioctocal, Pro-Cal-Sof, Sulfolax, Surfak

docusate sodium

Colace, Correctol Stool Softener Soft Gels, Diocto, Docu, Docusoft S, DOK, DOS Softgels, DOS, DOSS, DSS, Dulcolax Stool Softener, Ex-Lax Stool Softener, Fleet Sof-Lax, Modane Soft, Philliips Liqui-Gels, Regulax-SS, ♣Regulex, Silace, Soflax, Stool Softener, Therevac SB

Classification
Therapeutic: laxatives
Pharmacologic: stool softeners

Pregnancy Category C

Indications
PO: Prevention of constipation in patients who should avoid straining, such as after myocardial infarction (MI) or rectal surgery. **Rect:** Used as enema to soften fecal impaction.

Action
Promotes incorporation of water into stool, resulting in softer fecal mass. May also promote electrolyte and water secretion into the colon. **Therapeutic Effects:** Softening and passage of stool.

Pharmacokinetics
Absorption: Small amounts may be absorbed from the small intestine after oral administration. Absorption from the rectum is not known.
Distribution: Unknown.
Metabolism and Excretion: Amounts absorbed after oral administration are eliminated in bile.
Half-life: Unknown.

TIME/ACTION PROFILE (softening of stool)

ROUTE	ONSET	PEAK	DURATION
PO	24–48 hr (up to 3–5 days)	unknown	unknown
Rectal	2–15 min	unknown	unknown

Contraindications/Precautions
Contraindicated in: Hypersensitivity. Abdominal pain, nausea, or vomiting, especially when associated with fever or other signs of acute abdomen.
Use Cautiously in: Excessive or prolonged use may lead to dependence; Should not be used if prompt results are desired; Has been used safely during pregnancy and lactation.

Adverse Reactions/Side Effects
EENT: throat irritation. **GI:** mild cramps. **Derm:** rashes.

Interactions
Drug-Drug: None significant.

Route/Dosage

Docusate Calcium
PO (Adults): 240 mg once daily.
PO (Children ≥6 yr and Adults with Minimal Requirements): 50–150 mg once daily.

Docusate Sodium
PO (Adults and Children >12 yr): 50–500 mg once daily.
PO (Children 6–12 yr): 40–120 mg once daily.
PO (Children 3–6 yr): 20–60 mg once daily.
PO (Children <3 yr): 10–40 mg.
Rect (Adults): 50–100 mg or 1 unit containing 283 mg docusate sodium, soft soap, and glycerin.

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

donepezil (doe-**nep**-i-zill)

Aricept, Aricept ODT

Classification
Therapeutic: anti-Alzheimer's agents
Pharmacologic: cholinergics (cholinesterase inhibitors)

Pregnancy Category C

Indications
Treatment of mild-to-moderate dementia associated with Alzheimer's disease.

Action
Improves cholinergic function by inhibiting acetylcholinesterase. **Therapeutic Effects:** May temporarily lessen some of the dementia associated with Alzheimer's disease. Does not alter the course of the disease.

Pharmacokinetics
Absorption: Well absorbed following oral administration.
Distribution: Unknown.
Metabolism and Excretion: Partially metabolized by the liver and partially excreted by kidneys (17% unchanged). Two metabolites are pharmacologically active.
Half-life: 70 hr.

TIME/ACTION PROFILE (improvement in symptoms)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	several weeks	6 wk†

†Return to baseline after discontinuation

Contraindications/Precautions
Contraindicated in: Hypersensitivity to donepezil or piperidine derivatives.
Use Cautiously in: Patients with underlying cardiac disease, especially sick-sinus syndrome or supraventricular conduction defects; Patients with a history of ulcer disease or those currently taking NSAIDs; Patients with a history of seizures; Patients with a history of asthma or obstructive pulmonary disease; Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects
CNS: headache, abnormal dreams, depression, dizziness, drowsiness, fatigue, insomnia, syncope. **CV:** atrial fibrillation, hypertension, hypotension, vasodilation. **GI:** diarrhea, nausea, anorexia, vomiting. **GU:** frequent urination. **Derm:** ecchymoses. **Metab:** hot flashes, weight loss. **MS:** arthritis, muscle cramps.

Interactions
Drug-Drug: Exaggerates muscle relaxation from **succinylcholine**. Interferes with the action of **anticholinergics.** Increases the cholinergic effects of **bethanechol**. May increase the risk of GI bleeding from **NSAIDs. Quinidine** and **ketoconazole** decrease the metabolism of donepezil. **Rifampin**, **carbamazepine**, **dexamethasone**, **phenobarbital**, and **phenytoin** induce the enzymes that metabolize donepezil and may decrease its effects.
Drug-Natural Products: Angel's trumpet, jimson weed, and **scopolia** may antagonize cholinergic effects.

Route/Dosage
PO (Adults): 5 mg once daily; after 4–6 wk may increase to 10 mg once daily (dose should not exceed 5 mg/day in frail, elderly females).

NURSING IMPLICATIONS

Assessment
- Assess cognitive function (memory, attention, reasoning, language, ability to perform simple tasks) periodically throughout therapy.

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

NURSING IMPLICATIONS

Assessment

- Assess patient for abdominal distention, presence of bowel sounds, and usual pattern of bowel function.
- Assess color, consistency, and amount of stool produced.

Potential Nursing Diagnoses

Constipation (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- This medication does not stimulate intestinal peristalsis.
- **PO:** Administer with a full glass of water or juice. May be administered on an empty stomach for more rapid results.
- Oral solution may be diluted in milk or fruit juice to decrease bitter taste.
- Do not administer within 2 hr of other laxatives, especially mineral oil. May cause increased absorption.

Patient/Family Teaching

- Advise patient that laxatives should be used only for short-term therapy. Long-term therapy may cause electrolyte imbalance and dependence.
- Encourage patients to use other forms of bowel regulation, such as increasing bulk in the diet, increasing fluid intake (6–8 full glasses/day), and increasing mobility. Normal bowel habits are variable and may vary from 3 times/day to 3 times/wk.
- Instruct patient with cardiac disease to avoid straining during bowel movements (Valsalva maneuver).
- Advise patient not to use laxatives when abdominal pain, nausea, vomiting, or fever is present.
- Advise patient not to take docusate within 2 hr of other laxatives.

Evaluation/Desired Outcomes

- A soft, formed bowel movement, usually within 24–48 hr. Therapy may take 3–5 days for results. Rectal dose forms produce results within 2–15 min.

Why was this drug prescribed for your patient?

- Monitor heart rate periodically during therapy. May cause bradycardia.

Why was this drug prescribed for your patient?

Potential Nursing Diagnoses

Disturbed thought process (Indications)
Risk for injury (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **PO:** Administer in the evening just before going to bed. May be taken without regard to food.
- *Oral disintegrating tablets* should be allowed to dissolve on tongue; follow with water.

Patient/Family Teaching

- Emphasize the importance of taking donepezil daily, as directed. Missed doses should be skipped and regular schedule returned to the following day. Do not take more than prescribed; higher doses do not increase effects but may increase side effects.
- Caution patient and caregiver that donepezil may cause dizziness.
- Advise patient and caregiver to notify health care professional if nausea, vomiting, diarrhea, or changes in the color of the stool occur or if new symptoms occur or previously noted symptoms increase in severity.
- Advise patient and caregiver to notify health care professional of medication regimen before treatment or surgery.
- Emphasize the importance of follow-up exams to monitor progress.

Evaluation/Desired Outcomes

- Improvement in cognitive function (memory, attention, reasoning, language, ability to perform simple tasks) in patients with Alzheimer's disease.

High Alert

dopamine (dope-a-meen)

Intropin, ♣Revimine

Classification

Therapeutic: inotropics, vasopressors
Pharmacologic: adrenergics

Pregnancy Category C

Indications

Adjunct to standard measures to improve blood pressure, cardiac output, and urine output in the treatment of shock unresponsive to fluid replacement.

Action

Small doses (0.5–3 mcg/kg/min) stimulate dopaminergic receptors, producing renal vasodilation. Larger doses (2–10 mcg/kg/min) stimulate dopaminergic and beta$_1$-adrenergic receptors, producing cardiac stimulation and renal vasodilation. Doses greater than 10 mcg/kg/min stimulate alpha-adrenergic receptors and may cause renal vasoconstriction. **Therapeutic Effects:** Increased cardiac output. Increased BP. Improved renal blood flow.

Pharmacokinetics

Absorption: Administered IV only, resulting in complete bioavailability.
Distribution: Widely distributed, but does not cross the blood-brain barrier.
Metabolism and Excretion: Metabolized in liver, kidneys, and plasma.
Half-life: 2 min.

TIME/ACTION PROFILE (hemodynamic effects)

ROUTE	ONSET	PEAK	DURATION
IV	5 min	rapid	<10 min

♣ = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Tachyarrhythmias. Pheochromocytoma. Hypersensitivity to bisulfites (some products).
Use Cautiously in: Hypovolemia; Myocardial infarction; Occlusive vascular diseases; Older patients may be more susceptible to adverse effects; Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: headache. **EENT:** mydriasis (high dose). **Resp:** dyspnea. **CV:** arrhythmias, hypotension, vasoconstriction, angina, ECG changes, palpitations. **GI:** nausea, vomiting. **Derm:** piloerection. **Local:** irritation at IV site.

Interactions

Drug-Drug: Use with some **antidepressants**, **ergot alkaloids (ergotamine)**, **doxapram**, **guanadrel**, or **MAO inhibitors** results in severe hypertension. Use with **IV phenytoin** may cause hypotension and bradycardia. Use with **general anesthetics** may result in arrhythmias. **Beta blockers** may antagonize cardiac effects.

Route/Dosage

IV (Adults): *Dopaminergic (renal vasodilation) effects*—0.5–3 mcg/kg/min. *Beta$_1$-adrenergic (cardiac stimulation) effects*—2–10 mcg/kg/min. *Alpha-adrenergic (increased peripheral vascular resistance) effects*—10 mcg/kg/min; infusion rate may be increased as needed. **IV (Children):** 5–20 mcg/kg/min, depending on desired response (0.5–3 mcg/kg/min has been used to improve renal blood flow).

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure, heart rate, pulse pressure, ECG, pulmonary capillary wedge pressure (PCWP), cardiac output, central venous pressure (CVP), and urinary output continuously during the administration. Report significant changes in vital signs or arrhythmias. Consult physician for parameters for pulse, blood pressure, or ECG changes for adjusting dosage or discontinuing medication.
- Monitor urine output frequently throughout administration. Report decreases in urine output promptly.

*CAPITALS indicates life-threatening; underlines indicate most frequent.

doxazosin (dox-ay-zoe-sin)

Cardura

Classification

Therapeutic: antihypertensives
Pharmacologic: peripherally acting antiadrenergics

Pregnancy Category C

Indications

Hypertension (alone or with other agents). Symptoms of benign prostatic hyperplasia (BPH).

Action

Dilates both arteries and veins by blocking postsynaptic alpha-adrenergic receptors. Alpha-adrenergic blockade produces relaxation of smooth muscle in the bladder neck and prostate. **Therapeutic Effects:** Lowering of BP. Reduction in symptoms of BPH.

Pharmacokinetics

Absorption: Well absorbed after oral administration.
Distribution: Probably enters breast milk; rest of distribution unknown.
Metabolism and Excretion: Extensively metabolized by the liver.
Half-life: 22 hr.

TIME/ACTION PROFILE (antihypertensive effect)

ROUTE	ONSET	PEAK	DURATION
PO	1–2 hr	2–6 hr	24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity.
Use Cautiously in: Hepatic dysfunction; Geriatric patients or patients with impaired renal function (increased risk of hypotension); Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, headache, depression, drowsiness, fatigue, nervousness, weakness. **EENT:** abnormal vision, blurred vision, conjunctivitis, epistaxis. **Resp:** dyspnea. **CV:** first-dose orthostatic hypotension, arrhythmias, chest pain, edema, palpitations. **GI:** abdominal discomfort, constipation, diarrhea, dry mouth, flatulence, nausea, vomiting. **GU:** decreased libido, sexual dysfunction. **Derm:** flushing, rash, urticaria. **MS:** arthralgia, arthritis, gout, myalgia.

Interactions

Drug-Drug: ↑ risk of hypotension with acute ingestion of **alcohol**, other **antihypertensives**, **sildenafil**, **vardenafil**, or **nitrates.** May ↓ antihypertensive effect of **clonidine**.

Route/Dosage

PO (Adults): *Hypertension*—1 mg once daily, may be gradually increased at 2-wk intervals to 2–16 mg/day; incidence of postural hypotension greatly increased at doses >4 mg/day. *BPH*—1 mg once daily, may be gradually increased to 8 mg/day.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure and pulse 2–6 hr after first dose, with each increase in dose, and periodically during therapy. Report significant changes.
- Assess patient for first-dose orthostatic hypotension and syncope. Incidence may be dose related. Observe patient closely during this period and take precautions to prevent injury.
- Monitor intake and output ratios and daily weight, and assess for edema daily, especially at beginning of therapy. Report weight gain or edema.

♣ = Canadian drug name.

*CAPITALS indicates life-threatening; underlines indicate most frequent.

- Palpate peripheral pulses and assess appearance of extremities routinely throughout dopamine administration. Notify physician if quality of pulse deteriorates or if extremities become cold or mottled.
- If hypotension occurs, administration rate should be increased. If hypotension continues, more potent vasoconstrictors (norepinephrine) may be administered.
- ***Toxicity and Overdose:*** If excessive hypertension occurs, rate of infusion should be decreased or temporarily discontinued until blood pressure is decreased. Although additional measures are usually not necessary because of short duration of dopamine, phentolamine may be administered if hypertension continues.

Potential Nursing Diagnoses

Decreased cardiac output (Indications)
Ineffective tissue perfusion (Indications)

Implementation

- ***High Alert:*** Have second practitioner independently check original order, dosage calculations and infusion pump settings. Do not confuse dopamine with dobutamine.
- Correct hypovolemia with volume expanders before initiating dopamine therapy.
- Extravasation may cause severe irritation, necrosis, and sloughing of tissue. Administer into a large vein and assess administration site frequently. If extravasation occurs, affected area should be infiltrated liberally with 10–15 ml of 0.9% NaCl containing 5–10 mg of phentolamine. Reduce proportionally for pediatric patients. Infiltration within 12 hr of extravasation produces immediate hyperemic changes.
- **Continuous Infusion:** Dilute 200–400 mg in 250–500 ml of 0.9% NaCl, D5W, D5/LR, D5/0.45% NaCl, D5/0.9% NaCl, or LR for IV infusion. Concentrations commonly used are 800 mcg/ml or 0.8 mg/ml (200 mg/250 ml) when fluid expansion is not problematic and 1.6 mg/ml (400 mg/250 ml) or 3.2 mg/ml (800 mg/250 ml) when patient is on fluid restriction or a slower rate is desired. Dilute immediately before administration. Yellow or brown discoloration indicates decomposition. Discard solution that is cloudy, discolored, or contains a precipitate. Solution is stable for 24 hr. ***Rate:*** Administer at a rate of 0.5–5 mcg/kg/min, and increase by 1–4 mcg/kg/min at 10- to 30-min intervals until desired dosage is obtained. Infusion must be administered via infusion pump to ensure precise amount delivered. Rate of administration is titrated according to patient response (blood pressure, heart rate, urine flow, peripheral perfusion, presence of ectopic activity, cardiac output). Decrease rate gradually when discontinuing to prevent marked decreases in blood pressure.
- **Y-Site Incompatibility:** acyclovir, alteplase, amphotericin B cholesteryl sulfate, cefepime, indomethacin, insulin, thiopental.

Patient/Family Teaching

- Explain to patient the rationale for instituting this medication and the need for frequent monitoring.
- Advise patient to inform health care professional immediately if chest pain, dyspnea, numbness, tingling, or burning of extremities occurs.
- Instruct patient to inform health care professional immediately of pain or discomfort at the site of administration.

Evaluation/Desired Outcomes

- Increase in BP
- Increase in peripheral circulation.
- Increase in urine output.

Why was this drug prescribed for your patient?

- **BPH:** Assess patient for symptoms of prostatic hyperplasia (urinary hesitancy, feeling of incomplete bladder emptying, interruption of urinary stream, impairment of size and force of urinary stream, terminal urinary dribbling, straining to start flow, dysuria, urgency) prior to and periodically during therapy.

Potential Nursing Diagnoses

Risk for injury (Side Effects)
Impaired urinary elimination (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **Do not confuse Cardura (doxazosin) with Cardene (nicardipine) or Ridaura (auranofin).**
- Administer daily dose at bedtime.
- **Hypertension:** May be administered concurrently with a diuretic or other antihypertensive.

Patient/Family Teaching

- Emphasize the importance of continuing to take this medication, even if feeling well. Instruct patient to take medication at the same time each day. Take missed doses as soon as remembered unless almost time for next dose. Do not double doses.
- Doxazosin may cause drowsiness or dizziness. Advise patient to avoid driving or other activities requiring alertness until response to medication is known.
- Caution patient to change positions slowly to decrease orthostatic hypotension.
- Advise patient to consult health care professional before taking any cough, cold, or allergy remedies or herbal products.
- Emphasize the importance of follow-up visits to determine effectiveness of therapy.
- **Hypertension:** Instruct patient and family on proper technique for blood pressure monitoring. Advise them to check blood pressure at least weekly and report significant changes.
- Encourage patient to comply with additional interventions for hypertension (weight reduction, low-sodium diet, smoking cessation, moderation of alcohol consumption, regular exercise, and stress management).

Evaluation/Desired Outcomes

- Decrease in blood pressure without appearance of side effects.
- Decrease in urinary symptoms of BPH.

Why was this drug prescribed for your patient?

doxepin (dox-e-pin)

Sinequan, ♣Triadapin, Zonalon

Classification

Therapeutic: antianxiety agents, antidepressants, antihistamines
Pharmacologic: tricyclic antidepressants

Pregnancy Category C

Indications

PO: Depression. Anxiety. **Unlabeled uses:** Chronic pain syndromes.

Action

Prevents reuptake of norepinephrine serotonin by presynaptic neurons; resultant accumulation of neurotransmitters potentiates activity. Significant anticholinergic properties. **Therapeutic Effects:** ↓ depression/anxiety.

Pharmacokinetics

Absorption: Well absorbed.
Distribution: Widely distributed; enters breast milk.
Metabolism and Excretion: Mostly metabolized by the liver; one metabolite has antidepressant activity. Undergoes enterohepatic circulation.
Half-life: 8–25 hr.

TIME/ACTION PROFILE (antidepressant activity)

ROUTE	ONSET	PEAK	DURATION
PO	2–3 wk	up to 6 wk	days or wks

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Some products contain bisulfites and should be avoided in patients with known intolerance. Untreated narrow-angle glaucoma. Period immediately after myocardial infarction.
Use Cautiously in: Geriatric patients (initial dosage reduction recommended); Pre-existing cardiovascular disease (increased risk of adverse reactions); Prostatic enlargement (more susceptible to urinary retention); Seizures; Use during pregnancy only if potential maternal benefit outweighs risks to fetus; use during lactation may result in neonatal sedation; May ↑ risk of suicide attempt/ideation especially during dose early treatment or dose adjustment; risk may be greater in children or adolescents; Children <12 yr (safety not established).

Adverse Reactions/Side Effects

CNS: fatigue, sedation, agitation, confusion, hallucinations. **EENT:** blurred vision, ↑ intraocular pressure. **CV:** hypotension, arrhythmias, ECG abnormalities. **GI:** constipation, dry mouth, hepatitis, ↑ appetite, nausea. **GU:** urinary retention. **Derm:** photosensitivity, rashes. **Hemat:** blood dyscrasias. **Misc:** hypersensitivity reactions.

Interactions

Drug-Drug: May cause hypotension, tachycardia, and potentially fatal reactions when used with **MAO inhibitors** (discontinue 2 wk before doxepin). When **other antidepressants**, **phenothiazines**, **carbamazepine**, **type 1C antiarrthythmics (propafenone, flecainide)** drugs are used concurrently, dosage reduction of one or the other or both may be necessary. Concurrent use **cimetidine**, **quinidine**, **amiodarone**, and **ritonavir** may result in ↑ effects. Concurrent use with **SSRI antidepressants** may result in ↑ toxicity; avoid concurrent use (fluoxetine should be stopped 5 wk before). Concurrent use with **clonidine** may result in hypertensive crisis. Concurrent use with **levodopa** may result in delayed or ↓ absorption of levodopa or hypertension. Blood levels and effects may be ↓ by **rifamycin**. ↑ CNS depression with other **CNS depressants**, including **alcohol**, **antihistamines**, **clonidine**, **opioids**, and **sedative/hypnotics**. **Barbiturates** may alter blood levels and effects. **Adrenergic** and **anticholinergic** side effects may be additive with other **agents having these properties**. **Phenothiazines** or **hormonal contraceptives** ↑ levels/risk of toxicity. **Smoking** may ↑ metabolism and alter effects.
Drug-Natural Products: Concomitant use of **kava**, **valerian**, or **chamomile** can increase CNS depression.

Route/Dosage

PO (Adults): *Antidepressant/antianxiety*—25 mg 3 times daily; may be increased (range 25–300 mg/day). Once stabilized, entire daily dose may be given at bedtime. *Antipruritic*—10 mg–25 mg.
PO (Geriatric Patients): *Antidepressant*—25–50 mg/day initially; may be increased.

♣ = Canadian drug name.

*CAPITALS indicates life-threatening, underlines indicate most frequent

High Alert

doxorubicin hydrochloride

(dox-oh-**roo**-bi-sin hye-droe-**klor**-ide)

Adriamycin PFS, Adriamycin RDF, Rubex

Classification

Therapeutic: antineoplastics
Pharmacologic: anthracyclines

Pregnancy Category D

Indications

Alone or with other modalities in the treatment of Breast cancer, Ovarian cancer, Bladder cancer, Bronchogenic carcinoma, Malignant lymphomas and leukemias.

Action

Inhibits DNA and RNA synthesis by forming a complex with DNA; action is cell-cycle S-phase specific. Also has immunosuppressive properties. **Therapeutic Effects:** Death of rapidly replicating cells, particularly malignant ones.

Pharmacokinetics

Absorption: IV administration results in complete bioavailability.
Distribution: Widely distributed; does not penetrate CNS; extensively bound to tissues.
Metabolism and Excretion: Mostly metabolized by the liver to an active compound. Excreted mostly in bile, 50% as unchanged drug. <5% eliminated unchanged in urine.
Half-life: 16.7 hr.

TIME/ACTION PROFILE (effect on blood counts)

ROUTE	ONSET	PEAK	DURATION
IV	10 days	14 days	21–24 days

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Pregnancy or lactation.
Use Cautiously in: History of cardiac disease or high cumulative doses of anthracyclines; Depressed bone marrow reserve; Liver impairment (reduce dose if serum bilirubin >1.2 mg/dl); Patients with childbearing potential.

Adverse Reactions/Side Effects

Resp: recall pneumonitis. **CV:** CARDIOMYOPATHY–ECG CHANGES. **GI:** diarrhea, esophagitis, nausea, stomatitis, vomiting. **GU:** red urine. **Derm:** alopecia, photosensitivity. **Endo:** sterility, prepubertal growth failure with temporary gonadal impairment (children only). **Hemat:** anemia, leukopenia, thrombocytopenia. **Local:** phlebitis at IV site , tissue necrosis. **Metab:** hyperuricemia. **Misc:** hypersensitivity reactions.

Interactions

Drug-Drug: ↑ bone marrow depression with other **antineoplastics** or **radiation therapy.** Pediatric patients who have received concurrent doxorubicin and **dactinomycin** have an ↑ risk of recall pneumonitis at variable times following local radiation therapy. May ↑ skin reactions at previous **radiation therapy** sites. If **paclitaxel** is administered first, clearance of doxorubicin is ↓ and the incidence and severity of neutropenia and stomatitis are ↑ (problem is diminished if doxorubicin is administered first). Hematologic toxicity is ↑ and prolonged by concurrent use of **cyclosporine**; risk of coma and seizures is also ↑ . Incidence and severity of neutropenia and thrombocytopenia are ↑ by concurrent **progesterone**. **Phenobarbital** may ↑ clearance and decrease effects of doxorubicin. Doxorubicin may ↓ metabolism and ↑ effects of **phenytoin**. **Streptozocin** may ↑ the half-life of doxorubicin (dosage ↓ of doxorubicin recommended). May ↑ risk of hemorrhagic cystitis from **cyclophosphamide** or hepatitis from **mercaptopurine**. Cardiac toxicity may be ↑ by **radiation therapy** or **cyclophosphamide**. May ↓ antibody response to **live-virus vaccines** and ↑ risk of adverse reactions.

♣ = Canadian drug name.

*CAPITALS indicates life-threatening, underlines indicate most frequent.

NURSING IMPLICATIONS

Assessment

- Monitor BP and pulse rate before and during initial therapy.
- **Depression:** Assess mental status frequently. Confusion, agitation, and hallucinations may occur during initiation of therapy and may necessitate dosage reduction. Monitor mood changes. Assess for suicidal tendencies, especially during early therapy. Restrict amount of drug available to patient.
- **Pain:** Assess type, location, and severity of pain before and periodically throughout therapy.
- ***Lab Test Considerations:*** Assess WBC and differential blood counts, hepatic function, and serum glucose periodically. May cause elevated serum bilirubin and alkaline phosphatase levels. May cause bone marrow depression. Serum glucose level may be increased or decreased.

Potential Nursing Diagnoses

Ineffective coping (Indications)
Risk for injury (Side Effects)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- Do not confuse doxepin with doxycycline.
- May be given as a single dose at bedtime to minimize sedation during the day. Dose increases should be made at bedtime because of sedation. Dose titration is a slow process; may take weeks to months.
- **PO:** Administer medication with or after a meal to minimize gastric irritation. Capsules may be opened and mixed with food or fluids.
- Oral concentrate must be diluted in at least 120 ml of water, milk, or fruit juice. Do not mix with carbonated beverages or grape juice.

Patient/Family Teaching

- Instruct patient to take as directed. Do not skip or double missed doses. Inform patient that at least 2 wk are needed before drug effects are noticed. Stopping abruptly may cause nausea, headache, and malaise.
- May cause drowsiness and blurred vision. Caution patient to avoid driving and other activities requiring alertness until response to the drug is known.
- Orthostatic hypotension, sedation, and confusion are common during early therapy, especially in geriatric persons. Protect patient from falls and advise patient to change positions slowly.
- Advise patient to avoid alcohol and other CNS depressant drugs during and for at least 3–7 days after therapy has been discontinued.
- Advise patient to notify health care professional if urinary retention occurs or if dry mouth or constipation persists. Frequent rinses, good oral hygiene, and sugarless hard candy or gum may diminish dry mouth. An increase in fluid intake, fiber, and exercise may prevent constipation. If these symptoms persist, dosage reduction or discontinuation may be necessary.
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- Caution patient to use sunscreen and protective clothing to prevent photosensitivity reactions.
- Inform patient of need to monitor dietary intake; increase in appetite is possible and may lead to undesired weight gain.
- Therapy for depression is usually prolonged. Emphasize the importance of follow-up exams to monitor effectiveness and side effects.

Evaluation/Desired Outcomes

- Increased sense of well-being.
- Renewed interest in surroundings.
- Increased appetite.
- Improved energy level.
- Improved sleep.
- Decrease in anxiety.
- Decrease in chronic pain. Patients may require 2–6 wk of oral therapy before full therapeutic effects of medication are evident.

Why was this drug prescribed for your patient?

Route/Dosage

IV (Adults): 60–75 mg/m² daily, repeat q 21 days; or 25–30 mg/m² daily for 2–3 days, repeat q 3–4 wk or 20 mg/m²/wk. Total cumulative dose should not exceed 550 mg/m² without monitoring of cardiac function or 400 mg/m² in patients with previous chest radiation or other cardiotoxic chemotherapy.

IV (Children): 35–75 mg/m² as a single dose, repeat q 21 days, or 20–30 mg/m² once weekly, or 60–90 mg/m² given as a continuous infusion over 96 hours every 3–4 wk.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure, pulse, respiratory rate, and temperature frequently during administration. Report significant changes.
- Monitor for bone marrow depression. Assess for bleeding (bleeding gums, bruising, petechiae, guaiac stools, urine, and emesis) and avoid IM injections and taking rectal temperatures if platelet count is low. Apply pressure to venipuncture sites for 10 min. Assess for signs of infection during neutropenia. Anemia may occur. Monitor for increased fatigue, dyspnea, and orthostatic hypotension.
- Monitor intake and output ratios, and report occurrence of significant discrepancies. Encourage fluid intake of 2000–3000 ml/day. Allopurinol and alkalinization of the urine may be used to decrease serum uric acid levels and to help prevent urate stone formation.
- Severe and protracted nausea and vomiting may occur as early as 1 hr after therapy and may last 24 hr. Administer parenteral antiemetics 30–45 min prior to therapy and routinely around the clock for the next 24 hr as indicated. Monitor amount of emesis and notify physician or other health care professional if emesis exceeds guidelines to prevent dehydration.
- **Monitor for development of signs of cardiac toxicity, which may be either acute and transient (ST segment depression, flattened T wave, sinus tachycardia, and extrasystoles) or late onset (usually occurs 1–6 mo after initiation of therapy) and characterized by intractable CHF (peripheral edema, dyspnea, rales/crackles, weight gain). Chest x-ray, echocardiography, ECGs, and radionuclide angiography may be ordered prior to and periodically during therapy. Cardiotoxicity is more prevalent in children younger than 2 yr and geriatric patients. Dexrazoxane may be used to prevent cardiotoxicity in patients receiving cumulative doses of >300 mg/m².**
- Assess injection site frequently for redness, irritation, or inflammation. Doxorubicin is a vesicant but may infiltrate painlessly even if blood returns on aspiration of infusion needle. Severe tissue damage may occur if doxorubicin extravasates. If extravasation occurs, stop infusion immediately, restart, and complete dose in another vein. Local infiltration of antidote is not recommended. Apply ice packs and elevate and rest extremity for 24–48 hr to reduce swelling, then resume normal activity as tolerated. If swelling, redness, and/or pain persists beyond 48 hr, immediate consultation for possible debridement is indicated.
- Assess oral mucosa frequently for development of stomatitis. Increased dosing interval and/or decreased dosing is recommended if lesions are painful or interfere with nutrition.
- ***Lab Test Considerations:*** Monitor CBC and differential prior to and periodically during therapy. The WBC nadir occurs 10–14 days after administration, and recovery usually occurs by the 21st day. Thrombocytopenia and anemia may also occur. Increased dosing interval and/or decreased dose is recommended if ANC is <1000 cells/mm³ and/or platelet count is <50,000 cells/mm³.
- Monitor renal (BUN and creatinine) and hepatic (AST, ALT, LDH, and serum bilirubin) function prior to and periodically during therapy. Dose reduction is required for bilirubin >1.2 mg/dl or serum creatinine >3 mg/dl.
- May cause ↑ serum and urine uric acid concentrations.

Potential Nursing Diagnoses

Risk for infection (Adverse Reactions)

CONTINUED

CONTINUED

doxorubicin hydrochloride

Decreased cardiac output (Adverse Reactions)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- ***High Alert:*** Fatalities have occurred with incorrect administration of chemotherapeutic agents. Before administering, clarify all ambiguous orders; double check single, daily, and course-of-therapy dose limits; have second practitioner independently double check original order, calculations and infusion pump settings. Do not confuse doxorubicin hydrochloride (Adriamycin, Rubex) with doxorubicin hydrochloride liposome (Doxil) or with daunorubicin hydrochloride (Cerubidine) or daunorubicin citrate liposome (DaunoXome) or with idarubicin. Do not confuse adriamycin with idamycin. Clarify orders that do not include generic and brand names.
- Solution should be prepared in a biologic cabinet. Wear gloves, gown, and mask while handling medication. Discard IV equipment in specially designated containers.
- Aluminum needles may be used to administer doxorubicin but should not be used during storage, because prolonged contact results in discoloration of solution and formation of a dark precipitate. Solution is red.
- **Direct IV:** Dilute each 10 mg with 5 ml of 0.9% NaCl (nonbacteriostatic) for injection. Shake to dissolve completely. Do not add to IV solution. Reconstituted medication is stable for 24 hr at room temperature and 48 hr if refrigerated. Protect from sunlight. ***Rate:*** Administer each dose over 3–5 minutes through Y-site of a free-flowing infusion of 0.9% NaCl or D5W. Facial flushing and erythema along involved vein frequently occur when administration is too rapid.
- **Syringe Compatibility:** bleomycin, cisplatin, cyclophosphamide, droperidol, leucovorin calcium, methotrexate, metoclopramide, mitomycin, vincristine.
- **Syringe Incompatibility:** furosemide, heparin.
- **Y-Site Compatibility:** amifostine, aztreonam, bleomycin, chlorpromazine, cimetidine, cisplatin, cladribine, cyclophosphamide, dexamethasone, diphenhydramine, droperidol, etoposide phosphate, famotidine, filgrastim, fludarabine, fluorouracil, gatifloxacin, gemcitabine, granisetron, hydromorphone, leucovorin calcium, linezolid, lorazepam, lorazepam, melphalan, methotrexate, methylprednisolone, metoclopramide, mitomycin, morphine, ondansetron, paclitaxel, prochlorperazine edisylate, promethazine, ranitidine, sargramostim, sodium bicarbonate, teniposide, thiotepa, topotecan, vinblastine, vincristine, vinorelbine.
- **Y-Site Incompatibility:** allopurinol, amphotericin B cholesteryl sulfate, cefepime, ganciclovir, piperacillin/tazobactam, propofol.

Patient/Family Teaching

- Instruct patient to notify health care professional promptly if fever; sore throat; signs of infection; bleeding gums; bruising; petechiae; blood in stools, urine, or emesis; increased fatigue; dyspnea; or orthostatic hypotension occurs. Caution patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor and to avoid falls. Caution patient not to drink alcoholic beverages or take medication containing aspirin or NSAIDs, because these may precipitate gastric bleeding.
- Instruct patient to report pain at injection site immediately.
- Instruct patient to inspect oral mucosa for erythema and ulceration. If ulceration occurs, advise patient to use sponge brush, rinse mouth with water after eating and drinking, and confer with health care professional if mouth pain interferes with eating. Pain may require treatment with opioid

drotrecogin (dro-tre-**coe**-gin)

Xigris

Classification

Therapeutic: anti-infectives
Pharmacologic: activated protein C, human

Pregnancy Category C

Indications

To reduce mortality in adult patients with sepsis.

Action

Probably acts by suppressing widespread inflammation associated with sepsis. **Therapeutic Effects:** Decrease mortality due to sepsis.

Pharmacokinetics

Absorption: IV administration results in complete bioavailability.
Distribution: Unknown.
Metabolism and Excretion: Unknown.
Half-life: Unknown.

TIME/ACTION PROFILE (activity)

	ONSET	PEAK	DURATION
IV	unknown	end of infusion	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Patients with a high risk of bleeding, including those with active internal bleeding, recent (within 3 months) stroke, recent (within 2 months) intracranial or intraspinal injury or severe head trauma, any trauma associated with an increased risk of life-threatening bleeding, presence of an epidural catheter, intracranial neoplasm/mass lesion/cerebral herniation Patients not expected to survive due to pre-existing medical condition(s). HIV-positive patients with CD-4 cell counts ≤ 50/mm^3. Chronic dialysis patients. Patients who have undergone bone marrow, lung, liver, pancreas or small bowel transplantation. Lactation.
Use Cautiously in: Concurrent therapeutic heparin therapy (≥15 units/kg/hr), recent (within 3 days) thrombolytic therapy, recent (within 7 days) oral anticoagulants or glycoprotein IIb/IIIa inhibitors, recent (within 7 days) aspirin therapy >650 mg/day or other platelet inhibitors; Platelet count <30,000 x 10^6/L; Prothrombin time - INR >3.0; Recent (within 6 wk) GI bleeding; Recent (within 3 mos) ischemic stroke; Intracranial arteriovenous malformation or aneurysm; Known bleeding diathesis; Chronic severe hepatic disease; Any other serious bleeding risk; Surgical procedures (discontinue 2 hr before; resume 12 hr after if hemostasis is achieved); Pregnancy (use only if clearly needed); Children (safety not established).

Adverse Reactions/Side Effects

Hemat: BLEEDING.

Interactions

Drug-Drug: Risk of serious bleeding may be increased by **antiplatelet agents**, **anticoagulants**, **thrombolytic agents**, or **other agents that may affect coagulation**.
Drug-Natural Products: Risk of bleeding may be increased by **arnica, chamomile, clove, dong quai, feverfew, garlic, ginger, gingko, Panax ginseng** and others.

Route/Dosage

IV (Adults): 24 mcg/kg/hr for 96 hr.

NURSING IMPLICATIONS

Assessment

- Assess patient for signs of bleeding and hemorrhage (bleeding gums; nosebleed; unusual bruising; tarry, black stools; hematuria; fall in hematocrit or blood pressure; guaiac-positive stools, urine, or nasogastric aspirate) throughout therapy. If clinically important bleeding occurs, stop

analgesics. The risk of developing stomatitis is greatest 5–10 days after a dose; the usual duration is 3–7 days.
- Advise patient that this medication may have teratogenic effects. Contraception should be used during and for at least 4 mo after therapy is concluded. Inform patient before initiating therapy that this medication may cause irreversible gonadal suppression.
- Instruct patient to notify health care professional immediately if irregular heartbeat, shortness of breath, swelling of lower extremities, or skin irritation (swelling, pain, or redness of feet or hands) occurs.
- Discuss the possibility of hair loss with patient. Explore methods of coping. Regrowth usually occurs 2–3 mo after discontinuation of therapy.
- Instruct patient not to receive any vaccinations without advice of health care professional.
- Inform patient that medication may cause urine to appear red for 1–2 days.
- Instruct patient to notify health care professional if skin irritation occurs at site of previous radiation therapy.
- Advise family and/or caregivers to take precautions (i.e., latex gloves) in handling body fluids for at least 5 days posttreatment.
- Emphasize the need for periodic lab tests to monitor for side effects.

Evaluation/Desired Outcomes

- Decrease in size or spread of malignancies in solid tumors.
- Improvement of hematologic status in leukemias.

Why was this drug prescribed for your patient?

drotrecogin infusion immediately. Assess other agents used that may affect coagulation. Once hemostasis is achieved, reinstitution of drotrecogin may be reconsidered.
- Assess patient for infection (vital signs; appearance of wound, sputum, urine, and stool; WBC) at beginning of and throughout therapy.
- ***Lab Test Considerations:*** Most patients with severe sepsis have coagulopathy prolonging activated partial thromboplastin time (aPTT) and prothrombin time (PT). Drotrecogin may also affect aPTT, but has minimal effect on PT. Use PT to monitor coagulation status of patients receiving drotrecogin.

Potential Nursing Diagnoses

Ineffective tissue perfusion, impaired (Indications)

Implementation

- Drotrecogin should be discontinued 2 hr prior to invasive surgical procedures or procedures with a risk of bleeding. Once hemostasis is achieved, drotrecogin may be started 12 hr after the procedure.
- **Intermittent Infusion:** Calculate dose and number of 5-mg or 20-mg vials needed (vials contain excess to facilitate delivery. Reconstitute 5-mg vials with 2.5 ml and 20-mg vials with 10 ml sterile water for injection for a concentration of 2 mg/ml. Add sterile water slowly to vial; avoid inverting or shaking. Gently swirl until powder is completely dissolved. Reconstituted solution must be diluted further with 0.9% NaCl for a concentration of 100–200 mcg/ml if using an infusion pump or a concentration of 100–1000 mcg/ml if using a syringe pump. Withdraw amount of reconstituted solution needed from vial and add to infusion bag of 0.9% NaCl; direct stream to side of the bag to avoid agitating solution. Gently invert bag to mix. Reconstituted solution must be used within 3 hr and IV administration must be completed within 14 hr of preparation of IV solution. Do not administer if discolored or contains particulate matter. If infusion is interrupted, restart at initial infusion rate and continue to complete recommended infusion. ***Rate:*** Administer at a rate of 24 mcg/kg/hr for 96 hr. Do not use bolus dosing or dose escalation.
- **Y-Site Incompatibility:** Administer via a dedicated IV line or a dedicated lumen of a multilumen central venous catheter.
- **Solution Compatibility:** May be administered only with 0.9% NaCl, LR, dextrose or dextrose and saline mixtures.

Patient/Family Teaching

- Explain purpose of medication to patient.

Evaluation/Desired Outcomes

- Reduction of mortality in adult patients with severe sepsis.

Why was this drug prescribed for your patient?

duloxetine (do-lox-e-teen)

Cymbalta

Classification

Therapeutic: antidepressants
Pharmacologic: selective serotonin and norepinephrine reuptake inhibitors—SSNRIs

Pregnancy Category C

Indications

Major depressive disorder, in conjunction with psychotherapy. Management of diabetic neuropathic pain.

Action

Inhibits serotonin and norepinephrine reuptake in the CNS. Both antidepressant and pain inhibition are centrally mediated. **Therapeutic Effects:** Decreased depressive symptomatology. Decreased neuropathic pain.

Pharmacokinetics

Absorption: Well absorbed following oral administration.
Distribution: Unknown.
Protein Binding: Highly (>90%) protein-bound.
Metabolism and Excretion: Mostly metabolized, primarily by the CYP2D6 and CYP1A2 enzyme pathways.
Half-life: 12 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	6 hr	12 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Concurrent MAO inhibitor therapy. Uncontrolled narrow-angle glaucoma. End stage renal disease. Chronic hepatic impairment or substantial alcohol use (increased risk of hepatitis). Lactation.

Use Cautiously in: History of suicide attempt or ideation; History of mania (may activate mania/hypomania); Concurrent use of other centrally-acting drugs (↑ risk of adverse reactions); History of seizure disorder; Controlled narrow-angle glaucoma; Diabetic patients and those with renal impairment (consider lower initial dose with gradual increase); Use during third trimester may result in neonatal serotonin syndrome requiring prolonged hospitalization, respiratory and nutritional support; May ↑ risk of suicide attempt/ideation especially during dose early treatment or dose adjustment; risk may be greater in children or adolescents (safe use in children/adolescents not established).

Adverse Reactions/Side Effects

CNS: SEIZURES, fatigue, drowsiness, insomnia, activation of mania, dizziness, nightmares. **EENT:** blurred vision, ↑ intraocular pressure. **CV:** ↑ blood pressure. **GI:** ↓ appetite, constipation, dry mouth, nausea, diarrhea, ↑ liver enzymes, gastritis, hepatitis, vomiting. **GU:** dysuria, abnormal orgasm, erectile dysfunction, ↓ libido, urinary hesitation. **Derm:** ↑ sweating, pruritus, rash. **Neuro:** tremor.

Interactions

Drug-Drug: Concurrent use with **MAO inhibitors** may result in serious potentially fatal reactions (do not use within 14 days of discontinuing MAOI, wait at least 5 days after stopping duloxetine to start MAOI). ↑ risk of hepatotoxicity with chronic **alcohol** abuse. **Drugs that inhibit CYP1A2**, including **fluvoxamine** and some **fluoroquinolones** ↑ levels of duloxetine and should be avoided. **Drugs that inhibit CYP2D6**, including **paroxetine**, **fluoxetine** and **quinidine** ↑ levels of duloxetine and may increase the risk of adverse reactions. Duloxetine also inhibits CYP2D6 and may ↑ levels of drugs metabolized by CYP2D6, including **tricyclic antidepressants**, **phenothiazines** and **class 1C antiarrhythmics** (**propafenone** and **flecainide**); concurrent use should be undertaken with caution. ↑ risk of serious arrhythmias with **thioridazine**; avoid concurrent use.

dutasteride (doo-tas-te-ride)

Avodart

Classification

Therapeutic: benign prostatic hyperplasia (BPH) agents
Pharmacologic: androgen inhibitors

Pregnancy Category X

Indications

Management of the symptoms of benign prostatic hyperplasia (BPH) in men with an enlarged prostate gland.

Action

Inhibits the enzyme 5-alpha-reductase, which is responsible for converting testosterone to its potent metabolite 5-alpha-dihydrotestosterone in the prostate gland and other tissues. 5-Alpha-dihydrotestosterone is partly responsible for prostatic hyperplasia. **Therapeutic Effects:** Reduced prostate size with associated decrease in urinary symptoms.

Pharmacokinetics

Absorption: Well absorbed (60%) following oral administration; also absorbed through skin.
Distribution: 11.5% of serum concentration partitions into semen.
Protein Binding: 99% bound to albumin; 96.6 % bound to alpha-1 glycoprotein.
Metabolism and Excretion: Mostly metabolized by the liver via the CYP 3A4 metabolic pathway; metabolites are excreted in feces.
Half-life: 5 wk.

TIME/ACTION PROFILE (reduction in dihydrotestosterone levels†)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	1-2 wk	unknown

†Symptoms may only improve over 3–12 mo

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with other 5-alpha-reductase inhibitors may occur. Women. Children.
Use Cautiously in: Hepatic impairment.

Adverse Reactions/Side Effects

GU: decreased libido, ejaculation disorders, impotence. **Endo:** gynecomastia.

Interactions

Drug-Drug: Blood levels and effects may be increased by **ritonavir**, **ketoconazole**, **verapamil**, **diltiazem**, **cimetidine**, **ciprofloxacin**, or other **CYP 3A4 enzyme inhibitors**.

Route/Dosage

PO (Adults): 0.5 mg once daily.

NURSING IMPLICATIONS

Assessment

- Assess patient for symptoms of prostatic hypertrophy (urinary hesitancy, feeling of incomplete bladder emptying, interruption of urinary stream, impairment of size and force of urinary stream, terminal urinary dribbling, straining to start flow, dysuria, urgency) before and periodically throughout therapy.
- Digital rectal examinations should be performed before and periodically throughout therapy for BPH.
- ***Lab Test Considerations:*** Serum prostate-specific antigen (PSA) concentrations, which are used to screen for prostate cancer, decrease by about 20% within the 1st mo of therapy and stabilize at about 50% of the pretreatment level within 6 mo. New baseline PSA concentrations should be established at 3 and 6 mo of therapy and evaluated periodically throughout therapy.

Potential Nursing Diagnoses

Impaired urinary elimination (Indications)

Route/Dosage

PO (Adults): *Antidepressant*—20–30 mg twice daily; *for neuropathic pain*—60 mg once daily

Renal Impairment

PO (Adults): start with lower dose and increase gradually.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure before and periodically during therapy. Sustained hypertension may be dose related; decrease dose or discontinue therapy if this occurs.
- Monitor appetite and nutritional intake. Weigh weekly. Report continued weight loss. Adjust diet as tolerated to support nutritional status.
- **Depression:** Assess mental status and mood changes. Inform physician or other health care professional if patient demonstrates significant increase in anxiety, nervousness, or insomnia.
- Assess suicidal tendencies in both adults and children, especially in early therapy or during dose changes. Restrict amount of drug available to patient.
- **Pain:** Assess intensity, quality, and location of pain periodically during therapy. May require several weeks for effects to be seen.
- ***Lab Test Considerations:*** May cause ↑ ALT, AST, bilirubin, CPK, and alkaline phosphatase.

Potential Nursing Diagnoses

Ineffective coping (Indications)
Risk for suicide (Adverse Reactions)

Implementation

- **PO:** May be administered without regard to meals. Capsules should be swallowed whole. **Do not crush, chew, or open and sprinkle contents on food or liquids;** may effect enteric coating.

Patient/Family Teaching

- Instruct patient to take duloxetine as directed at the same time each day. Take missed doses as soon as possible unless time for next dose. Do not stop abruptly; must be decreased gradually.
- Encourage patient and family to be alert for emergence of anxiety, agitation, panic attacks, insomnia, irritability, hostility, impulsivity, akathisia, hypomania, mania, worsening of depression and suicidal ideation, especially during early antidepressant therapy. If these symptoms occur, notify health care professional.
- May cause drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to consult health care professional prior to taking any Rx, OTC, or herbal products.
- Instruct patient to notify health care professional if signs of liver damage (pruritus, dark urine, jaundice, right upper quadrant tenderness, unexplained "flu-like" symptoms) occur.
- Advise patient to avoid taking alcohol during duloxetine therapy.
- Instruct patient to notify health care professional if pregnancy is planned or suspected or if breastfeeding.

Evaluation/Desired Outcomes

- Increased sense of well-being
- Renewed interest in surroundings. Need for therapy should be periodically reassessed. Patients may notice improvement within 1–4 wks, but should be advised to continue therapy as directed. Therapy is usually continued for several months.
- Decrease in neuropathic pain associated with diabetic peripheral neuropathy.

Why was this drug prescribed for your patient?

Implementation

- **PO:** Administer once daily with or without meals. **Do not crush, break, or chew capsule.**

Patient/Family Teaching

- Instruct patient to take dutasteride at the same time each day as directed, even if symptoms improve or are unchanged. If a dose is missed, take as soon as remembered later in the day or omit dose. Do not make up by taking double doses the next day.
- Caution patient that sharing of dutasteride may be dangerous.
- Inform patient that the volume of ejaculate may be decreased during therapy but that this will not interfere with normal sexual function.
- Caution patient that dutasteride poses a potential risk to a male fetus. Women who are pregnant or may become pregnant should avoid exposure to semen of a partner taking dutasteride and should not handle dutasteride because of the potential for absorption.
- Advise patient to avoid donating blood for at least 6 mo after last dose of dutasteride to prevent a pregnant female from receiving dutasteride through a blood transfusion.
- Emphasize the importance of periodic follow-up exams to determine whether a clinical response has occurred.

Evaluation/Desired Outcomes

- Decrease in urinary symptoms of BPH.

Why was this drug prescribed for your patient?