piperacillin/tazobactam (pi-**per**-a-sill-in/tay-zoe-**bak**-tam)
Zosyn

piperacillin (pi-**per**-a-sill-in)
Pipracil

Classification
Therapeutic: anti-infectives
Pharmacologic: extended spectrum penicillins

Pregnancy Category B

Indications
Piperacillin: Treatment of serious infections due to susceptible organisms, including Skin and skin structure infections, Bone and joint infections, Septicemia, Respiratory tract infections, Intra-abdominal infections, Gynecologic and urinary tract infections. Combination with an aminoglycoside may be synergistic against *Pseudomonas*. Has been combined with other antibiotics in the treatment of infections in immunosuppressed patients. Perioperative prophylactic anti-infective in abdominal, genitourinary, and head and neck surgery. **Piperacillin/Tazobactam:** Appendicitis, Skin and skin structure infections, Gynecologic infections, Pneumonia caused by piperacillin-resistant, beta-lactamase–producing bacteria, including community-acquired pneumonia.

Action
Piperacillin: Binds to bacterial cell wall membrane, causing cell death. Spectrum is extended compared with other penicillins. **Tazobactam:** Inhibits beta-lactamase, an enzyme that can destroy penicillins. **Therapeutic Effects:** Death of susceptible bacteria. **Spectrum: Piperacillin:** Spectrum similar to penicillin but greatly extended, including several important gram-negative aerobic pathogens, notably: *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus mirabilis*, *Providencia rettgeri*, *Neisseria gonorrhoeae*. Also active against some anaerobic bacteria, including: *Bacteroides*. Not active against penicillinase-producing staphylococci or beta-lactamase–producing: Enterobacteriaceae **Piperacillin/Tazobactam:** Active against piperacillin-resistant, beta-lactamase–producing: *Bacteroides fragilis*, *E. coli*, *Staphylococcus aureus*, *Haemophilus influenzae*.

Pharmacokinetics
Absorption: Piperacillin is well absorbed (80%) from IM sites.
Distribution: Widely distributed. Enter CSF well only when meninges are inflamed. Cross the placenta and enter breast milk in low concentrations.
Metabolism and Excretion: Piperacillin is mostly (90%) excreted unchanged by the kidneys; 10% excreted in bile. Piperacillin/tazobactam is 80% renally excreted.
Half-life: 0.7–1.2 hr.

TIME/ACTION PROFILE (piperacillin blood levels)

ROUTE	ONSET	PEAK	DURATION
IM	rapid	30–50 min	4–6 hr
IV	rapid	end of infusion	4–6 hr

Contraindications/Precautions
Contraindicated in: Hypersensitivity to penicillins, betalactams, cephalosporins, or tazobactam (cross-sensitivity may occur).
Use Cautiously in: Renal impairment (dosage reduction or increased interval recommended if CCr <40 ml/min); Sodium restriction; Pregnancy and lactation (safety not established).

Adverse Reactions/Side Effects
CNS: SEIZURES (higher doses) , confusion, lethargy. **CV:** arrhythmias, CHF. **GI:** PSEUDOMEMBRANOUS COLITIS, diarrhea, drug-induced hepatitis, nausea. **GU:** hematuria (children only), interstitial nephritis. **Derm:** rashes (↑ in cystic fibrosis patients), urticaria. **F and E:** hypokalemia, hypernatremia.

CONTINUED

piperacillin

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

Implementation
- **Do not confuse Zosyn (piperacillin/tazobactam) with Zofran (ondansetron).**
- **IM:** To constitute, add 4 ml of sterile water, bacteriostatic water, 0.9% NaCl for injection, or 0.5 or 1% lidocaine (without epinephrine) to each 2-g vial, 6 ml to each 3-g vial, and 8 ml to each 4-g vial for a concentration of 1g/2.5 ml.

Piperacillin
- **IV:** Reconstitute with at least 5 ml of sterile water for injection, 0.9% NaCl, or bacteriostatic water. Shake well until dissolved. Solution is stable for 24 hr at room temperature and 7 days if refrigerated.
- Change IV sites every 48 hr to prevent phlebitis.
- **Direct IV:** Inject slowly, over 3–5 min, to minimize vein irritation.
- **Intermittent Infusion:** Dilute in at least 50 ml of 0.9% NaCl, D5W, D5/0.9% NaCl, or LR. ***Rate:*** Administer over 20–30 min for adults and 30 min for children.

Piperacillin/Tazobactam
- **Intermittent Infusion:** Reconstitute with 5 ml of 0.9% NaCl, sterile or bacteriostatic water for injection, or D5W. Do not use LR—incompatible. Shake well until dissolved. Dilute further in at least 50 ml of diluent. Discard any unused solution after 24 hr at room temperature or 48 hr if refrigerated. ***Rate:*** Administer over at least 30 min.

Patient/Family Teaching
- Advise patient to report signs of superinfection (black furry overgrowth on tongue, vaginal itching or discharge, loose or foul-smelling stools) and allergy.
- Caution patient to notify health care professional if fever and diarrhea occur, especially if stool contains blood, pus, or mucus. Advise patient not to treat diarrhea without consulting health care professional. May occur up to several weeks after discontinuation of medication.

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?

Hemat: bleeding, leukopenia, neutropenia. **Local:** pain at IM site, phlebitis at IV site. **Metab:** metabolic alkalosis. **Misc:** hypersensitivity reactions, including ANAPHYLAXIS and SERUM SICKNESS, fever (↑ in cystic fibrosis patients), superinfection.

Interactions

Drug-Drug: Probenecid ↓ renal excretion and ↑ blood levels. May alter excretion of **lithium**. **Potassium-losing diuretics, corticosteroids,** or **amphotericin B** may ↑ risk of hypokalemia. ↑ risk of hepatotoxicity with other **hepatotoxic agents**. May ↓ half-life of **aminoglycosides** in patients with renal impairment. May ↑ levels and risk of toxicity from **methotrexate**.

Route/Dosage

Contains 1.85 mEq sodium/g of piperacillin.

Piperacillin

IM, IV (Adults): *Most infections*—3–4 g q 4–6 hr (up to 24 g/day). *Complicated urinary tract infections*—3–4 g q 6–8 hr. *Uncomplicated urinary tract infections*—1.5–2 g q 6 hr *or* 3–4 g q 12 hr.
IM, IV (Neonates ≥2 kg): *Meningitis*—50 mg/kg q 8 hr for the first 7 days of life, then 50 mg/kg q 6 hr.
IM, IV (Neonates <2 kg): *Meningitis*—50 mg/kg q 12 hr for the first 7 days of life, then 50 mg/kg q 8 hr.

Renal Impairment

IM, IV (Adults): *CCr 20–40 ml/min*—3–4 g q 8 hr; *CCr <20 ml/min*—3– 4 g q 12 hr.

Piperacillin/Tazobactam

(dose expressed as combined piperacillin tazobactam content).
IV (Adults): 3.375–4.5 g q 6 hr.

Renal Impairment

IV (Adults): *CCr 20–40 ml/min*—2.25–3.375 g q 6 hr; *CCr <20 ml/min*—2.25 g q 6–8 hr.

NURSING IMPLICATIONS

Assessment

- Assess patient for infection (vital signs; appearance of wound, sputum, urine, and stool; WBC) at beginning of and during therapy.
- Obtain a history before initiating therapy to determine previous use of and reactions to penicillins or cephalosporins. Persons with a negative history of penicillin sensitivity may still have an allergic response.
- Obtain specimens for culture and sensitivity prior to initiating therapy. First dose may be given before receiving results.
- **Observe patient for signs and symptoms of anaphylaxis (rash, pruritus, laryngeal edema, wheezing). Discontinue the drug and notify the physician or other health care professional immediately if these occur. Keep epinephrine, an antihistamine, and resuscitation equipment close by in the event of an anaphylactic reaction.**
- ***Lab Test Considerations:*** Evaluate renal and hepatic function, CBC, serum potassium, and bleeding times prior to and routinely during therapy.
- May cause positive direct Coombs' test result.
- May cause ↑ BUN, creatinine, AST, ALT, serum bilirubin, alkaline phosphatase, and LDH.
- May cause leukopenia and neutropenia, especially with prolonged therapy or hepatic impairment.
- May cause prolonged prothrombin and partial thromboplastin time.
- *Piperacillin* may cause ↑ serum sodium and ↓ serum potassium concentrations.
- *Piperacillin/tazobactam* may also cause ↓ hemoglobin and hematocrit and thrombocytopenia, eosinophilia, leukopenia, and neutropenia. It also may cause proteinuria; hematuria; pyuria; hyperglycemia; ↓ total protein or albumin; and abnormalities in sodium, potassium, and calcium levels.

CONTINUED

High Alert

POTASSIUM SUPPLEMENTS (poe-**tass**-ee-um)

potassium chloride (poe-**tass**-ee-um/**klor**-ide)

♣Apo-K, Cena-K, Gen-K, K+ Care, K+ 10, ♣Kalium Durules, Kaochlor, Kaochlor S-F, Kaon-Cl, Kay Ciel, KCl, K-Dur, K-Lease, ♣K-Long, K-Lor, Klor-Con, Klorvess Liquid, Klotrix, K-Lyte/Cl Powder, K-Med, K-Norm, K-Sol, K-Tab, Micro-K, Micro-K, Micro-LS, Potasalan, Roychlor, Rum-K, Slow-K, Ten-K

potassium gluconate

Kaon, Kaylixir, K-G Elixir, ♣Potassium-Rougier

Classification

Therapeutic: mineral and electrolyte replacements/supplements

Pregnancy Category C

Indications

PO, IV: Treatment/prevention of potassium depletion. **IV:** Arrhythmias due to digoxin toxicity.

Action

Maintain acid-base balance, isotonicity, and electrophysiologic balance of the cell. Required for transmission of nerve impulses; contraction of cardiac, skeletal, and smooth muscle; gastric secretion; renal function; tissue synthesis; and carbohydrate metabolism. **Therapeutic Effects:** Replacement. Prevention of deficiency.

Pharmacokinetics

Absorption: Well absorbed following oral administration.
Distribution: Enters extracellular fluid; then is actively transported into cells.
Metabolism and Excretion: Excreted by the kidneys.
Half-life: Unknown.

TIME/ACTION PROFILE (increase in serum potassium levels)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	1–2 hr	unknown
IV	rapid	end of infusion	unknown

Contraindications/Precautions

Contraindicated in: Hyperkalemia. Severe renal impairment. Untreated Addison's disease. Severe tissue trauma. Hyperkalemic familial periodic paralysis. Some products may contain tartrazine or alcohol; avoid using in patients with hypersensitivity/intolerance.
Use Cautiously in: Cardiac disease; Renal impairment; Diabetes mellitus (liquids may contain sugar); Potassium acetate injection contains aluminum, which may become toxic with prolonged use to high risk groups (renal impairment, premature neonates); Hypomagnesemia; GI hypomotility (tablets, capsules).

Adverse Reactions/Side Effects

CNS: confusion, restlessness, weakness. **CV:** ARRHYTHMIAS, ECG changes. **GI:** abdominal pain, diarrhea, flatulence, nausea, vomiting; *tablets, capsules only*—GI ulceration, stenotic lesions. **Local:** irritation at IV site. **Neuro:** paralysis, paresthesia.

Interactions

Drug-Drug: Use with **potassium-sparing diuretics** or **ACE inhibitors** or **angiotensin II receptor antagonists** may lead to hyperkalemia. **Anticholinergics** may ↑ GI mucosal lesions in patients taking wax-matrix potassium chloride preparations.

Route/Dosage

Expressed as mEq of potassium. Potassium acetate contains 10.2 mEq/g; potassium bicarbonate contains 10 mEq potassium/g; potassium chloride contains 13.4 mEq potassium/g; potassium gluconate contains 4.3 mEq/g.
PO (Adults): *Prevention of deficiency*—20 mEq/day; *treatment of depletion*—40–100 mEq/day; single dose should not exceed 20 mEq.
PO (Children): 2–3 mEq/kg/day or 20–40 mEq/m²/day in divided doses.

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

CONTINUED

POTASSIUM SUPPLEMENTS

sea, vomiting, diarrhea, or stomach discomfort persists. Dosage may require adjustment.
- Emphasize the importance of follow-up exams to monitor serum levels.

Evaluation/Desired Outcomes

- Prevention and correction of serum potassium depletion.
- Cessation of arrhythmias caused by digoxin toxicity.

Why was this drug prescribed for your patient?

♣ = Canadian drug name.

* CAPITALS indicates life-threatening, underlines indicate most frequent

IV (Adults): *Serum potassium >2.5 mEq/L*—up to 200 mEq/day as an infusion (not to exceed 10 mEq/hr or 40 mEq/L via peripheral line (up to 100 mEq/L has been used via central line). *Serum potassium <2 mEq/L with symptoms*—up to 400 mEq/day as an infusion (not exceed 20 mEq/hr). **IV (Children):** up to 3 mEq/kg/day (40 mEq/m²/day) as an infusion.

NURSING IMPLICATIONS

Assessment

- Assess for signs and symptoms of hypokalemia (weakness, fatigue, U wave on ECG, arrhythmias, polyuria, polydipsia) and hyperkalemia (see Toxicity and Overdose).
- Monitor pulse, blood pressure, and ECG periodically during IV therapy.
- ***Lab Test Considerations:*** Monitor serum potassium before and periodically during therapy. Monitor renal function, serum bicarbonate, and pH. Determine serum magnesium level if patient has refractory hypokalemia; hypomagnesemia should be corrected to facilitate effectiveness of potassium replacement. Monitor serum chloride because hypochloremia may occur if replacing potassium without concurrent chloride.
- ***Toxicity and Overdose:*** **Symptoms of toxicity are those of hyperkalemia (slow, irregular heartbeat; fatigue; muscle weakness; paresthesia; confusion; dyspnea; peaked T waves; depressed ST segments; prolonged QT segments; widened QRS complexes; loss of P waves; and cardiac arrhythmias)** : Treatment includes discontinuation of potassium, administration of sodium bicarbonate to correct acidosis, dextrose and insulin to facilitate passage of potassium into cells, calcium salts to reverse ECG effects (in patients who are not receiving digoxin), sodium polystyrene used as an exchange resin, and/or dialysis for patient with impaired renal function.

Implementation

- ***High Alert:*** Medication errors involving IV administration of potassium chloride have resulted in fatalities. See IV administration guidelines below.
- **Do not confuse K-Dur with Imdur. Do not confuse Micro-K with micronase (glyburide).**
- If hypokalemia is due to diuretic therapy, consider decreasing diuretic dose, unless there is a history of arrhythmias or concurrent digitalis glycoside therapy.
- **PO:** Administer with or after meals to decrease GI irritation.
- Use of tablets and capsules should be reserved for patients who cannot tolerate liquid preparations.
- Dissolve effervescent tablets in 3–8 oz of cold water; ensure tablet is fully dissolved. Dilute powders and solutions in 3–8 oz of cold water or juice (do not use tomato juice if patient is on sodium restriction). Instruct patient to drink slowly over 5–10 min.
- Take tablets and capsules with a meal and full glass of water. **Do not chew or crush enteric-coated or extended-release tablets or capsules** Micro-K ExtenCaps capsules can be opened and sprinkled on soft food (pudding, applesauce) and swallowed immediately with water or juice.
- **IV:** Avoid extravasation; severe pain and tissue necrosis may occur.
- ***High Alert:*** Do not administer IV push or bolus.
- ***High Alert:*** Do not administer undiluted. Each single dose *must* be diluted and thoroughly mixed in 100–1000 ml of dextrose, saline, Ringer's or LR, or combinations. Usually limited to 40 mEq/L via peripheral line (100 mEq/L via central line). ***Rate: High Alert:*** Must be infused slowly. Check hospital policy for maximum infusion rates.

Patient/Family Teaching

- Explain need to take as directed (especially with concurrent digitalis glycosides or diuretics). Take missed doses as soon as remembered, if within 2 hr; if not, return to regular dose schedule.
- Some extended-release tablets are contained in a wax matrix that may be expelled in the stool. This occurrence is not significant.
- Instruct patient to avoid salt substitutes or low-salt milk or food unless approved by health care professional. Patient should be advised to read all labels to prevent excess potassium intake.
- Advise patient about sources of dietary potassium.
- Instruct patient to report dark, tarry, or bloody stools; weakness, unusual fatigue; or tingling of extremities. Notify health care professional if nau-

CONTINUED

High Alert

pramlintide (pram-lin-tide)

Symlin

Classification

Therapeutic: antidiabetics
Pharmacologic: hormones

Pregnancy Category C

Indications

Used with mealtime insulin in the management of diabetics whose blood sugar cannot be controlled by optimal insulin therapy; can be used with other agents (sulfonylureas, metformin).

Action

Acts as a synthetic analog of amylin, an endogenous pancreatic hormone that helps to control postprandial hyperglycemia; effects include slowed gastric emptying, suppression of glucagon secretion and regulation of food intake. **Therapeutic Effects:** Improved control of postprandial hyperglycemia.

Pharmacokinetics

Absorption: 30–40% absorbed following subcutaneous administration.
Distribution: Does not appear to significantly cross the placenta.
Metabolism and Excretion: metabolized by the kidneys; major metabolite has pharmacologic properties similar to the parent compound.
Half-life: 48 min.

TIME/ACTION PROFILE (effect on blood sugar)

ROUTE	ONSET	PEAK	DURATION
Subcut	rapid	20 min	3 hr

*Blood level

Contraindications/Precautions

Contraindicated in: Hypersensitivty. Inability to identify hypoglycemia. Gastroparesis or need for medications to stimulate gastric motility. Poor compliance with current insulin regimen or self-monitoring. HbA1c >9%. Recurring severe hypoglycemia within the last 6 mo, requiring treatment. Children.
Use Cautiously in: Pregnancy/lactation (use only if maternal benefit outweighs potential risks to fetus/newborn).

Adverse Reactions/Side Effects

Noted for concurrent use with insulin **CNS:** dizziness, fatigue, headache. **Resp:** cough. **GI:** nausea, abdominal pain, anorexia, vomiting. **Endo:** HYPOGLYCEMIA. **Derm:** local allergy. **MS:** arthralgia. **Misc:** systemic allergic reactions.

Interactions

Drug-Drug: ↑ likelihood of hypoglycemia with short-acting **insulin**; reduce dose of short-acting pre-meal insulin by 50%. Avoid concurrent use with other agents that ↓ GI motility, including **atropine** and other **anticholinergics**. Avoid concurrent use with other agents that ↓ GI absorption of nutrients, including **α-glucosidase inhibitors** including **acarbose** and **miglitol**. May delay oral absorption of concurrently administered drugs; if prompt absorption is desired, administer 1 hr before or 2 hr after pramlintide.

Route/Dosage

Insulin-using Type 2 Diabetes

Subcut: (Adults): 60 mcg, immediately prior to major meals initially, if no significant nausea occurs, dose may be increased to 120 mcg.

Type 1 Diabetes

Subcut: (Adults): 15 mcg, immediately prior to major meals initially, if no significant nausea occurs, dose may be increased by 15 mcg every 3 days up to 60 mcg.

pregabalin (pre-gab-a-lin)

Lyrica

Classification

Therapeutic: analgesics, anticonvulsants
Pharmacologic: gamma aminobutyric acid (GABA) analogues, nonopioid analgesics

Schedule V

Pregnancy Category C

Indications

Pain due to diabetic peripheral neuropathy, postherpetic neuralgia. Adjunctive therapy of partial-onset seizures in adults.

Action

Binds to calcium channels in CNS tissues which regulate neurotransmitter release. Does not bind to opioid receptors. **Therapeutic Effects:** Decreased neuropathic or post-herpetic pain. Decreased partial-onset seizures.

Pharmacokinetics

Absorption: Well absorbed (90%) following oral administration.
Distribution: Probably crosses the blood-brain barrier.
Metabolism and Excretion: Minimally metabolized, 90% excreted unchanged in urine.
Half-life: 6 hr.

TIME/ACTION PROFILE (decreasedpost–herpetic pain)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	2–4 wk	unknown

Contraindications/Precautions

Contraindicated in: Myopathy (known/suspected). Lactation.
Use Cautiously in: Renal impairment (dose alteration recommended for CCr <60 ml/min); Elderly patients (consider age-related decrease in renal function; CHF; History of drug dependence/drug-seekingbehavior; Children (safety not established); Use only if maternal benefit outweighs fetal risk; may also have ↑ risk of male-mediated teratogenicity).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, impaired attention/concentration/thinking. **CV:** edema. **EENT:** blurred vision. **GI:** dry mouth, abdominal pain, constipation, ↑ appetite, vomiting. **Hemat:** ↓ platelet count. **Metab:** weight gain. **Misc:** allergic reactions, fever.

Interactions

Drug-Drug: Concurrent use with **thiazolidinediones (pioglitazone, rosiglitazone)** may ↑ risk of fluid retention. ↑ risk of CNS depression with other **CNS depressants** including **opioids, alcohol, benzodiazepines**, or other **sedatives/hypnotics**.

Route/Dosage

PO (Adults): *Diabetic neuropathic pain*— 50 mg three times daily, increased over 7 days up to 100 mg three times daily; *partial onset seizures*—150 mg/day initially in 2–3 divided doses, may be gradually increased to 600 mg/day; *post-herpetic neuralgia*—75 mg twice daily or 50 mg three times daily initially, may be increased over 7 days to 300 mg/day in 2–3 divided doses, after 2–4 wk may be increased to 600 mg/day in 2–3 divided doses

Renal Impairment

PO (Adults): *CCr 30–60 ml/min*— 75–300 mg/day in 2–3 divided doses; *CCr 15–30 ml/min*— 25–150 mg/day in 1–2 divided doses; *CCr <15 ml/min*— 25–75 mg/day as a single daily dose.

NURSING IMPLICATIONS

Assessment

- Assess hemoglobin A1c, recent blood glucose monitoring data, history of insulin-induced hypoglycemia, current insulin regimen, and body weight prior to initiation of therapy.
- Assess for signs and symptoms of hypoglycemia (hunger, headache, sweating, tremor, irritability, difficulty concentrating, loss of consciousness, coma, seizure), occurs within 3 hr of injection. Pramlintide alone does not cause hypoglycemia, may increase risk when administered with insulin.
- ***Lab Test Considerations:*** Monitor blood glucose frequently, including pre- and post-meals and at bedtime.

Potential Nursing Diagnoses

Noncompliance (Patient/Family Teaching)

Implementation

- ***High Alert:*** Dose errors are a potential problem with administration of pramlintide. Pramlintide is available in a concentration of 0.6 mg/ml, dosing is in mcg, and insulin syringe for administration is in units. Carefully review dosing and conversion table prior to administration.
- Administer pramlintide and insulin as separate injections; do not mix.
- Adjust insulin doses to optimize glycemic control once target dose of pramlintide is achieved and nausea has subsided.
- **Subcut:** Administer immediately prior to major meals ≥250 kcal or containing ≥30 g of carbohydrate. Reduce preprandial rapid-acting, short-acting, and fixed-mix insulin doses by 50%. Use a U-100 syringe (preferably a 0.3 ml size) for optimal accuracy. Administer into abdomen or thigh, rotating injection sites. Do not administer solutions that are cloudy. Store unopened vials in refrigerator. Opened vials may be refrigerated or kept at room temperature for up to 28 days.

Patient/Family Teaching

- Instruct patient in proper use of pramlintide (injection technique, timing of doses, storage, and disposal of equipment). Make sure patient understands dosing and preparation of correct dose Emphasize importance of adherence to meal planning, physical activity, recognition and management of hypoglycemia and hyperglycemia, and assessment of diabetes complications. Advise patient to read the Medication Guide before use and with each refill for new information.
- Review with patient how to handle illness or stress, inadequate or omitted insulin dose, inadvertent administration of increased dose of insulin or pramlintide, inadequate food intake or missed meals. If a dose is missed, wait until the next meal and take usual dose; do not give an additional injection.
- Instruct patient to contact health care professional at least once a week until target dose of pramlintide is achieved, pramlintide is well-tolerated, and blood glucose concentrations are stable.
- May cause difficulty concentrating. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Inform patient that signs of local allergy (redness, swelling, itching at site of injection) usually resolve within a few days to a few weeks; may be related to pramlintide, irritants in skin cleansing agent or improper injection technique.
- Advise patient to contact health care professional if recurrent nausea or hypoglycemia occur; may lead to increased risk of severe hypoglycemia. Discontinue pramlintide therapy if recurrent unexplained hypoglycemia requiring medical assistance, persistent clinically significant nausea, or noncompliance with self-monitoring of blood glucose concentrations, insulin dose adjustments, or scheduled health care professional contacts or recommended clinic visits occur.
- Advise patient to contact health care professional before taking other Rx, OTC, vitamins, or herbal products with pramlintide and to avoid concurrent alcohol use.
- Advise female patients to notify health care professional if pregnancy is planned or suspected or if breastfeeding.

Evaluation/Desired Outcomes

- Reduction in postprandial glucose concentrations.

Why was this drug prescribed for your patient?

NURSING IMPLICATIONS

Assessment

- **Diabetic Peripheral Neuropathy & Postherpetic Neuralgia:** Assess location, characteristics, and intensity of pain periodically during therapy.
- **Seizures:** Assess location, duration, and characteristics of seizure activity.
- ***Lab Test Considerations:*** May cause ↑ creatine kinase levels.
- May cause ↓ platelet count.

Potential Nursing Diagnoses

Risk for injury (Adverse Reactions)

Implementation

- Pregabalin should be discontinued gradually over at least 1 wk. Abrupt discontinuation may cause insomnia, nausea, headache, and diarrhea when used for pain and may cause increase in seizure frequency when treating seizures.
- **PO:** May be administered without regard to meals.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed. Do not discontinue abruptly; may cause insomnia, nausea, headache, or diarrhea or increase in frequency of seizures. Advise patient to read the *Patient Information Leaflet* prior to taking pregabalin.
- May cause dizziness, drowsiness, and blurred vision. Caution patient to avoid driving or activities requiring alertness until response to medication is known. Advise patient to notify health care professional if changes in vision occur. Seizure patients should not resume driving until physician gives clearance based on control of seizure disorder.
- Instruct patient to promptly report unexplained muscle pain, tenderness, or weakness, especially if accompanied by malaise or fever. Discontinue therapy if myopathy is diagnosed or suspected or if markedly elevated creatine kinase levels occur.
- Inform patient that pregabalin may cause edema and weight gain.
- Caution patient to avoid alcohol or other CNS depressants with pregabalin.
- Advise female patient to notify health care professional if pregnancy is planned or suspected or if she intends to breastfeed or is breastfeeding an infant. Inform male patients who plan to father a child of the potential risk of male-mediated teratogenicity.
- Instruct patient to notify health care professional of medication regimen before treatment or surgery.
- Advise patient to carry identification describing disease process and medication regimen at all times.

Evaluation/Desired Outcomes

- Decrease in intensity of chronic pain.
- Decrease in the frequency or cessation of seizures.

Why was this drug prescribed for your patient?

procainamide (proe-kane-ah-mide)

Procanbid, Promine, Pronestyl, Pronestyl-SR

Classification

Therapeutic: antiarrhythmics (class IA)

Pregnancy Category C

Indications

Atrial premature contractions. Premature ventricular contractions, Ventricular tachycardia, Paroxysmal atrial tachycardia. Maintenance of sinus rhythm after conversion from atrial fibrillation or flutter.

Action

Decreases myocardial excitability. Slows conduction velocity. May depress myocardial contractility. **Therapeutic Effects:** Suppression of arrhythmias.

Pharmacokinetics

Absorption: Well absorbed (75–90%) after PO or IM administration.
Distribution: Rapidly and widely distributed.
Metabolism and Excretion: Converted by liver to *N*-acetylprocainamide (NAPA), an antiarrhythmic compound. 40–70% excreted by the kidneys.
Half-life: 2.5–4.7 hr (*NAPA*—7 hr). Prolonged in renal impairment.

TIME/ACTION PROFILE (antiarrhythmic effects)

ROUTE	ONSET	PEAK	DURATION
PO	30 min	60–90 min	3–4 hr
PO-ER	unknown	unknown	6–12 hr
IV	immediate	25–60 min	3–4 hr
IM	10–30 min	15–60 min	3–4 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Hypersensitivity to tartrazine (some PO products). AV block. Myasthenia gravis.

Use Cautiously in: Myocardial infarction or digoxin toxicity; Congestive heart failure, renal or hepatic insufficiency, or geriatric patients (dosage reduction or increased dosing interval recommended); Pregnancy, children, and lactation (safety not established).

Adverse Reactions/Side Effects

CNS: SEIZURES, confusion, dizziness. **CV:** ASYSTOLE, HEART BLOCK, VENTRICULAR ARRHYTHMIAS, hypotension. **GI:** diarrhea, anorexia, bitter taste, nausea, vomiting. **Derm:** rashes. **Hemat:** AGRANULOCYTOSIS, eosinophilia, leukopenia, thrombocytopenia. **Misc:** chills, drug-induced systemic lupus syndrome, fever.

Interactions

Drug-Drug: May have adverse effects with other **antiarrhythmics.** ↑ neurologic toxicity (confusion, seizures) with **lidocaine**. **Antihypertensives** and **nitrates** may ↑ hypotensive effect. Potentiates **neuromuscular blocking agents.** May partially ↓ the therapeutic effects of **anticholinesterase agents** in myasthenia gravis. ↑ risk of arrhythmias with **pimozide**. ↑ anticholinergic effects with **antihistamines, antidepressants, atropine, haloperidol**, and **phenothiazines.** Effects ↑ by **cimetidine, quinidine**, or **trimethoprim**.

Route/Dosage

PO (Adults): *Atrial arrhythmias*—1.25 g initially, then 750 mg 2 hr later, then 0.5–1 g q 2–3 hr; followed by maintenance dosing of 0.5–1 g q 4–6 hr or 1 g q 12 hr as sustained-release tablets. *Ventricular arrhythmias*—50 mg/kg/day in divided doses q 3 hr or q 12 hr for sustained-release tablets.
PO (Children): 12.5 mg/kg (375 mg/m²) 4 times daily.
IM (Adults): 50 mg/kg/day in divided doses q 3–6 hr.
IV (Adults): 100 mg q 5 min until arrhythmia is abolished or 1000 mg given; wait 10 min until further dosing *or* loading infusion of 500–600 mg over 25–30 min followed by maintenance infusion of 2–6 mg/min.

NURSING IMPLICATIONS

Assessment

- Monitor ECG, pulse, and BP continuously throughout IV administration. Parameters should be monitored periodically during oral administration. IV administration is usually discontinued if any of the following occur:

prochlorperazine (proe-klor-pair-a-zeen)

Compazine, ♣Stemetil, Ultrazine

Classification

Therapeutic: antiemetics, antipsychotics
Pharmacologic: phenothiazines

Pregnancy Category C

Indications

Nausea and vomiting. Psychoses. Anxiety.

Action

Alters effects of dopamine in the CNS. **Therapeutic Effects:** ↓ nausea and vomiting. ↓ signs/symptoms of psychoses/anxiety.

Pharmacokinetics

Absorption: Variable from PO; well absorbed after IM use.
Distribution: Widely distributed; concentrates in CNS; crosses placenta.
Metabolism and Excretion: Highly metabolized by liver and GI mucosa.
Half-life: Unknown.

TIME/ACTION PROFILE (antiemetic effect)

ROUTE	ONSET	PEAK	DURATION>
PO	30–40 min	unknown	3–4 hr
PO-ER	30–40 min	unknown	10–12 hr
Rectal	60 min	unknown	3–4 hr
IM	10–20 min	10–30 min	3–4 hr
IV	rapid (min)	10–30 min	3–4 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with other phenothiazines may occur. Narrow-angle glaucoma. Bone marrow depression. Severe liver/cardiovascular disease. Hypersensitivity to bisulfites/benzyl alcohol (some parenterals). Children <2 yr or 9.1 kg.

Use Cautiously in: Diabetes; Respiratory disease; Prostatic hypertrophy; CNS tumors; Epilepsy; GI obstruction; Geriatric/debilitated patients (use ↓ doses); Pregnancy/lactation (safety not established).

Adverse Reactions/Side Effects

CNS: NEUROLEPTIC MALIGNANT SYNDROME, extrapyramidal reactions, sedation, tardive dyskinesia. **EENT:** blurred vision, dry eyes, lens opacities. **CV:** ECG changes, hypotension, tachycardia. **GI:** constipation, dry mouth, anorexia, drug-induced hepatitis, ileus. **GU:** pink or reddish-brown discoloration of urine, urinary retention. **Derm:** photosensitivity, pigment changes, rashes. **Endo:** galactorrhea. **Hemat:** AGRANULOCYTOSIS, leukopenia. **Metab:** hyperthermia. **Misc:** allergic reactions.

Interactions

Drug-Drug: ↑ hypotension with **antihypertensives, nitrates**, or acute **alcohol** ingestion. ↑ CNS depression with other **CNS depressants**. ↑ anticholinergic effects with other **drugs possessing anticholinergic properties**. **Lithium** ↑ the risk of extrapyramidal reactions. May mask early signs of **lithium** toxicity. ↑ risk of agranulocytosis with **antithyroid agents**. ↓ the beneficial effects of **levodopa**. **Antacids** may ↓ absorption.

Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression. Increased anticholinergic effects with **angel's trumpet, jimson weed,** and **scopolia.**

Route/Dosage

Pediatric dose should not be >10 mg on the first day and then should not be >20 mg/day in children 2–5 yr or 25 mg/day in children 6–12 yr.

Antiemetic

PO (Adults and Children ≥12 yr): 5–10 mg 3–4 times daily may also be given as 15–30 mg once daily or 10 mg twice daily as ER capsules (up to 40 mg/day).

arrhythmia is resolved, QRS complex widens by 50%, P-R interval is prolonged, blood pressure drops >15 mm Hg, or toxic side effects develop. Patient should remain supine throughout IV administration to minimize hypotension.

- ***Lab Test Considerations:*** CBC should be monitored every 2 wk during the first 3 mo of therapy. May cause decreased leukocyte, neutrophil, and platelet counts. May be discontinued if leukopenia occurs. Blood counts usually return to normal within 1 mo of discontinuation of therapy.
- Monitor antinuclear antibody (ANA) periodically during prolonged therapy or if symptoms of lupus-like reaction occur. Therapy is discontinued if a steady increase in ANA titer occurs.
- May cause an increase in AST, ALT, alkaline phosphatase, LDH, and bilirubin, and a positive Coombs' test result.
- ***Toxicity and Overdose:*** Serum procainamide and NAPA levels may be monitored periodically during dosage adjustment. Therapeutic blood level of procainamide is 4–8 mcg/ml Toxicity may occur with procainamide blood levels of 8–16 mcg/ml or greater. Signs of toxicity include confusion, dizziness, drowsiness, decreased urination, nausea, vomiting, and tachyarrhythmias.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Administer with a full glass of water on an empty stomach either 1 hr before or 2 hr after meals. If GI irritation becomes a problem, may be administered with or immediately after meals. Tablets may be crushed and capsules opened and mixed with food or fluids for patient with difficulty swallowing. **Do not break, crush, or chew sustained-release tablets (Procan SR, Pronestyl-SR).**
- **IM:** IM doses are used only when PO and IV routes are not feasible.
- **Direct IV:** Dilute 100 mg in 10 ml of D5W or sterile water for injection. ***Rate:*** Administer at a rate not to exceed 50 mg/min. Rapid administration may cause ventricular fibrillation or asystole.
- **Intermittent Infusion:** Prepare IV infusion by adding 200 mg–1 g to 50–500 ml of D5W, for a concentration of 2–4 mg/ml. ***Rate:*** Administer initial infusion over 30 min. Administer maintenance infusion at 2–6 mg/min. Use infusion pump to ensure accurate dosage.

Patient/Family Teaching

- Instruct patient to take medication around the clock, exactly as directed, even if feeling well. Take missed dose as soon as remembered within 2 hr (4 hr for sustained-release tablets); omit if remembered later. Do not double doses. Consult health care professional before discontinuing medication; gradual reduction may be needed to prevent worsening of condition.
- Instruct patient or family member on how to take pulse. Advise patient to report changes in pulse rate or rhythm to health care professional.
- May cause dizziness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- **Advise patient to notify health care professional immediately if signs of drug-induced lupus syndrome (fever, chills, joint pain or swelling, pain with breathing, skin rash), leukopenia (sore throat, mouth, or gums), or thrombocytopenia (unusual bleeding or bruising) occur. Medication may be discontinued if these occur.**
- Caution patient not to take OTC medications with procainamide without consulting health care professional.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Advise patient to carry identification at all times describing disease process and medication regimen.
- Emphasize the importance of routine follow-up exams to monitor progress.

Evaluation/Desired Outcomes

- Resolution of cardiac arrhythmias without detrimental side effects.

Why was this drug prescribed for your patient?

PO (Children 18–39 kg): 2.5 mg 3 times daily or 5 mg twice daily (not to exceed 15 mg/day).
PO (Children 14–17 kg): 2.5 mg 2–3 times daily (not >10 mg/day).
PO (Children 9–13 kg): 2.5 mg 1–2 times daily (not >7.5 mg/day).
IM (Adults and Children ≥12 yr): 5–10 mg q 3–4 hr as needed. *Nausea/vomiting associated with surgery*—5–10 mg; may be repeated once.
IM (Children 2–12 yr): 132 mcg (0.132 mg)/kg single dose.
IV (Adults and Children ≥12 yr): 2.5–10 mg (not ≥40 mg/day). *Nausea/vomiting associated with surgery*—5–10 mg; may be repeated once.
Rect (Adults): 25 mg twice daily.
Rect (Children 18–39 kg): 2.5 mg 3 times daily or 5 mg twice daily (not >15 mg/day).
Rect (Children 14–17 kg): 2.5 mg 2–3 times daily (not >10 mg/day).
Rect (Children 9–13 kg): 2.5 mg 1–2 times daily (not >7.5 mg/day).

Antipsychotic

PO (Adults and Children ≥12 yr): 5–10 mg 3–4 times daily; may be ↑ q 2–3 days (up to 150 mg/day).
PO (Children 2–12 yr): 2.5 mg 2–3 times daily.
IM (Adults): 10–20 mg q 2–4 hr for up to 4 doses, then 10–20 mg q 4–6 hr (up to 200 mg/day).
IM (Children 2–12 yr): 132 mcg (0.132 mg)/kg (not >10 mg/dose.
IV (Adults and Children ≥12 yr): 2.5–10 mg (up to 40 mg/day).
Rect (Adults): 10 mg 3–4 times daily, may be increased by 5–10 mg q 2–3 days as needed.

Antianxiety

PO (Adults and Children ≥12 yr): 5 mg 3–4 times daily (not to exceed 20 mg/day or longer than 12 wk); may also be given as 15 mg once daily or 10 mg twice daily as ER capsules.
IM (Adults and Children ≥12 yr): 5–10 mg q 3–4 hr as needed (up to 40 mg/day).
IM (Children 2–12 yr): 132 mcg (0.132 mg)/kg.
IV (Adults): 2.5–10 mg (up to 40 mg/day).

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure and pulse during therapy.
- Monitor patient for onset of akathisia (restlessness or desire to keep moving) and extrapyramidal side effects (*parkinsonian*—difficulty speaking or swallowing, loss of balance control, pill-rolling, mask-like face, shuffling gait, rigidity, tremors and *dystonic*—muscle spasms, twisting motions, twitching, inability to move eyes, weakness of arms or legs), during and for 8–12 wk after therapy. Report symptoms; reduction in dosage or discontinuation may be necessary. Trihexyphenidyl or diphenhydramine may be used to control these symptoms.
- Monitor for tardive dyskinesia and neuroleptic malignant syndrome. Notify physician or other health care professional immediately if these symptoms occur.
- **Antiemetic:** Assess patient for nausea and vomiting before and 30–60 min after administration.
- **Antipsychotic:** Monitor patient's mental status (orientation to reality and behavior) before and periodically throughout therapy.
- Observe patient carefully when administering oral medication to ensure that medication is actually taken and not hoarded.
- **Anxiety:** Assess degree and manifestations of anxiety and mental status before and periodically during therapy.

Potential Nursing Diagnoses

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

Implementation

- Do not confuse prochlorperazine with chlorpromazine.
- To prevent contact dermatitis, avoid getting solution on hands.

CONTINUED

CONTINUED

prochlorperazine

- Phenothiazines should be discontinued 48 hr before and not resumed for 24 hr after myelography; they lower seizure threshold.
- **IM:** Keep patient recumbent for at least 30 min after injection to minimize hypotensive effects.
- **Direct IV:** Dilute to a concentration of 1 mg/ml and administer at a rate of 1 mg/min; not to exceed 5 mg/min.
- **Intermittent Infusion:** Dilute 20 mg in up to 1 liter of dextrose, saline, Ringer's, lactated Ringer's, or dextrose/saline solutions.
- **Syringe Incompatibility:** Manufacturer does not recommend mixing prochlorperazine with other medications in syringe.
- **Y-Site Compatibility:** calcium gluconate, cisatracurium, cisplatin, cyclophosphamide, cytarabine, doxorubicin, doxorubicin liposome, fluconazole, gatifloxacin, granisetron, heparin, hydrocortisone sodium succinate, linezolid, melphalan, methotrexate, ondansetron, paclitaxel, potassium chloride, propofol, remifentanil, sargramostim, sufentanil, teniposide, thiotepa, topotecan, vinorelbine, vitamin B complex with C.
- **Y-Site Incompatibility:** aldesleukin, allopurinol, amphotericin B cholesteryl, amifostine, aztreonam, cefepime, filgrastim, fludarabine, foscarnet, piperacillin/tazobactam.

Patient/Family Teaching

- Advise patient that abrupt withdrawal may lead to gastritis, nausea, vomiting, dizziness, headache, tachycardia, and insomnia.
- Advise patient to change positions slowly to minimize orthostatic hypotension.
- May cause drowsiness. Caution patient to avoid driving and other activities requiring alertness until response to medication is known.
- Advise patient to prevent photosensitivity reactions by using sunscreen and protective clothing. Extremes in temperature should also be avoided.
- Instruct patient to use sugarless gum or candy to minimize dry mouth.
- Instruct patient to report sore throat, fever, unusual bleeding or bruising, rashes, tremors, visual disturbances, dark urine, or clay-colored stools.

Evaluation/Desired Outcomes

- Relief of nausea and vomiting.
- Decrease in psychoses.
- Decrease in feelings of anxiety.

Why was this drug prescribed for your patient?

promethazine (proe-meth-a-zeen)

Antinaus, ✤Histanil, Pentazine, Phenadoz, Phenergan, Promacot, Promet, Prorex

Classification

Therapeutic: antiemetics, antihistamines, sedative/hypnotics
Pharmacologic: phenothiazines

Pregnancy Category C

Indications

Treatment of allergic conditions and motion sickness. Preoperative sedation. Treatment and prevention of nausea and vomiting. Adjunct to anesthesia and analgesia.

Action

Blocks the effects of histamine. Has inhibitory effect on the chemoreceptor trigger zone (CTZ) in the medulla. Alters the effects of dopamine in the CNS. Possesses significant anticholinergic activity. Produces CNS depression by indirectly decreased stimulation of the CNS reticular system. **Therapeutic Effects:** Relief of symptoms caused by histamine excess. Diminished nausea or vomiting. Sedation.

Pharmacokinetics

Absorption: Well absorbed after oral and IM administration; rectal administration may be less reliable.
Distribution: Widely distributed; crosses the blood-brain barrier and the placenta.
Metabolism and Excretion: Metabolized by the liver.
Half-life: Unknown.

TIME/ACTION PROFILE (noted as antihistaminic effects; sedative effects last 2–8 hr)

ROUTE	ONSET	PEAK	DURATION
PO, IM	20 min	unknown	+–12 hr
Rectal	20 min	unknown	+–12 hr
IV	3–5 min	unknown	+–12 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Comatose patients. Prostatic hypertrophy. Bladder neck obstruction. Some products contain alcohol or bisulfites and should be avoided in patients with known intolerance. Narrow-angle glaucoma. Children <2 yr (may cause fatal respiratory depression).
Use Cautiously in: Hypertension; Sleep apnea; Epilepsy; Underlying bone marrow depression; Use lowest effective dose, avoid concurrent respiratory depressants; Pregnancy (has been used safely during labor; avoid chronic use during pregnancy); Lactation (safety not established; may cause drowsiness in infant).

Adverse Reactions/Side Effects

CNS: NEUROLEPTIC MALIGNANT SYNDROME, confusion, disorientation, sedation, dizziness, extrapyramidal reactions, fatigue, insomnia, nervousness. **EENT:** blurred vision, diplopia, tinnitus. **CV:** bradycardia, hypertension, hypotension, tachycardia. **GI:** constipation, drug-induced hepatitis, dry mouth. **Derm:** photosensitivity, rashes. **Hemat:** blood dyscrasias.

Interactions

Drug-Drug: Additive CNS depression with **alcohol**, **antianxiety agents**, other **antihistamines**, **opioid analgesics**, and **sedative/hypnotics**. Additive anticholinergic effects with **antihistamines**, **antidepressants**, **atropine**, **disopyramide**, **haloperidol**, **phenothiazines**, and **quinidine**. Concurrent use with **MAO inhibitors** may result in increased CNS side effects.

Route/Dosage

Antihistamine

PO (Adults): 25 mg at bedtime or 10–12.5 mg 4 times daily.
PO (Children ≥2 yr): 5–12.5 mg 3 times daily or 25 mg at bedtime.

IM, IV, Rect (Adults): 25 mg; may repeat in 2 hr.
Rect (Children ≥2 yr): 0.125 mg/kg (3.75 mg/m²) q 4–6 hr or 0.5 mg/kg (15 mg/m²) at bedtime; may also be given as 6.25–12.5 mg 3 times daily or 25 mg at bedtime.

Antivertigo (Motion Sickness)
PO (Adults): 25 mg 30–60 min before departure; may be repeated in 8–12 hr.
PO (Children ≥2 yr): 10–25 mg or 0.5 mg/kg 30–60 min before departure; may be given twice daily.

Sedation
PO, Rect, IM, IV (Adults): 25–50 mg.
PO, Rect, IM (Children >2 yr): 10–25 mg or 0.5–1.1 mg/kg.

Sedation During Labor
IM, IV (Adults): 50 mg in early labor; when labor is established, additional doses of 25–75 mg may be given 1–2 times at 4-hr intervals (24-hr dose should not exceed 100 mg).

Antiemetic
PO, Rect, IM, IV (Adults): 10–25 mg q 4 hr as needed; initial PO dose should be 25 mg.
PO, Rect, IM (Children ≥2 yr): 0.25–0.5 mg/kg (7.5–15 mg/m²) q 4–6 hr or 10–25 mg q 4–6 hr.

NURSING IMPLICATIONS

Assessment
- Monitor blood pressure (BP), pulse, and respiratory rate frequently in patients receiving IV doses.
- Assess patient for level of sedation after administration. Risk of sedation and respiratory depression are increased when administered concurrently with other drugs that cause CNS depression.
- **Allergy:** Assess allergy symptoms (rhinitis, conjunctivitis, hives).
- **Antiemetic:** Assess patient for nausea and vomiting before and after administration.

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

Implementation
- When administering concurrently with opioid analgesics, supervise ambulation closely to prevent injury caused by increased sedation.
- **PO:** Administer with food or milk to minimize GI upset. Tablets may be crushed and mixed with food or fluids for patients with difficulty swallowing.
- **IM:** Administer deep into well-developed muscle. Subcut administration may cause tissue necrosis.
- **Direct IV:** IV doses should not exceed a concentration of 25 mg/ml. Slight yellow color does not alter potency. Do not use if precipitate is present. ***Rate:*** Administer each 25 mg slowly over at least 1 min. Rapid administration may produce a transient fall in BP.

Patient/Family Teaching
- May cause drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient that frequent mouth rinses, good oral hygiene, and sugarless gum or candy may decrease dry mouth.
- Caution patient to use sunscreen and protective clothing to prevent photosensitivity reactions.
- **Motion Sickness:** Advise patient to take medication at least 30 min and preferably 1–2 hr before exposure to conditions that may cause motion sickness.

Evaluation/Desired Outcomes
- Relief of allergic symptoms.
- Prevention of motion sickness.
- Sedation.
- Relief of nausea and vomiting.

Why was this drug prescribed for your patient?

propafenone (proe-**paff**-e-nown)

Rythmol

Classification

Therapeutic: antiarrhythmics (class IC)

Pregnancy Category C

Indications

Treatment of life-threatening ventricular arrhythmias, including ventricular tachycardia. Prolongs the time to recurrence of symptomatic paraxysmal atrial arrhythmias, including paroxysmal atrial fibrillation/flutter (PAF) and paroxysmal supraventricular tachycardia (PSVT).

Action

Slows conduction in cardiac tissue by altering transport of ions across cell membranes. **Therapeutic Effects:** Suppression of ventricular arrhythmias.

Pharmacokinetics

Absorption: Although well absorbed following oral administration, undergoes rapid hepatic metabolism (bioavailability 3–11%).
Distribution: Widely distributed; crosses the placenta.
Metabolism and Excretion: Extensively metabolized by the liver (CYP 1A2, CYP2D6 and CYP3A4 enzyme systems), some metabolites have antiarrhythmic activity. >90% of patients are considered extensive metabolizers. Others metabolize propafenone more slowly.
Half-life: 2–10 hr in extensive metabolizers, 10–32 hr in slow metabolizers.

TIME/ACTION PROFILE (antiarrhythmic effects)

ROUTE	ONSET	PEAK	DURATION
PO	hrs–days	4–5 days‡	hrs

‡Chronic dosing

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cardiogenic shock. Conduction disorders including sick sinus syndrome and AV block (without a pacemaker). Bradycardia. Severe hypotension. Concurrent quinidine or amiodarone. Nonallergic bronchospasm. Electrolyte disturbances. Uncontrolled CHF.
Use Cautiously in: Severe hepatic or renal impairment (dosage reduction may be necessary); Lower doses may be necessary due to age-related decrease in renal/hepatic/cardiovascular function, concurrent chronic illnesses and medications); Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, shaking, weakness. **EENT:** blurred vision. **CV:** SUPRAVENTRICULAR ARRHYTHMIA, VENTRICULAR ARRHYTHMIAS, conduction disturbances, angina, bradycardia, hypotension. **GI:** altered taste, constipation, nausea, vomiting, diarrhea, dry mouth. **Derm:** rash. **MS:** joint pain.

Interactions

Drug-Drug: Any **inhibitors of the CYP1A2, CYP2D6 or CYP3A4 enzyme systems** may ↑ levels, including **desipramine**, **paroxetine**, **ritonavir**, **sertraline**, **ketoconazole**, **saquinavir**, **erythromycin** (blood level monitoring recommended). **Quinidine** is a strong inhibitor of CYP2D6 and significantly ↑ levels of propafenone; concurrent use is not recommended. Propafenone is also an inhibitor of CYP2D6 and may ↑ levels of **desipramine**, **imipramine**, **haloperidol**, and **venlafaxine**. Significantly ↑ serum **digoxin** levels(↓ dose and blood level monitoring required). ↑ blood levels of **metoprolol** and **propranolol** (↓ dose may be required). Concurrent use of **local anesthetics** may ↑ risk of CNS adverse reactions. ↑ effects of **warfarin** (↓ warfarin if necessary, monitor prothrombin time.). Concurrent with **amiodarone** can adversely effect conduction/repolarization and should be avoided. May ↑ risk of CNS adverse reactions with **lidocaine**. May ↑ **cyclosporine** through blood levels and risk of nephrotoxicity. **Rifampin** may ↓ serum levels and effectiveness of propafenone.
Drug-Food: Grapefruit juice may ↑ levels.

PROPOXYPHENE

propoxyphene hydrochloride

(pro-**pox**-i-feen hye-droe-**klor**-ide)

Darvon

propoxyphene hydrochloride/aspirin/caffeine

Darvon Compound-65, Darvon Compound-32

propoxyphene napsylate (pro-**pox**-i-feen**nap**-si-late)

Darvon N

propoxyphene napsylate/acetaminophen

Darvon A500, Darvocet-N, Propacet, Propoxyphene with APAP, Wygesic

propoxyphene napsylate/aspirin

♣Darvon-N with ASA

propoxyphene/aspirin/caffeine

♣Darvon-N Compound, ♣692

Classification

Therapeutic: opioid analgesics
Pharmacologic: opioid agonists, opioid agonists/nonopioid analgesic combinations

Pregnancy Category C

See also Acetaminophen monograph and Salicylates monograph

Indications

Mild to moderate pain.

Action

Bind to opiate receptors in the CNS—alter the perception of and response to painful stimuli, while producing generalized CNS depression. **Therapeutic Effects:** Decrease in mild to moderate pain.

Pharmacokinetics

Absorption: Well absorbed following oral administration.
Distribution: Widely distributed. Enter breast milk in small amounts.
Metabolism and Excretion: Mostly metabolized by the liver. Some conversion to norpropoxyphene, a toxic metabolite.
Half-life: 6–12 hr.

TIME/ACTION PROFILE (analgesic effects)

ROUTE	ONSET	PEAK	DURATION
PO	15–60 min	2–3 hr	4–6 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Pregnancy or lactation (avoid chronic use).
Use Cautiously in: Head trauma; Increased intracranial pressure; Severe renal/hepatic/pulmonary disease; Hypothyroidism; Adrenal insufficiency; Alcoholism; Geriatric or debilitated patients (dosage decrease recommended); Undiagnosed abdominal pain; Prostatic hypertrophy; Lactation (has been used safely).

Adverse Reactions/Side Effects

CNS: dizziness, weakness, dysphoria, euphoria, headache, insomnia, paradoxical excitement, sedation. **EENT:** blurred vision. **CV:** hypotension. **GI:** nausea, abdominal pain, constipation, vomiting. **Derm:** rashes. **Misc:** physical dependence, psychological dependence, tolerance.

Interactions

Drug-Drug: Use with extreme caution in patients receiving **MAO inhibitors** (may result in unpredictable, severe, and potentially fatal reactions—↓ initial dose to 25% of usual dose). ↑ CNS depression with **alcohol**, **antidepressants**, and **sedative/hypnotics.** Smoking (**nicotine**) ↑ metabolism and may ↓ analgesic effectiveness. Administration of **partial-antagonist opioid analgesics** may precipitate withdrawal in physically dependent patients. **Nalbuphine**, **buprenorphine**, or **pentazocine** may ↓ analgesia.
Drug-Natural Products: Concomitant use of **kava**, **valerian**, **skullcap**, **chamomile**, or **hops** can increase CNS depression.

Route/Dosage

PO (Adults): 150 mg q 8 hr; may be gradually increased at 3–4-day intervals as required up to 300 mg q 8–12 hr.

NURSING IMPLICATIONS

Assessment

- **Monitor ECG or use Holter monitor prior to and periodically during therapy. May cause PR and QT prolongation.**
- Monitor blood pressure and pulse periodically during therapy.
- Monitor intake and output ratios and daily weight. Assess patients for signs of CHF (peripheral edema, rales/crackles, dyspnea, weight gain, jugular venous distention). May require reduction or discontinuation of therapy.
- ***Lab Test Considerations:*** May cause ↑ ANA titer, which is usually asymptomatic and reversible.
- Monitor prothrombin level in patients taking warfarin; may ↑ effects of warfarin.
- ***Toxicity and Overdose:*** Signs of toxicity include hypotension, excessive drowsiness, and decreased or abnormal heart rate. Notify physician or other health care professional if these signs occur.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Propafenone therapy should be initiated in a hospital with facilities for cardiac rhythm monitoring. Most serious proarrhythmic effects are seen in the first 2 wk of therapy.
- Previous antiarrhythmic therapy should be withdrawn 2–5 half-lives before starting propafenone.
- Dose adjustments should be at least 3–4 days apart because of the long half-life of propafenone.
- Correct pre-existing hypokalemia or hyperkalemia prior to instituting therapy.

Patient/Family Teaching

- Instruct patient to take medication around the clock exactly as directed, even if feeling better. Take missed doses as soon as remembered if within 4 hr; omit if remembered later. Gradual dosage reduction may be necessary.
- May cause dizziness. Caution patient to avoid driving and other activities requiring alertness until response to medication is known.
- Advise patient to notify health care professional of medication regimen prior to treatment or surgery.
- Instruct patient to notify health care professional if fever, sore throat, chills, or unusual bleeding or bruising occurs or if chest pain, shortness of breath, diaphoresis, palpitations, or visual changes become bothersome.
- Advise patient to carry identification describing disease process and medication regimen at all times.
- Emphasize the importance of follow-up exams to monitor progress.

Evaluation/Desired Outcomes

- Decrease in frequency of ventricular arrhythmias.
- Prolonged time to recurrence of symptomatic paraxysmal atrial arrhythmias, including paroxysmal atrial fibrillation/flutter and PSVT.

Why was this drug prescribed for your patient?

Route/Dosage

Consider cumulative effects of additional acetaminophen/aspirin; if toxic levels are exceeded, change to pure propoxyphene product.
PO (Adults): 65 mg q 4 hr (hydrochloride) or 100 mg q 4 hr (napsylate) as needed, not to exceed 340 mg/day (HCl) or 600 mg/day (napsylate). 100 mg propoxyphene napsylate = 65 mg propoxyphene hydrochloride.

NURSING IMPLICATIONS

Assessment

- Assess type, location, and intensity of pain before and 2 hr (peak) after administration. 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, high-dose therapy may lead to physical and psychological dependence and tolerance. This should not prevent patient from receiving adequate analgesia. Most patients who receive propoxyphene for pain do not develop psychological dependence. Progressively higher doses may be required to relieve pain with long-term therapy.
- Assess BP, pulse, and respirations before and periodically during administration. If respiratory rate is <10/min, assess level of sedation. Physical stimulation may prevent significant hypoventilation. Dose may need to be decreased by 25–50%. Initial drowsiness will diminish with continued use.
- Assess bowel function routinely. Prevent constipation with increased intake of fluids and bulk, and laxatives. Administer stimulant laxatives routinely if opioid use exceeds 2–3 days, unless contraindicated.
- ***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 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

- 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 opioid doses.
- Medication should be discontinued gradually after long-term use to prevent withdrawal symptoms.
- **PO:** May be administered with food or milk to minimize GI irritation.

Patient/Family Teaching

- Advise patient to take medication exactly as directed and not to take more than the recommended amount. Severe and permanent liver damage may result from prolonged use or high doses of acetaminophen. Renal damage may occur with prolonged use of acetaminophen or aspirin. Doses of nonopioid agents should not exceed the maximum recommended daily dose.
- Instruct patient on how and when to ask for pain medication.
- Medication may cause dizziness. Caution patient to avoid driving and other activities requiring alertness until response to the drug is known.
- Advise patient to change position slowly to minimize orthostatic hypotension.
- Caution patient to avoid concurrent use of alcohol or other CNS depressants.

Evaluation/Desired Outcomes

- Decrease in severity of pain without significant alteration in level of consciousness.

Why was this drug prescribed for your patient?

psyllium (sill-i-yum)

Alramucil, Cillium, Effer-Syllium, Fiberall, Fibrepur, Hydrocil, ♣Karacil, Konsyl, Metamucil, Modane Bulk, Mylanta Natural Fiber Supplement, Naturacil Caramels, ♣Natural Source Fibre Laxative, Perdiem, ♣Prodiem, Pro-Lax, Reguloid Natural, Serutan, Siblin, Syllact, Vitalax, V-Lax

Classification

Therapeutic: laxatives
Pharmacologic: bulk-forming agents

Pregnancy Category UK

Indications

Management of simple or chronic constipation, particularly if associated with a low-fiber diet. Useful in situations in which straining should be avoided (after myocardial infarction or rectal surgery, prolonged bed rest). Used in the management of chronic watery diarrhea.

Action

Combines with water in the intestinal contents to form an emollient gel or viscous solution that promotes peristalsis and reduces transit time. **Therapeutic Effects:** Relief and prevention of constipation.

Pharmacokinetics

Absorption: Not absorbed from the GI tract.
Distribution: No distribution occurs.
Metabolism and Excretion: Excreted in feces.
Half-life: Unknown.

TIME/ACTION PROFILE (laxative effect)

ROUTE	ONSET	PEAK	DURATION
PO	12–24 hr	2–3 days	unknown

♣ = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Abdominal pain, nausea, or vomiting (especially when associated with fever). Serious adhesions. Dysphagia.
Use Cautiously in: Some dosage forms contain sugar, aspartame, or excessive sodium and should be avoided in patients on restricted diets; Has been used safely during pregnancy and lactation.

Adverse Reactions/Side Effects

Resp: bronchospasm. **GI:** cramps, intestinal or esophageal obstruction, nausea, vomiting.

Interactions

Drug-Drug: May decrease the absorption of **warfarin**, **salicylates**, or **digitalis glycosides.**

Route/Dosage

PO (Adults): 1–2 tsp/packets/wafers (3–6 g psyllium) in or with a full glass of liquid 2–3 times daily. Up to 30 g daily in divided doses.
PO (Children >6 yr): 1 tsp/packets/wafers (1.5–3 g psyllium) in or with ½–1 glass of liquid 2–3 times daily. Up to 15 g daily in divided doses.

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.
- ***Lab Test Considerations:*** May cause elevated blood glucose levels with prolonged use of preparations containing sugar.

Potential Nursing Diagnoses

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

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

QUINIDINE (kwin-i-deen)

quinidine gluconate

Quinaglute Dura-Tabs

quinidine sulfate

♣Apo-Quinidine, Cin-Quin, ♣Novoquinidin, Quinidex Extentabs, Quinora

Classification

Therapeutic: antiarrhythmics (class IA)

Pregnancy Category C

Indications

Atrial and ventricular arrhythmias.

Action

Decreases myocardial excitability. Slows conduction velocity. **Therapeutic Effects:** Suppression of arrhythmias.

Pharmacokinetics

Absorption: Well absorbed following PO and IM administration Extended-release oral preparations absorbed more slowly.
Distribution: Widely distributed. Crosses the placenta; enters breast milk.
Metabolism and Excretion: Metabolized by the liver; 10–30% excreted unchanged by the kidneys.
Half-life: 6–8 hr (increased in CHF or severe liver impairment).

TIME/ACTION PROFILE (antiarrhythmic effects)

ROUTE	ONSET	PEAK	DURATION
PO (sulfate)	30 min	1–1.5 hr	6–8 hr
PO (sulfate–ER)	unknown	4 hr	8–12 hr
PO (gluconate)	unknown	3–4 hr	6–8 hr
IM	30 min	30–90 min	6–8 hr
IV	1–5 min	rapid	6–8 hr

♣ = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Conduction defects. Digoxin toxicity.
Use Cautiously in: CHF or severe liver disease (use lower doses); Hypokalemia or hypomagnesium (increases the risk of QT_c prolongation); Pregnancy, lactation, or children (safety not established; extended-release preparations should not be used in children).

Adverse Reactions/Side Effects

CNS: dizziness, headache, syncope. **EENT:** blurred vision, diplopia, mydriasis, photophobia, tinnitus. **CV:** HYPOTENSION, arrhythmias, tachycardia. **GI:** anorexia, cramping, diarrhea, nausea, bitter taste, drug-induced hepatitis. **Derm:** rashes. **Hemat:** hemolytic anemia, thrombocytopenia. **Misc:** fever.

Interactions

Drug-Drug: ↑ **digoxin** levels and may cause toxicity (dosage ↓ recommended). **Amiodarone** ↑ quinidine levels and risk of toxicity. **Phenytoin**, **phenobarbital**, or **rifampin** may increase metabolism and decrease effectiveness. **Cimetidine**, **diltiazem**, and **verapamil** ↓ metabolism and may ↑ blood levels. Excretion is delayed and effects ↑ by **carbonic anhydrase inhibitors** and **thiazide diuretics**. Potentiates **neuromuscular blocking agents** and **warfarin**. ↑ hypotension with **antihypertensives**, **nitrates**, and acute ingestion of **alcohol**. May ↑ **procainamide**, **propafenone**, or **tricyclic antidepressant** levels and risk of toxicity. May antagonize **anticholinesterase therapy** in patients with myasthenia gravis. **Drugs that alkalinize the urine**, including high-dose **antacid** therapy or **sodium bicarbonate**, ↑ blood levels and the risk of toxicity. ↑ anticholinergic effects may occur with **agents having anticholinergic properties** (including **antihistamines**, **tricyclic antidepressants**). ↑ risk of arrhythmias with **pimozide**.
Drug-Food: Grapefruit juice increases serum levels and effect. **Foods that alkalinize the urine** may increase serum quinidine levels and the risk of toxicity.

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

Implementation

- Available in sugar-free, flavored powder, effervescent powder, granules, and wafer forms. Packets are not standardized for volume but each contains 3–3.5 g of psyllium.
- **PO:** Administer with a full glass of water or juice, followed by an additional glass of liquid. Solution should be taken immediately after mixing because it may congeal. Do not administer without sufficient fluid and do not chew granules.

Patient/Family Teaching

- Encourage patient to use other forms of bowel regulation such as increasing bulk in the diet, increasing fluid intake, and increasing mobility. Normal bowel habits are individualized; frequency of bowel movement may vary from 3 times/day to 3 times/wk.
- May be used for long-term management of chronic constipation.
- 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.

Evaluation/Desired Outcomes

- A soft, formed bowel movement usually within 12–24 hr. May require 3 days of therapy for results.

Why was this drug prescribed for your patient?

Route/Dosage

Quinidine Gluconate (62% Quinidine)

PO (Adults): 324–660 mg q 6–12 hr as extended-release tablets (325–650 mg q 6 hr if not extended release).
IM (Adults): 600 mg initially, followed by 400 mg as often as q 2 hr.
IV (Adults): Infuse at 16 mg/min until arrhythmia is controlled, QRS complex widens, or bradycardia or hypotension occurs.

Quinidine Sulfate (83% Quinidine)

Premature Atrial or Ventricular Contractions

PO (Adults): 200–300 mg q 6–8 hr or 300–600 mg of extended-release preparation every 8–12 hr maintenance (not to exceed 4 g/day).
PO (Children): 6 mg/kg or 180 mg/m^2 5 times daily.
PO (Adults): *Paroxysmal supraventricular tachycardia*—400–600 mg q 2–3 hr until arrhythmia is terminated. *Conversion of atrial fibrillation*—200 mg q 2–3 hr for 5–8 doses; dosage may be increased at daily intervals if necessary. *Premature atrial/ventricular contractions*—200–300 mg q 6–8 hr or 300–600 mg of extended-release preparation every 8–12 hr maintenance (not to exceed 4 g/day).

NURSING IMPLICATIONS

Assessment

- Monitor ECG, pulse, and blood pressure continuously throughout IV administration and periodically during oral administration. IV administration is usually discontinued if any of the following occurs: arrhythmia is resolved, QRS complex widens by 50%, P-R or Q-T intervals are prolonged, or frequent ventricular ectopic beats or tachycardia develops. Patient should remain supine throughout IV administration to minimize hypotension.
- ***Lab Test Considerations:*** Monitor hepatic and renal function, CBC, and serum potassium levels periodically during prolonged therapy.
- ***Toxicity and Overdose:*** Serum quinidine levels may be monitored periodically during dosage adjustment. Therapeutic serum concentrations are 2–6 mcg/ml. Toxic effects usually occur at concentrations >8 mcg/ml: Signs and symptoms of toxicity or cinchonism include tinnitus, hearing loss, visual disturbances, headache, nausea, and dizziness. These may occur after a single dose. Cardiac signs of toxicity include QRS widening, cardiac asystole, ventricular ectopic beats, idioventricular rhythms (ventricular tachycardiaor fibrillation), paradoxic tachycardia, and arterial embolism.

Potential Nursing Diagnoses

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

Implementation

- **Do not confuse quinidine with quinine.**
- A test dose of a single 200-mg quinidine sulfate tablet or 200 mg IM quinidine gluconate may be administered before quinidine therapy to check for intolerance.
- **PO:** Administer with a full glass of water on an empty stomach either 1 hr before or 2 hr after meals for faster absorption. If GI irritation becomes a problem, may be administered with or immediately after meals. **Extended-release preparations (Quinaglute Dura-Tabs, Quinidex Extentabs, Quinalan) should be swallowed whole; do not break, crush, or chew.**
- **Intermittent Infusion:** Dilute 800 mg of quinidine gluconate (10 ml) in 50 ml of D5W for injection for a concentration of 16 mg/ml. Solution is stable for 24 hr at room temperature or 48 hr if refrigerated. ***Rate:*** Administer quinidine gluconate at a rate not to exceed 1 ml/min. Administer via infusion pump to ensure accurate dose. Rapid administration may cause peripheral vascular collapse and severe hypotension.

CONTINUED

CONTINUED

QUINIDINE

Patient/Family Teaching

- Instruct patient to take medication around the clock, exactly as directed, even if feeling well. If a dose is missed, take as soon as remembered if within 2 hr; if remembered later, omit. Do not double doses.
- Instruct patient or family member on how to take pulse. Advise patient to report changes in pulse rate or rhythm to health care professional.
- May cause dizziness or blurred vision. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Inform patient that quinidine may cause increased sensitivity to light. Dark glasses may minimize this effect.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Instruct patient not to take OTC medications with quinidine without consulting health care professional.
- Advise patient to consult health care professional if symptoms of cinchonism, rash, or dyspnea occur or if diarrhea is severe or persistent.
- Advise patient to carry identification describing disease process and medication regimen at all times.
- Emphasize the importance of routine follow-up exams to monitor progress.

Evaluation/Desired Outcomes

- Resolution of cardiac arrhythmias without detrimental side effects.

Why was this drug prescribed for your patient?

rabeprazole (ra-**bep**-ra-zole)

Aciphex
♣Pariet

Classification

Therapeutic: antiulcer agents
Pharmacologic: proton-pump inhibitors

Pregnancy Category B

Indications

Gastroesophageal reflux disease (GERD). Duodenal ulcers (including combination therapy with clarithromycin and amoxicillin to erradicate *H. pylori* and prevent recurrence). Pathological hypersecretory conditions, including Zollinger-Ellison syndrome.

Action

Binds to an enzyme in the presence of acidic gastric pH, preventing the final transport of hydrogen ions into the gastric lumen. **Therapeutic Effects:** Diminished accumulation of acid in the gastric lumen, with lessened acid reflux. Healing of duodenal ulcers and esophagitis. Decreased acid secretion in hypersecretory conditions.

Pharmacokinetics

Absorption: Delayed-release tablet is designed to allow rabeprazole, which is not stable in gastric acid, to pass through the stomach intact. Subsequently 52% is absorbed after oral administration.
Distribution: Unknown.
Protein Binding: 96.3%.
Metabolism and Excretion: Mostly metabolized by the liver (hepatic cytochrome P450 3A and 2C19 enzyme systems); 10% excreted in feces; remainder excreted in urine as inactive metabolites.
Half-life: 1–2 hr.

TIME/ACTION PROFILE (acid suppression)

ROUTE	ONSET	PEAK	DURATION
PO	within 1 hr	unknown	24 hr‡

‡Suppression continues to increase over the first week of therapy

Contraindications/Precautions

Contraindicated in: Hypersensitivity to rabeprazole or related drugs (benzimidazoles).
Use Cautiously in: Severe hepatic impairment (dosage reduction may be necessary); Pregnancy, lactation, or children (breastfeeding not recommended; use in pregnancy only if needed; safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, headache, malaise. **GI:** abdominal pain, constipation, diarrhea, nausea. **Derm:** photosensitivity, rash. **MS:** neck pain. **Misc:** allergic reactions, chills, fever.

Interactions

Drug-Drug: Rabeprazole is metabolized by the CYP450 enzyme system and may interact with other drugs metabolized by this system. ↓ blood levels of **ketoconazole**. ↑ blood levels of **digoxin**. May alter the effects of **drugs whose absorption is pH dependent**. May increase the risk of bleeding with **warfarin** (monitor INR/PT).

Route/Dosage

PO (Adults): *GERD, duodenal ulcers*—20 mg once daily *prevention of duodenal ulcer recurrence*—20 mg twice daily for 7 days with amoxicillin 1000 mg twice daily for 7 days and clarithromycin 500 mg twice daily for 7 days; *hypersecretory conditions*—60 mg once daily initially, may be adjusted as needed and continued as necessary; doses up to 100 mg daily or 60 mg twice daily have been used.

NURSING IMPLICATIONS

Assessment

- Assess patient routinely for epigastric or abdominal pain and frank or occult blood in the stool, emesis, or gastric aspirate.
- ***Lab Test Considerations:*** Monitor CBC with differential periodically during therapy.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Administer doses before meals, preferably in the morning. **Tablets should be swallowed whole; do not crush, break, or chew.**

Patient/Family Teaching

- Instruct patient to take medication as directed for the full course of therapy, even if feeling better. Take missed doses as soon as remembered but not if almost time for next dose. Do not double doses.
- May cause occasional drowsiness or dizziness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid alcohol, products containing aspirin or NSAIDs, and foods that may cause an increase in GI irritation.
- Caution patients to wear sunscreen and protective clothing to prevent photosensitivity reactions.
- Advise patient to report onset of black, tarry stools; diarrhea; abdominal pain; or persistent headache to health care professional promptly.

Evaluation/Desired Outcomes

- Decrease in abdominal pain or prevention of gastric irritation and bleeding. Healing of duodenal ulcers can be seen on x-ray examination or endoscopy.
- Decrease in symptoms of GERD. Therapy is continued for 4–8 wk after initial episode.

Why was this drug prescribed for your patient?

raloxifene (ra-lox-i-feen)

Evista

Classification

Therapeutic: bone resorption inhibitors

Pregnancy Category X

Indications

Treatment and prevention of osteoporosis in postmenopausal women.

Action

Binds to estrogen receptors, producing estrogen-like effects on bone, resulting in reduced resorption of bone and decreased bone turnover. **Therapeutic Effects:** Prevention of osteoporosis in patients at risk.

Pharmacokinetics

Absorption: Although well absorbed (>60%) after oral administration, extensive first-pass metabolism results in 2% bioavailability.
Distribution: Highly bound to plasma proteins, remainder of distribution unknown.
Metabolism and Excretion: Extensively metabolized by the liver; undergoes enterohepatic cycling; excreted primarily in feces.
Half-life: 27.7 hr.

TIME/ACTION PROFILE (effects on bone turnover)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	3 mo	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. History of thromboembolic events. Women with childbearing potential. Pregnancy, lactation, or children.

Use Cautiously in: Potential immobilization (increased risk of thromboembolic events).

Adverse Reactions/Side Effects

MS: leg cramps. **Misc:** hot flashes.

Interactions

Drug-Drug: Cholestyramine decreases absorption (avoid concurrent use). May alter effects of **warfarin** and **other highly protein-bound drugs**. Concurrent systemic **estrogen** therapy is not recommended.

Route/Dosage

PO (Adults): 60 mg once daily.

NURSING IMPLICATIONS

Assessment

- Assess patient for bone mineral density with x-ray and serum and urine bone turnover markers (bone-specific alkaline phosphatase, osteocalcin, and collagen breakdown products) before and periodically during therapy.
- ***Lab Test Considerations:*** May cause increased apolipoprotein A1, and reduced serum total cholesterol, LDL cholesterol, fibrinogen, apolipoprotein B, and lipoprotein.
- May cause increased hormone-binding globulin (sex steroid-binding globulin, thyroxine-binding globulin, corticosteroid-binding globulin) with increases in total hormone concentrations.
- May cause small decreases in serum total calcium, inorganic phosphate, total protein, and albumin.
- May also cause slight decrease in platelet count.

Potential Nursing Diagnoses

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

ramelteon (ra-mel-tee-on)

Rozerem

Classification

Therapeutic: sedative/hypnotics
Pharmacologic: melatonin receptor agonist

Pregnancy Category C

Indications

Treatment of insomnia characterized by difficult sleep onset.

Action

Activates melatonin receptors, which promotes maintenance of circadian rhythm, a part of the sleep-wake cycle. **Therapeutic Effects:** Easier onset of sleep.

Pharmacokinetics

Absorption: Well absorbed (84%), but bioavailability is low (1.8%) due to extensive first pass liver metabolism. Absorption in increased by a high fat meal.
Distribution: Widely distributed to body tissues.
Metabolism and Excretion: Extensively metabolized by the liver; mainly by CYP1A2 enzyme system. Metabolites are excreted mostly in urine (88%); 4% excreted in feces.
Half-life: 1–2.6 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	rapid	30–90 min	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Severe hepatic impairment. Concurrent fluvoxamine. lactation. Children (safety not established).
Use Cautiously in: Depression or history of suicidal ideation; Moderate hepatic impairment; Concurrent use of CYP3A4 inhibitors, such as ketoconazole; Concurrent use of CYP2C9 inhibitors, such as fluconazole; Use only if maternal benefit outweighs fetal risk.

Adverse Reactions/Side Effects

CNS: dizziness, fatigue, headache, insomnia (worsened). **GI:** nausea. **Endo:** ↑ prolactin levels, ↓ testosterone levels.

Interactions

Drug-Drug: Blood levels and effects are ↑ by **fluvoxamine**, potent inhibitor of the CYP1A2 enzyme system; concurrent use is contraindicated. Levels and effects may be ↓ by Id **rifampin**, an inducer of CYP enzymes. Concurrent use of CYP3A4 inhibitors, such as **ketoconazole** may ↑ levels and effects; use cautiously. Concurrent use of CYP2C9 inhibitors, such as **fluconazole** may ↑ levels and effects; use cautiously. ↑ risk of excessive CNS depression with other CNS depressants including **alcohol**, **benzodiazepines**, **opioids**, and other **sedative/hypnotics**.

Route/Dosage

PO (Adults): 8 mg within 30 min of going to bed.

NURSING IMPLICATIONS

Assessment

- Assess sleep patterns before and periodically throughout course of therapy.

Potential Nursing Diagnoses

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

Implementation

- Do not administer with or immediately after a high fat meal.

Implementation

- **PO:** May be administered without regard to meals.
- Calcium supplementation should be added to diet if daily intake is inadequate.

Patient/Family Teaching

- Instruct patient to take raloxifene as directed. Discuss the importance of adequate calcium and vitamin D intake or supplementation. Advise patient to discontinue smoking and alcohol consumption.
- Emphasize the importance of regular weight-bearing exercise. Advise patient that raloxifene should be discontinued at least 72 hr before and during prolonged immobilization (recovery from surgery, prolonged bed rest). Instruct patient to avoid prolonged restrictions of movement during travel because of increased risk of venous thrombosis.
- Advise patient that raloxifene will not reduce hot flashes or flushes associated with estrogen deficiency, and may cause hot flashes.
- Advise patient that raloxifene may have teratogenic effects. Instruct patient to notify health care professional immediately if pregnancy is planned or suspected.
- Instruct patient to read the package insert when initiating therapy and again with each prescription refill.

Evaluation/Desired Outcomes

- Prevention of osteoporosis in postmenopausal women.

Why was this drug prescribed for your patient?

- Before administering, reduce external stimuli and provide comfort measures to increase effectiveness of medication.
- **PO:** Administer within 30 min prior to going to bed.

Patient/Family Teaching

- Instruct patient to take ramelteon as directed, within 30 minutes of going to bed and to confine activities to those necessary to prepare for bed.
- Causes drowsiness. Caution patient to avoid driving and other activities requiring alertness until response to medication is known.
- Caution patient to avoid concurrent use of alcohol or other CNS depressants.

Evaluation/Desired Outcomes

- Relief of insomnia.

Why was this drug prescribed for your patient?

repaglinide (re-**pag**-gli-nide)

Gluconorm, Prandin

Classification

Therapeutic: antidiabetics
Pharmacologic: meglitinides

Pregnancy Category C

Indications

Type 2 diabetes mellitus, with diet and exercise; may be used with metformin, rosigliazone, or pioglitazone.

Action

Stimulates the release of insulin from pancreatic beta cells by closing potassium channels, which results in the opening of calcium channels in beta cells. This is followed by release of insulin. **Therapeutic Effects:** Lowering of blood glucose.

Pharmacokinetics

Absorption: Well absorbed (56%) after oral administration.
Distribution: Unknown.
Metabolism and Excretion: Mostly metabolized by the liver; metabolites are excreted primarily in feces.
Half-life: 1 hr.

TIME/ACTION PROFILE (effects on blood glucose)

ROUTE	ONSET	PEAK	DURATION
PO	within 30 min	unknown	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Lactation. Diabetic ketoacidosis. Insulin-dependent diabetes.

Use Cautiously in: Impaired liver function (longer dosing intervals may be necessary); Severe renal impairment (dosage reduction recommended); Pregnancy and children (safety not established; insulin recommended to control diabetes during pregnancy).

Adverse Reactions/Side Effects

CV: angina, chest pain. **Endo:** HYPOGLYCEMIA, hyperglycemia.

Interactions

Drug-Drug: Ketoconazole, miconazole, gemofibrozil itraconazole and **erythromycin** may ↓ metabolism and ↑ risk of hypoglycemia. Effects may also be ↑ by **NSAIDs, hormonal contraceptives, simvastatin, sulfonamides, chloramphenicol, warfarin, probenecid, MAO inhibitors,** and **beta blockers.** Effects may be ↓ by **corticosteroids, phenothiazines, thyroid preparations, estrogens, hormonal contraceptives, phenytoin, nicotinic acid, sympathomimetics, isoniazid,** and **calcium channel blockers.**
Drug-Natural Products: Glucosamine may worsen blood glucose control. **chromium,** and **coenzyme Q-10** may produce ↑ hypoglycemic effects.

Route/Dosage

PO (Adults): 0.5–4 mg taken before meals (not to exceed 16 mg/day)

Renal Impairment

PO (Adults): *Severe renal impairment*—start with 0.5 mg/day and titrate carefully.

NURSING IMPLICATIONS

Assessment

- **Observe patient for signs and symptoms of hypoglycemic reactions (abdominal pain, sweating, hunger, weakness, dizziness, headache, tremor, tachycardia, anxiety). Hypoglycemia may be difficult to recognize in geriatric patients and in patients taking beta blockers. Hypoglycemia is more likely to occur with insuffi-**

Rh_0(D) IMMUNE GLOBULIN

(arr aych oh dee im-**yoon glob**-yoo-lin)

Rh_0(D) immune globulin standard dose IM

BayRho-D Full Dose, Gamulin Rh, HypRho-D, Rhesonativ, RhoGAM

Rh_0(D) globulin microdose IM

BayRho-D Mini Dose, HypRho-D Mini-Dose, MICRhoGAM, Mini-Gamulin R

Rh_0(D) globulin IV

WinRho SD, WinRho SDF

Classification

Therapeutic: vaccines/immunizing agents
Pharmacologic: immune globulins

Pregnancy Category C

Indications

IM, IV: Administered to Rh_0(D)-negative patients who have been exposed to Rh_0(D)-positive blood by Delivering an Rh_0(D)-positive infant, Miscarrying or aborting an Rh_0(D)-positive fetus, Having amniocentesis or intra-abdominal trauma while carrying an Rh_0(D)-positive fetus, Following accidental transfusion of Rh_0(D)-positive blood to an Rh_0(D)-negative patient. **IV:** Management of immune thrombocytopenic purpura (ITP).

Action

Prevent production of anti-Rh_0(D) antibodies in Rh_0(D)-negative patients who were exposed to Rh_0(D)-positive blood. Increase platelet counts in patients with ITP. **Therapeutic Effects:** Prevention of antibody response and hemolytic disease of the newborn (erythroblastosis fetalis) in future pregnancies of women who have conceived an Rh_0(D)-positive fetus. Prevention of Rh_0(D) sensitization following transfusion accident. Decreased bleeding in patients with ITP.

Pharmacokinetics

Absorption: Well absorbed from IM sites.
Distribution: Unknown.
Metabolism and Excretion: Unknown.
Half-life: *IM*—30 days; *IV*—24 days.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
IM	rapid	5–10 days	unknown
IV‡	unknown	2 hr	unknown

‡When given for ITP, platelet counts start to rise in 1–2 days, peak after 5–7 days, and last for 30 days

Contraindications/Precautions

Contraindicated in: Rh_0(D)- or Du-positive patients. Patients previously sensitized to Rh_0(D) or Du.
Use Cautiously in: Patients with previous hypersensitivity reactions to immune globulins or thimerosal (IM product); ITP patients with pre-existing anemia (decreased dose if Hgb <10 g/dl).

Adverse Reactions/Side Effects

Hemat: *ITP*—anemia, introvascular hemolysis (D-positive patients with ITP only). **Local:** pain at IM site. **Misc:** fever.

Interactions

Drug-Drug: May decrease antibody response to some **live-virus vaccines (measles, mumps, rubella).**

Route/Dosage

Rh_0 (D) Immune Globulin (for IM use only)

Following Delivery

IM (Adults): 1 vial standard dose (300 mcg) within 72 hr of delivery.

cient caloric intake, following intense prolonged exercise, or when alcohol or more than one hypoglycemic agent is used.

- ***Lab Test Considerations:*** Monitor fasting serum glucose and glycosylated hemoglobin periodically during therapy to evaluate effectiveness.

Potential Nursing Diagnoses

Imbalanced nutrition: more than body requirements (Indications)
Noncompliance (Patient/Family Teaching)

Implementation

- Patients stabilized on a diabetic regimen who are exposed to stress, fever, trauma, infection, or surgery may require administration of insulin. Withhold repaglinide and reinstitute after resolution of acute episode.
- Repaglinide therapy should be temporarily discontinued from patients requiring surgery involving restricted intake of food and fluids.
- There is no fixed dose of repaglinide. Dose is based on periodic monitoring of blood glucose and long-term response is based on glycolysated hemoglobin levels. If adequate response is not achieved, metformin may be added to regimen. If combination therapy is unsuccessful, oral hypoglycemic therapy may need to be discontinued and replaced with insulin.
- When replacing other oral hypoglycemic agents, repaglinide may be started on the day following discontinuation of the other agent. Monitor blood glucose closely. Discontinuation of long-acting oral hypoglycemics may require monitoring for a week or more.
- Short-term repaglinide therapy may be used for patients well controlled with diet experiencing transient loss of control.
- **PO:** Administer up to 30 min before meals. Patients who skip a meal or add an extra meal should skip or add a dose, respectively, for that meal.

Patient/Family Teaching

- Instruct patient to take repaglinide before each meal, exactly as directed.
- Explain to patient that repaglinide helps control hyperglycemia but does not cure diabetes. Therapy is usually long term.
- Encourage patient to follow prescribed diet, medication, and exercise regimen to prevent hyperglycemic or hypoglycemic episodes.
- Review signs of hypoglycemia and hyperglycemia with patient. If hypoglycemia occurs, advise patient to take a glass of orange juice or 2–3 tsp of sugar, honey, or corn syrup dissolved in water, and notify health care professional.
- Instruct patient in proper testing of blood glucose. These tests should be monitored closely during periods of stress or illness and a health care professional notified if significant changes occur.
- Caution patient to avoid taking other prescription or OTC medications, herbal products, or alcohol during repaglinide therapy without consulting health care professional.
- Insulin is the recommended method of controlling blood glucose during pregnancy. Counsel female patients to use a form of contraception other than oral contraceptives and to notify health care professional promptly if pregnancy is planned or suspected.
- Advise patient to inform health care professional of medication regimen prior to treatment or surgery.
- Advise patient to carry a form of sugar (sugar packets, candy) and identification describing disease process and medication regimen at all times.
- Emphasize the importance of routine follow-up exams and regular testing of blood glucose and glycosylated hemoglobin.

Evaluation/Desired Outcomes

- Control of blood glucose levels without the appearance of hypoglycemic or hyperglycemic episodes.

Why was this drug prescribed for your patient?

Before Delivery

IM (Adults): 1 vial standard dose (300 mcg) at 26–28 wk.

Termination of Pregnancy (<13 wk Gestation)

IM (Adults): 1 vial of microdose (50 mcg) within 72 hr.

Termination of Pregnancy (>13 wk Gestation)

IM (Adults): 1 vial standard dose (300 mcg) within 72 hr.

Large Fetal-Maternal Hemorrhage

IM (Adults): Packed RBC volume of hemorrhage/15 = number of vials of standard dose (300 mcg) preparation (round to next whole number of vials).

Transfusion Accident

IM (Adults): (Volume of Rh-positive blood administered × Hct of donor blood)/15 = number of vials of standard dose (300 mcg) preparation (round to next whole number of vials).

Rh_0 (D) Immune Globulin IV (for IM or IV Use)

Following Delivery

IM, IV (Adults): 600 IU (120 mcg) within 72 hr of delivery.

Prior to Delivery

IM, IV (Adults): 1500 IU (300 mcg) of Rh_0(D) immune globulin IV at 28 wk; if initiated earlier in pregnancy, repeat q 12 wk.
IM, IV (Adults): 600 IU (120 mcg) within 72 hr.

Following Amniocentesis <34 wk or Chorionic Villus Sampling

IM, IV (Adults): 1500 IU (300 mcg) within 72 hr; repeat q 12 wk during pregnancy.

Large Fetal-Maternal Hemorrhage/Transfusion Accident

IM (Adults): 6000 IU (1200 mcg) q 12 hr until total dose is given (total dose determined by amount of blood loss/hemorrhage).

IV (Adults): 3000 IU (600 mcg) q 8 hr until total dose is given (total dose determined by amount of blood loss/hemorrhage).

Immune Thrombocytopenic Purpura (ITP)

IV (Adults and Children): 50 mcg (250 IU)/kg initially (if Hgb <10g/dl, decrease dose to 25–40 mcg [125–200 IU]/kg); further dosing/frequency determined by clinical response (range 25–60 mcg [125–300 IU] /kg). Each dose may be given as a single dose or in 2 divided doses on separate days.

NURSING IMPLICATIONS

Assessment

- **IV:** Assess vital signs periodically during therapy in patients receiving Rh_0 (D) IG IV.
- **ITP:** Monitor patient for signs and symptoms of intravascular hemolysis [IVH] (back pain, shaking chills, hemoglobinuria), anemia, and renal insufficiency. If transfusions are required, use Rh_0(D) negative packed red blood cells to prevent exacerbation of IVH.
- ***Lab Test Considerations:*** *Pregnancy:* Type and crossmatch of mother and newborn's cord blood must be performed to determine need for medication. Mother must be Rh_0(D)-negative and Du-negative. Infant must be Rh_0(D)-positive. If there is doubt regarding infant's blood type or if father is Rh_0(D)-positive, medication should be given.
- An infant born to a woman treated with Rh_0(D) immune globulin antepartum may have a weakly positive direct Coombs' test result on cord or infant blood.
- **ITP:** Monitor platelet counts, RBC counts, hemoglobin, and reticulocyte levels to determine effectiveness of therapy.

Potential Nursing Diagnoses

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

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Rh_0(D) IMMUNE GLOBULIN

Implementation

- Do not give to infant, to Rh_0(D)-positive individual, or to Rh_0(D)-negative individual previously sensitized to the Rh_0(D) antigen. However, there is no more risk than when given to a woman who is not sensitized. When in doubt, administer Rh_0 (D) immune globulin.
- Do not confuse IM and IV formulations. Rh immune globulin for IV administration is labelled 'Rh Immune Globulin Intravenous.' Rh Immune Globulin Intravenous may be given IM, however, Rh Immune Globulin (microdose and standard dose) is for IM use only and cannot be given IV.
- When using prefilled syringes, allow solution to reach room temperature before administration.
- **IM:** Reconstitute Rh_0 (D) immune globulin IV for IM use immediately before use with 1.25 ml of 0.9% NaCl. Inject diluent onto inside wall of vial and wet pellet by gently swirling until dissolved. Do not shake.
- Administer into the deltoid muscle. Dose should be given within 3 hr but may be given up to 72 hr after delivery, miscarriage, abortion, or transfusion.
- **Direct IV:** Reconstitute Rh_0 (D) immune globulin IV for IV administration immediately before use with 2.5 ml of 0.9% NaCl. Inject diluent onto inside wall of vial and wet pellet by gently swirling until dissolved. Do not shake. ***Rate:*** Administer over 3–5 min.

Patient/Family Teaching

- **Pregnancy:** Explain to patient that the purpose of this medication is to protect future Rh_0(D)-positive infants.
- **ITP:** Explain purpose of medication to patient.

Evaluation/Desired Outcomes

- Prevention of erythroblastosis fetalis in future Rh_0(D)-positive infants.
- Prevention of Rh_0(D) sensitization following transfusion accident.
- Decreased bleeding episodes in patients with ITP.

Why was this drug prescribed for your patient?

rifampin (rif-**am**-pin)

Rifadin, Rimactane, ♣Rofact

Classification

Therapeutic: antituberculars
Pharmacologic: rifamycins

Pregnancy Category C

Indications

Active tuberculosis (with other agents). Elimination of the meningococcal carrier state.

Action

Inhibits RNA synthesis by blocking RNA transcription in susceptible organisms. **Therapeutic Effects:** Bactericidal action against susceptible organisms. **Spectrum:** Broad spectrum notable for activity against: Mycobacteria, *Staphylococcus aureus*, *Haemophilus influenzae*, *Legionella pneumophila*, *Neisseria meningitidis*.

Pharmacokinetics

Absorption: Well absorbed after oral administration.
Distribution: Widely distributed; penetreates CSF. Crosses placenta; enters breast milk.
Metabolism and Excretion: Mostly metabolized by the liver; 60% eliminated in feces via biliary elimination.
Half-life: 3 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	rapid	2–4 hr	12–24 hr
IV	rapid	end of infusion	12–24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Concurrent delavirdine, indinavir, nelfinavir, pyrazinamide or saquinavir.
Use Cautiously in: History of liver disease; Concurrent use of other hepatotoxic agents; Pregnancy or lactation.

Adverse Reactions/Side Effects

CNS: ataxia, confusion, drowsiness, fatigue, headache, weakness. **EENT:** red discoloration of tears. **GI:** abdominal pain, diarrhea, flatulence, heartburn, nausea, red discoloration of saliva, vomiting, drug-induced hepatitis. **GU:** red discoloration of urine. **Hemat:** hemolytic anemia, thrombocytopenia. **MS:** arthralgia, myalgia. **Misc:** red discoloration of all body fluids, flu-like syndrome.

Interactions

Drug-Drug: ↑ risk of hepatotoxicity with other **hepatotoxic agents,** including **alcohol, ketoconazole isoniazid, pyrazinamide** (concurrent use with **pyrazinamide** may result in potentially fatal hepatotoxicity and should be avoided). Rifampin significantly ↓ blood levels of **delavirdine, indinavir, nelfinavir,** and **saquinavir**; concurrent use is contraindicated. Rifampin stimulates liver enzymes, which may ↑ metabolism and ↓ effectiveness of other drugs, including **ritonavir, nevirapine,** and **efavirenz** (dosage adjustment may be necessary), **corticosteroids, disopyramide, quinidine, opioid analgesics, oral hypoglycemic agents, warfarin, estrogens, phenytoin, verapamil, fluconazole, ketoconazole, itraconazole, quinidine, tocainide, theophylline, chloramphenicol,** and **hormonal contraceptive agents.**

Route/Dosage

Tuberculosis

PO, IV (Adults): 600 mg/day or 10 mg/kg/day (up to 600 mg/day) single dose; may also be given 2–3 times weekly.
PO, IV (Children): 10–20 mg/kg/day single dose (not to exceed 600 mg/day); may also be given 2–3 times weekly.

Asymptomatic Carriers of Meningococcus

PO, IV (Adults): 600 mg q 12 hr for 2 days.
PO, IV (Children ≥1 mo): 10 mg/kg q 12 hr for 2 days.
PO (Infants <1 mo): 5 mg/kg q 12 hr for 2 days.

NURSING IMPLICATIONS

Assessment

- Perform mycobacterial studies and susceptibility tests prior to and periodically during therapy to detect possible resistance.
- Assess lung sounds and character and amount of sputum periodically during therapy.
- ***Lab Test Considerations:*** Evaluate renal function, CBC, and urinalysis periodically and during therapy.
- Monitor hepatic function at least monthly during therapy. May cause ↑ BUN, AST, ALT, and serum alkaline phosphatase, bilirubin, and uric acid concentrations.
- May cause false-positive direct Coombs' test results. May interfere with folic acid and vitamin B assays.
- May interfere with dexamethasone suppression test results; discontinue rifampin 15 days prior to test.
- May interfere with methods for determining serum folate and vitamin B levels and with urine tests based on color reaction.
- May delay hepatic uptake and excretion of sulfobromophthalein (SBP) during SBP uptake and excretion tests; perform test prior to daily dose of rifampin.

Potential Nursing Diagnoses

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

Implementation

- **Do not confuse rifampin with rifabutin.**
- **PO:** Administer medication on an empty stomach at least 1 hr before or 2 hr after meals with a full glass (240 ml) of water. If GI irritation becomes a problem, may be administered with food. Antacids may also be taken 1 hr before administration. Capsules may be opened and contents mixed with applesauce or jelly for patients with difficulty swallowing.
- Pharmacist can compound a syrup for patients unable to swallow solids.
- **Intermittent Infusion:** Reconstitute 600-mg vial with 10 ml of sterile water for injection and swirl gently to dissolve completely. Dilute further in 500 ml or 100 ml of D5W or 0.9% NaCl. Solution is stable for 24 hr at room temperature; however, manufacturer recommends administration within 4 hr to prevent precipitation. ***Rate:*** Administer solutions diluted in 500 ml over 3 hr and solutions diluted in 100 ml over 30 min.

Patient/Family Teaching

- Advise patient to take medication once daily (unless biweekly regimens are used), as directed; not to skip doses or double up on missed doses. Emphasize the importance of continuing therapy even after symptoms have subsided. Length of therapy for tuberculosis depends on regimen being used and underlying disease states. Patient on short-term prophylactic therapy should also be advised of the importance of compliance with therapy.
- Advise patient to notify health care professional promptly if signs and symptoms of hepatitis (yellow eyes and skin, nausea, vomiting, anorexia, unusual tiredness, weakness) or thrombocytopenia (unusual bleeding or bruising) occur.
- Caution patient to avoid the use of alcohol during this therapy because it may increase the risk of hepatotoxicity.
- Instruct patient to report the occurrence of flu-like symptoms (fever, chills, myalgia, headache) promptly.
- Rifampin may occasionally cause drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.

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rifampin

- Inform patient that saliva, sputum, sweat, tears, urine, and feces may become red-orange to red-brown and that soft contact lenses may become permanently discolored.
- Advise patient that this medication has teratogenic properties and may decrease the effectiveness of oral contraceptives. Counsel patient to use a nonhormonal form of contraception throughout therapy.
- Emphasize the importance of regular follow-up exams to monitor progress and to check for side effects.

Evaluation/Desired Outcomes

- Decreased fever and night sweats
- Diminished cough and sputum production.
- Negative sputum cultures.
- Increased appetite.
- Weight gain.
- Reduced fatigue.
- Sense of well-being in patients with tuberculosis.
- Prevention of meningococcal meningitis.
- Prevention of *Haemophilus influenzae* type B infection. Prophylactic course is usually-short term.

Why was this drug prescribed for your patient?

risedronate (riss-ed-roe-nate)

Actonel

Classification

Therapeutic: bone resorption inhibitors
Pharmacologic: biphosphonates

Pregnancy Category C

Indications

Prevention and treatment of postmenopausal and corticosteroid-induced osteoporosis. Management of Paget's disease of bone in patients who have a serum alkaline phosphatase level of at least twice normal, have symptoms, are at risk for complications.

Action

Inhibits bone resorption by binding to bone hydroxyapatite, which inhibits osteoclast activity. **Therapeutic Effects:** Reversal of the progression of osteoporosis with decreased fractures and other sequelae. Reduced bone turnover and resorption; normalization of serum alkaline phosphatase with reduced complications of Paget's disease.

Pharmacokinetics

Absorption: Rapidly but poorly absorbed following oral administration (0.63% bioavailability).
Distribution: 60% of absorbed dose distributes to bone.
Metabolism and Excretion: 40% of absorbed dose is excreted unchanged by kidneys; unabsorbed drug is excreted in feces.
Half-life: *Initial*—1.5 hr; *terminal*—220 hr (reflects dissociation from bone).

TIME/ACTION PROFILE (effects on serum alkaline phosphatase)

ROUTE	ONSET	PEAK	DURATION
PO	within days	30 days	up to 16 mo

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Hypocalcemia. Lactation. Severe renal impairment (CCr <30 ml/min).
Use Cautiously in: History of upper GI disorders; Other disturbances of bone or mineral metabolism (correct abnormalities before initiating therapy); Dietary deficiencies (supplemental vitamin D and calcium may be required); Pregnancy or children (safety not established; use in pregnancy only if potential benefit justifies potential risks).

Adverse Reactions/Side Effects

CNS: weakness. **EENT:** amblyopia, conjunctivitis, dry eyes, eye pain/inflammation, tinnitus. **CV:** chest pain, edema. **GI:** abdominal pain, diarrhea, belching, colitis, constipation, dysphagia, esophagitis, esophageal ulcer, gastric ulcer, nausea. **Derm:** rash. **MS:** arthralgia, bone pain, leg cramps, myasthenia. **Misc:** flu-like syndrome.

Interactions

Drug-Drug: Concurrent use with **NSAIDs** or **aspirin** ↑ risk of GI irritation. Absorption is ↓ by **calcium supplements** or **antacids.**
Drug-Food: Food decreases absorption (administer at least 30 min before breakfast).

Route/Dosage

PO (Adults): *Osteoporosis*—5 mg once daily; taken 30 min before breakfast *or* 35 mg once weekly; *Paget's disease*—30 mg once daily for 2 mo; taken 30 min before breakfast. Retreatment may be considered after 2 mo off therapy.

NURSING IMPLICATIONS

Assessment

- **Osteoporosis:** Assess patients via bone density study for low bone mass before and periodically during therapy.
- **Paget's disease:** Assess for symptoms of Paget's disease (bone pain, headache, decreased visual and auditory acuity, increased skull size).
- ***Lab Test Considerations:*** *Osteoporosis:* Assess serum calcium before and periodically during therapy. Hypocalcemia and vitamin D deficiency should be treated before initiating alendronate therapy. May cause mild, transient ↑ of calcium and phosphate.
- *Paget's disease:* Monitor alkaline phosphatase prior to and periodically during therapy to monitor effectiveness of therapy.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Administer first thing in the morning with 6–8 oz of plain water, 30 min prior to other medications, beverages, or food.
- Calcium-, magnesium-, or aluminum-containing agents may interfere with absorption of risedronate and should be taken at a different time of day with food.

Patient/Family Teaching

- Instruct patient on the importance of taking exactly as directed, first thing in the morning, 30 min prior to other medications, beverages, or food. Waiting longer than 30 min will improve absorption. Risedronate should be taken with 6–8 oz of plain water (mineral water, orange juice, coffee, and other beverages decrease absorption). If a dose is missed, skip dose and resume the next morning; do not double doses or take later in the day. Do not discontinue without consulting health care professional.
- Caution patients to remain upright for 30 min following dose to facilitate passage to stomach and minimize risk of esophageal irritation.
- Advise patient to eat a balanced diet and consult health care professional about the need for supplemental calcium and vitamin D.
- Encourage patient to participate in regular exercise and to modify behaviors that increase the risk of osteoporosis (stop smoking, reduce alcohol consumption).
- Advise female patients to notify health care professional if pregnancy is planned or suspected or if she is nursing.

Evaluation/Desired Outcomes

- Reversal of the progression of osteoporosis with decreased fractures and other sequelae.
- Decrease in serum alkaline phosphatase and the progression of Paget's disease.

Why was this drug prescribed for your patient?

risperidone (riss-**per**-i-done)

Risperdal, Risperdal M-TAB, Risperdal Consta

Classification

Therapeutic: antipsychotics

Pregnancy Category C

Indications

Schizophrenia (treatment and prevention of relapse). Bipolar mania (oral only; can be used with lithium or valproate).

Action

May act by antagonizing dopamine and serotonin in the CNS. **Therapeutic Effects:** Decreased symptoms of psychoses or bipolar mania.

Pharmacokinetics

Absorption: Well absorbed (70%) after administration oral tablets, solution or orally disintegrating tablets. Following IM administration, small initial release of drug, followed by 3–wk lag; the rest of release starts at 3 wk and lasts 4–6 wk.

Distribution: Unknown.

Protein Binding: *Risperidone*—>90%; *9-hydroxyrisperidone*—77%.

Metabolism and Excretion: Extensively metabolized by the liver. Most patients convert risperidone to 9-hydroxyrisperidone rapidly. Poor metabolizers (6–8% of Caucasians) convert it more slowly; 9-hydroxyrisperidone is an active antipsychotic. Risperidone and its active metabolite are renally eliminated.

Half-life: *Extensive metabolizers*—3 hr for risperidone, 21 hr for 9-hydroxyrisperidone. *Poor metabolizers*—20 hr for risperidone, 30 hr for 9-hydroxyrisperidone.

TIME/ACTION PROFILE (clinical effects)

ROUTE	ONSET	PEAK	DURATION
PO	1–2 wk	unknown	up to 6 wk†
IM	3 wk	4–6 wk	up to 6 wk†

†After discontinuation

Contraindications/Precautions

Contraindicated in: Hypersensitivity.

Use Cautiously in: Cardiovascular disease (increased risk of arrhythmias/hypotension); History of seizures/suicide attempt/drug abuse; Geriatric patients (may ↑ cardiovascular morbidity/mortality in elderly patients with dementia-related psychoses); Geriatric/debilitated patients, patients with renal/hepatic impairment (use lower initial dose); Diabetes or risk factors for diabetes (may worsen glucose control); Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: NEUROLEPTIC MALIGNANT SYNDROME, aggressive behavior, dizziness, extrapyramidal reactions, headache, increased dreams, increased sleep duration, insomnia, sedation, fatigue, impaired temperature regulation, nervousness, tardive dyskinesia. **EENT:** pharyngitis, rhinitis, visual disturbances. **Resp:** cough, dyspnea, rhinitis. **CV:** arrhythmias, orthostatic hypotension, tachycardia. **GI:** constipation, diarrhea, dry mouth, nausea, abdominal pain, anorexia, dyspepsia, increased salivation, vomiting. **GU:** decreased libido, dysmenorrhea, difficulty urinating, polyuria. **Derm:** itching/skin rash, dry skin, increased pigmentation, increased sweating, photosensitivity, seborrhea. **Endo:** galactorrhea, hyperglycemia. **MS:** arthralgia, back pain. **Misc:** weight gain, polydipsia, weight loss.

Interactions

Drug-Drug: May ↓ the antiparkinsonian effects of **levodopa** or other **dopamine agonists. Carbamazepine**, **phenytoin**, **phenobarbital**, **rifampin** and other **enzyme inducers** ↑ metabolism and may ↓ effective-

CONTINUED

risperidone

Implementation

- Do not confuse risperidone with reserpine.
- When switching from other antipsychotics, discontinue previous agents when starting risperidone and minimize the period of overlapping antipsychotic agents.
- If therapy is reinstituted after an interval off risperidone, follow initial 3-day titration schedule.
- For IM use, establish tolerance with oral dosing before IM use and continue oral dosing for 3 wk following initial IM injection. Do not increase dose more frequently than every 4 wks.
- **PO:** For orally disintegrating tablets, open blister pack by pealing back foil to expose tablet; do not try to push tablet through foil. Use dry hands to remove tablet from blister and immediately place entire tablet on tongue. Tablets disintegrate in mouth within seconds and can be swallowed with or without liquid. Do not attempt to split or chew tablet. Do not try to store tablets once removed from blister.
- Oral solution can be mixed with water, coffee, orange juice, or low fat milk; do not mix with cola or tea.
- **IM:** Reconstitute with 2 ml of diluent provided by manufacturer. Administer via deep gluteal injection using enclosed safety needle; alternate buttocks with each injection. Allow solution to warm to room temperature prior to injection. Administer immediately after mixed with diluent; shake well to mix suspension. Must be administered within 6 hr of reconstitution. Store dose pack in refrigerator.
- Do not combine dose strengths in a single injection.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed.
- Inform patient of the possibility of extrapyramidal symptoms. Instruct patient to report these symptoms immediately to health care professional.
- Advise patient to change positions slowly to minimize orthostatic hypotension.
- May cause drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to use sunscreen and protective clothing when exposed to the sun to prevent photosensitivity reactions. Extremes in temperature should also be avoided; this drug impairs body temperature regulation.
- Caution patient to avoid concurrent use of alcohol, other CNS depressants, and OTC medications or herbal products without consulting health care professional.
- Advise female patients to notify health care professional if pregnancy is planned or suspected or if breastfeeding or planning to breastfeed.
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- Instruct patient to notify health care professional promptly if sore throat, fever, unusual bleeding or bruising, rash, or tremors occur.
- Emphasize the need for continued follow-up for psychotherapy and monitoring for side effects.

Evaluation/Desired Outcomes

- Decrease in excited, paranoic, or withdrawn behavior.
- Decrease in bipolar mania.

Why was this drug prescribed for your patient?

ness; dosage adjustment may be necessary. **Fluoxetine** and **paroxetine** ↑ blood levels and may ↑ effects; dosage adjustment may be necesssary. **Clozapine** ↓ metabolism and may ↑ effects of risperidone. ↑ CNS depression may occur with other **CNS depressants**, including **alcohol, antihistamines**, **sedative/hypnotics**, or **opioid analgesics**.

Drug-Natural Products: Kava, valerian or chamomile can ↑ CNS depression.

Route/Dosage

Schizophrenia

PO (Adults): 1 mg twice daily, increased by 3rd day to 3 mg twice daily. Further increments may be made at weekly intervals by 1 mg twice daily (usual range, 4–6 mg/day; not to exceed 16 mg/day). May also be given as a single daily dose after initial titration.

IM (Adults): 25 mg every 2 wk; some patients may require larger dose of 37.5 or 50 mg every 2 wk.

Bipolar Mania

PO (Adults): 2–3 mg/day as a single daily dose, dosage may be increased at 24–hr intervals by 1 mg (range 1–5 mg/day.

PO (Geriatric Patients or Debilitated Patients): Start with 0.5 mg twice daily; increase by 0.5 mg twice daily, up to 1.5 mg twice daily; then increase at weekly intervals if necessary. May also be given as a single daily dose after initial titration.

Renal Impairment

Hepatic Impairment

PO (Adults): Start with 0.5 mg twice daily; increase by 0.5 mg twice daily, up to 1.5 mg twice daily; then increase at weekly intervals if necessary. May also be given as a single daily dose after initial titration.

NURSING IMPLICATIONS

Assessment

- Monitor patient's mental status (delusions, hallucinations, and behavior) before and periodically during therapy.
- Monitor mood changes. Assess for suicidal tendencies, especially during early therapy. Restrict amount of drug available to patient.
- Monitor blood pressure (sitting, standing, lying down) and pulse before and frequently during initial dose titration. May cause prolonged QT interval, tachycardia, and orthostatic hypotension. If hypotension occurs, dose may need to be decreased.
- Observe patient when administering medication to ensure medication is swallowed and not hoarded.
- Monitor patient for onset of extrapyramidal side effects (*akathisia*—restlessness; *dystonia*—muscle spasms and twisting motions; or *pseudoparkinsonism*—mask-like face, rigidity, tremors, drooling, shuffling gait, dysphagia). Report these symptoms; reduction of dose or discontinuation may be necessary. Trihexyphenidyl or diphenhydramine may be used to control symptoms.
- Monitor for tardive dyskinesia (involuntary rhythmic movement of mouth, face, and extremities). Report immediately; may be irreversible.
- Monitor for development of neuroleptic malignant syndrome (fever, respiratory distress, tachycardia, seizures, diaphoresis, hypertension or hypotension, pallor, tiredness). Notify physician or other health care professional immediately if these symptoms occur.
- ***Lab Test Considerations:*** May cause ↑ serum prolactin levels.
- May cause ↑ AST and ALT.
- May also cause anemia, thrombocytopenia, leukocytosis, and leukopenia.

Potential Nursing Diagnoses

Risk for self-directed violence (Indications)
Disturbed thought process (Indications)
Risk for injury (Side Effects)

CONTINUED

rizatriptan (riz-a-**trip**-tan)

Maxalt, Maxalt-MLT

Classification

Therapeutic: vascular headache suppressants
Pharmacologic: 5 HT_1 agonists

Pregnancy Category C

Indications

Acute treatment of migraine headache.

Action

Acts as an agonist at specific 5-HT_1 receptor sites in intracranial blood vessels and sensory trigeminal nerves. **Therapeutic Effects:** Cranial vessel vasoconstriction with associated decrease in release of neuropeptides and resultant decrease in migraine headache.

Pharmacokinetics

Absorption: Completely absorbed after oral administration, but first-pass metabolism results in 45% bioavailability.
Distribution: Unknown.
Metabolism and Excretion: Primarily metabolized by monoamine oxidase-A (MAO-A); minor conversion to an active compound; 14% excreted unchanged in urine.
Half-life: 2–3 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	30 min	1–1.5 hr	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Ischemic or vasospastic cardiovascular, cerebrovascular, or peripheral vascular syndromes. History of significant cardiovascular disease. Uncontrolled hypertension. Should not be used within 24 hr of other 5-HT_1 agonists or ergot-type compounds (dihydroergotamine). Basilar or hemiplegic migraine. Concurrent MAO-A inhibitor therapy or within 2 wk of discontinuing MAO-A inhibitor therapy. Phenylketonuria (orally disintegrating tablet contains aspartame).
Use Cautiously in: Severe renal impairment, especially in patients on dialysis; Moderate hepatic impairment; Pregnancy, lactation, or children <18 yr (safety not established)
Exercise Extreme Caution in: Cardiovascular risk factors (hypertension, hypercholesterolemia, cigarette smoking, obesity, diabetes, strong family history, menopausal women or men >40 yr); use only if cardiovascular status has been evaluated and determined to be safe and first dose is administered under supervision.

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, weakness. **CV:** CORONARY ARTERY VASOSPASM, MI, VENTRICULAR FIBRILLATION, VENTRICULAR TACHYCARDIA, chest pain, myocardial ischemia. **GI:** dry mouth, nausea. **Misc:** hypersensitivity reactionstion including ANGIOEDEMA, toxic epidermal necrolysis, pain.

Interactions

Drug-Drug: Concurrent **MAO-A inhibitors** ↑ blood levels and adverse reactions (concurrent use or use within 2 wk or MAO inhibitor is contraindicated). Concurrent use with other **5-HT agonists** or **ergot-type compounds (dihydroergotamine)** may result in ↑ vasoactive properties (avoid use within 24 hr of each other). **Propranolol** ↑ blood levels and risk of adverse reactions (dosage reduction recommended). Concurrent use with **SSRI antidepressants** may result in weakness, hyperreflexia, and incoordination.
Drug-Natural Products: Increased risk of serotinergic side effects including serotonin syndrome with **St. John's wort** and **SAMe.**

rosiglitazone (roe-zi-**glit**-a-zone)

Avandia

Classification

Therapeutic: antidiabetics
Pharmacologic: thiazolidinediones

Pregnancy Category C

Indications

Type 2 diabetes mellitus (with diet and exercise); may be used with metformin sulfonylureas or insulin.

Action

Improves sensitivity to insulin by acting as an agonist at receptor sites involved in insulin responsiveness and subsequent glucose production and utilization. Requires insulin for activity. **Therapeutic Effects:** Decreased insulin resistance resulting in glycemic control without hypoglycemia.

Pharmacokinetics

Absorption: Well absorbed (99%) after oral administration.
Distribution:
Protein Binding: 99.8% bound to plasma proteins.
Metabolism and Excretion: Entirely metabolized by the liver.
Half-life: 3.2–3.6 hr (increased in liver disease).

TIME/ACTION PROFILE (effects on blood glucose)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	unknown	12–24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Diabetic ketoacidosis. Clinical evidence of active liver disease or increased ALT (>2.5 times upper limit of normal). Pregnancy or lactation (insulin should be used). Children <18 yr or type 1 diabetes.
Use Cautiously in: Edema; CHF (avoid use in moderate to severe CHF unless benefits outweigh risks); Concurrent use with insulin (may increase risk of adverse cardiovascular reactions); Hepatic impairment; Women with childbearing potential (may restore ovulation and risk of pregnancy).

Adverse Reactions/Side Effects

CV: CHF, edema. **Derm:** urticaria. **Hemat:** anemia. **Metab:** ↑ total cholesterol, LDL and HDL, weight gain. **Misc:** ANGIOEDEMA (rare).

Interactions

Drug-Drug: Concurrent use with **rifampin** ↓ levels and may ↓ effectiveness. **Gemfibrozil** ↑ levels and may ↑ risk of hypoglycemia (↓ dose of rosiglitazone).
Drug-Natural Products: Glucosamine may worsen blood glucose control. **Fenugreek, chromium,** and **coenzyme Q-10** may produce additive hypoglycemic effects.

Route/Dosage

PO (Adults): 4 mg as a single dose once daily or 2 mg twice daily; after 8 wk, may be increased if necessary to 8 mg once daily or 4 mg twice daily.

NURSING IMPLICATIONS

Assessment

- Observe patient taking concurrent insulin for signs and symptoms of hypoglycemia (sweating, hunger, weakness, dizziness, tremor, tachycardia, anxiety).
- Assess patient for edema and signs of CHF (dyspnea, rales/crackles, peripheral edema, weight gain, jugular venous distension). May require discontinuation of rosiglitazone.
- ***Lab Test Considerations:*** Monitor serum glucose and glycosylated hemoglobin (HbA1c) periodically during therapy to evaluate effectiveness.

Route/Dosage

PO (Adults): 5–10 mg (5-mg dose in patients receiving propranolol); may be repeated in 2 hr; not to exceed 3 doses/24 hr.

NURSING IMPLICATIONS

Assessment

- Assess pain location, character, intensity, and duration and associated symptoms (photophobia, phonophobia, nausea, vomiting) during migraine attack.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Tablets should be swallowed whole with liquid.
- Orally disintegrating tablets should be left in the package until use. Remove from the blister pouch. Do not push tablet through the blister; peel open the blister pack with dry hands and place tablet on tongue. Tablet will dissolve rapidly and be swallowed with saliva. No liquid is needed to take the orally disintegrating tablet.

Patient/Family Teaching

- Inform patient that rizatriptan should be used only during a migraine attack. It is meant to be used for relief of migraine attacks but not to prevent or reduce the number of attacks.
- Instruct patient to administer rizatriptan as soon as symptoms of a migraine attack appear, but it may be administered at any time during an attack. If migraine symptoms return, a second dose may be used. Allow at least 2 hr between doses, and do not use more than 30 mg in any 24-hr period.
- If first dose does not relieve headache, additional rizatriptan doses are not likely to be effective; notify health care professional.
- Caution patient not to take rizatriptan within 24 hr of other vascular headache suppressants.
- Advise patient that lying down in a darkened room after rizatriptan administration may further help relieve headache.
- Caution patient not to use rizatriptan if she is pregnant, suspects she is pregnant, plans to become pregnant, or is breastfeeding. Adequate contraception should be used during therapy.
- Advise patient to notify health care professional before next dose of rizatriptan if pain or tightness in the chest occurs during use. **If pain is severe or does not subside, notify health care professional immediately.** If feelings of tingling, heat, flushing, heaviness, pressure, drowsiness, dizziness, tiredness, or sickness develop, discuss with health care professional at next visit.
- May cause dizziness or drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid alcohol, which aggravates headaches, during rizatriptan use.

Evaluation/Desired Outcomes

- Relief of migraine attack.

Why was this drug prescribed for your patient?

- Monitor CBC with differential periodically throughout therapy. May cause ↓ in hemoglobin, hematocrit, and WBC, usually during the first 4–8 wk of therapy; then levels stabilize.
- Monitor AST and ALT prior to initiating therapy and periodically thereafter or if jaundice or symptoms of hepatic dysfunction occur. May cause irreversible ↑ in AST and ALT or hepatic failure (rare). If ALT increases to >3 times the upper limit of normal, recheck ALT promptly. Discontinue rosiglitazone if ALT remains >3 times normal.
- May cause ↑ in total cholesterol, LDL, and HDL and ↓ in free fatty acids.

Potential Nursing Diagnoses

Imbalanced nutrition: more than body requirements (Indications)
Deficient knowledge, related to medication regimen (Patient/Family Teaching)
Noncompliance (Patient/Family Teaching)

Implementation

- Patients stabilized on a diabetic regimen who are exposed to stress, fever, trauma, infection, or surgery may require administration of insulin.
- Available in combination with metformin.
- **PO:** May be administered with or without meals.

Patient/Family Teaching

- Instruct patient to take medication exactly as directed. If dose for 1 day is missed, do not double dose the next day.
- Explain to patient that this medication controls hyperglycemia but does not cure diabetes. Therapy is long term.
- Review signs of hypoglycemia and hyperglycemia with patient. If hypoglycemia occurs, advise patient to take a glass of orange juice or 2–3 tsp of sugar, honey, or corn syrup dissolved in water and notify health care professional.
- Encourage patient to follow prescribed diet, medication, and exercise regimen to prevent hypoglycemic or hyperglycemic episodes.
- Instruct patient in proper testing of serum glucose and ketones. These tests should be closely monitored during periods of stress or illness and health care professional notified if significant changes occur.
- Advise patient to notify health care professional immediately if signs of hepatic dysfunction (nausea, vomiting, abdominal pain, fatigue, anorexia, dark urine, jaundice) or CHF occur.
- Insulin is the preferred method of controlling blood glucose during pregnancy. Counsel female patients that higher doses of oral contraceptives or a form of contraception other than oral contraceptives may be required and to notify health care professional promptly if pregnancy is planned or suspected.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Advise patient to carry a form of sugar (sugar packets, candy) and identification describing disease process and medication regimen at all times.
- Emphasize the importance of routine follow-up exams.

Evaluation/Desired Outcomes

- Control of blood glucose levels.

Why was this drug prescribed for your patient?

SALICYLATES

aspirin (**as**-pir-in)
acetylsalicylic acid, Acuprin, ♣Apo-ASA, ♣Apo-ASEN, ♣Arthrinol, ♣Arthrisin, ♣Artria S.R, A.S.A, Aspergum, Aspir-Low, Aspirtab, ♣Astrin, Bayer Aspirin, Bayer Timed-Release Arthritic Pain Formula, ♣Coryphen, Easprin, Ecotrin, 8-Hour Bayer Timed-Release, Empirin, ♣Entrophen, Halfprin, ♣Headache Tablets, Healthprin, Norwich Aspirin, ♣Novasen, ♣PMS-ASA

choline salicylate (**koe**-leen sal-**i**-sil-ate)
Arthropan

choline and magnesium salicylates
(**koe**-leen mag-**neez**-ee-um sal-**i**-sil-ates)
CMT, Tricosal, Trilisate

magnesium salicylate (mag-**neez**-ee-um sal-**i**-sil-ate)
♣Doan's Backache Pills, Doan's Regular Strength Tablets, Magan, Mobidin

salsalate (**sal**-sa-late)
Amigesic, Anaflex, Amigesic, Anaflex, Dilsalcid, Marthritic, Mono-Gesic, Salflex, Salgesic, Salsitab

sodium salicylate (**soe**-dee-yum sal-**i**-sil-ate)
♣Dodd's Pills, ♣Dodd's Extra Strength, ♣Gin Pain Pills

Classification
Therapeutic: antipyretics, nonopioid analgesics
Pharmacologic: salicylates

Pregnancy Category D (aspirin–first trimester), C (magnesium salicylate, salsalate–first trimester)

Indications
Inflammatory disorders including Rheumatoid arthritis, Osteoarthritis. Mild to moderate pain. Fever. **Aspirin:** Prophylaxis of transient ischemic attacks and myocardial infarction (MI).

Action
Produce analgesia and reduce inflammation and fever by inhibiting the production of prostaglandins. **Therapeutic Effects:** Analgesia. Reduction of inflammation. Reduction of fever. **Aspirin:** Decreased incidence of transient ischemic attacks and MI.

Pharmacokinetics
Absorption: *Aspirin*—Well absorbed from the upper small intestine; absorption from enteric-coated preparations may be unreliable; rectal absorption is slow and variable. *Choline and magnesium salicylates*—Well absorbed following oral administration. *Salsalate*—Splits into two molecules of salicylic acid following oral administration; absorbed in the small intestine.
Distribution: All salicylates are rapidly and widely distributed; cross the placenta and enter breast milk.
Metabolism and Excretion: Extensively metabolized by the liver; inactive metabolites excreted by the kidneys. Amount excreted unchanged by the kidneys depends on urine pH; as pH increases, amount excreted unchanged increases from 2–3% up to 80%.
Half-life: 2–3 hr for low doses; up to 15–30 hr with larger doses because of saturation of liver metabolism.

TIME/ACTION PROFILE (analgesia/fever reduction†)

ROUTE	ONSET	PEAK	DURATION
Aspirin–PO	5–30 min	1–3 hr	3–6 hr
Aspirin–PO-ER	5–30 min	2–4 hr	8–12 hr
Aspirin–Rect	1–2 hr	4–5 hr	7 hr
All other salicylates–PO	5–30 min	1–3 hr	3–6 hr

†Antirheumatic effect may take 2–3 wk of chronic dosing

Contraindications/Precautions
Contraindicated in: Hypersensitivity to aspirin, tartrazine (FDC yellow dye #5), or other salicylates. Cross-sensitivity with other NSAIDs may exist (less with nonaspirin salicylates). Bleeding disorders or thrombocytopenia

CONTINUED

SALICYLATES

Choline Salicylate

435 mg of choline salicylate is equivalent to 325 mg of aspirin
PO (Adults): *Pain/fever*—435–669 mg (½–¾ tsp) q 3 hr or 425–870 mg (½–1 tsp) q 4 hr or 870–1305 mg (1–1½ tsp) q 6 hr as needed. *Inflammation*—4.8–7.2 g/day in divided doses.
PO (Children): *Analgesic/antipyretic*—2 g/m²/day in 4–6 divided doses. *Anti-inflammatory*—107–133 mg/kg/day in 4–6 divided doses (up to 174 mg/kg).

Magnesium Salicylate
PO (Adults): 303.7 mg q 4 hr or 467 mg q 6 hr.

Choline and Magnesium Salicylates
5 ml of liquid equivalent to 500 mg salicylate or 650 mg of aspirin. Tablet strength expressed in mg of salicylate: 500-mg tablet equivalent to 650 mg of aspirin, 750-mg tablet equivalent to 975 mg of aspirin, 1000-mg tablet equivalent to 1.3 g of aspirin
PO (Adults): *Pain/fever*—2–3 g of salicylate/day in 2–3 divided doses. *Inflammation*—3 g/day at bedtime or in 2–3 divided doses.
PO (Children >37 kg): 2.2 g of salicylate/day in 2 divided doses.
PO (Children <37 kg): 50 mg of salicylate/kg/day in 2 divided doses.

Salsalate
PO (Adults): 1 g 3 times daily initially; further titration may be required.

Sodium Salicylate
PO (Adults): *Pain/fever*—325–650 mg q 4 hr. *Inflammation*—3.6–5.4 g/day in divided doses.
PO (Children): *Pain/fever*—1.5 g/m²/day in 4–6 divided doses. *Inflammation*—80–100 mg/kg/day in 4–6 divided doses.

NURSING IMPLICATIONS

Assessment
- **Patients who have asthma, allergies, and nasal polyps or who are allergic to tartrazine are at an increased risk for developing hypersensitivity reactions.**
- **Pain:** Assess pain and limitation of movement; note type, location, and intensity before and at the peak (see Time/Action Profile) after administration.
- **Fever:** Assess fever and note associated signs (diaphoresis, tachycardia, malaise, chills).
- ***Lab Test Considerations:*** Monitor hepatic function before antirheumatic therapy and if symptoms of hepatotoxicity occur; more likely in patients, especially children, with rheumatic fever, systemic lupus erythematosus, juvenile arthritis, or pre-existing hepatic disease. May cause ↑ serum AST, ALT, and alkaline phosphatase, especially when plasma concentrations exceed 25 mg/100 ml. May return to normal despite continued use or dose reduction. If severe abnormalities or active liver disease occurs, discontinue and use with caution in future.
- Monitor serum salicylate levels periodically with prolonged high-dose therapy to determine dose, safety, and efficacy, especially in children with Kawasaki disease.
- May alter results of serum uric acid, urine vanillylmandelic acid (VMA), protirelin-induced thyroid-stimulating hormone (TSH), urine hydroxyindoleacetic acid (5-HIAA) determinations, and radionuclide thyroid imaging.
- May cause ↓ serum potassium and cholesterol concentrations.
- *Aspirin:* In addition to the above lab tests, aspirin prolongs bleeding time for 4–7 days and, in large doses, may cause prolonged prothrombin time. Monitor hematocrit periodically in prolonged high-dose therapy to assess for GI blood loss.
- ***Toxicity and Overdose:*** Monitor patient for the onset of tinnitus, headache, hyperventilation, agitation, mental confusion, lethargy, diar-

(more important with aspirin). Children or adolescents with viral infections (may increase the risk of Reye's syndrome). **Salsalate** Peri-operative pain from coronary artery bypass graft (CABG) surgery.
Use Cautiously in: Salsalate Cardiovascular disease or risk factors for cardiovascular disease (may ↑ risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, especially with prolonged use); Chronic alcohol abuse; History of GI bleeding or ulcer disease; Severe renal disease (magnesium toxicity may occur with magnesium salicylate); Severe hepatic disease; Geriatric patients (↑ risk of adverse reactions, especially GI bleeding; more sensitive to toxic levels); Pregnancy; salicylates may have adverse effects on fetus and mother and in general should be avoided during pregnancy, especially during the 3rd trimester); Lactation (safety not established).

Adverse Reactions/Side Effects

EENT: hearing loss, tinnitus. **GI: GI BLEEDING** , dyspepsia, epigastric distress, heartburn, nausea, abdominal pain, anorexia, hepatotoxicity, vomiting. **Hemat:** *Aspirin*— anemia, hemolysis, increased bleeding time. **Misc:** **ANAPHYLAXIS** and **LARYNGEAL EDEMA** , **REYE'S SYNDROME** (children) , noncardiogenic pulmonary edema.

Interactions

Drug-Drug: Aspirin: May ↑ the risk of bleeding with **warfarin**, **heparin**, **heparin-like agents**, **thrombolytic agents**, **ticlopidine**, **clopidogrel**, **tirofiban**, or **eptifibatide**, although these agents are frequently used safely in combination and in sequence. **Ibuprofen:** may negate the cardioprotective antiplatelet effects of low-dose aspirin. **Aspirin:** May ↑ risk of bleeding with **cefoperazone**, **cefotetan**, or **valproic acid**. **All salicylates:** May ↑ activity of **penicillins**, **phenytoin**, **methotrexate**, **valproic acid**, **oral hypoglycemic agents**, and **sulfonamides.** May ↓ beneficial effects of **probenecid** or **sulfinpyrazone**. **Corticosteroids** may ↓ serum salicylate levels. **Urinary acidification** ↑ reabsorption and may ↑ serum salicylate levels. **Alkalinization of the urine** or the ingestion of large amounts of **antacids** ↑ excretion and ↓ serum salicylate levels. May blunt the therapeutic response to **diuretics**, **antihypertensives**, or some **NSAIDs**. ↑ risk of GI irritation with **NSAIDs**. ↑ risk of ototoxicity with **vancomycin**.
Drug-Natural Products: Aspirin: ↑ anticoagulant effect and bleeding risk with **arnica**, **chamomile**, **clove**, **feverfew**, **garlic**, **ginger**, **ginkgo**, **Panax ginseng**, and others.
Drug-Food: Foods capable of acidifying the urine may ↑ serum salicylate levels.

Route/Dosage

Aspirin

Pain/fever

PO, Rect (Adults): 325–500 mg q 3 hr or 325–650 mg q 4 hr or 650–1000 mg q 6 hr (not to exceed 4 g/day). *Extended-release tablets*—650 mg q 8 hr or 800 mg q 12 hr.
PO, Rect (Children 2–11 yr): 65 mg/kg/day (1.5 g/m²/day) in 4–6 divided doses.

Inflammation

PO (Adults): 2.4 g/day initially; increased to maintenance dose of 3.6–5.4 g/day in divided doses (up to 7.8 g/day for acute rheumatic fever).
PO (Children): 80–100 mg/kg/day in divided doses (up to 130 mg/kg/day for acute rheumatic fever).

Prevention of Transient Ischemic Attacks

PO (Adults): 1–1.3 g daily in 2–4 divided doses (doses as low as 325 mg/day may be used in patients who are intolerant of the higher dose).

Prevention of Myocardial Infarction

PO (Adults): 300–325 mg/day (doses as low as 80 mg/day may be effective).

Kawasaki Disease

PO (Children): 80–120 mg/kg/day in 4 divided doses initially; may be followed by maintenance dose of 3–8 mg/kg/day as a single dose for up to 8 wk.

CONTINUED

rhea, and sweating. If these symptoms appear, withhold medication and notify physician or other health care professional immediately.

Potential Nursing Diagnoses

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

Implementation

- Use lowest effective dose for shortest period of time.
- Aspirin is also available in combination with antihistamines, decongestants, cough suppressants, and opioids. See Appendix A.
- **PO:** Administer after meals or with food or an antacid to minimize gastric irritation. Food slows but will not alter the total amount absorbed.
- **Do not crush or chew enteric-coated tablets.** Do not take antacids within 1–2 hr of enteric-coated tablets. Chewable tablets may be chewed, dissolved in liquid, or swallowed whole. Some extended-release tablets may be broken or crumbled but must not be ground up before swallowing. See manufacturer's prescribing information for individual products.

Patient/Family Teaching

- Instruct patient to take salicylates with a full glass of water and to remain in an upright position for 15–30 min after administration.
- Advise patient to report tinnitus; unusual bleeding of gums; bruising; black, tarry stools; or fever lasting longer than 3 days.
- Caution patient to avoid concurrent use of alcohol with this medication to minimize possible gastric irritation; 3 or more glasses of alcohol per day may increase risk of GI bleeding. Caution patient to avoid taking concurrently with acetaminophen or NSAIDs for more than a few days, unless directed by health care professional to prevent analgesic nephropathy.
- Teach patient on a sodium-restricted diet to avoid effervescent tablets or buffered-aspirin preparations.
- Tablets with an acetic (vinegar-like) odor should be discarded.
- Advise patient on long-term therapy to inform health care professional of medication regimen before surgery. Aspirin may need to be withheld for 1 wk before surgery.
- Centers for Disease Control and Prevention warn against giving aspirin to children or adolescents with varicella (chickenpox) or influenza-like or viral illnesses because of a possible association with Reye's syndrome.
- **Transient Ischemic Attacks or MI:** Advise patient receiving aspirin prophylactically to take only prescribed dosage. Increasing the dosage has not been found to provide additional benefits.

Evaluation/Desired Outcomes

- Relief of mild to moderate discomfort.
- Increased ease of joint movement. May take 2–3 wk for maximum effectiveness.
- Reduction of fever.
- Prevention of transient ischemic attacks.
- Prevention of MI.

Why was this drug prescribed for your patient?

saquinavir (sa-kwin-a-vir)

Invirase

Classification

Therapeutic: antiretrovirals
Pharmacologic: protease inhibitors

Pregnancy Category B

Indications

HIV infection (with other antiretrovirals).

Action

Inhibits the action of HIV protease and prevents the cleavage of viral polyproteins. **Therapeutic Effects:** Slowing of the progression of HIV infection and its sequelae. Increased CD4 cell counts and decreased viral load.

Pharmacokinetics

Absorption: Incompletely absorbed after oral administration; rapidly undergoes extensive first-pass hepatic metabolism. Absorption of Fortovase and Invirase is not the same; products are not interchangeable.
Distribution: Distributes into tissues, but CNS penetration is poor.
Metabolism and Excretion: Mostly metabolized by the liver; <1% excreted unchanged in urine.
Half-life: 13 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	unknown	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Concurrent dihydroergotamine (or other ergot derivatives), midazolam, rifabutin, rifampin, lovastatin, simvastatin, and triazolam. Lactation (breast-feeding not recommended in HIV-infection).

Use Cautiously in: Diabetes mellitus (may exacerbate hyperglycemia; hyperglycemia may progress to ketoacidosis); Hemophilia (increased risk of bleeding); Hepatic impairment (may exacerbate liver dysfunction caused by hepatitis B or C or other causes); Pregnancy or children <16 yr (safety not established).

Adverse Reactions/Side Effects

CNS: SEIZURES, confusion, headache, mental depression, psychic disorders, weakness. **CV:** thrombophlebitis. **GI:** abdominal discomfort, diarrhea, increased liver enzymes, jaundice, nausea. **Derm:** photosensitivity, severe cutaneous reactions. **Endo:** hyperglycemia. **Hemat:** acute myeloblastic leukemia, hemolytic anemia, thrombocytopenia. **Neuro:** ataxia. **Misc:** STEVENS-JOHNSON SYNDROME.

Interactions

Drug-Drug: Rifampin and **rifabutin** significantly ↓ saquinavir levels; concurrent use is contraindicated. **Dihydroergotamine** and **ergotamine** (↑ risk of vasoconstriction); **midazolam** and **triazolam** (↑ CNS depression); **lovastatin** and **simvastatin** (↑ risk of myopathy); concurrent use is contraindicated. Coadministration with **clarithromycin** significantly ↑ saquinavir levels and ↓ clarithromycin levels. Saquinavir levels are also significantly ↑ by **indinavir**, **delavirdine**, **nelfinavir**, **ritonavir**, and **ketoconazole** (dosage adjustments may be necessary). **Carbamazepine**, **phenobarbital**, **phenytoin**, **nevirapine**, and **dexamethasone** may ↓ saquinavir levels.
Drug-Natural Products: St. John's wort ↓ levels and effectiveness; may promote development of drug resistance.
Drug-Food: Grapefruit juice ↑ serum levels and effects. Food significantly increases ↑ the absorption of saquinavir. **Garlic** can significantly ↓ levels.

sennosides (se-na,sen-oh-sides)

Black-Draught, Ex-Lax, Ex-Lax Chocolated, Fletchers' Castoria, Maximum Relief Ex-Lax, Sena-Gen, Senexon, Senokot, SenokotXTRA

Classification

Therapeutic: laxatives
Pharmacologic: stimulant laxatives

Pregnancy Category C

Indications

Treatment of constipation, particularly when associated with Slow transit time, Constipating drugs, Irritable or spastic bowel syndrome, Neurologic constipation.

Action

Active components of senna (sennosides) alter water and electrolyte transport in the large intestine, resulting in accumulation of water and increased peristalsis. **Therapeutic Effects:** Laxative action.

Pharmacokinetics

Absorption: Minimally absorbed following oral administration.
Distribution: Unknown.
Metabolism and Excretion: Unknown.
Half-life: Unknown.

TIME/ACTION PROFILE (laxative effect)

ROUTE	ONSET	PEAK	DURATION
PO	6–12 hr†	unknown	3–4 days

†May take as long as 24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Abdominal pain of unknown cause, especially if associated with fever. Rectal fissures. Ulcerated hemorrhoids. Known alcohol intolerance (some liquid products).
Use Cautiously in: Chronic use (may lead to laxative dependence); Possible intestinal obstruction; Pregnancy or lactation (safety not established; may be used safely during breastfeeding).

Adverse Reactions/Side Effects

GI: cramping, diarrhea, nausea. **GU:** pink/red or brown/black discoloration of urine. **F and E:** electrolyte abnormalities (chronic use or dependence). **Misc:** laxative dependence.

Interactions

Drug-Drug: May decrease absorption of other **orally administered drugs** because of decreased transit time.

Route/Dosage

Larger doses have been used to treat/prevent opioid-induced constipation. Consult labeling of individual OTC products for more specific dosing information.
PO (Adults and Children >12 yr): 12–50 mg 1–2 times daily.
PO (Children 6–12 yr): 6–25 mg 1–2 times daily.
PO (Children 2–6 yr): 3–12.5 mg 1–2 times daily.

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)
Diarrhea (Side Effects)

Route/Dosage

Invirase

PO (Adults): 600 mg 3 times daily within 2 hr of a meal *or* 1000 mg twice daily.

Fortovase

PO (Adults): 1200 mg 3 times daily *or* 1000 mg twice daily within 2 hr of a meal.

NURSING IMPLICATIONS

Assessment

- Assess patient for change in severity of symptoms of HIV and for symptoms of opportunistic infections during therapy.
- ***Lab Test Considerations:*** Monitor viral load and CD4 count regularly during therapy.
- May cause hyperglycemia, which may result in diabetic ketoacidosis.
- Monitor hematologic and hepatic function before and periodically during therapy. May cause anemia, thrombocytopenia, and ↑ liver enzymes. Use with rifampin greatly ↑ risk of hepatitis and ↑ serum transaminases.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Administer within 2 hr after a full meal to increase effectiveness. Taking without food causes decreased blood concentrations and may result in no antiviral activity.
- Capsules are stable until expiration date if refrigerated or for 3 mo when brought to room temperature.

Patient/Family Teaching

- Instruct patient to take saquinavir as directed at the same time each day, within 2 hr after a full meal. Take missed doses as soon as possible if not almost time for next dose; do not double doses. Do not discontinue without consulting health care professional. Changes from Invirase to Fortovase should be made under supervision of health care professional.
- Instruct patient that saquinavir should not be shared with others.
- Inform patient that saquinavir does not cure HIV or prevent associated or opportunistic infections. Saquinavir does not reduce the risk of transmission of HIV to others through sexual contact or blood contamination. Caution patient to use a condom during sexual contact and to avoid sharing needles or donating blood to prevent spreading HIV to others. Advise patient that the long-term effects of saquinavir are unknown at this time.
- Advise patient not to take other medications, prescription or OTC, or herbal products concurrently without consulting health care professional.
- Inform patient that saquinavir may cause hyperglycemia. Advise patient to notify health care professional if increased thirst or hunger; unexplained weight loss; increased urination; fatigue; or dry, itchy skin occurs. Rare but serious bullous skin eruptions with polyarthritis may also occur.
- Inform patient that long-term effects of saquinavir are unknown at this time.
- Emphasize the importance of regular follow-up exams and blood tests to determine progress and monitor for side effects.

Evaluation/Desired Outcomes

- Slowing of the progression of HIV infection and its sequelae.
- Decrease in viral load and improvement in CD4 cell counts.

Why was this drug prescribed for your patient?

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

Implementation

- Available in tablets, oral solution, syrup, granules, and suppositories. Available in combination with docusate and psyllium (see Appendix A).
- **PO:** Take with a full glass of water. Administer at bedtime for evacuation 6–12 hr later. Administer on an empty stomach for more rapid results.
- Shake oral solution well before administering.
- Granules should be dissolved or mixed in water or other liquid before administration.

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 patient to use other forms of bowel regulation such as increasing bulk in the diet, increasing fluid intake, and increasing mobility. Normal bowel habits are individualized and may vary from 3 times/day to 3 times/wk.
- Inform patient that this medication may cause a change in urine to a pink, red, violet, yellow, or brown color.
- 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.

Evaluation/Desired Outcomes

- A soft, formed bowel movement.

Why was this drug prescribed for your patient?

sertraline (ser-tra-leen)

Zoloft

Classification

Therapeutic: antidepressants
Pharmacologic: selective serotonin reuptake inhibitors (SSRIs)

Pregnancy Category B

Indications

Management of the following (in conjunction with psychotherapy): Depression, Panic disorder, OCD, Post-traumatic stress disorder (PTSD), Social anxiety disorder, Premenstrual dysphoric disorder.

Action

Inhibits neuronal uptake of serotonin in the CNS, thus potentiating the activity of serotonin. Has little effect on norepinephrine or dopamine. **Therapeutic Effects:** Antidepressant action. Decreased incidence of panic attacks. Decreased obsessive and compulsive behavior. Decreased feelings of intense fear, helplessness, or horror. Decreased social anxiety. Decrease in premenstrual dysphoria.

Pharmacokinetics

Absorption: Appears to be well absorbed after oral administration.
Distribution: Extensively distributed throughout body tissues.
Protein Binding: 98%.
Metabolism and Excretion: Extensively metabolized by the liver; one metabolite has some antidepressant activity; 14% excreted unchanged in feces.
Half-life: 24 hr.

TIME/ACTION PROFILE (antidepressant effect)

ROUTE	ONSET	PEAK	DURATION
PO	within 2–4 wk	unknown	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Concurrent MAO inhibitor therapy (may result in serious, potentially fatal reactions).
Use Cautiously in: Severe hepatic/renal impairment; History of mania; Patients at risk of suicide; Pregnancy or lactation; Children (↑ incidence of CNS reactions).

Adverse Reactions/Side Effects

CNS: dizziness, drowsiness, fatigue, headache, insomnia, agitation, anxiety, confusion, emotional lability, impaired concentration, manic reaction, nervousness, weakness, yawning. **EENT:** pharyngitis, rhinitis, tinnitus, visual abnormalities. **CV:** chest pain, palpitations. **GI:** diarrhea, dry mouth, nausea, abdominal pain, anorexia, altered sense of taste, constipation, dyspepsia, flatulence, increased appetite, vomiting. **GU:** sexual dysfunction, menstrual disorders, urinary frequency. **Derm:** increased sweating, hot flashes, rash. **MS:** back pain, myalgia. **Neuro:** tremor, hypertonia, hypoesthesia, paresthesia, twitching. **Misc:** decreased weight gain (children), fever, thirst.

Interactions

Drug-Drug: Serious, potentially fatal reactions (hyperthermia, rigidity, myoclonus, autonomic instability, with fluctuating vital signs and extreme agitation, which may proceed to delirium and coma) may occur with concurrent **MAO inhibitors** MAO inhibitors should be stopped at least 14 days before sertraline therapy. Sertraline should be stopped at least 14 days before MAO inhibitor therapy. May ↑ **pimozide** levels and the risk of potentially life-threatening cardiovascular reactions. May ↑ sensitivity to **adrenergics** and ↑ the risk of serotonin syndrome. Concurrent use with **alcohol** is not recommended. May ↑ levels/effects of **warfarin**, **phenytoin**, **tricyclic antidepressants** some **benzodiazepines (alprazolam)**, **cloazapine** or **tolbutamide**. **Cimetidine** ↑ blood levels and effects.
Drug-Natural Products: ↑ risk of serotinergic side effects including serotonin syndrome with **St. John's wort** and **SAMe.**

CONTINUED

sertraline

- May cause drowsiness or dizziness. Caution patient to avoid driving and other activities requiring alertness until response to the drug is known.
- Advise patient to avoid alcohol or other CNS depressant drugs during therapy and to consult with health care professional before taking other medications with sertraline.
- Inform patient that frequent mouth rinses, good oral hygiene, and sugarless gum or candy may minimize dry mouth. If dry mouth persists for more than 2 wk, consult health care professional regarding use of saliva substitute.
- Advise patient to wear sunscreen and protective clothing to prevent photosensitivity reactions.
- Instruct female patient to inform health care professional if pregnancy is planned or suspected or if she is breastfeeding.
- Advise patient to notify health care professional if headache, weakness, nausea, anorexia, anxiety, or insomnia persists.
- Emphasize the importance of follow-up exams to monitor progress. Encourage patient participation in psychotherapy.

Evaluation/Desired Outcomes

- Increased sense of well-being
- Renewed interest in surroundings. May require prolonged therapy to obtain antidepressant effects.
- Decrease in obsessive-compulsive behaviors.
- Decrease in frequency and severity of panic attacks.
- Decrease in symptoms of post-traumatic stress disorder.
- Decrease in social anxiety disorder.
- Decrease in symptoms of premenstrual dysphoric disorder.

Why was this drug prescribed for your patient?

Route/Dosage

Depression/OCD

PO (Adults): 50 mg/day as a single dose in the morning or evening initially; after several weeks may be increased at weekly intervals up to 200 mg/day, depending on response.
PO (Children 13–17 yr): *OCD*—50 mg once daily.
PO (Children 6–12 yr): *OCD*—25 mg once daily.

Panic Disorder

PO (Adults): 25 mg/day initially, may increase after 1 wk to 50 mg/day.

PTSD

PO (Adults): 25 mg once daily for 7 days, then increase to 50 mg once daily; may then be increased if needed at intervals of at least 7 days (range 50–200 mg once daily).

Social Anxiety Disorder

PO (Adults): 25 mg once daily initially, then 50 mg once daily; may be increased at weekly intervals up to 200 mg/day.

Premenstrual dysphoric disorder

PO (Adults): 50 mg/day initially either daily or daily during luteal phase of cycle. Daily dosing may be titrated upward in 50 mg increments at the beginning of a cycle. In luteal phase-only dosing a 50 mg/day titration step for three days at the beginning of each luteal phase dosing period should be used (range 50–150 mg/day).

NURSING IMPLICATIONS

Assessment

- Monitor appetite and nutritional intake. Weigh weekly. Notify physician or other health care professional of continued weight loss. Adjust diet as tolerated to support nutritional status.
- **Depression:** Monitor mood changes. Inform physician or other health care professional if patient demonstrates significant increase in anxiety, nervousness, or insomnia.
- Assess for suicidal tendencies, especially during early therapy. Restrict amount of drug available to patient.
- **OCD:** Assess patient for frequency of obsessive-compulsive behaviors. Note degree to which these thoughts and behaviors interfere with daily functioning.
- **Panic Attacks:** Assess frequency and severity of panic attacks.
- **PTSD:** Assess patient for feelings of fear, helplessness, and horror. Determine effect on social and occupational functioning.
- **Social Anxiety Disorder:** Assess patient for symptoms of social anxiety disorder (blushing, sweating, trembling, tachycardia during interactions with new people, people in authority, or groups) periodically during therapy.
- **Premenstrual Dysphoric Disorder:** Assess patient for symptoms of premenstrual dysphoric disorder (feeling angry, tense or tired; crying easily, feeling sad or hopeless; arguing with family or friends for no reason; difficulty sleeping or paying attention; feeling out of control or unable to cope; having cramping, bloating, food craving, or breast tenderness) periodically during therapy.

Potential Nursing Diagnoses

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

Implementation

- **Do not confuse sertraline with selegiline.**
- Periodically reassess dose and continued need for therapy.
- **PO:** Administer as a single dose in the morning or evening.

Patient/Family Teaching

- Instruct patient to take sertraline as directed. Take missed doses as soon as possible and return to regular dosing schedule. Do not double doses.

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sirolimus (sir-**oh**-li-mus)

Rapamune

Classification

Therapeutic: immunosuppressants

Pregnancy Category C

Indications

Prevention of organ rejection in allogenic kidney transplantation (concurrently with corticosteroids and cyclosporine). Sirolimus is also eluted from the Cypher coronary stent used in angioplasty procedures.

Action

Inhibits T-lymphocyte activation/proliferation, which occurs as a response to antigenic and cytokine stimulation; antibody production is also inhibited.
Therapeutic Effects: Decreased incidence and severity of organ rejection.

Pharmacokinetics

Absorption: Rapidly absorbed following oral administration (14% bioavailability).
Distribution: Concentrates in erythrocytes; distributes to heart, intestines, kidneys, liver, lungs, muscle, spleen, and testes in high concentrations.
Protein Binding: 92%.
Metabolism and Excretion: Extensively metabolized (some metabolism by P450 3A4 system); 91% excreted in feces.
Half-life: 62 hr.

TIME/ACTION PROFILE (blood levels)

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

🍁 = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Alcohol intolerance/sensitivity (solution contains ethanol). Concurrent ketoconazole or grapefruit juice. Severe hepatic impairment. Pregnancy and lactation.
Use Cautiously in: Mild to moderate hepatic impairment; Women with childbearing potential; Children <13 yr (safety not established).

Adverse Reactions/Side Effects

Reflects combined therapy with corticosteroids and cyclosporine **CNS:** insomnia. **Resp:** interstitial lung disease. **CV:** edema, hypotension. **GI:** hepatic toxicity. **GU:** renal impairment. **Derm:** acne, rash, thrombocytopenic purpura. **F and E:** hypokalemia. **Hemat:** leukopenia, thrombocytopenia, anemia. **Metab:** hyperlipidemia. **MS:** arthralgias. **Neuro:** tremor. **Misc:** ↑ risk of infection, ↑ risk of lymphoma, ↑ risk of lymphocele, mucosal herpes simplex infections, ↓ wound healing, lymphocele.

Interactions

Drug-Drug: Cyclosporine (modified) greatly ↑ blood levels (administer sirolimus 4 hr after cyclosporine). Drugs which inhibit the CYP 3A4 enzyme system may be expected to ↑ blood levels and the risk of adverse reactions. **Ketoconazole**, **voriconazole**, **itraconazole**, **clarithromycin**, **erythromycin**, **telithromycin** significantly ↑ blood levels (concurrent use is contraindicated). Blood levels are also ↑ by **diltiazem** and **verapamil** (monitor sirolimus levels and adjust dose as necessary) and may be ↑ by **nicardipine**, **verapamil**, **clotrimazole**, **fluconazole**, **troleandomycin**, **metoclopramide**, **cimetidine**, **danazol**, and **protease inhibitor antiretrovirals**. **Rifampin** and **rifabutin** ↑ metabolism by stimulating the CYP 3A4 system and significantly ↓ blood levels (concurrent use should be avoided.). Blood levels may also be ↓ by **carbamazepine**, **phenobarbital**, **phenytoin**, **rifabutin**, and **rifapentine**. Risk of renal impairment may be ↑ by concurrent use of other **nephrotoxic agents.** Concurrent use with tacrolimus and corticosteroids in lung transplantation may ↑ risk of anastamotic dehiscence; fatalites have been reported (not approved for this use). Concurrent use with tacrolimus and corticosteroids

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

CONTINUED

sirolimus

liquids. Stir vigorously and drink at once. Refill container with at least 4 oz of additional liquid, stir vigorously, and drink at once.

- If using the pouch, empty entire contents of pouch into at least 2 oz of water or orange juice; do not use other liquids. Stir vigorously and drink at once. Refill container with at least 4 oz of additional liquid, stir vigorously, and drink at once.
- Store bottles and pouches in refrigerator. Solution may develop a slight haze when refrigerated; allow to stand at room temperature and shake gently until haze disappears. Sirolimus may remain in syringe at room temperature or refrigerated for up to 24 hr. Discard syringe after 1 use.

Patient/Family Teaching

- Instruct patient to take sirolimus at the same time each day, as directed. Do not skip or double up on missed doses. Do not discontinue medication without advice of health care professional.
- Reinforce the need for lifelong therapy to prevent transplant rejection. Review symptoms of rejection for transplanted organ and stress need to notify health care professional immediately if they occur.
- Emphasize the importance of repeated lab tests during sirolimus therapy.
- Advise patient of the risk of taking sirolimus during pregnancy. Caution women of childbearing years to use effective contraception prior to, during, and for 12 weeks following therapy.

Evaluation/Desired Outcomes

- Prevention of transplanted kidney rejection.

Why was this drug prescribed for your patient?

🍁 = Canadian drug name.

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

in liver transplantation may ↑ risk of hepatic artery thrombosis; fatalites have been reported (not approved for this use). May ↓ antibody response to and ↑ risk of adverse reactions to **live-virusvaccines** (avoid vaccination).

Drug-Natural Products: Concomitant use with **echinacea**, and **melatonin** may interfere with immunosuppression. **St. John's wort**: may ↑ blood levels and the risk of toxicity.

Drug-Food: Grapefruit juice ↓ CYP3A4 metabolism and ↑ levels; do not use as a diluent and avoid concurrent ingestion.

Route/Dosage

PO (Adults and Children ≥13 yr): 6-mg loading dose, followed by 2 mg/day maintenance dose. *Dosing following cyclosprine withdrawal*—Patients at low to moderate risk for rejection after transplantation may be withdrawn from cyclosporine over 4–8 wk beginning 2–4 mo after transplant. Thereafter, sirolimus dose should be titrated upward to maintain a whole blood trough level of 12–14 ng/ml. Clinical assessment should also be used to gauge dose. Dose changes can be made at 7–14 day intervals. The following formula may also be used: sirolimus maintenance dose = current dose x (target concentration/current concentration). If a large increase is needed, a loading dose may be given and blood levels reassessed 3–4 days later. Loading dose may be calculated by the following formula: sirolimus loading dose = 3 x (new maintenance dose-current maintenance dose). Loading doses >40 mg should be spread over 2 days.

PO (Adults and Children ≥13 yr and <40 kg): 3 mg/m^2 loading dose, followed by 1 mg/m^2/day maintenance dose. *See adjustments above for doses following cyclosporine withdrawal.*

Hepatic Impairment

PO (Adults and Children ≥13 yr and <40 kg): Decrease maintenance dose by 33%; loading dose is unchanged.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure closely during therapy. Hypertension is a common complication of sirolimus therapy and should be treated.
- ***Lab Test Considerations:*** Monitor sirolimus blood levels in patients likely to have altered drug metabolism, patients ≥13 yr who weigh <40 kg, patients with hepatic impairment, and during concurrent administration of drugs that may interact with sirolimus. Trough concentrations of ≥15 ng/ml are associated with an ↑ in adverse effects.
- Monitor patients for hyperlipidemia. May require additional interventions to treat hyperlipidemia.
- May cause anemia, leukopenia, thrombocytopenia, and hypokalemia.

Potential Nursing Diagnoses

Risk for infection (Adverse Reactions)

Implementation

- Therapy with sirolimus should be started as soon as possible post-transplant. Concurrent therapy with cyclosporine and corticosteroids is recommended. Sirolimus should be taken 4 hr after cyclosporine (MODIFIED, Neoral).
- Sirolimus should be ordered only by physicians skilled in immunosuppressive therapy, with the staff and facilities to manage renal transplant patients.
- Antimicrobial prophylaxis for *Pneumocystis carinii* pneumonia for 1 year and for cytomegalovirus protection for 3 months post-transplant are recommended.
- **PO:** Administer consistently with or without food. Do not administer with or mix with grapefruit juice.
- To dilute from bottle, use amber oral dose syringe to withdraw prescribed amount. Empty sirolimus from syringe into a glass or plastic container holding at least 2 oz (60 ml) of water or orange juice; do not use other

CONTINUED

sulindac (soo-lin-dak)

♣Apo-Sulin, Clinoril, ♣Novo-Sundac

Classification

Therapeutic: antirheumatics, nonsteroidal anti-inflammatory agents

Pregnancy Category UK

Indications

Management of inflammatory disorders, including Rheumatoid arthritis, Osteoarthritis, Acute gouty arthritis, Bursitis.

Action

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

Pharmacokinetics

Absorption: Well absorbed from the GI tract after oral administration.
Distribution: Unknown. Enters breast milk in small amounts.
Metabolism and Excretion: Converted by the liver to active drug. Minimal amounts excreted unchanged by the kidneys.
Half-life: 7.8 hr (16.4 hr for active metabolite).

TIME/ACTION PROFILE

ROUTE	ONSET	PEAK	DURATION
PO (analgesic)	1–2 days	unknown	12 hr
PO (anti-inflammatory)	few days–1 wk	2 wk or more	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity may occur with other NSAIDs, including aspirin. Active GI bleeding or ulcer disease. Peri-operative pain from coronary artery bypass graft (CABG) surgery.

Use Cautiously in: Cardiovascular disease or risk factors for cardiovascular disease (may ↑ risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, especially with prolonged use); Severe cardiovascular, renal, or hepatic disease (dosage modification recommended); Geriatric patients (↑ risk of GI bleeding); History of ulcer disease; Pregnancy, lactation, or children (avoid use during second half of pregnancy).

Adverse Reactions/Side Effects

CNS: dizziness, headache, drowsiness. **EENT:** blurred vision, tinnitus. **CV:** edema. **GI:** DRUG-INDUCED HEPATITIS, GI BLEEDING, constipation, diarrhea, discomfort, dyspepsia, nausea, vomiting, anorexia, flatulence, pancreatitis. **GU:** renal failure. **Derm:** EXFOLIATIVE DERMATITIS, STEVENS-JOHNSON SYNDROME, TOXIC EPIDERMAL NECROLYSIS, rashes, photosensitivity. **Hemat:** blood dyscrasias, prolonged bleeding time. **Misc:** allergic reactions including HYPERSENSITIVITY SYNDROME and ANAPHYLAXIS.

Interactions

Drug-Drug: Concurrent use of **aspirin** may ↓ effectiveness. ↑ risk of bleeding with **anticoagulants**, **thrombolytic agents**, **tirofiban**, **eptifibatide**, **clopidogrel ticlopidine**, **cefoperazone**, **cefotetan**, or **valproic acid**. ↑ adverse GI side effects with **aspirin**, **corticosteroids**, and other **NSAIDs**. May ↓ response to **antihypertensives** or **diuretics**. May ↑ serum levels and risk of toxicity from **lithium**. May ↑ the risk of hematologic toxicity from **antineoplastics** or **radiation therapy.** ↑ risk of adverse renal effects with **gold compounds**, **cyclosporine**, or chronic use of **acetaminophen**. **Antacids** ↓ blood levels and ↓ effectiveness of sulindac. ↑ risk of photosensitivity reactions with other **photosensitizing medications.** ↑ risk of hypoglycemia with **insulins** or **oral hypoglycemic agents.** Should not be used concurrently with **dimethyl sulfoxide** because of ↑ risk of peripheral neuropathy and ↓ levels of sulindac and its metabolite.

♣ = Canadian drug name.

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

sumatriptan (soo-ma-**trip**-tan)

Imitrex

Classification

Therapeutic: vascular headache suppressants
Pharmacologic: 5 HT_1 agonists

Pregnancy Category C

Indications

Acute treatment of migraine attacks. **Subcut:** Acute treatment of cluster headache episodes.

Action

Acts as a selective agonist at specific vascular serotonin receptor sites, causing vasoconstriction in large intracranial arteries. **Therapeutic Effects:** Relief of acute attacks of migraine.

Pharmacokinetics

Absorption: Well absorbed (97%) after subcut administration. Absorption after oral administration is incomplete and significant amounts undergo substantial hepatic metabolism, resulting in poor bioavailability (14%). Well absorbed after intranasal administration.
Distribution: Does not cross the blood-brain barrier. Remainder of distribution not known.
Metabolism and Excretion: Mostly metabolized (80%) by the liver.
Half-life: 2 hr.

TIME/ACTION PROFILE (relief of migraine)

ROUTE	ONSET	PEAK	DURATION
PO	within 30 min	2–4 hr	up to 24 hr
Subcut	30 min	up to 2 hr	up to 24 hr
Nasal	within 60 min	2 hr	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Patients with ischemic heart disease or signs and symptoms of ischemic heart disease, Prinzmetal's angina, or uncontrolled hypertension. Concurrent MAO inhibitor therapy. Elderly patients (excessive risk of cardiovascular complications).
Use Cautiously in: Patients with any history of cardiovascular disease; Patients with childbearing potential; Pregnancy, lactation, or children <18 yr (safety not established)
Exercise Extreme Caution in: Cardiovascular risk factors (hypertension, hypercholesterolemia, smoking, obesity, diabetes, family history, menopausal women or men >40 yr); use only if cardiovascular status has been evaluated and determined to be safe and first dose is administered under supervision.

Adverse Reactions/Side Effects

All adverse reactions are less common after oral administration **CNS:** dizziness, vertigo, anxiety, drowsiness, fatigue, feeling of heaviness, feeling of tightness, headache, malaise, strange feeling, tight feeling in head, weakness. **EENT:** alterations in vision, nasal sinus discomfort, throat discomfort. **CV:** MI, angina, chest pressure, chest tightness, coronary vasospasm, ECG changes, transient hypertension. **GI:** abdominal discomfort, dysphagia. **Derm:** tingling, warm sensation, cool sensation, flushing. **Local:** injection site reaction. **MS:** jaw discomfort, muscle cramps, myalgia, neck pain, neck stiffness. **Neuro:** numbness.

Interactions

Drug-Drug: The risk of vasospastic reactions may be increased by concurrent use of **ergotamine** or **dihydroergotamine** (avoid within 24 hr of each other). Concurrent use with **lithium**, **MAO inhibitors** (do not use within 2 wk of discontinuing MAO inhibitor), or **selective serotonin reuptake inhibitor antidepressants** (may cause weakness, hyperreflexia and incoordination).
Drug-Natural Products: Increased risk of serotinergic side effects including serotonin syndrome with **St. John's wort** and **SAMe.**

♣ = Canadian drug name.

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

Route/Dosage

PO (Adults): 150–200 mg twice daily (not to exceed 400 mg/day).

NURSING IMPLICATIONS

Assessment

- **Patients who have asthma, aspirin-induced allergy, and nasal polyps are at increased risk for developing hypersensitivity reactions. Monitor for rhinitis, asthma, and urticaria.**
- Assess pain and range of movement before and after 1–2 wk of therapy.
- ***Lab Test Considerations:*** BUN, serum creatinine, CBC, and liver function should be evaluated periodically in patients receiving prolonged therapy.
- Serum potassium, glucose, alkaline phosphatase, AST, and ALT may show increased levels.
- Bleeding time may be prolonged for 1 day after discontinuation of therapy.

Potential Nursing Diagnoses

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

Implementation

- **Do not confuse Clinoril (sulindac) with Clozaril (clozapine).**
- 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:** May be administered with food, milk, or antacids to decrease GI irritation. Food slows but does not reduce the extent of absorption. Tablets may be crushed and mixed with fluids or food.

Patient/Family Teaching

- Advise patient to take this medication with a full glass of water and to remain in an upright position for 15–30 min after administration.
- Instruct patient to take medication exactly as directed. If a dose is missed, it should be taken as soon as remembered but not if it is almost time for the next dose. Do not double doses.
- May cause dizziness. Advise patient to avoid driving or other activities requiring alertness until response to the medication is known.
- Caution patient to avoid the concurrent use of alcohol, aspirin, NSAIDs, acetaminophen, or other OTC medications without consulting health care professional.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Advise patient to use 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

- Decreased pain and improved joint mobility. Partial relief of arthritis may be seen within 7 days, but maximum effectiveness may require 2–3 wk of continuous therapy. Patients who do not respond to one NSAID may respond to another.

Why was this drug prescribed for your patient?

Route/Dosage

PO (Adults): 25 mg initially; if response is inadequate at 2 hr, up to 100 mg may be given (initial doses of 25–50 mg may be more effective than 25 mg). If headache recurs, doses may be repeated q 2 hr (not to exceed 300 mg/day). If PO therapy is to follow subcut injection, additional PO sumatriptan may be taken q 2 hr (not to exceed 200 mg/day).
Subcut: (Adults): 6 mg; may repeat after 1 hr (not to exceed 12 mg in 24 hr).
Intranasal (Adults): Single dose of 5, 10, or 20 mg in one nostril; may be repeated in 2 hr, not to exceed 40 mg/24 hr or treatment of >5 episodes/mo.

Hepatic Impairment

PO (Adults): 25 mg initially; if response is inadequate at 2 hr, up to 50 mg may be given (initial doses of 25–50 mg may be more effective than 25 mg). If headache recurs, doses may be repeated q 2 hr (not to exceed 300 mg/day). If PO therapy is to follow subcut injection, additional PO sumatriptan may be taken q 2 hr (not to exceed 200 mg/day); no single oral dose should exceed 50 mg.

NURSING IMPLICATIONS

Assessment

- Assess pain location, intensity, duration, and associated symptoms (photophobia, phonophobia, nausea, vomiting) during migraine attack.
- Give initial subcut under observation to patients with potential for coronary artery disease including postmenopausal women, men >40 years, patients with risk factors for coronary artery disease such as hypertension, hypercholesterolemia, obesity, diabetes, smoking, or family history. Monitor blood pressure before and for 1 hr after initial injection. If angina occurs, monitor ECG for ischemic changes.

Potential Nursing Diagnoses

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

Implementation

- **Do not confuse sumatriptan with zolmitriptan.**
- **PO: Tablets should be swallowed whole; do not crush, break, or chew** Tablets are film-coated to prevent contact with tablet contents, which have an unpleasant taste and may cause nausea and vomiting.
- **Subcut:** Administer as a single injection just below the skin.
- **Intranasal:** 10-mg dose may be administered as 2 sprays of 5 mg in one nostril or 1 spray in each nostril.

Patient/Family Teaching

- Inform patient that sumatriptan should be used only during a migraine attack. It is meant to be used for relief of migraine attacks but not to prevent or reduce the number of attacks.
- Instruct patient to administer sumatriptan as soon as symptoms of a migraine attack appear, but it may be administered at any time during an attack. If migraine symptoms return, a 2nd injection may be used. Allow at least 1 hr between doses, and do not use more than 2 injections in any 24-hr period.
- Advise patient that lying down in a darkened room after sumatriptan administration may further help relieve headache.
- Caution patient not to use sumatriptan if she is pregnant, suspects that she is pregnant, or plans to become pregnant. Adequate contraception should be used during therapy.
- Advise patient to notify health care professional before next dose of sumatriptan if pain or tightness in the chest occurs during use. If pain is severe or does not subside, notify health care professional immediately. If wheezing; heart throbbing; swelling of eyelids, face, or lips; skin rash; skin lumps; or hives occur, notify health care professional immediately and do not take more sumatriptan without approval of health care professional. Additional sumatriptan doses are not likely to be effective and alternative medications, as previously discussed with health care profes-

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sumatriptan

sional, may be used. If usual dose fails to relieve 3 consecutive headaches or if frequency and/or severity increases, notify health care professional. If feelings of tingling, heat, flushing, heaviness, pressure, drowsiness, dizziness, tiredness, or sickness develop, discuss with health care professional at next visit.

- Sumatriptan may cause dizziness or drowsiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid alcohol, which aggravates headaches, during sumatriptan use.
- **Subcut:** Instruct patient on the proper technique for loading, administering, and discarding the autoinjector. Patient information pamphlet is provided. Instructional video is available from the manufacturer.
- Inform patient that pain or redness at the injection site usually lasts less than 1 hr.
- **Intranasal:** Instruct patient in proper technique for intranasal administration. Usual dose is a single spray in one nostril. If headache returns, a 2nd dose may be administered in ≥2 hr. Do not administer 2nd dose if no relief was provided by 1st dose without consulting health care professional.

Evaluation/Desired Outcomes

- Relief of migraine attack.

Why was this drug prescribed for your patient?

tacrolimus (ta-**kroe**-li-mus)

Prograf

Classification

Therapeutic: immunosuppressants

Pregnancy Category C

Indications

Prevention of organ rejection in patients who have undergone allogenic liver transplantation (with corticosteroids). **Unlabeled uses:** Prevention of rejection of other types of organ transplantation.

Action

Inhibits T-lymphocyte activation. **Therapeutic Effects:** Prevention of transplanted organ rejection.

Pharmacokinetics

Absorption: 14.4–21.8% absorbed.
Distribution: Crosses the placenta and enters breast milk.
Metabolism and Excretion: 99% metabolized by the liver.
Half-life: *Liver transplant patients*—11.7 hr; *healthy volunteers*—21.2 hr.

TIME/ACTION PROFILE (immunosuppression)

ROUTE	ONSET	PEAK	DURATION
PO	rapid	1.3–3.2 hr†	12 hr
IV	rapid	unknown	8–12 hr

†Blood level

Contraindications/Precautions

Contraindicated in: Hypersensitivity to tacrolimus or to castor oil (a component in the injection). Concurrent cyclosporine. Breastfeeding.

Use Cautiously in: Renal/hepatic impairment (dosage ↓ may be required; if oliguria occurs, wait 48 hr before initiating); Children (may need ↑ doses); Pregnancy (hyperkalemia and renal impairment may occur in the newborn).

Adverse Reactions/Side Effects

CNS: SEIZURES, headache, insomnia, tremor, abnormal dreams, agitation, anxiety, confusion, dizziness, lability, depression, drowsiness, hallucinations, psychoses. **EENT:** abnormal vision, amblyopia, rhinitis, sinusitis, tinnitus, voice change. **Resp:** asthma, bronchitis, cough, pharyngitis, pneumonia, pulmonary edema. **CV:** ascites, hypertension, peripheral edema, QTc prolongation. **GI:** GI BLEEDING, pain, anorexia, diarrhea, nausea, vomiting, cholangitis, cholestatic jaundice, dyspepsia, dysphagia, flatulence, ↑ appetite, ↑ liver function studies, thrush, peritonitis. **GU:** nephrotoxicity, urinary tract infection. **Derm:** pruritus, rash, alopecia, herpes simplex, hirsutism, photosensitivity, sweating. **Endo:** hyperglycemia. **F and E:** hyperkalemia, hypomagnesemia, acidosis, alkalosis, hyperlipidemia, hyperphosphatemia, hyperuricemia, hypocalcemia, hypokalemia, hyponatremia, hypophosphatemia. **Hemat:** anemia, lymphocytosis, thrombocytopenia, coagulation defects, leukopenia. **MS:** arthralgia, hypertonia, leg cramps, muscle spasm, myalgia, myasthenia, osteoporosis. **Neuro:** paresthesia, neuropathy. **Misc:** allergic reactions including ANAPHYLAXIS, generalized pain, abnormal healing, chills, fever, increased risk of lymphoma.

Interactions

Drug-Drug: Risk of nephrotoxicity is increased by **aminoglycosides, amphotericin B, cisplatin,** or **cyclosporine** (allow 24 hr after stopping cyclosporine). **Potassium-sparing diuretics** or **angiotensin-converting enzyme (ACE) inhibitors** ↑ the risk of hyperkalemia. The following drugs ↑ tacrolimus blood levels: **azole antifungals, bromocriptine, calcium channel blockers, cimetidine, clarithromycin, cyclosporine, danazol, erythromycin, methylprednisolone, magnesium/aluminum hydroxide, nelfinavir,** and **metoclopramide**. **Phenobarbital, phenytoin, carbamazepine, caspofungin, sirolimus,** and

rifamycins may ↓ tacrolimus blood levels. **Vaccinations** may be less effective if given concurrently with tacrolimus (avoid use of live vaccines).
Drug-Food: Food ↓ the rate and extent of GI absorption. **Grapefruit juice** ↑ absorption.

Route/Dosage

PO (Adults): 0.075–0.15 mg/kg q 12 hr.
PO (Children): Start therapy at 0.15 mg/kg q 12 hr.
IV (Adults): 0.05–0.1 mg/kg/day as a continuous infusion.
IV (Children): 0.1 mg/kg/day as a continuous infusion.

NURSING IMPLICATIONS

Assessment

- Monitor blood pressure closely during therapy. Hypertension is a common complication of tacrolimus therapy and should be treated.
- **Observe patients receiving IV tacrolimus for the development of anaphylaxis (rash, pruritus, laryngeal edema, wheezing) for at least 30 min and frequently thereafter. If signs develop, stop infusion and initiate treatment.**
- ***Lab Test Considerations:*** Monitor serum creatinine, potassium, and glucose closely. Elevated serum creatinine and decreased urine output may indicate nephrotoxicity. May cause hyperglycemia; may require insulin therapy. May also cause hyperuricemia, hypokalemia, hypomagnesemia, acidosis, alkalosis, hyperlipidemia, hyperphosphatemia, hypophosphatemia, hypocalcemia, and hyponatremia.
- Monitor CBC and platelet count. May cause anemia, lymphocytosis, and thrombocytopenia.
- ***Toxicity and Overdose:*** Tremor and headache have been associated with high whole blood concentrations; may respond to dose adjustment.

Implementation

- Therapy with tacrolimus should be started no sooner than 6 hr post-transplant. Concurrent therapy with corticosteroids is recommended in the early postoperative period.
- Oral therapy is preferred due to risk of anaphylactic reactions with IV tacrolimus. Replace IV therapy with oral therapy as soon as possible.
- Start adults at the lower end of the dose range; children require and tolerate higher doses; start at upper end of dosing range.
- **PO:** Oral doses can be initiated 8–12 hr after discontinuation of IV doses.
- **Continuous Infusion:** Dilute in 0.9% NaCl or D5W for a concentration of 0.004–0.02 mg/ml prior to use. May be stored in polyethylene or glass containers for 24 hr following dilution. Do not store in PVC containers. ***Rate:*** Administer daily dose as a continuous infusion over 24 hr.

Patient/Family Teaching

- Instruct patient to take tacrolimus at the same time each day, as directed. Do not skip or double up on missed doses. Do not discontinue medication without advice of health care professional.
- Reinforce the need for lifelong therapy to prevent transplant rejection. Review symptoms of rejection for transplanted organ and stress need to notify health care professional immediately if they occur.
- Emphasize the importance of repeated lab tests during tacrolimus therapy.
- Advise patient of the risk of taking tacrolimus during pregnancy.
- Inform patient of the risk of lymphoma with tacrolimus therapy.

Evaluation/Desired Outcomes

- Prevention of transplanted liver rejection.

Why was this drug prescribed for your patient?

tamoxifen (ta-**mox**-i-fen)

♣Alpha-Tamoxifen, ♣Med Tamoxifen, Nolvadex, ♣Nolvadex-D, ♣Novo-Tamoxifen, ♣Tamofen, ♣Tamone, ♣Tamoplex

Classification

Therapeutic: antineoplastics
Pharmacologic: antiestrogens

Pregnancy Category D

Indications

Adjuvant therapy of breast cancer after surgery and radiation (delays recurrence). Palliative or adjunctive treatment of advanced breast cancer. Prevention of breast cancer in high-risk patients. Treatement of ductal carninoma **in situ** following breast surgery and radiation. McCune-Albright syndrome with precocious puberty in girls 2–10 yr.

Action

Competes with estrogen for binding sites in breast and other tissues. Reduces DNA synthesis and estrogen response. **Therapeutic Effects:** Suppression of tumor growth. Reduced incidence of breast cancer in high-risk patients. Delayed puberty in McCune-Albright syndrome.

Pharmacokinetics

Absorption: Absorbed after oral administration.
Distribution: Widely distributed.
Metabolism and Excretion: Mostly metabolized by the liver. Slowly eliminated in the feces. Minimal amounts excreted in the urine.
Half-life: 7 days.

TIME/ACTION PROFILE (tumor response)

ROUTE	ONSET	PEAK	DURATION
PO	4–10 wk	several mos	unknown

♣ = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Concurrent warfarin therapy of history of deep vein thrombosis (patients at high risk for breast cancer only). Pregnancy or lactation.
Use Cautiously in: Decreased bone marrow reserve; Women with childbearing potential.

Adverse Reactions/Side Effects

CNS: confusion, depression, headache, weakness. **EENT:** blurred vision. **CV:** PULMONARY EMBOLISM, STROKE, edema. **GI:** nausea, vomiting. **GU:** UTERINE MALIGNANCIES, vaginal bleeding. **F and E:** hypercalcemia. **Hemat:** leukopenia, thrombocytopenia. **Metab:** hot flashes. **MS:** bone pain. **Misc:** tumor flare.

Interactions

Drug-Drug: Estrogens and **aminoglutethimide** may ↓ effectiveness of concurrently administered tamoxifen. Blood levels are ↑ by **bromocriptine**. May ↑ the anticoagulant effect of **warfarin**. Risk of thromboembolic events is ↑ by concurrent use of other **antineoplastics**.

Route/Dosage

Treatment of Breast Cancer

PO (Adults): 10–20 mg twice daily; doses of 20 mg/day may be taken as a single dose.

Prevention of Breast Cancer/Ductal carcinoma *in situ*

PO (Adults): 20 mg once daily for 5 yr.

McCune-Albright Syndrome

PO (Children (girls) 2–10 yr): 20 mg once daily for up to one year.

NURSING IMPLICATIONS

Assessment

- Assess for an increase in bone or tumor pain. Confer with physician or other health care professional regarding analgesics. This transient pain usually resolves despite continued therapy.

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

tamsulosin (tam-**soo**-loe-sin)

Flomax

Classification

Therapeutic: none assigned
Pharmacologic: peripherally acting antiadrenergics

Pregnancy Category B

Indications

Management of outflow obstruction in male patients with prostatic hyperplasia.

Action

Decreases contractions in smooth muscle of the prostatic capsule by preferentially binding to alpha-adrenergic receptors. **Therapeutic Effects:** Decreased symptoms of prostatic hyperplasia (urinary urgency, hesitancy, nocturia).

Pharmacokinetics

Absorption: Slowly absorbed after oral administration.
Distribution: Widely distributed.
Metabolism and Excretion: Extensively metabolized by the liver; <10% excreted unchanged in urine.
Half-life: 14 hr.

TIME/ACTION PROFILE (increase in urine flow)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	2 wk	unknown

Contraindications/Precautions

Contraindicated in: Hypersensitivity.
Use Cautiously in: Patients at risk for prostate carcinoma (symptoms may be similar).

Adverse Reactions/Side Effects

CNS: dizziness, headache. **EENT:** rhinitis. **CV:** orthostatic hypotension. **GU:** retrograde/diminished ejaculation.

Interactions

Drug-Drug: Cimetidine may increase blood levels and the risk of toxicity. Increased risk of hypotension with other peripherally acting anti-adrenergics (**doxazosin**, **prazosin**, **terazosin**); concurrent use should be avoided.

Route/Dosage

PO (Adults): 0.4 mg once daily after a meal; may be increased after 2–4 wk to 0.8 mg/day.

NURSING IMPLICATIONS

Assessment

- 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) before and periodically throughout therapy.
- 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.

Potential Nursing Diagnoses

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

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

- ***Lab Test Considerations:*** Monitor CBC, platelets, and calcium levels before and during therapy. May cause transient hypercalcemia in patients with metastases to the bone. An estrogen receptor assay should be assessed before initiation of therapy.
- Monitor serum cholesterol and triglyceride concentrations in patients with pre-existing hyperlipidemia. May cause ↑ concentrations.
- Monitor hepatic function tests and thyroxine (T_4) periodically during therapy. May cause ↑ serum hepatic enzyme and thyroxine concentrations.
- Gynecologic examinations should be performed regularly; may cause variations in Papanicolaou and vaginal smears.

Potential Nursing Diagnoses

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

Implementation

- **PO:** Administer with food or fluids if GI irritation becomes a problem. Consult physician or other health care professional if patient vomits shortly after administration of medication to determine need for repeat dose.
- **Do not crush, break, chew, or administer an antacid within 1–2 hr of enteric-coated tablet.**

Patient/Family Teaching

- Instruct patient to take medication as directed. If a dose is missed, it should be omitted.
- If skin lesions are present, inform patient that lesions may temporarily increase in size and number and may have increased erythema.
- Advise patient to report bone pain to health care professional promptly. This pain may be severe. Inform patient that this may be an indication of the drug's effectiveness and will resolve over time. Analgesics should be ordered to control pain.
- Instruct patient to monitor weight weekly. Weight gain or peripheral edema should be reported to health care professional.
- This medication may induce ovulation and may have teratogenic properties. Advise patient to use a nonhormonal method of contraception during and for 1 mo after the therapy.
- Advise patient that medication may cause hot flashes. Notify health care professional if these become bothersome.
- Instruct patient to notify health care professional promptly if pain or swelling of legs, shortness of breath, weakness, sleepiness, confusion, nausea, vomiting, weight gain, dizziness, headache, loss of appetite, or blurred vision occurs. Patient should also report menstrual irregularities, vaginal bleeding, pelvic pain or pressure.

Evaluation/Desired Outcomes

- Decreased size or spread of breast cancer. Observable effects of therapy may not be seen for 4–10 wk after initiation.
- Delayed puberty in McCune-Albright syndrome.

Why was this drug prescribed for your patient?

Implementation

- Do not confuse Flomax (tamsulosin) with Fosamax (alendronate) or Volmax (albuterol).
- **PO:** Administer daily dose 30 min after the same meal each day.
- If dose is interrupted for several days at either the 0.4-mg or 0.8-mg dose, restart therapy with the 0.4-mg/day dose.

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. If a dose is missed, take as soon as remembered unless it is almost time for next dose. Do not double doses.
- May cause dizziness. Advise patient to avoid driving or other activities requiring alertness until response to medication is known.
- Caution patient to change positions slowly to minimize orthostatic hypotension.
- Advise patient to consult health care professional before taking any cough, cold, or allergy remedies.
- Emphasize the importance of follow-up visits to determine effectiveness of therapy.

Evaluation/Desired Outcomes

- Decrease in urinary symptoms of benign prostatic hyperplasia.

Why was this drug prescribed for your patient?

tegaserod (te-gas-er-od)

Zelnorm

Classification

Therapeutic: anti-irritable bowel syndrome agents
Pharmacologic: 5 HT_4 agonists

Pregnancy Category B

Indications

Short-term treatment of irritable bowel syndrome (IBS) in women whose primary symptom is constipation.

Action

Acts as a partial agonist of 5–hydroxytryptamine (5–HT, serotonin) at the 5–HT_4 receptor site. Agonist activity causes the release of other neurotransmitters and results in increased peristalsis, increased intestinal secretion, and decreased visceral sensitivity. **Therapeutic Effects:** Decreased constipation as a chronic symptom of IBS.

Pharmacokinetics

Absorption: 10% absorbed following oral administration.
Distribution: Extensively distributed to tissues.
Protein Binding: 98% bound to plasma proteins.
Metabolism and Excretion: 66% excreted unchanged in feces; remainder is metabolized in the GI tract and by the liver. Metabolites are renally excreted.
Half-life: 11 hr.

TIME/ACTION PROFILE

ROUTE	ONSET	PEAK	DURATION
PO	unknown	1 hr†	1–2wk‡

†Blood levels

‡Return of symptoms following discontinuation

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Moderate to severe hepatic impairment. Severe renal impairment.; History of bowel obstruction, gallbladder disease, sphincter of Oddi dysfunction, or intra-abdominal adhesions. Concurrent or frequent diarrhea. New or worsening abdominal pain.
Use Cautiously in: Mild hepatic impairment; Patients >65 yr (safety not established); Pregnancy, lactation or children <18 yr (safety not established).

Adverse Reactions/Side Effects

CNS: headache. **GI:** diarrhea.

Interactions

Drug-Drug: None known.

Route/Dosage

PO (Adults): 6 mg twice daily before meals.

NURSING IMPLICATIONS

Assessment

- Assess patient for symptoms of IBS (abdominal pain or discomfort, bloating, constipation).

Potential Nursing Diagnoses

Constipation (Indications)
Diarrhea (Adverse Reactions)

Implementation

- **PO:** Administer twice daily shortly before meals.

Patient/Family Teaching

- Instruct patient to take tegaserod as directed. Review patient information leaflet with patient. Missed doses should be omitted; do not double dose. Take next dose as scheduled. Medication increases the movement of stool through the bowels, but does not cure IBS. If tegaserod is stopped, IBS symptoms may return within 1–2 wk.
- Advise patient to notify health care professional if new or worsening abdominal pain with or without rectal bleeding occurs.
- May cause diarrhea. Usually occurs during first week of therapy and resolves with continued therapy. Advise patient to notify health care profes-

telithromycin (tel-i-thro-mye-sin)

Ketek

Classification

Therapeutic: anti-infectives
Pharmacologic: ketolides

Pregnancy Category C

Indications

Acute bacteria exacerbation of chronic bronchitis. Acute bacterial sinusitis. Community-acquired pneumonia.

Action

Blocks bacterial protein synthesis at the level of the 50S ribosomal subunit. **Therapeutic Effects:** Resolution of infection. **Spectrum:** Active against the following organisms: *Staphylococcus aureus* (methicillin and erythromycin susceptible strains only), *Streptococcus pneumoniae* (including multidrug resistant strains), *Haemophilus influenzae*, *Moraxella catarrhalis*, *Chlamydophila pneumoniae*, and *Mycoplasma pneumoniae*.

Pharmacokinetics

Absorption: 57% absorbed following oral administration; unaffected by food.
Distribution: Concentrates in bronchial mucosa, epithelial lining fluid and alveolar macrophages.
Metabolism and Excretion: 70% metabolized by the liver (50% by CYP 3A4), 13% excreted unchanged in urine, 7% excreted unchanged via biliary/intestinal elimination.
Half-life: 10 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
PO	rapid	1 hr	24 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Hypersensitivity to macrolides (erythromycin, azithromycin, clarithromycin). Concurrent use of pimozide, ergot alkaloids, simvastatin, lovastatin, atorvastatin, or rifampin. Congenital QTc prolongation, uncorrected hypokalemia or hypomagnesemia, bradycardia, concurrent use of Class IA (quinidine, procainamide) or Class III antiarrhythmics (dofetilide). Myasthenia gravis.
Use Cautiously in: CCr <30 mL/min (dosage not established); Pregnancy (use only if benefits outweigh risks to fetus), lactation; Concurrent use of midazolam and other benzodiazpines; Children (safety not established).

Adverse Reactions/Side Effects

EENT: visual disturbances. **CV:** arrhythmias, QTc prolongation. **GI:** PSEUDOMEMBRANOUS COLITIS, diarrhea, hepatitis, nausea. **Neuro:** exacerbation of myasthenia gravis.

Interactions

Drug-Drug: Blood levels are ↑ by **ketoconazole** and **itraconazole**. ↑ levels and risk of myopathy from **simvastatin**, **lovastatin**, and **atorvastatin**; avoid concurrent use. ↑ levels and risk of excessive sedation with **midazolam**; careful titration is required. Similar effects may occur with **triazolam**. ↑ levels of **metoprolol**; use caution in patients with CHF. May also ↑ levels, effects and risk of toxicity from **ergot derivatives** (**ergotamine**, **dihydroergotamine**); concurrent use not recommended; similar effects may occur with **carbamazepine**, **cyclosporine**, **tacrolimus**, **sirolimus**, **hexobarbital**, or **phenytoin**. **Rifampin** ↓ levels and effectiveness; avoid concurrent use. Similar effects may occur with **phenytoin**, **carbamazepine**, or **phenobarbital**.

sional if severe diarrhea or diarrhea accompanied by severe cramping, abdominal pain, or dizziness.
- Caution patient to notify health care professional prior to taking other Rx or OTC medications or herbal products concurrently with tegaserod.
- Advise patient to notify health care professional if pregnancy is planned or suspected, or if breastfeeding an infant.

Evaluation/Desired Outcomes
- Decrease in abdominal pain/discomfort, bloating, and constipation
- Therapy should be continued for 4–6 wks for women with IBS with constipation that respond to therapy; an additional 4–6 wk course may be considered.
- For chronic idiopathic constipation, health care professional and patient should periodically assess the need for continued therapy.

Why was this drug prescribed for your patient?

Route/Dosage
PO (Adults): *Acute bacterial exacerbation of chronic bronchitis, acute bacterial sinusitis*—800 mg once daily for 5 days; *community-acquired pneumonia*—800 mg once daily for 7–10 days.

NURSING IMPLICATIONS

Assessment
- Assess for infection (vital signs; appearance of wound, sputum, urine, and stool; WBC) at beginning of and during therapy.
- Obtain specimens for culture and sensitivity before initiating therapy. First dose may be given before receiving results.
- Determine any family history of QTc prolongation or proarrythmic conditions (hypokalemia, bradycardia).
- ***Lab Test Considerations:*** May cause ↑ platelet count.

Potential Nursing Diagnoses
Risk for infection (Indications)
Noncompliance (Patient/Family Teaching)

Implementation
- **PO:** Administer with or without food.

Patient/Family Teaching
- Instruct patient to take medication as directed and to finish medication completely, even if feeling better. Take missed doses as soon as remembered, but do not take more than one dose in a 24–hr period.
- May cause visual disturbances (blurred vision, difficulty focusing, diplopia). Caution patient to avoid driving or other activities requiring visual acuity until response to medication is known. Advise patient to notify health care professional if visual disturbances interfere with daily activities.
- Instruct patient to notify health care professional if fainting occurs.
- Advise patient to report the signs of superinfection (black, furry overgrowth on the tongue; vaginal itching or discharge; loose or foul-smelling stools).
- Instruct patient to notify health care professional if fever and diarrhea develop, especially if stool contains blood, pus, or mucus. Advise patient not to treat diarrhea without consulting health care professional.
- Advise patient to avoid taking other Rx, OTC, or herbal products without consulting health care professional.
- Advise patient to notify health care professional if pregnancy is planned or suspected or if breast feeding.

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?

temazepam (tem-az-a-pam)

Restoril

Classification

Therapeutic: sedative/hypnotics
Pharmacologic: benzodiazepines

Schedule IV

Pregnancy Category X

Indications

Short-term management of insomnia.

Action

Acts at many levels in the CNS, producing generalized depression. Effects may be mediated by gamma-aminobutyric acid (GABA), an inhibitory neurotransmitter. **Therapeutic Effects:** Relief of insomnia.

Pharmacokinetics

Absorption: Well absorbed after oral administration.
Distribution: Widely distributed; crosses blood-brain barrier. Probably crosses the placenta and enters breast milk.
Metabolism and Excretion: Metabolized by the liver.
Half-life: 10–20 hr.

TIME/ACTION PROFILE (sedation)

ROUTE	ONSET	PEAK	DURATION
PO	30 min	2–3 hr	6–8 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Cross-sensitivity with other benzodiazepines may exist. Pre-existing CNS depression. Severe uncontrolled pain. Narrow-angle glaucoma. Pregnancy or lactation.

Use Cautiously in: Pre-existing hepatic dysfunction; History of suicide attempt or drug addiction; Geriatric or debilitated patients (dosage reduction recommended).

Adverse Reactions/Side Effects

CNS: hangover, dizziness, drowsiness, lethargy, paradoxical excitation. **EENT:** blurred vision. **GI:** constipation, diarrhea, nausea, vomiting. **Derm:** rashes. **Misc:** physical dependence, psychological dependence, tolerance.

Interactions

Drug-Drug: Additive CNS depression with **alcohol**, **antidepressants**, **antihistamines**, **opioid analgesics**, and other **sedative/hypnotics**. May decrease efficacy of **levodopa**. **Rifampin** or **tobacco (smoking)** increases metabolism and may decrease effectiveness of temazepam. **Probenecid** may prolong the effects of temazepam. Sedative effects may be antagonized by **theophylline**.
Drug-Natural Products: Concomitant use of **kava, valerian, skullcap, chamomile,** or **hops** can increase CNS depression.

Route/Dosage

PO (Adults): 15–30 mg at bedtime; some patients may need only 7.5 mg.
PO (Geriatric Patients or Debilitated Patients): 7.5 mg at bedtime.

NURSING IMPLICATIONS

Assessment

- Assess sleep patterns before and periodically throughout course of therapy.
- Prolonged high-dose therapy may lead to psychological or physical dependence. Restrict amount of drug available to patient, especially if patient is depressed or suicidal or has a history of addiction.

Potential Nursing Diagnoses

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

terazosin (ter-ay-zoe-sin)

Hytrin

Classification

Therapeutic: antihypertensives
Pharmacologic: peripherally acting antiadrenergics

Pregnancy Category C

Indications

Mild to moderate hypertension (alone or with other agents). Urinary outflow obstruction in patients with benign prostatic hyperplasia.

Action

Dilates both arteries and veins by blocking postsynaptic alpha-adrenergic receptors. Decreases contractions in prostatic capsule smooth muscle. **Therapeutic Effects:** Lowered BP. Decreased symptoms of prostatic hyperplasia (urinary urgency, urinary hesitancy, nocturia).

Pharmacokinetics

Absorption: Well absorbed after oral administration.
Distribution: Unknown.
Metabolism and Excretion: 50% metabolized by liver; 10% excreted unchanged by kidneys; 20% excreted unchanged in feces; 40% excreted in bile.
Half-life: 12 hr.

TIME/ACTION PROFILE

ROUTE	ONSET†	PEAK‡	DURATION†
PO–hypertension	15 min	6–8 wk	24 hr
PO–prostatic hyperplasia	2–6 wk	unknown	unknown

†After single dose
‡After multiple oral dosing

Contraindications/Precautions

Contraindicated in: Hypersensitivity.
Use Cautiously in: Dehydration, volume/sodium depletion (risk of hypotension); Pregnancy, lactation, or children (safety not established).

Adverse Reactions/Side Effects

CNS: dizziness, headache, weakness, drowsiness, nervousness. **EENT:** nasal congestion, blurred vision, conjunctivitis, sinusitis. **Resp:** dyspnea. **CV:** first-dose orthostatic hypotension, arrhythmias, chest pain, palpitations, peripheral edema, tachycardia. **GI:** nausea, abdominal pain, diarrhea, dry mouth, vomiting. **GU:** impotence, urinary frequency. **Derm:** pruritus. **Metab:** weight gain. **MS:** arthralgia, back pain, extremity pain. **Neuro:** paresthesia. **Misc:** fever.

Interactions

Drug-Drug: ↑ hypotension with other **antihypertensives**, acute ingestion of **alcohol**, or **nitrates. NSAIDs**, **sympathomimetics**, or **estrogens** may ↓ effects of antihypertensive therapy.

Route/Dosage

Hypertension

PO (Adults): 1 mg initially, then slowly increase up to 5 mg/day (usual range 1–5 mg/day); may be given as single dose or in 2 divided doses (not to exceed 20 mg/day).

Benign Prostatic Hyperplasia

PO (Adults): 1 mg at bedtime, increase gradually up to 5–10 mg/day.

NURSING IMPLICATIONS

Assessment

- Monitor BP (lying and standing) and pulse frequently during initial dose adjustment and periodically during therapy. Notify physician or other health care professional of significant changes.
- Assess patient for first-dose orthostatic reaction and syncope. May occur 30 min–2 hr after initial dose and occasionally thereafter. Incidence may be dose related. Volume-depleted or sodium-restricted patients may be more sensitive to this effect.

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

Implementation

- **Do not confuse temazepam with flurazepam.**
- Supervise ambulation and transfer of patients after administration. Remove cigarettes. Side rails should be raised and call bell within reach at all times.
- **PO:** Administer with food if GI irritation becomes a problem.

Patient/Family Teaching

- Instruct patient to take temazepam exactly as directed. Discuss the importance of preparing environment for sleep (dark room, quiet, avoidance of nicotine and caffeine). If less effective after a few weeks, consult health care professional; do not increase dose.
- May cause daytime drowsiness or dizziness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known.
- Advise patient to avoid the use of alcohol and other CNS depressants and to consult the health care professional before the use of OTC preparations that contain antihistamines or alcohol.
- Advise patient to inform health care professional if pregnancy is planned or suspected.
- Emphasize the importance of follow-up appointments to monitor progress.

Evaluation/Desired Outcomes

- Improvement in sleep habits, which may not be noticeable until the third day of therapy.

Why was this drug prescribed for your patient?

- Monitor intake and output ratios and daily weight; assess for edema daily, especially at beginning of therapy.
- **Hypertension:** Monitor frequency of prescription refills to determine adherence.
- **Benign Prostatic Hyperplasia:** 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) before and periodically during therapy.
- Rule out prostatic carcinoma before therapy; symptoms are similar.

Potential Nursing Diagnoses

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

Implementation

- May be used in combination with diuretic or beta blockers to minimize sodium and water retention. If these are added to terazosin therapy, reduce dose of terazosin initially and titrate to effect.
- **PO:** Administer initial dose at bedtime. If necessary, dose may be increased to twice daily.

Patient/Family Teaching

- Instruct patient to take medication at the same time each day. Take missed doses as soon as remembered. If not remembered until next day, omit; do not double doses.
- Advise patient to weigh self twice weekly and assess feet and ankles for fluid retention.
- May cause dizziness or drowsiness. Advise patient to avoid driving or other activities requiring alertness until response to the medication is known.
- Caution patient to avoid sudden changes in position to decrease orthostatic hypotension. Alcohol, CNS depressants, standing for long periods, hot showers, and exercising in hot weather should be avoided because of enhanced orthostatic effects.
- Advise patient to consult health care professional before taking any cough, cold, or allergy remedies.
- Instruct patient to notify health care professional of medication regimen before any surgery.
- Advise patient to notify health care professional if frequent dizziness, fainting, or swelling of feet or lower legs occurs.
- Emphasize the importance of follow-up exams to evaluate effectiveness of medication.
- **Hypertension:** Emphasize the importance of continuing to take this medication as directed, even if feeling well. Medication controls but does not cure hypertension.
- 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).
- Instruct patient and family on proper technique for blood pressure monitoring. Advise them to check blood pressure at least weekly and to report significant changes.

Evaluation/Desired Outcomes

- Decreased blood pressure without appearance of side effects.
- Decreased symptoms of prostate hyperplasia. May require 2–6 wk of therapy before effects are noticeable.

Why was this drug prescribed for your patient?

teriparatide (ter-i-**par**-a-tide)

Forteo

Classification

Therapeutic: hormones
Pharmacologic: parathyroid hormones (rDNA origin)

Pregnancy Category C

Indications

Treatment of osteoporosis in postmenopausal women at high risk for fractures. To increase bone mass in men with osteoporosis at high risk for fracture. Most useful for those have failed or are intolerant to other osteoporosis therapies.

Action

Regulates calcium and phosphate metabolism in bone and kidney by binding to specific cell receptors; stimulates osteoblastic activity. Increases serum calcium and decreases serum phosphorus. **Therapeutic Effects:** Increased bone mineral density with reduced risk of fractures.

Pharmacokinetics

Absorption: Extensively absorbed after subcut administration.
Distribution: Unknown.
Metabolism and Excretion: Metabolized by the liver; metabolites renally excreted.
Half-life: 1 hr (after subcut use).

TIME/ACTION PROFILE (effects on serum calcium)

	ONSET	PEAK	DURATION
subcut	2 hr	4–6 hr	16–24 hr

♣ = Canadian drug name.

Contraindications/Precautions

Contraindicated in: Hypersensitivity. Paget's disease of the bone or other metabolic bone disease. Unexplained ↑ alkaline phosphatase. Pediatric or young adult patients. Previous radiation therapy, history of bone metastases or skeletal malignancy. Pre-existing hypercalcemia. Pregnancy or lactation.
Use Cautiously in: Concurrent **digoxin**.

Adverse Reactions/Side Effects

CV: orthostatic hypotension.

Interactions

Drug-Drug: Transient hypercalcemia may increase the risk of **digoxin** toxicity.

Route/Dosage

Subcut: (Adults): 20 mcg once daily.

NURSING IMPLICATIONS

Assessment

- Assess patient for bone mineral density before and periodically during therapy.
- ***Lab Test Considerations:*** Effects increase serum calcium and decrease serum phosphorus. Maximum effect is within 4–6 hr. By 16 hr post-dose, serum calcium has returned to near baseline. If hypercalcemia persists, discontinue teriperatide and evaluate cause of hypercalcemia.
- May asymptomatically increase serum uric acid concentrations.

Potential Nursing Diagnoses

Risk for injury (Indications)

Implementation

- Use of teriparatide should not continue more than 2 yr.
- **Subcut:** Administer subcut into thigh or abdominal wall once daily. May be administered at any time of day without regard to food. Solution should be clear and colorless. Do not use if solid particles appear, or if solution

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

TETRACYCLINES

doxycycline (dox-i-**sye**-kleen)

Adoxa, ♣Apo-Doxy, Doryx, Doxy, Doxy Caps, ♣Doxycin, Monodox, ♣Novodoxylin, Vibramycin, Vibra-Tabs

minocycline (min-oh-**sye**-kleen)

Dyancin, Minocin, Vectrin

tetracycline (te-tra-**sye**-kleen)

Achromycin, ♣Apo-Tetra, ♣Novotetra, ♣Nu-Tetra, Panmycin, Robitet, Sumycin, Tetracap, Tetracyn, Tetralan

Classification

Therapeutic: anti-infectives

Pregnancy Category UK

Indications

Treatment of infections caused by unusual organisms, including *Mycoplasma, Chlamydia, Rickettsia, Borellia burgdorferi*. Gonorrhea and syphilis in penicillin-allergic patients. Prevention of exacerbations of chronic bronchitis. Treatment of anthrax (doxycycline only). Acne. **Unlabeled uses: Doxycycline:** Lyme disease.

Action

Inhibits bacterial protein synthesis at the level of the 30S bacterial ribosome. **Therapeutic Effects:** Bacteriostatic action. **Spectrum:** Includes activity against: *Bacillus anthracis, Clostridium perfringens, Clostridium tetani, Listeria monocytogenes, Nocardia, Propionibacterium acnes, Actinomyces israelii*. Also active against: *Haemophilus influenzae, Legionella pneumophila, Yersinia enterocolitica, Yersinia pestis, Neisseria gonorrhoeae, Neisseria meningitidis*. Additional spectrum includes: *Mycoplasma, Treponema pallidum, Chlamydia, Rickettsia, Borrelia burgdorferi*.

♣ = Canadian drug name.

Pharmacokinetics

Absorption: *Tetracycline*—60–80% absorbed following PO use. *Doxycycline, minocycline*—well absorbed from the GI tract.
Distribution: Widely distributed, some penetration into CSF; crosses the placenta, enters breast milk.
Metabolism and Excretion: *Doxycycline*—20–40% excreted unchanged in urine; some intestinal inactivation and some enterohepatic circulation with excretion in bile/feces. *Minocycline*—5–20% excreted unchanged by the urine; some metabolism by the liver with enterohepatic circulation and excretion in bile/feces. *Tetracycline*—Excreted mostly unchanged by the kidneys.
Half-life: *Doxycycline*—14–17 hr (↑ in severe renal impairment). *Minocycline*—11–26 hr. *Tetracycline*—6–12 hr.

TIME/ACTION PROFILE (blood levels)

ROUTE	ONSET	PEAK	DURATION
Doxycycline-PO	1–2 hr	1.5–4 hr	12 hr
Doxycycline-IV	rapid	end of infusion	12 hr
Minocycline-PO	rapid	2–3 hr	6–12 hr
Minocycline-IV	rapid	end of infusion	6–12 hr
Tetracycline-PO	1–2 hr	2–4 hr	6–12 hr

Contraindications/Precautions

Contraindicated in: Hypersensitivity. May contain alcohol or bisulfites; avoid in patients with hypersensitivity/intolerance. Pregnancy (may permanently stain infant's teeth if used during last half of pregnancy). Lactation. Children <8 yr (permanent staining of teeth). Can be used in children and pregnant and lactating women for the treatment of anthrax (doxycycline only).
Use Cautiously in: Cachecticdebilitated patients; Renal disease; Hepatic impairment (doxycycline, minocycline); Nephrogenic diabetes insipidus.

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

is cloudy or colored. Store pen in the refrigerator; do not freeze or use if it has been frozen. Minimize time out of refrigerator; use immediately and return to refrigerator. *Forteo* pen can be used for up to 28 days after the first injection. After the 28-day use period, discard the *Forteo* pen, even if it still contains some unused solution.

Patient/Family Teaching

- Advise patient to administer medication at same time each day. If a dose is missed, administer as soon as remembered that day. Do not take more than one injection/day.
- Instruct patient on proper administration technique and disposal of needles. Patient should read *Medication Guide* and *User Manual* before starting therapy and re-read them each time prescription is refilled. User manual can be found at www.forteo.com/control/pen_user_manual. Caution patient to throw pen away after 28–day use period and not to share their pen with other patients.
- Advise patient to administer at same time each day. If a dose is missed, administer as soon as remembered that day. Do not take more than one injection/day.
- Discuss the importance of other treatments for osteoporosis (supplemental calcium and/or vitamin D, weight-bearing exercise, modification of behavioral factors such as smoking and/or alcohol consumption).
- May cause orthostatic hypotension during first several doses. Caution patient to administer medication in a lying or sitting position. If lightheadedness or palpitations occur, lie down until symptoms resolve. Notify health care professional if symptoms persist or worsen.
- Instruct patient to notify health care professional if persistent symptoms of hypercalcemia (nausea, vomiting, constipation, lethargy, muscle weakness) occur.
- Emphasize the importance of follow-up tests for bone mineral density.

Evaluation/Desired Outcomes

- Increased bone mineral density with reduced risk of fractures.

Why was this drug prescribed for your patient?

Adverse Reactions/Side Effects

CNS: benign intracranial hypertension (↑ in children), *minocycline*—dizziness. **EENT:** *minocycline*—vestibular reactions. **GI:** diarrhea, nausea, vomiting, esophagitis, hepatotoxicity, pancreatitis. **Derm:** photosensitivity, rashes, *minocycline*—pigmented skin/mucous membranes. **Hemat:** blood dyscrasias. **Local:** *doxycycline, minocycline*—phlebitis at IV site. **Misc:** hypersensitivity reactions, superinfection.

Interactions

Drug-Drug: May ↑ the effect of **warfarin**. May ↓ the effectiveness of **estrogen-containing oral contraceptives**. **Antacids**, **calcium**, **iron**, and **magnesium** form insoluble compounds (chelates) that ↓ absorption; effect is least with doxycycline. **Sucralfate** may bind to tetracycline and prevent its absorption from the GI tract. **Cholestyramine** or **colestipol** ↓ absorption of tetracyclines. **Adsorbent antidiarrheals** may ↓ absorption. **Barbiturates**, **carbamazepine**, or **phenytoin** may ↓ the activity of doxycycline.

Drug-Food: Calcium in foods or **dairy products** ↓ absorption by forming insoluble compounds (chelates).

Route/Dosage

Doxycycline

PO (Adults and Children >45 kg): *Most infections*—100 mg q 12 hr on the 1st day, then 100–200 mg once daily or 50–100 mg q 12 hr. *Gonorrhea*—100 mg q 12 hr for 7 days or 300 mg followed 1 hr later by another 300-mg dose. *Malaria prophylaxis*—100 mg once daily. *Lyme disease*—100 mg twice daily. *Anthrax*—100 mg twice daily for 60 days.

PO (Children ≤45 kg): 2.2 mg/kg q 12 hr on the 1st day, then 2.2–4.4 mg/kg/day given once daily or 1.1–2.2 mg/kg q 12 hr. *Anthrax*—2.2 mg/kg twice daily for 60 days.

IV (Adults and Children >45 kg): 200 mg once daily or 100 mg q 12 hr on the 1st day, then 100–200 mg once daily or 50–100 mg q 12 hr. *Anthrax*—100 mg q 12 hr change to oral when appropriate, for 60 days.

IV (Children ≤45 kg): 4.4 mg/kg once daily or 2.2 mg/kg q 12 hr on the 1st day, then 2.2–4.4 mg/kg/day given once daily or 1.1–2.2 mg/kg q 12 hr. *Anthrax*—100 mg q 12 hr change to oral when appropriate, for 60 days.

Minocycline

PO (Adults): 100–200 mg initially, then 100 mg q 12 hr or 50 mg q 6 hr; *acne*——50 mg 1–3 times daily.

PO (Children ≥8 yr): 4 mg/kg initially, then 2 mg/kg q 12 hr.

IV (Adults): 200 mg initially, then 100 mg q 12 hr (up to 400 mg/day).

IV (Children ≥8 yr): 4 mg/kg initially, then 2 mg/kg q 12 hr.

Tetracycline

PO (Adults): 250–500 mg q 6 hr or 500 mg–1 g q 12 hr. *Chronic treatment of acne*—500 mg–2 g/day for 3 wk, then decrease to 125 mg–1 g/day.

PO (Children ≥8 yr): 6.25–12.5 mg/kg q 6 hr or 12.5–25 mg/kg q 12 hr.

NURSING IMPLICATIONS

Assessment

- Assess for infection (vital signs; appearance of wound, sputum, urine, and stool; WBC) at beginning of and throughout therapy.
- Obtain specimens for culture and sensitivity before initiating therapy. First dose may be given before receiving results.
- **IV:** Assess IV site frequently; may cause thrombophlebitis.
- ***Lab Test Considerations:*** Monitor renal and hepatic functions and CBC periodically during long-term therapy.
- May cause ↑ AST, ALT, serum alkaline phosphatase, bilirubin, and amylase concentrations. Tetracyclines, except doxycycline, may cause ↑ serum BUN.
- May cause false ↑ in urinary catecholamine levels.

Potential Nursing Diagnoses

Risk for infection (Indications, Side Effects)
Noncompliance (Patient/Family Teaching)

CONTINUED

CONTINUED

TETRACYCLINES

Implementation

- May cause yellow-brown discoloration and softening of teeth and bones if administered prenatally or during early childhood. Not recommended for children under 8 yr of age or during pregnancy or lactation unless used for the treatment of anthrax.
- **PO:** Administer around the clock. Administer at least 1 hr before or 2 hr after meals. *Doxycycline and minocycline* may be taken with food or milk if GI irritation occurs. Administer with a full glass of liquid and at least 1 hr before going to bed to avoid esophageal ulceration. Use calibrated measuring device for liquid preparations. Shake liquid preparations well. Do not administer within 1–3 hr of other medications.
- Avoid administration of calcium, antacids, magnesium-containing medications, sodium bicarbonate, or iron supplements within 1–3 hr of oral tetracyclines.

Doxycycline

- **PO:** To prepare doses for infants and children exposed to anthrax place one 100 mg tablet in a small bowl and crush to a fine powder with a metal spoon, leaving no large pieces. Add 4 level teaspoons of lowfat milk, lowfat chocolate milk, regular chocolate milk, chocolate pudding or an apple juice and sugar mixture made by combining 4 teaspoons of sugar and 4 teaspoons of apple juice. Mix food or drink and doxycycline powder until powder dissolves. Mixture is stable in a covered container for 24 hrs if refrigerated (if made with milk or pudding) or at room temperature (if made with juice). Number of teaspoons to administer/dose is based on child's weight (0–12.5 lbs— ½ tsp; 12.5–25 lbs— 1 tsp; 25–37.5 lbs— 1½ tsp; 37.5–50 lbs— 2 tsp; 50–62.5 lbs— 2½ tsp; 62.5–75 lbs— 3 tsp; 75–87.5 lbs— 3½ tsp; 87.5–100 lbs— 4 tsp).
- **Intermittent Infusion:** Dilute each 100 mg with 10 ml of sterile water or 0.9% NaCl for injection. Dilute further in 100–1000 ml of 0.9% NaCl, D5W, D5/LR, Ringer's, or LR. Solution is stable for 12 hr at room temperature and 72 hr if refrigerated. If diluted with D5/LR or LR, administer within 6 hr. Protect solution from direct sunlight. Concentrations of less than 1 mcg/ml or greater than 1 mg/ml are not recommended. ***Rate:*** Administer over a minimum of 1–4 hr. Avoid rapid administration. Avoid extravasation.
- **Y-Site Compatibility:** acyclovir, amifostine, amiodarone, aztreonam, bivalirudin, cisatracurium, cyclophosphamide, dexmedetomidine, diltiazem, docetaxel, etoposide phosphate, fenoldopam, filgrastim, fludarabine, gemcitabine, granisetron, hydromorphone, linezolid, magnesium sulfate, melphalen, meperidine, morphine, ondansetron, perphenazine, propofol, remifentanil, sargramostim, tacrolimus, teniposide, theophylline, thiotepa, vinorelbine.
- **Y-Site Incompatibility:** heparin, piperacillin/tazobactam.

Minocycline

- **Intermittent Infusion:** Dilute each 100 mg with 5–10 ml of sterile water for injection. Dilute further in 500–1000 ml of 0.9% NaCl, D5W, D5/0.9% NaCl, Ringer's or LR. Solution is stable for 24 hr at room temperature. ***Rate:*** Administer over 6 hr immediately following dilution. Avoid rapid infusions. May cause thrombophlebitis; avoid extravasation.
- **Y-Site Compatibility:** aztreonam, cisatracurium, cyclophosphamide, docetaxel, etoposide phosphate, filgrastim, fludarabine, gemcitabine, granisetron, heparin, hydrocortisone sodium succinate, linezolid, magnesium sulfate, melphalan, perphenazine, potassium chloride, remifentanil, sargramostim, teniposide, vinorelbine, vitamin B complex with C.
- **Y-Site Incompatibility:** allopurinol, amifostine, hydromorphone, meperidine, morphine, piperacillin/tazobactam, propofol, thiotepa.

High Alert

THROMBOLYTIC AGENTS

alteplase
(**al**-te-plase)
Activase, ♣Activase rt-PA, ♣Lysatec rt-PA, tissue plasminogen activator, t-PA

anistreplase
(an-**eye**-strep-lase)
anisoylated plasminogen–streptokinase activator complex, APSAC, Eminase

reteplase
(**re**-te-plase)
Retavase

streptokinase
(strep-toe-**kye**-nase)
Kabbikinase, Streptase

tenecteplase
(te-**nek**-te-plase)
TNKase

urokinase
(yoor-oh-**kye**-nase)
Abbokinase

Classification
Therapeutic: thrombolytics
Pharmacologic: plasminogen activators

Pregnancy Category B (urokinase), C (alteplase, anistreplase, reteplase, streptokinase, tenecteplase)

Indications

Acute coronary thrombosis (MI). **Streptokinase, urokinase:** Massive pulmonary emboli. **Alteplase:** Acute ischemic stroke. **Streptokinase:** Deep vein thrombosis or arterial thromboembolism. **Alteplase:** Occluded central venous access devices.

Action

Convert plasminogen to plasmin, which then degrades fibrin in clots. Alteplase, reteplase, and urokinase directly activate plasminogen. Anistreplase and streptokinase combine with plasminogen to form activator complexes. **Therapeutic Effects:** Lysis of thrombi in coronary arteries, with preservation of ventricular function. Lysis of pulmonary emboli or deep vein thrombosis. Decreased neurologic sequelae of stroke. Clearing of clots in cannulae/catheters (alteplase, urokinase).

Pharmacokinetics

Absorption: After IV administration, absorption is complete. Intracoronary administration/administrationinto occluded catheters/cannulae has a more localized effect.
Distribution: Distribution is not known.
Metabolism and Excretion: *Alteplase*—Rapidly metabolized by the liver. *Anistreplase*—Inactivated by binding to plasmin inactivators. *Reteplase*—Cleared primarily by the liver and kidneys. *Streptokinase*—Rapidly cleared from circulation. *Tenecteplase*—Mostly metabolized by the liver.
Half-life: *Alteplase*—35 min; *anistreplase*—70–120 min; *reteplase*—13–16 min; *streptokinase activator complex*—23 min; *Tenecteplase initial phase*—20–24 min; *tenecteplase terminal phase*— 90–130 min *urokinase*—up to 20 min.

TIME/ACTION PROFILE (fibrinolysis)

ROUTE	ONSET	PEAK†	DURATION
Alteplase IV	unknown	20 min–2 hr (45 min avg)	unknown
Anistreplase IV	unknown	45 min	6 hr‡
Reteplase IV	rapid	within 2 hr	48 hr
Streptokinase IV	immediate	rapid	4 hr (up to 12 hr)
Tenecteplase IV	rapid	unknown	unknown
Urokinase IV	immediate	rapid	up to 12 hr

†Reperfusion of myocardium generally occurs 20 min–2 hr after start of IV dosing (average 45 min)

‡Systemic hyperfibrinolytic state may persist for 2 days

Contraindications/Precautions

Contraindicated in: Active internal bleeding. History of cerebrovascular accident, recent CNS trauma or surgery, neoplasm, or arteriovenous malfor-

Patient/Family Teaching

- Instruct patient to take medication around the clock and to finish the drug completely as directed, even if feeling better. Take missed doses as soon as possible unless it is almost time for next dose; do not double doses. Advise patient that sharing of this medication may be dangerous.
- Advise patient to avoid taking milk or other dairy products concurrently with *tetracycline* Also avoid taking antacids, calcium, magnesium-containing medications, sodium bicarbonate, and iron supplements within 1–3 hr of oral tetracyclines.
- Advise female patient to use a nonhormonal method of contraception while taking tetracyclines and until next menstrual period.
- *Minocycline* commonly causes dizziness or unsteadiness. Caution patient to avoid driving or other activities requiring alertness until response to medication is known. Notify health care professional if these symptoms occur.
- Caution patient to use sunscreen and protective clothing to prevent photosensitivity reactions.
- Advise patient to report the signs of superinfection (black, furry overgrowth on the tongue, vaginal itching or discharge, loose or foul-smelling stools). Skin rash, pruritus, and urticaria should also be reported.
- Instruct patient to notify health care professional of medication regimen before treatment or surgery.
- Instruct patient to notify health care professional if symptoms do not improve within a few days for systemic preparations.
- Caution patient to discard outdated or decomposed tetracyclines; they may be toxic.

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.
- Decrease in acne lesions.
- Treatment of inhalation anthrax (post exposure) or treatment of cutaneous anthrax.

Why was this drug prescribed for your patient?

mation. Severe uncontrolled hypertension. Known bleeding tendencies. Hypersensitivity; cross-sensitivity with anistreplase and streptokinase may occur.

Use Cautiously in: Recent (within 10 days) major surgery, trauma, GI or GU bleeding; Left heart thrombus; Severe hepatic or renal disease; Hemorrhagic ophthalmic conditions; Septic phlebitis; Previous puncture of a noncompressible vessel; Subacute bacterial endocarditis or acute pericarditis; Recent streptococcal infection or previous therapy with anistreplase or streptokinase (from 5 days–6 mo); may produce resistance because of antibody formation; increased dosage requirements may be encountered (anistreplase and streptokinase only); Geriatric patients (>75 yr; increased risk of intracranial bleeding); Pregnancy, lactation, or children (safety not established)

Exercise Extreme Caution in: Patients receiving warfarin therapy; Early postpartum period (10 days).

Adverse Reactions/Side Effects

CNS: INTRACRANIAL HEMORRHAGE, headache. **EENT:** epistaxis, gingival bleeding; *streptokinase*— periorbital edema. **Resp:** bronchospasm, hemoptysis. **CV:** reperfusion arrhythmias, hypotension. **GI:** GI BLEEDING, RETROPERITONEAL BLEEDING. **GU:** GU TRACT BLEEDING. **Derm:** ecchymoses, flushing, urticaria. **Hemat:** BLEEDING. **Local:** hemorrhage at injection sites, phlebitis at IV site. **MS:** musculoskeletal pain. **Misc:** allergic reactions including ANAPHYLAXIS, fever.

Interactions

Drug-Drug: Aspirin, other **NSAIDs**, **warfarin**, **heparin** and **heparin-like agents**, **abciximab**, **eptifibatide**, **tirofiban**, **clopidogrel**, **ticlopidine**, or **dipyridamole**—concurrent use ↑ risk of bleeding, although these agents are frequently used together or in sequence. Risk of bleeding ↑ by concurrent use of **cefotetan**, **cefoperazone**, or **valproic acid**. Effects may be ↓ by **antifibrinolytic agents**, including **aminocaproic acid**, **aprotinin**, or **tranexamic acid**.

Drug-Natural Products: ↑ anticoagulant effect and bleeding risk with **anise, arnica, chamomile, clove, dong quai, fenugreek, feverfew, garlic, ginger, ginkgo, Panax ginseng, licorice,** and others.

Route/Dosage

Alteplase

MI (Accelerated or Front-Loading Regimen)

IV (Adults): 15 mg initially, then 0.75 mg/kg (up to 50 mg) over 30 min, then 0.5 mg/kg (up to 35 mg) over next 60 min; usually accompanied by heparin therapy.

MI (Standard Regimen)

IV (Adults >65 kg): 60 mg over 1st hr (6–10 mg given as a bolus over first 1–2 min), 20 mg over the 2nd hr, and 20 mg over the 3rd hr for a total dose of 100 mg.

IV (Adults <65 kg): 0.75 mg/kg over 1st hr (0.075–0.125 mg/kg given as a bolus over first 1–2 min), 0.25 mg/kg over the 2nd hr, and 0.25 mg/kg over the 3rd hr for a total dose of 1.25 mg/kg (not to exceed 100 mg total).

Pulmonary Embolism

IV (Adults): 100 mg over 2 hr; follow with heparin.

Acute Ischemic Stroke

IV (Adults): 0.9 mg/kg (not to exceed 90 mg), given as an infusion over 1 hr, with 10% of the dose given as a bolus over the 1st min.

Occluded Venous Access Devices

IV (Adults and Children >30 kg): 2 mg/2 ml instilled into occluded catheter; if unsuccessful, may repeat once after 2 hr.

IV (Children 10–30 kg): 110% of the lumen volume (not to exceed 2 mg in 2 ml) instilled into occluded catheter; if unsuccessful, may repeat once after 2 hr.

Anistreplase

MI

IV (Adults): 30 units over 2–5 min.

Reteplase

MI

IV (Adults): 10 units, followed 30 min later by an additional 10 units.

Streptokinase

MI

IV (Adults): 1.5 million IU.

CONTINUED