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Cardiovascular System Medications
Antihypertensives

LISINOPRIL

Drug Class: Angiotensin-Converting Enzyme (ACE) Inhibitor

Mechanism of Action: Blocks the conversion of angiotensin I to angiotensin II, leading to vasodilation, reduced blood pressure, and decreased workload on the heart.

Indications: Hypertension, heart failure, post-myocardial infarction, diabetic nephropathy.

DOSAGE:

Adults: Initial dose: 5 to 10 milligrams orally once daily; maintenance dose: 20 to 40 milligrams per day.

Pediatrics (≥6 years old): Initial dose: 0.07 milligrams per kilogram orally once daily (max 5 milligrams/day); maximum dose: 0.6 milligrams per kilogram (up to 40 milligrams/day).

Side Effects: Hypotension, hyperkalemia, dry cough, dizziness, angioedema, renal impairment.

Contraindications: Pregnancy, history of angioedema, bilateral renal artery stenosis, hypersensitivity to ACE inhibitors.

Nursing Considerations:

- Monitor blood pressure and kidney function (creatinine, blood urea nitrogen).
- Assess potassium levels due to risk of hyperkalemia.
- Educate patients to report swelling of the face, lips, or throat (angioedema risk).
- Avoid potassium supplements or potassium-sparing diuretics.
- Do not use during pregnancy due to fetal toxicity risk.

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Cardiovascular System Medications
Antihypertensives

ENALAPRIL

Drug Class: Angiotensin-Converting Enzyme (ACE) Inhibitor

Mechanism of Action: Inhibits the conversion of angiotensin I to angiotensin II, leading to vasodilation, decreased blood pressure, and reduced cardiac workload.

Indications: Hypertension, heart failure, left ventricular dysfunction, diabetic nephropathy.

DOSAGE:
Adults: Initial dose: 2.5 to 5 milligrams orally once daily; maintenance dose: 10 to 40 milligrams per day (single dose or divided into two doses).
Pediatrics (≥1 month old): Initial dose: 0.08 milligrams per kilogram orally once daily (max 5 milligrams/day); maximum dose: 0.58 milligrams per kilogram per day (up to 40 milligrams/day).

Side Effects: Hypotension, dizziness, hyperkalemia, dry cough, angioedema, renal dysfunction.

Contraindications: Pregnancy, history of angioedema, bilateral renal artery stenosis, hypersensitivity to ACE inhibitors.

Nursing Considerations:

- Monitor blood pressure and renal function (creatinine, blood urea nitrogen).
- Assess potassium levels to prevent hyperkalemia.
- Educate patients about the risk of angioedema (swelling of the face, lips, or throat).
- Discontinue immediately if pregnancy is detected due to fetal toxicity risk.
- Advise patients to avoid potassium supplements and potassium-sparing diuretics.

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Cardiovascular System Medications
Antihypertensives

CAPTOPRIL

Drug Class: Angiotensin-Converting Enzyme (ACE) Inhibitor

Mechanism of Action: Inhibits angiotensin-converting enzyme (ACE), preventing the formation of angiotensin II, leading to vasodilation, reduced blood pressure, and decreased aldosterone secretion.

Indications: Hypertension, heart failure, diabetic nephropathy, post-myocardial infarction, proteinuria.

DOSAGE:
Adults: Initial dose: 12.5 to 25 milligrams orally two to three times daily; maintenance dose: 25 to 150 milligrams per day in divided doses (max 450 milligrams/day).
Pediatrics (≥1 month old): Initial dose: 0.15 milligrams per kilogram orally three times daily; maximum dose: 6 milligrams per kilogram per day.

Side Effects: Hypotension, hyperkalemia, dry cough, dizziness, angioedema, neutropenia, rash, proteinuria.

Contraindications: Pregnancy, history of angioedema, bilateral renal artery stenosis, hypersensitivity to ACE inhibitors.

Nursing Considerations:

- Monitor blood pressure and renal function (creatinine, blood urea nitrogen).
- Assess potassium levels to avoid hyperkalemia.
- Educate patients about early signs of angioedema (swelling of the face, lips, or throat).
- Take on an empty stomach for better absorption.
- Monitor white blood cell count due to risk of neutropenia, especially in patients with renal impairment.
- Avoid potassium supplements and potassium-sparing diuretics.

Cardiovascular System Medications
Antihypertensives

LOSARTAN

Drug Class: Angiotensin II Receptor Blocker (ARB)

Mechanism of Action: Blocks the binding of angiotensin II to its receptors, preventing vasoconstriction and aldosterone release, leading to decreased blood pressure and reduced fluid retention.

Indications: Hypertension, diabetic nephropathy, stroke prevention, heart failure (off-label).

DOSAGE:
Adults: Initial dose: 25 to 50 milligrams orally once daily; maintenance dose: 50 to 100 milligrams per day (single dose or divided into two doses).
Pediatrics (≥6 years old): Initial dose: 0.7 milligrams per kilogram orally once daily (max 50 milligrams/day); maximum dose: 1.4 milligrams per kilogram per day (up to 100 milligrams/day).

Side Effects: Hypotension, dizziness, hyperkalemia, fatigue, renal dysfunction, angioedema (rare).

Contraindications: Pregnancy, bilateral renal artery stenosis, hypersensitivity to angiotensin II receptor blockers.

Nursing Considerations:

- Monitor blood pressure and renal function (creatinine, blood urea nitrogen).
- Assess potassium levels to prevent hyperkalemia.
- Discontinue immediately if pregnancy is detected due to fetal toxicity risk.
- Does not cause a dry cough, making it an alternative for patients intolerant to ACE inhibitors.
- Avoid potassium supplements and potassium-sparing diuretics.

Cardiovascular System Medications
Antihypertensives

VALSARTAN

Drug Class: Angiotensin II Receptor Blocker

Mechanism of Action: Blocks angiotensin II from binding to its receptors, leading to vasodilation, decreased blood pressure, and reduced aldosterone secretion, which decreases fluid retention.

Indications: Hypertension, heart failure, post-myocardial infarction with left ventricular dysfunction.

DOSAGE:
Adults: Initial dose: 40 to 80 milligrams orally once daily; maintenance dose: 80 to 320 milligrams per day (single dose or divided into two doses).
Pediatrics (≥1 year old): Initial dose: 1.3 milligrams per kilogram orally once daily (maximum 40 milligrams/day); maximum dose: 2.7 milligrams per kilogram per day (up to 160 milligrams/day).

Side Effects: Hypotension, dizziness, hyperkalemia, fatigue, renal impairment, angioedema (rare).

Contraindications: Pregnancy, bilateral renal artery stenosis, hypersensitivity to angiotensin II receptor blockers.

Nursing Considerations:

- Monitor blood pressure and renal function (creatinine, blood urea nitrogen).
- Assess potassium levels to prevent hyperkalemia.
- Discontinue immediately if pregnancy is detected due to fetal toxicity risk.
- Does not cause a dry cough, making it an alternative for patients intolerant to angiotensin-converting enzyme inhibitors.
- Advise patients to avoid potassium supplements and potassium-sparing diuretics.

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Cardiovascular System Medications
Antihypertensives

METOPROLOL

Drug Class: Beta-Adrenergic Blocker (Beta-Blocker)

Mechanism of Action: Selectively blocks beta-1 adrenergic receptors in the heart, reducing heart rate, myocardial contractility, and oxygen demand, leading to decreased blood pressure and improved cardiac function.

Indications: Hypertension, angina pectoris, heart failure, myocardial infarction, atrial fibrillation, migraine prophylaxis (off-label).

DOSAGE:
Hypertension & Angina: Initial dose: 25 to 100 milligrams orally once daily; maintenance dose: 100 to 400 milligrams per day (single dose or divided into two doses).
Heart Failure: Initial dose: 12.5 to 25 milligrams orally once daily; target dose: 200 milligrams per day.

Side Effects: Bradycardia, hypotension, dizziness, fatigue, depression, erectile dysfunction, bronchospasm (in high doses).
Contraindications: Bradycardia, heart block greater than first-degree, cardiogenic shock, decompensated heart failure, severe hypotension.

Nursing Considerations:

- Monitor heart rate and blood pressure before administration; hold if heart rate is below 50 beats per minute or if hypotension occurs.
- Use cautiously in patients with asthma or chronic obstructive pulmonary disease due to potential bronchospasm.
- Educate patients not to stop abruptly to avoid rebound hypertension and tachycardia.
- Assess for signs of worsening heart failure, such as weight gain and increased shortness of breath.
- Take with food to enhance absorption.

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Cardiovascular System Medications
Antihypertensives

ATENOLOL

Drug Class: Beta-Adrenergic Blocker (Beta-Blocker)

Mechanism of Action: Selectively blocks beta-1 adrenergic receptors in the heart, reducing heart rate, myocardial contractility, and cardiac output, leading to decreased blood pressure and oxygen demand.

Indications: Hypertension, angina pectoris, heart failure, myocardial infarction, atrial fibrillation, migraine prophylaxis (off-label).

DOSAGE:
Hypertension & Angina: Initial dose: 25 to 50 milligrams orally once daily; maintenance dose: 50 to 100 milligrams per day.
Post-Myocardial Infarction: Initial dose: 50 milligrams orally twice daily, then 100 milligrams once daily.

Side Effects: Bradycardia, hypotension, dizziness, fatigue, depression, cold extremities, erectile dysfunction.
Contraindications: Bradycardia, heart block greater than first-degree, cardiogenic shock, decompensated heart failure, severe hypotension.

Nursing Considerations:

- Monitor heart rate and blood pressure before administration; hold if heart rate is below 50 beats per minute or if hypotension occurs.
- Do not stop abruptly to avoid rebound hypertension and tachycardia.
- Use cautiously in patients with diabetes as it may mask hypoglycemia symptoms.
- Assess for signs of worsening heart failure, such as weight gain and increased shortness of breath.
- Take on an empty stomach or at the same time daily for consistent absorption.

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Cardiovascular System Medications
Antihypertensives

PROPANOLOL

Drug Class: Non-Selective Beta-Adrenergic Blocker

Mechanism of Action: Blocks both beta-1 and beta-2 adrenergic receptors, reducing heart rate, myocardial contractility, and cardiac output while also causing bronchoconstriction and reduced renin secretion.

Indications: Hypertension, angina pectoris, arrhythmias, migraine prophylaxis, essential tremor, anxiety, hyperthyroidism, hypertrophic cardiomyopathy, post-myocardial infarction.

DOSAGE:
Hypertension: Initial dose: 40 milligrams orally twice daily; maintenance dose: 120 to 240 milligrams per day in divided doses (max 640 milligrams/day).
Migraine Prophylaxis: Initial dose: 80 milligrams orally per day in divided doses; maintenance dose: 160 to 240 milligrams per day.
Anxiety: 10 to 40 milligrams orally before stressful events.

Side Effects: Bradycardia, hypotension, dizziness, fatigue, depression, bronchospasm, hypoglycemia, cold extremities.
Contraindications: Asthma, chronic obstructive pulmonary disease, bradycardia, heart block greater than first-degree, cardiogenic shock, decompensated heart failure.

Nursing Considerations:

- Monitor heart rate and blood pressure before administration; hold if heart rate is below 50 beats per minute or if hypotension occurs.
- Do not stop abruptly to prevent rebound hypertension, tachycardia, and angina.
- Use cautiously in patients with diabetes as it may mask hypoglycemia symptoms.
- Avoid use in patients with asthma or chronic obstructive pulmonary disease due to risk of bronchoconstriction.
- Assess for signs of worsening heart failure, such as weight gain and increased shortness of breath.

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Cardiovascular System Medications
Antihypertensives

AMLODIPINE

Drug Class: Calcium Channel Blocker (Dihydropyridine)

Mechanism of Action: Inhibits calcium ion influx into vascular smooth muscle and cardiac muscle, leading to vasodilation, decreased peripheral resistance, and reduced blood pressure without significantly affecting heart rate or contractility.

Indications: Hypertension, angina pectoris, coronary artery disease.

DOSAGE:
Adults: Initial dose: 2.5 to 5 milligrams orally once daily; maintenance dose: 5 to 10 milligrams per day.
Pediatrics (≥6 years old): Initial dose: 2.5 milligrams orally once daily; maximum dose: 5 milligrams per day.

Side Effects: Hypotension, dizziness, peripheral edema, headache, flushing, palpitations, fatigue.
Contraindications: Severe hypotension, cardiogenic shock, known hypersensitivity to amlodipine or dihydropyridine calcium channel blockers.

Nursing Considerations:

- Monitor blood pressure and heart rate before administration.
- Assess for peripheral edema, especially in the lower extremities.
- Educate patients to rise slowly from sitting or lying positions to prevent dizziness.
- Avoid grapefruit juice, as it may increase drug levels and potentiate effects.
- Use cautiously in patients with heart failure, as it may worsen symptoms in some cases.

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Cardiovascular System Medications
Antihypertensives

DILTIAZEM

Drug Class: Calcium Channel Blocker (Non-Dihydropyridine)

Mechanism of Action: Inhibits calcium ion influx into cardiac and vascular smooth muscle, leading to decreased myocardial contractility, reduced heart rate, and vasodilation, thereby lowering blood pressure and reducing cardiac workload.

Indications: Hypertension, angina pectoris, atrial fibrillation, atrial flutter, supraventricular tachycardia.

DOSAGE:
Hypertension & Angina: Initial dose: 120 to 180 milligrams orally once daily; maintenance dose: 240 to 360 milligrams per day (max 480 milligrams/day).
Atrial Fibrillation or Supraventricular Tachycardia (Intravenous): Initial dose: 0.25 milligrams per kilogram intravenously over 2 minutes; may repeat with 0.35 milligrams per kilogram if necessary.

Side Effects: Bradycardia, hypotension, dizziness, peripheral edema, fatigue, constipation, headache.
Contraindications: Severe hypotension, second- or third-degree atrioventricular block (without pacemaker), sick sinus syndrome, acute myocardial infarction with pulmonary congestion, decompensated heart failure.

Nursing Considerations:

- Monitor blood pressure and heart rate before administration; hold if heart rate is below 50 beats per minute or if hypotension occurs.
- Assess for signs of heart failure, such as dyspnea, weight gain, and peripheral edema.
- Avoid grapefruit juice, as it may increase drug levels and enhance effects.
- Do not crush or chew extended-release tablets; instruct patients to swallow them whole.
- Use cautiously in patients taking beta-blockers, as the combination may cause excessive bradycardia.

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Cardiovascular System Medications
Antihypertensives

VERAPAMIL

Drug Class: Calcium Channel Blocker (Non-Dihydropyridine)

Mechanism of Action: Inhibits calcium ion influx into cardiac and vascular smooth muscle, leading to decreased myocardial contractility, slowed atrioventricular conduction, and vasodilation, which lowers blood pressure and reduces cardiac workload.

Indications: Hypertension, angina pectoris, atrial fibrillation, atrial flutter, supraventricular tachycardia, migraine prophylaxis.

DOSAGE:
Hypertension: Initial dose: 180 to 240 milligrams orally once daily; maintenance dose: 240 to 480 milligrams per day (max 480 milligrams/day).
Angina: Initial dose: 80 to 120 milligrams orally three times daily; maintenance dose: 240 to 480 milligrams per day.
Atrial Fibrillation or Supraventricular Tachycardia (Intravenous): Initial dose: 5 to 10 milligrams intravenously over 2 minutes; may repeat with 10 milligrams after 30 minutes if necessary.

Side Effects: Bradycardia, hypotension, dizziness, peripheral edema, constipation, headache, fatigue.

Contraindications: Severe hypotension, second- or third-degree atrioventricular block (without pacemaker), sick sinus syndrome, heart failure with reduced ejection fraction, cardiogenic shock.

Nursing Considerations:

- Monitor blood pressure and heart rate before administration; hold if heart rate is below 50 beats per minute or if hypotension occurs.
- Assess for signs of heart failure, such as dyspnea, weight gain, and peripheral edema.
- Avoid grapefruit juice, as it may increase drug levels and enhance effects.
- Do not crush or chew extended-release tablets; instruct patients to swallow them whole.
- Use cautiously in patients taking beta-blockers, as the combination may cause excessive bradycardia and hypotension.

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Cardiovascular System Medications
Antihypertensives

FUROSEMIDE

Drug Class: Loop Diuretic

Mechanism of Action: Inhibits sodium and chloride reabsorption in the ascending loop of Henle, leading to increased urine output, decreased fluid volume, and reduced blood pressure.

Indications: Hypertension, edema associated with heart failure, liver cirrhosis, renal disease, pulmonary edema, hypercalcemia.

DOSAGE:
Hypertension & Edema: Initial dose: 20 to 40 milligrams orally once or twice daily; maintenance dose: 20 to 80 milligrams per day in divided doses.
Intravenous (IV) or Intramuscular (IM): 20 to 40 milligrams intravenously over 1 to 2 minutes; may increase by 20 milligrams every 2 hours if needed (max 200 milligrams/dose).
Pediatrics:
Intravenous (IV): 0.5 to 1 milligram per kilogram per dose; may increase up to 2 milligrams per kilogram per dose.

Side Effects: Hypokalemia, hyponatremia, dehydration, hypotension, dizziness, ototoxicity (with high doses or rapid IV administration), metabolic alkalosis, hyperglycemia.

Contraindications: Anuria, severe electrolyte imbalance, sulfonamide hypersensitivity (caution), hepatic coma.

Nursing Considerations:

- Monitor blood pressure, electrolytes (potassium, sodium), and kidney function before and during therapy.
- Administer early in the day to prevent nocturia.
- Educate patients about orthostatic hypotension and the importance of changing positions slowly.
- Encourage a potassium-rich diet or supplementation if needed.
- Avoid rapid intravenous administration to prevent ototoxicity.

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Cardiovascular System Medications
Antihypertensives

HYDROCHLOROTHIAZIDE

Drug Class: Thiazide Diuretic

Mechanism of Action: Inhibits sodium and chloride reabsorption in the distal convoluted tubule of the nephron, leading to increased urine output, decreased blood volume, and reduced blood pressure.

Indications: Hypertension, edema associated with heart failure, liver cirrhosis, chronic kidney disease, nephrolithiasis (calcium stones).

DOSAGE:
Hypertension: Initial dose: 12.5 to 25 milligrams orally once daily; maintenance dose: 25 to 50 milligrams per day (max 100 milligrams/day).
Edema: Initial dose: 25 to 100 milligrams orally once or twice daily; maximum dose: 200 milligrams per day.
Pediatrics:
Oral: Initial dose: 0.5 to 1 milligram per kilogram per day in a single or divided dose; maximum dose: 3 milligrams per kilogram per day (max 100 milligrams/day).

Side Effects: Hypokalemia, hyponatremia, dehydration, hypotension, dizziness, hypercalcemia, hyperglycemia, hyperuricemia (may precipitate gout).

Contraindications: Anuria, severe electrolyte imbalance, hypersensitivity to thiazides or sulfonamides.

Nursing Considerations:

- Monitor blood pressure, electrolytes (potassium, sodium), and kidney function before and during therapy.
- Administer in the morning to prevent nocturia.
- Encourage a potassium-rich diet or supplementation if needed.
- Educate patients about orthostatic hypotension and instruct them to change positions slowly.
- Use cautiously in diabetic patients, as it may increase blood glucose levels.

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Cardiovascular System Medications
Antihypertensives

SPIRONOLACTONE

Drug Class: Potassium-Sparing Diuretic; Aldosterone Antagonist

Mechanism of Action: Competitively inhibits aldosterone in the distal renal tubules, leading to increased sodium and water excretion while retaining potassium and hydrogen ions, reducing fluid volume and blood pressure.

Indications: Hypertension, heart failure, edema associated with liver cirrhosis or nephrotic syndrome, primary hyperaldosteronism, hypokalemia.

DOSAGE:
Hypertension & Edema: Initial dose: 25 to 100 milligrams orally once daily or in divided doses; maintenance dose: 25 to 200 milligrams per day.
Heart Failure: Initial dose: 12.5 to 25 milligrams orally once daily; maximum dose: 50 milligrams per day.
Primary Hyperaldosteronism: 100 to 400 milligrams per day in divided doses.
Pediatrics:
Oral: 1 to 3 milligrams per kilogram per day in single or divided doses; maximum dose: 100 milligrams per day.

Side Effects: Hyperkalemia, gynecomastia, menstrual irregularities, dizziness, hypotension, nausea, abdominal cramps, dehydration.

Contraindications: Hyperkalemia, anuria, severe renal impairment, Addison's disease, hypersensitivity to spironolactone.

Nursing Considerations:

- Monitor potassium levels closely to prevent hyperkalemia.
- Assess for signs of dehydration and electrolyte imbalances.
- Educate patients to avoid potassium supplements and potassium-rich foods (e.g., bananas, oranges, potatoes).
- Administer in the morning to prevent nocturia.
- Use cautiously in patients with kidney disease, as it may lead to worsening hyperkalemia.

Cardiovascular System Medications
Antiarrhythmics

LIDOCAINE

Drug Class: Local Anesthetic; Class IB Antiarrhythmic

Mechanism of Action: Blocks sodium channels in neuronal and cardiac tissues, preventing nerve impulse transmission (local anesthesia) and stabilizing cardiac membranes by reducing automaticity and excitability (antiarrhythmic effect).

Indications: Local and regional anesthesia, ventricular arrhythmias (especially after myocardial infarction), status epilepticus (off-label).

DOSAGE:
Local Anesthesia: 1% or 2% solution applied topically or injected; maximum dose: 300 milligrams per procedure (without epinephrine) or 500 milligrams (with epinephrine).
Ventricular Arrhythmias (Intravenous):
Loading dose: 1 to 1.5 milligrams per kilogram intravenously over 2 minutes.
Maintenance infusion: 1 to 4 milligrams per minute intravenously.
Ventricular Arrhythmias (Pediatrics):
Loading dose: 1 milligram per kilogram intravenously over 2 minutes.
Maintenance infusion: 20 to 50 micrograms per kilogram per minute.

Side Effects: Hypotension, bradycardia, dizziness, paresthesia, confusion, seizures, respiratory depression, cardiac arrest (at toxic levels).
Contraindications: Severe heart block without a pacemaker, Wolff-Parkinson-White syndrome, hypersensitivity to amide anesthetics, severe hepatic impairment.

Nursing Considerations:

- Monitor electrocardiogram (ECG), blood pressure, and respiratory status during intravenous administration.
- Assess for signs of lidocaine toxicity, including confusion, tremors, paresthesia, and seizures.
- Avoid intravenous administration in patients with severe bradycardia or heart block.
- For local anesthesia, ensure aspiration before injection to avoid intravascular administration.
- Use caution in patients with liver disease, as lidocaine is metabolized in the liver.

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Cardiovascular System Medications
Antiarrhythmics

AMIODARONE

Drug Class: Class III Antiarrhythmic

Mechanism of Action: Prolongs repolarization by blocking potassium channels, slows conduction through the atrioventricular node, and has sodium and calcium channel-blocking properties, leading to reduced arrhythmogenic activity.

Indications: Ventricular fibrillation, ventricular tachycardia, atrial fibrillation, supraventricular tachycardia.

DOSAGE:
Ventricular Arrhythmias (Intravenous):
Loading dose: 150 milligrams intravenously over 10 minutes.
Infusion: 1 milligram per minute for 6 hours, then 0.5 milligrams per minute for 18 hours.
Maximum dose: 2.2 grams per 24 hours.
Pediatrics:
Loading dose: 5 milligrams per kilogram intravenously over 30 to 60 minutes.
Maintenance infusion: 5 to 10 milligrams per kilogram per day.
Maximum daily dose: 15 milligrams per kilogram per day.

Side Effects: Hypotension, bradycardia, pulmonary toxicity (pulmonary fibrosis), thyroid dysfunction (hypothyroidism or hyperthyroidism), hepatotoxicity, corneal deposits, photosensitivity, skin discoloration (bluish-gray), QT prolongation.
Contraindications: Severe sinus node dysfunction, second- or third-degree atrioventricular block without a pacemaker, iodine hypersensitivity, severe liver disease.

Nursing Considerations:

- Monitor electrocardiogram (ECG) continuously during intravenous infusion to detect arrhythmias or QT prolongation.
- Assess for pulmonary symptoms (e.g., dyspnea, cough) as amiodarone can cause pulmonary fibrosis.
- Regularly monitor thyroid and liver function tests due to potential endocrine and hepatic effects.
- Advise patients to avoid excessive sun exposure due to the risk of photosensitivity.
- Use cautiously in patients with preexisting liver, lung, or thyroid disease.

Cardiovascular System Medications
Vasodilators

NITROGLYCERIN

Drug Class: Nitrate; Vasodilator

Mechanism of Action: Converts to nitric oxide in vascular smooth muscle, leading to vasodilation, reduced myocardial oxygen demand, decreased preload and afterload, and improved coronary blood flow.

Indications: Angina pectoris, acute coronary syndrome, heart failure, hypertensive emergencies.

Adults:
Sublingual (Acute Angina): 0.3 to 0.6 milligrams every 5 minutes as needed (maximum 3 doses in 15 minutes).
Intravenous (Hypertensive Emergency/Acute Heart Failure): 5 micrograms per minute, titrated up to 200 micrograms per minute based on response.
Pediatrics:
Intravenous: 0.25 to 0.5 micrograms per kilogram per minute, titrated up to 5 micrograms per kilogram per minute as needed.

Side Effects: Hypotension, dizziness, headache, reflex tachycardia, flushing, nausea, syncope, methemoglobinemia (rare).

Contraindications: Severe hypotension, increased intracranial pressure, concurrent use of phosphodiesterase-5 inhibitors (e.g., sildenafil, tadalafil), severe anemia.

Nursing Considerations:

- Monitor blood pressure and heart rate closely to prevent severe hypotension.
- Educate patients on proper sublingual administration—instruct them to let the tablet dissolve under the tongue and not to swallow.
- Instruct patients to sit or lie down when taking nitroglycerin to avoid syncope.
- Rotate transdermal patch sites and ensure a nitrate-free period (10-12 hours) to prevent tolerance.
- Store sublingual tablets in a dark, tightly closed container away from moisture and heat.

Cardiovascular System Medications
Vasodilators

SODIUM NITROPRUSSIDE

Drug Class: Vasodilator; Antihypertensive

Mechanism of Action: Directly relaxes arterial and venous smooth muscle by releasing nitric oxide, leading to decreased peripheral resistance, reduced afterload, and decreased myocardial oxygen demand.

Indications: Hypertensive emergencies, acute heart failure, controlled hypotension during surgery

DOSAGE
Adults:
Intravenous Infusion: 0.3 to 0.5 micrograms per kilogram per minute, titrated up to a maximum of 10 micrograms per kilogram per minute.
Pediatrics:
Intravenous Infusion: 0.3 to 0.5 micrograms per kilogram per minute, titrated up to a maximum of 8 micrograms per kilogram per minute.

Side Effects: Hypotension, cyanide toxicity, thiocyanate toxicity, dizziness, headache, flushing, nausea, tachycardia, metabolic acidosis.
Contraindications: Severe hypotension, compensatory hypertension (e.g., in arteriovenous shunts or coarctation of the aorta), cyanide metabolism disorders, renal or hepatic failure (increased risk of toxicity).

Nursing Considerations:

- Continuous blood pressure monitoring is required due to the rapid onset and potent effects.
- Infusion should be administered through a central line to prevent extravasation.
- Protect the solution from light to prevent degradation.
- Monitor for cyanide toxicity symptoms (e.g., altered mental status, metabolic acidosis, tachycardia, seizures).
- If infusion lasts longer than 48 hours, check thiocyanate levels, especially in patients with renal impairment.

Cardiovascular System Medications
Vasodilators

HYDRALAZINE

Drug Class: Direct-Acting Vasodilator

Mechanism of Action: Directly relaxes arterial smooth muscle, leading to decreased systemic vascular resistance, reduced afterload, and lowered blood pressure, with reflex sympathetic activation increasing heart rate and cardiac output.

Indications: Hypertension, hypertensive emergency, heart failure (especially in combination with isosorbide dinitrate in heart failure with reduced ejection fraction).

DOSAGE

Hypertension (Oral): Initial dose: 10 milligrams four times daily; maintenance dose: 25 to 50 milligrams four times daily (maximum 300 milligrams per day).

Hypertensive Emergency (Intravenous/Intramuscular): 10 to 20 milligrams every 4 to 6 hours as needed.

Heart Failure (Oral, with Isosorbide Dinitrate): 25 to 50 milligrams three to four times daily.

Pediatrics:

Intravenous: 0.1 to 0.2 milligrams per kilogram per dose every 4 to 6 hours as needed.

Side Effects: Reflex tachycardia, headache, dizziness, fluid retention, nausea, flushing, palpitations, systemic lupus erythematosus-like syndrome (with long-term use), hypotension.

Contraindications: Coronary artery disease, mitral valve rheumatic heart disease, hypersensitivity to hydralazine.

Nursing Considerations:

- Monitor blood pressure and heart rate closely, especially for reflex tachycardia.
- Assess for fluid retention and signs of heart failure, as vasodilation can lead to compensatory sodium and water retention.
- Educate patients about the risk of lupus-like syndrome (e.g., joint pain, rash, fever) with long-term use.
- Administer with food to enhance absorption and minimize gastrointestinal side effects.
- Use cautiously in patients with ischemic heart disease, as rapid vasodilation may trigger angina or myocardial infarction.

Cardiovascular System Medications
Vasopressors and Inotropes

EPINEPHRINE

Drug Class: Adrenergic agonist (Sympathomimetic)

Mechanism of Action: Stimulates alpha and beta adrenergic receptors, causing vasoconstriction (alpha-1), increased heart rate and cardiac output (beta-1), and bronchodilation (beta-2).

Indications: Anaphylaxis, cardiac arrest, severe asthma, bradycardia, hypotension, and as a vasoconstrictor in local anesthesia.

DOSAGE

Adults:

Anaphylaxis: 0.3–0.5 mg intramuscularly every 5–15 minutes as needed.

Cardiac arrest: 1 mg intravenously every 3–5 minutes during resuscitation.

Pediatrics:

Anaphylaxis: 0.01 mg/kg intramuscularly every 5–15 minutes as needed (maximum single dose: 0.3 mg).

Cardiac arrest: 0.01 mg/kg intravenously every 3–5 minutes.

Side Effects: Hypertension, tachycardia, palpitations, anxiety, headache, tremors, dizziness, nausea, vomiting, and tissue necrosis if extravasation occurs.

Contraindications: Hypersensitivity to epinephrine, narrow-angle glaucoma, hypertension, tachyarrhythmias, and use with caution in patients with cardiovascular disease or hyperthyroidism.

Nursing Considerations:

- Monitor vital signs, especially heart rate and blood pressure.
- Assess for signs of an allergic reaction or anaphylaxis resolution.
- Ensure proper administration route (intramuscular for anaphylaxis, intravenous for cardiac arrest).
- Educate patients on the correct use of an epinephrine auto-injector.
- Avoid extravasation, as it can cause severe tissue damage.
- Use cautiously in patients with cardiovascular disease, as it may cause arrhythmias or increased myocardial oxygen demand.

Cardiovascular System Medications
Vasopressors and Inotropes

NOREPINEPHRINE

Drug Class: Adrenergic agonist (Vasopressor)

Mechanism of Action: Primarily stimulates alpha-adrenergic receptors, causing vasoconstriction and increased blood pressure. It also has mild beta-1 adrenergic effects, leading to a slight increase in heart rate and cardiac output.

Indications: Hypotension, septic shock, cardiogenic shock, and neurogenic shock.

DOSAGE

Adults: Initial dose: 2–4 mcg/min intravenously, titrated to maintain adequate blood pressure (usual range: 2–30 mcg/min).

Pediatrics: Safety and efficacy are not well established; used off-label with cautious titration based on weight and response.

Side Effects: Hypertension, bradycardia, arrhythmias, peripheral ischemia, anxiety, headache, extravasation leading to tissue necrosis, and decreased urine output.

Contraindications: Hypersensitivity to norepinephrine, hypotension due to hypovolemia (unless volume resuscitation is performed), mesenteric or peripheral vascular thrombosis.

Nursing Considerations:

- Continuously monitor blood pressure and heart rate.
- Administer through a central line to prevent extravasation and tissue necrosis.
- If extravasation occurs, administer phentolamine to prevent tissue damage.
- Correct hypovolemia before initiating norepinephrine therapy.
- Monitor urine output and signs of organ perfusion.
- Use cautiously in patients with ischemic heart disease due to increased myocardial oxygen demand.

Cardiovascular System Medications
Vasopressors and Inotropes

DOPAMINE

Drug Class: Adrenergic agonist (Inotropic agent, vasopressor)

Mechanism of Action: Stimulates dopamine receptors and alpha- and beta-adrenergic receptors in a dose-dependent manner:

- Low doses (1–5 mcg/kg/min): Primarily stimulate dopamine receptors, increasing renal perfusion and urine output.
- Moderate doses (5–10 mcg/kg/min): Stimulate beta-1 receptors, increasing heart rate and cardiac contractility.
- High doses (>10 mcg/kg/min): Stimulate alpha receptors, causing vasoconstriction and increased blood pressure.

Indications: Shock, heart failure, hypotension, bradycardia unresponsive to atropine.

DOSAGE

Adults: Initial dose: 2–5 mcg/kg/min intravenously, titrated up to 20 mcg/kg/min based on response.
Pediatrics: 2–20 mcg/kg/min intravenously, titrated based on clinical response.

Side Effects: Hypertension, bradycardia, arrhythmias, peripheral ischemia, anxiety, headache, extravasation leading to tissue necrosis, and decreased urine output.

Contraindications: Hypersensitivity to norepinephrine, hypotension due to hypovolemia (unless volume resuscitation is performed), mesenteric or peripheral vascular thrombosis.

Nursing Considerations:

- Monitor blood pressure, heart rate, and urine output closely.
- Administer through a central line to prevent extravasation and tissue necrosis.
- If extravasation occurs, treat with phentolamine.
- Correct hypovolemia before starting dopamine therapy.
- Use cautiously in patients with ischemic heart disease due to increased myocardial oxygen demand.
- Titrate dosage based on hemodynamic response to avoid excessive vasoconstriction or tachycardia.

Cardiovascular System Medications
Vasopressors and Inotropes

DOBUTAMINE

Drug Class: Adrenergic agonist (Inotropic agent)

Mechanism of Action: Primarily stimulates beta-1 adrenergic receptors, increasing myocardial contractility and cardiac output with minimal effects on heart rate and systemic vascular resistance.

Indications: Heart failure, cardiogenic shock, low cardiac output states.

DOSAGE

Adults: Initial dose: 2–5 mcg/kg/min intravenously, titrated up to 20 mcg/kg/min based on response.

Pediatrics: 2–20 mcg/kg/min intravenously, titrated based on clinical response.

Side Effects: Tachycardia, hypertension or hypotension, arrhythmias, angina, palpitations, headache, nausea, and hypokalemia.

Contraindications: Hypersensitivity to dobutamine, hypertrophic obstructive cardiomyopathy, uncorrected hypovolemia.

Nursing Considerations:

- Monitor heart rate, blood pressure, and cardiac rhythm continuously.
- Assess for signs of myocardial ischemia, such as chest pain or arrhythmias.
- Correct hypovolemia before initiating dobutamine therapy.
- Monitor urine output and signs of improved organ perfusion.
- Use cautiously in patients with atrial fibrillation, as it may increase ventricular response rate.
- Titrate based on hemodynamic response to avoid excessive tachycardia or hypotension.

Cardiovascular System Medications
Vasopressors and Inotropes

VASOPRESSIN

Drug Class: Antidiuretic hormone (Vasopressor)

Mechanism of Action: Binds to vasopressin type one receptors in blood vessels, causing vasoconstriction and increasing blood pressure. It also binds to vasopressin type two receptors in the kidneys, promoting water reabsorption and reducing urine output.

Indications: Circulatory shock caused by severe infection, diabetes insipidus, gastrointestinal bleeding such as esophageal varices, and cardiac arrest as an alternative to epinephrine.

DOSAGE

Adults:

- Septic shock: 0.01–0.03 units/min intravenously as a continuous infusion.
- Cardiac arrest: 40 units intravenously once during resuscitation (may replace first or second dose of epinephrine).
- Diabetes insipidus: 5–10 units subcutaneously or intramuscularly every 3–4 hours as needed.

Side Effects: Hypertension, bradycardia, arrhythmias, ischemia, fluid retention, hyponatremia, nausea, abdominal cramps, and tissue necrosis if extravasation occurs.
Contraindications: Hypersensitivity to vasopressin, chronic nephritis with nitrogen retention, caution in patients with coronary artery disease, heart failure, or asthma due to vasoconstriction effects.

Nursing Considerations:

- Monitor blood pressure, heart rate, and urine output closely.
- Assess for signs of tissue ischemia (e.g., cyanosis, pain, or necrosis at infusion site).
- Use cautiously in patients with cardiovascular disease due to the risk of myocardial ischemia.
- Monitor serum sodium levels to prevent hyponatremia and water intoxication.
- Administer via central line when used as a continuous infusion to prevent extravasation.
- Educate patients with diabetes insipidus on proper administration and the importance of fluid balance monitoring.

Cardiovascular System Medications
Cardiac Glycosides

DIGOXIN

Drug Class: Cardiac glycoside

Mechanism of Action: Inhibits sodium-potassium adenosine triphosphatase, leading to an increase in intracellular calcium, which enhances cardiac contractility. It also slows electrical conduction through the atrioventricular node, reducing heart rate.

Indications: Heart failure, atrial fibrillation, and atrial flutter.

DOSAGE

Adults:

Loading dose: 0.5 to 1 mg orally or intravenously, divided into doses over 24 hours.

Maintenance dose: 0.125 to 0.25 mg per day.

Pediatrics:

Maintenance dose: 0.01 to 0.05 mg per kg per day, depending on age and weight.

Side Effects: Nausea, vomiting, loss of appetite, slow heart rate, irregular heart rhythms, blurred vision, yellow-green halos around objects, confusion, and dizziness.

Contraindications: Allergy to digoxin, slow heart rhythms such as second or third-degree atrioventricular block without a pacemaker, low potassium levels, low magnesium levels, high calcium levels, and severe kidney disease.

Nursing Considerations:

- Monitor heart rate before administration; do not give if the heart rate is below sixty beats per minute in adults or below the age-specific limit in children.
- Assess for signs of digoxin toxicity, including nausea, visual disturbances, and irregular heart rhythms.
- Monitor blood levels of digoxin, potassium, magnesium, and calcium to prevent toxicity.
- Use cautiously in patients with kidney disease, as digoxin is eliminated by the kidneys.
- Educate patients to take digoxin at the same time each day and report symptoms of toxicity immediately.
- Be prepared to administer digoxin-specific antibody therapy in cases of severe toxicity.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

MORPHINE

Drug Class: Opioid analgesic

Mechanism of Action: Binds to opioid receptors in the central nervous system, reducing the perception of pain and producing sedation. It also depresses the respiratory center in the brainstem and reduces gastrointestinal motility.

Indications: Moderate to severe pain, pain management in myocardial infarction, palliative care, and acute pulmonary edema.

DOSAGE

Adults:

- Oral: 10 to 30 milligrams every 4 hours as needed.
- Intravenous: 2.5 to 15 milligrams every 2 to 6 hours as needed.
- Intramuscular or subcutaneous: 5 to 10 milligrams every 4 hours as needed.
- Epidural: 2 to 5 milligrams once, followed by patient-controlled analgesia if needed.

Pediatrics:

- Oral: 0.2 to 0.5 milligrams per kilogram every 4 to 6 hours as needed.
- Intravenous: 0.05 to 0.2 milligrams per kilogram every 2 to 4 hours as needed.

Side Effects: Respiratory depression, drowsiness, dizziness, constipation, nausea, vomiting, low blood pressure, slow heart rate, urinary retention, and itching.

Contraindications: Allergy to morphine, significant respiratory depression, acute or severe asthma, gastrointestinal obstruction, and head trauma with increased intracranial pressure.

Nursing Considerations:

- Monitor respiratory rate before administration; do not give if it is below twelve breaths per minute in adults.
- Assess for signs of overdose, including pinpoint pupils, slow breathing, and unconsciousness.
- Administer with caution in older adults and patients with kidney disease due to increased risk of accumulation and toxicity.
- Educate patients about the risk of dependence, tolerance, and withdrawal symptoms.
- Encourage adequate fluid intake and fiber consumption to prevent constipation.
- Be prepared to administer naloxone in case of opioid overdose.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

FENTANYL

Drug Class: Opioid analgesic

Mechanism of Action: Binds to opioid receptors in the central nervous system, producing analgesia, sedation, and respiratory depression. It has a rapid onset and is significantly more potent than morphine.

Indications: Severe pain, anesthesia adjunct, pain management in cancer patients, and sedation for mechanically ventilated patients.

DOSAGE

Adults:

Intravenous: 25 to 100 micrograms every 1 to 2 hours as needed.

Transdermal patch: 12 to 100 micrograms per hour, changed every 72 hours.

Oral transmucosal: 200 to 1600 micrograms as needed for breakthrough cancer pain.

Pediatrics:

Intravenous: 1 to 2 micrograms per kilogram every 30 to 60 minutes as needed.

Side Effects: Respiratory depression, sedation, dizziness, nausea, vomiting, constipation, low blood pressure, slow heart rate, muscle rigidity, and itching.

Contraindications: Allergy to fentanyl, severe respiratory depression, acute or severe asthma, gastrointestinal obstruction, and use in opioid-naïve patients with transdermal patches.

Nursing Considerations:

- Monitor respiratory rate closely; do not administer if breathing is severely depressed.
- Assess for signs of overdose, including slow breathing, pinpoint pupils, and loss of consciousness.
- Use cautiously in older adults and patients with kidney or liver impairment.
- Educate patients and caregivers on the proper use and disposal of transdermal patches to prevent accidental exposure.
- Encourage fluid intake and fiber consumption to prevent constipation.
- Be prepared to administer naloxone in case of opioid overdose.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

HYDROMORPHONE

Drug Class: Opioid analgesic

Mechanism of Action: Binds to opioid receptors in the central nervous system, producing analgesia, sedation, and respiratory depression. It is more potent than morphine and has a rapid onset of action.

Indications: Moderate to severe pain, post-surgical pain management, and palliative care.

DOSAGE

Adults:

Oral (Immediate-release): 2 to 4 mg every 4 to 6 hours as needed.

Oral (Extended-release): 8 to 64 mg once daily.

Intravenous or intramuscular: 0.2 to 1 mg every 2 to 3 hours as needed.

Pediatrics:

Intravenous: 0.01 to 0.04 mg per kg every 4 to 6 hours as needed.

Side Effects: Respiratory depression, drowsiness, dizziness, nausea, vomiting, constipation, low blood pressure, slow heart rate, dry mouth, and itching.

Contraindications: Severe respiratory depression, acute or severe asthma, gastrointestinal obstruction, and known allergy to hydromorphone.

Nursing Considerations:

- Monitor respiratory rate before administration; do not give if it is below 12 breaths per minute in adults.
- Assess for signs of overdose, including slow breathing, pinpoint pupils, and loss of consciousness.
- Use with caution in older adults and patients with kidney or liver impairment.
- Educate patients on the risk of dependence, tolerance, and withdrawal symptoms.
- Encourage adequate fluid intake and fiber consumption to prevent constipation.
- Be prepared to administer naloxone in case of opioid overdose.

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Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

OXYCODONE

Drug Class: Opioid analgesic

Mechanism of Action: Is a semisynthetic opioid that binds to mu-opioid receptors in the central nervous system. This interaction inhibits pain signaling pathways, modifies the perception of pain, and induces sedation and euphoria.

Indications: Moderate to severe pain, post-surgical pain management, and chronic pain requiring long-term opioid treatment.

DOSAGE

Adults:

Immediate-release oral: 5 to 15 mg every 4 to 6 hours as needed.

Extended-release oral: 10 to 80 mg every 12 hours.

Pediatrics (Above 11 years for extended-release formulations):

Oral (Extended-release): 10 mg every 12 hours, adjusted based on response.

Side Effects: Respiratory depression, sedation, dizziness, nausea, vomiting, constipation, low blood pressure, dry mouth, sweating, and itching.

Contraindications: Severe respiratory depression, acute or severe asthma, gastrointestinal obstruction, and hypersensitivity to oxycodone.

Nursing Considerations:

- Monitor respiratory rate before administration; do not give if it is below 12 breaths per minute in adults.
- Assess for signs of opioid overdose, including slow breathing, pinpoint pupils, and loss of consciousness.
- Use cautiously in older adults and patients with liver or kidney impairment.
- Educate patients on the risk of dependence, tolerance, and withdrawal symptoms.
- Encourage adequate hydration and fiber intake to prevent constipation.
- Be prepared to administer naloxone in case of opioid overdose.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

IBUPROFEN

Drug Class: Nonsteroidal anti-inflammatory drug

Mechanism of Action: inhibits cyclooxygenase enzymes, specifically cyclooxygenase-1 and cyclooxygenase-2, which reduces the production of prostaglandins. This leads to decreased inflammation, pain relief, and fever reduction.

Indications: Mild to moderate pain, inflammation, fever, osteoarthritis, rheumatoid arthritis, dysmenorrhea, and musculoskeletal disorders.

DOSAGE

Adults:

Oral: 200 to 400 mg every 4 to 6 hours as needed (maximum 3,200 mg per day).

Pediatrics:

Oral: 5 to 10 mg per kg every 6 to 8 hours (maximum 40 mg per kg per day).

Side Effects: Gastric irritation, nausea, vomiting, abdominal pain, gastrointestinal bleeding, dizziness, headache, increased blood pressure, and kidney dysfunction.

Contraindications: History of gastrointestinal ulcers or bleeding, severe kidney disease, severe liver disease, aspirin allergy, and heart failure.

Nursing Considerations:

- Administer with food or milk to reduce gastrointestinal irritation.
- Monitor for signs of gastrointestinal bleeding, such as black stools or vomiting blood.
- Use cautiously in patients with kidney disease, as long-term use can worsen kidney function.
- Educate patients to avoid alcohol while taking ibuprofen to reduce the risk of gastrointestinal damage.
- Assess for signs of fluid retention and increased blood pressure, especially in patients with cardiovascular disease.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

NAPROXEN

Drug Class: Nonsteroidal anti-inflammatory drug

Mechanism of Action: Naproxen inhibits cyclooxygenase-1 and cyclooxygenase-2 enzymes, reducing prostaglandin synthesis. This leads to decreased inflammation, pain relief, and fever reduction.

Indications: Mild to moderate pain, inflammation, osteoarthritis, rheumatoid arthritis, dysmenorrhea, gout, and musculoskeletal disorders.

DOSAGE

Adults:

Oral (Immediate-release): 250 to 500 mg every 8 to 12 hours (maximum 1,500 mg per day for short-term use).

Oral (Extended-release): 750 to 1,000 mg once daily.

Pediatrics (Above 2 years): Oral: 5 to 7 mg per kg every 8 to 12 hours (maximum 1,000 mg per day).

Side Effects: Gastric irritation, nausea, vomiting, abdominal pain, gastrointestinal bleeding, dizziness, headache, increased blood pressure, kidney dysfunction, and fluid retention.

Contraindications: History of gastrointestinal ulcers or bleeding, severe kidney disease, severe liver disease, aspirin allergy, and heart failure.

Nursing Considerations:

- Administer with food or milk to reduce gastrointestinal irritation.
- Monitor for signs of gastrointestinal bleeding, such as black stools or vomiting blood.
- Use cautiously in patients with kidney disease, as long-term use can impair kidney function.
- Educate patients to avoid alcohol while taking naproxen to reduce the risk of gastrointestinal damage.
- Assess for signs of fluid retention and increased blood pressure, especially in patients with cardiovascular disease.

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Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

ASPIRIN

Drug Class: Nonsteroidal anti-inflammatory drug, antiplatelet agent

Mechanism of Action: Aspirin irreversibly inhibits cyclooxygenase-1 and cyclooxygenase-2 enzymes, reducing prostaglandin and thromboxane synthesis. This results in anti-inflammatory, analgesic, antipyretic, and antiplatelet effects by preventing platelet aggregation.

Indications: Pain, fever, inflammation, prevention of cardiovascular events (such as heart attack and stroke), acute coronary syndrome, and treatment of Kawasaki disease.

DOSAGE

Adults:

Pain, fever, inflammation: 325 to 650 mg every 4 to 6 hours as needed (maximum 4,000 mg per day).

Cardiovascular prevention: 81 to 325 mg once daily.

Pediatrics:

Kawasaki disease: 80 to 100 mg per kg per day in divided doses, then reduced to 3 to 5 mg per kg per day after fever subsides.

Aspirin is generally avoided in children due to the risk of Reye's syndrome, except in specific conditions such as Kawasaki disease.

Side Effects: Gastric irritation, nausea, vomiting, gastrointestinal bleeding, increased bleeding risk, ringing in the ears, dizziness, and allergic reactions.

Contraindications: History of gastrointestinal ulcers or bleeding, bleeding disorders, severe kidney or liver disease, aspirin allergy, and use in children with viral infections due to the risk of Reye's syndrome.

Nursing Considerations:

- Administer with food or milk to reduce gastrointestinal irritation.
- Monitor for signs of gastrointestinal bleeding, such as black stools or vomiting blood.
- Assess for signs of aspirin toxicity, including ringing in the ears, confusion, and rapid breathing.
- Educate patients about the increased risk of bleeding and the need to stop aspirin before surgery if instructed by a healthcare provider.
- Avoid use in children with viral infections to prevent Reye's syndrome.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

KETOROLAC

Drug Class: Nonsteroidal anti-inflammatory drug

Mechanism of Action: Ketorolac inhibits cyclooxygenase-1 and cyclooxygenase-2 enzymes, reducing prostaglandin synthesis. This leads to strong analgesic and anti-inflammatory effects without significant sedative properties.

Indications: Short-term management of moderate to severe pain, particularly post-surgical pain, musculoskeletal pain, and renal colic.

DOSAGE

Adults:

Oral: 10 mg every 4 to 6 hours as needed (maximum 40 mg per day, limited to 5 days).

Intravenous or intramuscular: Initial dose of 30 mg, followed by 15 to 30 mg every 6 hours (maximum 120 mg per day for up to 5 days).

Pediatrics (Above 2 years):

Intravenous or intramuscular: 0.5 mg per kg every 6 to 8 hours (maximum 30 mg per dose and 120 mg per day, limited to 5 days).

Side Effects: Gastrointestinal irritation, nausea, vomiting, abdominal pain, gastrointestinal bleeding, kidney dysfunction, dizziness, headache, and increased blood pressure.

Contraindications: History of gastrointestinal ulcers or bleeding, severe kidney disease, severe liver disease, bleeding disorders, aspirin allergy, pregnancy (third trimester), and concurrent use with other nonsteroidal anti-inflammatory drugs.

Nursing Considerations:

- Administer with food or milk to reduce gastrointestinal irritation.
- Monitor for signs of gastrointestinal bleeding, such as black stools or vomiting blood.
- Assess kidney function, especially in older adults or patients with dehydration.
- Educate patients to avoid alcohol and other nonsteroidal anti-inflammatory drugs to reduce gastrointestinal risks.
- Do not exceed the recommended duration of use (5 days) to prevent serious kidney and gastrointestinal complications.

Central Nervous System Medications
Analgesics and Anti-Inflammatory Medications

ACETAMINOPHEN

Drug Class: Analgesic and antipyretic

Mechanism of Action: Acetaminophen inhibits prostaglandin synthesis in the central nervous system, primarily by blocking cyclooxygenase pathways in the brain. Unlike nonsteroidal anti-inflammatory drugs, it has minimal anti-inflammatory effects and does not inhibit platelet function.

Indications: Mild to moderate pain, fever reduction, headache, musculoskeletal pain, and osteoarthritis.

DOSAGE

Adults:

Oral or rectal: 325 to 650 mg every 4 to 6 hours as needed (maximum 4,000 mg per day).

Intravenous: 1,000 mg every 6 hours or 650 mg every 4 hours (maximum 4,000 mg per day).

Pediatrics:

Oral or rectal: 10 to 15 mg per kg every 4 to 6 hours as needed (maximum 75 mg per kg per day, not exceeding 4,000 mg per day).

Side Effects: Liver toxicity in high doses, nausea, vomiting, rash, and rarely, allergic reactions.

Contraindications: Severe liver disease, alcohol use disorder, and hypersensitivity to acetaminophen.

Nursing Considerations:

- Monitor liver function, especially in patients with chronic alcohol use or liver disease.
- Educate patients to avoid exceeding the maximum daily dose to prevent liver toxicity.
- Assess for signs of overdose, such as nausea, vomiting, right upper quadrant pain, confusion, and jaundice.
- Be prepared to administer acetylcysteine as an antidote in case of overdose.
- Instruct patients to check for hidden acetaminophen in combination medications to prevent unintentional overdose.

Central Nervous System Medications Sedatives and Anesthetics

MIDAZOLAM

Drug Class: Benzodiazepine, central nervous system depressant

Mechanism of Action: Midazolam enhances the activity of gamma-aminobutyric acid at gamma-aminobutyric acid type A receptors in the central nervous system. This leads to sedation, anxiolysis, muscle relaxation, and anticonvulsant effects.

Indications: Preoperative sedation, procedural sedation, induction and maintenance of anesthesia, seizures, and sedation for mechanically ventilated patients.

DOSAGE

Adults:

Intravenous: 1 to 2.5 mg every 2 minutes as needed (maximum total dose 5 mg).
Intramuscular: 5 mg once for preoperative sedation.
Intranasal (Seizures): 5 mg once.

Pediatrics:

Intravenous: 0.05 to 0.1 mg per kg once (maximum 2.5 mg per dose).
Intramuscular: 0.1 mg per kg once (maximum 5 mg).
Intranasal (Seizures): 0.2 mg per kg once (maximum 10 mg)

Side Effects: Respiratory depression, drowsiness, low blood pressure, nausea, vomiting.

Contraindications: Severe respiratory depression, myasthenia gravis, acute narrow-angle glaucoma.

Nursing Considerations:

- Monitor respiratory rate, oxygen saturation, and blood pressure closely.
- Have resuscitation equipment and flumazenil available in case of overdose.
- Use cautiously in older adults and patients with liver or kidney impairment, as metabolism may be prolonged.
- Monitor for signs of paradoxical reactions such as agitation or aggression.
- Ensure continuous cardiac monitoring when administered intravenously.
- Educate patients and families about potential short-term memory loss after administration.
- Avoid concomitant use with opioids or alcohol due to increased risk of respiratory depression.
- Administer slowly to reduce the risk of hypotension and respiratory depression.

Central Nervous System Medications Sedatives and Anesthetics

LORAZEPAM

Drug Class: Benzodiazepine

Mechanism of Action: Enhances gamma-aminobutyric acid activity in the central nervous system, producing sedation, anxiolysis, muscle relaxation, and anticonvulsant effects.

Indications: Anxiety, status epilepticus, preoperative sedation, insomnia, and alcohol withdrawal syndrome.

DOSAGE

Adults:

Anxiety (Oral): 1 to 3 mg every 8 to 12 hours as needed.
Status epilepticus (Intravenous): 4 mg slowly over 2 minutes; may repeat after 10 to 15 minutes if seizures persist.
Preoperative sedation (Intramuscular or Intravenous): 2 to 4 mg once, 1 to 2 hours before the procedure.

Pediatrics:

Status epilepticus (Intravenous): 0.05 to 0.1 mg per kg every 10 to 15 minutes as needed (maximum 4 mg per dose).
Preoperative sedation (Intramuscular or Intravenous): 0.05 mg per kg once (maximum 4 mg).

Side Effects: Drowsiness, dizziness, confusion, respiratory depression, low blood pressure, fatigue, nausea, and potential dependence with prolonged use.

Contraindications: Severe respiratory depression, acute narrow-angle glaucoma, hypersensitivity to benzodiazepines, and pregnancy (risk of fetal harm).

Nursing Considerations:

- Monitor respiratory rate, oxygen saturation, and blood pressure, especially after intravenous administration.
- Have resuscitation equipment and flumazenil available in case of overdose.
- Educate patients about the risk of dependence and avoid long-term use without medical supervision.
- Use cautiously in older adults, as it increases the risk of falls and confusion.
- Avoid concurrent use with opioids, alcohol, or other central nervous system depressants to prevent respiratory depression.
- Administer slowly intravenously to reduce the risk of hypotension and respiratory depression.
- Monitor for signs of paradoxical reactions, such as agitation or aggression, especially in pediatric and geriatric patients.

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Central Nervous System Medications Sedatives and Anesthetics

DIAZEPAM

Drug Class: Benzodiazepine

Mechanism of Action: Diazepam binds to specific receptors in the central nervous system, increasing the efficiency of gamma-aminobutyric acid, an inhibitory neurotransmitter. This results in reduced neuronal excitability, producing anxiolytic, muscle relaxant, sedative, and anticonvulsant effects.

Indications: Anxiety, muscle spasms, status epilepticus, alcohol withdrawal, and preoperative sedation.

DOSAGE

Adults:

- Anxiety (Oral): 2 to 10 mg every 6 to 12 hours as needed.
- Muscle spasms (Oral): 2 to 10 mg every 6 to 12 hours as needed.
- Status epilepticus (Intravenous or Rectal): 5 to 10 mg every 10 to 15 minutes as needed (maximum 30 mg per episode).
- Alcohol withdrawal (Oral or Intravenous): 10 mg every 6 hours for 24 hours, then 5 mg every 6 hours as needed.

Side Effects: Drowsiness, dizziness, respiratory depression, low blood pressure, fatigue, nausea, muscle weakness, and risk of dependence with prolonged use.

Contraindications: Severe respiratory depression, acute narrow-angle glaucoma, hypersensitivity to benzodiazepines, and pregnancy (risk of fetal harm).

Nursing Considerations:

- Monitor respiratory rate, oxygen saturation, and blood pressure, especially after intravenous administration.
- Have resuscitation equipment and flumazenil available in case of overdose.
- Educate patients about the risk of dependence and withdrawal symptoms if discontinued abruptly.
- Use cautiously in older adults due to increased risk of falls, confusion, and prolonged sedation.
- Avoid concurrent use with opioids, alcohol, or other central nervous system depressants to prevent respiratory depression.
- Administer slowly intravenously to reduce the risk of hypotension and respiratory depression.
- Monitor for signs of paradoxical reactions such as agitation, especially in pediatric and geriatric patients.

Central Nervous System Medications Sedatives and Anesthetics

PHENOBARBITAL

Drug Class: Barbiturate, Anticonvulsant

Mechanism of Action: Phenobarbital enhances the activity of gamma-aminobutyric acid by prolonging the opening of chloride ion channels, leading to decreased neuronal excitability. This results in sedative, hypnotic, anticonvulsant, and anxiolytic effects

Indications: Seizure disorders, status epilepticus, sedation, and withdrawal symptoms in neonates.

DOSAGE

Adults:

Seizure disorders (Oral): 50 to 100 mg once or twice daily.

Status epilepticus (Intravenous or Intramuscular): 10 to 20 mg per kg as a single dose.

Sedation (Oral): 30 to 120 mg per day in divided doses.

Pediatrics:

Seizure disorders (Oral): 3 to 6 mg per kg per day in divided doses.

Status epilepticus (Intravenous or Intramuscular): 15 to 20 mg per kg as a single dose.

Side Effects: Drowsiness, dizziness, respiratory depression, hypotension, bradycardia, nausea, vomiting, and risk of dependence with prolonged use.

Contraindications: Severe respiratory depression, history of porphyria, hepatic impairment, and hypersensitivity to barbiturates.

Nursing Considerations:

- Monitor respiratory rate, blood pressure, and level of consciousness, especially after intravenous administration.
- Assess for signs of toxicity, such as confusion, ataxia, or respiratory depression.
- Educate patients about the risk of dependence and withdrawal symptoms with prolonged use.
- Avoid abrupt discontinuation to prevent withdrawal seizures.
- Use cautiously in older adults due to increased sensitivity and risk of oversedation.
- Avoid concurrent use with other central nervous system depressants, including alcohol and opioids.
- Monitor liver function tests regularly in long-term therapy.

Central Nervous System Medications Sedatives and Anesthetics

ZOLPIDEM

Drug Class: Non-benzodiazepine sedative-hypnotic

Mechanism of Action: Zolpidem binds to gamma-aminobutyric acid type A receptors, specifically at the omega-1 subunit, enhancing inhibitory neurotransmission. This leads to central nervous system depression, reducing sleep latency and improving sleep maintenance.

Indications: Short-term treatment of insomnia.

DOSAGE
Adults:
Immediate-release tablets: 5 mg for women and 5 to 10 mg for men, taken once at bedtime.
Extended-release tablets: 6.25 mg for women and 6.25 to 12.5 mg for men, taken once at bedtime.

Pediatrics: Not recommended for children due to lack of safety and efficacy data.

Side Effects: Drowsiness, dizziness, headache, memory impairment, sleepwalking, hallucinations, nausea, and risk of dependence with prolonged use.

Contraindications: Hypersensitivity to zolpidem, history of complex sleep behaviors, severe hepatic impairment, and concurrent use of alcohol or other sedatives.

Nursing Considerations:

- MInstruct patients to take zolpidem immediately before bedtime, ensuring at least seven to eight hours of sleep time.
- Monitor for unusual sleep behaviors such as sleepwalking, sleep-driving, or engaging in activities without memory of them.
- Use cautiously in older adults due to increased risk of falls, confusion, and prolonged sedation.
- Avoid combining with alcohol, opioids, or other central nervous system depressants due to the risk of severe respiratory depression.
- Assess liver function in patients with hepatic impairment, as metabolism may be prolonged.
- Advise patients not to abruptly discontinue the medication, as it may cause rebound insomnia.

Central Nervous System Medications Sedatives and Anesthetics

PROPOFOL

Drug Class: General anesthetic, Sedative-hypnotic

Mechanism of Action: Propofol potentiates gamma-aminobutyric acid activity at gamma-aminobutyric acid type A receptors, leading to a rapid onset of sedation by inhibiting neuronal excitation. It also decreases cerebral metabolic demand and reduces sympathetic nervous system activity, resulting in hypotension.

Indications: Induction and maintenance of general anesthesia, sedation for mechanical ventilation in intensive care units, and procedural sedation.

DOSAGE

Adults:

Induction of anesthesia: 1.5 to 2.5 mg per kg intravenously over 20 to 30 seconds.

Maintenance of anesthesia: 100 to 200 micrograms per kg per minute intravenously as continuous infusion.

Sedation for mechanical ventilation: 5 to 50 micrograms per kg per minute intravenously as continuous infusion.

Pediatrics:

Induction of anesthesia: 2.5 to 3.5 mg per kg intravenously over 20 to 30 seconds.

Maintenance of anesthesia: 125 to 300 micrograms per kg per minute intravenously as continuous infusion.

Side Effects: Hypotension, bradycardia, respiratory depression, apnea, injection site pain, hypertriglyceridemia, and risk of propofol infusion syndrome with prolonged use.

Contraindications: Hypersensitivity to propofol or its components (including egg and soy allergy), hemodynamic instability, and conditions requiring deep sedation for extended periods.

Nursing Considerations:

- Monitor blood pressure, heart rate, and respiratory status continuously during administration.
- Ensure advanced airway management is available due to the risk of apnea and respiratory depression.
- Use strict aseptic technique to prevent contamination, as propofol supports bacterial growth.
- Monitor for signs of propofol infusion syndrome, including metabolic acidosis, cardiac failure, rhabdomyolysis, and hyperkalemia.
- Avoid prolonged use in critically ill patients unless necessary, and assess lipid levels due to the risk of hypertriglyceridemia.
- Educate patients and families about potential postoperative drowsiness and impaired cognition after use.

Central Nervous System Medications Sedatives and Anesthetics

KETAMINE

Drug Class: General anesthetic, Dissociative anesthetic

Mechanism of Action: Ketamine acts as a non-competitive antagonist of N-methyl-D-aspartate receptors, blocking excitatory neurotransmission in the central nervous system. This results in dissociative anesthesia, analgesia, amnesia, and minimal respiratory depression.

Indications: Induction and maintenance of anesthesia, procedural sedation, pain management, and treatment-resistant depression.

DOSAGE

Adults:

Induction of anesthesia (Intravenous): 1 to 2 mg per kg as a single dose over 30 to 60 seconds.

Sedation for procedures (Intravenous): 0.5 to 1 mg per kg as a single dose, followed by 0.25 to 0.5 mg per kg as needed.

Pain management (Intravenous): 0.1 to 0.5 mg per kg per hour as continuous infusion.

Pediatrics:

Induction of anesthesia (Intravenous): 1 to 2 mg per kg as a single dose over 30 to 60 seconds.

Induction of anesthesia (Intramuscular): 4 to 10 mg per kg as a single dose.

Side Effects: Increased blood pressure, tachycardia, hallucinations, emergence delirium, hypersalivation, nausea, vomiting, and potential respiratory depression at high doses.

Contraindications: Severe hypertension, history of psychosis, uncontrolled cardiovascular disease, elevated intracranial pressure, and hypersensitivity to ketamine.

Nursing Considerations:

- Monitor blood pressure and heart rate, as ketamine can cause significant cardiovascular stimulation.
- Assess for emergence reactions, including hallucinations and delirium, and provide a calm environment during recovery.
- Ensure airway protection, especially in higher doses, due to the risk of respiratory depression.
- Use cautiously in patients with head trauma or intracranial hypertension, as ketamine may increase intracranial pressure.
- Educate patients about potential visual disturbances, dizziness, and confusion after administration.
- Avoid use in patients with a history of psychiatric disorders unless used under close supervision.

Central Nervous System Medications
Anticonvulsants

PHENYTOIN

Drug Class: Anticonvulsant, Hydantoin derivative

Mechanism of Action: Phenytoin stabilizes neuronal membranes by blocking voltage-gated sodium channels, reducing repetitive neuronal firing. This helps prevent seizure propagation without causing generalized central nervous system depression.

Indications: Tonic-clonic seizures, focal seizures, and status epilepticus.

DOSAGE

Adults:

Seizure maintenance (Oral): 300 to 400 mg per day in divided doses.

Status epilepticus (Intravenous loading dose): 15 to 20 mg per kg at a rate not exceeding 50 mg per minute.

Intravenous maintenance dose: 4 to 6 mg per kg per day.

Pediatrics:

Seizure maintenance (Oral): 5 mg per kg per day in divided doses (maximum 300 mg per day).

Status epilepticus (Intravenous loading dose): 15 to 20 mg per kg at a rate not exceeding 1 mg per kg per minute.

Side Effects: Gingival hyperplasia, nystagmus, ataxia, dizziness, hypotension, rash, hepatotoxicity, and risk of Stevens-Johnson syndrome.

Contraindications: Hypersensitivity to phenytoin, sinus bradycardia, heart block, history of drug-induced rash, and concurrent use with delavirdine.

Nursing Considerations:

- Monitor serum phenytoin levels (therapeutic range: 10 to 20 micrograms per milliliter) to prevent toxicity.
- Administer intravenous phenytoin slowly to avoid hypotension and cardiac arrhythmias.
- Educate patients about proper oral hygiene to reduce gingival hyperplasia.
- Assess for signs of toxicity, including confusion, slurred speech, and coordination problems.
- Avoid abrupt discontinuation to prevent rebound seizures.
- Use cautiously in patients with hepatic or renal impairment, as metabolism may be altered.
- Instruct patients to avoid alcohol and other central nervous system depressants, which can increase sedation and seizure risk.

Central Nervous System Medications Anticonvulsants

CARBAMAZEPINE

Drug Class: Anticonvulsant, Mood stabilizer

Mechanism of Action: Carbamazepine blocks voltage-gated sodium channels, reducing neuronal excitability and preventing repetitive firing. This helps in seizure control, mood stabilization, and neuropathic pain management.

Indications: Tonic-clonic seizures, focal seizures, trigeminal neuralgia, and bipolar disorder.

DOSAGE

Adults:

Seizure maintenance (Oral): 200 mg twice daily, increased gradually to 800 to 1200 mg per day in divided doses.

Bipolar disorder (Oral): 200 mg twice daily, adjusted based on response.

Pediatrics:

Seizure maintenance (Oral):Children under 6 years: 10 to 20 mg per kg per day in divided doses.

Children 6 to 12 years: 100 mg twice daily, increased gradually to 400 to 800 mg per day.

Side Effects: Dizziness, drowsiness, ataxia, nausea, vomiting, blurred vision, rash, hyponatremia, agranulocytosis, and Stevens-Johnson syndrome.

Contraindications: Hypersensitivity to carbamazepine, history of bone marrow suppression, use of monoamine oxidase inhibitors within the past 14 days, and known HLA-B*1502 allele in Asian patients due to risk of severe skin reactions.

Nursing Considerations:

- Monitor complete blood count regularly due to the risk of bone marrow suppression.
- Assess for signs of Stevens-Johnson syndrome, particularly in patients of Asian descent.
- Monitor sodium levels, especially in elderly patients, due to the risk of hyponatremia.
- Educate patients to avoid alcohol and grapefruit juice, which can alter drug metabolism.
- Assess for changes in mood or behavior, as carbamazepine can increase the risk of suicidal thoughts.
- Advise patients to use non-hormonal contraceptives, as carbamazepine reduces the effectiveness of oral contraceptives.
- Avoid abrupt discontinuation to prevent rebound seizures.

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Central Nervous System Medications Anticonvulsants

VALPROATE

Drug Class: Anticonvulsant, Mood stabilizer

Mechanism of Action: Valproate increases gamma-aminobutyric acid levels by inhibiting its metabolism and enhancing its effects, leading to neuronal stabilization. It also blocks voltage-gated sodium channels and calcium channels, reducing excessive neuronal firing and preventing seizures.

Indications: Generalized seizures, focal seizures, bipolar disorder, and migraine prophylaxis.

DOSAGE

Adults:

Seizure maintenance (Oral): 10 to 15 mg per kg per day, increased gradually to a maximum of 60 mg per kg per day.

Bipolar disorder (Oral): 250 mg twice daily, titrated to 1000 to 2500 mg per day based on response.

Migraine prophylaxis (Oral): 250 to 500 mg twice daily.

Pediatrics:

Seizure maintenance (Oral): 10 to 15 mg per kg per day, increased gradually to a maximum of 60 mg per kg per day.

Side Effects: Nausea, vomiting, drowsiness, dizziness, tremor, weight gain, hair loss, hepatotoxicity, pancreatitis, thrombocytopenia, and teratogenic effects.

Contraindications: Hypersensitivity to valproate, severe hepatic impairment, mitochondrial disorders, urea cycle disorders, and pregnancy due to the risk of neural tube defects.

Nursing Considerations:

- Monitor liver function tests regularly due to the risk of hepatotoxicity, especially in children under two years.
- Assess for signs of pancreatitis, such as severe abdominal pain, nausea, and vomiting.
- Monitor platelet counts, as valproate may cause thrombocytopenia.
- Educate female patients of childbearing age about the teratogenic risks and recommend effective contraception.
- Avoid abrupt discontinuation to prevent rebound seizures.
- Assess for signs of mood changes or suicidal thoughts, as valproate can affect mental health.
- Advise patients to take the medication with food to reduce gastrointestinal discomfort.

Central Nervous System Medications
Anticonvulsants

LEVETIRACETAM

Drug Class: Anticonvulsant

Mechanism of Action: Levetiracetam binds to synaptic vesicle protein 2A, modulating neurotransmitter release and reducing excessive neuronal excitability, which helps prevent seizures. Unlike other anticonvulsants, it does not significantly affect sodium or calcium channels.

Indications: Focal seizures, generalized tonic-clonic seizures, and myoclonic seizures.

DOSAGE

Adults:

Seizure maintenance (Oral or Intravenous): 500 mg twice daily, increased gradually to a maximum of 3000 mg per day.

Pediatrics:

Seizure maintenance (Oral or Intravenous): Children 4 to 16 years: 10 mg per kg twice daily, increased gradually to a maximum of 60 mg per kg per day.

Side Effects: Drowsiness, dizziness, fatigue, irritability, behavioral changes, mood disturbances, and rare cases of suicidal thoughts.

Contraindications: Hypersensitivity to levetiracetam. Use with caution in patients with a history of depression or psychiatric disorders.

Nursing Considerations:

- Monitor for behavioral changes, including aggression, agitation, or suicidal thoughts.
- Educate patients to avoid alcohol and other central nervous system depressants, which can enhance sedation.
- Assess renal function regularly, as levetiracetam is excreted primarily by the kidneys.
- Avoid abrupt discontinuation to prevent withdrawal seizures.
- Encourage patients to take the medication at the same time each day for consistency.
- Inform patients that drowsiness and dizziness may occur, especially at the start of treatment.

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Central Nervous System Medications Anticonvulsants

GABAPENTIN

Drug Class: Anticonvulsant, Neuropathic pain agent

Mechanism of Action: Gabapentin binds to voltage-gated calcium channels in the central nervous system, reducing excitatory neurotransmitter release. This decreases neuronal hyperexcitability, providing anticonvulsant and analgesic effects.

Indications: Partial seizures, neuropathic pain, postherpetic neuralgia, and restless legs syndrome.

DOSAGE

Adults:

Seizure maintenance (Oral): 300 mg once daily, increased gradually to 900 to 1800 mg per day in divided doses.

Neuropathic pain (Oral): 300 mg once daily, titrated up to 1800 to 3600 mg per day in divided doses.

Pediatrics:

Seizure maintenance (Oral): 10 to 15 mg per kg per day, divided into three doses, with a maximum of 50 mg per kg per day.

Side Effects: Drowsiness, dizziness, fatigue, ataxia, peripheral edema, weight gain, and mood changes.

Contraindications: Hypersensitivity to gabapentin. Use with caution in patients with renal impairment or a history of depression.

Nursing Considerations:

- Monitor for signs of central nervous system depression, including drowsiness and dizziness.
- Assess for mood changes or suicidal thoughts, especially in patients with a history of psychiatric disorders.
- Adjust the dose in patients with renal impairment, as gabapentin is excreted by the kidneys.
- Educate patients to avoid alcohol and other central nervous system depressants, which can increase sedation.
- Inform patients to take the medication consistently, as abrupt discontinuation can lead to withdrawal symptoms.
- Advise patients about the potential for weight gain and the importance of maintaining a healthy lifestyle.

Central Nervous System Medications
Parkinson's Disease Medications

LEVODOPA-CARBIDOPA

Drug Class: Dopaminergic agent, Antiparkinsonian

Mechanism of Action:

Levodopa: A precursor of dopamine that crosses the blood-brain barrier and is converted into dopamine, replenishing deficient levels in Parkinson's disease.
Carbidopa: A peripheral decarboxylase inhibitor that prevents the conversion of levodopa into dopamine outside the brain, increasing the amount of levodopa that reaches the central nervous system and reducing peripheral side effects such as nausea and hypotension.

DOSAGE
Adults:
Initial dose (Oral): 100 mg of levodopa and 25 mg of carbidopa three times daily.
Maintenance dose: Adjusted based on response, typically 300 to 800 mg of levodopa per day in divided doses.
Maximum dose: 2000 mg of levodopa per day.

Side Effects: Nausea, vomiting, dizziness, orthostatic hypotension, dyskinesia, hallucinations, confusion, and motor fluctuations (on-off phenomenon).

Contraindications: Hypersensitivity to levodopa or carbidopa, narrow-angle glaucoma, use of monoamine oxidase inhibitors within the last 14 days, and history of malignant melanoma.

Nursing Considerations:

- Monitor for signs of dyskinesia and adjust the dosage if excessive involuntary movements occur.
- Educate patients to take the medication with food to reduce nausea but avoid high-protein meals, which can interfere with absorption.
- Assess for orthostatic hypotension and advise patients to change positions slowly.
- Monitor mental status for signs of hallucinations, confusion, or mood changes.
- Inform patients that the effects of the medication may fluctuate over time, requiring dose adjustments.
- Encourage adherence to the prescribed regimen to maintain symptom control.

Central Nervous System Medications
Parkinson's Disease Medications

SELEGILINE

Drug Class: Monoamine oxidase type B inhibitor, Antiparkinsonian agent

Mechanism of Action: Selegiline selectively inhibits monoamine oxidase type B, an enzyme responsible for the breakdown of dopamine in the brain. By reducing dopamine degradation, it prolongs dopamine activity, enhancing motor function in Parkinson's disease.

Indications: Parkinson's disease (as adjunct therapy to levodopa-carbidopa) and major depressive disorder (transdermal formulation).

DOSAGE
Adults:

- (Parkinson's disease, Oral):Tablet: 5 mg twice daily with breakfast and lunch (maximum 10 mg per day).
- Orally disintegrating tablet: 1.25 mg once daily before breakfast (may increase to 2.5 mg per day).

Side Effects: Insomnia, dizziness, nausea, dry mouth, orthostatic hypotension, headache, confusion, hallucinations, and hypertensive crisis if taken with tyramine-rich foods.
Contraindications: Hypersensitivity to selegiline, concurrent use of serotonin reuptake inhibitors, tricyclic antidepressants, or other monoamine oxidase inhibitors, and pheochromocytoma.

Nursing Considerations:

- Educate patients to avoid tyramine-rich foods (aged cheese, cured meats, fermented foods) to prevent hypertensive crisis.
- Monitor for signs of serotonin syndrome if combined with other serotonergic drugs.
- Assess blood pressure regularly, as selegiline may cause orthostatic hypotension.
- Inform patients that the orally disintegrating tablet should not be swallowed with food or liquid and should dissolve completely on the tongue.
- Advise patients to take the last daily dose early in the afternoon to minimize insomnia.
- Monitor for signs of hallucinations or confusion, especially in elderly patients.

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Central Nervous System Medications
Anxiolytics

ALPRAZOLAM

Drug Class: Benzodiazepine, Anxiolytic

Mechanism of Action: Alprazolam enhances the effect of gamma-aminobutyric acid, an inhibitory neurotransmitter, by binding to benzodiazepine receptors in the central nervous system. This results in sedation, muscle relaxation, anticonvulsant effects, and reduced anxiety.

Indications: Generalized anxiety disorder, panic disorder, and short-term treatment of insomnia.

DOSAGE
Adults:
Anxiety: 0.25 to 0.5 mg three times daily (maximum 4 mg per day).
Panic disorder: 0.5 mg three times daily, titrated as needed (maximum 10 mg per day).
Elderly or debilitated patients: Start with 0.25 mg two to three times daily to minimize excessive sedation.

Side Effects: Drowsiness, dizziness, fatigue, memory impairment, dry mouth, constipation, respiratory depression (at high doses), and potential for dependence.
Contraindications: Hypersensitivity to benzodiazepines, severe respiratory depression, acute narrow-angle glaucoma, and concurrent use of strong central nervous system depressants (such as opioids or alcohol).

Nursing Considerations:

- Educate patients to avoid alcohol and other central nervous system depressants to prevent excessive sedation or respiratory depression.
- Advise patients to take the lowest effective dose for the shortest duration possible.
- Assess for signs of paradoxical reactions, such as agitation or increased anxiety, especially in elderly patients.
- Instruct patients not to abruptly discontinue the medication to avoid withdrawal symptoms, including seizures.
- Inform patients that the orally disintegrating tablet should not be swallowed with food or liquid and should dissolve completely on the tongue.
- Advise patients to take the last daily dose early in the afternoon to minimize insomnia.
- Monitor for signs of hallucinations or confusion, especially in elderly patients.

Central Nervous System Medications
Anxiolytics

CLONAZEPAM

Drug Class: Benzodiazepine, Anticonvulsant, Anxiolytic

Mechanism of Action: Clonazepam enhances the effect of gamma-aminobutyric acid, an inhibitory neurotransmitter, by binding to benzodiazepine receptors in the central nervous system. This results in sedation, muscle relaxation, anticonvulsant activity, and reduced anxiety.

Indications: Seizure disorders (absence seizures, myoclonic seizures, and Lennox-Gastaut syndrome), panic disorder, and restless legs syndrome.

DOSAGE
Adults:
Seizures: Initial dose of 0.5 mg three times daily, increased gradually if needed (maximum 20 mg per day).
Panic disorder: Initial dose of 0.25 mg twice daily, increased to 1 mg per day if necessary (maximum 4 mg per day).

Side Effects: Drowsiness, dizziness, fatigue, confusion, memory impairment, ataxia, respiratory depression (at high doses), and potential for dependence.

Contraindications: Hypersensitivity to benzodiazepines, severe respiratory insufficiency, acute narrow-angle glaucoma, and severe liver disease.

Nursing Considerations:

- Monitor for signs of dependence, tolerance, and withdrawal symptoms if the medication is discontinued abruptly.
- Educate patients to avoid alcohol and other central nervous system depressants to prevent excessive sedation or respiratory depression.
- Use cautiously in elderly patients due to an increased risk of falls and cognitive impairment.
- Instruct patients to take the medication as prescribed and avoid sudden discontinuation to prevent withdrawal symptoms, including seizures.
- Assess for changes in mood or behavior, as benzodiazepines can sometimes cause paradoxical reactions, such as increased agitation or aggression.
- Monitor respiratory status, especially in patients with preexisting respiratory disorders.

Central Nervous System Medications
Anxiolytics

LORAZEPAM

Drug Class: Benzodiazepine, Anxiolytic, Sedative-Hypnotic

Mechanism of Action: Lorazepam enhances the activity of gamma-aminobutyric acid, an inhibitory neurotransmitter, by binding to benzodiazepine receptors in the central nervous system. This results in sedation, muscle relaxation, anticonvulsant effects, and anxiolysis.

Indications: Anxiety disorders, status epilepticus, preoperative sedation, and insomnia.

DOSAGE
Adults:
(Oral):
Anxiety: 1 to 3 mg two to three times daily (maximum 10 mg per day).
Insomnia due to anxiety: 2 to 4 mg at bedtime.
Pediatrics (Intravenous for status epilepticus):
Children over one month: 0.1 mg per kilogram (maximum 4 mg per dose), given slowly over two minutes.

Side Effects: Drowsiness, dizziness, confusion, respiratory depression (especially at high doses), hypotension, and potential for dependence.

Contraindications: Hypersensitivity to benzodiazepines, acute narrow-angle glaucoma, severe respiratory depression, and use with strong central nervous system depressants.

Nursing Considerations:

- Monitor respiratory function, especially when given intravenously or in high doses.
- Educate patients to avoid alcohol and other sedatives to prevent excessive central nervous system depression.
- Use with caution in elderly patients due to increased risk of falls and cognitive impairment.
- Avoid abrupt discontinuation to prevent withdrawal symptoms, including rebound anxiety, agitation, and seizures.
- Assess for signs of paradoxical reactions, such as increased agitation or aggression, particularly in elderly or pediatric patients.
- Instruct patients to take the lowest effective dose for the shortest duration possible to reduce the risk of dependence.

Central Nervous System Medications
Antipsychotics

HALOPERIDOL

Drug Class: First-generation antipsychotic, Butyrophenone derivative

Mechanism of Action: Haloperidol blocks dopamine type 2 receptors in the brain, particularly in the mesolimbic and mesocortical pathways, leading to a reduction in psychotic symptoms. It also has effects on other neurotransmitter systems, contributing to its sedative and antiemetic properties.

Indications: Schizophrenia, acute psychosis, Tourette syndrome, delirium, agitation, and nausea or vomiting (off-label).

DOSAGE

Adults:

- Oral: Schizophrenia and psychosis: 0.5 to 5 mg two to three times daily (maximum 30 mg per day in severe cases).
- Intramuscular or Intravenous: Acute agitation or delirium: 2 to 10 mg intramuscular every one to four hours as needed (maximum 20 mg per day).

Side Effects: Extrapyramidal symptoms (dystonia, akathisia, Parkinsonism, tardive dyskinesia), sedation, hypotension, prolonged QT interval, neuroleptic malignant syndrome, and anticholinergic effects.

Contraindications: Hypersensitivity to haloperidol, severe central nervous system depression, Parkinson's disease, prolonged QT interval, and history of neuroleptic malignant syndrome.

Nursing Considerations:

- Monitor for extrapyramidal symptoms and tardive dyskinesia; consider adjunctive treatment with anticholinergic agents if needed.
- Assess for signs of neuroleptic malignant syndrome, including hyperthermia, muscle rigidity, autonomic instability, and altered mental status.
- Monitor electrocardiogram for QT prolongation, especially in patients with cardiac risk factors.
- Educate patients and caregivers about the importance of adherence and potential side effects.
- Avoid abrupt discontinuation to prevent withdrawal symptoms and worsening of psychiatric conditions.

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Central Nervous System Medications
Antipsychotics

CHLORPROMAZINE

Drug Class: Typical antipsychotic (phenothiazine)

Mechanism of Action: Blocks dopamine D2 receptors in the limbic system and basal ganglia, reducing dopaminergic transmission and alleviating psychotic symptoms. It also has antihistaminic, anticholinergic, and alpha-adrenergic blocking effects.

Indications: schizophrenia and other psychotic disorders, as well as for managing acute manic episodes in bipolar disorder

DOSAGE
Adults:
Schizophrenia: 25-100 mg orally every 6-8 hours, adjusted based on response (maximum dose 800 mg/day).
Nausea and vomiting: 10-25 mg every 4-6 hours as needed.
Persistent hiccups: 25-50 mg every 6-8 hours.
Pediatrics
Schizophrenia: 0.5 mg/kg/dose every 6-8 hours, gradually adjusted (maximum 75 mg/day in children under 5 years old and 200 mg/day in those over 5 years old).

Side Effects: Sedation, orthostatic hypotension, dry mouth, blurred vision, and constipation. In some cases, it may cause serious neurological complications such as tardive dyskinesia and neuroleptic malignant syndrome, as well as cardiovascular effects like QT interval prolongation.

Contraindications: hypersensitivity to phenothiazines, severe central nervous system depression, or significant hypotension.

Nursing Considerations:

- Monitor for signs of extrapyramidal symptoms and tardive dyskinesia.
- Check blood pressure regularly to prevent orthostatic hypotension.
- Warn patients about the risk of drowsiness and advise against activities requiring alertness.
- Monitor liver function in long-term treatment.
- Educate patients on the importance of not abruptly discontinuing the medication.

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Central Nervous System Medications
Antipsychotics

RISPERIDONE

Drug Class: Atypical antipsychotic (second-generation antipsychotic)

Mechanism of Action: Blocks dopamine D2 and serotonin 5-HT2A receptors, reducing excessive dopaminergic and serotonergic activity in the brain. This helps alleviate psychotic symptoms while minimizing extrapyramidal side effects compared to typical antipsychotics.

Indications: Schizophrenia, bipolar disorder, and irritability associated with autism spectrum disorder.

DOSAGE

Adults:

- Schizophrenia: Initial dose of 1-2 mg orally once daily, titrated to 4-6 mg/day based on response (maximum 16 mg/day).
- Bipolar disorder: 2-3 mg once daily, adjusted as needed (maximum 6 mg/day).

Pediatrics

- Autism-related irritability (5-17 years): 0.25-0.5 mg/day, titrated to 1-2.5 mg/day based on response.
- Schizophrenia (13-17 years): 0.5 mg twice daily, increased gradually to 3-6 mg/day.

Side Effects: Sedation, weight gain, dizziness, and increased appetite. It may also cause metabolic changes such as hyperglycemia, increased cholesterol levels, and, in some cases, extrapyramidal symptoms like tremors and rigidity.

Contraindications: hypersensitivity to the drug or other antipsychotics. It should be used with caution in individuals with cardiovascular disease, seizures, or a history of neuroleptic malignant syndrome.

Nursing Considerations:

- Monitor for weight gain and metabolic changes, including blood glucose and lipid levels.
- Assess for signs of extrapyramidal symptoms and tardive dyskinesia.
- Educate patients about the risk of drowsiness and dizziness, advising caution when performing tasks that require alertness.
- Monitor blood pressure regularly, as the drug may cause hypotension.
- Advise patients and caregivers on the importance of adherence to therapy and gradual dose adjustments.

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Central Nervous System Medications Antipsychotics

OLANZAPINE

Drug Class: Atypical antipsychotic (second-generation antipsychotic)

Mechanism of Action: Blocks dopamine D2 and serotonin 5-HT2A receptors, reducing excessive dopaminergic activity in the mesolimbic pathway to alleviate psychotic symptoms while modulating serotonergic transmission to improve mood and cognition. Olanzapine also interacts with histaminergic, muscarinic, and adrenergic receptors, contributing to sedation, weight gain, and metabolic effects.

Indications: Schizophrenia and acute or maintenance therapy for bipolar disorder, particularly manic or mixed episodes.

DOSAGE

Adults:

- Schizophrenia: Initial dose of 5-10 mg orally once daily, titrated up to 10-20 mg/day (maximum 20 mg/day).
- Bipolar disorder: 10-15 mg once daily, adjusted as needed (maximum 20 mg/day).
- Depression adjunct: 5-20 mg daily in combination with fluoxetine.

Pediatrics

- Schizophrenia and bipolar disorder: 2.5-5 mg once daily, titrated to 10-20 mg/day.

Side Effects: Sedation, weight gain, increased appetite, and dry mouth. It may also cause metabolic disturbances (hyperglycemia, dyslipidemia, and insulin resistance) as well as orthostatic hypotension and dizziness.

Contraindications: Olanzapine is contraindicated in patients with hypersensitivity to the drug. It should be used with caution in those with a history of cardiovascular disease, diabetes, seizures, or neuroleptic malignant syndrome.

Nursing Considerations:

- Monitor weight, blood glucose, and lipid levels due to the risk of metabolic syndrome.
- Assess for signs of sedation and orthostatic hypotension, particularly in elderly patients.
- Educate patients about the potential for increased appetite and the importance of a balanced diet and exercise.
- Monitor for extrapyramidal symptoms and signs of tardive dyskinesia.
- Advise patients to avoid alcohol and other central nervous system depressants.

Central Nervous System Medications Antipsychotics

CLOZAPINE

Drug Class: Atypical antipsychotic (second-generation antipsychotic)

Mechanism of Action: Blocks dopamine D2 receptors in the mesolimbic pathway, reducing psychotic symptoms, while its strong antagonism of serotonin 5-HT2A receptors helps mitigate extrapyramidal side effects. Additionally, it has high affinity for histaminergic, cholinergic, and adrenergic receptors, contributing to sedation, weight gain, and metabolic effects.

Indications: Treatment-resistant schizophrenia in patients who have failed to respond to other antipsychotics.

DOSAGE

Adults:

- Schizophrenia: Initial dose of 12.5 mg once or twice daily, titrated gradually to 300-450 mg/day (maximum 900 mg/day).

Pediatrics

- Not typically recommended due to risk of severe adverse effects, but doses of 12.5-25 mg/day have been used cautiously in select cases.

Side Effects: Sedation, hypersalivation, weight gain, and hypotension. Severe risks include agranulocytosis, seizures, myocarditis, and metabolic disturbances such as diabetes and dyslipidemia.

Contraindications: Patients with a history of drug-induced agranulocytosis, severe cardiac disease, or uncontrolled seizures. It should not be used in those taking bone marrow-suppressing medications or with severe liver or renal impairment.

Nursing Considerations:

- Monitor absolute neutrophil count (ANC) regularly due to the risk of agranulocytosis.
- Assess for signs of myocarditis, including chest pain, fatigue, and palpitations.
- Monitor weight, blood glucose, and lipid levels due to metabolic risks.
- Educate patients about excessive salivation and ways to manage it.
- Advise patients to rise slowly to prevent orthostatic hypotension.
- Ensure gradual dose titration to reduce the risk of seizures and hypotension.

Central Nervous System Medications
Antipsychotics

QUETIAPINE

Drug Class: Atypical antipsychotic (second-generation antipsychotic)

Mechanism of Action: Blocks dopamine D2 and serotonin 5-HT2A receptors, reducing psychotic symptoms while modulating mood and cognition. Additionally, it has affinity for histaminergic and adrenergic receptors, contributing to its sedative and hypotensive effects.

Indications: Schizophrenia, bipolar disorder (including manic, depressive, and maintenance phases), and as an adjunct in major depressive disorder when standard antidepressants are insufficient.

DOSAGE

Adults:

- Schizophrenia: Initial dose of 25 mg twice daily, titrated to 300-800 mg/day in divided doses.
- Bipolar disorder: 50-100 mg at bedtime, titrated to 300-400 mg/day.
- Depression adjunct: 50 mg once daily, titrated to 150-300 mg/day.
- **Pediatrics (10-17 years):**
- Schizophrenia: 25 mg twice daily, increased to 400-800 mg/day.
- Bipolar disorder: 50 mg once daily, titrated to 400-600 mg/day.

Side Effects: Common adverse effects include sedation, dizziness, weight gain, and dry mouth. It may also cause orthostatic hypotension, metabolic disturbances such as hyperglycemia and dyslipidemia, and, in rare cases, extrapyramidal symptoms.

Contraindications: Quetiapine is contraindicated in patients with hypersensitivity to the drug. Caution is required in those with cardiovascular disease, diabetes, seizures, or a history of neuroleptic malignant syndrome.

Nursing Considerations:

- Monitor for sedation and dizziness, especially at treatment initiation.
- Assess for weight gain and metabolic changes, including blood glucose and lipid levels.
- Educate patients on the importance of gradual dose titration to minimize side effects.
- Monitor for signs of orthostatic hypotension and advise patients to rise slowly.
- Caution patients against alcohol use and operating heavy machinery.
- Evaluate for any signs of suicidal ideation, particularly in patients with depression.

Central Nervous System Medications
Mood Stabilizers

LITHIUM

Drug Class: Mood stabilizer

Mechanism of Action: Modulates neurotransmitter activity by altering sodium transport in nerve cells, stabilizing mood by reducing excessive excitability of neurons. It also affects serotonin and dopamine levels, contributing to its mood-stabilizing effects.

Indications: Treatment and prevention of manic and depressive episodes in bipolar disorder.

DOSAGE

Adults:

- Acute mania: 900-1800 mg/day in divided doses.
- Maintenance: 600-1200 mg/day in divided doses.
- **Pediatrics:**
- Initial dose of 300 mg twice daily, adjusted based on serum levels (target range: 0.6-1.2 mEq/L).

Side Effects: Nausea, fine hand tremors, increased thirst, frequent urination, and weight gain. Long-term use may cause hypothyroidism, renal impairment, and in severe cases, lithium toxicity, which presents with confusion, vomiting, diarrhea, and tremors.

Contraindications: Patients with severe renal impairment, dehydration, cardiovascular disease, or sodium imbalance. It should be used cautiously in patients taking diuretics or nonsteroidal anti-inflammatory drugs due to the risk of toxicity.

Nursing Considerations:

- Monitor serum lithium levels regularly to prevent toxicity.
- Assess kidney and thyroid function periodically due to long-term risks.
- Encourage consistent sodium and fluid intake to avoid fluctuations in lithium levels.
- Educate patients to recognize early signs of toxicity, such as nausea, tremors, and confusion.
- Advise patients to avoid excessive caffeine and alcohol, which can affect lithium excretion.
- Ensure patient adherence to scheduled laboratory tests and follow-ups.

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Central Nervous System Medications
Antidepressants

FLUOXETINE

Drug Class: Selective serotonin reuptake inhibitor (SSRI)

Mechanism of Action: Inhibits the reuptake of serotonin in the presynaptic neuron, increasing serotonin availability in the synaptic cleft, which enhances mood regulation and reduces symptoms of depression and anxiety.

Indications: Major depressive disorder, generalized anxiety disorder, obsessive-compulsive disorder, bulimia nervosa, and panic disorder.

DOSAGE

Adults:

- Depression and anxiety disorders: 10-20 mg/day, increased to 20-80 mg/day as needed.
- Bulimia nervosa: 60 mg/day.
- Obsessive-compulsive disorder: 20-60 mg/day.

Pediatrics (≥8 years):

- Depression: 10 mg/day, titrated to 20 mg/day after several weeks if needed.
- Obsessive-compulsive disorder: 10 mg/day, increased to 20-60 mg/day based on response.

Side Effects: Common adverse effects include nausea, insomnia, headache, dry mouth, and decreased libido. In some patients, it may cause increased anxiety, agitation, or weight changes, and there is a risk of suicidal ideation, particularly in young individuals.

Contraindications: Fluoxetine is contraindicated in patients taking monoamine oxidase inhibitors (MAOIs) due to the risk of serotonin syndrome. It should be used with caution in individuals with a history of seizures, bipolar disorder, or hepatic impairment.

Nursing Considerations:

- Monitor for signs of serotonin syndrome, including agitation, confusion, rapid heart rate, and sweating.
- Assess for suicidal ideation, particularly in children, adolescents, and young adults.
- Educate patients that full therapeutic effects may take 4-6 weeks.
- Advise patients to take the medication in the morning to reduce the risk of insomnia.
- Inform patients about potential sexual dysfunction and discuss alternative management strategies if needed.
- Caution against abrupt discontinuation to prevent withdrawal symptoms such as dizziness, irritability, and flu-like symptoms.

Central Nervous System Medications
Antidepressants

SERTRALINE

Drug Class: Selective serotonin reuptake inhibitor (SSRI)

Mechanism of Action: Enhances serotonergic neurotransmission by selectively inhibiting the reuptake of serotonin in the central nervous system, leading to improved mood, reduced anxiety, and stabilization of emotional responses. Unlike some antidepressants, it has minimal effects on norepinephrine and dopamine, making it well-tolerated with a lower risk of sedation.

Indications: Major depressive disorder, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, social anxiety disorder, and premenstrual dysphoric disorder.

DOSAGE

Adults:

- Depression and anxiety disorders: 25-50 mg/day, increased gradually up to 200 mg/day as needed.
- Obsessive-compulsive disorder: 50-200 mg/day.
- Panic disorder and post-traumatic stress disorder: Initial dose of 25 mg/day, titrated up to 50-200 mg/day.

Pediatrics (≥6 years):

- Obsessive-compulsive disorder: Starting dose of 25 mg/day, titrated to 50-200 mg/day based on response.

Side Effects: The most common adverse effects include nausea, dizziness, insomnia, dry mouth, and diarrhea. Some individuals may experience increased anxiety at the beginning of treatment, sexual dysfunction, or weight fluctuations. In younger patients, there is an increased risk of suicidal ideation.

Contraindications: Sertraline should not be used concurrently with monoamine oxidase inhibitors (MAOIs) or pimozide due to the risk of serotonin syndrome. Caution is required in patients with a history of seizures, hepatic impairment, or bipolar disorder, as it may trigger manic episodes.

Nursing Considerations:

- Monitor for serotonin syndrome symptoms such as hyperthermia, confusion, tachycardia, and muscle rigidity.
- Assess for signs of suicidal thoughts, particularly in young patients during the first weeks of treatment.
- Educate patients that full therapeutic effects may take 4-6 weeks to develop.
- Recommend taking the medication in the morning to minimize the risk of insomnia.
- Discuss potential sexual dysfunction and alternative management strategies if necessary.
- Caution against abrupt discontinuation to prevent withdrawal symptoms like dizziness, irritability, and flu-like effects.

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Central Nervous System Medications Antidepressants

ESCITALOPRAM

Drug Class: Selective serotonin reuptake inhibitor (SSRI)

Mechanism of Action: Increases serotonin levels in the synaptic cleft by selectively inhibiting its reuptake at the presynaptic neuron. This enhances neurotransmission, promoting emotional stability and reducing symptoms of depression and anxiety with minimal effects on other neurotransmitter systems.

Indications: Major depressive disorder and generalized anxiety disorder. It is also prescribed for panic disorder, social anxiety disorder, and obsessive-compulsive disorder

DOSAGE

Adults:

- Depression and anxiety disorders: Initial dose of 10 mg/day, which can be increased to 20 mg/day if needed.

Pediatrics (≥12 years):

- Depression: Starting dose of 10 mg/day, with a maximum of 20 mg/day based on response.

Side Effects: The most common adverse effects include nausea, headache, drowsiness, dizziness, and dry mouth. Some patients may experience sexual dysfunction, weight changes, or increased anxiety at the start of treatment. There is also a risk of suicidal ideation, particularly in adolescents and young adults.

Contraindications: Escitalopram is contraindicated in patients taking monoamine oxidase inhibitors (MAOIs) due to the risk of serotonin syndrome. It should be used cautiously in individuals with a history of seizures, bipolar disorder, or hepatic impairment.

Nursing Considerations:

- Monitor for serotonin syndrome, particularly when combined with other serotonergic drugs.
- Assess for suicidal thoughts, especially in young patients during the early weeks of treatment.
- Educate patients that the full therapeutic effect may take 4-6 weeks.
- Advise taking the medication at the same time daily, preferably in the morning to avoid insomnia.
- Inform patients about possible sexual dysfunction and discuss alternative options if necessary.
- Warn against sudden discontinuation to prevent withdrawal symptoms such as dizziness, irritability, and flu-like effects.

Central Nervous System Medications
Antidepressants

VENLAFAXINE

Drug Class: Serotonin-norepinephrine reuptake inhibitor (SNRI)

Mechanism of Action: Blocks the reuptake of both serotonin and norepinephrine, increasing their levels in the synaptic cleft. This dual action enhances mood, reduces anxiety, and improves energy levels, making it effective for both depressive and anxiety disorders. At lower doses, its primary effect is on serotonin; while at higher doses its primary effect is on norepinephrine

Indications: Used for major depressive disorder, generalized anxiety disorder, panic disorder, and social anxiety disorder. It may also be prescribed for migraines and neuropathic pain

DOSAGE

Adults:

- Initial dose of 37.5-75 mg/day, increased gradually to a maximum of 225 mg/day.

Pediatrics (≥12 years):

- Starting dose of 37.5 mg/day, adjusted as needed.

Side Effects: Common effects include nausea, dizziness, insomnia, sweating, and dry mouth. It may also cause hypertension, weight loss, sexual dysfunction, and withdrawal symptoms if stopped abruptly.

Contraindications: Avoid use with monoamine oxidase inhibitors (MAOIs) due to serotonin syndrome risk. Use cautiously in patients with hypertension, cardiovascular disease, seizures, or bipolar disorder.

Nursing Considerations:

- Monitor blood pressure regularly, as it may cause hypertension.
- Assess for suicidal ideation, especially in young patients.
- Advise taking with food to reduce nausea.
- Educate on gradual dose reduction to prevent withdrawal symptoms.
- Warn against alcohol consumption due to central nervous system effects.

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Central Nervous System Medications
Antidepressants

AMITRIPTYLINE

Drug Class: Tricyclic antidepressant (TCA)

Mechanism of Action: Inhibits the reuptake of serotonin and norepinephrine in the central nervous system, increasing their synaptic availability and enhancing neurotransmission. This leads to mood stabilization and pain relief. Additionally, it has antihistaminic and anticholinergic properties, contributing to its sedative and side effect profile.

Indications: Major depressive disorder, neuropathic pain, migraines, and insomnia. It is also prescribed off-label for fibromyalgia, irritable bowel syndrome, and post-herpetic neuralgia.

DOSAGE

Adults:

- Depression: Initial dose of 25-50 mg/day at bedtime, titrated up to 150 mg/day if needed.
- Neuropathic pain and migraines: 10-50 mg/day, adjusted based on response.

Side Effects: Drowsiness, dizziness, dry mouth, constipation, and weight gain. It may also cause blurred vision, orthostatic hypotension, urinary retention, and, in higher doses, cardiac arrhythmias or seizures.

Contraindications: Patients taking monoamine oxidase inhibitors (MAOIs) or those recovering from a recent myocardial infarction. Caution is required in individuals with cardiovascular disease, glaucoma, urinary retention, or seizure disorders.

Nursing Considerations:

- Monitor for suicidal ideation, especially in younger patients.
- Assess for orthostatic hypotension and advise patients to rise slowly from sitting or lying positions.
- Educate on drowsiness and caution against operating heavy machinery.
- Inform patients about dry mouth management strategies, such as frequent hydration or sugar-free gum.
- Advise against alcohol consumption, as it may enhance central nervous system depression.
- Taper dose gradually when discontinuing to prevent withdrawal symptoms.

Respiratory System Medications
Bronchodilators

ALBUTEROL

Drug Class: Beta-2 adrenergic agonist

Mechanism of Action: Stimulates beta-2 adrenergic receptors in the smooth muscle of the airways, leading to bronchodilation by relaxing bronchial muscles. This improves airflow and relieves bronchospasm in respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD).

Indications: Treatment and prevention of bronchospasm in patients with reversible obstructive airway diseases, including asthma and COPD

DOSAGE

Adults and Pediatrics:

- Acute bronchospasm: 90 mcg (1-2 inhalations) every 4-6 hours as needed.
- Exercise-induced bronchospasm: 90 mcg (2 inhalations) 15-30 minutes before exercise.

Nebulized solution:

- Adults: 2.5 mg every 6-8 hours as needed.
- Pediatrics (≥2 years): 1.25-2.5 mg every 6-8 hours.

Side Effects: Tachycardia, palpitations, tremors, nervousness, headache, and dizziness. Some patients may experience throat irritation, muscle cramps, or paradoxical bronchospasm in rare cases.

Contraindications: It should be used cautiously in individuals with cardiovascular diseases, hyperthyroidism, diabetes, or seizure disorders due to the risk of exacerbating these conditions.

Nursing Considerations:

- Monitor heart rate and blood pressure, as albuterol can cause tachycardia and hypertension.
- Educate patients on the proper inhaler technique to ensure effective drug delivery.
- Assess for signs of paradoxical bronchospasm and discontinue use if it occurs.
- Caution patients against overuse, as excessive use may lead to decreased effectiveness and increased side effects.
- Advise rinsing the mouth after use to prevent throat irritation.
- Evaluate for potential interactions with other adrenergic agents or beta-blockers.

Respiratory System Medications
Bronchodilators

SALMETEROL

Drug Class: Long-acting beta-2 adrenergic agonist (LABA)

Mechanism of Action: Stimulates beta-2 adrenergic receptors in the airway smooth muscle, leading to prolonged bronchodilation. Unlike short-acting beta agonists, it has a slower onset and provides sustained relaxation of the bronchial muscles, improving airflow and preventing bronchospasm.

Indications: Used for the long-term maintenance treatment of asthma and chronic obstructive pulmonary disease (COPD).

DOSAGE
Adults and Pediatrics:

- Asthma and COPD: 50 mcg inhaled every 12 hours.

Side Effects: Headache, throat irritation, tachycardia, tremors, and dizziness. Rare but serious adverse effects include paradoxical bronchospasm and an increased risk of asthma-related death if used without a corticosteroid.
Contraindications: Should not be used as monotherapy in asthma. It is contraindicated in acute bronchospasm and hypersensitivity to the drug. Caution is advised in patients with cardiovascular disorders, hyperthyroidism, or diabetes.

Nursing Considerations:

- Educate patients that salmeterol is not a rescue inhaler and should not be used for acute symptoms.
- Monitor respiratory status and assess for worsening asthma or COPD symptoms.
- Ensure proper inhaler technique to maximize drug efficacy.
- Caution against excessive use, as it may lead to tolerance or increased side effects.
- Advise patients using it for asthma to always combine it with an inhaled corticosteroid.
- Assess for potential drug interactions, especially with beta-blockers and other adrenergic agents.

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Respiratory System Medications
Bronchodilators

IPRATROPIUM

Drug Class: Anticholinergic (Bronchodilator)

Mechanism of Action: Blocks muscarinic receptors in the airway smooth muscle, inhibiting the action of acetylcholine. This prevents bronchoconstriction, leading to bronchodilation and improved airflow in conditions such as chronic obstructive pulmonary disease (COPD) and asthma. Unlike beta-agonists, it does not stimulate the sympathetic nervous system.

Indications: Used for the maintenance treatment of bronchospasm associated with COPD, including chronic bronchitis and emphysema. It is also used as an adjunct therapy for acute asthma exacerbations when combined with short-acting beta agonists.

DOSAGE

Adults:

Inhaler: 2 puffs (34 mcg) every 6 hours as needed.

Nebulized solution: 500 mcg every 6-8 hours as needed.

Pediatrics:

Nebulized solution: 125-250 mcg every 6-8 hours as needed.

Side Effects: Dry mouth, throat irritation, cough, dizziness, and headache. Some patients may experience blurred vision, urinary retention, or palpitations. Rarely, it can cause paradoxical bronchospasm.

Contraindications: Caution is required in individuals with narrow-angle glaucoma, prostatic hyperplasia, or bladder obstruction due to its anticholinergic effects.

Nursing Considerations:

- Educate patients that ipratropium is not a rescue inhaler and should not be used for acute bronchospasm relief.
- Monitor respiratory function and assess for symptom improvement.
- Instruct patients to rinse their mouth after inhalation to prevent dry mouth and irritation.
- Caution against contact with eyes, as it may cause pupil dilation and blurred vision.
- Evaluate for potential drug interactions, particularly with other anticholinergics.
- Assess urinary output in patients with a history of bladder obstruction or prostatic hyperplasia.

Respiratory System Medications
Bronchodilators

THEOPHYLLINE

Drug Class: Methylxanthine (Bronchodilator)

Mechanism of Action: Inhibits phosphodiesterase, leading to increased cyclic adenosine monophosphate (cAMP) levels, which relaxes bronchial smooth muscles and reduces airway inflammation. It also stimulates the central nervous system and has mild diuretic effects.

Indications: Used for long-term management of asthma and chronic obstructive pulmonary disease (COPD) to prevent bronchospasm. It is typically used when other bronchodilators are not sufficient.

DOSAGE

Adults:

300-600 mg daily, adjusted based on serum theophylline levels (therapeutic range: 10-20 mcg/mL).

Pediatrics:

Dose is weight-based, usually starting at 10 mg/kg/day, divided into multiple doses.

Side Effects: Nausea, vomiting, headache, insomnia, and restlessness. High doses may cause tachycardia, arrhythmias, seizures, and hypotension due to toxicity.

Contraindications: Caution is needed in those with cardiac arrhythmias, peptic ulcer disease, liver disease, or seizure disorders due to the risk of severe adverse effects

Nursing Considerations:

- Monitor serum theophylline levels to avoid toxicity.
- Assess for signs of overdose, including severe nausea, palpitations, seizures, or hypotension.
- Educate patients to avoid caffeine, as it may increase central nervous system stimulation.
- Advise patients to take the medication at the same time each day to maintain therapeutic levels.
- Evaluate for potential drug interactions, especially with antibiotics and seizure medications that can alter theophylline metabolism.
- Monitor for improvements in respiratory function and assess for adverse reactions.

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Respiratory System Medications
Bronchodilators

TIOTROPIUM

Drug Class: Long-acting anticholinergic (LAMA) bronchodilator

Mechanism of Action: Blocks muscarinic receptors (primarily M3) in the airway smooth muscle, inhibiting acetylcholine-mediated bronchoconstriction. This results in prolonged bronchodilation, reducing airflow obstruction in chronic respiratory conditions.

Indications: Used for long-term maintenance treatment of chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema.

DOSAGE

Adults:

- COPD: 18 mcg inhaled once daily (via HandiHaler) or 2.5 mcg (2 puffs) once daily (via Respimat).
- Asthma: 1.25 mcg (2 puffs) once daily (via Respimat).

Pediatrics (>6 years):

Asthma: 1.25 mcg (2 puffs) once daily (via Respimat).

Side Effects: Dry mouth, sore throat, cough, and constipation. Some patients may experience dizziness, urinary retention, or blurred vision. Rarely, it can cause paradoxical bronchospasm.

Contraindications: Caution is required in individuals with narrow-angle glaucoma, prostatic hyperplasia, or bladder obstruction due to its anticholinergic effects.

Nursing Considerations:

- Instruct patients that tiotropium is not a rescue medication and should not be used for acute bronchospasm.
- Educate on proper inhaler use to ensure effective drug delivery.
- Monitor for signs of urinary retention, especially in older adults.
- Advise patients to avoid getting the medication in their eyes, as it may cause pupil dilation and blurred vision.
- Encourage hydration to reduce dry mouth and throat irritation.
- Assess for symptom improvement and possible adverse effects, adjusting therapy as needed.

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Respiratory System Medications
Corticosteroids

BUDESONIDE

Drug Class: Inhaled corticosteroid (ICS)

Mechanism of Action: Reduces airway inflammation by inhibiting the release of inflammatory mediators, decreasing mucosal edema, and suppressing immune responses in the respiratory tract. This leads to improved airflow and prevention of bronchospasm in chronic respiratory conditions.

Indications: Used for the long-term management of asthma and chronic obstructive pulmonary disease (COPD) to reduce inflammation and prevent exacerbations.

DOSAGE

Adults:

- Asthma: 180-600 mcg inhaled twice daily (maximum 1,200 mcg/day).
- COPD (when combined with long-acting bronchodilators): 160-320 mcg twice daily.

Pediatrics (>6 years):

Asthma: 180-360 mcg inhaled twice daily (maximum 720 mcg/day).

Side Effects: Throat irritation, hoarseness, cough, and dry mouth. Prolonged use may increase the risk of oral candidiasis, osteoporosis, and adrenal suppression. Rarely, systemic effects like hyperglycemia or immune suppression can occur.

Contraindications: Caution is required in individuals with active infections, osteoporosis, or a history of adrenal insufficiency, as corticosteroids can worsen these conditions.

Nursing Considerations:

- Educate patients that budesonide is a maintenance medication and not for acute symptom relief.
- Instruct patients to rinse their mouth after each use to prevent oral candidiasis.
- Monitor for signs of adrenal suppression, especially with prolonged use.
- Assess for potential interactions with other corticosteroids or immunosuppressants.
- Encourage adherence to therapy for optimal asthma or COPD control.
- Evaluate bone health in long-term users due to the risk of osteoporosis.

Respiratory System Medications
Corticosteroids

FLUTICASONE

Drug Class: Inhaled corticosteroid (ICS)

Mechanism of Action: Suppresses inflammation in the airways by inhibiting the release of inflammatory mediators, reducing swelling, mucus production, and hyperresponsiveness. This leads to improved airflow and decreased frequency of asthma and chronic obstructive pulmonary disease (COPD) exacerbations.

Indications: Used for the long-term management of asthma and chronic obstructive pulmonary disease (COPD) to prevent symptoms and reduce airway inflammation. It is not a rescue medication for acute bronchospasm.

DOSAGE

Adults:

- Asthma: 100-500 mcg inhaled twice daily (maximum 1,000 mcg/day).
- COPD (when combined with a long-acting bronchodilator): 100-250 mcg twice daily.

Pediatrics (>4 years):

Asthma: 50-100 mcg inhaled twice daily (maximum 200 mcg/day).

Side Effects: Throat irritation, hoarseness, cough, and dry mouth. Prolonged use may lead to oral candidiasis, adrenal suppression, and increased risk of osteoporosis. Rarely, systemic effects such as hyperglycemia and immunosuppression may occur.

Contraindications: Caution is advised in individuals with active infections, osteoporosis, glaucoma, or a history of adrenal insufficiency, as corticosteroids can worsen these conditions.

Nursing Considerations:

- Educate patients that fluticasone is not for acute symptom relief and should be used consistently.
- Instruct patients to rinse their mouth after each use to prevent oral candidiasis.
- Monitor for signs of adrenal suppression, especially in long-term therapy.
- Assess for potential drug interactions, particularly with strong CYP3A4 inhibitors like ritonavir.
- Encourage adherence to therapy for optimal control of asthma or COPD.
- Evaluate bone health periodically due to the risk of osteoporosis with prolonged use.

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Respiratory System Medications
Corticosteroids

PREDNISONE

Drug Class: Systemic corticosteroid

Mechanism of Action: Suppresses inflammation and immune response by inhibiting cytokine production, decreasing capillary permeability, and reducing leukocyte migration. It also affects glucose metabolism and suppresses adrenal function with prolonged use.

Indications: Used for a wide range of inflammatory and autoimmune conditions, including asthma and chronic obstructive pulmonary disease (COPD) exacerbations, rheumatoid arthritis, lupus, inflammatory bowel disease, and severe allergic reactions. It is also used as an immunosuppressant in organ transplantation.

DOSAGE

- **Adults:** 5-60 mg daily, depending on the condition being treated. Tapering is required for long-term use.
- **Pediatrics:** 0.5-2 mg/kg/day, depending on severity and response, with a maximum of 60 mg/day.

Side Effects: Short-term use may cause insomnia, increased appetite, weight gain, and mood changes. Long-term use can lead to osteoporosis, adrenal suppression, hyperglycemia, hypertension, immunosuppression, and gastric ulcers.
Contraindications: Contraindicated in patients with systemic fungal infections or hypersensitivity to corticosteroids. Caution is required in individuals with diabetes, osteoporosis, peptic ulcer disease, or psychiatric disorders due to the risk of worsening these conditions.

Nursing Considerations:

- Monitor blood glucose levels, especially in diabetic patients.
- Assess for signs of adrenal insufficiency if stopping the drug abruptly.
- Educate patients to take prednisone with food to reduce gastrointestinal irritation.
- Monitor for signs of infection due to immunosuppression.
- Evaluate bone density in long-term users to prevent osteoporosis.
- Teach patients about gradual tapering to avoid adrenal crisis.

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Respiratory System Medications
Corticosteroids

METHYLPREDNISOLONE

Drug Class: Systemic corticosteroid

Mechanism of Action: Suppresses inflammation and immune responses by inhibiting leukocyte migration, reducing capillary permeability, and decreasing the release of inflammatory mediators. It also influences glucose metabolism and suppresses adrenal function with prolonged use.

Indications: Used to treat acute and chronic inflammatory conditions such as asthma and chronic obstructive pulmonary disease (COPD) exacerbations, rheumatoid arthritis, lupus, allergic reactions, multiple sclerosis, and certain skin and gastrointestinal diseases. It is also used in transplant patients to prevent organ rejection.

DOSAGE

Adults:

- Oral: 4-48 mg/day, depending on the condition.
- Intravenous (IV): 40-250 mg every 6 hours for severe conditions.

Pediatrics:

- Oral: 0.5-2 mg/kg/day in divided doses.
- IV: 1-2 mg/kg/day in divided doses.

Side Effects: Short-term use may cause nausea, mood changes, insomnia, and increased appetite. Long-term use can lead to osteoporosis, hyperglycemia, adrenal suppression, hypertension, weight gain, gastrointestinal ulcers, and increased susceptibility to infections.

Contraindications: Contraindicated in patients with systemic fungal infections or hypersensitivity to corticosteroids. Caution is needed in individuals with diabetes, osteoporosis, glaucoma, hypertension, or peptic ulcer disease due to potential worsening of these conditions.

Nursing Considerations:

- Monitor blood glucose levels, particularly in diabetic patients.
- Assess for signs of adrenal insufficiency if the medication is discontinued abruptly.
- Advise patients to take oral doses with food to minimize gastrointestinal irritation.
- Monitor for signs of infection due to immunosuppression.
- Evaluate bone health in long-term users to prevent osteoporosis.
- Educate patients on the importance of gradual tapering to prevent adrenal crisis.

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Respiratory System Medications
Antihistamines

DIPHENHYDRAMINE

Drug Class: First-generation antihistamine (H1 receptor antagonist)

Mechanism of Action: Blocks histamine H1 receptors, preventing histamine-induced allergic reactions such as vasodilation, increased capillary permeability, and bronchoconstriction. It also has sedative, antiemetic, and anticholinergic properties

Indications: Used for the relief of allergic reactions, anaphylaxis (adjunct therapy), motion sickness, nausea, insomnia, and symptoms of the common cold. It is also used to treat extrapyramidal symptoms caused by antipsychotic medications.

DOSAGE

Adults:

- Allergies: 25-50 mg every 4-6 hours (maximum 300 mg/day).
- Insomnia: 50 mg at bedtime.
- Motion sickness: 25-50 mg taken 30 minutes before travel, then every 4-6 hours as needed.

Pediatrics:

- Allergies: 1-2 mg/kg/dose every 4-6 hours (maximum 300 mg/day).
- Insomnia: 1 mg/kg at bedtime (maximum 50 mg).

Side Effects: Common side effects include drowsiness, dizziness, dry mouth, blurred vision, and constipation. High doses or prolonged use may cause confusion, urinary retention, and paradoxical excitation, especially in children and older adults.

Contraindications: Caution is needed in individuals with glaucoma, urinary retention, asthma, or cardiovascular disease due to its anticholinergic effects.

Nursing Considerations:

- Warn patients about drowsiness and advise against driving or operating heavy machinery.
- Monitor for signs of excessive sedation, especially in older adults.
- Encourage hydration and fiber intake to prevent constipation.
- Educate patients to avoid alcohol and other central nervous system depressants.
- Monitor for paradoxical excitation, particularly in children.
- Use with caution in patients with respiratory conditions, as it may thicken bronchial secretions.

Respiratory System Medications
Antihistamines

CHLORPHENIRAMINE

Drug Class: First-generation antihistamine (H1 receptor antagonist)

Mechanism of Action: Blocks histamine H1 receptors, reducing allergic responses such as vasodilation, increased capillary permeability, and bronchoconstriction. It has mild sedative and anticholinergic effects but is generally less sedating than diphenhydramine.

Indications: Used for the relief of allergic reactions, hay fever, urticaria, rhinitis, and common cold symptoms. It can also be used for mild cases of anaphylaxis as an adjunct to epinephrine.

DOSAGE
Adults: 4 mg every 4-6 hours (maximum 24 mg/day).
Pediatrics (≥2 years): 0.35 mg/kg/day in divided doses every 4-6 hours (maximum 12 mg/day for children under 12).

Side Effects: Drowsiness, dizziness, dry mouth, blurred vision, and constipation. In some cases, it may cause nausea, headache, or difficulty urinating. Older adults may experience confusion and increased fall risk.

Contraindications: Caution is advised in individuals with glaucoma, urinary retention, asthma, hypertension, or cardiovascular disease due to its mild anticholinergic effects.

Nursing Considerations:

- Advise patients to avoid activities requiring alertness, such as driving, due to possible drowsiness.
- Monitor for excessive sedation, especially in older adults.
- Encourage hydration and fiber intake to prevent constipation.
- Educate patients to avoid alcohol and other central nervous system depressants.
- Use cautiously in patients with respiratory conditions, as it may thicken bronchial secretions.

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Respiratory System Medications
Antihistamines

LORATADINE

Drug Class: First-generation antihistamine (H1 receptor antagonist)

Mechanism of Action: Selectively blocks peripheral H1 histamine receptors, preventing histamine-induced allergic responses such as vasodilation, increased capillary permeability, and mucus secretion. Unlike first-generation antihistamines, it does not significantly cross the blood-brain barrier, reducing sedation.

Indications: Used to treat allergic rhinitis, hay fever, chronic urticaria, and other mild allergic reactions.

DOSAGE
Adults: 10 mg once daily.
Pediatrics (≥2 years): 5 mg once daily (for children 2-5 years) or 10 mg once daily (for children ≥6 years).

Side Effects: Generally well tolerated, with occasional headache, dry mouth, and mild drowsiness. Rarely, it may cause fatigue, gastrointestinal discomfort, or tachycardia.

Contraindications: Contraindicated in patients with hypersensitivity to loratadine. Caution is advised in individuals with severe hepatic impairment or kidney disease, as dose adjustments may be necessary.

Nursing Considerations:

- Educate patients that loratadine is a non-drowsy antihistamine, but some individuals may still experience mild sedation.
- Monitor liver and kidney function in patients with organ impairment.
- Advise patients to avoid alcohol, as it may enhance drowsiness in sensitive individuals.
- Assess for effectiveness in controlling allergy symptoms, and consider switching medications if inadequate relief is observed.
- Encourage adherence to daily dosing for optimal symptom control.

Respiratory System Medications
Antihistamines

CETIRIZINE

Drug Class: First-generation antihistamine (H1 receptor antagonist)

Mechanism of Action: Selectively blocks peripheral H1 histamine receptors, reducing allergic responses such as nasal congestion, itching, and swelling. It has minimal penetration into the central nervous system, resulting in lower sedation compared to first-generation antihistamines.

Indications: Used for the treatment of allergic rhinitis, chronic idiopathic urticaria, and other mild allergic reactions.

DOSAGE

Adults: 10 mg once daily (maximum 10 mg/day).

Pediatrics:

6 months to 2 years: 2.5 mg once daily (maximum 5 mg/day).

- 2-5 years: 2.5 mg once or twice daily (maximum 5 mg/day).
- ≥6 years: 5-10 mg once daily (maximum 10 mg/day).

Side Effects: Generally well tolerated, with occasional drowsiness, dry mouth, dizziness, and gastrointestinal discomfort. Rarely, it may cause fatigue, headache, or tachycardia.

Contraindications: Caution is advised in individuals with severe renal impairment, as dose adjustments may be necessary.

Nursing Considerations:

- Inform patients that cetirizine has a low risk of sedation, but sensitivity varies among individuals.
- Monitor renal function in patients with kidney disease and adjust doses accordingly.
- Educate patients to avoid alcohol and other central nervous system depressants.
- Assess for symptom relief and consider alternative treatments if necessary.
- Encourage consistent daily use for optimal allergy control.

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Endocrine System Medications
Antidiabetics

INSULIN

INSULIN (RAPID-ACTING: LISPRO, ASPART)

Drug Class: Rapid-acting insulin

Mechanism of Action: Lowers blood glucose by promoting glucose uptake into muscle and fat cells while inhibiting hepatic glucose production. It has a rapid onset and short duration, making it ideal for postprandial glucose control.

Indications: Used for glycemic control in patients with diabetes mellitus type 1 and type 2. It is commonly administered before meals to prevent postprandial hyperglycemia

DOSAGE

Adults & Pediatrics: Individualized based on blood glucose levels, dietary intake, and insulin sensitivity. Typically, 0.1–0.4 units/kg per meal, administered subcutaneously 15 minutes before meals.

Side Effects: Hypoglycemia (sweating, dizziness, confusion, tachycardia), injection site reactions, lipodystrophy, and in rare cases, hypokalemia.

Contraindications: Contraindicated in patients with hypoglycemia or hypersensitivity to insulin. Caution is required in individuals with renal or hepatic impairment, as insulin metabolism may be altered.

Nursing Considerations:

- Monitor blood glucose levels closely before and after administration.
- Ensure food intake occurs within 15 minutes of injection to prevent hypoglycemia.
- Rotate injection sites to prevent lipodystrophy.
- Educate patients on recognizing signs of hypoglycemia and appropriate management.
- Assess for potential interactions with other glucose-lowering medications.
- Store unopened insulin in the refrigerator; once opened, it can be kept at room temperature for up to 28 days.

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Endocrine System Medications
Antidiabetics

INSULIN
INTERMEDIATE-ACTING (NPH)

Drug Class: Intermediate-acting insulin

Mechanism of Action: Lowers blood glucose by promoting glucose uptake into muscle and fat cells while inhibiting hepatic glucose production. NPH insulin has a delayed onset and prolonged duration due to the addition of protamine, which slows absorption.

Indications: Used for basal glycemic control in patients with diabetes mellitus type 1 and type 2. It is typically administered twice daily and can be combined with rapid-acting or short-acting insulin for mealtime glucose control.

DOSAGE

Adults & Pediatrics: Individualized based on blood glucose levels, dietary intake, and insulin sensitivity. Typically 0.1-0.5 units/kg/day, administered subcutaneously once or twice daily.

Side Effects: Hypoglycemia (sweating, dizziness, confusion, tachycardia), weight gain, injection site reactions, and lipodystrophy.

Contraindications: Contraindicated in patients with hypoglycemia or hypersensitivity to insulin. Caution is required in individuals with renal or hepatic impairment, as insulin metabolism may be altered.

Nursing Considerations:

- Monitor blood glucose levels regularly to prevent hypo- or hyperglycemia.
- Administer 30-60 minutes before meals, as NPH has a delayed onset.
- Roll the vial gently before use to mix the suspension; do not shake.
- Rotate injection sites to prevent lipodystrophy.
- Educate patients on recognizing and managing hypoglycemia.
- Store unopened insulin in the refrigerator; once opened, it can be kept at room temperature for up to 28 days.

Endocrine System Medications
Antidiabetics

INSULIN
LONG-ACTING (GLARGINE, DETEMIR)

Drug Class: Long-acting insulin

Mechanism of Action: Provides a steady, prolonged release of insulin to maintain basal glucose levels by promoting glucose uptake in muscle and fat cells while inhibiting hepatic glucose production. Unlike intermediate-acting insulin, it has no peak, reducing the risk of hypoglycemia.

Indications: Used for basal glycemic control in patients with diabetes mellitus type 1 and type 2. It is typically administered once daily, though some patients may require twice-daily dosing.

DOSAGE

Adults & Pediatrics: Individualized based on blood glucose levels and insulin sensitivity. Typically 0.1-0.5 units/kg/day, administered subcutaneously once daily at the same time each day.

Side Effects: Hypoglycemia (less common due to lack of peak), weight gain, injection site reactions, and lipodystrophy.

Contraindications: Contraindicated in patients with hypoglycemia or hypersensitivity to insulin. Caution is required in individuals with renal or hepatic impairment due to altered insulin metabolism.

Nursing Considerations:

- Monitor blood glucose levels regularly to ensure adequate glycemic control.
- Do not mix with other insulins in the same syringe.
- Administer at the same time each day to maintain steady blood levels.
- Rotate injection sites to prevent lipodystrophy.
- Educate patients that long-acting insulin does not cover mealtime spikes and should be used in combination with rapid-acting insulin if needed.
- Store unopened insulin in the refrigerator; once opened, it can be kept at room temperature for up to 28 days.

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Endocrine System Medications
Antidiabetics

METFORMIN

Drug Class: Biguanide (Oral antidiabetic agent)

Mechanism of Action: Reduces hepatic glucose production, decreases intestinal glucose absorption, and enhances insulin sensitivity in peripheral tissues, leading to improved glucose uptake and utilization. Unlike insulin or sulfonylureas, it does not stimulate insulin secretion, minimizing the risk of hypoglycemia.

Indications: Used as a first-line treatment for type 2 diabetes mellitus to improve glycemic control. It is also used in polycystic ovary syndrome (PCOS) to improve insulin resistance.

DOSAGE

- **Adults:** Initially 500 mg once or twice daily with meals, titrated up to 2000-2500 mg/day in divided doses.
- **Pediatrics (≥10 years):** 500 mg once daily, increased as needed to a maximum of 2000 mg/day.

Side Effects: Gastrointestinal discomfort (nausea, diarrhea, abdominal pain), metallic taste, and vitamin B12 deficiency with long-term use. Rarely, it may cause lactic acidosis, especially in patients with renal impairment.

Contraindications: Contraindicated in patients with severe renal impairment (eGFR <30 mL/min/1.73m²), metabolic acidosis, or severe hepatic disease. It should be discontinued before contrast imaging procedures to prevent lactic acidosis.

Nursing Considerations:

- Monitor renal function regularly to prevent accumulation and lactic acidosis.
- Administer with meals to reduce gastrointestinal side effects.
- Educate patients on recognizing symptoms of lactic acidosis (weakness, rapid breathing, abdominal pain).
- Assess vitamin B12 levels periodically in long-term use.
- Avoid alcohol consumption, as it increases the risk of lactic acidosis.
- Temporarily discontinue before any contrast dye procedures and restart only after confirming renal function is normal.

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Endocrine System Medications
Thyroid and Antithyroid Medications

LEVOTHYROXINE

Drug Class: Thyroid hormone replacement

Mechanism of Action: A synthetic form of thyroxine (T4) that is converted into triiodothyronine (T3) in peripheral tissues. It regulates metabolism, energy production, and growth by binding to thyroid hormone receptors and influencing gene expression.

Indications: Used for the treatment of hypothyroidism, including primary, secondary, and congenital hypothyroidism. It is also used to suppress thyroid-stimulating hormone (TSH) in goiter and thyroid cancer management.

DOSAGE

- **Adults:** Typically 25-200 mcg/day, based on TSH levels. Initial dose is 25-50 mcg/day, titrated every 4-6 weeks.
- **Pediatrics:** Based on age and weight, ranging from 10-15 mcg/kg/day in neonates to lower doses in older children.

Side Effects: Overdosage can cause hyperthyroid symptoms such as palpitations, insomnia, weight loss, heat intolerance, and osteoporosis with long-term excessive use. Rarely, it may cause angina or arrhythmias in cardiac patients.
Contraindications: Contraindicated in patients with untreated adrenal insufficiency, acute myocardial infarction, or hypersensitivity to the drug. Caution is needed in patients with cardiovascular disease due to increased metabolic demand.

Nursing Considerations:

- Administer in the morning on an empty stomach, at least 30-60 minutes before breakfast, to enhance absorption.
- Monitor TSH levels every 4-6 weeks during dose adjustments.
- Educate patients that therapy is lifelong and should not be discontinued without medical supervision.
- Avoid co-administration with calcium, iron, or antacids, as they interfere with absorption.
- Assess for signs of overdosage (tachycardia, tremors) and underdosage (fatigue, weight gain).
- Use caution in elderly patients and those with cardiac disease, starting with lower doses to prevent cardiovascular complications.

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Endocrine System Medications
Thyroid and Antithyroid Medications

METHIMAZOLE

Drug Class: Antithyroid agent (Thionamide)

Mechanism of Action: Inhibits thyroid peroxidase, blocking the synthesis of thyroid hormones (T3 and T4) by preventing the oxidation of iodide and the coupling of iodotyrosines. It does not affect preformed thyroid hormones but reduces new hormone production over time.

Indications: Used for the treatment of hyperthyroidism, including Graves' disease and toxic multinodular goiter. It is also used as preoperative therapy before thyroidectomy or radioactive iodine treatment.

DOSAGE

- **Adults:** Initial dose 15-60 mg/day, divided into 1-3 doses, followed by a maintenance dose of 5-15 mg/day.
- **Pediatrics:** 0.4-0.7 mg/kg/day, divided into 2-3 doses.

Side Effects: Common effects include rash, nausea, and mild gastrointestinal discomfort. Serious but rare effects include agranulocytosis, hepatotoxicity, and vasculitis.

Contraindications: Contraindicated in pregnancy (especially first trimester) due to teratogenic effects, in patients with hypersensitivity to thionamides, and in severe hepatic impairment.

Nursing Considerations:

- Monitor thyroid function tests (TSH, T3, T4) regularly to assess effectiveness.
- Assess for symptoms of agranulocytosis (fever, sore throat, infections) and hepatotoxicity (jaundice, dark urine).
- Educate patients to report signs of infection immediately due to the risk of neutropenia.
- Advise against abrupt discontinuation, as it can cause thyroid storm.
- Avoid in pregnant patients during the first trimester, switching to propylthiouracil (PTU) if necessary.
- Monitor liver enzymes in long-term therapy.

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Endocrine System Medications
Thyroid and Antithyroid Medications

HYDROCORTISONE

Drug Class: Corticosteroid (Glucocorticoid)

Mechanism of Action: Mimics cortisol, binding to glucocorticoid receptors to regulate inflammation, immune response, and metabolism. It inhibits prostaglandin and leukotriene synthesis, reducing inflammation and suppressing immune activity.

Indications: Used to treat adrenal insufficiency (Addison's disease), severe allergic reactions, inflammatory conditions (such as rheumatoid arthritis and dermatitis), and as immunosuppressive therapy in autoimmune diseases. It is also used in septic shock and as topical therapy for skin conditions.

DOSAGE

- **Oral (Adrenal Insufficiency):** 15-30 mg/day in divided doses.
- **IV (Shock/Severe Inflammation):** 50-100 mg IV every 6-8 hours as needed.
- **Topical:** Applied 1-4 times daily, depending on severity

Side Effects: Includes hyperglycemia, fluid retention, hypertension, osteoporosis, muscle weakness, delayed wound healing, and increased risk of infections. Long-term use can cause Cushing's syndrome (moon face, buffalo hump, weight gain).

Contraindications: Contraindicated in systemic fungal infections and hypersensitivity to corticosteroids. Caution is needed in diabetes, hypertension, osteoporosis, and immunosuppressed

Nursing Considerations:

- Monitor blood glucose, blood pressure, and signs of adrenal suppression.
- Administer oral doses in the morning to mimic natural cortisol secretion.
- Taper doses gradually if discontinuing to prevent adrenal crisis.
- Educate patients on long-term effects, including osteoporosis and weight gain.
- Avoid live vaccines during treatment due to immunosuppression.
- For topical use, apply thinly to avoid skin atrophy

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Endocrine System Medications
Thyroid and Antithyroid Medications

DEXAMETHASONE

Drug Class: Corticosteroid (Glucocorticoid)

Mechanism of Action: Binds to glucocorticoid receptors, exerting anti-inflammatory and immunosuppressive effects by inhibiting cytokine production and reducing leukocyte infiltration. It also suppresses adrenal function at high doses and decreases capillary permeability

Indications: Used for inflammatory and autoimmune disorders, cerebral edema, severe allergic reactions, adrenal insufficiency, chemotherapy-induced nausea, and as a diagnostic agent for Cushing's syndrome. It is also used in COVID-19 management for severe cases requiring oxygen support.

DOSAGE

- **Oral/IV (Inflammation):** 0.5-10 mg/day in divided doses.
- **Cerebral Edema:** 10 mg IV, then 4 mg IV every 6 hours.
- **Dexamethasone Suppression Test:** 1 mg orally at 11 PM, with morning cortisol measurement.

Side Effects: Hyperglycemia, fluid retention, hypertension, mood changes, muscle weakness, osteoporosis, delayed wound healing, and increased risk of infections. Prolonged use may cause adrenal suppression and Cushing's syndrome.

Contraindications: Contraindicated in systemic fungal infections and hypersensitivity to corticosteroids. Caution is required in patients with diabetes, hypertension, osteoporosis, and immunosuppression.

Nursing Considerations:

- Monitor blood glucose, electrolytes, and blood pressure regularly.
- Taper doses gradually to prevent adrenal insufficiency.
- Educate patients on potential mood changes and weight gain.
- Avoid live vaccines due to immunosuppressive effects.
- Administer with food or milk to reduce gastrointestinal irritation.
- Use caution in long-term therapy to minimize osteoporosis and muscle wasting.

Gastrointestinal System Medications
Acid Reducers and Gastroprotective Agents

OMEPRAZOLE

Drug Class: Proton pump inhibitor (PPI)

Mechanism of Action: Irreversibly inhibits the hydrogen-potassium ATPase (proton pump) in the gastric parietal cells, reducing gastric acid secretion and increasing gastric pH. This promotes mucosal healing and decreases acid-related damage.

Indications: Used for gastroesophageal reflux disease (GERD), peptic ulcers, Zollinger-Ellison syndrome, and Helicobacter pylori eradication therapy. It is also prescribed for the prevention of stress ulcers in critically ill patients.

DOSAGE

- **GERD/Ulcers:** 20-40 mg orally once daily for 4-8 weeks.
- **H. pylori Eradication:** 20 mg twice daily in combination with antibiotics for 10-14 days.
- **Zollinger-Ellison Syndrome:** 60 mg/day, adjusted as needed.

Side Effects: Headache, nausea, diarrhea, abdominal pain, and long-term risks such as osteoporosis, vitamin B12 deficiency, and increased risk of Clostridioides difficile infection.

Contraindications: Contraindicated in hypersensitivity to PPIs. Long-term use should be avoided in patients at risk for bone fractures or magnesium deficiency.

Nursing Considerations:

- Administer before meals, preferably in the morning, for optimal absorption.
- Monitor for signs of gastrointestinal infections due to reduced stomach acid.
- Assess bone density in long-term use due to the risk of osteoporosis.
- Educate patients to avoid abrupt discontinuation to prevent rebound acid hypersecretion.
- Monitor for hypomagnesemia (tremors, muscle cramps, arrhythmias) in prolonged therapy.
- Advise patients to avoid NSAIDs and alcohol, which can worsen gastric irritation.

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Gastrointestinal System Medications
Acid Reducers and Gastroprotective Agents

PANTOPRAZOLE

Drug Class: Proton pump inhibitor (PPI)

Mechanism of Action: Irreversibly inhibits the hydrogen-potassium ATPase enzyme in gastric parietal cells, leading to a significant reduction in gastric acid secretion and increased gastric pH. This effect helps heal and prevent acid-related damage to the gastrointestinal lining.

Indications: Used for gastroesophageal reflux disease (GERD), erosive esophagitis, Zollinger-Ellison syndrome, and gastric or duodenal ulcers. It is also used for the prevention of stress ulcers in hospitalized patients.

DOSAGE

- **GERD/Erosive Esophagitis:** 40 mg orally or IV once daily for 8 weeks.
- **Zollinger-Ellison Syndrome:** 40-240 mg daily, divided as needed.
- **Stress Ulcer Prophylaxis:** 40 mg IV or orally once daily in critically ill patients.

Side Effects: Generally well tolerated but may cause headache, diarrhea, nausea, abdominal pain, and long-term risks such as osteoporosis, vitamin B12 deficiency, and increased risk of Clostridioides difficile infection.

Contraindications: Contraindicated in hypersensitivity to PPIs. Long-term use should be avoided in patients at risk for bone fractures or magnesium deficiency.

Nursing Considerations:

- Administer before meals, preferably in the morning, for maximum effectiveness.
- Monitor for gastrointestinal infections due to reduced stomach acid.
- Assess bone health in long-term therapy due to increased fracture risk.
- Educate patients to avoid sudden discontinuation to prevent rebound acid hypersecretion.
- Monitor magnesium levels in prolonged use, watching for symptoms like muscle cramps or arrhythmias.
- Advise patients to limit NSAIDs and alcohol, which can worsen gastric irritation.

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Gastrointestinal System Medications
Acid Reducers and Gastroprotective Agents

ESOMEPRAZOLE

Drug Class: Proton pump inhibitor (PPI)

Mechanism of Action: Irreversibly inhibits the hydrogen-potassium ATPase enzyme in gastric parietal cells, reducing gastric acid secretion and increasing gastric pH. This helps protect the gastrointestinal mucosa and promotes healing of acid-related conditions.

Indications: Used for gastroesophageal reflux disease (GERD), erosive esophagitis, Zollinger-Ellison syndrome, Helicobacter pylori eradication, and prevention of gastric ulcers associated with nonsteroidal anti-inflammatory drug (NSAID) use. It is also used for stress ulcer prophylaxis in critically ill patients.

DOSAGE

- **GERD/Erosive Esophagitis:** 20-40 mg orally once daily for 4-8 weeks.
- **H. pylori Eradication:** 40 mg once daily in combination with antibiotics for 10-14 days.
- **Zollinger-Ellison Syndrome:** 40 mg twice daily, adjusted as needed.
- **Stress Ulcer Prophylaxis:** 40 mg IV once daily in critically ill patients.

Side Effects: Headache, nausea, diarrhea, and abdominal pain. Long-term use may lead to osteoporosis, vitamin B12 deficiency, hypomagnesemia, and increased risk of Clostridioides difficile infection.

Contraindications: Contraindicated in patients with hypersensitivity to PPIs. Long-term use should be avoided in individuals at risk for bone fractures or magnesium deficiency.

Nursing Considerations:

- Administer before meals, preferably in the morning, for maximum absorption.
- Monitor for gastrointestinal infections due to reduced acid levels.
- Assess bone health with prolonged therapy to reduce fracture risk.
- Educate patients on the importance of gradual discontinuation to prevent rebound acid hypersecretion.
- Monitor serum magnesium levels in long-term use.
- Advise avoiding NSAIDs and alcohol, which can worsen gastric irritation.

Gastrointestinal System Medications
Acid Reducers and Gastroprotective Agents

RANITIDINE

Drug Class: Histamine-2 receptor antagonist (H2 blocker)

Mechanism of Action: Blocks histamine-2 receptors in the gastric parietal cells, reducing gastric acid secretion and lowering stomach acidity. This helps in healing ulcers and preventing acid-related damage to the gastrointestinal lining.

Indications: Previously used for gastroesophageal reflux disease (GERD), peptic ulcers, Zollinger-Ellison syndrome, and prevention of stress ulcers in critically ill patients.

DOSAGE

- **GERD/Ulcers:** 150 mg orally twice daily or 300 mg once daily at bedtime.
- **IV (Severe Cases):** 50 mg IV every 6-8 hours.

Side Effects: Generally well tolerated but may cause headache, dizziness, constipation, or diarrhea. Long-term use was associated with an increased risk of vitamin B12 deficiency.

Contraindications: Previously contraindicated in patients with hypersensitivity to H2 blockers. Use with caution in renal impairment.

Nursing Considerations:

- Ranitidine was withdrawn from the market due to concerns about contamination with N-nitrosodimethylamine (NDMA), a potential carcinogen.
- Patients should be advised to switch to alternative acid-reducing medications such as proton pump inhibitors (omeprazole, pantoprazole) or other H2 blockers (famotidine).
- If a patient is still using ranitidine, assess for alternative treatments and educate on safer options.

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Gastrointestinal System Medications
Acid Reducers and Gastroprotective Agents

SUCRALFATE

Drug Class: Gastrointestinal protectant

Mechanism of Action: Forms a gel-like substance that adheres to the ulcerated tissue in the stomach or duodenum, creating a protective barrier over the ulcer and preventing further damage from gastric acid and digestive enzymes. It also stimulates local prostaglandin release, promoting mucosal healing.

Indications: Used primarily for the treatment of peptic ulcers, particularly in the stomach and duodenum. It is also used for the prevention of stress ulcers in critically ill patients and for the management of oral mucositis.

DOSAGE

- **Peptic Ulcer:** 1 gram orally four times daily, before meals and at bedtime.
- **Stress Ulcer Prophylaxis:** 1 gram orally twice daily or as prescribed.

Side Effects: Constipation is the most common side effect. Less common effects include dry mouth, nausea, indigestion, and dizziness.

Contraindications: Contraindicated in patients with hypersensitivity to sucralfate. Caution is required in renal impairment due to the aluminum content.

Nursing Considerations:

- Administer on an empty stomach, 1 hour before meals for optimal effect.
- Ensure the patient does not take antacids or H2 blockers within 30 minutes of sucralfate, as they may interfere with its action.
- Monitor for constipation and encourage the patient to increase fluid intake and fiber if needed.
- Instruct patients not to crush or chew the tablets; they should be swallowed whole.
- Use caution in patients with renal impairment, as sucralfate contains aluminum, which can accumulate in the kidneys.
- Advise patients to avoid smoking and excessive alcohol consumption, which can worsen ulcer formation.

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Gastrointestinal System Medications
Laxatives

LACTULOSE

Drug Class: Osmotic laxative

Mechanism of Action: Draws water into the colon by osmosis, softening stool and promoting bowel movements. It also reduces ammonia levels in patients with hepatic encephalopathy by converting ammonia into ammonium, which is excreted in the stool.

Indications: Used for the treatment of chronic constipation and hepatic encephalopathy to lower blood ammonia levels in patients with liver disease.

DOSAGE

- **Constipation:** 15-30 mL orally once daily, adjusted as needed.
- **Hepatic Encephalopathy:** 30-45 mL orally three to four times daily, titrated to produce 2-3 soft stools per day.

Side Effects: Common side effects include diarrhea, bloating, flatulence, nausea, and electrolyte imbalances with prolonged use.

Contraindications: Contraindicated in patients with galactose intolerance or bowel obstruction. Caution is required in diabetic patients due to sugar content.

Nursing Considerations:

- Administer with water or juice to improve taste and adherence.
- Monitor stool frequency and consistency to adjust dosage.
- In hepatic encephalopathy, assess mental status and ammonia levels regularly.
- Encourage hydration to prevent dehydration from excessive diarrhea.
- Use cautiously in diabetic patients, as lactulose contains sugars that can affect blood glucose levels.
- Educate patients that bloating and gas may occur but usually decrease over time.

Gastrointestinal System Medications
Laxatives

BISACODYL

Drug Class: Osmotic laxative

Mechanism of Action: Stimulates peristalsis by directly irritating the intestinal mucosa and nerve endings in the colon, leading to increased bowel motility and fluid accumulation in the intestines, which facilitates stool passage.

Indications: Used for the relief of occasional constipation, bowel preparation before medical procedures (such as colonoscopy), and management of constipation in patients with reduced bowel motility.

DOSAGE

- **Constipation:** 5-15 mg orally once daily or 10 mg rectally once daily.
- **Bowel Preparation:** 10-15 mg orally the night before the procedure, sometimes followed by a rectal dose in the morning.

Side Effects: Common effects include abdominal cramping, diarrhea, nausea, and dehydration. Prolonged use may cause dependence and electrolyte imbalances.

Contraindications: Contraindicated in patients with bowel obstruction, appendicitis, undiagnosed abdominal pain, or severe dehydration.

Nursing Considerations:

- Administer orally at bedtime for a bowel movement in the morning or rectally for faster action (within 15-60 minutes).
- Instruct patients not to crush or chew enteric-coated tablets, as this can cause gastric irritation.
- Encourage short-term use only, as prolonged use can lead to laxative dependence.
- Monitor for electrolyte imbalances, especially in elderly or dehydrated patients.
- Educate patients to increase dietary fiber, hydration, and physical activity for long-term bowel regulation.

Gastrointestinal System Medications Antiemetics

METOCLOPRAMIDE

Drug Class: Prokinetic agent and dopamine antagonist

Mechanism of Action: Enhances gastrointestinal motility by blocking dopamine receptors in the chemoreceptor trigger zone, reducing nausea and vomiting. It also increases lower esophageal sphincter tone and accelerates gastric emptying by stimulating acetylcholine release in the gastrointestinal tract.

Indications: Used for the treatment of gastroparesis, gastroesophageal reflux disease (GERD), nausea and vomiting (including chemotherapy-induced and postoperative nausea), and as an adjunct in radiologic examinations of the gastrointestinal tract.

DOSAGE

- **Gastroparesis:** 10 mg orally or IV before meals and at bedtime, up to four times daily.
- **Nausea and Vomiting:** 10 mg IV or IM every 6-8 hours as needed.
- **GERD:** 10-15 mg orally up to four times daily, 30 minutes before meals.

Side Effects: Common effects include drowsiness, fatigue, diarrhea, and restlessness. Serious adverse effects include extrapyramidal symptoms such as tardive dyskinesia, particularly with long-term use.

Contraindications: Contraindicated in patients with gastrointestinal obstruction, perforation, or pheochromocytoma. Should be used with caution in patients with Parkinson's disease or a history of seizures.

Nursing Considerations:

- Administer 30 minutes before meals for optimal effectiveness.
- Monitor for extrapyramidal symptoms such as involuntary movements, tremors, or muscle rigidity.
- Limit use to less than 12 weeks to reduce the risk of tardive dyskinesia.
- Educate patients to avoid alcohol and central nervous system depressants, which can increase drowsiness.
- Monitor for signs of depression or suicidal thoughts, as the drug can affect mood.
- Use cautiously in elderly patients, as they are more prone to adverse neurological effects.

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Gastrointestinal System Medications
Antiemetics

ONDANSETRON

Drug Class: Serotonin (5-HT3) receptor antagonist

Mechanism of Action: Blocks serotonin receptors in the chemoreceptor trigger zone and the vagus nerve, preventing nausea and vomiting by inhibiting signals to the brain that induce the emetic response.

Indications: Used for the prevention and treatment of nausea and vomiting associated with chemotherapy, radiation therapy, postoperative recovery, and gastroenteritis.

DOSAGE

Adults:

- Chemotherapy-Induced Nausea and Vomiting: 8 mg orally every 8 hours, or 0.15 mg/kg IV every 4 hours as needed.
- Postoperative Nausea and Vomiting: 4 mg IV or orally every 6-8 hours as needed.

Pediatric:

- Chemotherapy-Induced Nausea and Vomiting (≥6 months old): 0.15 mg/kg IV every 4 hours (maximum 16 mg per dose) or 4 mg orally every 8 hours for children 4-11 years old.

Side Effects: Common effects include headache, dizziness, fatigue, and constipation. In rare cases, it may cause QT prolongation and serotonin syndrome when used with other serotonergic drugs.

Contraindications: Contraindicated in patients with hypersensitivity to ondansetron. Caution is required in patients with prolonged QT interval, electrolyte imbalances, or those taking medications that affect cardiac conduction.

Nursing Considerations:

- Administer 30 minutes before chemotherapy or surgery for optimal prevention.
- Monitor for QT prolongation in high-risk patients, especially those with cardiac conditions.
- Assess for serotonin syndrome if used with other serotonergic drugs (e.g., antidepressants).
- Educate patients on potential constipation and encourage hydration and fiber intake.
- Use cautiously in pregnant women, as safety data in early pregnancy are limited.

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Antimicrobials
Antibiotics

AMOXICILLIN

Drug Class: Penicillin-type beta-lactam antibiotic

Mechanism of Action: Inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. It is bactericidal against susceptible gram-positive and gram-negative bacteria.

Indications: Used to treat respiratory tract infections, urinary tract infections, otitis media, sinusitis, streptococcal pharyngitis, skin infections, and as part of combination therapy for Helicobacter pylori eradication.

DOSAGE

Adults:

- Mild to Moderate Infections: 500 mg orally every 8-12 hours
- Severe Infections: 875 mg orally every 12 hours or 500 mg every 8 hours

Pediatric

- Mild to Moderate Infections: 20-40 mg/kg/day divided every 8-12 hours
- Severe Infections: 80-90 mg/kg/day divided every 8-12 hours
- Otitis Media: 80-90 mg/kg/day divided every 12 hours (maximum 500 mg per dose)

Side Effects: Common effects include nausea, diarrhea, rash, and headache. Rare but serious effects include anaphylaxis, Stevens-Johnson syndrome, and Clostridioides difficile-associated diarrhea.

Contraindications: Contraindicated in patients with hypersensitivity to penicillins or cephalosporins. Caution is required in patients with renal impairment, as dose adjustment may be necessary.

Nursing Considerations:

- Administer with or without food, but taking with food may reduce gastrointestinal discomfort.
- Monitor for allergic reactions, especially in patients with a history of penicillin allergy.
- Educate patients to complete the full course of therapy, even if symptoms improve.
- Monitor for signs of superinfection (e.g., oral or vaginal candidiasis, diarrhea).
- For pediatric patients, use the correct weight-based dosing and administer the suspension with an accurate measuring device.
- Store liquid formulations in the refrigerator and shake well before use.

Antimicrobials
Antibiotics

AMPICILLIN

Drug Class: Penicillin-type beta-lactam antibiotic

Mechanism of Action: Inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. It is bactericidal and effective against a broad range of gram-positive and gram-negative bacteria.

Indications: Used to treat respiratory tract infections, urinary tract infections, otitis media, sinusitis, streptococcal pharyngitis, skin infections, and as part of combination therapy for Helicobacter pylori eradication.

DOSAGE

Adults:

- Mild to Moderate Infections: 250-500 mg orally every 6 hours
- Severe Infections: 1-2 g IV/IM every 4-6 hours
- Bacterial Meningitis or Endocarditis: 2 g IV every 4 hours

Pediatric

- Infants and Children: 100-200 mg/kg/day IV divided every 4-6 hours

Side Effects: Common effects include nausea, diarrhea, rash, and injection site reactions. Rare but serious effects include anaphylaxis, Stevens-Johnson syndrome, Clostridioides difficile-associated diarrhea, and neutropenia

Contraindications: Contraindicated in patients with hypersensitivity to penicillins or cephalosporins. Use with caution in patients with renal impairment, as dose adjustment may be required.

Nursing Considerations:

- Administer on an empty stomach (1 hour before or 2 hours after meals) for better absorption.
- Monitor for allergic reactions, especially in patients with a history of penicillin allergy.
- Educate patients to complete the full course of therapy to prevent bacterial resistance.
- Assess for signs of superinfection (e.g., oral or vaginal candidiasis, persistent diarrhea).
- In intravenous administration, monitor for phlebitis or irritation at the infusion site.
- Adjust doses in renal impairment to prevent toxicity.

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Antimicrobials
Antibiotics

PIPERACILLIN-TAZOBACTAM

Drug Class: Penicillin-type beta-lactam antibiotic with beta-lactamase inhibitor

Mechanism of Action: Piperacillin inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. Tazobactam is a beta-lactamase inhibitor that protects piperacillin from enzymatic degradation by beta-lactamase-producing bacteria, expanding its spectrum of activity against resistant organisms.

Indications: Used to treat moderate to severe infections, including pneumonia (hospital-acquired and ventilator-associated), intra-abdominal infections, complicated urinary tract infections, skin and soft tissue infections, and febrile neutropenia.

DOSAGE

- **Adults:** 3.375 g IV every 6 hours or 4.5 g IV every 6-8 hours (higher dose for severe infections)

Pediatric:

- Infants (>2 months) and Children: 80-100 mg/kg piperacillin component IV every 6-8 hours (maximum 4.5 g per dose)
- Neonates: Use is limited; dose adjusted based on weight and renal function

Side Effects: Common effects include diarrhea, nausea, headache, and injection site reactions. Serious but rare effects include Clostridioides difficile-associated diarrhea, hypersensitivity reactions, thrombocytopenia, and nephrotoxicity.

Contraindications: Contraindicated in patients with hypersensitivity to penicillins, cephalosporins, or beta-lactamase inhibitors. Use with caution in patients with renal impairment, as dose adjustment is required.

Nursing Considerations:

- Administer IV infusion over 30 minutes; do not administer as a rapid bolus.
- Monitor renal function closely, especially in elderly patients or those with preexisting renal disease.
- Assess for allergic reactions, particularly in patients with a history of penicillin allergy.
- Watch for signs of superinfection, including oral thrush or Clostridioides difficile-associated diarrhea.
- Monitor electrolytes, as the formulation contains sodium, which may affect patients with heart failure or hypertension.
- Educate patients to report any rash, difficulty breathing, or severe diarrhea immediately.

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Antimicrobials
Antibiotics

CEPHALEXIN

Drug Class: First-generation cephalosporin antibiotic

Mechanism of Action: Inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. It is bactericidal and primarily effective against gram-positive bacteria, with limited gram-negative coverage.

Indications: Used to treat skin and soft tissue infections, streptococcal pharyngitis, uncomplicated urinary tract infections, otitis media, and respiratory tract infections.

DOSAGE

- **Adults:** 250-500 mg orally every 6 hours (maximum 4 g/day)
- **Pediatric:** 25-50 mg/kg/day orally divided every 6-12 hours (maximum 4 g/day)

Side Effects: Common effects include nausea, diarrhea, abdominal pain, and rash. Rare but serious effects include hypersensitivity reactions, Clostridioides difficile-associated diarrhea, and Stevens-Johnson syndrome.

Contraindications: Contraindicated in patients with hypersensitivity to cephalosporins or severe penicillin allergy. Use with caution in patients with renal impairment, as dose adjustment is necessary.

Nursing Considerations:

- Administer with or without food, but taking with food may reduce gastrointestinal discomfort.
- Monitor for allergic reactions, especially in patients with a history of penicillin allergy.
- Educate patients to complete the full course of therapy even if symptoms improve.
- Assess for superinfection, such as oral or vaginal candidiasis.
- Monitor renal function, particularly in elderly patients or those with renal disease.
- If using liquid suspension, instruct caregivers to shake well before use and store in the refrigerator.

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Antimicrobials
Antibiotics

CEPHALEXIN

Drug Class: Third-generation cephalosporin antibiotic

Mechanism of Action: Inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. It has broad-spectrum activity against gram-positive and gram-negative bacteria and is highly resistant to beta-lactamase enzymes.

Indications: Used to treat bacterial meningitis, pneumonia, urinary tract infections, gonorrhea, sepsis, intra-abdominal infections, and skin and soft tissue infections. It is also used for surgical prophylaxis.

DOSAGE

- **Adults:** 1-2 g IV/IM every 12-24 hours (maximum 4 g/day)

Pediatric

- **Neonates:** 20-50 mg/kg/day IV/IM once daily (do not exceed 50 mg/kg/day)
- **Infants and Children:** 50-100 mg/kg/day IV/IM divided every 12-24 hours (maximum 4 g/day)

Side Effects: Common effects include pain at the injection site, nausea, diarrhea, and headache. Serious but rare effects include Clostridioides difficile-associated diarrhea, hypersensitivity reactions, hemolytic anemia, and biliary sludge formation.

Contraindications: Contraindicated in patients with hypersensitivity to cephalosporins or severe penicillin allergy. It should not be used in neonates receiving intravenous calcium due to the risk of fatal precipitation in the lungs and kidneys.

Nursing Considerations:

- Administer IV over 30 minutes or IM deep into a large muscle (e.g., gluteus) to reduce pain.
- Do not mix with calcium-containing solutions, including lactated Ringer's solution.
- Monitor for allergic reactions, especially in patients with penicillin allergy.
- Assess for signs of superinfection, such as oral candidiasis or persistent diarrhea.
- Monitor liver and kidney function in long-term use, especially in neonates and elderly patients.
- Educate patients receiving IM injections that lidocaine may be used to reduce pain.

Antimicrobials
Antibiotics

CEFEPIME

Drug Class: Fourth-generation cephalosporin antibiotic

Mechanism of Action: IInhibits bacterial cell wall synthesis by binding to penicillin-binding proteins, leading to bacterial lysis and death. It has broad-spectrum activity against gram-positive and gram-negative bacteria, including Pseudomonas aeruginosa, and is resistant to many beta-lactamases.

Indications: Used to treat pneumonia (including hospital-acquired), urinary tract infections, skin and soft tissue infections, febrile neutropenia, intra-abdominal infections (in combination with metronidazole), and meningitis.

DOSAGE

- **Adults:** 1-2 g IV every 8-12 hours (maximum 6 g/day)
- **Pediatric:Infants and Children (>2 months):** 50 mg/kg IV every 8-12 hours (maximum 2 g per dose)

Side Effects: Common effects include nausea, diarrhea, rash, and injection site reactions. Rare but serious effects include Clostridioides difficile-associated diarrhea, neurotoxicity (encephalopathy, seizures), and hypersensitivity reactions.

Contraindications: Contraindicated in patients with hypersensitivity to cephalosporins or severe penicillin allergy. Use with caution in patients with renal impairment due to the risk of neurotoxicity.

Nursing Considerations:

- Administer IV over 30 minutes; do not administer as a rapid bolus.
- Monitor for signs of neurotoxicity, especially in patients with renal impairment (e.g., confusion, seizures).
- Assess for allergic reactions, particularly in patients with a history of beta-lactam allergy.
- Watch for superinfection, such as oral candidiasis or Clostridioides difficile-associated diarrhea.
- Monitor renal function closely and adjust the dose in patients with kidney disease.
- Educate patients to report neurological symptoms such as altered mental status or tremors.

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Antimicrobials
Antibiotics

ERYTHROMYCIN

Drug Class: Macrolide antibiotic

Mechanism of Action: Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit, preventing bacterial growth. It is bacteriostatic but can be bactericidal at high concentrations. It has broad-spectrum activity, mainly against gram-positive bacteria and some gram-negative organisms.

Indications: Used to treat respiratory tract infections, skin and soft tissue infections, pertussis, diphtheria, chlamydial infections, and as an alternative for penicillin-allergic patients in streptococcal or syphilis infections. It is also used for gastroparesis due to its prokinetic effects.

DOSAGE

- **Adults:** 250-500 mg orally every 6 hours or 500-1000 mg IV every 6 hours (maximum 4 g/day)
- **Pediatric:** 30-50 mg/kg/day orally or IV divided every 6-12 hours (maximum 4 g/day)

Side Effects: Common effects include nausea, vomiting, diarrhea, and abdominal cramping. Serious but rare effects include QT prolongation, hepatotoxicity, Clostridioides difficile-associated diarrhea, and hearing loss (at high doses).

Contraindications: Contraindicated in patients with known macrolide hypersensitivity or those taking drugs that prolong the QT interval. Use with caution in patients with liver disease due to the risk of hepatotoxicity.

Nursing Considerations:

- Administer oral formulations on an empty stomach with a full glass of water to enhance absorption, unless gastrointestinal upset occurs.
- Monitor for QT prolongation, especially in patients with heart disease or those taking other medications that prolong the QT interval.
- Assess for gastrointestinal distress, as erythromycin is known to cause significant nausea and diarrhea.
- Monitor liver function tests in long-term therapy due to the risk of hepatotoxicity.
- Advise patients to report signs of hearing loss or ringing in the ears, especially with high IV doses.
- Avoid concurrent use with CYP3A4 inhibitors, as erythromycin is a strong inhibitor and may increase the risk of drug toxicity.

Antimicrobials
Antibiotics

AZITHROMYCIN

Drug Class: Macrolide antibiotic

Mechanism of Action: Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit, preventing bacterial growth. It has bacteriostatic effects but can be bactericidal at high concentrations. Compared to erythromycin, it has a longer half-life and better tissue penetration.

Indications: Used to treat respiratory tract infections (including pneumonia and bronchitis), streptococcal pharyngitis, skin and soft tissue infections, otitis media, sinusitis, chlamydial infections, gonorrhea, and Mycobacterium avium complex in immunocompromised patients.

DOSAGE

Adults:

- Respiratory infections, skin infections: 500 mg orally on day 1, then 250 mg once daily for 4 days
- Chlamydia: 1 g orally as a single dose
- IV dose for pneumonia: 500 mg IV once daily for at least 2 days, then switch to oral therapy

Pediatric:

- Respiratory infections, otitis media: 10 mg/kg orally on day 1, then 5 mg/kg once daily for 4 days
- Maximum dose: 500 mg/day

Side Effects: Common effects include nausea, vomiting, diarrhea, and abdominal pain. Serious but rare effects include QT prolongation, hepatotoxicity, Clostridioides difficile-associated diarrhea, and allergic reactions.

Contraindications: Contraindicated in patients with hypersensitivity to macrolides. Use with caution in patients with liver disease or those taking drugs that prolong the QT interval.

Nursing Considerations:

- Administer oral suspension on an empty stomach for better absorption, but it may be taken with food if gastrointestinal upset occurs.
- Monitor for QT prolongation, especially in patients with heart disease or those on other QT-prolonging medications.
- Assess for liver function impairment, especially in long-term use.
- Educate patients to complete the full course of antibiotics even if symptoms improve.
- Monitor for superinfection, such as oral or vaginal candidiasis.
- For intravenous administration, infuse over at least 60 minutes to avoid reactions.

Antimicrobials
Antibiotics

CLARITHROMYCIN

Drug Class: Macrolide antibiotic

Mechanism of Action: Mechanism of Action: Inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit, preventing bacterial growth. It has bacteriostatic activity but can be bactericidal at higher concentrations. It is more stable in acid than erythromycin and has a broader spectrum, including activity against Helicobacter pylori.

Indications: Used to treat respiratory tract infections (such as pneumonia, bronchitis, and sinusitis), skin and soft tissue infections, Helicobacter pylori eradication in peptic ulcer disease, and Mycobacterium avium complex infections in immunocompromised patients.

DOSAGE

Adults:

- Mild to moderate infections: 250-500 mg orally every 12 hours for 7-14 days
- H. pylori eradication (with amoxicillin and a proton pump inhibitor): 500 mg orally twice daily for 7-14 days

Pediatric:

- 7.5 mg/kg orally every 12 hours (maximum 500 mg per dose)

Side Effects: Common effects include nausea, diarrhea, abdominal pain, and altered taste. Serious but rare effects include QT prolongation, hepatotoxicity, Clostridioides difficile-associated diarrhea, and hypersensitivity reactions.

Contraindications: Contraindicated in patients with hypersensitivity to macrolides and those taking medications that prolong the QT interval or are metabolized by CYP3A4 (such as statins and some antiarrhythmics). Use with caution in patients with hepatic or renal impairment.

Nursing Considerations:

- Administer with or without food, but extended-release tablets should be taken with food for better absorption.
- Monitor for QT prolongation, especially in patients with heart disease or those on QT-prolonging medications.
- Assess for signs of liver dysfunction, such as jaundice or elevated liver enzymes.
- Educate patients to complete the full course of therapy even if symptoms improve.
- Avoid concurrent use with CYP3A4 inhibitors, as clarithromycin can increase drug levels and toxicity risks.
- Monitor for superinfection, including oral candidiasis or Clostridioides difficile-associated diarrhea.

Antimicrobials
Antibiotics

GENTAMICIN

Drug Class: Aminoglycoside antibiotic

Mechanism of Action: Inhibits bacterial protein synthesis by binding irreversibly to the 30S ribosomal subunit, leading to misreading of mRNA and defective proteins. It has a bactericidal effect and is particularly effective against aerobic gram-negative bacteria.

Indications: Used to treat severe infections caused by gram-negative bacteria, including sepsis, pneumonia, urinary tract infections, peritonitis, endocarditis (in combination with other antibiotics), and complicated skin and soft tissue infections. It is also used for neonatal sepsis.

DOSAGE

Adults:

- Conventional dosing: 3-5 mg/kg/day IV or IM divided every 8 hours
- Once-daily dosing: 5-7 mg/kg IV once daily

Pediatric:

- Neonates (<1 week): 2.5 mg/kg IV or IM every 12 hours
- Infants and children: 2-2.5 mg/kg IV or IM every 8 hours

Side Effects: Common effects include nephrotoxicity (reversible acute kidney injury), ototoxicity (hearing loss, tinnitus, or vestibular dysfunction), and neuromuscular blockade in rare cases.

Contraindications: Contraindicated in patients with hypersensitivity to aminoglycosides. Use with caution in patients with renal impairment, pre-existing hearing loss, or neuromuscular disorders such as myasthenia gravis.

Nursing Considerations:

- Monitor renal function (creatinine, blood urea nitrogen) before and during treatment to prevent nephrotoxicity.
- Assess for ototoxicity, including hearing loss, tinnitus, or vertigo, and report any signs immediately.
- Check serum drug levels (peak and trough) to ensure therapeutic efficacy and prevent toxicity.
- Administer slow IV infusion over 30-60 minutes to reduce the risk of toxicity.
- Monitor urine output closely, as decreased output may indicate nephrotoxicity.
- Use cautiously in combination with other nephrotoxic or ototoxic drugs (e.g., vancomycin, furosemide).
- Educate patients and caregivers about the importance of reporting any hearing or balance disturbances promptly.

Antimicrobials
Antibiotics

AMIKACIN

Drug Class: Aminoglycoside antibiotic

Mechanism of Action: Inhibits bacterial protein synthesis by binding irreversibly to the 30S ribosomal subunit, causing misreading of mRNA and defective protein formation, leading to bacterial cell death. It is bactericidal and has a broader spectrum than gentamicin, particularly effective against multidrug-resistant gram-negative bacteria.

Indications: Used to treat severe gram-negative bacterial infections, including sepsis, pneumonia, urinary tract infections, intra-abdominal infections, bone and joint infections, and endocarditis. It is also used for multidrug-resistant tuberculosis as a second-line agent.

DOSAGE

Adults:

- Conventional dosing: 15 mg/kg/day IV or IM divided every 8-12 hours
- Once-daily dosing: 15-20 mg/kg IV once daily

Pediatric:

- Neonates (<1 week): 10 mg/kg IV or IM as a loading dose, then 7.5 mg/kg every 12 hours
- Infants and children: 15-20 mg/kg/day IV or IM divided every 8-12 hours

Side Effects: Common effects include nephrotoxicity (manifesting as acute kidney injury), ototoxicity (irreversible hearing loss, tinnitus, or balance disturbances), and, rarely, neuromuscular blockade leading to respiratory depression.

Contraindications: Contraindicated in patients with aminoglycoside hypersensitivity. Use with caution in those with renal impairment, hearing loss, or neuromuscular disorders such as myasthenia gravis.

Nursing Considerations:

- Monitor renal function (creatinine, blood urea nitrogen) before and during therapy to detect early nephrotoxicity.
- Assess for ototoxicity, including hearing loss, tinnitus, or dizziness, and report any symptoms immediately.
- Check serum drug levels (peak and trough) to ensure therapeutic efficacy and prevent toxicity.
- Administer slow IV infusion over 30-60 minutes to minimize the risk of toxicity.
- Monitor urine output, as decreased output may indicate kidney damage.
- Avoid concurrent use with other nephrotoxic or ototoxic drugs (e.g., vancomycin, furosemide).
- Educate patients to report any changes in hearing, balance, or urination promptly.

Antimicrobials
Antibiotics

CIPROFLOXACIN

Drug Class: Fluoroquinolone antibiotic

Mechanism of Action: Inhibits bacterial DNA gyrase and topoisomerase IV, enzymes essential for DNA replication and repair, leading to bacterial cell death. It is bactericidal and has broad-spectrum activity against gram-negative and some gram-positive bacteria.

Indications: Used to treat urinary tract infections, respiratory tract infections (excluding pneumonia caused by Streptococcus pneumoniae), gastroenteritis, bone and joint infections, intra-abdominal infections, and anthrax exposure.

DOSAGE

Adults:

- Uncomplicated urinary tract infection: 250-500 mg orally every 12 hours for 3 days
- Complicated urinary tract infection or pyelonephritis: 500-750 mg orally every 12 hours for 7-14 days
- Severe infections: 400 mg IV every 8-12 hours

Pediatric:

- Complicated urinary tract infection or pyelonephritis: 10-20 mg/kg orally or IV every 12 hours (maximum 750 mg per dose)

Side Effects: Common effects effects include nausea, diarrhea, dizziness, and headache. Serious but rare effects include tendon rupture, QT prolongation, peripheral neuropathy, and Clostridioides difficile-associated diarrhea.

Contraindications: Contraindicated in patients with hypersensitivity to fluoroquinolones. Use with caution in patients with a history of tendon disorders, myasthenia gravis, QT prolongation, or renal impairment. Avoid in pediatric patients unless benefits outweigh risks due to concerns about cartilage damage.

Nursing Considerations:

- Do not administer with dairy products or antacids, as they reduce absorption.
- Monitor for tendon pain or swelling, especially in older adults and those on corticosteroids.
- Assess for QT prolongation in patients with cardiac disease or taking QT-prolonging drugs.
- Encourage hydration to prevent crystalluria and kidney damage.
- Educate patients to avoid excessive sun exposure and use sunscreen due to photosensitivity risk.
- Monitor for signs of Clostridioides difficile infection, such as severe diarrhea.
- Instruct patients to complete the full course of therapy, even if symptoms improve.

Antimicrobials
Antibiotics

LEVOFLOXACIN

Drug Class: Fluoroquinolone antibiotic

Mechanism of Action: Inhibits bacterial DNA gyrase and topoisomerase IV, enzymes required for bacterial DNA replication, transcription, and repair, leading to bacterial cell death. It is bactericidal and effective against a broad range of gram-negative and gram-positive bacteria, including respiratory pathogens.

Indications: Used to treat respiratory tract infections (pneumonia, bronchitis), urinary tract infections, skin and soft tissue infections, sinusitis, prostatitis, and bacterial conjunctivitis. It is also used for anthrax and plague post-exposure prophylaxis.

DOSAGE

Adults:

- Pneumonia: 500-750 mg orally or IV once daily for 7-14 days
- Urinary tract infection: 250-750 mg orally or IV once daily for 3-10 days
- Skin infections: 500 mg orally or IV once daily for 7-14 days

Pediatric:

- Complicated urinary tract infection or pyelonephritis: 10 mg/kg orally or IV every 12 hours (max 750 mg per dose)
- Anthrax exposure: 8 mg/kg orally every 12 hours (max 500 mg per dose)

Side Effects: Common effects include nausea, headache, dizziness, and diarrhea. Serious but rare effects include tendon rupture, QT prolongation, peripheral neuropathy, seizures, and Clostridioides difficile-associated diarrhea.

Contraindications: Use with caution in patients with myasthenia gravis, a history of tendon disorders, QT prolongation, renal impairment, or central nervous system disorders (e.g., epilepsy). Avoid in pediatric patients unless absolutely necessary due to cartilage toxicity concerns.

Nursing Considerations:

- Avoid administering with dairy products, calcium, magnesium, or antacids, as they reduce absorption.
- Monitor for tendon pain or swelling, especially in older adults or patients taking corticosteroids.
- Assess for QT prolongation in patients with cardiac conditions or those taking QT-prolonging medications.
- Encourage hydration to prevent crystalluria and renal complications.
- Advise patients to avoid excessive sun exposure due to increased photosensitivity risk.
- Monitor for Clostridioides difficile-associated diarrhea and discontinue if severe diarrhea occurs.
- Ensure the full course of treatment is completed, even if symptoms improve.

Antimicrobials
Antibiotics

TRIMETHOPRIM-SULFAMETHOXAZOLE (TMP-SMX)

Drug Class: Sulfonamide antibiotic

Mechanism of Action: Inhibits bacterial folic acid synthesis through a dual mechanism. Sulfamethoxazole inhibits dihydropteroate synthase, preventing the formation of dihydrofolic acid, while trimethoprim inhibits dihydrofolate reductase, blocking the conversion to tetrahydrofolate. This sequential blockade results in bactericidal activity against a broad spectrum of gram-positive and gram-negative bacteria.

Indications: Used to treat urinary tract infections, respiratory tract infections (including Pneumocystis jirovecii pneumonia), traveler's diarrhea, skin and soft tissue infections caused by methicillin-resistant Staphylococcus aureus (MRSA), and shigellosis.

DOSAGE

Adults:

- Urinary tract infection: 160 mg TMP / 800 mg SMX orally every 12 hours for 3-7 days
- Pneumocystis jirovecii pneumonia (treatment): 15-20 mg/kg/day TMP divided every 6-8 hours for 14-21 days

Pediatric:

- Urinary tract infection: 8-10 mg/kg/day TMP divided every 12 hours
- Pneumocystis jirovecii pneumonia (treatment): 15-20 mg/kg/day TMP divided every 6-8 hours for 14-21 days

Side Effects: Common effects include nausea, vomiting, rash, and hyperkalemia. Severe reactions include Stevens-Johnson syndrome, toxic epidermal necrolysis, blood dyscrasias (e.g., agranulocytosis, thrombocytopenia), and crystalluria leading to nephrotoxicity.

Contraindications: Contraindicated in patients with severe renal or hepatic impairment, megaloblastic anemia due to folate deficiency, or in neonates due to the risk of kernicterus. Use with caution in patients with G6PD deficiency due to the risk of hemolysis.

Nursing Considerations:

- Monitor renal function and electrolytes, especially potassium, due to the risk of hyperkalemia.
- Encourage increased fluid intake to prevent crystalluria and nephrotoxicity.
- Assess for signs of allergic reactions, including rash, fever, or blistering, and discontinue if severe.
- Monitor complete blood count regularly in long-term use to detect hematologic abnormalities.
- Educate patients to complete the full course of therapy, even if symptoms improve.
- Advise against excessive sun exposure, as the drug can cause photosensitivity.

Antimicrobials
Antibiotics

DOXYCYCLINE

Drug Class: Tetracycline antibiotic

Mechanism of Action: Inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit, preventing the attachment of transfer RNA to the messenger RNA-ribosome complex. This action inhibits bacterial growth (bacteriostatic) and is effective against a broad spectrum of gram-positive and gram-negative bacteria, atypical pathogens, and some protozoa.

Indications: Used to treat respiratory tract infections, skin infections (including acne and MRSA-related infections), sexually transmitted infections (chlamydia, syphilis, gonorrhea), Lyme disease, Rocky Mountain spotted fever, Q fever, anthrax, brucellosis, and malaria prophylaxis.

DOSAGE

Adults:

- General infections: 100 mg orally or IV every 12 hours
- Chlamydia: 100 mg orally every 12 hours for 7 days
- Malaria prophylaxis: 100 mg orally once daily starting 1-2 days before travel, during stay, and for 4 weeks after leaving endemic area

Pediatric:

- ≥8 years old (for most infections): 2.2 mg/kg orally or IV every 12 hours (maximum 100 mg per dose)

Side Effects: Common effects include nausea, vomiting, diarrhea, and photosensitivity. Serious effects include esophagitis, hepatotoxicity, pseudotumor cerebri (intracranial hypertension), and permanent tooth discoloration in children under eight years old.

Contraindications: Contraindicated in children under eight years old (except in severe infections where benefits outweigh risks), pregnancy (due to fetal skeletal development impairment), and patients with severe hepatic impairment.

Nursing Considerations:

- Administer with a full glass of water and remain upright for 30 minutes to prevent esophagitis.
- Avoid dairy products, antacids, and iron supplements within two hours of taking the medication, as they reduce absorption.
- Monitor for photosensitivity reactions and advise patients to use sunscreen and protective clothing.
- Assess for signs of hepatotoxicity, especially in long-term use.
- Monitor for superinfections, such as oral or vaginal candidiasis.
- Ensure the full course of therapy is completed, even if symptoms improve.

Antimicrobials
Antivirals

ACYCLOVIR

Drug Class: Antiviral (Nucleoside Analog)

Mechanism of Action: Inhibits viral DNA synthesis by selectively targeting viral thymidine kinase, which phosphorylates acyclovir into its active form. This active form competitively inhibits viral DNA polymerase, leading to premature DNA chain termination and preventing viral replication. It is effective against herpes simplex virus (HSV-1, HSV-2), varicella-zoster virus (VZV), and, to a lesser extent, Epstein-Barr virus.

Indications: Used for the treatment of herpes simplex infections (oral and genital), herpes zoster (shingles), varicella (chickenpox), and herpes simplex encephalitis. It is also used for prophylaxis in immunocompromised patients to prevent reactivation of latent infections.

DOSAGE

Adults:

- Genital herpes (initial episode): 200 mg orally every 4 hours (5 times daily) for 7-10 days or 400 mg orally every 8 hours for 7-10 days
- Recurrent genital herpes: 200 mg orally every 4 hours for 5 days
- Herpes zoster (shingles): 800 mg orally every 4 hours for 7-10 days

Pediatric:

- Varicella (chickenpox) (>2 years old): 20 mg/kg orally (max 800 mg per dose) every 6 hours for 5 days
- Neonatal herpes: 10-20 mg/kg IV every 8 hours for 14-21 days

Side Effects: Common effects include nausea, vomiting, diarrhea, headache, and dizziness. In intravenous administration, nephrotoxicity, neurotoxicity (hallucinations, confusion), and phlebitis at the injection site may occur.

Contraindications: Contraindicated in patients with hypersensitivity to acyclovir or valacyclovir. Use with caution in patients with renal impairment, dehydration, or neurological disorders.

Nursing Considerations:

- Ensure adequate hydration to reduce the risk of nephrotoxicity, especially with intravenous administration.
- Monitor renal function (creatinine and blood urea nitrogen) in patients receiving high doses or prolonged treatment.
- Assess for neurological side effects, particularly in elderly or immunocompromised patients.
- Educate patients that acyclovir does not cure herpes, but it reduces symptoms and viral shedding.
- Encourage adherence to the full treatment regimen for optimal effectiveness.
- Instruct patients with genital herpes to avoid sexual contact during outbreaks, as the virus can still be transmitted even with treatment.

Antimicrobials
Antivirals

OSELTAMIVIR

Drug Class: Neuraminidase inhibitor (Antiviral)

Mechanism of Action: Inhibits neuraminidase, an enzyme essential for the release of newly formed influenza viruses from infected cells. This prevents viral replication and spread within the respiratory tract, reducing symptom severity and duration if initiated early.

Indications: Used for the treatment and prophylaxis of influenza A and B in symptomatic patients within 48 hours of onset. It is also indicated for high-risk populations, including immunocompromised individuals, the elderly, and those with chronic conditions to prevent severe complications.

DOSAGE

Adults:

- Treatment: 75 mg orally twice daily for 5 days
- Prophylaxis: 75 mg orally once daily for 7-10 days (up to 6 weeks during outbreaks in high-risk patients)

Pediatric:

- Treatment (≥1 year old): 3 mg/kg orally twice daily for 5 days (max 75 mg per dose)
- Prophylaxis (≥1 year old): 3 mg/kg orally once daily for 7-10 days (max 75 mg per dose)

Side Effects: Common effects include nausea, vomiting, headache, and abdominal pain. Rare but severe reactions include neuropsychiatric symptoms (hallucinations, delirium, suicidal thoughts), particularly in pediatric patients.

Contraindications: Contraindicated in patients with hypersensitivity to oseltamivir. Use with caution in patients with severe renal impairment, as dose adjustments are required.

Nursing Considerations:

- Administer within 48 hours of symptom onset for maximum effectiveness.
- Monitor for neuropsychiatric symptoms, especially in children and adolescents.
- Assess for signs of allergic reactions, including rash and anaphylaxis.
- Educate patients that oseltamivir is not a substitute for the influenza vaccine and should not replace annual vaccination.
- Encourage adherence to the full treatment regimen, even if symptoms improve before completion.
- Adjust dosage in patients with renal impairment based on creatinine clearance levels.

Antimicrobials
Antivirals

ZIDOVUDINE

Drug Class: Nucleoside Reverse Transcriptase Inhibitor (NRTI)

Mechanism of Action: Inhibits HIV reverse transcriptase, an enzyme necessary for viral RNA conversion into DNA. By incorporating itself into the growing viral DNA chain, it causes premature termination, preventing viral replication and reducing viral load in patients with HIV infection.

Indications: Used for the treatment of HIV infection in combination with other antiretroviral drugs. It is also indicated for the prevention of mother-to-child transmission of HIV during pregnancy and labor, as well as post-exposure prophylaxis in healthcare workers.

DOSAGE

Adults:

- HIV treatment: 300 mg orally every 12 hours or 200 mg every 8 hours
- Post-exposure prophylaxis: 300 mg orally every 12 hours for 28 days (combined with other antiretrovirals)

Pediatric:

- Neonatal prophylaxis (HIV-exposed infants): 4 mg/kg orally every 12 hours for 6 weeks
- Children (≥4 weeks old): 180-240 mg/m² orally every 12 hours (maximum 300 mg per dose)

Side Effects: Common effects include nausea, vomiting, headache, fatigue, and myopathy. Serious effects include bone marrow suppression (leading to anemia and neutropenia), hepatotoxicity, and lactic acidosis.

Contraindications: Contraindicated in patients with a history of hypersensitivity to zidovudine. Use with caution in those with pre-existing anemia, bone marrow suppression, hepatic impairment, or lactic acidosis.

Nursing Considerations:

- Monitor complete blood count (CBC) regularly to detect anemia and neutropenia.
- Assess for signs of lactic acidosis and hepatotoxicity, such as abdominal pain, jaundice, or unexplained fatigue.
- Encourage adherence to therapy, as missed doses can lead to viral resistance.
- Educate pregnant women on the importance of adherence to reduce the risk of mother-to-child HIV transmission.
- Advise patients to report symptoms of muscle weakness or fatigue, which may indicate myopathy.
- Coordinate with other healthcare providers to ensure combination therapy for optimal viral suppression.

Antimicrobials
Antifungals

FLUCONAZOLE

Drug Class: Antifungal (Triazole)

Mechanism of Action: Inhibits fungal cytochrome P450-dependent enzyme 14α-demethylase, which is essential for ergosterol synthesis. This disrupts fungal cell membrane integrity, leading to increased permeability and fungal cell death. It is highly selective for fungal cells, with minimal effects on human cells.

Indications: Used for the treatment of systemic and localized fungal infections, including candidiasis (oropharyngeal, esophageal, vaginal), cryptococcal meningitis, and coccidioidomycosis. It is also used for prophylaxis in immunocompromised patients, such as those undergoing chemotherapy or with HIV/AIDS.

DOSAGE

Adults:

- Vaginal candidiasis: 150 mg orally as a single dose
- Oropharyngeal candidiasis: 200 mg orally on day 1, then 100 mg daily for at least 7-14 days
- Cryptococcal meningitis: 400 mg orally or IV on day 1, then 200-400 mg daily for 10-12 weeks

Pediatric:

- Candidiasis: 6-12 mg/kg orally or IV on day 1, then 3-12 mg/kg daily (maximum 600 mg/day)
- Cryptococcal meningitis: 12 mg/kg on day 1, then 6-12 mg/kg daily for several weeks

Side Effects: Common effects include nausea, vomiting, headache, abdominal pain, and diarrhea. Serious reactions include hepatotoxicity, QT prolongation, and Stevens-Johnson syndrome in rare cases.

Contraindications: Contraindicated in patients with hypersensitivity to fluconazole. Use with caution in those with hepatic disease, renal impairment, or a history of arrhythmias. It should not be combined with drugs that prolong the QT interval.

Nursing Considerations:

- Monitor liver function tests (ALT, AST, bilirubin), especially in long-term therapy.
- Assess for signs of hepatotoxicity, such as jaundice, dark urine, or unexplained fatigue.
- Monitor for QT prolongation, especially in patients taking other medications that affect cardiac conduction.
- Educate patients to complete the full course of treatment even if symptoms improve.
- Advise women to avoid alcohol while taking fluconazole, as it may increase liver toxicity.
- Check for potential drug interactions, particularly with warfarin, oral hypoglycemics, and certain antipsychotics.

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Antimicrobials
Antifungals

AMPHOTERICIN B

Drug Class: Polyene Antifungal

Mechanism of Action: Binds to ergosterol in fungal cell membranes, creating pores that increase permeability and lead to ion leakage. This disrupts cellular homeostasis, causing fungal cell death. It has broad-spectrum antifungal activity but also affects human cell membranes, leading to significant toxicity.

Indications: Used for severe systemic fungal infections, including cryptococcal meningitis, histoplasmosis, aspergillosis, candidiasis, and mucormycosis. It is typically reserved for life-threatening infections due to its toxicity.

DOSAGE

Adults:

- Conventional formulation: 0.3-1.5 mg/kg IV daily
- Liposomal formulation (less nephrotoxic): 3-5 mg/kg IV daily

Pediatric:

- Conventional formulation: 0.25-1 mg/kg IV daily
- Liposomal formulation: 3-5 mg/kg IV daily

Side Effects: Severe nephrotoxicity, electrolyte imbalances (hypokalemia, hypomagnesemia), infusion-related reactions (fever, chills, hypotension), hepatotoxicity, and anemia.

Contraindications: Contraindicated in patients with hypersensitivity to amphotericin B. Use with caution in those with renal impairment, electrolyte disturbances, or hepatic dysfunction.

Nursing Considerations:

- Monitor renal function (BUN, creatinine) and electrolytes closely during therapy.
- Premedicate with acetaminophen and antihistamines to reduce infusion-related reactions.
- Administer slowly over 2-6 hours IV to minimize adverse effects.
- Ensure adequate hydration to reduce nephrotoxicity risk.
- Monitor for signs of hepatotoxicity, such as jaundice and elevated liver enzymes.
- Assess for signs of anemia (fatigue, pallor) due to bone marrow suppression.
- Use the liposomal formulation when possible to reduce nephrotoxicity.

Antimicrobials
Antifungals

NYSTATIN

Drug Class: Polyene Antifungal

Mechanism of Action: Binds to ergosterol in fungal cell membranes, creating pores that increase membrane permeability. This leads to the leakage of intracellular components, causing fungal cell death. It is effective against Candida species and is not significantly absorbed systemically, making it ideal for topical and oral use.

Indications: Used for the treatment of oropharyngeal candidiasis (thrush), cutaneous and mucocutaneous candidiasis, and vaginal candidiasis. It is also used prophylactically in immunocompromised patients at risk for fungal infections.

DOSAGE

Adults:

- Oral candidiasis: 400,000-600,000 units orally 4 times daily (swish and swallow or swish and spit) for 7-14 days
- Topical candidiasis: Apply cream, ointment, or powder 2-3 times daily
- Vaginal candidiasis: 1 vaginal tablet (100,000 units) once daily for 14 days

Pediatric:

- Oral candidiasis (infants): 200,000 units orally 4 times daily
- Children: 400,000-600,000 units orally 4 times daily

Side Effects: Generally well tolerated, but may cause nausea, vomiting, diarrhea, and irritation at the application site. Allergic reactions are rare but possible.

Contraindications: Contraindicated in patients with hypersensitivity to nystatin. Use with caution in individuals with severe mucosal irritation or gastrointestinal dysfunction.

Nursing Considerations:

- Instruct patients to swish and hold the suspension in the mouth for several minutes before swallowing for maximum effectiveness in oral candidiasis.
- Ensure patients complete the full course of treatment to prevent recurrence.
- Monitor for signs of allergic reactions, such as rash or difficulty breathing.
- Educate on proper hygiene to prevent reinfection, especially in cases of recurrent vaginal or cutaneous candidiasis.
- Advise patients to avoid eating or drinking immediately after oral administration to allow for adequate mucosal contact time.

Antimicrobials
Antituberculosis Medications

ISONIAZID

Drug Class: Antitubercular Agent

Mechanism of Action: Inhibits mycolic acid synthesis, a crucial component of the Mycobacterium tuberculosis cell wall. This disrupts bacterial cell wall integrity, leading to bacterial death in actively dividing cells and inhibiting growth in dormant bacteria. It is bactericidal against actively replicating Mycobacterium tuberculosis and bacteriostatic against dormant forms.

Indications: Used for the treatment and prophylaxis of tuberculosis (TB). It is part of the standard first-line regimen for active TB and is also used as monotherapy for latent TB infection to prevent progression to active disease.

DOSAGE

Adults:

- Latent TB: 300 mg orally once daily for 6-9 months or 900 mg twice weekly for 6-9 months
- Active TB (part of combination therapy): 5 mg/kg (maximum 300 mg) orally or intramuscularly once daily

Pediatric:

- Latent TB: 10-15 mg/kg (maximum 300 mg) orally once daily for 9 months
- Active TB: 10-15 mg/kg (maximum 300 mg) orally or intramuscularly once daily

Side Effects: Common adverse effects include hepatotoxicity, peripheral neuropathy, gastrointestinal upset, and rash. Severe cases may present with hepatitis, neurotoxicity (seizures, optic neuritis), and drug-induced lupus-like syndrome.

Contraindications: Contraindicated in patients with severe liver disease or hypersensitivity to isoniazid. Use with caution in alcoholics, elderly patients, and individuals with renal impairment or pre-existing neuropathy.

Nursing Considerations:

- Monitor liver function tests (ALT, AST) before and during treatment to detect hepatotoxicity.
- Assess for signs of peripheral neuropathy (tingling, numbness, burning), which can be prevented with pyridoxine (Vitamin B6) supplementation.
- Educate patients to avoid alcohol to reduce the risk of liver toxicity.
- Ensure adherence to therapy due to the long treatment duration and the risk of drug resistance.
- Administer on an empty stomach (1 hour before or 2 hours after meals) for optimal absorption unless gastrointestinal upset occurs.
- Monitor for signs of jaundice, dark urine, or unexplained fatigue, which may indicate liver toxicity.

Antimicrobials
Antituberculosis Medications

RIFAMPIN

Drug Class: Antitubercular Agent, Rifamycin Antibiotic

Mechanism of Action: Inhibits bacterial DNA-dependent RNA polymerase, preventing transcription and subsequent protein synthesis. This results in bacterial cell death. Rifampin is bactericidal against Mycobacterium tuberculosis and other susceptible bacteria.

Indications: Used primarily for the treatment of tuberculosis (TB) as part of combination therapy. Also indicated for latent TB infection (as an alternative to isoniazid), prophylaxis for meningococcal meningitis, and treatment of infections caused by Staphylococcus aureus, including methicillin-resistant strains (MRSA), in combination with other antibiotics.

DOSAGE

Adults:

- Active TB: 10 mg/kg (maximum 600 mg) orally or intravenously once daily
- Latent TB: 600 mg orally once daily for 4 months
- Meningococcal prophylaxis: 600 mg orally every 12 hours for 2 days

Pediatric:

- Active TB: 10-20 mg/kg (maximum 600 mg) orally or intravenously once daily
- Meningococcal prophylaxis: 10 mg/kg every 12 hours for 2 days (maximum 600 mg per dose); 5 mg/kg for neonates

Side Effects: Common effects include hepatotoxicity, gastrointestinal discomfort, rash, and flu-like symptoms. It may cause orange-red discoloration of urine, sweat, tears, and saliva, which is harmless but can stain contact lenses. Serious adverse effects include severe liver damage, thrombocytopenia, and renal impairment.

Contraindications: Contraindicated in patients with severe liver disease or hypersensitivity to rifamycins. Use with caution in patients with alcoholism, renal impairment, or concurrent hepatotoxic drugs.

Nursing Considerations:

- Monitor liver function tests (ALT, AST, bilirubin) before and during therapy due to the risk of hepatotoxicity.
- Inform patients about harmless orange-red discoloration of body fluids and advise against wearing soft contact lenses.
- Assess for signs of hepatotoxicity, such as jaundice, dark urine, or persistent fatigue.
- Avoid alcohol and hepatotoxic drugs (e.g., acetaminophen) to minimize liver damage.
- Monitor for drug interactions, as rifampin induces hepatic enzymes (CYP450), reducing the effectiveness of oral contraceptives, warfarin, and antiretrovirals.
- Administer on an empty stomach (1 hour before or 2 hours after meals) for optimal absorption unless gastrointestinal discomfort occurs.

Antimicrobials
Antituberculosis Medications

PYRAZINAMIDE

Drug Class: Antitubercular Agent

Mechanism of Action: Disrupts Mycobacterium tuberculosis cell membrane metabolism and transport by being converted into pyrazinoic acid, which lowers intracellular pH and inhibits bacterial growth. It is bactericidal in acidic environments, making it particularly effective against dormant bacteria within macrophages.

Indications: Used in combination therapy for the treatment of active tuberculosis (TB), particularly in the initial intensive phase of treatment to shorten the duration of therapy.

DOSAGE

- **Adults:** 15-30 mg/kg (maximum 2 g) orally once daily or 50-70 mg/kg (maximum 4 g) orally 2-3 times per week as part of combination therapy.
- **Pediatric:** 30-40 mg/kg (maximum 2 g) orally once daily as part of combination therapy.

Side Effects: Common effects include hepatotoxicity, hyperuricemia, arthralgia, and gastrointestinal discomfort. Severe reactions may include acute liver failure, severe gout, and hypersensitivity reactions.

Contraindications: Contraindicated in patients with severe liver disease, acute gout, or hypersensitivity to pyrazinamide. Use with caution in patients with renal impairment or a history of hyperuricemia.

Nursing Considerations:

- Monitor liver function tests (ALT, AST, bilirubin) before and during therapy due to the risk of hepatotoxicity.
- Assess uric acid levels regularly, as pyrazinamide can cause hyperuricemia and may trigger gout attacks.
- Encourage adequate hydration to prevent uric acid buildup and reduce the risk of gout.
- Educate patients to report signs of hepatotoxicity, such as jaundice, dark urine, or persistent nausea.
- Administer with food if gastrointestinal discomfort occurs, but note that food may slightly reduce absorption.
- Use cautiously in diabetic patients, as pyrazinamide may affect glucose control.

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Immune System Medications
Immunosuppressants

CYCLOSPORINE

Drug Class: Immunosuppressant, Calcineurin Inhibitor

Mechanism of Action: Inhibits calcineurin, preventing the activation of T-lymphocytes and reducing the production of interleukin-2 (IL-2). This suppression of immune response helps prevent organ rejection and control autoimmune diseases.

Indications: Used primarily for the prevention of organ transplant rejection (kidney, liver, heart) and the treatment of autoimmune conditions such as rheumatoid arthritis and severe psoriasis. It is also used in nephrotic syndrome and certain inflammatory eye conditions.

DOSAGE

Adults:

- Transplant prevention: Initial dose 8-15 mg/kg/day orally in 2 divided doses, then maintenance 3-5 mg/kg/day
- Autoimmune diseases: 2.5-5 mg/kg/day orally in 2 divided doses

Pediatric:

- Transplant prevention: Initial dose 10-15 mg/kg/day orally in 2 divided doses, then maintenance 3-5 mg/kg/day

Side Effects: Common effects include nephrotoxicity, hypertension, tremors, hirsutism, gingival hyperplasia, and gastrointestinal discomfort. Long-term use may lead to infection risk, hepatotoxicity, hyperlipidemia, and malignancies (such as lymphoma and skin cancer).

Contraindications: Contraindicated in patients with uncontrolled hypertension, severe renal impairment, malignancies, or hypersensitivity to cyclosporine. Use with caution in patients with liver disease, uncontrolled infections, or concurrent nephrotoxic drugs.

Nursing Considerations:

- Monitor renal function (creatinine, BUN) and liver function tests (ALT, AST, bilirubin) regularly due to risk of toxicity.
- Monitor blood pressure frequently, as hypertension is a common side effect.
- Assess for signs of infection, as immunosuppression increases susceptibility to opportunistic infections.
- Educate patients to maintain good oral hygiene to prevent gingival hyperplasia.
- Avoid grapefruit juice, as it increases cyclosporine levels and risk of toxicity.
- Monitor drug levels (trough levels) regularly to ensure therapeutic effectiveness and avoid toxicity.

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Immune System Medications
Immunosuppressants

TACROLIMUS

Drug Class: Immunosuppressant, Calcineurin Inhibitor

Mechanism of Action: Inhibits calcineurin, preventing the activation of T-lymphocytes and the production of interleukin-2 (IL-2), thereby suppressing the immune response. This action helps prevent transplant rejection and treat certain autoimmune conditions.

Indications: Primarily used for the prevention of organ transplant rejection (kidney, liver, heart). It is also used in the treatment of autoimmune diseases such as atopic dermatitis (topical formulation) and severe refractory rheumatoid arthritis.

DOSAGE

Adults:

- **T**ransplant prevention: 0.1-0.2 mg/kg/day orally in 2 divided doses, adjusted based on drug levels
- Topical use for dermatitis: Apply thin layer twice daily

Pediatric:

- Transplant prevention: 0.15-0.3 mg/kg/day orally in 2 divided doses, adjusted as needed

Side Effects: Common effects include nephrotoxicity, hypertension, hyperglycemia, tremors, insomnia, and gastrointestinal discomfort. Long-term use may lead to increased infection risk, neurotoxicity, electrolyte imbalances, and malignancies (such as lymphoma and skin cancer).

Contraindications: Contraindicated in patients with uncontrolled hypertension, severe renal or hepatic impairment, or hypersensitivity to tacrolimus. Use with caution in patients with diabetes, infections, or taking nephrotoxic medications.

Nursing Considerations:

- Monitor renal function (creatinine, BUN) and liver function tests (ALT, AST, bilirubin) frequently due to risk of toxicity.
- Monitor blood pressure and blood glucose levels, as tacrolimus can cause hypertension and hyperglycemia.
- Assess for signs of infection, as immunosuppression increases susceptibility.
- Educate patients to avoid grapefruit juice, which increases tacrolimus levels and toxicity risk.
- Monitor drug trough levels regularly to maintain therapeutic levels and prevent toxicity.
- Encourage proper hand hygiene and infection prevention measures due to immunosuppressive effects.

Immune System Medications
Immunosuppressants

AZATHIOPRINE

Drug Class: Immunosuppressant, Antimetabolite

Mechanism of Action: Inhibits purine synthesis, preventing the proliferation of T and B lymphocytes. This leads to a suppression of the immune response, reducing inflammation and preventing graft rejection.

Indications: Used for the prevention of organ transplant rejection (kidney, liver, heart) and the treatment of autoimmune diseases, including rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel disease (Crohn's disease and ulcerative colitis), and myasthenia gravis.

DOSAGE

Adults:

- Transplant prevention: 3-5 mg/kg/day orally or intravenously initially, then 1-3 mg/kg/day for maintenance
- Autoimmune diseases: 1-3 mg/kg/day orally

Pediatric:

- Transplant prevention: 2-5 mg/kg/day orally or intravenously
- Autoimmune diseases: 1-3 mg/kg/day orally

Side Effects: Common effects include bone marrow suppression (leukopenia, thrombocytopenia, anemia), hepatotoxicity, nausea, vomiting, and increased infection risk. Long-term use may lead to malignancies (especially lymphoma and skin cancer) and gastrointestinal disturbances.

Contraindications: Contraindicated in patients with severe bone marrow suppression, active infections, or hypersensitivity to azathioprine. Use with caution in patients with liver disease, renal impairment, or those receiving other immunosuppressants.

Nursing Considerations:

- Monitor complete blood count (CBC) regularly for signs of bone marrow suppression.
- Monitor liver function tests (ALT, AST, bilirubin) periodically due to hepatotoxicity risk.
- Assess for signs of infection, as immunosuppression increases susceptibility.
- Educate patients to use sun protection, as there is an increased risk of skin malignancies.
- Avoid live vaccines due to immunosuppressive effects.
- Monitor for gastrointestinal symptoms, as nausea and vomiting are common.
- Assess for signs of bleeding or bruising, as thrombocytopenia may occur.