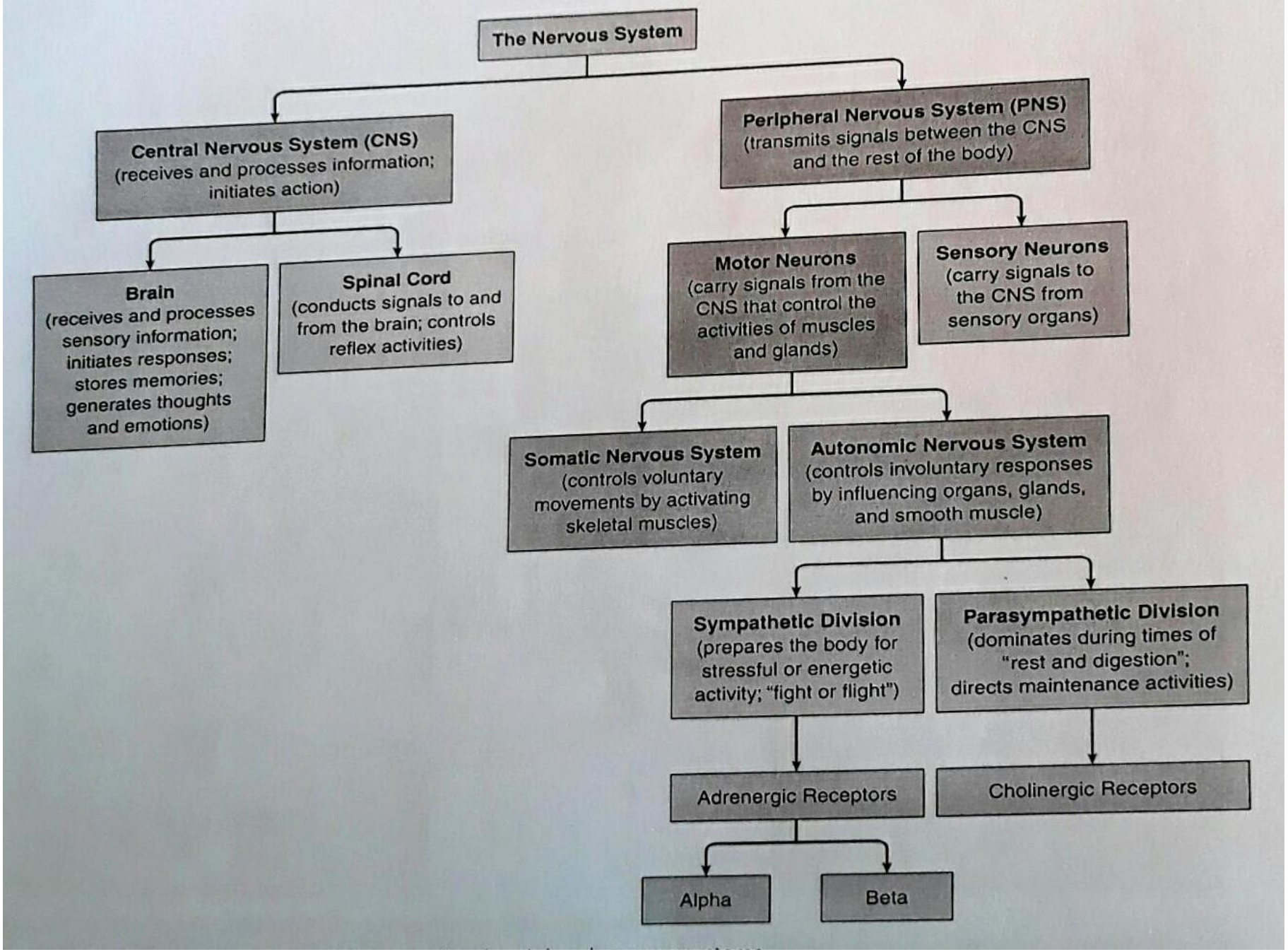
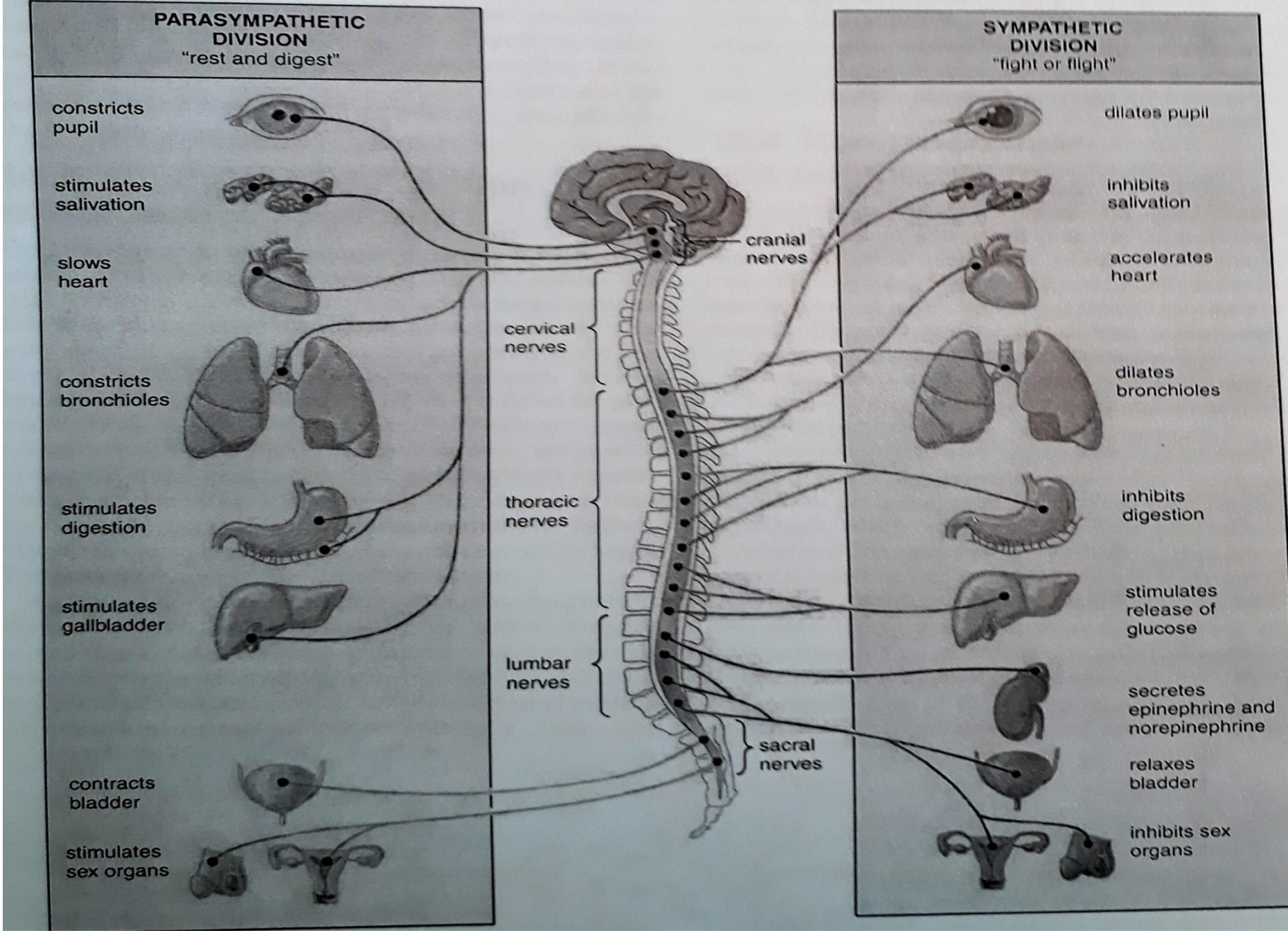
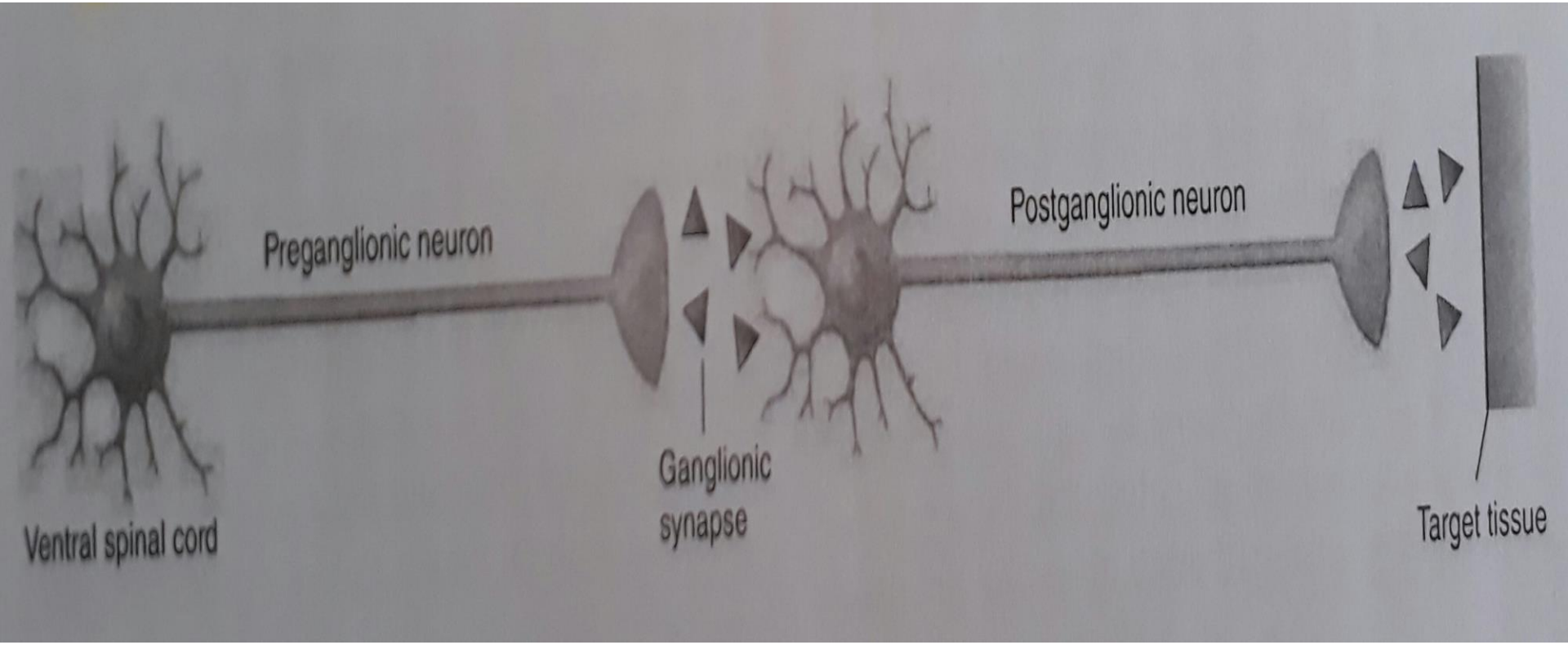
The Nervous System







Adrenergic Drugs Affecting the Autonomic Nervous System

Norepinephrine (NE)

- Released by most postganglionic nerves
- Class of agents called *catecholamines*, all involved in neurotransmission
  - Natural catecholamines: NE, epinephrine (adrenalin), dopamine
  - Synthetic catecholamines: isoproterenol, dobutamine

Norepinephrine (NE)

- Adrenergic receptors—receptors at the ends of postganglionic sympathetic neurons
  - Cause adrenaline-like response

Norepinephrine (NE)

- Is synthesized in the nerve terminal
- Requires the amino acids phenylalanine and tyrosine
- Conversion of dopamine to norepinephrine
- NE in nerve terminal may be returned to vesicles for future use, or destroyed enzymatically by monoamine oxidase (MAO)

Two Types of Adrenergic Receptors

- Alpha receptors and beta receptors
- Hugely important to pharmacology
- Some drugs are selective and activate only one type of adrenergic receptor, whereas others affect all receptor subtypes

$Alpha_1$-adrenergic Receptors

- In all sympathetic target organs except heart
- Response
  - Constriction of blood vessels
  - Dilation of pupils

Alpha$_2$-adrenergic Receptors

- At presynaptic adrenergic neuron terminals
- Inhibit release of norepinephrine

$Beta_2$-adrenergic Receptors

- In all sympathetic target organs except the heart
- Inhibit smooth muscle

Table 13.1 Types of Adrenergic Receptors

Table 13.1 Types of Adrenergic Receptors

Neurotransmitter	Receptor	Primary Locations	Responses
Norepinephrine (adrenergic agonist)	$Alpha_1$	All sympathetic target organs except the heart	Constriction of blood vessels, dilation of pupils
	$Alpha_2$	Presynaptic adrenergic nerve terminals	Inhibition of release of norepinephrine
	$Beta_1$	Heart and kidneys	Increased heart rate and force of contraction; release of renin
	$Beta_2$	All sympathetic target organs except the heart	Inhibition of smooth muscle
	$Beta_3$	Adipose tissue	Lipolysis
		Urinary bladder	Relaxation of the detrusor muscle

Five Mechanisms by Which Drugs Can Affect Synaptic Transmission

- Affect the synthesis of the neurotransmitter in the nerve terminal
- Prevent storage of the neurotransmitter in vesicles within the presynaptic nerve
- Influence release of the neurotransmitter from the presynaptic nerve

Five Mechanisms by Which Drugs Can Affect Synaptic Transmission

- Prevent the normal destruction or reuptake of the neurotransmitter
- Bind to the receptor site on the postsynaptic target tissue

Table 13.2 General Approaches Affecting Adrenergic Neuronal Transmission (1 of 2)

Table 13.2 General Approaches Affecting Adrenergic Neuronal Transmission

Approach	Example	Indications
Drugs may affect the synthesis of neurotransmitter in the nerve terminal. • Drugs that decrease the amount of neurotransmitter synthesis will inhibit nervous system activity. • Those drugs that increase neurotransmitter synthesis will promote nervous system activity.	*Alpha methyl para tyrosine (MPT)* This drug temporarily inhibits tyrosine hydroxylase, the rate limiting step in the synthesis of dopamine.	*Historical interest in the control of hypertension; current possible usefulness for various neuropsychiatric disorders.* Due to weakened release of dopamine, this drug was once thought useful in the treatment of hypertension. Applications more recently include dystonia, dyskinesia, Huntington's chorea, mania, obsessive-compulsive disorder, substance abuse disorders, and schizophrenia.
Drugs can prevent the storage of the neurotransmitter in vesicles within the presynaptic nerve. • Prevention of neurotransmitter storage will inhibit nervous system activity.	*Reserpine* This drug depletes stores of catecholamines in the brain and in the adrenal medulla.	*Antihypertensive symptoms in patients diagnosed with schizophrenia.* Mild essential hypertension or as adjunctive therapy for patients with psychotic symptoms.

Table 13.2 General Approaches Affecting Adrenergic Neuronal Transmission (2 of 2)

Table 13.2 General Approaches Affecting Adrenergic Neuronal Transmission

Approach	Example	Indications
Drugs can influence the release of the neurotransmitter from the presynaptic nerve. • Promoting neurotransmitter release will stimulate nervous system activity. Slowing neurotransmitter release will have the opposite effect.	*Amphetamine, dextroamphetamine mixed salts (Adderall)* These drugs increase the release of monoamines and they block the reuptake of norepinephrine and dopamine into the presynaptic neuron.	*Patients diagnosed with ADHD or narcolepsy.* For the treatment of attention deficit/hyperactivity disorder (ADHD) and patients having difficulty staying awake.
Drugs can prevent the normal destruction or reuptake of the neurotransmitter. • Drugs that cause the neurotransmitter to remain in the synapse for a longer time will stimulate nervous system activity.	*Monoamine oxidase inhibitors (MAOIs)* These drugs block the degradation of dopamine and norepinephrine within central and peripheral adrenergic nerve terminals.	*For patients diagnosed with clinical depression not controlled by other antidepressants, (i.e., selective serotonin reuptake inhibitors, atypical antidepressants and tricyclic antidepressants (TCAs).*
Drugs can bind to the receptor site on the postsynaptic target tissue. • Drugs that bind to postsynaptic receptors and stimulate target tissue will increase nervous system activity. • Drugs that attach to the postsynaptic targets and prevent the neurotransmitter from reaching its receptors will inhibit nervous system activity.	*Beta blockers* Beta blockers exert their effects by preventing catecholamines from binding to beta receptors in the body.	*Widely used for the control of hypertension.* For high blood pressure, heart failure, and for patients with a history of myocardial infarction (MI). Treatments may help to alleviate signs of heart palpitations and tremulousness.

Other Types of Adrenergic Receptors

- Dopamine serves a larger role as a neurotransmitter

Classification and Naming of Autonomic Drugs

- Based on two possible actions of autonomic drugs on sympathetic nervous system
  - Stimulation of sympathetic nervous system (called adrenergic agents or sympathomimetics)
  - Inhibition of sympathetic nervous system (called adrenergic-blocking agents, adrenergic antagonists, or sympatholytics)

Adrenergic Agents (Sympathomimetics)

- **Prototype drug**: phenylephrine (Neo-Synephrine)
- **Mechanism of action**: to stimulate the sympathetic nervous system directly/indirectly
  - Produces many of the same responses as the anticholinergics

Adrenergic Agents (Sympathomimetics)

- **Primary use**: depends on receptors activated
  - **Alpha$_1$ receptors**: nasal congestion, hypotension, dilation of pupils for eye examination
  - **Alpha$_2$ receptors**: hypertension
  - **Beta$_1$ receptors**: cardiac arrest, heart failure, shock
  - **Beta$_2$ receptors**: asthma and premature-labor contractions

Adrenergic Agents (Sympathomimetics)

- **Adverse effects**: tachycardia, hypertension, dysrhythmias, CNS excitation and seizures, dry mouth, nausea and vomiting, anorexia

Prototype Drug | Phenylephrine *(Neo-Synephrine)*

Therapeutic Class: Nasal decongestant; mydriatic drug; antihypotensive
Pharmacologic Class: Adrenergic drug (sympathomimetic)

Actions and Uses

Phenylephrine is a selective alpha-adrenergic agonist that is available in different formulations, including intranasal, ophthalmic, intramuscular (IM), subcutaneous, and intravenous (IV). All its actions and indications are extensions of its sympathetic stimulation.

Intranasal Administration: When applied intranasally by spray or drops, phenylephrine reduces nasal congestion by constricting small blood vessels in the nasal mucosa.

Topical Administration: Applied topically to the eye during ophthalmic examinations, phenylephrine can dilate the pupil without causing significant cycloplegia.

Parenteral Administration: The parenteral administration of phenylephrine can reverse acute hypotension caused by spinal anesthesia or vascular shock. Because phenylephrine lacks beta-adrenergic agonist activity, it produces relatively few cardiac side effects at therapeutic doses. Its longer duration of activity and lack of significant cardiac effects gives phenylephrine some advantages over epinephrine or norepinephrine in treating acute hypotension.

Adverse Effects

When the drug is used topically or intranasally, side effects are uncommon. Intranasal use can cause burning of the mucosa and rebound congestion if used for prolonged periods (see chapter 39). Ophthalmic preparations can cause narrow-angle glaucoma secondary to their mydriatic effect. High doses can cause reflex bradycardia due to the elevation of blood pressure caused by stimulation of $alpha_1$ receptors.

When used parenterally, the drug should be used with caution in patients with advanced coronary artery disease, hypertension, or hyperthyroidism. Anxiety, restlessness, and tremor may occur due to the drug's stimulation effect on the CNS. Patients with hyperthyroidism may experience a severe increase in basal metabolic rate, resulting in increased blood pressure and ventricular tachycardia.

Black Box Warning: Severe reactions, including death, may occur with IV infusion even when appropriate dilution is used to avoid rapid diffusion. Therefore, restrict IV use for situations in which other routes are not feasible.

Prototype Drug | Phenylephrine *(Neo-Synephrine)*

Therapeutic Class: Nasal decongestant; mydriatic drug; antihypotensive
Pharmacologic Class: Adrenergic drug (sympathomimetic)

Administration Alerts

- Parenteral administration can cause tissue injury with extravasation.
- Phenylephrine ophthalmic drops may damage soft contact lenses.
- Pregnancy category C.

PHARMACOKINETICS

Onset	Peak	Duration
Immediate IV; 10–15 min IM/subcutaneous	5–10 min IV; 15–30 min IM/subcutaneous	15–20 min IV; 30–120 min IM/subcutaneous; 3–6 h topical

Contraindications: This drug should not be used in patients with acute pancreatitis, heart disease, hepatitis, or narrow-angle glaucoma.

Interactions

Drug–Drug: Drug interactions may occur with MAO inhibitors (MAOIs), causing a hypertensive crisis. Increased effects may also occur with tricyclic antidepressants, ergot alkaloids, and oxytocin. Inhibitory effects occur with alpha blockers and beta blockers. Phenylephrine is incompatible with iron preparations (ferric salts). Phenylephrine may cause dysrhythmias when taken in combination with digoxin.

Lab Tests: Unknown.

Herbal/Food: Unknown.

Treatment of Overdose: Overdose may cause tachycardia and hypertension. Treatment with an alpha blocker such as phentolamine (Regitine) may be indicated to decrease blood pressure.

Role of Nurse

- Monitor patient's condition
- Provide education on drug therapy
- Note adverse effects of drug therapy
- Identify possible interactions
- Identify contraindications of drug therapy

Adrenergic Drugs (Sympathomimetics)

- Monitor vital signs, urinary and cardiac output as appropriate
- Monitor breathing patterns
- Observe patient's responsiveness to light
  - Effect on CNS, Miosis
- Monitor for rhinorrhea and epistaxis
  - Nose mucus, nosebleed

Nursing Practice Application

Pharmacotherapy With Adrenergic Drugs

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Baseline assessment prior to administration: • Obtain a complete health history including cardiovascular, cerebrovascular, respiratory disease, or diabetes. Obtain a drug history including allergies, current prescription and over-the-counter (OTC) drugs, and herbal preparations. Be alert to possible drug interactions. • Evaluate appropriate laboratory findings such as hepatic or renal function studies. • Obtain baseline vital signs, weight, and urinary and cardiac output as appropriate. • Assess the nasal mucosa for excoriation or bleeding prior to beginning therapy for nasal congestion. • Assess the patient's ability to receive and understand instruction. Include the family and caregivers as needed.	• *Decreased Cardiac Output* • *Ineffective Tissue Perfusion* • *Impaired Gas Exchange* • *Ineffective Airway Clearance* • *Deficient Knowledge* (drug therapy) • *Risk for Injury,* related to adverse effects of drug therapy or administration • *Risk for Disturbed Sleep Pattern,* related to adverse effects of drug therapy *NANDA I © 2014

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic Drugs

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Assessment throughout administration: • Assess for desired therapeutic effects dependent on the reason for the drug (e.g., increased ease of breathing, blood pressure (BP) within normal range, nasal congestion improved). • Continue frequent and careful monitoring of vital signs and urinary and cardiac output as appropriate, especially if IV administration is used. • Assess for and promptly report adverse effects: tachycardia, hypertension, dysrhythmias, tremors, dizziness, headache, and decreased urinary output. Immediately report severe hypertension, seizures, and angina which may signal drug toxicity.	

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Ensuring therapeutic effects:	
• Continue frequent assessments for therapeutic effects dependent on the reason the drug therapy is given. (Pulse, BP, and respiratory rate should be within normal limits or within the parameters set by the health care provider. Nasal congestion should be decreased; reddened, irritated sclera should be improved.)	• Teach the patient, family, or caregiver how to monitor the pulse and BP, as appropriate. Ensure the proper use and functioning of any home equipment obtained.
• Provide supportive nursing measures; e.g., proper positioning for dyspnea, shock, etc. (Supportive nursing measures will supplement therapeutic drug effects and optimize the outcome.)	• Teach the patient to report increasing dyspnea despite medication therapy and to not take more than the prescribed dose unless instructed otherwise by the health care provider.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Minimizing adverse effects:	
• Monitor for signs of excessive autonomic nervous system stimulation and notify the health care provider if the BP or pulse exceeds established parameters. Continue frequent cardiac monitoring (e.g., ECG, cardiac output) and urine output if IV adrenergics are given. (Because adrenergic drugs stimulate the heart rate and raise BP, they must be closely monitored to avoid adverse effects. **Lifespan:** The older adult may be at greater risk due to previously existing cardiovascular disease. **Diverse Patients:** Research suggests African Americans may experience an impaired [diminished] vascular response to isoproterenol, and vital signs should be monitored frequently during administration.)	• Instruct the patient to report palpitations, shortness of breath, chest pain, excessive nervousness or tremors, headache, or urinary retention immediately. • Teach the patient to limit or eliminate the use of foods and beverages that contain caffeine because these may cause excessive nervousness, insomnia, and tremors.
• Closely monitor the IV infusion site when using IV adrenergics. All IV adrenergic drips should be given via infusion pump. (Blanching at the IV site is an indicator of extravasation and the IV infusion should be immediately stopped and the provider contacted for further treatment orders. Infusion pumps allow precise dosing of the medication.)	• To allay possible anxiety, teach the patient about the rationale for all equipment used and the need for frequent monitoring.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
• Monitor oral and nasal mucosa and breath sounds in patients taking inhaled adrenergic drugs. (Inhaled epinephrine and other adrenergic drugs may reduce bronchial secretions, making removal of mucus more difficult.) • Inspect nasal mucosa for irritation, rhinorrhea, or bleeding after nasal use. Avoid prolonged use of adrenergic nasal sprays. (Vasoconstriction may cause transient stinging, excessive dryness, or bleeding. Rebound congestion with chronic rhinorrhea may result after prolonged treatment.)	• Continue to monitor blood glucose and appropriate laboratory work. (Adrenergic drugs affect a wide range of body systems. A change in antidiabetes medications or dosing may be required if glucose remains elevated.) • Teach the patient with diabetes to monitor his or her blood glucose more frequently and to notify the health care provider if a consistent increase is noted. • Teach the patient to increase fluid intake to moisten airways and assist in the expectoration of mucus, unless contraindicated. • Instruct the patient not to use nasal spray longer than 3–5 days without consulting the provider. OTC saline nasal sprays may provide comfort if mucosa is dry and irritated. Increasing oral fluid intake may also help with hydration. • **Lifespan:** Teach the family or caregiver that adrenergic nasal sprays and other decongestants are not recommended in children and should be used only under a provider's supervision.
• Provide for eye comfort such as darkened room, soft cloth over eyes, and sunglasses. Transient stinging after installation of eyedrops may occur. (Adrenergic drugs can cause mydriasis and photosensitivity to light. Localized vasoconstriction may cause stinging of the eyes.)	• Instruct the patient that photosensitivity may occur, and sunglasses may be needed in bright light or for outside activities. The provider should be notified if irritation or sensitivity occurs beyond 12 hours after the drug has been discontinued. Soft contact lens users should check with the provider before using, as some solutions may stain lenses. **Lifespan & Safety**: Assist the older adult with ambulation if blurred vision or light-sensitivity occurs, to prevent falls.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Patient understanding of drug therapy: • Use opportunities during administration of medications and during assessments to provide patient education. (Using time during nursing care helps to optimize and reinforce key teaching areas.)	• The patient, family, or caregiver should be able to state the reason for the drug; appropriate dose and scheduling; what adverse effects to observe for and when to report; equipment needed as appropriate and how to use that equipment; and the required length of medication therapy needed with any special instructions regarding renewing or continuing the prescription as appropriate.
Patient self-administration of drug therapy: • When administering medications, instruct the patient, family, or caregiver in proper self-administration of an inhaler, epinephrine injection kit, nasal spray, or ophthalmic drops. (Using time during nurse administration of these drugs helps to reinforce teaching.)	• Instruct the patient in proper administration techniques, followed by teach-back. Inhalation forms should only be dispensed when the patient is upright to properly aerosolize the drug and prevent overdosage from excessively large droplets. • Teach the patient, family, or caregiver proper technique for epinephrine auto-injector and to have on hand for emergency use at all times. If epinephrine auto-injector is needed and used, 911 and the health care provider should be called immediately after use. • Teach the patient, family, or caregiver to not share nasal sprays with other people to prevent infection. • The patient, family, or caregiver is able to discuss appropriate dosing and administration needs.

See Table 13.3 for a list of drugs to which these nursing actions apply.

Adrenergic-Blocking Agents

- Primary use of beta blockers is in the treatment of hypertension
- Beta-adrenergic antagonists have several other important therapeutic applications
- Angina pectoris (Blocking the effect of adrenaline on heart, reduced rate and con.)
  - Migraines
  - Heart failure

Adrenergic-Blocking Agents

- **Prototype drug**: prazosin (Minipress)
- **Mechanism of action**: to inhibit the sympathetic nervous system
- **Primary use**: hypertension, dysrhythmias, angina, heart failure, benign prostatic hypertrophy

Adrenergic-Blocking Agents

- **Adverse effects**: dizziness, drowsiness, headache, loss of energy and strength, palpitations, dry mouth

Prototype Drug | Prazosin *(Minipress)*

Therapeutic Class: Antihypertensive **Pharmacologic Class:** Adrenergic-blocking drug

Actions and Uses

Prazosin is a selective alpha$_1$-adrenergic antagonist that competes with norepinephrine at its receptors on vascular smooth muscle in arterioles and veins. Its major action is a rapid decrease in peripheral resistance that reduces blood pressure. It has little effect on cardiac output or heart rate, and it causes less reflex tachycardia than some other drugs in this class. Tolerance to prazosin's antihypertensive effect may occur. Its most common use is in combination with other drugs, such as beta blockers or diuretics, in the pharmacotherapy of hypertension. Prazosin has a short half-life and is often taken two or three times per day.

Administration Alerts

- Give a low first dose to avoid severe hypotension.
- Safety during pregnancy (category C) or lactation is not established.

Onset	Peak	Duration
2 H	2–4 H	LESS THAN 24 H

Adverse Effects

Like other alpha blockers, prazosin tends to cause orthostatic hypotension due to alpha$_1$ inhibition in vascular smooth muscle. In rare cases, this hypotension can cause unconsciousness about 30 minutes after the first dose. To avoid this situation, the first dose should be very low and given at bedtime. Dizziness, drowsiness, or light-headedness may occur. Reflex tachycardia may result from the rapid fall in blood pressure. Alpha blockade may cause nasal congestion or inhibition of ejaculation.

Contraindications: Safety during pregnancy and lactation is not established.

Interactions

Drug–Drug: Concurrent use of antihypertensives and diuretics results in extremely low blood pressure. Alcohol should be avoided.

Lab Tests: Prazosin increases urinary metabolites of vanillylmandelic acid (VMA) and norepinephrine, which are measured to screen for pheochromocytoma (adrenal tumor). Prazosin will cause false-positive results.

Herbal/Food: Do not use saw palmetto or nettle root products. Saw palmetto blocks alpha$_1$ receptors, resulting in the dilation of blood vessels and a hypotensive response.

Treatment of Overdose: Overdose may cause hypotension. Blood pressure may be elevated by the administration of fluid expanders, such as normal saline, or vasopressors, such as dopamine or dobutamine.

Table 13.4 Selected Adrenergic-Blocking Drugs(Antagonists) (1 of 2)

Table 13.4 Selected Adrenergic-Blocking Drugs (Antagonists)

Drug	Primary Receptor Subtype	Primary Uses
acebutolol (Sectral)	$Beta_1$	Hypertension, dysrhythmias, angina
alfuzosin (UroXatral)	$Alpha_1$	Benign prostatic hyperplasia (BPH)
atenolol (Tenormin)	$Beta_1$	Hypertension, angina
bisoprolol (Zebeta)	$Beta_1$	Hypertension, heart failure
carteolol (Cartrol)	$Beta_1$ and $beta_2$	Hypertension, glaucoma
carvedilol (Coreg)	$Alpha_1$, $beta_1$ and $beta_2$	Hypertension, heart failure, acute MI
doxazosin (Cardura)	$ALPHA_1$	Hypertension, BPH
esmolol (Brevibloc)	$Beta_1$	Hypertension, dysrhythmias
metoprolol (Lopressor, Toprol)	$Beta_1$	Hypertension, acute MI, heart failure

Table 13.4 Selected Adrenergic-Blocking Drugs(Antagonists) (2 of 2)

Table 13.4 Selected Adrenergic-Blocking Drugs (Antagonists)

Drug	Primary Receptor Subtype	Primary Uses
nadolol (Corgard)	Beta$_1$ and beta$_2$	Hypertension, angina
phentolamine (Regitine)	Alpha	Severe hypertension
prazosin (Minipress)	Alpha$_1$	Hypertension
propranolol (Inderal, Innopran XL) (see page 453 for the Prototype Drug box)	Beta$_1$ and beta$_2$	Hypertension, dysrhythmias, heart failure
sotalol (Betapace, Sorine)	Beta$_1$ and beta$_2$	Dysrhythmias
tamsulosin (Flomax)	Alpha$_1$	BPH
terazosin (Hytrin)	Alpha$_1$	Hypertension
timolol (Blocadren, Timoptic) (see page 871 for the Prototype Drug box)	Beta$_1$ and beta$_2$	Hypertension, acute MI, glaucoma

Note: This is a partial list of adrenergic-blocking drugs. For additional drugs and doses, refer to the chapter containing the primary use.

Role of Nurse

- Monitor patient's condition
- Provide education on drug therapy
- Note adverse effects of drug therapy
- Identify possible interactions
- Identify contraindications of drug therapy

Adrenergic Blocker

- Monitor urinary hesitancy, incomplete bladder emptying, interrupted urinary stream
- Monitor vital signs, level of consciousness, and mood
- Monitor for dizziness, drowsiness, or light-headedness
- Observe for side effects
- Monitor cardiac output

Nursing Practice Application

Pharmacotherapy With Adrenergic-Blocker Drugs

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Baseline assessment prior to administration: • Obtain a complete health history including cardiovascular, cerebrovascular, respiratory disease, or diabetes. Obtain a drug history including allergies, current prescription and OTC drugs, herbal preparations, and alcohol use. Be alert to possible drug interactions. • Evaluate appropriate laboratory findings including electrolytes, glucose, and hepatic and renal function studies. • Obtain baseline weight, vital signs, and cardiac monitoring (e.g., ECG, cardiac output as appropriate). • For treatment of BPH, assess urinary output. • Assess the patient's ability to receive and understand instruction. Include the family and caregivers as needed.	• *Decreased Cardiac Output* • *Ineffective Tissue Perfusion* • *Impaired Gas Exchange* • *Ineffective Airway Clearance* • *Impaired Urinary Elimination* • *Activity Intolerance* • *Deficient Knowledge* (drug therapy) • *Risk for Falls,* related to adverse effects of drug therapy • *Risk for Injury,* related to adverse effects of drug therapy • *Risk for Disturbed Sleep Pattern,* related to adverse effects of drug therapy • *Risk for Sexual Dysfunction,* related to adverse effects of drug therapy *NANDA I © 2014

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic-Blocker Drugs

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Assessment throughout administration: • Assess for desired therapeutic effects dependent on the reason for the drug (e.g., BP within normal range, dysrhythmias/palpitations relieved, greater ease in urination). • Continue frequent and careful monitoring of vital signs, daily weight, and urinary and cardiac output as appropriate, especially if IV administration is used. • Assess for and promptly report adverse effects: bradycardia, hypotension, dysrhythmias, reflex tachycardia (from too-rapid decrease in BP or hypotension), dizziness, headache, and decreased urinary output. Severe hypotension, seizures, and dysrhythmias/palpitations may signal drug toxicity and should be immediately reported.	

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Ensuring therapeutic effects: • Continue frequent assessments as described earlier for therapeutic effects dependent on the reason the drug therapy is given. Daily weights should remain at or close to baseline weight. (Pulse, BP, and respiratory rate should be within normal limits or within parameters set by the health care provider. Urinary hesitancy or frequency should be decreased and urine output improved. An increase in weight over 1 kg per day may indicate excessive fluid gain. **Diverse Patients:** Research indicates differing responses to antihypertensive therapy, including with adrenergic blocking drugs, in ethnically diverse populations compared to non-Hispanic whites.)	• Teach the patient, family, or caregiver how to monitor the pulse and BP as appropriate. Ensure the proper use and functioning of any home equipment obtained. • Have the patient weigh self daily along with BP and pulse measurements. The pulse rate should be taken for one full minute at a pulse point most easily felt. Report a weight gain or loss of more than 1 kg (2 lb) in a 24-hour period.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic-Blocker Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Minimizing adverse effects:	
• Continue to monitor vital signs. Take BP lying, sitting, and standing to detect orthostatic hypotension. Be particularly cautious with older adults, who are at increased risk for hypotension. Notify the health care provider if the BP or pulse decrease beyond established parameters or if hypotension is accompanied by reflex tachycardia. (Adrenergic drugs decrease heart rate and cause vasodilation, resulting in lowered BP. Orthostatic hypotension may increase the risk of falls or injury. **Lifespan:** Be aware that dizziness may increase the risk of falls in the older adult. Reflex tachycardia may signal that the BP has dropped too quickly or too substantially.)	• **Safety:** Teach the patient to rise from lying to sitting or standing slowly to avoid dizziness or falls. If dizziness occurs, the patient should sit or lie down and not attempt to stand or walk, until the sensation passes. • Instruct the patient to stop taking medication if BP is 90/60 mmHg or below, or parameters set by the health care provider, and immediately notify the provider.
• Continue cardiac monitoring (e.g., ECG) as ordered for dysrhythmias in the hospitalized patient. (External monitoring devices will detect early signs of adverse effects as well as monitoring for therapeutic effects.)	• Instruct the patient to immediately report palpitations, chest pain, or dyspnea.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic-Blocker Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
• Weigh the patient daily and report a weight gain or loss of 1 kg (2 lb) or more in a 24-hour period. (Daily weight is an accurate measure of fluid status and takes into account intake, output, and insensible losses. Weight gain or edema may signal that BP has lowered too quickly, stimulating renin release or is an adverse effect.)	• Have the patient weigh self daily, ideally at the same time of day, and record weight along with BP and pulse measurements. Have the patient report a weight gain or loss of more than 1 kg (2 lb) in a 24-hour period.
• Monitor urine output and symptoms of dysuria such as hesitancy or retention when given for BPH. (Continued or worsening urinary symptoms may indicate need for further evaluation of the condition. **Lifespan:** Be aware that the male older adult with an enlarged prostate is at higher risk for mechanical obstruction.)	• Have the patient promptly report urinary hesitancy, feelings of bladder fullness, or difficulty starting urinary stream.
• **Safety:** Give the first dose of the drug at bedtime. (A first-dose response may result in a greater initial drop in BP than subsequent doses.)	• Instruct the patient to take the first dose of medication at bedtime, immediately before going to bed, and to avoid driving for 12 to 24 hours after the first dose or when the dosage is increased until the effects are known.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic-Blocker Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
• Continue to monitor blood glucose and appropriate laboratory work. (Adrenergic-blocking drugs affect a wide range of body systems. They may also interfere with some oral diabetic drugs or change the way a hypoglycemic reaction is perceived.) • Assess the patient's mental status and mood. (Adrenergic blockers may cause depression or dysphoria.)	• Teach the patient with diabetes to monitor blood glucose more frequently and to be aware of subtle signs of possible hypoglycemia (e.g., nervousness, irritability). The patient on oral antidiabetic drugs should promptly report any consistent changes in blood sugar levels to the health care provider. • Teach the patient to report unusual feelings of sadness, despondency, apathy, or depression that may warrant a change in medication.
• Provide for eye comfort such as adequately lighted room. (Adrenergic-blocking drugs can cause miosis and difficulty seeing in low-light levels.)	• **Safety**: Caution the patient about driving or other activities in low-light conditions or at night until the effects of the drug are known.
• Do not abruptly stop the medication. (Rebound hypertension and tachycardia may occur.)	• Teach the patient, family, or caregiver not to stop the medication abruptly and to call the health care provider if the patient is unable to take the medication for more than 1 day due to illness.

Nursing Practice Application *continued*

Pharmacotherapy With Adrenergic-Blocker Drugs

IMPLEMENTATION

Interventions and (Rationales)	Patient-Centered Care
Patient understanding of drug therapy:	
• Use opportunities during administration of medications and during assessments to provide patient education. (Using time during nursing care helps to optimize and reinforce key teaching areas.)	• The patient, family, or caregiver should be able to state the reason for the drug; appropriate dose and scheduling; what adverse effects to observe for and when to report; equipment needed as appropriate and how to use that equipment; and the required length of medication therapy needed with any special instructions regarding renewing or continuing the prescription as appropriate.
Patient self-administration of drug therapy:	
• When administering medications, instruct the patient, family, or caregiver in the proper self-administration of drugs and ophthalmic drops. (Using time during nurse administration of these drugs helps to reinforce teaching.)	• Instruct the patient in proper administration techniques, followed by teach-back. • The drug should be taken at the same time each day when possible. • The patient, family, or caregiver is able to discuss appropriate dosing and administration needs.

See Table 13.4 for a list of drugs to which these nursing actions apply.

Drugs Affecting the Autonomic Nervous System

- Assessment
  - Potential nursing diagnoses
  - Reason for drug
  - Monitoring vital signs
  - Doing complete health history

Drugs Affecting the Autonomic Nervous System

- Cautions and contraindications for drug
  - Allergies
  - Drug history
  - Possible drug interactions
  - Evaluating lab findings
  - Assess for therapeutic effect
  - Watch for adverse effects

Drugs Affecting the Autonomic Nervous System

- Nursing Diagnosis
  - Deficient Knowledge related to drug therapy
  - Risk for Injury related to side effect of drug therapy
  - Disturbed Sleep Pattern

Drugs Affecting the Autonomic Nervous System

- Planning
  - Patient will exhibit therapeutic outcome based on specific drug
  - Patient will demonstrate an understanding of drug's activity
  - Patient will accurately describe drug side effects and precautions
  - Patient will demonstrate proper administration technique

Drugs Affecting the Autonomic Nervous System

- Implementation
  - Administration of drug
  - Observing for adverse effects
  - Patient education/discharge planning
  - Providing additional information as needed to encourage compliance
  - Doing home-health visits

Drugs Affecting the Autonomic Nervous System

- Evaluation
  - Evaluating effectiveness of drug therapy
  - Confirming that patient goals and expected outcomes have been met

Drugs for Anxiety and Insomnia

Types of Anxiety Disorders

- Situational anxiety
- Generalized anxiety disorder (GAD)
- Panic disorder
- Phobias
- Social anxiety disorder
- Obsessive-compulsive disorder (OCD)
- Post-traumatic stress disorders (PTSD)

Limbic System

- Located in middle of brain
- Responsible for emotional responses, learning, memory
- Signals pass to hypothalamus

Hypothalamus

- Responsible for unconscious responses
- Connects with *reticular formation*

Reticular Formation

- Network of neurons along length of brainstem
- Stimulation causes heightened awareness and arousal
- Inhibition causes general drowsiness and sleep

Reticular Activating System (RAS)

- Projects from brainstem to thalamus
- Responsible for sleeping and wakefulness
- Signals from hypothalamus to higher brain centers
- Thought to be process responsible for feelings such as anxiety and fear, restlessness, and interrupted sleeping pattern

Pharmacotherapy Illustrated

14.1 | Regions of the Brain Affected by Antianxiety Medications

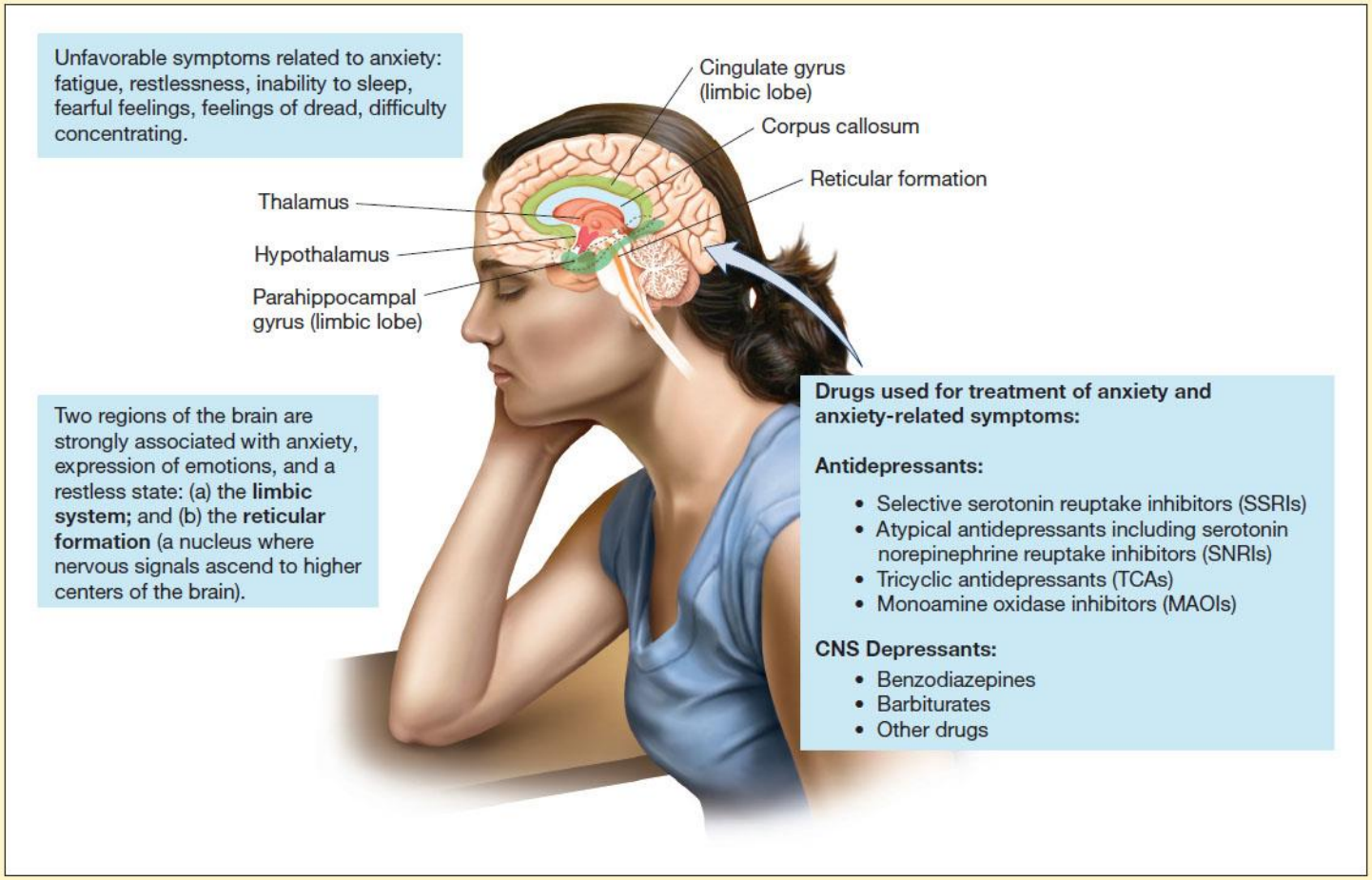
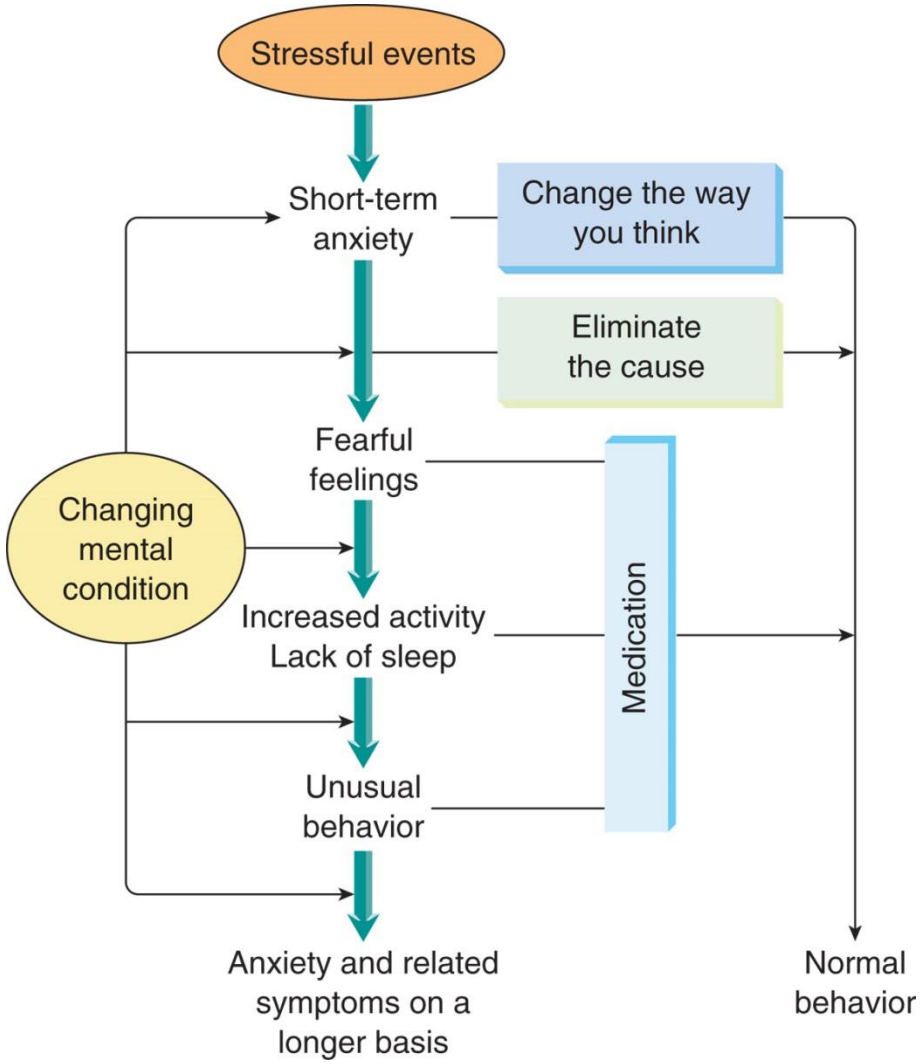


Figure 14.1 A model of anxiety in which stressful events or a changing mental condition can produce unfavorable symptoms, some of which may be controlled by medication



Nonpharmacologic Therapies to Cope with Anxiety

- Cognitive behavioral therapy
- Counseling
- Biofeedback techniques
- Meditation

Anxiolytics

- Drugs having the ability to relieve anxiety
- Quite effective
- Used when anxiety begins to significantly affect daily activities

Classes of Medications Used to Treat Anxiety and Sleep Disorders

- System is relatively free of disease
- Drugs are used to stimulate or inhibit target organs of the autonomic nervous system

Treating Anxiety and Insomnia with CNS Agents

- CNS depressants used to treat anxiety and sleep disorders categorized in four classes
  - Antidepressants
  - Benzodiazepines
  - Nonbenzodiazepine anxiolytics
  - Barbiturates
- CNS depression—a continuum ranging from relaxation, to sedation, to the induction of sleep and anesthesia

Sedatives and Hypnotics

- CNS depressants are sometimes called
  - Sedatives due to their ability to sedate or relax a patient
  - Hypnotics because of their ability to induce sleep
  - Sedative–hypnotics due to calming effect at lower doses and sleep at higher doses
- Most CNS depressants can cause physical and psychological dependence

Monitor Patient's Condition and Provide Education

- Obtain vital signs, medical and drug history
- Discuss lifestyle and dietary habits
- What precipitated the feelings of anxiety?

Assess Patient's Need for Antianxiety or Insomnia Drugs

- Assess intensity and duration of symptoms
- Identify precipitating factors
- Identify coping mechanisms
- Assess for sleep disorder

Obtain Drug History

- Hypersensitivity
- Use of alcohol and other CNS depressants
- Drug abuse and dependence

Use Cautiously for Certain Patients

- The elderly
- Those with suicidal potential
- Those with impaired renal or liver function

Insomnia

- Acts of sleeping and waking are synchronized to many different bodily functions
- Insomnia is sometimes associated with anxiety
  - Short-term or behavioral insomnia sometimes attributed to stress
  - Food or beverages with stimulants may disturb sleep

Insomnia

- Long-term insomnia often caused by depression, manic disorders, chronic pain
- Nonpharmacologic means should be attempted prior to drug therapy

Insomnia

- Rebound insomnia
  - Caused by discontinuation of long-used sedative drug
- Older patients more likely to experience medication-related sleep problems

Electroencephalogram (EEG)

- Tool for diagnosing sleep disorders, seizure activity, depression, and dementia
- Can identify two types of sleep
  - Nonrapid eye movement (NREM)
  - Rapid eye movement (REM)

Normal Sleep Patterns Involve NREM and REM

- Occur every 90 minutes
- NREM sleep—three stages
- REM sleep follows NREM sleep
- During REM sleep, dreaming occurs

Electroencephalogram (EEG)

- REM sleep—brain wave pattern of this stage similar to when person is drowsy but awake
- Patients deprived of stage III NREM sleep experience depression, apathy, and fatigue
  - Lack of REM sleep causes sleep debt—patient becomes frightened, irritable, paranoid, and even emotionally disturbed

Table 14.1 Stages of Sleep

Table 14.1 Stages of Sleep

Stage	Description
NREM stage 1	At the onset of sleep, the patient is in a stage of drowsiness for about 5 to 10 minutes. During this time, the patient can be easily awakened.
NREM stage 2	The patient is still in light sleep. The heart rate slows and the body temperature drops.
NREM stage 3	This the deepest stage of sleep. It is harder to wake up the patient in this stage. The patient is disoriented for a brief time.
REM sleep	This stage is characterized by eye movement and loss of muscle tone. Eye movement occurs in bursts of activity. Dreaming takes place in this stage. The mind is very active and resembles a normal waking state.

Antidepressants

- Treat major depression and a range of anxiety conditions
- Primary medications to reduce symptoms of panic and anxiety
  - Tricyclic antidepressants (TCAs)
  - Monoamine oxidase inhibitors (MAOIs)
  - Selective serotonin reuptake inhibitors (SSRIs)
  - Atypical antidepressants do not fall conveniently into the other categories

Antidepressants

- Adverse reactions make antidepressants unusable for some patients

Antidepressants

- **Prototype drug**: Escitalopram (*Lexapro*)
- **Mechanism of action**: increases availability of serotonin at specific postsynaptic receptor sites located within the CNS

Antidepressants

- **Primary use**: generalized anxiety and depression
- **Adverse effects**: dizziness, nausea, insomnia, somnolence, confusion, seizures

Prototype Drug | Escitalopram *(Lexapro)*

Therapeutic Class: Antidepressant; anxiolytic
Pharmacologic Class: Selective serotonin reuptake inhibitor (SSRI)

Actions and Uses

Escitalopram is an SSRI that increases the availability of serotonin at specific postsynaptic receptor sites located within the CNS. Selective inhibition of serotonin reuptake results in antidepressant activity without production of symptoms of sympathomimetic or anticholinergic activity. This medication is indicated for conditions of generalized anxiety and depression. Off-label uses include the treatment of panic disorders.

Administration Alerts

- This medication should not be started until 14 days have elapsed after discontinuing any MAOI drugs.
- In cases of renal or hepatic impairment or in older adults, reduced doses are advised.
- Dose increments should be separated by at least 1 week.
- Pregnancy category C.

PHARMACOKINETICS

Onset	Peak	Duration
With once-daily dosing, steady-state plasma concentrations can be reached within 1 wk	5 h	Variable

Adverse Effects

Serious reactions include dizziness, nausea, insomnia, somnolence, confusion, and seizures if taken in overdose.

Black Box Warning: Antidepressants increase the risk of suicidal thinking and behavior in children, adolescents, and young adults with major depressive disorder and other psychiatric disorders. This drug is not approved for pediatric patients less than 12 years of age.

Contraindications: This drug should not be used in patients who are breast-feeding or within 14 days of MAOI therapy.

Interactions

Drug–Drug: MAOIs should be avoided due to serotonin syndrome, marked by autonomic hyperactivity, hyperthermia, rigidity, diaphoresis, and neuroleptic malignant syndrome. Combination with MAOIs could result in hypertensive crisis, hyperthermia, and autonomic instability.

Escitalopram will increase plasma levels of metoprolol and cimetidine. Concurrent use of alcohol and other CNS depressants may enhance CNS depressant effects; patients should avoid alcohol when taking this drug.

Lab Tests: Unknown.

Herbal/Food: Use caution with herbal supplements such as St. John's wort, which may cause serotonin syndrome and increase the effects of escitalopram.

Treatment of Overdose: There is no specific treatment for overdose. Treat symptoms, as indicated, including dizziness, confusion, nausea, vomiting, tremor, sweating, tachycardia, and seizures.

Antidepressant Class Information

- SSRIs—partial list information/conditions
  - Safer than other classes
  - Less common sympathomimetic effects (increased heart rate and hypertension)
  - Fewer anticholinergic effects
  - Can cause weight gain and sexual dysfunction

Antidepressant Class Information

- Serotonin norepinephrine reuptake inhibitors (SNRIs)—partial list information/conditions
  - Many possible side effects
    - Abnormal dreams, sweating
    - Constipation, dry mouth, loss of appetite, weight loss
    - Tremor, abnormal vision, headaches, nausea
    - Vomiting, dizziness, and loss of sexual desire

Table 14.2 Antidepressants for Treatment of Anxiety Symptoms, Restlessness, and Depression

Table 14.2 Antidepressants for Treatment of Anxiety Symptoms, Restlessness, and Depression

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRIs)		
citalopram (Celexa)	PO: start at 20 mg/day; may increase to 40 mg/day if needed	*Nausea, vomiting, dry mouth, insomnia, somnolence, headache, nervousness, anxiety, gastrointestinal (GI) disturbances, anorexia, sexual dysfunction, agitation, dizziness, fatigue*
 escitalopram (Lexapro)	PO: 10 mg/day; may increase to 20 mg/day if needed after 1 wk	
fluoxetine (Prozac)	PO: 20 mg/day in a.m.; may increase by 20 mg/day at weekly intervals (max: 80 mg/day); when stable may switch to one 90-mg sustainedrelease capsule per week (max: 90 mg/wk)	Stevens–Johnson syndrome (SJS), extreme mania/hypomania, and suicidality (especially in children), abnormal bleeding, extreme psychomotor disturbances, seizures, autonomic instability with possible rapid fluctuations of vital signs, severe hyperthermia, serotonin syndrome
fluvoxamine (Luvox)	PO: start with 50 mg/day; may increase slowly up to 300 mg/day given at bedtime or divided bid	
paroxetine (Paxil, Pexeva, others)	PO: 20–60 mg/day	
sertraline (Zoloft) (see page 206 for the Prototype Drug box)	PO: begin with 50 mg/day; gradually increase every few weeks according to response (range: 50–200 mg).	
ATYPICAL ANTIDEPRESANTS		
duloxetine (Cymbalta)	PO: 40–60 mg/day in one or two divided doses	*Erratic heart rate and blood pressure, orthostatic hypotension, dry mouth, dizziness, somnolence, nausea, vomiting, sweating*
mirtazapine (Remeron)	PO: 15 mg/day in a single dose at bedtime; may increase every 1–2 wk (max: 45 mg/day)	
trazodone (Desyrel, Oleptro)	PO: 150 mg/day in divided doses; may increase By 50 mg/day over 3–4 days (max: 400–600 mg/day)	Severe hostility, impulsivity, mental status changes that include extreme agitation progressing to delirium and coma, suicidality (especially in children)
venlafaxine (Effexor)	PO: start with 37.5 mg/day sustained release and increase to 75–225 mg/day sustained release	

Antidepressant Class Information

- TCAs (partial list information/conditions)
  - Not for use for patients with heart attack, heart block, or arrhythmia
  - **Potential side effects**: dry mouth, blurred vision, urine retention, and hypertension
  - Concurrent use with alcohol or other CNS depressants should be avoided

Antidepressant Class Information

- MAOIs (partial list information/conditions)
  - Avoid foods containing tyramine
  - Potentiate the effects of insulin and other diabetic drugs
  - Common adverse effects include orthostatic hypotension, headache, and diarrhea

Table 14.2 Antidepressants for Treatment of Anxiety Symptoms, Restlessness, and Depression

Table 14.2 Antidepressants for Treatment of Anxiety Symptoms, Restlessness, and Depression

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
TRICYCLIC ANTIDEPRESANTS (TCAs)		
amitriptyline (Elavil)	PO: 75–100 mg/day, may gradually increase to 150–300 mg/day (use lower doses in nonhospitalized patients)	*Drowsiness, sedation, dizziness, orthostatic hypotension, dry mouth, constipation, urine retention, weight gain, tremor, dysrhythmias, blurred vision, slight mydriasis* <u>Agranulocytosis; bone marrow depression; seizures; heart block; myocardial infarction (MI); angioedema of the face, tongue, or generalized</u>
clomipramine (Anafranil)	PO: 75–300 mg/day in divided doses	
desipramine (Norpramin)	PO: 75–100 mg/day at bedtime or in divided doses; may gradually increase to 150–300 mg/day (use lower doses in older adult patients)	
doxepin (Silenor)	PO: 30–150 mg/day at bedtime or in divided doses; may gradually increase to 300 mg/day (use lower doses in older adult patients)	
imipramine (Tofranil) (see page 208 for the Prototype Drug box)	PO: 75–100 mg/day (max: 300 mg/day) in single or divided doses	
nortriptyline (Aventyl, Pamelor)	PO: 25 mg tid or qid, gradually increased to 100–150 mg/day	
trimipramine (Surmontil)	PO: 75–100 mg/day (max 300 mg/day) in divided doses	
MONOAMINE OXIDASE INHIBITORS (MAOIs)		
phenelzine (Nardil) (see page 209 for the Prototype Drug box)	PO: 15 mg tid, rapidly increasing to at least 60 mg/day; may need up to 90 mg/day	*Orthostatic hypotension, constipation, dry mouth, nausea* <u>Hypertensive crisis, hyperthermia</u>
tranylcypromine (Parnate)	PO: 30 mg/day in two divided doses (20 mg in a.m., 10 mg in p.m.); may increase by 10 mg/day at 3-wk intervals (max: 60 mg/day)	

Note: *Italics* indicate common adverse effects; <u>underlining</u> indicates serious adverse effects.

Benzodiazepines

- **Prototype drug**: lorazepam (Ativan)
- **Mechanism of action**: binds to GABA receptor-chloride channel molecule, which intensifies GABA effects
- **Primary use**: for anxiety disorders and insomnia
- **Adverse effects**: drowsiness, dizziness, respiratory depression

Prototype Drug | Lorazepam *(Ativan)*

Therapeutic Class: Sedative–hypnotic; anxiolytic; anesthetic adjunct
Pharmacologic Class: Benzodiazepine; $GABA_A$-receptor agonist

Actions and Uses

Lorazepam is a benzodiazepine that acts by potentiating the effects of GABA, an inhibitory neurotransmitter, in the thalamic, hypothalamic, and limbic levels of the CNS. It is one of the most potent benzodiazepines. It has an extended half-life of 10 to 20 hours, which allows for once- or twice-a-day oral dosing. In addition to being used as an anxiolytic, lorazepam is used as a preanesthetic medication to provide sedation and for the management of status epilepticus. Unlabeled uses include the treatment of chemotherapy-induced nausea and vomiting.

Administration Alerts

- When administering intravenous (IV), monitor respirations every 5 to 15 minutes. Have airway and resuscitative equipment accessible.
- Pregnancy category D.

PHARMACOKINETICS

Onset	Peak	Duration
1–5 min IV; 15–30 min IM; 30 minutes PO	90 min IM; 2 h PO	Variable

Adverse Effects

The most common adverse effects of lorazepam are drowsiness and sedation, which may decrease with time. When given in higher doses or by the IV route, more severe effects may be observed, such as amnesia, weakness, disorientation, ataxia, sleep disturbance, blood pressure changes, blurred vision, double vision, nausea, and vomiting.

Contraindications: This drug should not be used in patients with acute narrow-angle glaucoma, closed-angle glaucoma, misuse or excessive use of drugs, liver disease, impaired brain function, or thoughts of suicide.

Interactions

Drug–Drug: Lorazepam interacts with multiple drugs. For example, concurrent use of CNS depressants, including alcohol, potentiates sedative effects and increases the risk of respiratory depression and death. Symptoms include visual changes, nausea, vomiting, dizziness, and confusion. Lorazepam may decrease the antiparkinsonism effects of levodopa and increase phenytoin levels.

Lab Tests: Unknown.

Herbal/Food: Use cautiously with herbal supplements. For example, sedation-producing herbs such as kava, valerian, chamomile, or hops may have an additive effect with medication. Stimulant herbs such as gotu kola and ma huang may reduce the drug's effectiveness.

Treatment of Overdose: If overdose occurs, flumazenil (Romazicon), a specific benzodiazepine receptor antagonist, can be administered to reverse CNS depressant effects.

Benzodiazepines

- Some treat short-term insomnia
- Others treat various anxiety disorders
- Most benzodiazepines given orally
- Drugs of choice for short-term treatment of insomnia caused by anxiety—greater margin of safety

Benzodiazepines Bind to GABA Receptor-Chloride Channel Molecule

- Intensify effects of GABA
- **Examples**: Xanax, Librium, Tranxene

Benzodiazepines

- Have a number of other important indications
  - Seizure disorders
  - Alcohol withdrawal
  - Central muscle relaxation
  - Induction agents in anesthesia

Table 14.3 Benzodiazepines for Anxiety and Insomnia

Table 14.3 Benzodiazepines for Anxiety and Insomnia

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
ANXIETY THERAPY		
alprazolam (Xanax)	For anxiety: PO: 0.25–0.5 mg tid (max: 4 mg/day) For panic attacks: PO: 1–2 mg tid (max: 8 mg/day)	*Drowsiness, sedation, lethargy, ataxia*
chlordiazepoxide (Librium)	Mild anxiety: PO: 5–10 mg tid or qid; IM/IV: 50–100 mg 1 h before a medical procedure Severe anxiety: PO: 20–25 mg tid or qid; IM/IV: 50–100 mg followed by 25–50 mg tid or qid	Physical dependence, acute hyperexcited states, hallucinations, increased muscle spasticity, renal impairment, congenital defects among women who are pregnant, respiratory impairment due to hypersalivation, respiratory depression, laryngospasm, cardiovascular collapse
clonazepam (Klonopin)	PO: 1–2 mg/day in divided doses (max: 4 mg/day)	
clorazepate (Tranxene)	PO: 15 mg/day at bedtime (max: 60 mg/day in divided doses)	
diazepam (Valium) (see page 190 for the Prototype Drug box)	PO: 2–10 mg bid IM/IV: 2–10 mg: repeat if needed in 3–4 h	
lorazepam (Ativan)	PO: 2–6 mg/day in divided doses (max: 10 mg/day)	
oxazepam (Serax)	PO: 10–30 mg tid or qid	
INSOMNIA THERAPY		
estazolam (Prosom)	PO: 1 mg at bedtime; may increase to 2 mg if necessary	*Drowsiness, somnolence, headache, memory impairment*
flurazepam (Dalmane)	PO: 15–30 mg at bedtime	
quazepam (Doral)	PO: 7.5–15 mg at bedtime	
temazepam (Restoril)	PO: 7.5–30 mg at bedtime	Agranulocytosis, coma
triazolam (Halcion)	PO: 0.125–0.25 mg at bedtime (max: 0.5 mg/day)	

Note: *Italics* indicate common adverse effects; underlining indicates serious adverse effects.

Barbiturates

- **Prototype drug:** diazepam (Valium)
- Mechanism of action
  - Binds with GABA receptor-chloride channel molecules, intensifying effects of GABA
  - Inhibits brain impulses from passing through limbic and reticular activating systems

Barbiturates

- **Primary use**: as sedative and hypnotic
- **Adverse effects**: tolerance, respiratory depression, psychological and physical dependence

Barbiturates

- Powerful CNS depressants prescribed for sedative, hypnotic, and antiseizure effects
- Rarely, if ever, prescribed for treating anxiety or insomnia because of potential for severe adverse side effects

Barbiturates

- High risk for dependence
- Low doses reduce anxiety
- Moderate doses promote sleep

Table 14.4 Barbiturates With Sedative and Hypnotic Properties

Table 14.4 Barbiturates With Sedative and Hypnotic Properties

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
SHORT ACTING		
pentobarbital (Nembutal) secobarbital (Seconal)	Hypnotic: IM: 150–200 mg Hypnotic: PO: 100 mg at bedtime	Respiratory depression, laryngospasm, apnea
INTERMEDIATE ACTING		
butabarbital (Butisol)	Hypnotic: PO: 100 mg at bedtime	*Residual sedation* Agranulocytosis, angioedema, SJS, respiratory depression, circulatory collapse, apnea, laryngospasm
LONG ACTING		
phenobarbital (Luminal) (see page 189 for the Prototype Drug box)	Sedative/Hypnotic: PO: 30–120 mg/day; IV/IM: 100–200 mg/day	*Drowsiness, somnolence* Agranulocytosis, respiratory depression, SJS, exfoliative dermatitis (rare), CNS depression, coma, death

Note: *Italics* indicate common adverse effects; underlining indicates serious adverse effects.

Barbiturates Bind to GABA Receptor-Chloride Channel Molecule

- Intensifies effect of GABA in brain
- **Examples**: Nembutal, Seconal

Nonbenzodiazepine, Nonbarbiturate CNS Depressants

- Chemically unrelated to either benzodiazepines or barbiturates
- Used mainly for treatment of social anxiety symptoms

Nonbenzodiazepine, Nonbarbiturate CNS Depressants

- **Prototype**: zolpidem (Ambien)
- **Mechanism of action**: binds to GABA receptors
- **Primary use**: as hypnotic
- **Adverse effects**: mild nausea, dizziness, diarrhea, daytime drowsiness, amnesia, sleepwalking, eating while asleep

Nonbenzodiazepine, Nonbarbiturate CNS Depressants

- **Mechanism of action**: binds to GABA receptor
  - Preserves sleep stage III
  - Offers minor effects of REM sleep
- Other nonbarbiturate CNS depressant
  - BuSpar

Prototype Drug | Zolpidem *(Ambien, Edluar, Intermezzo)*

Therapeutic Class: Sedative–hypnotic

Pharmacologic Class: Nonbenzodiazepine $GABA_A$ receptor agonist; nonbenzodiazepine, nonbarbiturate CNS depressant

Actions and Uses

Although it is a nonbenzodiazepine, zolpidem acts in a similar fashion to facilitate GABA-mediated CNS depression in the limbic, thalamic, and hypothalamic regions. It preserves stage 3 of sleep and has only minor effects on REM sleep. The only indication for zolpidem is for short-term insomnia management (7 to 10 days). The drug is available in sublingual tablets (Edluar) and oral spray (Zolpimist) formulations. In January 2013, the FDA lowered the recommended dose due to adverse effects observed especially among women.

Administration Alerts

- Because of rapid onset, 7–27 minutes, give immediately before bedtime.
- Pregnancy category B.

Onset	Peak	Duration
7–27 min	0.5–2.3 h	6–8 h

Adverse Effects

Adverse effects include daytime sedation, confusion, amnesia, dizziness, depression with suicidal thoughts, nausea, and vomiting. Zolpidem has been associated with the development of adverse neuropsychiatric reactions, such as hallucinations, sensory distortion, sleepwalking, and nocturnal eating. Women have been found to have a significantly higher serum zolpidem concentration than men. Adverse reactions that develop are dose dependent.

Contraindications: Lactating women should not take this drug.

Interactions

Drug–Drug: Drug interactions with zolpidem include an increase in sedation when used concurrently with other CNS depressants, including alcohol. Phenothiazines augment CNS depression.

Lab Tests: Unknown.

Herbal/Food: When taken with food, absorption is slowed significantly, and the onset of action may be delayed.

Treatment of Overdose: Generalized symptomatic and supportive measures should be applied with immediate gastric lavage where appropriate. IV fluids should be administered as needed. Use of flumazenil (Romazicon) as a benzodiazepine receptor antagonist may be helpful.

Table 14.5 Miscellaneous Drugs for Anxiety and Insomnia (1 of 2)

Table 14.5 Miscellaneous Drugs for Anxiety and Insomnia

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
NONBENZODIAZEPINE, NONBARBITURATE CNS DEPRESSANTS		
buspirone (BuSpar)	Sedative: PO: 7.5–15 mg in divided doses; may increase by 5 mg/day every 2–3 days if needed (max: 60 mg/day)	*Dizziness, headache, drowsiness, nausea, fatigue, ataxia, vomiting, bitter metallic taste, dry mouth, diarrhea, hypotension* Angioedema, cardiac arrest, exfoliative dermatitis (rare); SJS, anaphylaxis, respiratory failure, coma, sudden death
dexmedetomidine (Precedex)	Sedative: IV: loading dose 1 mcg/kg over 10 min; maintenance dose 0.2–0.7 mcg/kg/h	
eszopiclone (Lunesta)	Hypnotic: PO: 2 mg at bedtime; depending on the age, clinical response, and tolerance of the patient, dose may be lowered to 1 mg	
zaleplon (Sonata)	Hypnotic: PO: 10 mg at bedtime (max: 20 mg/day)	
zolpidem (Ambien, Edluar, Intermezzo)	Hypnotic: PO: 5–10 mg at bedtime; Sublingual: 5-10 mg with at least 7-8 h remaining before the planned time of awakening	
ANTISEIZURE MEDICATIONS		
valproic acid (Depakene, Depakote) (see page 192 for the Prototype Drug box)	Social anxiety symptoms: PO: 250 mg tid (max: 60 mg/kg/day)	*Sedation, drowsiness, nausea, vomiting, prolonged bleeding time* Deep coma with overdose, liver failure, pancreatitis, prolonged bleeding time, bone marrow suppression

Table 14.5 Miscellaneous Drugs for Anxiety and Insomnia (2 of 2)

Table 14.5 Miscellaneous Drugs for Anxiety and Insomnia

Drug	Route and Adult Dose (max dose where indicated)	Adverse Effects
BETA BLOCKERS		
atenolol (Tenormin) (see page 421 for the Prototype Drug box)	Social anxiety symptoms: PO: 25–100 mg/day	*Bradycardia, hypotension, confusion, fatigue, drowsiness*
propranolol (Inderal) (see page 453 for the Prototype Drug box)	Social anxiety symptoms: PO: 40 mg bid (max: 320 mg/day)	Anaphylactic reactions, SJS, toxic epidermal necrolysis, exfoliative dermatitis, agranulocytosis, laryngospasm, bronchospasm
MELATONIN RECEPTOR DRUGS		
ramelteon (Rozerem)	Hypnotic: PO: 8 mg at bedtime	*Somnolence, dizziness, nausea*
tasimelteon (Hetlioz)	Hypnotic: PO: 20 mg per day taken before bedtime, at the same time every night	Respiratory tract infection
OREXIN RECEPTOR BLOCKER		
suvorexant (Belsomra)	Hypnotic: PO: taken in 5, 10, 15, or 20-mg strengths within 30 min of bed and no more than once per night (max: 20 mg/day)	*Daytime sleepiness* No serious adverse effects

Note: *Italics* indicate common adverse effects; underlining indicates serious adverse effects.

Nonbenzodiazepine, Nonbarbiturate CNS Depressants

- Assess for common side effects of CNS depression
- Assess neurological status, level of consciousness
- Monitor vital signs, observe respiratory patterns particularly during sleep
- Monitor patient's intake of stimulants, such as caffeine and nicotine
- Monitor affect and emotional status

Drugs for Anxiety and Insomnia

- Assessment
- Potential nursing diagnoses
- Reason for drug
- Monitoring vital signs
- Cautions and contraindications

Drugs for Anxiety and Insomnia

- Possible drug interactions
  - Completing health history
  - Drug history
  - Evaluation of lab reports

Drugs for Anxiety and Insomnia

- Nursing diagnosis
  - Risk for injury related to drug therapy
  - Deficient knowledge related to drug therapy
  - Ineffective individual coping

Drugs for Anxiety and Insomnia

- **Planning**: Patient will
  - Experience therapeutic effects depending on drug
  - Be free of adverse effects
  - Demonstrate an understanding of the drug's activity
  - Accurately describe drug side effects and precautions
  - Demonstrate proper self-administration technique

Drugs for Anxiety and Insomnia

- Implementation
  - Interventions and rationales
  - Administration of drug
  - Observing for adverse effects
  - Patient education and discharge planning

Drugs for Anxiety and Insomnia

- Evaluation
  - Effectiveness of drug therapy
  - Evaluate the achievement of goals and expected outcomes

Nursing Practice Application

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Baseline assessment prior to administration: • Obtain a complete health history including hepatic, renal, respiratory, cardiovascular or neurologic disease, mental status, narrow-angle glaucoma, and pregnancy or breast-feeding. Obtain a drug history including allergies, current prescription and OTC drugs, herbal preparations, and caffeine and alcohol use. Be alert to possible drug interactions. • Assess stress and coping patterns (e.g., existing or perceived stress, duration, coping mechanisms or remedies). • Obtain a sleep history (e.g., quality and quantity of sleep, restlessness or frequent wakefulness, snoring or apnea, remedies used for sleep, concerns). • Evaluate appropriate laboratory findings (e.g., hepatic or renal function studies). • Obtain baseline vital signs and weight. Assess the patient's risk for falls. • Assess the patient's ability to receive and understand instruction. Include the family and caregivers as needed.	• *Anxiety* • *Disturbed Sleep Pattern* • *Fatigue* • *Ineffective Coping* • *Activity Intolerance* • *Deficient Knowledge* (drug therapy) • *Risk for Injury, related to adverse effects of drug therapy* • *Risk for Falls,* related to adverse effects of drug therapy *NANDA I © 2014

Nursing Practice Application *continued*

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
Assessment throughout administration: • Assess for desired therapeutic effects (e.g., statements of improvement in anxiety, appetite, ability to carry out ADLs, and sleep patterns normalized). • Continue periodic monitoring of liver and renal function studies. • Assess vital signs and weight periodically or if symptoms warrant. • Assess for and promptly report adverse effects: excessive dizziness, drowsiness, light-headedness, confusion, agitation, palpitations, tachycardia, and musculoskeletal weakness.	

Nursing Practice Application *continued*

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
IMPLEMENTATION	
Interventions and (Rationales)	**Patient-Centered Care**
Ensuring therapeutic effects: • Continue assessments as described earlier for therapeutic effects. (If the drug is given for anxiety, the patient reports decreased anxiety, improved sleep and eating habits, improved coping, and ability to carry out ADLs without anxiety. If the drug is given for sleep, the patient reports the ability to fall and remain asleep and improved daytime wakefulness. **Diverse Patients:** Barbiturates induce P450 enzymes and may interact with other drugs. Ethnically diverse populations may also experience effects that are less than, or more than the expected effects of the drug. Nonbenzodiazepine sedative-hypnotic drugs are also metabolized through the P450 pathways. Women may metabolize some sublingual drugs (e.g., zolpidem [Ambien] more slowly, and the dosage may need to be halved by the provider.)	• Encourage the patient to keep a sleep diary of usual bedtime, the time involved trying to fall asleep, the quality and quantity of sleep, and daytime sleepiness. • **Collaboration:** Assist the patient in developing healthy coping strategies and sleep habits with referral to appropriate health care providers as needed. • **Diverse Patients:** Teach ethnically diverse patients to observe for optimal therapeutic effects and to report promptly.
Minimizing adverse effects: • Continue to monitor vital signs, mental status, and coordination and balance periodically. **Lifespan:** Be particularly cautious with older adults who are at increased risk for falls. (Drugs used for anxiety and sleep may cause excessive drowsiness and dizziness, increasing the risk of falls and injury. **Lifespan:** Many benzodiazepines and all barbiturates are included in the Beers List of potentially inappropriate drugs for older adults and warrant careful monitoring.)	• **Safety:** Teach the patient to rise from lying or sitting to standing slowly to avoid dizziness or falls. If dizziness occurs, the patient should sit or lie down and not attempt to stand or walk until the sensation passes.

Nursing Practice Application *continued*

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
IMPLEMENTATION	
Interventions and (Rationales)	**Patient-Centered Care**
• Ensure patient safety, especially in older adults. Observe for light-headedness or dizziness. Monitor and assist with ambulation as needed. (Dizziness and drowsiness for a prolonged period may occur, depending on the drug's half-life. Daytime drowsiness may impair walking or the ability to carry out usual ADLs. Subtle changes to mental alertness, cognitive functioning, or motor coordination may occur, even in the absence of sleepiness.)	• **Safety:** Instruct the patient to call for assistance prior to getting out of bed or attempting to walk alone, and to avoid driving or other activities requiring mental alertness or physical coordination until the effects of the drug are known.
• Assess for changes in level of consciousness, disorientation or confusion, or agitation. (Neurologic changes may indicate overmedication or effects of sleep deprivation.)	• Instruct the patient or caregiver to immediately report increasing lethargy, disorientation, confusion, changes in behavior or mood, slurred speech, or ataxia. • Have caregivers observe for nighttime behavioral activities such as sleepwalking, sleep-eating or sleep-driving if nonbenzodiazepine sedative-hypnotic drugs are given, and report immediately. The patient may not remember or be aware of these activities.
• Assess for changes in visual acuity, blurred vision, loss of peripheral vision, seeing rainbow halos around lights, acute eye pain, or any of these symptoms accompanied by nausea and vomiting and report immediately. (Increased intraoptic pressure in patients with narrow-angle glaucoma may occur in patients taking benzodiazepines.)	• Instruct the patient to immediately report any visual changes or eye pain.

Nursing Practice Application *continued*

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
IMPLEMENTATION	
Interventions and (Rationales)	**Patient-Centered Care**
• Monitor affect and emotional status. (Drugs may increase risk of mental depression, especially in patients with suicidal tendencies. Concurrent use of alcohol and other CNS depressants increase the effects and the risk.)	• Instruct the patient to report significant mood changes, especially depression, and to avoid alcohol and other CNS depressants while taking the drug. • Teach the patient about the need for continued monitoring, especially if pre-existing depression is present.
• Encourage appropriate lifestyle changes: lowered caffeine intake including OTC medications that contain caffeine, increased exercise during the day but not immediately before bedtime, limited or no alcohol intake, and smoking cessation. (Healthy lifestyle changes will support and minimize the need for drug therapy. Caffeine and nicotine may decrease the effectiveness of the drug. Alcohol and other CNS depressants may increase the adverse effects of the drugs.)	• Encourage the patient to adopt a healthy lifestyle of decreased or abstinence from caffeine, nicotine, and alcohol; and increased exercise. Avoiding caffeine, decreasing stimulation (e.g., TV, Internet use) before bedtime, and regular bedtime habits help to promote sleep. • Advise the patient to discuss all OTC medications with the health care provider to ensure that caffeine or alcohol is not included in the formulation.
• Avoid abrupt discontinuation of therapy. (Withdrawal symptoms, including rebound anxiety and sleeplessness, are possible with abrupt discontinuation after long-term use.)	• Instruct the patient to take the drug exactly as prescribed and to not stop it abruptly.
• Assess home storage of medications and identify risks for corrective action. (Overdosage may occur if the patient takes additional doses when drowsy or disoriented from medication effects.)	• **Safety:** Instruct the patient that these drugs should not be kept at the bedside to avoid taking additional doses when drowsy.

Nursing Practice Application *continued*

Pharmacotherapy for Anxiety or Sleep Disorders

ASSESSMENT	POTENTIAL NURSING DIAGNOSES*
IMPLEMENTATION	
Interventions and (Rationales)	**Patient-Centered Care**
• Assess prior methods of stress reduction or sleep hygiene. Reinforce previously used effective methods and teach new coping skills. (Drug therapy is used for the shortest amount of time possible. Developing other coping skills or improved sleep hygiene may lessen the need for drug therapy.)	• **Collaboration:** Teach the patient nonpharmacologic methods for stress relief and for improved sleep hygiene. Refer to appropriate health care providers or support groups as needed.
Patient understanding of drug therapy: • Use opportunities during administration of medications and during assessments to provide patient education. (Using time during nursing care helps to optimize and reinforce key teaching areas.)	• The patient should be able to state the reason for the drug; appropriate dose and scheduling; what adverse effects to observe for and when to report; and the anticipated length of medication therapy.
Patient self-administration of drug therapy: • When administering the medication, instruct the patient, family, or caregiver in proper self-administration of drug, e.g., taking only the amount prescribed. (Using time during nurse administration of these drugs helps to reinforce teaching.)	• The patient is able to discuss appropriate dosing and administration needs. • Teach patients to not open, chew, or crush extended release tablets (e.g., zopidem [Ambien]); swallow them whole with plenty of water. Sublingual forms of the drug (e.g., zolpidem [Edluar]) should be allowed to dissolve under the tongue; water should not be taken.

See Tables 14.2, 14.3, and 14.4 for lists of drugs to which these nursing actions apply.