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2nd Edition



Jaypee's NURSING DRUG BOOK 2022-2023

Forewords
Suresh K Sharma
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Jaypee's
Nursing Drug Book
2022-2023

Second Edition

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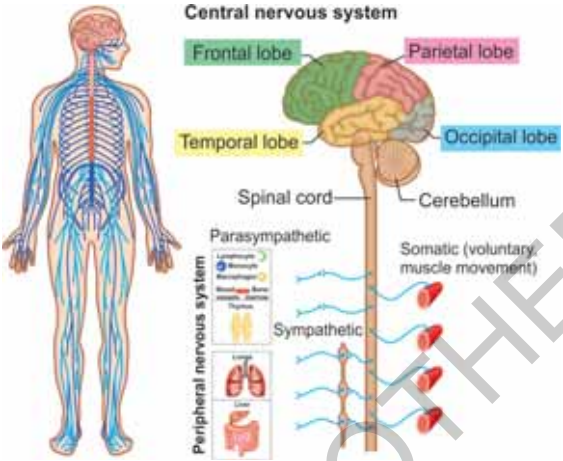
UNIT 8

Nervous System Drugs

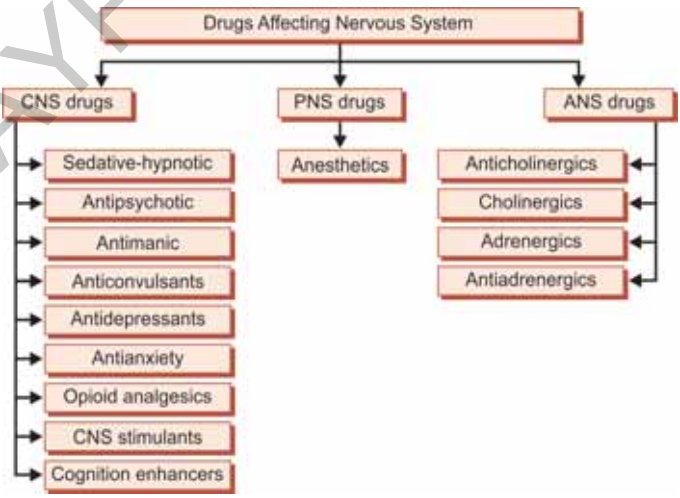
MAJOR COMPONENTS



COMMON DISEASE CONDITIONS

- **Parkinson's disease:** A chronic progressive neurological disease linked to decreased dopamine production.
- **Cerebral palsy:** Neurological disorder caused by a non-progressive brain injury or malformation that occurs while the child's brain is under development.
- **Alzheimer's disease:** A progressive degenerative disease of the brain that leads to dementia.
- **Meningitis:** Inflammation of the membranes of brain and spinal cord.

THERAPEUTIC CLASSIFICATION OF DRUG



Please note!

PNS drugs (muscle relaxants) have been discussed under drugs of musculoskeletal system.

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CHAPTER 8.1

Sedative-Hypnotic

PHARMACOLOGICAL OVERVIEW

General Use

Anxiety disorders, alcohol withdrawal, hyperexcitability and agitation, insomnia, paresthesia.

Classified Into

- Benzodiazepines—hypnotic, antianxiety, anticonvulsant
- Barbiturates—long-acting, short-acting, ultra-short acting
- Nonbarbiturates
- Other hypnotics.

Action Mechanism

It enables gamma-aminobutyric acid (GABA) to effectively interfere with neuron firing, by acting on the limbic system and reticular activating system.

Barbiturates inhibit neuronal impulse conduction in the ascending RAS, depress the cerebral cortex, alter cerebellar function, and depress motor output.

Nursing Responsibilities

Assessment

- Assess for cautions and contraindications.
- Assess effectiveness of therapy and evaluate for occurrence of adverse effects.

Potential Nursing Diagnoses

- Impaired gas exchange related to respiratory depression
- Disturbed thought processes and sensory perception related to CNS effects
- Risk for injury related to CNS effects

Implementation with Rationale

- Administer intravenous diuretics slowly because rapid administration may cause cardiac problems.
- Do not mix intravenous drugs in solution with any other drugs to avoid potential drug-drug interactions.
- Taper dose as ordered to avoid seizure attacks.
- Provide comfort measures (e.g. small, frequent meals, access to bathroom facilities, orientation, etc.) to help patient tolerate drug effects
- Provide safety measures (e.g. adequate lighting, raised side rails, etc.) to prevent injuries.
- Educate client on drug therapy to promote compliance.

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ESZOPICLONE

Cyclopyrrolone
Lunesta

Available forms: Tabs 1, 2, 3 mg

Indication	*Dosage/Route*	*Administering*
Insomnia	PO 1 mg immediately before bed, may increase to 2–3 mg if needed, max 3 mg **Hepatic dose/CYP3A4 inhibitors** PO 1 mg immediately before bed with severe hepatic disease, max 2 mg/day	Do not break, crush or chew tab Take immediately before bedtime Avoid taking with foo For short-term use only

⚠ Pregnancy, breastfeeding, children, geriatric patients, severe hepatic disease, abrupt discontinuation, COPD, depression, labor, sleep apnea, substance abuse, suicidal ideation, ethanol intoxication

Hypersensitivity

Adverse Effects

CNS: Suicidal thoughts/actions SKN: Angioedema

Drug Interaction

Increases: CNS depression—CNS depressants; toxicity due to decreased eszopiclone elimination—CYP3A4 inhibitors (clarithromycin, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, troleandomycin, SSRIs)

Decreases: Eszopiclone effect—CYP3A4 inducers (dexamethasone, barbiturates, carbamazepine, oxcarbazepine, phenytoin, fosphenytoin, ethotoin)

Drug/Food
Decrease: Product action—food

Drug/Herb
Decrease: Eszopiclone effect—St John's wort

Nursing Consideration

- Assess sleep pattern—ability to go to sleep, stay asleep, early morning awakenings, conservative methods used
- Monitor during first dose for anaphylaxis, angioedema
- Assess for CNS—depression/suicidal thoughts behaviors
- Encourage sleep inducing methods—reading, quiet environment, warm bath, milk
- Avoid alcohol intake in older adults with delirium or at high risk for delirium

Patient/Family "Must Know"??



- Daytime drowsiness may occur
- Do not engage in hazardous activities
- Memory problem may occur
- Approval from the prescriber is mandatory for intake of any other medication

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- Avoid alcohol intake
- Notify prescriber if pregnancy is suspected or planned
- Avoid use after a high-fat meal
- Notify prescriber of facial swelling, rash, complex sleep disorders (sleep driving, sleep eating), change in thinking or behavior
- Tolerance and dependence may occur on extended use
- To be aware of CNS depression, suicidal thoughts/behaviors; report at once

LORAZEPAM

Benzodiazepine, short acting
Ativan

Available forms: Tabs 0.5, 1, 2 mg; inj 2, 4 mg/mL; oral sol 2 mg/mL

Indication	*Dosage/Route*	*Administering*
Anxiety, irritability with psychiatric or organic disorder, insomnia, adjunct for endoscopic procedures, status epilepticus **Unlabeled uses:** Antiemetic before chemotherapy, rectal use, alcohol withdrawal, seizure prophylaxis, agitation, sedation maintenance	**Anxiety**  PO 2–3 mg/day in divided doses; max 10 mg/day  Same as for adults  PO 1–2 mg/day in divided doses or 0.5–1 mg at bedtime **Preoperatively for sedation**  IM 50 µg/kg 2 hours before surgery IV 44 µg/kg 15–20 min before surgery, max 2 mg; 15–20 min before surgery  ≥12 years: IV 0.05 mg/kg; max 4 mg **Status epilepticus**  N IV 0.05 mg/kg  IV 0.1 mg/kg up to 4 mg/dose RECT (unlabeled) 0.05–0.1 mg × 2; wait for 7 min before giving second dose **Sedation in mechanically ventilated patients (unlabeled)**  Intermittent IV 0.044 mg/kg q2–4hr, prn, max 4 mg single dose  Intermittent IV 0.044 mg/kg q2–4hr, prn, max 4 mg single dose	**PO Route** • With food or milk for GI symptoms; crushed if patient is unable to swallow medication as a whole • Sugarless gum, hard candy, frequent sips of water for dry mouth • Largest dose given at bedtime, if it is being given in divided doses • Concentrate—use calibrated dropper; add to food/drink; consume immediately **IM Route** • Deep into large muscle mass • Use this route when IV is not feasible **Direct IV Route** • Prepare immediately before use; short stability time • IV after diluting in equal volume sterile water, 5% dextrose or 0.9% NaCl for injection; give through

 **precaution**; **contraindications**; **Adverse effects: life-threatening**

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IV INF 0.5–8 mg/hour, titrate, use loading dose of 2–4 mg

IV INF 0.5–8 mg/hour, titrate, use loading dose of 2–4 mg

Insomnia

PO 2–4 mg at bedtime; only minimally effective after 2 weeks of continuous therapy

PO 0.5–1 mg initially

Alcohol withdrawal (unlabeled)

PO 2 mg q6hr × 4 divided doses, then 1 mg q6hr for 8 doses

Y tube or 3-way stopcock; give at ≤2 mg/1 min; do not give rapidly
- Do not use in neonates (benzyl alcohol)

Children <12 years, geriatric patients, debilitated patients, renal/hepatic disease, addiction, suicidal ideation, abrupt discontinuation

Pregnancy, breastfeeding, hypersensitivity to benzodiazepines, benzyl alcohol, closed angle glaucoma, psychosis, history of drug abuse, COPD, sleep apnea

Adverse Effects

CNS: Dizziness, drowsiness
CVS: Orthostatic hypotension, ECG changes, tachycardia, apnea, cardiac arrest (IV, rapid)
EENT: Blurred vision

Drug Interaction

Decrease: Lorazepam effects—valproic acid, oral contraceptives; change dose as needed

Drug/Herb
Increases: CNS depression—chamomile, kava, valerian

Increases: AST, ALT

Black Box Warning

- Coadministration with other CNS depressants (especially opioids) should be avoided; if used together, use lower dose
- Increase: Lorazepam effects—CNS depressants, opioids, alcohol, disulfiram
- Avoid alcohol, other psychotropic medications, opioids unless directed by the prescriber
- Notify to prescriber immediately of breathlessness, dizziness, coma or no if no response

Nursing Consideration

- Assess for decrease in anxiety, mental status—mood, sensorium affect, sleeping pattern, drowsiness, dizziness, suicidal tendencies
- Monitor renal/hepatic/blood status if receiving high dose therapy

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- Physical dependency, withdrawal symptoms—headache, nausea, vomiting, muscle pain, weakness, tremors, seizures, after long-term use, excessive use
- Alcohol consumption—avoid in older adults; may increase cognitive impairment, delirium

Patient/Family "Must Know"??



- Should not be used for everyday stress or for > 4 months unless directed by the prescriber
- Should not be taken more than prescribed amount as it is habit forming
- Avoid OTC preparation (cough, cold, hay fever) unless approved by the prescriber
- Avoid driving or activities that require alertness since drowsiness may occur
- Should not be discontinued abruptly after long-term use
- To rise slowly because fainting may occur, especially among geriatric patients
- Drowsiness may worsen at the beginning of the treatment
- To report suicidal ideation
- Pregnancy/breastfeeding—not to use in pregnancy/breastfeeding; to use contraception while using this product

OXAZEPAM

Benzodiazepine, short acting
Novoxapam, Serax, Zapex

Available forms: Caps 10, 15, 30 mg

Indication	*Dosage/Route*	*Administering*
Anxiety, alcohol withdrawal **Unlabeled use:** Insomnia	**Anxiety** PO 10–15 mg tid-qid; max 120 mg/day PO 10 mg daily bid; max 60 mg/day tid **Alcohol withdrawal** PO 15–30 mg tid-qid **Severe anxiety syndrome, agitation, anxiety with depression** PO 15–30 mg tid >12 years: PO 15–30 mg tid	• Without regard to food • Taper product (0.5 mg q3 days) before discontinuing

⚠ Geriatric patients, debilitated patients, renal/hepatic disease, depression, suicidal ideation, dementia, sleep apnea, seizure disorder

Pregnancy, breastfeeding, children <6 years, hypersensitivity to benzodiazepine, closed angle glaucoma, psychosis

⚠ **precaution**; **contraindications**; **Adverse effects: life-threatening**

Antianxiety

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Adverse Effects

CNS: Dizziness, drowsiness
CVS: Orthostatic hypotension, ECG changes, tachycardia
EENT: Blurred vision
GIT: Drug induced hepatitis

Drug Interaction

Decreases

- Oxazepam effects—oral contraceptives, phenytoin, theophylline, valproic acid
- Effects of levodopa

Drug/Herb

Increase: CNS depression—kava, melatonin, valerian

Increases: AST, ALT, serum bilirubin
Decrease: WBC

Black Box Warning

- Depressants, respiratory depression
- Increases: Oxazepam effects, respiratory depression—CNS depressants, alcohol, disulfiram
- Respiratory depression—not to be used in pre-existing respiratory depression; use cautiously in severe pulmonary disease; monitor respirations

Nursing Consideration

- Monitor CBC and LFTs periodically
- Assess BP in lying, standing position and pulse; if systolic BP drops 20 mm Hg, hold product; notify prescriber
- Assess mood, sensorium, affect, sleep pattern, drowsiness, dizziness, sedation, suicidal thoughts/behavior
- Monitor for signs of physical dependency and withdrawal symptoms—weakness, tremor, seizures (long-term use)

Patient/Family "Must Know"??



- Medication should not be used for everyday stress; and should not be used for > 4 months unless directed by the prescriber
- Not to take more than prescribed dose as it is habit forming
- Avoid OTC preparations (cough, cold, hay fever) unless approved by the prescriber
- Avoid driving or other activities that require alertness because drowsiness may occur
- Not to discontinue product abruptly after long-term use
- Drowsiness may worsen at the beginning of the treatment
- To rise slowly because fainting may occur, especially in geriatric patients
- Notify prescriber if pregnancy is planned or suspected

PROPOFOL

Phenol derivative

Diprivan

Available forms: Inj 10 mg/mL in 20 mL ampule, vials, syringes

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Indication	*Dosage/Route*	*Administering*
Induction or maintenance of anesthesia as part of balanced anesthetic techniques; sedation in mechanically ventilated patients	**Anesthesia**  <55 years and ASA I/II (diprivan or generic): IV 40 mg q10sec until induction onset, maintenance 100–200 µg/kg/min or IV BOL 20–50 mg prn, allow 3–5 min between adjustments  ≥3 years or ASA I/II: IV induction 2.5–3.5 mg/kg over 20–30 sec when not premedicated or lightly premedicated  2 months–16 years maintenance: IV 125–300 µg/kg/min, lower dose for ASA III or IV **ICU Sedation**  IV 5 µg /kg/min over 5 min; may increase by 5–10 µg/kg/min over 5–10 min until desired response (diprivan or generic)	**IV Route** • Shake well before use; dilution is not necessary, but if diluted use only D5W to ≥2 mg/mL; give over 3–5 min, titrate to needed level of sedation; use only glass containers when mixing, not stable in plastic; use aseptic technique when transferring from original container • Only with resuscitative equipment available, only by qualified person trained in anesthesia • Store in light resistant area at room temperature, use within 6 hours of opening • If transferred from original container to another container, complete infusion within 12 hours (deprivan), 6 hours (generic propofol)

⚠ Pregnancy, breastfeeding, children, geriatric patients, respiratory depression, severe repiratory disorders, cardiac dysrhythmias, labor and delivery, renal disease, hyperlipidemia

Hypersensitivity to this product or soybean oil, eggs, benzyl alcohol (some products)

Adverse Effects

CNS: Increased intracranial pressure, impaired cerebral flow, seizures
CVS: Bradycardia, hypotension, asystole bradydysrhythmias
GIT: Nausea, vomiting, abdominal cramping, pancreatitis
SKN: Flushing, phlebitis, hives, burning/stinging at injection site
RES: Apnea, cough, hiccups
SYST: Propofol infusion syndrome

Drug Interaction

Do not use within 10 days of MAOIs

Increase: CNS depression—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, inhalational anesthesia

Drug/Herb
Decrease: Propofol effect—St John's wort

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Nursing Consideration

- Assess injection site—phlebitis, burning, stinging
- Monitor ECG for changes—PVC, PAC, ST segment changes; monitor VS
- Monitor for neurologic excitatory symptoms—movement, tremor, dizziness, LOC, pupil reaction
- Avoid general anesthetic use in child <3 years, may negatively affect the brain
- Monitor for allergic reactions—hives
- Assess respiratory dysfunction—respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min
- Assess for propofol infusion syndrome—rhabdomyolysis, renal failure, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, heart failure usually between 35 and 93 hours after infusion begun at >5 mg/kg/hour for >48 hours

Patient/Family "Must Know"??



- Avoid hazardous activities until drug effect wears off; it may cause dizziness, drowsiness, sedation
- It may cause burning sensation during administration

RAMELTEON

Melatonin receptor agonist
Rozerem

Available forms: Tabs 8 mg

INDICATION	DOSAGE/ROUTE	ADMINISTERING
Insomnia (difficulty with sleep onset)	PO 8 mg within 30 minutes of bed time **Hepatic dose:** Do not use with severe hepatic disease; use with caution for mild to moderate hepatic disease	• Within 30 minutes of bedtime for sleeplessness, on empty stomach for onset • Do not break tabs, swallow as a whole • Store in tight container in cool environment

⚠ Pregnancy, hepatic disease, alcoholism, COPD, seizure disorder, depression, sleep apnea, angioedema, suicidal ideation, sleep related behaviors (sleep walking), ethanol intoxication, schizophrenia, bipolar disorder, alcohol intoxication, hepatic encephalopathy

Breastfeeding, children, infants, hypersensitivity

Adverse Effects

CNS: Suicidal thoughts/actions

SYST: Severe allergic reactions, angioedema

Drug Interaction

Possible toxicity: Antiretroviral protease inhibitors

Increases: Ramelteon effect, toxicity—alcohol; CYP1A2 inhibitors, azole antifungals (ketoconazole, fluconazole), fluvoxamine, anxiolytics, sedatives, hypnotics, barbiturates, ciprofloxacin, strong CYP2C9 inhibitors, strong CYP3A4 inhibitors

⚠ **precaution**; **contraindications**; **Adverse effects: life-threatening**

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Decrease: Ramelteon effect—strong CYP inducer (rifampin)

Drug/Food
Prolonged absorption, sleep onset reduced—high fat/heavy meal



Increase: Protein level



Nursing Consideration

- Assess for severe hypersensitivity reactions—assess for angioedema (facial swelling); product to be discontinued
- Monitor sleep pattern—type of sleep problem—falling asleep, staying asleep; complex sleep disorders (sleep walking, driving, eating)
- Mental status; mood, sensorium affect, memory (long, short-term), suicidal ideation

Patient/Family "Must Know"??



- To avoid driving or other activities that require alertness until product is stabilized because drowsiness may continue the next day
- To avoid alcohol ingestion, CNS depressants
- To avoid alternative measures to improve sleep—reading, exercise several hours before bedtime, warm bath, warm milk, TV, self-hypnosis
- To report if pregnancy is planned or suspected; to avoid breastfeeding
- To take product within 30 minutes before going to bed
- Avoid eating a high-fat/heavy meal before taking product
- To report cessation of menses, galactorrhoea (women), decreased libido, infertility, worsening of insomnia, behavioral changes, severe allergic reactions, suicidal thoughts/behaviors, if insomnia gets worse
- Medicine guide to be given to the patient and reviewed

TEMAZEPAM

Benzodiazepine, short to intermediate acting
Restoril

Available forms: Caps 7.5, 15, 22.5, 30 mg

Indication	*Dosage/Route*	*Administering*
Insomnia, short-term treatment (generally 7–10 days)	PO 7.5 to 30 mg at bedtime PO 7.5 mg at bedtime	• 15–30 minutes before bedtime for sleeplessness • Without regard to food • Store in tight container in cool environment

Children <15 years, geriatric patients, anemia, renal/hepatic disease, suicidal ideation, drug abuse, psychosis, acute closed angle glaucoma, angioedema, dementia, sleep related behaviors (sleep walking), seizure disorder, intermittent porphyria, COPD, myasthenia gravis

Pregnancy, breastfeeding, hypersensitivity to benzodiazepines

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Adverse Effects

CNS: Lethargy, drowsiness, daytime sedation

SYST: Severe allergic reactions

Drug Interaction

Increases

- Effects of cimetidine, disulfiram, oral contraceptives
- Effects of temazepam—probenecid

Decrease: Effect of antacids, theophylline, rifampicin

Drug/Herb
Increase: CNS depression—hops, kava, valerian, chamomile, skullcap

Drug/Food
Decrease: Temazepam effect—caffeine



Increases: AST, ALT

Black Box Warning

- Coadministration with other CNS depressants, respiratory depression
- Increases: Action of both products—CNS depressants, alcohol
- To avoid alcohol ingestion, sedatives, hypnotics

Nursing Consideration

- Assess mental status—mood, sensorium affect, memory (long, short), orientation
- Monitor for sleep problem—falling asleep, staying asleep; baseline, periodically
- Dependency—restrict amount given to the patient, assess for physical/psychological dependency; high level risk for abuse
- Assist with ambulation after receiving the dose
- Avoid alcohol in older adults; increased sensitivity to benzodiazepine and delirium metabolism; may cause delirium

Patient/Family "Must Know"??



- To avoid driving or other activities that requires alertness until stabilized because drowsiness, dizziness may occur
- To take as directed; not to increase dose unless approved by prescriber
- To explain about the alternative measures to improve sleep—reading, exercise several hours before bedtime, warm bath, warm milk, TV, self-hypnosis
- Not to discontinue product abruptly after long-term use
- Complex sleep-related behavior may occur—sleep driving/eating/walking
- Hangover, memory impairment is common in geriatric patients but less common than with barbiturates
- To report if pregnancy is planned or suspected; to use contraception while using this product; avoid in pregnancy; cautious use in breastfeeding; excretion is unknown

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TRIAZOLAM

Benzodiazepine, short-acting
Halcion, Apo-Triazo

Available forms: Tabs 0.125, 0.25 mg

Indication	*Dosage/Route*	*Administering*
Insomnia, sedative/ hypnotics	PO 0.125– 0.5 mg at bedtime; max 0.5 mg/day PO 0.625–0.125 mg at bedtime; max 0.25 mg/day	• After trying conservative measures for insomnia • Half an hour before bedtime for sleeplessness • On empty stomach for fast onset; may be taken with food if GI symptoms occur • Avoid use with CNS depressants; serious CNS depression may result

⚠ Children <15 years, geriatric patients, anemia, renal/hepatic disease, suicidal ideation, drug abuse, psychosis, acute closed angle glaucoma, angioedema, respiratory disease, depression, sleep related behaviors (sleep walking), seizure disorder, intermittent porphyria, myasthenia gravis, Parkinson's disease

Pregnancy, breastfeeding, hypersensitivity to benzodiazepines

Adverse Effects

CNS: Headache, lethargy, drowsiness, daytime sedation, complex sleep related reactions—sleep driving/sleep eating
GIT: Hepatic injury
SYST: Severe allergic reactions

Drug Interaction

Smoking may decrease hypnotic effects
Increases
- Triazolam levels—CYP3A4 inhibitors, protease inhibitors
- Effects of cimetidine, disulfiram, erythromycin, clarithromycin, probenecid, isoniazid, oral contraceptives; do not use concurrently

Decrease: Effect of antacids, theophylline, rifampicin

Drug/Herb
Increase: CNS depression—hops, kava, valerian, chamomile, lavender

Drug/Food
Grapefruit may increase action; avoid concurrent use

Increases: AST, ALT, serum bilirubin

Black Box Warning

- Coadministration with other CNS depressants
- Avoid use with CNS depressants; serious CNS depression may result
- Increase: Action of both products—CNS depressants, alcohol

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Nursing Consideration

- Monitor severe allergic reactions may occur
- Monitor blood studies—HCT, Hgb, RBC if blood dyscrasias suspected (rare)
- Monitor hepatic studies—AST, ALT, serum bilirubin if hepatic damage has occurred
- Assess the mental status—mood, sensorium affect, memory (long, short), insomnia, withdrawal symptoms, excessive sedation, impaired coordination
- Monitor blood dyscrasias—fever, sore throat, brushing, rash, jaundice, epistaxis (rare)
- Assess the type of sleep problem—falling asleep, staying asleep
- Assistance with ambulation after receiving the dose.

Patient/Family "Must Know"??



- To use reliable contraception
- Dependency may occur on long-term use
- To avoid driving or other activities that requires alertness until the product is stabilized
- Effectiveness may be noticed after 2 nights
- To explain about the alternative measures to improve sleep—reading, exercise several hours before bedtime, warm bath, warm milk, TV, self-hypnosis
- Complex sleep-related behavior may occur—sleep driving/eating/walking
- Hangover is common in geriatric patients but less common than with barbiturates; rebound insomnia may occur for 1–2 nights after discontinuing products; to discontinue by decreasing dose by 50% q2nights until 0.125 mg for 2 nights; then stop

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Jaypee's NURSING DRUG BOOK 2022-2023



Salient Features

- System wise brief overview of anatomy, essential physiological concepts for understanding action mechanism of drug and therapeutic classification in flowchart format
- More than 100 alphabetically arranged lucid drug monographs, with eye-catching icons and authentic drug information for quick and easy reference
- Color coded indicators on drug monographs to identify and learn overlapping functional properties of specific drugs
- Interesting memory aids (mnemonics) and important facts about pharmacology to make learning fun for students
- Pharmacological concepts captured as simple illustrations for enhanced learning
- FDA warning and drug interaction captured in boxes
- Priority-based concise appendices for quick reference of concepts
- Indicator strip-color code bar specific to additional drug class to which the drug belongs also added
- Three new appendices related to Covidology with the basics of COVID-19, Do Not Crush drugs and Pediatric Intravenous Medication Reference Chart were also included.

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