# Medication Administration NCLEX Review

## I. Pharmacodynamics

Pharmacodynamics is the study of how medications achieve their effects in the body. It takes into consideration how medication molecules interact with cells and tissues of the body as well as their biological responses, which influence the selection of specific medications for a therapeutic regimen. Medications have a variety of names, are classified by their characteristics, and have a primary reason for being administered (therapeutic effect). Because of the numerous medications available for use and their complexity of action, primary and secondary effects, and potential for interactions, nurses must know not only the commonly prescribed medications but also how to access information based on a medication's name or classification.

### A. Medication names

1. Chemical.

- Describes a medication's chemical and molecular structure.
- Example: 2-(4-isobutylphenyl) propionic acid: ibuprofen (Motrin, Advil).

2. Generic (nonproprietary, official).

- Simple name that is easier to pronounce.
- Begins with a lowercase letter.
- Example: 2-(4-isobutylphenyl) propionic acid: ibuprofen(Motrin, Advil).

3. Trade (brand, proprietary).

- Usually short and easy to recall.
- Begins with a capital letter.
- Registered by the U.S. Patent Office and approved by the FDA.
- Example: 2-(4-isobutylphenyl) propionic acid: ibuprofen (Motrin, Advil).

### B. Medication classifications

1. Medications are grouped together based on common characteristics. 2. Ways to classify medications. a. Effect on the body, such as central nervous system depressants. b. Therapeutic use, such as anticoagulants. c. Chemical characteristics, such as beta-adrenergic blocking agents. 3. Medications may fit into more than one classification because they have a broad range of effects.

### C. Primary effects of medications (therapeutic effects)

1. Symptomatic (palliative).

- Used to relieve signs or symptoms of disease, not the disease itself.

- Example: Acetaminophen relieves fever.

2. Preventive.

- Used to avoid disease.
- Example: Measles vaccine prevents measles.

3. Diagnostic.

- Used to help diagnose the presence of disease.
- Example: Radiopaque dye outlines internal body structures.

4. Curative (chemotherapeutic).

- Used to eradicate a disease or destroy disease-producing pathogens or body cells.
- Examples: Antibiotics such as azithromycin (Zithromax) destroy bacteria, and antineoplastics such as cisplatin destroy cancer cells.

5. Health maintenance (substitutive).

- Used to support normal body function.
- Examples: Regular insulin (Novolin R) lowers serum glucose level in clients with diabetes; levothyroxine (Synthroid) replaces thyroid hormones in clients with hypothyroidism.

6. Contraceptive.

- Used to prevent pregnancy.
- Example: Combined oral contraceptives (estrogen and progestin) and progestin-only pills are prescribed to prevent pregnancy.

7. Antidote.

- Used to reverse the toxic effect of another medication.
- Examples: Vitamin K limits bleeding due to warfarin (Coumadin) and naloxone (Narcan) limits central nervous system depression due to opioids.

**D. Secondary effects of medications (unintended effects) and related nursing care**

1. Side effect.

- A side effect is a common unintended response to a medication that generally is predictable and well tolerated.
- Examples: Dry mouth, anorexia.
- Nursing care.
    - Implement palliative independent and dependent measures to address side effects that are not serious.
    - Examples: Offering frequent mouth care for a client experiencing dry mouth; providing food preferences for a client with anorexia.

2. Adverse effect.

- An adverse effect is an unintended, usually unpredictable harmful response to a medication that is more severe than a side effect.
- Example: Bone marrow depression.
- Nursing care.
    - Notify the primary health-care provider of the client's status.
    - Discontinue the medication per the primary health-care provider's prescription (cessation of the medication generally is indicated).

3. Toxic effect.

- A toxic effect is a dangerous, harmful response to a medication.
- May result from a medication overdose, accumulation of a medication's ingredients due to impaired biotransformation or excretion (cumulative effect), or the body's abnormal sensitivity to a medication.
- Examples: Liver damage (hepatotoxicity), kidney damage (nephrotoxicity).
- Nursing care.
    - Assess the type and amount of over-the counter (OTC) medications the client is using.
    - Teach clients how to examine medication labels to identify ingredients in OTC medications that can cause a cumulative effect when taken with another medication with the same ingredient (e.g., acetaminophen [Tylenol] for pain and an OTC cold remedy that contains acetaminophen; taken together they may exceed the recommended dose limit for acetaminophen).
    - Withhold the medication and notify the primary health-care provider if the client exhibits a toxic reaction to a medication.

4. Allergic reaction.

- An allergic reaction is the response of a client's immune system to the presence of a substance that produces a hypersensitivity reaction (e.g., medication).
- Certain classifications of medications frequently cause allergic reactions
- Example: Rash, breathing difficulty, circulatory collapse (anaphylaxis).
- Nursing care.
    - Collect information from the client and primary health-care provider about a history of medication and food allergies before administering prescribed medications.
    - Document the presence of allergies according to agency policy and procedure (e.g., in the nursing history and physical, on the medication administration record, and on the medication reconciliation form); have the client describe the clinical manifestations of the allergic response.
    - Secure an allergy alert band to the client's wrist to alert health-care team members of the client's history of allergies.
    - Check the client's clinical record, medication administration record, and wristband to ensure that the client has no allergies before administering medications.
    - Ensure that medication products that a client is susceptible to are not contained in a prescribed or OTC medication that the client will be taking.
    - Assess for clinical manifestations of an allergic response to medications, especially when administering a medication for the first time.

    - Implement emergency measures if a client experiences an anaphylactic response to a medication (e.g., initiate the rapid response team and prepare medications, such as epinephrine, that may be prescribed to support the client).
    - Teach a client who has a medication allergy how to examine medication labels to ensure that OTC medications do not contain offending allergens.

5. Idiosyncratic reaction.

- An idiosyncratic reaction is a resistant, overreaction, or unpredictable reaction that is different from the expected response to a medication.
- Example: An older adult becomes agitated or restless after receiving a sedative.
- Nursing care.
    - Notify the primary health-care provider of the client's status.
    - Discontinue the medication per the primary health-care provider's prescription cessation of the medication generally is indicated.

6. Tolerance.

- Tolerance occurs when there is a decreased physiological response after repeated exposure to a medication.
- Example: A client receiving an opioid no longer experiences relief from pain.
- Nursing care.
    - Notify the primary health-care provider if tolerance occurs.
    - Implement the primary health-care provider's prescriptions, which may include discontinuation of the medication, an increase in the medication dose, or replacement of the medication with a different medication.

7. Teratogenic effect.

- A teratogenic effect occurs when a medication causes abnormal development of a fetus when taken by a pregnant woman, especially during the first trimester of pregnancy, when the organs of the fetus are developing (organogenesis).
- Medications are classified from category A (no risk to fetus) and progressively escalate in level of risk to category D (evidence of fetal risk but potential benefit to the mother may be acceptable).
- A separate category identified as X classifies medications that cause fetal abnormalities, for example, isotretinoin (Claravis) for severe acne and acitretin (Soriatane) for severe psoriasis.
- Examples: Classifications include diuretics, antiepileptics, analgesics, antihistamines, antibiotics, and antiemetics.
- Nursing care.
    - Ensure that the client is not pregnant when a medication that is teratogenic is prescribed.
    - Teach the client to abstain from sexual intercourse or use more than one contraceptive method during the course of therapy.

**E. Medication interactions and related nursing care**

1. Synergistic effect.

- A synergistic effect occurs when the combined effect of two medications is greater than when the effects of each are added together.
- Example: Administration of either a diuretic or an antihypertensive to treat hypertension may
  decrease the client's blood pressure by 10%; however, when administered together, the drugs may interact exceeding the combined effect of both drugs which may decrease the client's blood pressure excessively.
- Nursing care.
    - Assess resources to identify whether medications being administered concurrently have the potential for precipitating a synergistic effect.
    - Assess for clinical manifestations of an excessive response. If one occurs, withhold the next dose and notify the primary health-care provider of the client's status.

2. Potentiation.

- Potentiation occurs when the interaction of two medications results in an increase in the action of just one of the medications.
- Example: Probenecid blocks the excretion of penicillin, increasing the blood level of penicillin and, therefore, its effectiveness.
- Nursing care.
    - Assess resources to identify whether medications being administered concurrently have the ability to precipitate a potentiation effect.
    - Assess for clinical manifestations of the expected therapeutic effects, particularly those related to the medication that is being maximized by the interaction of the two medications.

3. Physical or chemical incompatibilities.

- Physical or chemical incompatibilities occur when two medications interact with each other resulting in an unintended effect.
- Antagonistic relationship.
    - One medication decreases the therapeutic effect of another medication.
    - Example: Loop diuretics can decrease the effects of nonsteroidal anti-inflammatory medications.
    - Chemical incompatibility.
- Two intravenous medications when combined can cause chemical deterioration of one or both medications (usually due to acid-base incompatibility), resulting in precipitate formation, color change, or gas development.
- Example: Famotidine (Pepcid) and azithromycin (Zithromax) cannot be combined in one solution.
- Nursing care.
    - Assess resources to identify whether medications being administered concurrently are compatible or incompatible.
    - Administer incompatible intravenous medications separately to maintain the integrity of each medication.
    - Check mixed solutions before administration for changes in appearance that indicate a medication interaction (e.g., precipitate, color change, or gas development).

**F. Commonalities of nursing care related to nontherapeutic responses to medications**

1. Check medication compatibility charts before administering medications being given concurrently to ensure that they are compatible.

2. Assess for therapeutic and nontherapeutic clinical manifestations of medication therapy.

3. Withhold a medication when a client demonstrates a sign or symptom that is more serious than a side effect or if a medication-medication interaction occurs and report the finding to the primary health-care provider.

4. Teach the client about the medication regimen.

- The action of and rationale for the prescribed medication.
- Pertinent information regarding safe administration.
- Actions to take if a dose is accidentally omitted.
- Assessments to make to evaluate responses to the medication. e. Actions to take in the event of a nontherapeutic response.

5. Document consultation with the primary healthcare provider regarding a client's nontherapeutic response to medication therapy and resulting interventions.

6. Document all information associated with medication administration and client responses to therapy.

7. Implement emergency actions to support a client who has a serious nontherapeutic response until a primary health-care provider assumes responsibility for prescribing medical interventions; for example, activate the rapid response team, administer oxygen, elevate the head of the bed, and prepare for intubation and mechanical ventilation if a client is having difficulty breathing.

8. Implement measures based on standing prescriptions; for example, administer an antidote for an overdose or epinephrine for an anaphylactic reaction.

**II. Pharmacokinetics**

Pharmacokinetics is the study of the absorption, distribution, biotransformation (metabolism), and excretion of medications. Each of these factors is related to the concentration of the medication in the body and can be viewed in relation to a time frame associated with the medication's pharmacological effects (Fig. 9.1). Nurses should understand these concepts as well as the factors that affect pharmacokinetics and related nursing care.

**A. Elements of pharmacokinetics**

1. Absorption.

- Absorption is the process of movement of a medication into the bloodstream.
- Rate of absorption depends on a number of factors.
    - Route of administration: Oral route requires time for medication absorption versus the intravenous route, which is distributed immediately.

- Presence or absence of food in the stomach: Food in the stomach can delay absorption of medications and lengthen the time it takes for a medication to reach the small intestines, where most medications are absorbed.

2. Distribution.

- Distribution is the transport of a medication from the site of absorption to the site of medication action.
- Affected by such factors as degree of membrane permeability; protein binding capacity of the medication; and interruption in arterial blood supply to a tissue, organ, or extremity that limits delivery of a medication to the target site.
  - Tightly packed endothelial cells prevent some medications from being distributed to the brain (blood-brain barrier).
  - Only medications that are lipid soluble and are more loosely bound to plasma proteins can pass through the blood-brain barrier.

3. Biotransformation (metabolism).

- Biotransformation is the conversion of a medication to a less active form (detoxification) in preparation for excretion.
- Occurs mainly in the liver but also can occur in the kidneys, intestinal mucosa, lungs, or blood plasma.
- Can be affected by disease states.

4. Excretion.

- Excretion is the elimination of medications by the body.
- Occurs primarily via the kidneys, where medications are eliminated from the body via urine but also can occur via feces, perspiration, saliva, breath, and breast milk.
- Ability to excrete medications decreases with age, placing older adults at risk for medication accumulation and toxicity.
- Kidney disease can interfere with excretion, thereby causing medication accumulation and toxicity.

**B. Concepts associated with medication effectiveness and related nursing care**

1. Duration.

- Duration is the length of time a therapeutic blood concentration of a medication is maintained.
- Nursing care.
  - Assess the client’s response, considering the medication’s expected duration of action.
  - Notify the primary health-care provider if an unexpected response occurs.
  - Example: A client receiving a sedative is lethargic long after the effect of the medication should have dissipated, requiring a decrease in the dosage of the medication or discontinuation of the medication.

2. Half-life.

- Half-life is the time needed to metabolize or inactivate one-half the amount of a medication.
- Nursing care.
    - Assess the client's response, considering the medication's half-life.
    - Notify the primary health-care provider if an unexpected response occurs.
    - Example: A client has pain before the next scheduled dose of an analgesic, indicating that the dose should be increased or the time between doses shortened.

3. Onset.

- Onset is the length of time it takes the body to respond to a medication.
- Nursing care.
    - Assess the client's response to a medication at the time of the medication's expected onset.
    - Example: Most oral analgesics have an onset of 20 to 30 minutes.

4. Peak blood level.

- A peak blood level is the highest blood concentration of a medication.
- Nursing care.
    - Arrange for the client's blood to be drawn for a peak plasma level 30 to 60 minutes after medication administration.
    - Example: Client's peak blood level for a medication exceeds the expected therapeutic level; withhold the medication and inform the primary health-care provider; a decrease in the frequency or dose usually is required.
    - Seek a prescription for a decrease in the dose and/or frequency of administration.

5. Trough blood level.

- A trough blood level is the lowest blood concentration of a medication.
- Nursing care.
    - Arrange for the client's blood to be drawn for a trough level just before the next scheduled dose.
    - Example: Client's trough level for a medication is less than the expected therapeutic level; inform the primary health-care provider; an increase in the frequency or dose usually is required.
    - Seek a prescription for an increase in the dose and/or frequency of administration.

6. Therapeutic range.

- The therapeutic range is the dosage range or serum concentration of a medication usually expected to achieve the medication's desired effect.
- Nursing care.
    - Monitor serum peak and trough levels to ensure that levels fall within the established therapeutic window for the medication.
    - Example: The peak level for gentamicin should not exceed 10 mcg/mL and trough levels should not be below 2 mcg/mL).

**C. Factors affecting pharmacokinetics and related nursing care**

1. Age.

- Infants have immature body systems and are small in size.
- Older adults experience decreased multiorgan functioning, which increases medication absorption and decreases biotransformation and excretion.
- Nursing care.
    - Ensure that medication doses are appropriate for body weight of infants and children.
    - Assess infants, children, and older adults for clinical manifestations of medication toxicity. Clients may require a lower dose of the medication.

2. Body mass.

- A person with a larger body mass may require a larger dose.
- A person with a smaller body mass may require a lower dose.
- Nursing care.
    - Evaluate the response of obese clients to medications to ensure that a therapeutic response is achieved with the prescribed dose.
    - Evaluate the response of a client with a small body mass to ensure that the dose prescribed is not excessive.

3. Diet.

- The presence of food can delay the absorption of some medications.
- Some medications can cause gastric irritation when not taken with food.
- Some foods can alter the action of medications.
    - Foods high in vitamin K should be consistently limited in clients receiving the anticoagulant warfarin (Coumadin) because vitamin K is the antidote for warfarin toxicity; in addition, inconsistent intake of vitamin K causes fluctuating prothrombin times and International Normalized Ratio (INR) levels.
    - Tyramine-rich foods, such as aged cheese, pickled herring, yogurt, raisins, chicken liver, dried sausage, and sauerkraut, when taken with a monoamine oxidase (MAO) inhibitor, can precipitate a hypertensive crisis, intracranial bleeding, and death.
- Some medications can alter nutrients or appetite.
    - Quinolone antibiotics may extend the effects of caffeine.
    - Lisdexamfetamine (Vivance) reduces appetite, contributing to weight loss.
- Nursing care.
    - Teach clients when a medication should be given with or without food.
    - Teach clients about foods to ingest or avoid to prevent nontherapeutic effects of medications.

4. Environment.

- Hot environments cause peripheral vasodilation, intensifying the action of vasodilators.
- Cold environments cause peripheral vasoconstriction, inhibiting the action of vasodilators while increasing the action of vasoconstrictors.
- Noisy environments can interfere with the therapeutic effects of sedatives and analgesics.
- Nursing care.
    - Ensure a temperate (moderate, not excessive) environmental temperature when a

client is receiving a vasodilator or vasoconstrictor.
    - Ensure a quiet environment when a client is receiving a sedative or analgesic.

5. Gender.

- Medication response discrepancies in men and women are attributable to body fat distribution, percentage of body fluid differences, and hormonal differences that affect medication absorption.
- The majority of medication research is based on studies involving men; responses of women may be different from what is documented in medication literature.
- Nursing care.
    - Explore manufacturer-provided information to determine if research included women if the medication is to be administered to a woman.
    - Assess for therapeutic and nontherapeutic responses in women.

6. Genetic, ethnic, and cultural factors.

- Genes can cause liver metabolism to be slow or rapid, influencing medication metabolism.
- Research demonstrates that a dose of medication may be therapeutic for individuals in a specific ethnic group and toxic for those in another group (e.g., opioids are metabolized at a slower rate by individuals of Asian descent).
- Nursing care.
    - Identify clients who are at risk for nontherapeutic effects of medication therapy because of genetic, ethnic, and cultural factors.
    - Assess clients of Asian descent who are prescribed opioids for clinical manifestations of medication toxicity.

7. Illness and disease.

- Impaired gastrointestinal, liver, kidney, or cardiovascular function can alter a client's response to a medication because of altered absorption, transport, biotransformation, or excretion.
- Nursing care.
    - Assess clients with impaired gastrointestinal functioning to ensure that oral medications are effective; route may need to be changed when oral medications are ineffective.
    - Assess clients with impaired cardiovascular functioning to ensure that medications are effective; impaired cardiovascular functioning may not transport medications to desired site of action.
    - Assess clients with impaired liver or kidney functioning for signs of toxicity due to inadequate biotransformation or excretion of the medication.

8. Psychological factors.

- If a client believes that a medication will work, the client often has a more favorable therapeutic response.
- If a client mistrusts the value of a medication, this belief can interfere with the medication's effectiveness.
- Anxiety can interfere with the therapeutic effect of central nervous system depressants.

- Nursing care.
    - Explore the client's beliefs about the value of a medication regimen.
    - Clarify the client's misunderstandings about a medication to increase trust in the value of the regimen.
    - Employ nursing measures to reduce anxiety when a client is receiving central nervous system depressants.

9. Route of administration.

- The route influences the volume of medication absorbed into the circulation and its transport to the target site (e.g., oral medications require time to be absorbed and transported, whereas those administered via the intravenous route produce an immediate response).
- Nursing care.
    - Ensure that the route is appropriate for the client's situation. For example, if the client has gastric surgery, the oral route may not be appropriate; if the client is confused, the client may not understand that a troche should be held in the buccal cavity until dissolved.
    - Assess the client's response to medication based on the expected onset associated with the route used.

**III. Medication Misuse**

Many medications, particularly central nervous system stimulants and depressants, have a narrow therapeutic window. When medications are misused, the therapeutic window may be exceeded, resulting in numerous negative physiological and psychological consequences, including death. Nurses must teach clients how to use medications responsibly, assess clients for the clinical manifestations of medication misuse, and intervene to help clients who are struggling with the negative consequences of medication misuse.

**A. Terminology related to medication misuse**

1. Drug misuse: Continual or periodic maladaptive use of a medication different from the recommended prescribed pattern, causing physical and/or emotional harm with a risk of disturbance of daily life.

2. Habituation: Repeated misuse that causes a person to feel better than when not using the medication; the person generally can discontinue use without severe psychological or physical effects.

3. Illicit medications(street medications): Medications that are sold illegally.

4. Physiological dependence: Need for a medication to avoid physical manifestations of withdrawal.

5. Psychological dependence: Emotional need for a medication to maintain a feeling of well-being, satisfaction, or pleasure.

6. Tolerance: Condition in which the body becomes accustomed to a medication and needs a larger dose to attain the desired effect or to prevent clinical manifestations of withdrawal.

7. Withdrawal syndrome: Presence of specific physical and/or psychological signs and symptoms associated with cessation of a particular medication on which the client is dependent.

**B. Nursing care related to medication misuse**

1. Assess for clinical manifestations of physiological dependence on a medication (e.g., signs and symptoms of withdrawal when the medication is not taken).

- Stimulants: Pressured speech, hyperactivity or hypoactivity, signs of central nervous system stimulation or depression, and requests for analgesics before the next scheduled dose.
- Opioids: Watery eyes, runny nose, dilated pupils, tremors, chills, fever, yawning, diaphoresis, nausea, vomiting, diarrhea, and abdominal cramps.

2. Assess for clinical manifestations of psychological dependence on a medication (e.g., signs and symptoms of anxiety when the medication is not taken, compulsive behaviors associated with procuring and using a medication).

3. Assess for clinical manifestations of tolerance to a medication (e.g., request for a medication before the next scheduled dose, nonachievement of a therapeutic effect after receiving what is considered to be an adequate dose).

4. Assess for clinical manifestations of habituation to a medication (e.g., taking a laxative every day, using an antihistamine to promote sleep).

5. Use interviewing skills to determine insight into personal problems resulting from medication misuse and explore client concerns.

6. Teach nonpharmacological strategies to manage stress and anxiety.

7. Teach pregnant women to avoid unnecessary medications, alcohol, and nicotine because of the risk of fetal harm.

8. Reinforce efforts by the client toward stopping medication misuse.

9. Provide information about referrals to professionals or agencies that can assist the client with withdrawal.

**IV. Herbal Supplements**

Herbs are plants used for medicinal purposes. Many people take them to promote health and wellness, increase energy and performance, prevent and treat illnesses, or relieve depression. The use of herbal supplements has increased concurrent with the expanding interest in alternative therapies as people seek more “natural” therapies. Unfortunately, many people are misinformed of the facts about herbal supplements. Nurses must educate clients so that clients can make informed decisions about the use of herbal supplements.

**A. Factual information about herbal supplements**

1. Some herbal supplements may prevent, treat, and cure some illnesses through the use of plant substances.
2. Some manufacturers of herbal supplements claim benefits that are unproven.
3. Some herbal supplements, when taken with prescribed or OTC medications, can cause serious medication-medication interactions or nontherapeutic responses.
4. Some clients do not share information regarding self-medication with herbal supplements because
   either they do not realize the importance of this information or they are embarrassed that they are self-medicating

**B. Herbal supplements and related nursing care**

1. Know and understand information related to the most common herbal supplements.
2. Collect data about herbal supplement intake (including the name of each supplement and the amount, frequency, and reasons for its use), and share this information with clients' primary health-care providers. Also include this information on medication reconciliation forms.
3. Explore each client's understanding about herbal supplements being taken.
4. Assess for signs and symptoms of adverse reactions to herbal supplements.
5. Teach clients that herbal supplements can increase or decrease the effects of other medications and therefore must be avoided when taking certain prescribed or OTC medications.
6. Teach clients to avoid the ingestion of alcohol with many herbal supplements because of the risk of nontherapeutic interactions.
7. Teach clients about the risk of having an allergic reaction to herbal supplements and instruct them to discontinue intake if signs and symptoms occur.
8. Encourage clients to discuss benefits and risks of taking herbal supplements with their primary health-care providers.
9. Teach clients to stop the use of herbal supplements that have antiplatelet properties, such as garlic and gingko biloba, when scheduled for dental intervention or surgery.
10. Encourage women who are pregnant or trying to become pregnant to avoid all herbal supplements because little is known regarding teratogenic effects.
11. Encourage women who are breastfeeding to avoid taking herbal supplements because of unknown effects on infants.
12. Refer clients to reliable sources of information about herbal supplements.

**V. The Rights of Medication Administration and Related Nursing Care**

A nurse should focus on five elements when administering medications. These elements are called the Five Rights of Medication Administration and include the right client, right medication, right dose, right route, and right time. A nurse should consider these five elements when administering each medication because they have proven to be valuable in reducing medication errors.

**Please click here to view video:** https://youtu.be/TqVrR69Swr0

**A. Right client**

1. Check the client's name against two verifiers, following agency policy. For example, ask the client to state his or her name and birth date and verify the name against the medication administration record (MAR) and client's wristband; if applicable, use a computer scanner to verify the client's wristband bar code.
2. Follow alert procedures when two clients have a similar last name (e.g., place them in different rooms, flag their MARs and the front of their clinical records, and place wristbands issuing the alert).

**B. Right medication**

1. Know the normal dose for commonly administered medications.
2. Check a resource about a medication for which you are unsure.
3. Verify the medication against the primary healthcare provider's prescription.
4. Use a computer scanner to verify the medication package bar code.

**C. Right dose**

1. Ensure that the prescribed dose is appropriate for the client. Use a pediatric calculation formula for infants and children.
2. Calculate the dose carefully and double-check all math calculations.
3. Use a computer scanner to verify the medication package bar code.
4. Question the primary health-care provider about a dose outside the expected range.

**D. Right route**

1. Give the medication via the prescribed route.
2. Ensure that the route is safe for the client (e.g., rectal route is contraindicated in clients with rectal bleeding; oral route is contraindicated when a client is vomiting).

**E. Right time**

1. Give the medication at the prescribed time, ensuring that it is less than 60 minutes before or after the scheduled time (e.g., numerous clients receiving care from one nurse cannot all receive 10:00 medications at the same time).
2. Ensure that the medication is administered at the prescribed frequency (e.g., once a day, twice a day, three times a day).

Other importation rights of medication administration:

**F. Right education**

1. Provide the client with information about the medication, including its name, action, expected therapeutic response, and associated precautions.

2. Ask whether the client has any questions and correct misconceptions.

**G. Right assessment**

1. Implement all assessments required before medication administration (e.g., pulse rate and/or blood pressure for cardiac medications).
2. Administer medications based on parameters identified by the primary health-care provider that require a specific assessment (e.g., give a specific number of units of insulin to “cover” a particular blood glucose level).
3. Ensure that the medication is still appropriate for the client.

**H. Right to refuse**

1. Explore the client’s reason for refusing to take a medication.
2. Implement teaching regarding the necessity of the medication and correct client misconceptions.
3. Accept the client’s right to refuse to take a medication.
4. Document the client’s stated reason for refusing a medication.
5. Notify the primary health-care provider of the client’s refusal to take a prescribed medication.

**I. Right evaluation**

1. Reassess the client and compare the actual outcome with the expected outcome to determine medication effectiveness.
2. Be alert for nontherapeutic effects.
3. Notify the primary health-care provider of nontherapeutic effects and seek new prescriptions as needed.
4. Document the client’s response to all medications in the clinical record.

**J. Right documentation**

1. Document all medications given in the MAR after they are given, never before.
2. Maintain appropriate legal documents concerning controlled medications.
3. Follow agency policy when a medication is not administered; for example, circle, initial, or highlight the dose on an electronic chart and document why the medication was not given (e.g., client refused medication, BP beyond parameters).
4. Complete an incident report if a prescribed medication was not administered properly, such as not on time, missed dose, or inaccurate dose.

**VI. Medication-Dispensing Systems**

The introduction of individual packaging of medications (unit-dose) and the use of a medication cart with a drawer for each client provided a better system to secure, store, prepare, and deliver medications to clients prior to the previous system of large bottles of stock medications, reducing

medication errors. Automated dispensing systems have added an additional level of safety by requiring a user password and providing a computer database that records all pertinent information when a medication is administered. The most recent safety measure is the use of a computer sensor to scan a bar code to verify the client's name and the medication to be administered; it also documents the medications administered. Multiple checks and balances help to maintain client safety concerning medication administration.

**A. Medication cart**

1. Lockable, rolling cabinet that contains medications for clients on a specific unit.

- Must be locked whenever the nurse steps away.
- Can be opened only by a key/card or access code.

2. Should be wheeled to outside each client's room when administering medications and left locked outside an open doorway to a client's room when giving medications to a client.

3. Generally are stored in or near the nurse's station when not in use, although some facilities require them to be locked to the wall of the nurse's station or stored in a locked medication room.

4. Generally contains the following contents.

- Top of the cart provides a work surface and holds important equipment and supplies, such as the computer, pitcher of water, medicine cups, and pill crusher.
- A sharps container, trash container, and light may be built into the top or attached to the side of the cart.
- Handles are provided for steering and for holding equipment, such as a stethoscope.
- The top drawer may contain straws, tongue blades, gauze, alcohol wipes, and other supplies.
- Small drawers correlate to the room number and beds on the unit; they are labeled with clients' identification information and contain the medications that each client is to receive for 24 hours.
- A large drawer may contain bulkier items, such as bottles of liquids.
- Another large drawer may contain stock medications, such as aspirin, ibuprofen, acetaminophen, and docusate sodium.
- Another drawer with divided compartments may contain different-sized syringes and gauge needles.

5. Medications in drawers are restocked by a member of the pharmacy department.

6. Generally contain medications in unit-dose packages, with each package stating the medication name, dose, and expiration date.

**B. Medication room**

1. Generally, contains controlled medications in a locked cabinet or an automated medication dispensing cabinet.

2. Used to prepare intravenous solutions before transport to a client's room or preparation of

subcutaneous (Sub-Q) or intramuscular (IM) injections, which are then capped and transported individually to each client.

3. May have a refrigerator dedicated only for the storage of medications that must be kept cool, such as some vaccines and skin test agents.

**C. Automated medication-dispensing systems**

1. Computer access system that controls the distribution, management, and control of medications.

2. Usually contains controlled medications, but some agencies are moving toward using an automated medication-dispensing cabinet for all client medications.

3. Requires the password/card of the caregiver, requires the nurse to access a client's name and select a medication, dispenses the medication, and records the entire transaction.

## VII. Medication Prescriptions

Administration of a medication requires a prescription by a primary health-care provider and is a dependent function of the nurse. The nurse must ensure that all components of a prescription are evident before administering the medication. Primary health-care providers can write various types of prescriptions, such as standing, as needed (prn), single-dose, immediately (STAT), and now orders. Nurses must know the policies and procedures associated with the communication of medication prescriptions, such as transcription of medication prescriptions and reception of verbal and telephone prescriptions. These legal requirements and policies and procedures are designed to ensure safety and reduce errors associated with the delivery of medications.

**A. Parts of a medication prescription**

1. Client's full name.
2. Date and time the prescription is written.
3. Name of the medication.
4. Dosage of the medication.
5. Route of administration.
6. Frequency of administration.
7. Situation (e.g., when an as-needed medication should be administered, parameters for when a medication should be held).
8. Primary health-care provider's signature.

**B. Types of medication prescriptions**

1. Standing (routine).

- Medication prescription that is carried out until it is discontinued or the required number of days has lapsed.
- Nursing care.
    - Know facility policies regarding automatic discontinuation of medications.

    - Be aware that standing prescriptions must be reordered after surgery or transfer to a different service.
    - Administer a medication as prescribed until it is discontinued, the number of prescribed days' lapses, or according to facility policy, such as 5 to 14 days for specific antibiotics.
    - Evaluate the client's response to the medication.

2. As needed (prn).

- Prescription for a medication to be given only when it is needed; must include circumstances in which the medication is to be given (e.g., morphine sulfate 2 mg IV prn every 3 hours for incisional pain).
- Nursing care.
    - Document assessments that indicated the need for the medication in the clinical record.
    - Check the MAR to identify when a medication was last given to ensure that adequate time has lapsed since the previous dose.
    - Document administration in the prn section of the MAR.
    - Evaluate the client's response to the medication.

3. Single-dose (one time only).

- Prescription for a medication to be given only once, such as a medication given before a diagnostic test or before surgery.
- Nursing care.
    - Administer the medication one time only.
    - Document administration of the medication in the single-dose section of the MAR.
    - Evaluate the client's response to the medication.

4. Immediately (STAT).

- Prescription for a single dose of a medication to be given immediately.
- Often prescribed in emergency situations.
- Nursing care.
    - Administer a STAT medication immediately.
    - Document administration in the singledose section of the MAR.
    - Evaluate the client's response to the medication.

**C. Communication of medication prescriptions**

1. Written prescription: A primary health-care provider writes a prescription following the protocol established by the agency. It generally involves a computer form that is electronically sent to the pharmacy.

- Ensure that prescriptions contain all required elements.
- Notify the pharmacy of the new prescription; this may be done manually, by fax, or auto matically when it was initiated on the computer; computer prescriptions help to minimize errors by automatically notifying the pharmacy and generating an MAR.
- Transcribe to or verify prescriptions on the MAR; this may be done manually or by a

computer; recheck it several times to ensure accuracy.

2. Verbal prescription: Prescription given by a primary health-care provider verbally in person.

- Accept only in emergency situations, when there is no time to put it in writing.
- Repeat the prescription back to the primary health-care provider for confirmation.
- Ensure that the primary health-care provider countersigns it as soon as possible and no later than 24 hours after the event.

3. Telephone prescription: Prescription given by a primary health-care provider via the telephone; generally used in emergency situations when a primary health-care provider is not present.

- Use only in situations in which a written or verbal prescription is not possible.
- Follow policy as to who can receive telephone prescriptions, such as a primary nurse or supervisor.
- Repeat the prescription back to the primary health-care provider for confirmation.
- Make sure that two nurses listen to the prescription and have both nurses countersign the prescription.
- Ensure that the primary health-care provider countersigns the prescription within 24 hours.

## VIII. Nursing Care Related to Medication Administration

Preparing and administering medications involves more than just removing medication from a package and giving it to a client. It involves critical thinking throughout the process to ensure that the rights of medication administration are addressed as well as the general considerations associated with medication administration. When administering any medication, irrespective of the route, the nurse should follow guidelines to ensure that medications are prepared and administered safely. This process is complex and requires that the nurse remain focused without interruptions because it is too easy to become distracted
and confused. Accuracy and client safety are the expected outcomes of medication administration.

### A. General considerations when administering medications

1. Complete or review the medication reconciliation form, including prescribed medications, OTC medications, supplemental herbs, and vitamins, to ensure the client is receiving prescribed medications and help prevent nontherapeutic medication-medication interactions or an excess of medication intake.

2. Identify food and medication allergies and communicate them according to facility policies and procedures, such as on the MAR, on the front of the clinical record, on a wristband, in the plan of care, and by notification of the pharmacy. Doing so prevents allergic responses and ensures continuity of care.

3. Identify factors that impact medication therapy (e.g., age, disease, gender, body mass, diet) and perform a health history and physical examination as needed to ensure client factors are taken into consideration when determining the appropriateness of a medication.

4. Administer oral medications with food or between meals as indicated by the pharmacy and the medication manufacturer to facilitate absorption (e.g., taking ferrous sulfate [Feosol] with ascorbic acid [citrus juice] or taking certain medications, such as levothyroxine [Synthroid], on an empty stomach) and to help minimize gastric irritation for certain medications (e.g., ibuprofen [Advil, Motrin])

5. Assess client understanding of prescribed medications and provide information to ensure accurate knowledge, including medication name; therapeutic action; nontherapeutic effects; parameters associated with the medication, such as pulse rate or BP; and actions to take in case of an adverse reaction or missed dose. Doing so ensures the client is knowledgeable about prescribed medications and supports participation in the medication regimen.

6. Assess pregnancy status if a prescribed medication is teratogenic to reduce the risk of injury to a developing fetus. Determine whether a mother is breastfeeding to reduce the risk of transfer of medication ingredients to a breastfeeding infant.

7. Perform (e.g., blood glucose monitoring) or review results (e.g., peak and trough levels) of diagnostic tests that impact medication administration to ensure administration of a safe dose of a medication.

8. Withhold a medication that indicates a peak level higher than the therapeutic level to ensure prevention of excessive medication levels.

9. Notify the primary health-care provider of medication levels outside the established parameters to ensure that the primary health-care provider can prescribe a corrective action if necessary.

**B. Common nursing interventions when administering medications**

1. Perform hand hygiene per policy and procedure, such as using soap and water or a hand sanitizer, to remove debris and minimize the number of microorganisms on the hands, thereby reducing the risk of infection.

2. Position the medication cart outside the client’s room. Lock the cart when it is unattended and when away from the cart giving medications to a client to minimize contamination of the cart and prevent unauthorized access to medications.

3. Verify that the medication being prepared is prescribed for the client (right client and right medication), is the prescribed dose (right dose), is being administered via the prescribed route (right route), and is being given at the prescribed time (right time). This verification should be performed three times (triple check) to reduce the risk of medication errors. For example:

- **First check**:When removing the medication from a drawer.
- **Second check**:When preparing the medication, such as placing an unopened oral medication in a medicine cup, pouring a liquid, or filling a syringe.
- **Third check**:Just before opening the package of an oral medication at the bedside or just after preparation of a liquid or parenteral medication.

4. Verify the expiration date on a medication package and return the medication to the pharmacy if it is expired because expired medications can lose their potency.

5. Introduce yourself and state that you are there to administer medications. This supports a client's right to know who is providing care and what is to be done.

6. Ask the client to state his or her name and birth date and verify the response against the MAR and wristband; follow the verification policy and procedure of the facility (e.g., a medication package bar code must be verified against the bar code on the client's wristband).

7. Teach about the medications being administered and ask whether the client has any questions to ensure understanding about the medications being administered and support motivation to take the medication.

8. Establish whether a client's status is within prescribed or expected parameters before administering a medication (e.g., pulse rate greater than 60 beats/minute for digoxin or BP within parameters set by a policy or the primary health-care provider).

9. Withhold a medication and inform the primary health-care provider when a client's status does not meet set parameters to prevent an excessive level of the medication and promote an appropriate response by the primary healthcare provider.

10. Assess for therapeutic and nontherapeutic responses to a medication before administering another dose (e.g., stools are not loose when receiving a stool softener or laxative.)

11. Withhold a medication if it is no longer appropriate or if an adverse response occurred to prevent client injury.

12. Notify the primary health-care provider if a nontherapeutic response occurs that is more serious than a minor side effect. Doing so ensures immediate attention to nontherapeutic responses that require medical intervention or a change in a medication prescription.

13. Assist the client into a comfortable position for the prescribed route, such as sitting or Fowler's for oral medications or side lying for IM injections. The upright position uses gravity to facilitate ingestion of oral medications; the side-lying position provides access to the dorsogluteal and ventrogluteal muscles for an IM injection.

14. Allow the client to self-administer medications when appropriate. Assist those who need assistance, such as with positioning, holding a cup, or inserting an oral medication into the mouth. Doing so supports independence, allows the client to set the pace, and facilitates medication ingestion.

15. Document administration of medications, only after medications are administered, in the clinical record or MAR or according to facility policy and procedure. Doing so ensures accurate and complete documentation of medication administration in a permanent record.

16. Document nonadministration of a medication in the MAR or the clinical record progress notes or according to facility policy and procedure. Doing so ensures documentation of the event.

**C. Administering medications to clients at risk for complications**

1. Introduction.

- A nurse must assess all clients to determine whether they are at risk for complications associated with medication administration. For example, a nurse should assess the client's developmental level (particularly age) and health status (particularly the ability to swallow, presence of the gag reflex, and efficiency of kidney function).
- Once the potential for complications are identified, the nurse should implement additional interventions that specifically address the client's needs.

2. Older adults and related nursing care.

- May have difficulty swallowing tablets due to dry mouth.
    - Crush tablets that are crushable.
    - Give water before, during, and after medication administration.
    - Stroke under the chin to promote swallowing.
    - Seek a prescription for a liquid form of the medication.
- May process information more slowly, have slower physical movements, and/or experience decreased strength and reflexes.
    - Allow more time to provide information about medications.
    - Keep explanations simple.
    - Allow more time to administer medications; do not hurry the client.
    - Teach the client to avoid childproof safety tops on medication containers to facilitate easier handling of containers and to support independence if unable to open safety top containers. If children are in the home, then keep medications without safety tops in a locked cabinet.
    - Assess the client's ability to self-administer medications, such as eyedrops and injections.
    - Explore strategies for assistance, such as having a visiting nurse or family member assist with medication administration in the home.
- May be more forgetful, omitting doses or taking excessive doses of medications.
    - Construct a calendar of days and times medications are taken.
    - Instruct the client to place medications or signs in a prominent place in the home.
    - Teach the client how to use a divided pill container (e.g., if the morning section is empty in the evening, it confirms the morning medications were taken) to support the medication regimen and minimize errors.
- May have decreased visual acuity.
    - Write out the medication calendar in large letters or containers with raised letters.
    - Suggest using a large-labeled or braille divided pill container.
    - Suggest using a syringe that has a preset volume control feature to ensure an accurate dose when self-administering a parenteral medication.
- May not be able to afford prescribed medications.
    - Suggest that the primary health-care provider prescribe the generic form of the medication if available or a less costly medication.
    - Seek funding resources.
- Have decreased rate of medication metabolism and excretion, which increases the risk of toxicity.
    - Ensure that the prescribed dose takes into consideration the aging process to minimize the risk of an excessive dose.
    - Explore whether the client can manage with a lower dose than that for younger adults to avoid medication toxicity.
    - Assess for clinical indicators of medication toxicity.

    - Monitor blood levels of medications to ensure early identification of medication accumulation and promote early intervention to prevent toxicity.
    - Teach the client not to exceed the recommended doses of medications.
- Are at increased risk for medication interactions due to the intake of multiple medications (polypharmacy) necessary for treatment of chronic illnesses.
    - Assess for clinical indicators of medication interactions.
    - Encourage the primary health-care provider to periodically review the medication reconciliation form to promote discontinuation of unnecessary medications or to reduce a dose.

3. Infants and children and related nursing care.

- Infants and children vary in size, weight, and surface area and pass through various stages of growth and development.
    - Carefully calculate and recheck medication dosages using a pediatric calculation formula.
    - Assess developmental level and adjust interventions based on the child's physical, emotional, and cognitive levels.
- Infants and children are at risk for aspirating or choking on liquid medications.
    - Use a medication nipple for infants so that they can suck the medication; this is the safest method of administering a liquid medication to an infant because infants are familiar with breastfeeding or formula feeding.
    - Position the child in a sitting or semisitting position.
    - Use a needleless syringe or dropper.
    - Place the liquid between the lower gum and cheek.
    - Instill the medication slowly to avoid giving too much liquid at once.
    - Offer the child a choice of a spoon, needleless syringe, or dropper to support a sense of control.
- Young children may not be able to ingest tablets.
    - Crush tablets that are crushable and mix them with applesauce
    - Dissolve tablets that are dissolvable on a spoon with warm water.
    - Secure a liquid form of the medication.
- Young children are not moved by logic; saying, "This medication will make you feel better" will not work if the child does not like the taste.
    - Admit that the medication might not taste good, but that it will be followed with a nice-tasting juice to facilitate trust.
    - Give an ice pop just before giving an unpleasant tasting medication to numb the taste buds.
    - Avoid using an important food or liquid to mask the taste of a medication to prevent an unpleasant association and subsequent refusal of the important food or liquid.
- Children may be afraid of injections because they are associated with pain or the unfamiliar.
    - Awaken a sleeping child for an injection because doing so is less frightening and supports trust.
    - Admit that the injection might be uncomfortable, but that it will be over quickly to support trust.
    - Apply a topical anesthetic cream before an injection to minimize the discomfort of needle insertion.
    - Offer a toy to play with during and after the injection to distract the child.

    - Use the vastus lateralis muscle for children who are not walking yet because gluteal muscles are not fully developed.
    - Obtain the assistance of another health team member, rather than a parent, to restrain the child if necessary to avoid associating the parent with an unpleasant event.
    - Cuddle or have the parent cuddle the child after an injection to provide comfort.

4. Clients at risk for aspiration and related nursing care.

- The client may have difficulty chewing and swallowing or have an impaired gag reflex.
    - Assess the client's ability to swallow and cough and the presence of the gag reflex.
    - Place the client in an upright position if possible.
    - Thicken liquids or offer fruit nectars with oral medications to make fluid easier to control.
    - Avoid the use of a straw because fluid is harder to control when using a straw than when using a cup.
    - Crush tablets that are crushable and mix them with a teaspoon of applesauce or secure a prescription for an alternate route.
    - Allow the client to hold PO medications and a cup of water and to set the pace; do not hurry the client.
    - Administer medications on the strong side of the mouth for a client with weakness of the oral cavity.
    - Administer PO medications one at a time and ensure that each is swallowed before giving the next.
- The client may have an altered level of consciousness.
    - Seek a prescription for an alternate route for oral medications.
    - Explain what is being done and why, with the assumption that the client hears and understands.