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Routes of Drug Administration

Pharmacology

Oral, sublingual, buccal, topical, inhalational, rectal, intradermal, subcutaneous, intramuscular and intravenous routes; advantages, disadvantages and nursing responsibilities.

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CHAPTER 03 / PHARMACOLOGY 03. Routes of Drug Administration

1. Definition and classification

A route of administration is the path by which a medicine is introduced into or applied to the body. Enteral routes use the gastrointestinal tract or related mucosal surfaces; parenteral routes bypass the gastrointestinal tract, particularly injections. Topical, transdermal and inhalational administration have distinct local or systemic purposes. Route changes can alter bioavailability and risk even when the generic name is unchanged.

2. Enteral and mucosal routes

Route	Advantages	Disadvantages and nursing points
Oral	Convenient, economical, acceptable	Variable absorption, first-pass effect, unsuitable with unsafe swallowing or some acute situations.
Sublingual	Rapid mucosal absorption for suitable drugs	Limited drug choices; do not swallow or chew when the formulation requires dissolution.
Buccal	Mucosal absorption, may avoid much first-pass metabolism	Local irritation or incorrect swallowing; place as directed.
Rectal	Useful in selected patients unable to take oral medicines	Variable absorption, privacy concerns, contraindications after some rectal procedures or in severe neutropenia.

Oral medication administration

Check the prescription, allergies, swallowing ability, NPO instructions and relevant observations. Ensure the correct formulation and offer suitable fluid if permitted. Do not crush enteric-coated, modified-release, hazardous or other unsuitable tablets. Consult pharmacy for dispersible or liquid alternatives. Observe swallowing if necessary and document administration. For enteral tubes, confirm placement by approved methods, check compatibility and administer medicines separately with prescribed flushes. Do not mix medicines directly into feed unless explicitly authorized.

3. Topical, transdermal and inhalational routes

Route	Examples	Nursing responsibilities
Topical	Hydrocortisone cream, eye preparations	Apply to correct site; avoid contaminating applicators; verify skin integrity and amount.

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Transdermal	Nicotine or fentanyl patch	Remove previous patch, rotate sites, date/time per policy, avoid heat, dispose safely.
Inhalational	Salbutamol, inhaled corticosteroid	Teach correct device technique, observe response, rinse mouth after corticosteroids as directed.
Nasal / ocular / otic	Nasal sprays, eye or ear drops	Check correct organ and preparation; do not interchange eye and ear medicines.

Transdermal medicines provide systemic delivery over time. A topical medicine usually targets the application site but can sometimes be absorbed systemically. Inhalation delivers drugs directly to the airway; systemic absorption and adverse effects are still possible.

4. Parenteral administration

Route	Typical site or approach	Usual angle for injection
Intradermal (ID)	Dermis, commonly inner forearm	5-15
Subcutaneous (SC)	Abdomen, thigh or upper arm according to product	45 or 90 , based on needle and tissue
Intramuscular (IM)	Deltoid, vastus lateralis, ventrogluteal	90
Intravenous (IV)	Patent peripheral or central venous access	Access/device dependent

Intradermal and subcutaneous routes

ID administration is used for selected diagnostic tests and vaccines. A small superficial wheal may be expected with correct technique. SC administration is commonly used for insulin and selected anticoagulants. Rotate injection sites appropriately, assess skin and follow product-specific needle and technique instructions. Do not massage heparin injection sites.

Intramuscular route

IM delivery can provide systemic action or depot release. Select the muscle, needle length and maximum volume using patient age, size, formulation and local protocol. Vaccines generally do not require aspiration at recommended sites; other injection instructions vary. Avoid injured tissue and assess bleeding risk. Incorrect placement may cause pain, nerve injury or inadequate absorption.

Intravenous route

IV medication enters the circulation directly and can produce rapid, irreversible exposure. Verify the correct preparation, dilution, compatibility, administration rate, vascular access and monitoring. Assess catheter patency and signs of infiltration, phlebitis and extravasation. Never administer an IM-only formulation intravenously. Use smart pumps when indicated and follow the drug-specific extravasation protocol if leakage occurs.

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5. Advantages and disadvantages of parenteral routes

Advantages include rapid onset for appropriate IV drugs, use when gastrointestinal delivery is unsafe and predictable delivery of many agents. Disadvantages include infection risk, pain, tissue injury, need for trained staff, equipment requirements and greater consequences of preparation errors. Absorption from SC or IM tissue may be unreliable in shock.

6. Safe administration procedure

1. 1. Verify patient identity, medicine, dose, route, time and clinical indication.
2. 2. Review allergies, relevant observations, laboratory tests and contraindications.
3. 3. Perform hand hygiene; select appropriate equipment and maintain asepsis.
4. 4. Prepare the medicine according to the label and approved reference, including concentration and compatibility.
5. 5. Explain the procedure, position the patient and obtain cooperation or appropriate consent.
6. 6. Administer using trained technique. Do not reuse needles or syringes across patients.
7. 7. Observe the patient, dispose of sharps immediately in approved containers, document and reassess.

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B.SC. NURSING / STUDY NOTES

7. Complications and prevention

Complication	Prevention or initial nursing action
Aspiration	Check swallowing safety; withhold unsafe oral administration and seek guidance.
Injection-site infection	Hand hygiene, aseptic non-touch technique and single-use equipment.
Haematoma	Recognize bleeding risk; apply appropriate pressure without trauma.
Extravasation	Stop infusion; keep access if required for aspiration/antidote, do not flush, obtain urgent drug-specific guidance.
Anaphylaxis	Recognize airway, breathing or circulatory compromise and activate emergency response.

8. Important examination questions

Long answer questions

1. 1. Classify routes of administration and explain advantages, disadvantages and nursing care.
2. 2. Describe precautions for IM, SC, ID and IV administration.

Short answer questions

- Sublingual route; transdermal patch; inhaler technique; enteral tube administration; extravasation.

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Very short answer questions

- Usual IM angle? - 90 .
- Which route has complete bioavailability? - IV.
- Name one SC medicine. - Insulin.

9. Quick revision

Verify formulation and route together; assess swallowing before oral medicines; never crush unsuitable tablets. ID, SC and IM angles differ. IV drugs require compatibility, rate and access checks. Monitor after all routes.

Conclusion

The safest route is the authorized route suited to the medicine, clinical condition and patient needs. Correct preparation and surveillance reduce preventable harm.

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Practice questions

Choose one best answer. The answer key and explanations follow the questions.

1. A patient has difficulty swallowing an enteric-coated tablet. What is the appropriate nursing action?

A. Consult pharmacy for a suitable alternative formulation
B. Crush the tablet into food routinely
C. Chew the tablet before administration
D. Dissolve every coated tablet in hot water

2. What should be checked when applying a new transdermal medicine patch?

A. The same damaged site is reused
B. The previous patch has been removed
C. The old patch remains beneath the new one
D. External heat is applied over the patch

3. Which instruction applies to subcutaneous heparin administration?

A. Use the intradermal route for every product
B. Ignore product-specific technique instructions
C. Do not massage the injection site
D. Massage the site firmly after injection

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Answer key and explanations

1. A - Consult pharmacy for a suitable alternative formulation

Enteric-coated and modified-release tablets may be unsuitable for crushing; alternatives require pharmacy advice.

2. B - The previous patch has been removed

Removing the previous patch prevents unintended continued delivery from multiple patches.

3. C - Do not massage the injection site

The chapter specifically advises against massaging heparin injection sites.

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