University of Mosul
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Second Stage
Fundamentals of Nursing
Name of chapter
(Medication Administration)
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Medication Administration

Overview

Safe and accurate administration of medications is one of the nurse's most important responsibilities when caring for clients. The nurse's judgment is critical to confirm that the right drug is being given to a client, that it is administered properly, and that appropriate observations and measurements are made to evaluate the drug's effect and the client's response.

**Medication:** Is a substance administered for the diagnosis, cure, treatment, relief, or prevention of disease.

**Factors affecting of drug metabolism**

1- Personal attributes (body weight, age, and sex)
2- Physiological factors (state of health or disease process, acid-base and fluid electrolyte balance)
3- Immunological factors
4- Psychological factors.
5- Illness and disease.
6- Time of administration.
7- Drug tolerance.
8- Route of drug administration.
9- Developmental factors (pregnancy, Infant, Older people)
10- Diet.
**Documentation of the medication**

A medication must have a physician's order or prescription before it can be legally administered to a client. The physician's order is a verbal or written order, which is recorded in a file or in the client's Chart. Written orders are safer because they leave less potential misunderstanding, legal responsibility or error.

**Drugs orders**

It consists of 7 parts:

1- The name of the client.
2- The date of the drug was prescribed or ordered.
3- The name of the drug.
4- The dosage.
5- The route of drug administration and any special rules of administration.
6- The time and frequency of the drug that should be given.
7- The signature of the individual who ordered the drug.

**Medication Administration**

Preparing and administering medications requires accuracy by the nurse. The nurse must pay full attention to the procedure and try not to do other task simultaneously. Accuracy is the greatest when the nurse observes the five rights of drug administration:

1- The Right Drug.
2- The Right Dose.
3- The Right Client.
4- The Right Rout.
5- The Right Time.
Basic principle of nurse on drugs administration:
1- The nurse must know the drug's prescribed dose, method of administration, actions, expected therapeutic effect, possible interactions with other drugs, and adverse effects.
2- The nurse must know the institution's administration procedures for the client's welfare and the nurse's legal protection.
3- The nurse must Review physician's order for completeness the client's name, date of the order, name of the drug, dose, rout, time of administration, and the physician's signature.
4- The nurse discusses the medication and its actions with the client; recheck the medication order if the client disagrees with the dose or the physician's order.
5- The nurse must check the physician's order against the client's medication administration record for accuracy.
6- The nurse gives the patient the right to know about the medication he is receiving and the right to refuse it.

Routes of Administration

The rout for administration a drug depends on its properties and desired effect and on the client's physical and mental condition. The nurse is often the best person to judge the rout most desirable for a client. And the routs of drugs are classified as following:
1- Nonparenteral

A- Oral (by mouth)

B- Sublingual (under the tongue)

C- Topical (applied to the skin, instillation and irrigation, inhalation)

D- In body cavity (into the rectum or vagina).

E- Eye (*ophthalmic*) (inside of eye and conjunctiva)

F- Ear (inside of ear canal)

G- Nasal Instillation (into the side of nasal cavity)

2- Parenteral

A- Intramuscular injection. (IM) (Injection into muscle)

B- Subcutaneous. (SC) (Injection into the subcutaneous tissue of the skin)

C- Intradermal. (ID) (Injection into the dermis of the skin)

D- Intravenous. (IV) (Injection into a vein)

**Nonparenteral Rout Medication Administration**

1- *Oral medication administration*

**Definition:** is the most common and convenient type for most clients by which the drug is swallowed to the stomach, or administrated under the tongue for slow action.

Characteristics of oral medication administration: (Advantages)

1- It's the easiest, least expensive, safe, and most desirable type of drug to administration.

2- Is commonly called P.O. medication (from the Latin per *os*, meaning "through the mouth").
3- Has the slowest onset of action because it is absorbed through the gastric mucosa into the bloodstream for a systemic effect.

4- Can have a local effect (for example, antacids)

5- Is supplied in the form of tablets, capsules, enteric-coated tablets, liquids, syrups, and suspensions

6- Is contraindicated in a client who is vomiting or cannot swallow food or fluids, who is having gastric suctioning, or who lacks mental awareness.

7- Administration of medication by oral route can be in many approaches (swallowing, chewing, sublingual and by nasogastric tube NG tube).

**Disadvantage**

1- Unpleasant taste of the drugs.

2- Irritation of the gastric mucosa.

3- Irregular absorption from the gastrointestinal tract.

4- Slow absorption.

5- Harm to the client's teeth.

**Purpose**

1- To provide safe, effective drug therapy with minimal complications and discomfort.

2- To provide a convenient route for drug therapy.

2- *Topical Administering Skin Application*

**Definition:** is the applied of substance to a circumscribed surface area of the body.
**Characteristics of topical and skin medication administration:** (Advantages)

1- Is applied externally to the skin or mucous membranes.

2- The pharmaceutical forms used in topical and skin administration are including (lotions, liniments, ointments, pastes, powders, patches, creams, gels, jellies, foams, Aerosol spray).

3- It requires use of sterile supplies and sterile techniques when applied on open skin lesion such as sterile and applicators.

4- Can create systemic and local effects if absorbed through the skin.

5- Can be applied into body cavities or orifices, such as the urinary bladder, eyes, ear, nose, rectum, or vagina.

6- Can be administered by inhalation into the respiratory tract by a nebulizer.

**Disadvantage:** Not absorbed well (completely)

**Purpose**

1- To facilitate absorption through the skin or mucous membranes.

2- Provide local anesthetic effect

3- To stop slow, or prevent microbial growth.

**3- Administration of vaginal and rectal instillations**

**Characteristics of vaginal and rectal medication administration**

1- It's a safe, alternative method of medication administration.

2- It's usually supplied as a solid cone- or oval shaped mass of medication dissolved in a wax like substance; body heat melts the wax and release the medication to be absorbed.

3- It's administrated to provide a local or systemic effect.

4- Rectal suppository is contraindicated with cases of rectal surgery or active rectal bleeding.
5- It has many types of forms as:

A- Rectal suppository is used mainly when the client is nauseated or vomiting, this route does not irritate the upper GI (Gastrointestinal) tract.

B- Vaginal suppository is used to deliver medication directly when treating vaginal infection or inflammation.

**Purpose**

1- To provide an alternative route of administration.
2- To promote bowel elimination.
3- To treat vaginal infection, pain, or itching (local effect).
4- To treat rectal hemorrhoid and fissure (local effect).

4- *Administration of Eye (ophthalmic) medication.*

**Definition:** medications that instilled in the form of liquid or ointment and indicated for ophthalmic use.

**Characteristics of Eye medication administration:**

1- It's instilled the medication as a sterile liquid, drops, or an ointment.
2- It's supplied as liquid in a plastic or glass container with a dropper; or as ointment, in a small tube.
3- Sterile preparation and sterile technique are indicated.

**Purpose**

1- To provide local anesthetic effect.
2- To decrease intraocular pressure.
3- To dilate the pupil for eye examination.
4- To treat ophthalmic infection.
5- Administration of Ear (otic) medication.

Characteristics of Ear medication administration:

1- It's supplied as drops in plastic or glass container with dropper.
2- Requires a sterile technique to instill medication special if tympanic membrane is damaged.

Purpose

1- To relieve ear pain.
2- To provide local therapy to reduce inflammation by otic antibiotic medication.
3- To soften ear wax for removed at later time.

6- Administration of nasal medication.

Definition: medications that instilled for shrink swollen mucous membranes, loosen secretion and facilitate drainage or to treat infection of sinuses.

Characteristics of nasal medication administration:

1- Nasal drops are used to treat sinus infection.
2- Small doses are needed.
3- Nebulizer bronchodilator medication can be administrated in emergency cases.

Parenteral Rout Medication Administration

Parenteral medication: is the rout by which injections are used to instill medications into body tissues. Injected drugs act more quickly than oral medications because they reach the bloodstream either directly or by rapid absorption through the tissues, thus the client's condition can change rapidly.
Parenteral drugs can be administered through four different routes:

1- **Subcutaneous (SC, SQ) injection:** injection into tissue just below the dermis of the skin.
2- **Intramuscular (IM) injection:** injection into the body of a muscle.
3- **Intradermal (ID) injection:** injection into the dermis just under the epidermis.
4- **Intravenous (IV) injection:** injection into the vein.

Each type of injection requires a certain set of skill to make certain that the medication reaches the proper local. Failure to inject a medication correctly can result in complications such as a drug response that is too rapid, nerve injury with associated pain, localized bleeding, tissue necrosis, and sterile abscess.

**Equipment of Parenteral drugs administration**

1- **Syringe:** A syringe consists of a cylindrical barrel, a tip designed to fit the hub of a hypodermic needle, and a close-fitting plunger.

Characteristics of syringe:

1- Syringes are single-use and disposable or descried.
2- They are packaged separately, with or without a sterile needle, in a paper wrapper or rigid plastic container.
3- Syringes in general classified as (non-Luer-lok) or (Luer-lok) on the design of the syringe tip.
4- Syringe comes in various sizes, ranging from (1- 60ml) in capacity.
5- Syringe has scales along the barrel called (Milliliter), (Unit).
6- Syringe are used to administration of medication, or liquid food by Nasogastric tube or used for diagnostic measures such as pull-up sample of blood or abscess.
2. **Needles:** A needle has 3 parts: the hub, the shaft, and the bevel.

   Characteristics of needles:

   1. Needles come in sheaths to allow flexibility in choosing the right needle for a client.
   2. Needles kept in sterile technique with cap intact.
   3. Gentle force is used in dealing with needle.
   4. Size of needles varies in length from ¼ inch to 3 inches. (1 inch to 1½ inches for IM injection, ⅜ to ⅝ inches for SC or ID injection,
   5. As the needles gauge gets smaller the needle diameter becomes larger.
   6. Selection of needles gauge depends on the viscosity of fluid.
   7. Chooses of needles length according to the client's size and weight and type of tissue into which the drugs is to be injected.

**Principle of prevention needles – stick injury.**

1. Use strict aseptic technique during all steps of preparation and administration.
2. Avoid touching the tip of the needle, the inside of the barrel, the shaft of the plunger, or the needle with an unsterile object.
3. Protect the nurse's fingers and face from being cut by glass of ampoule through place a piece of sterile gauze between thumb and the ampule neck or around the ampule neck.
4. Perform hand hygiene to reduce transmission of microorganisms.
5. Cleans site of injection with antiseptic swab from center and rotate outward in circular direction to prevent insertion of microorganism inside human body.
6. Discard equipment in appropriate area (disposal container).
7- Careful insert the needle into the upright vial through the center of the rubber cap.

8- Never bend or break needles before disposal.

9- Recap used needles under specified circumstance by inserting the needle into cap using one hand.

1- **Administration of medication by Intramuscular injection. (IM)**

Definition: An injection given by the intramuscular (IM) route deposits, medication into deep muscle tissue. The vascularity of muscle tissue results in fast drug absorption. An aqueous solution is absorbed in 10 to 30 minutes, as opposed to at least 30 minutes when given subcutaneously. A nurse uses a longer and larger-gauge needle to pass through SC tissue and penetrate deep muscle tissue. Generally for the average adult a 21- to 25-gauge 1½ inch needle inserted at a 90-degree. Intramuscular injection sites should be rotated to decrease the risk of hypertrophy. An older adult or cachectic client may require a shorter, smaller-gauge needle because of muscle atrophy. For well-developed children a 1-inch needle will usually penetrate deep muscle. Emaciated muscles absorb medication poorly and should be avoided when possible.

**Characteristics of Intramuscular Injection (IM) administration (Advantage):**

1- Muscle is less sensitive to irritating and viscous drugs.

2- A normal, well-developed adult client can safely tolerate as much as 4 ml of medication in larger muscles such as the gluteus medius without discomfort than subcutaneous tissue.

3- Older infants and small children (e.g., under the age of 2) receiving IM injections should receive no more than 1 ml of medication.

4- Safe method than other parenteral administration rout.
5- Slow action of medication can be achieved by this route of administration.

6- Some medication need to be absorbed slowly and harm if given intravenously such as oily hormone, long acting penicillin.

Disadvantage of Intramuscular Injection (IM) administration:

1- Tissue injury (burn, wound).

2- Presence of nodules.

3- Lumps.

4- Abscesses.

5- Tenderness.

6- Other pathology such as (viral hepatitis B), (cross infection).

7- Sciatic nerve injury (nerve damage).

8- Sterile abscess.

9- Gangrene.

Sites selected for Intramuscular injection.

1- Ventrogluteal muscle.

Involves the gluteus Medias and minimums it is situated deep and away from major nerves and blood vessels and is a safe site for all clients. It's the preferred injection site for adults and for children younger than 7 months. The site of injection lies over the greater trochanter of the client's hip of femur bone. It lies over the gluteus minimums, and it preferred site for (IM) injection because the area had no large nerve or blood vessels, provides greatest thickness of muscle, no fat and no bone.
2- vastus lateralis muscle

Is another injection site used in the adult client and is the preferred site for infants under 7 months; the muscle is thick and well developed. It is located on the anterior lateral aspect of the thigh; in an adult it extends from a handbreadth above the knee to a handbreadth below the greater trochanter of the femur. The middle third of the muscle is the suggested site for injection. The width of the muscle usually extends from the midline of the thigh to the midline of the thigh's outer side.

3- Deltoid muscle

Is easily accessible, the muscle is not well developed in many adults. The radial and ulnar nerves and the brachial artery lie within the upper arm along the humerus. Should be used this site only for small medication volumes (0.5 to 1.0 ml) and when other sites are inaccessible because of dressings or casts. The deltoid muscle is in the edge of the acromion process, which forms the base of a triangle in line with the midpoint of the lateral aspect of the upper arm. The injection site is in the center of the triangle, about 2.5 to 5 cm (1 to 2 inches) below the acromion process.

4- Dorsogluteal muscle.

It is composed of the thick gluteal muscle of the buttocks, the Dorsogluteal site can be used for adult and children with well-developed gluteal muscle which develop by walking. The muscle is in the posterior superior iliac spine, the injection site is then lateral and superior site by positioning the patient on prone position or side-lying position.
5- **Rectus femur is muscle.**

The muscle belong to quadriceps muscle group it is used only occasionally for (IM) injection. It is situated on the anterior aspect of the thigh; its advantage the patient can reach this site easily. Disadvantage is considerable discomfort for some people.

2- **Administration of medication by Subcutaneous injection. (SC)**

**Definition:** depositing medication into the loose connective tissue underlying the dermis which is not richly supplied with blood vessels muscles; thus drug are not absorbed as quickly as those given intramuscularly.

**Characteristics of Subcutaneous Injection (SC) administration (Advantage):**

1- Drug given subcutaneously are isotonic, nonirritating, no viscous, and water soluble, example of medication given SC (epinephrine, heparin, insulin, tetanus toxoid, allergy medications, vaccine, narcotics and heparin).

2- Small doses of medication (0.5 – 1 ml) should be given SC.

3- Area of injection can easily accessible.

4- Patient can do self – administration SC injection (Insulin).

5- Multiple areas of injections may be rotated to avoid drug administration complication.

6- Needle 25 gauge ⅝ inches with medium bevel inserted at 45° degree angle.
Disadvantage of Subcutaneous Injection (SC) administration:

1- Tissue is sensitive to irritating solution and large volume of medication.
2- Medication collecting within the tissues can cause sterile abscesses which appear as hardened, painful lump.

Sites selected for subcutaneous injection.

1- Outer aspect of the upper arms.
2- Outer aspects of the abdomen below the costal margin to the iliac crests.
3- The anterior aspects of the thigh.
4- The scapular areas of the upper back
5- Upper ventrogluteal and dorsogluteal areas.

3- Administration of medication by Intradermal injection. (ID)

Definition: is the administration of a drug into the dermal layer of the skin just beneath the epidermis.

Characteristics Intradermal of Injection (ID) administration (Advantage):

1- This method is used for skin test (tuberculin test) and allergy test.
2- Drug absorption occurs slowly.
3- Common used to antibiotic screening test.
4- Tuberculin syringe 1 ml and with needle (¼ - ½ inches) 26 or 27 gauge is used.
5- The needle inserted at 15° degree angle of injection
6- Small amount of medication (0.01 – 0.1ml) are injected intradermally.
7- Bleb should be appearing after needle withdrawal.
Disadvantage of Intradermal Injection (ID) administration:

1- Negative result if bleb does not appear or if the site bleeds after injection.
2- Irritation of skin due to large amount of drug administration.

Sites selected for Intradermal injection

1- Inner aspect of lower arm.
2- Upper site of chest.
3- Back site of chest beneath the scapulae.
4- Commonly the left arm is used for tuberculin test and the right arm is used for all other tests.

4- Administration of medication by Intravenous injection. (IV)

Definition: administration of medication to the client's bloodstream directly by the vein.

Characteristics Intravenous of Injection (IV) administration (Advantage):

1- When rapid effect is required.
2- Rout is appropriate when medications are too irritating to the tissue when given by other routes.
3- When there are contraindications to give medication by other routes such as abscesses on gluteal muscles occur.
4- When large volume infusion or medication are indicated.
5- When there are multi dose of drug administration for long period.
6- Easy to perform venipunctures by needle to administration of medication or by introduce continuous line as cannula.
Disadvantage of Intravenous Injection (IV) administration:

1- Rapid severe reactions to the medication (anaphylactic shock).
2- Infection transmission.
3- Fluid volume overload.
4- Transmission of infection by contaminated syringes such as (HIV, viral hepatitis B).
5- Thrombophlebitis repeated injection on the same vein.