



Midwifery III

NTQF Level III

Learning guide - 16

Unit of Competence	Providing Basic First aid and Emergency Care
Module Title:	Providing Basic First aid and Emergency Care
LG Code:	HLT MDW3 LO 2 LG 16
Module Code	HLT MDW3 M05 0219
TTLM Code:	HLT MDW 3 M LO2 TTLM, 09 2019 V1

LO 2: Apply pharmacology in the field of midwifery practice

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 1 of 16
	Author: Federal TVET	



Instruction Sheet

Learning Guide # 2

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

Basic pharmacology

Drug calculations

Route of administration

Side effects

Mechanism of action

Toxicity of drugs

Monitoring drug before, during and after administration

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, **upon completion of this Learning Guide, you will be able to:**

Describe basic pharmacological knowledge

Explain Basic pharmacology is applied

Describe about drug calculations, correct route of administration, side effects, mechanism of action, toxicity is given

Perform drug checking/ maintaining before, during and after administration

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1 in page 3
4. Accomplish the “Self-check 1, **in page 14**
5. Submit your accomplished Self-check. This will form part of your training portfolio. Your trainer will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your trainer shall advice you on additional work. But if satisfactory you can proceed to Learning Guide # 3.



Information Sheet-1	Basic pharmacology
---------------------	--------------------

1.1 Basic Pharmacology

1.1.1 Definitions: Pharmacology can be defined as the study of substances that interact with living systems through chemical processes, especially by binding to regulatory molecules and activating or inhibiting normal body processes.

1.1.2 Pharmacokinetics: Study of the metabolism and action of drugs Particularly emphasizes the following: Absorption, Distribution , Biotransformation , Excretion

1.1.3 Pharmacodynamics: study of how a drug works and how we can expect the body to respond to the administration of a drug

1.1.4 The Physical Nature of Drugs

Drugs may be solid at room temperature (eg, aspirin, atropine), liquid (eg, nicotine, ethanol), or gaseous (eg, nitrous oxide). These factors often determine the best route of administration. For example, some liquid drugs are easily vaporized and can be inhaled in that form, eg, halothane, amyl nitrite.

1.1.4 Classification of Drug

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 3 of 16
	Author: Federal TVET	



Classifications of Medications

- Anticoagulants
- Anticonvulsants
- Antidiabetics
- Antidysrhythmics
- Antihypertensives
- Anti-infectives
- Antipsychotics
- Cardiac Glycosides
- Corticosteroids
- Drotrecogin
- GI Agents
- IV fluids
- Narcotics
- Parenteral Nutrition
- Platelet Aggregation Inhibitors
- Respiratory Medications
- Sedatives
- Vasoactive agents

1.2 Drug calculations

- **Loading doses** - one or a series of doses that may be given at the onset of therapy with the aim of achieving the target concentration rapidly.
- **Maintenance doses:** The plateau can be maintained with smaller dose called maintenance dose.

Dose calculation Based on Age

Young's Equation (preferably from one to twelve years of age)

$$\text{Dose of Child} = \frac{\text{Age in Years}}{\text{Age in years} + 12} \times \text{Adult Age}$$

Cowlings Equation

$$\text{Dose of Child} = \frac{\text{Age in Years at next years}}{24} \times \text{Adult dose}$$

Fried Equation (preferably from birth to one years of age)

$$\text{Dose of Child} = \frac{\text{Age in month}}{150} \times \text{Adult dose}$$

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 4 of 16
	Author: Federal TVET	



Determination of drug dosage

There are different rules to determine the dose in children.

1. **Fried's rule** -(for infants under 2 years)
 Infant dose = $\frac{\text{age in month} \times \text{adult dose}}{150}$
2. **Clark's rule** -(for children over 2 years)
 Child dose = $\frac{\text{weigh in lb} \times \text{adult dose}}{150}$
 Or
 = $\frac{\text{weigh in Kg}(0.45)(\text{adult dose})}{150}$

NB- 1 lb=0.45kg

3. **Young's rule**
 Child dose = $\frac{\text{Age in years} \times \text{adult dose}}{\text{Age in years} + 12}$
4. **Surface area** -is the most accurate method.

$$\text{Child dose} = \frac{\text{Surface area in sqm} \times \text{adult dose}}{1.75}$$

$$\text{Note -surface area in sqm} = \frac{4W + 7}{W + 90}$$

Where W is weight in kg.

5. **Dose in mg/kg.**

In order to administer drugs to children safely one should know about and apply the 6 rights (the previous five rights and the right of the parent and child to know).

1.3 Route of administration

➤ Enteral Route

Enterally- through the gastrointestinal tract

The enteral routes are:

- Oral
 - Rectal
 - Directly in to the stomach by means of gastric tubes.
- Parenterally - through other than gastro intestinal tract.
- Topically (in to the eyes, ears, nose or on the skin)
 - Intradermally: in to dermis.
 - Subcutaneously: in to cutaneous.
 - Intravenously: in to venous.
 - Intramuscularly: in to muscle.



- Intrathecal: in to subarachnoid space.
- Intraosseous: in to bone.
- Intra-articular: in to joint

1.3.1 Oral Administration

Definition: - Oral medication is drugs administered by mouth.

Advantage, Disadvantages & contra-indications

- Most drugs are administered by the oral route because it is the safest, most convenient, and least expensive method.
- The disadvantage of the oral route is that it is slower acting than the other routes, such as injectables.
- Drugs may not be given orally to clients with gastrointestinal intolerance or those on NPO (nothing by mouth) status.
- Oral drugs should be given with caution to clients who have difficulty swallowing, such as a patient who has had a cerebro vascular accident (stroke).
- Oral administration is also precluded by unconsciousness.
- When small amounts of drugs are required, the **buccal** (cheek) or sublingual route is used.
- Drugs administered through these routes act quickly because of the oral mucosa's thin epithelium and large vascular system, which allows the drug to quickly be absorbed by the blood.
- Certain oral drugs are prepared for sublingual or buccal administration to prevent their destruction or transformation in the stomach or small intestines.
- Buccal drugs are designed to be placed in the buccal pocket (superior-posterior aspect of the internal cheek next to the molars) for absorption by the mucous membrane of the mouth.
- Sublingual medications are designed to dissolve quickly when placed under the tongue. For example, erythritol tetra nitrate (anti-angina) can be given either sublingually or buccally as prescribed, whereas isoproterenol hydrochloride (a bronchodilator) and

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 6 of 16
	Author: Federal TVET	



nitroglycerin (an anti-angina) are given sublingually, and methyltestosterone (an androgen) is given only buccally.

- When digestive juices inactivate the effect of the drug, we do not give.
- Also when there is inadequate absorption of the drug, which leads to inaccurate determination of the drug absorbed.
- When the drug is irritating to the mucus membrane of the elementary canal.

Types of oral medications:

- | | |
|-----------------------|---------------------|
| 1. Lozenges (troches) | 6. Suspensions |
| 2. Tablets | 7. Pills & gargle |
| 3. Capsules | 8. Effervescent |
| 4. Syrups | 9. Powder |
| 5. Tinctures | 10. Oily medication |

1.3.2 Suppositories:

Purpose:

- To produce a laxative effect. (Bowel movement). Suppository is used frequently instead of enema since it is inexpensive.
- To check diarrhea
- To produce local sedative in the treatment of hemorrhoids or rectal abscess.
- To produce general sedative effects when medications cannot be taken by mouth.
- To check rectal bleeding

Kinds of suppositories used:

- Bisacodyl (Dulucolax) is commonly ordered for its laxative action. It stimulates the rectum and lubricates its contents. Normally 15 minutes are needed to produce bowel movement.
- Glycerin or soap for bringing about bowel movement. If soap suppository is used, cut a split of soap 2-6cm and wash it on hot water to smooth the rough edges before administration.
- Bismuth – to reduce symptoms of vomiting and diarrhea.
- Opium, sodium barbital etc. for sedation.



1.3.4 Intradermal injection:

Definition: It is an injection given into the outer layer of the skin. (corneum:most outer layer of the dermis)

Purpose: For diagnostic purpose

- A) Tine test (mantoux test) : to test for the presence of tuberculosis infection.
- B) Allergic reaction

Intradermal injection may also be given for therapeutic purpose,

1.3.5 Sub-cutaneous injection(SC,SQ)

Definition: Injection of drug under the skin in the sub-cutaneous tissue

Purpose:-

- 1. To obtain quick absorption than oral administration.
- 2. When it is impossible to give medicines orally.

1.3.6 I.V. Injections:

Definition: It is the introduction of a drug in solution form into a vein. Often the amount is not more than 10ml. at a time.

Purpose:

- 1. When the giving drug is irritating to the body tissue if given through other routes.
- 2. When quick action is desired.
- 3. When it is particularly desirable to eliminate the variability of absorption.
(to make absorption uniform)
- 4. When blood drawing is needed (exsanguinations).

1.3.7 Intra-muscular injection:

Definition: It is an introduction of a drug into a body's system via the muscles.

Purpose:

- 1. To obtain quick action next to the intra-venous route
- 2. To avoid an irritation from the drug if given through other route.

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 8 of 16
	Author: Federal TVET	



1.3.8 Blood Transfusion

Definition: - It is the giving of blood to a patient through a vein .

Purpose

1. To counteract severe hemorrhage and replace the blood loss.
2. To prevent circulatory failure in operation. Where blood loss is considerable, such as in rectal resection, hysterectomy and arterial surgery.
3. In severe burns to make up for blood lost by burning but only after plasma and electrolytes have been replaced.
4. For severe anemia from cancer, marrow aplasia and similar conditions.
5. To provide clotting factors normally present in blood which may be absent as a result of disease.

Table 1: Routes of Administration, Bioavailability, and General Characteristics.

Route	Bioavailability (%)	Characteristics
Intravenous (IV)	100 (by definition)	Most rapid onset
Intramuscular (IM)	75 to \approx 100	Large volumes often feasible; may be painful
Subcutaneous (SC)	75 to \approx 100	Smaller volumes than IM; may be painful
Oral (PO)	5 to $<$ 100	Most convenient; first-pass effect may be significant
Rectal (PR)	30 to $<$ 100	Less first-pass effect than oral
Inhalation	5 to $<$ 100	Often very rapid onset
Transdermal	80 to \approx 100	Usually very slow absorption; used for lack of first-pass effect; prolonged duration of action

1.4 Side effects: Adverse drug reactions (ADR)

- The drugs that produce useful therapeutic effect may also produce unwanted or toxic effects.
- It has been estimated that about 0.5% of patients who die in hospitals do so as a result of their treatment rather than the condition for which they were being treated.



- Serious systemic drug toxicity may result from overdoses.
- There is always an exaggeration of a drug's pharmacological action and some times it is predictable, e.g. Hypotension following antihypertensive drugs.
- Hypoglycaemia following insulin.
- ADR Is defined as any response to a drug that is noxious and unintended and that occurs at doses used in man for prophylaxis, diagnosis or therapy (WHO).
- The adverse effects are:
 - Side effects;
 - untoward effects;
 - allergic reactions;
 - idiosyncratic reactions; and,
 - teratogenic effects.

1.4.1 Side effects:

- Side effects are in fact pharmacological effects produced with a therapeutic dose of the drug.
- e.g.: Dryness of mouth with atropine which is troublesome in peptic ulcer patients and useful when used as a preanaesthetic medication.

1.4.2 Untoward effects:

- Untoward effects develop with therapeutic dose of a drug.
- They are undesirable and if very severe, may necessitate the cessation of treatment.

E.g: Diarrhoea with ampicillin and potassium loss with diuretics.

1.5 Teratogenic effect:

- Some drugs given in the first three months of pregnancy may cause congenital abnormalities and are said to be teratogenic.
- The best known example is thalidomide which results in early easily recognizable abnormalities such as absent or grossly abnormal limbs.
- Other drugs with teratogenic potential are androgens, steroids, anti convulsants, anti neoplastic drugs, cortisone, lithium, penicillamine, tricyclic antidepressants and warfarin

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 10 of 16
	Author: Federal TVET	



1.6 Mechanism of Drug action

The fundamental mechanism of drug action can be distinguished into four categories

1. **Physical action**:- Physical property of the drug is responsible for its action

E.g. Osmotic activity- Magnesium sulphate

2. **Chemical action**: - the drug reacts according to simple chemical equation

E.g. Antiacids ($\text{Al}(\text{OH})_3$ and other) neutralize gastric HCl

3. **Through enzymes**:- Almost all biological reactions are carried out under catalytic influences of enzymes are a very important target of drug actions.

Drugs can either increase or decrease the rate of enzymatically mediated reactions; which can be **Stimulation**: - by increasing the affinity of an enzyme for substrates

- Enzyme induction i.e. synthesis of more enzyme proteins

Inhibition

- May drugs inhibit a particular enzyme without affecting others. This inhibition is either competitive or non-competitive

i. Competitive

- The drug competes with the normal substrate or co-enzyme

ii. Non-competitive

- The drug reacts at an adjacent site and not with catalytic site, but alters the enzyme catalytic property

4. **Through receptors**:-

- A Drug receptor is a specialized target macromolecule, present on the cell surface or intracellularly, that binds a drug and mediates its pharmacological action

1.7 Toxicology is that branch of pharmacology which deals with the undesirable effects of chemicals on living systems, from individual cells to complex ecosystems.

1.8 Monitoring drug before, during and after administration

- A critical element of drug administration is documentation.
- The standard is “if it was not documented it was not done.”
- Many drug errors can be avoided with appropriate documentation.

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 11 of 16
	Author: Federal TVET	



- The nurse responsible for administering the medication must initial the medication on the MAR near the time the drug is scheduled.
- Usually there is a space available for a full signature on the record.
- The nurse should document that a drug has been given after the client has taken the drug.

1.9 Guidelines for Safe Administration of Medications

- ✓ Never administer medications that are prepared by another nurse.
- ✓ You are responsible for a medication error if you administer a medication that was inaccurately prepared by another nurse.
- Nurses should listen carefully to the client who questions the addition or deletion of a medication.
- Most clients are aware of their prescribed medications. If a client questions the drug or dose you are preparing to administer, recheck the order.
- If a medication is withheld, indicate the exact reason why in the client's record.
- Legally you are accountable for giving ordered medications to the client; however, circumstances may prevent you from giving a medication as ordered.
- Medications may be held for some diagnostic tests, or the client receiving antihypertensive medications may have a blood pressure that is lower than normal. If you gave the antihypertensive, the blood pressure would decrease, causing further hypotension.
- *Do not leave medications at the client's bedside for any reason.*
- The client may forget to take the medication, medications can accumulate, and the client could take two or more of the same medication, causing an overdose, or another client who is confused could take the medicine.
- Initial the MAR only for those medications you actually have administered. This practice ensures accurate charting by clearly indicating which actions you have performed.
- Advise clients not to take medications belonging to others and not to offer their medications to others.

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 12 of 16
	Author: Federal TVET	



- Medications are ordered for each client on the basis of the history, physical examination, and effectiveness of the medication.
- If the client refuses to take a medication once it has been prepared, the nurse must indicate that a dose was missed. In some hospitals, a circle is placed around the time the medication was scheduled to be given.
- The nurse should write in the record why the dose was missed and notify the health care practitioner.
- The client may have refused because the tablet was too large.
- The medication may be supplied as a liquid so an alternate form of the medication can be given; the nurse must request that the health care practitioner change the order to a liquid.
- Clients do have the right to refuse medications. However, if clients understand the actions of the medication, they may be willing to take the medication.
- Clients who are scheduled for various diagnostic tests or treatments at the time the medication is to be administered will need to have the medication times rescheduled.

Self-Check 1	Written Test
---------------------	---------------------



Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define pharmacology
2. What is pharmacokinetics
3. Mention the difference between loading and maintenance dose
4. List route of medication of administration
5. List general guide line for Safe Administration of Medications

Note: Satisfactory rating - 12 points Unsatisfactory - below 10 points

You can ask your teacher for the copy of the correct answers

Answer Sheet

Provide Basic First aid and Emergency Care Level III Version: 1 Revision : 0	Date : September 2019	Page 14 of 16
	Author: Federal TVET	



Score = _____
Rating: _____
Date: _____

Name: _____

Short Answer Questions

1. _____

2. _____

3. _____

4. _____

5. _____



List of Reference

1. Bertan G, Katzung – Basic and clinical Pharmacology 9th edition

2. Patient Safety and Quality: An Evidence-Based Handbook for Nurses, Ronda G. Hughes, 2018

Prepared By							
No	Name	Educational Back grand	LEVEL	Region	College	Email	Phone Number
1	Masresha Leta	Midwifery	A	Harari	Harar HSC	masreshaleta3@gmail.com	0911947787
2	Gosaye T/haymanot Zewde	Midwifery	A	Harari	Harar HSC	Zewdegosa@yahoo.com	0913227450
3	Amare Kiros	Midwifery	A	BGRS	Pawi HSC	amarekiros9@gmail.com	0920843010
4	Jalele Mosisa	Midwifery	B	oromia	Nekemte HSC	jalemosis2018@gmail.com	0939316415
5	Serkalem Fetene	Midwifery	A	oromia	Mettu HSC	serkefetene@gmail.com	0912022476
6	Balela Kadir	Midwifery	B	oromia	Nagelle HSC	balela.kedirbedu@gmail.com	0916633542
7	Sadeya Mohamed	Midwifery	A	Somali	Jiggiga HSC	yanaan261@gamil.com	0915076012