Republic of Liberia

Ministry of Health

2nd Edition National Standard Therapeutic Guidelines and Essential Medicines List Liberia - 2017

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National Standard Therapeutic Guidelines
and
Essential Medicines List
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Telephone number: +231886557636

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Copies of the guidelines may be obtained from:

Pharmacy Division
Ministry of Health
P. O. Box 9009
1000 Monrovia, Liberia

TABLE OF CONTENTS

ABBREVIATIONS AND UNITS

a.c.	*ante cibum* (before food)
ACT	Artemisinin-based Combination Therapy
AIDS	Acquired Immune Deficiency Syndrome
AQ	Amodiaquine
ART	Antiretroviral Therapy
AS	Artesunate
ATS	Anti-Tetanus Serum *(also known as Tetanus Antitoxin)*
BCG	Bacillus Calmette-Guerin
b.d.	*bis die* (twice daily)
BP	Blood Pressure
BW	Body Weight
^{o}C	Degree s Celsius
cap	Capsule
cm	Centimeter
CMM	Cervical Mucus Method
COC	Combined Oral Contraceptive
dl	Deciliter
DOTS	Directly Observed Treatment Strategy (*Internationally Recognized Strategy for Tuberculosis Control [WHO]*)
DPT	Diphtheria-Polio-Tetanus
ECG	Electrocardiogram
EMLL	Essential Medicines List for Liberia
FDC	Fixed-Dose Combination
FP	Family Planning
Hb	Hemoglobin
HepB	Hepatitis B
Hib	Hemophilus influenzae type B
HIV	Human Immunodeficiency Virus
hr	hour
IM	Intramuscular
IPT	Intermittent Preventive Treatment
IUD	Intrauterine Device
IV	Intravenous
g	kilogram
L	Liter/litre
LAM	Lactational Amenorrhea Method
LCMS	Liberian Central Medical Stores
m	meter
mEq	Milliequivalent
mg	milligram
min	minute
ml	milliliter

ABBREVIATIONS AND UNITS (cont'd)

mm Hg	millimeters of mercury
mmol	millimole
MoH	Ministry of Health
CSH	Collaborative Support for Health
MU	mega units
NF	National Formulary
NGT	Nasogastric Tube
NSTG	National Standard Therapeutic Guidelines
o.d.	*omni die*(daily)
o.m.	*omni mane* (in the morning)
o.n.	*omni nocte* (at night)
OPV	Oral Polio Vaccine
ORS	Oral Rehydration Salt
p.c.	*post cibum* (after food)
PCP	Pneumocystis Jirovecii Pneumonia (*previously known as Pneumocystis Carinii)*
PCV	Packed Cell Volume
pess	Pessary
PEM	Protein Energy Malnutrition
PID	Pelvic Inflammatory Disease
PMI	President's Malaria Initiative
POP	Progesterone-only Pill
PPF	Procaine Penicillin Fortified
p.r.n.	*Pro re nata* (when required)
q.q.h	*Quarta quaque hara* (every 4 hours)
RDT	Rapid Diagnostic Test
RPR	Rapid Plasma Reagin
sec(s)	second(s)
SLC	Sodium Lactate Compound
SP	Sulfadoxine-Pyrimethamine
stat	statim (immediately, as initial dose)
STI	Sexually Transmitted Infections
tab	Tablet
TB	Tuberculosis
t.d.s.	*ter die sumendus* (3 times daily)
TIG	Tetanus Immunoglobulin
TT	Human Tetanus Toxoid
USAID	United States Agency for International Development
vsc	Voluntary Surgical Contraception
WHO	World Health Organization
wk	Week
yr	Year

FOREWORD TO THE SECOND EDITION

The Second Edition of the National Standard Therapeutic Guidelines (NSTG) of Liberia has evolved through the work of the First Edition which was published in 2011 under the auspices of the Ministry of Health through its Pharmacy Division. As expected, this policy document is designed to provide current and up-to-date, practical and reader friendly information for both upper and lower levels of the current three tiers of the healthcare delivery system of Liberia (i.e., clinics, health centers, and hospital) with its primary focus on the treatment of common diseases presenting within the territorial confines of Liberia. The guidelines are purposely designed to establish and maintain a strong foundation for the rational use of medicines and other health commodities that are appropriate for the smooth running of a holistic healthcare delivery system.

As Liberia has embarked upon an ambitious process of building resilient healthcare delivery system with strong community participation, the provision of an adequate and responsive supply of good, high quality, efficacious, safe, accessible, and affordable medicines become the task and responsibility of the Government of the Republic of Liberia. It is expected that the medicines described herein this new edition are made available at all times and properly utilized by health professionals and patients alike. The intent is to rationally manage resources in a way that will promote efficiency and better therapeutic outcomes for all without discrimination. The issues that border on patient care and safety are of great concern to the current management team of the restructured Ministry of Health (MoH) detached from social welfare. The MoH is cognizant of the fact that building scrupulous mitigating mechanisms against the wasteful use of health commodities will create the necessary fertile grounds for continuous support from our health partners.

Consequently, enormous efforts have been made to adequately address the problems of wilful wastage of essential health commodities; problems of patient care and safety, with the aim of ensuring both the regular availability and geographic equitable access to required essential medicines, as well as their rational use by health professionals, patients, and the public in general.

By definition, rational use of medicines (RUM) means that patients receive medicines that satisfy their clinical needs, in doses that meet their own individual requirements, for an adequate period, with little or free of unwanted effects, and at the lowest cost to them and the community. The NSTG combined with the Essential Medicine List for Liberia (EMLL), has been designed to facilitate rational use of health commodities by providing carefully researched details of cost- effective as well as comprehensive, yet concise treatment and relevant alternatives and guidance on when to refer and admit patients based on the level of the health facility under consideration. It is an important tool for the day-to-day work of the health professionals. The document is equally useful for health practitioners working in the private sector and those working in the non- governmental organizations (NGO) and communities as well. The MoH, as the regulator of health services in Liberia, strongly encourages all health practitioners from all sectors to make maximum use of the information on the medicines available to them and also adopt the generic names of the medicines. Even though NSTG provides careful researched details of recommended treatment regimens for all levels, the clinical judgment and experience of clinicians will be required to adjust these recommendations to appropriately meet the needs of the specific individuals seeking medical care.

The NSTG is to be used concomitantly with the Essential Medicines List of Liberia (EMLL). This provides appropriate guidance on the careful selection of medicines for each level of the healthcare delivery system of the country and the National Formulary which provides detailed information on all the medicines included in the EMLL and the NSTG respectfully. It is expected that the correct use of the information provided in the three publications will ultimately facilitate the appropriate selection and use of essential medicines thereby reducing wastages of health commodities and maximizing health benefits for all.

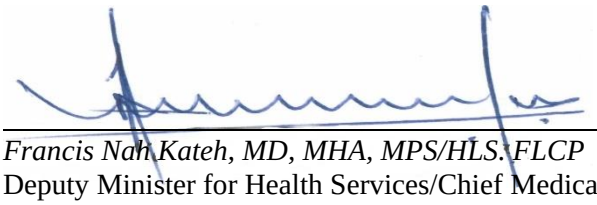
Like the First Edition of the NSTG, the compilation of relevant resource materials for the Second Edition has been made possible through a careful process of consultation with well selected key specialists covering wide range of medical and pharmaceutical specialties and intensive plenary discussions on wide range of issues bordering on safety, efficacy, quality, affordability, accessibility, and appropriateness of the health commodities. To add value to this current edition, thorough review, revision, and special consultative meetings were organized by the Pharmacy Division in collaboration with the World Health Organization (WHO) Office in Liberia. The review, revision, and workshops were facilitated by a consultant hired by the WHO. During the workshops and consultative meetings, critical decisions were reached with the aim of accommodating an array of health commodities as well as infection prevention and control (IPC) materials that were introduced in the healthcare delivery system of Liberia due to the Ebola Virus Disease (EVD) epidemic that devastated the West African Region. The participants concluded on the following to wit:

- *Determined the parameters for the careful vetting of every molecule of drug that was selected to be included in the Essential Medicine List (EML);*
- *Carefully vetted every molecule of drug included in the EML using the Essential Medicine Concept;*
- *Categorized each drug molecule in the EML based on the three tiers of the health care delivery system of Liberia (i.e. clinic, health centers, hospitals);*
- *Reached a critical decision to maintain the current format of the two documents: National Standard Therapeutic Guidelines (NSTG) and Essential Medicine List in its combined form;*
- *Reached a decision to create a new section exclusively on Infection Prevention and Control (IPC) for the protection of healthcare workers against infectious diseases with emphasis on Ebola Virus Disease (EVD,) Lassa Fever, Yellow Fever, Hepatitis A, B, & C etc.*

I want to sincerely express my deep gratitude to the revision team members for their careful, thorough, and dedicated work and all those who have contributed to the preparation of this very important “users friendly” publication. Your efforts put into the preparation of this policy document are recognized and greatly appreciated.

Standard therapeutic guidelines the world over are dynamic in nature. It is therefore important to interject here that national guidelines such as the NSTG are subjected to regular review and regularly updated to appropriately incorporate the prevailing therapeutic practices. Henceforth, the continual feedback from the users on the usefulness, relevance, and accuracy of the NSTG is vital to the Ministry of Health in making any decision on the future modifications and subsequent improvements in the Second Edition of the NSTG-EML of Liberia. I strongly believed that conscious familiarization with, and daily use of these guidelines by our healthcare professionals will eventually lead to improved consistency of prescribing practices nationwide both urban and rural communities of our country. It is also expected that the publication of this resource material herein will ensure improvements in medicines supply system and dispensing practices

and thus ensure that our patients receive the best service possible to restoring confidence in the healthcare delivery system of Liberia. I therefore would like to recommend the National Standard Therapeutic Guidelines and Essential Medicines List (NSTG-EML) of Liberia as an authentic policy document to be adapted by the Ministry of Health of the Republic of Liberia.



Francis Nah Kateh, MD, MHA, MPS/HLS, FLCP
Deputy Minister for Health Services/Chief Medical Officer
Ministry of Health, Republic of Liberia

PREFACE AND ACKNOWLEDGEMENT TO THE SECONDEDITION

The second edition of the National Standard Therapeutic Guidelines and Essential Medicines List (NSTG-EML) is scrupulously building on the foundation of the first edition which was published in 2011. This new edition is designed to guide prescribers with the best methods for medicines used in the Essential Medicine List of Liberia (EMLL) which accounts for patient safety and access to quality and efficacious medications across the population; as well as the three tiers of the healthcare delivery system of the country (i.e., clinics, health centers, and hospitals).

The NSTG-EML provides crucial recommendations on how to use the medicines in the EMLL to achieve the best therapeutic outcomes in our patients with particular focus on the healthcare delivery system of Liberia. This second edition, like the first edition, was developed following a wide range of consultations with medical specialists and other pharmaceutical experts as well as public health specialists across the healthcare delivery system in Liberia. Expert opinions were gathered from vertical programs including the National AIDS Control Program (NACP), National Malaria Control Program (NMCP), National Leprosy and Tuberculosis Program (NLTCP), Mental Health Division (MHD), Family Health and Reproduction Division (FHRP) of the Ministry of Health.

As enshrined in the National Medicine Policy (NMP) document, the strategy of rational use of medicines across the nation is intended to improve the use of medicines in the healthcare delivery system of the country and also ensures that healthcare professionals receive both basic and continuing education programs in all aspects of the rational use of medicines as a means of improving medicines utilization in all our health facilities, both public and private sectors. The NSTG-EML is designed to be a vital tool to strengthen and standardize treatment of common conditions in Liberia for both the public and private sectors. It is expected that the document be used as the basis for prescribing and dispensing in our healthcare system whether public, private, or the NGO Communities operating under the umbrella of the Ministry of Health, Republic of Liberia.

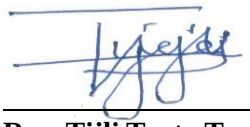
Like the immediate past edition, this will be subject to constant review and revision to reflect the current realities of health practices in the country. It is expected, and will therefore be encouraged that all healthcare professionals get familiar with the content of the document and constantly evaluate its relevance and appropriateness to their daily operations in the health facilities nationwide. The review and revision exercise of the document was necessitated by the protocols set to do same every two years; this process was however, delayed due to lack of funds and sponsorship. Additionally, the emergence of the Ebola Virus Disease (EVD) epidemic which has introduced an array of medicinal and other health commodities into the healthcare system otherwise foreign to the medical practices in Liberia, has spoken volumes of appeals to donor partners to hasten the review process.

The development of the second edition was made possible through the World Health Organization (WHO) by providing financial and technical support. Other partners that provided technical support included Collaborative Support for Health (CSH), MSF-France, UNICEF, UNFPA, Liberia Postgraduate College of Physicians and Surgeons, School of Pharmacy, School of Medicine, the John F. Kennedy Memorial Medical Center, vertical programs of the Ministry of Health, especially, National AIDS Control Program, National Leprosy and Tuberculosis Control Program, and the National Malaria Control Program, the Family

Health Division and the Mental Health Division. My profound gratitude goes to all others who might not have been captured herein.

I wish to register my sincere thanks and appreciation to the revision committee members for their dedication and sacrificial work. The following physicians, pharmacists, and administrators representing various academic and medical institutions that patiently and honestly worked with the Pharmacy Division from the onset of the revision exercise and continued to offer valuable suggestions and critical analysis of the document are hereby recognized. These individuals include: Dr. Roseda E. Marshal; Dr. Samson K. Arzoaquoi; Dr. Torsu Y. Jallabah; Dr. Catherine Cooper; and Dr. Lekilay G. Tehmeh. Others include Prof. Joseph Gono; Asst. Prof. Ezekiel Fayiah Hallie; Pharm. Joseph N. B. Jimmy; Pharm. Hasipha C. Tarpeh; Pharm. Duredoh Freeman George; Pharm. Arthur Loryoun; Pharm. Joseph S. Weah; Pharm. James D. K. Goteh; Pharm. S. Samuel Gayflor; Pharm. Joseph S. Quoi; Pharm. John F. Serville; Mr. John G. Gleekiah; and Mr. Norris David. The dedicated staff members of the Pharmacy Division worth mentioning for their commitment to duty include Mr. William Digker; Madame Victoria B. Nimene; and Mrs. Zoe Taylor Sirleaf.

My profound gratitude goes to the Deputy Minister for Health Services and Chief Medical Officer of the Republic of Liberia, Dr. Francis Nah Kateh, for his consistent administrative pieces of advice given the Pharmacy Division and oversight role played throughout the review and revision process of the document. Dr. Kateh was very instrumental in his flexibility in granting the permission to the Division to seeking technical assistance from the WHO.



Rev. Tijli Tarty Tyee, Sr. MSc, FPCPharm, BPharm, RPh, BSc
Chief Pharmacist
Ministry of Health
Republic of Liberia

Special Acknowledgement and Recognition

We would like to extend sincere appreciation to all who participated in the review of this important document; by either attending workshops or sending their inputs throughout all the chapters.

1. The Liberia National Standard Therapeutic Guidelines and Essential Medicines List Review Committee-

Pharm. Hasipha C. Tarpeh - **Chairperson**
Dr. Torsu Y. Jallabah – **Vice Chairperson**
Pharm. Joseph N. B. Jimmy – **Recording Secretary**
Rev. Tijli Tarty Tyee, Sr – **General Secretary**
Pharm. J. Nathaniel B. Woart –**Treasurer**
Dr. Mohammed Sankoh -**Chaplain**
Dr. Roseda E. Marshal
Dr. Samson Arzoaquoi
Dr. Catherine Cooper
Dr. Lekilay G. Tehmeh
Prof. Joseph Gono
Asst. Prof. Ezekiel Fayiah Hallie
Pharm. Duredoh Freeman George
Pharm. Arthur Loryoun
Pharm. Joseph S. Weah
Pharm. James D. K. Goteh
Dr. Eugene Didi Dolopei

2. The following individuals made a telling contribution to the document:

Name	***Organization/Designation***
Pharm. Joseph S. Quoi	MoH Liberia-Mental Health Division
Pharm. S. Samuel Gayflor	MoH Liberia-Bong County Pharmacist
Mr. John G. Gleekiah	MoH Liberia-Clinical Supervisor
Mary W. Tiah	MoH Liberia-Director Nursing Division
Pharm. Adolphus Clarke	MoH Liberia-Expanded Program on Immunization
Marilyn K. Geeplay	MoH Liberia-Nutrition Division
Pharm. Menmon P.Z. Dunah	MoH Liberia-National Drug Service
Pharm. Lewis Momoh	MoH Liberia-James N. Davis Junior Memorial Hospital
Pharm. David Z. Sakui	MoH Liberia-C. B. Dunbar Memorial Hospital
Pharm. John F. Serville	MoH Liberia-Pharmacy Division
Mr. Norris David	TNIMA-Tubman National Institute of Medical Arts
P. Konah Nyansaiye	MoH Liberia-National Malarial Control Program
Pharm. David Sneh	MoH Liberia-Redemption Hospital
Veronica Neblett-Siafa	MoH Liberia- Family Health Division
Dr. Alex Ntale Gasasira	W.H.O-Liberia Country Representative
Dr. Peter Clement	W.H.O-Liberia Technical Coordinator
Dr. Emmanuel Musa	W.H.O-Liberia Deputy Country Representative

Samuel Gavi	W.H.O-Essential Drugs and Medicines Technical Advisor
Dr. April Baller	W.H.O-Liberia
Redda Seifeldin	W.H.O-Liberia
Dr. R Kesavan	W.H.O-Liberia
Dr. Moses K. Jeuronlon	W.H.O-Liberia
Bentoe Z. Tchaingwe	W.H.O-Liberia
Dr. Anthony Asije	UNICEF-Liberia
Pharm. Tima Sannah Brewah	UNICEF-Liberia
Katherine Faigao	UNICEF-Nutrition, Child Survival & Development Specialist - Liberia
Kaa Williams	USAID-Liberia
Arthur Loryoun	USAID (CSH)-Liberia
Tapiwa Mukwashi	USAID (JSI-Deliver)-Liberia
Joachim W. Joh	USAID(JSI-Deliver)-Liberia
Dr. John Ly	Last Mile Health-Liberia
Dr. Ami Waters	Last Mile Health-Liberia
Dr. Simon Akena	Last Mile Health-Liberia
Dr. Mark J. Sneider	Last Mile Health-Liberia
Dr. Kelvin Chan	Last Mile Health-Liberia
Pharm. Christolyn Chizoba	MSF-France, Liberia

INTRODUCTION

The Ministry of Health in collaboration with the World Health Organization (WHO), John F. Kennedy Memorial Hospital, Medicines San Frontiers-Belgium, and Medical Emergency Relief Cooperative International (MERCI) formulated their own Treatment Guidelines in the 1990s to assist the health worker in choosing the appropriate pharmaceutical treatment after the correct diagnosis has been made. In response to new knowledge on medicines and diseases and changes in the epidemiology of diseases in Liberia, it became necessary to review and revise the existing NTG which was dated back to 1986. This review and other revisions have been supported with funding and technical support from WHO Essential Medicines Program. The Government of Liberia, through its National Medicines Policy, remains committed to ensuring that good quality medicines are available and accessible for all people and that these medicines are affordable and rationally used. Achieving these objectives requires a comprehensive strategy that focuses on a good supply and distribution chain system of medicines, and appropriate and rational prescribing, dispensing, and use of medicines.

The Purpose of This Book

These national therapeutic guidelines have been prepared to assist and guide prescribers (including doctors, medical assistants, and midwives), pharmacists, dispensers, and other health care staff who prescribe at primary care facilities in providing quality care to patients. The guidelines list the preferred treatments for common health problems experienced by people in the health system and were field-tested before being finalized to ensure that the opinions of the intended users were considered and incorporated. The guidelines are designed to be used as a guide to treatment choices and as a reference book to help in the overall management of patients, such as when to refer. The guidelines are meant for use at all levels within the health system, both public and private. The content of these treatment guidelines will undergo a process of continuous review. Comments or suggestions for improvement are welcomed. Those comments or suggestions for the addition of diseases should include evidence of prevalence as well as a draft treatment guideline using the format set out in this book. These suggestions should be sent to the Chief Pharmacist of the Ministry of Health.

How to Use This Book

To use these guidelines effectively, you must become familiar with the contents. Take time to read the book and understand the content and layout.

Order of Sections

Diseases are grouped according to the Anatomical Therapeutic Chemical category, and the categories appear in order of importance in a Liberian setting. For each of these disease states, the structuring of the information and guidance has been standardized to include the generic name of the medicine of choice, adult dosage, and where relevant, child dosage.

Selecting a Treatment

The choice of treatment guidance used here is based on the principles of evidence-based medicine. That is, it is based on the international medical and pharmaceutical literature, which clearly demonstrates the efficacy of the treatment choices.

Care should be taken to avoid symptomatic management of uncertain diagnoses. When treating patients, the final responsibility for the well-being of the individual patient remains with the prescriber who must take steps to ensure that he or she is competent to manage the most common conditions presenting at his or

her practice. He or she should become familiar with particularly those aspects of the treatment guidelines relating to those conditions.

It is important to remember that the guidance given in this book is based on the assumption that the prescriber is competent to handle patients at this level and that he or she has diagnostic tests and monitoring equipment available.

Referral

These guidelines also make provision for referral of patients to other health facilities. Patients should be referred when the prescriber is not able to manage the patient either because of a lack of personal experience or because appropriate facilities are not available. Patients should be referred, in accordance with agreed-upon arrangements, to facilities where the necessary competence, diagnosis, and support mechanisms exist. The patient should be given a transmittal letter or note indicating the problem and what has been done so far, including laboratory tests and treatment. When indicated, emergency treatment must be given before referring the patient. Remember that the act of referral does not remove from the prescriber the responsibility for the well-being of the patient.

Prescription Writing

Medicines should be prescribed only when they are necessary in treatment following a clear diagnosis. Not all patients need a prescription for a medicine; non-pharmaceutical treatment may be suitable and should always be kept in mind. In all cases, the benefit of administering the medicine should be considered in relation to the risk involved. This consideration is particularly important during pregnancy where the risk to both mother and fetus must be considered.

Prescriptions should:

- Be written legibly in ink or other indelible medium
- Be written by the prescriber and not left for another person to complete
- Be dated
- State the full name and address of the patient
- Specify the age and weight of the patient (especially in the case of children)
- Be signed in ink by the prescriber; it is helpful to include contact details (e.g., name and telephone number)

When writing a prescription, the following should be noted:

- Names of medicines and preparations should be written in full. Unofficial abbreviations should not be used because the risk is high for misinterpretation.
- Nonproprietary (generic) names are used in this document, and they should always be used in prescribing.
- Avoid the unnecessary use of decimal points• for example, 3 mg, not 3.0 mg.
  - Quantities of 1gram or more should be written1g.
  - Quantities less than 1gram should be written in milligrams- for example, 500 mg, not 0.5g.
  - Quantities less than 1milligram should be written in micrograms- for example, 100micrograms, not mg.
  - Where decimals are unavoidable, a zero should be written in front of the decimal point where there is no other figure-for example, 0.5 ml, not .5ml.
- *Micrograms, nanograms,* and *units* should not be abbreviated. - Use the term *milliliter* (ml) not cubic centimeter (cc or cm^3).
- State dose and dose frequency. In the case of "as required," a minimum dose interval should be specified-for example, "every 4-6 hours (hrs.) as required for pain."

- State the quantity to be supplied, or indicate the number of days of treatment required.
- Write directions, preferably in English, without abbreviation. We recognize that some Latin abbreviations are used, and these abbreviations are detailed in "Abbreviations, Acronyms, and Units."

Do not use other abbreviations.

- Avoid:
  - The use of symptomatic treatments for minor self-limiting conditions
  - Where possible, the prescribing of placebos; spend a little time educating and reassuring the patient
  - Multiple prescribing (polypharmacy), especially when the diagnosis is not clear
  - The use of the parenteral route of administration except where there are clear, clinical indications for this route; use the oral route whenever possible

Where possible, all children (younger than 12 years) should get dosage according to the body weight. In these guidelines, "Child" refers to a patient younger than12 years unless it is otherwise specified. Where weighing is not possible, children younger than 5 years old get a quarter of the adult dose, the 5-8-year-old group gets half of the adult dose, and 9-12 year- old category gets three-quarters of the adult dose.

For ease of administration, syrups should be availed to children younger than 5 years where possible, and the dosage of the base of the medicine by weight should be clearly specified. Tetracycline should not be given to children younger than 8 yrs. Acetylsalicylic acid should not be given to children younger than 8 years and pregnant women. All medicines should be given with caution in pregnant mothers.

For diseases that have more than one medicine to treat, the first medicine listed is the first-line medicine. Only generic names of medicines are presented in this book, and it should therefore be used together with the EMLL.

For Patients with Penicillin Allergies

The following penicillin derivatives are listed in the EMLL. If a patient is allergic to penicillin, do not use these. Instead, please substitute tetracyclines (e.g., doxycycline), quinolones (e.g., ciprofloxacin), macrolides (e.g., clarithromycin), aminoglycosides (e.g., gentamicin) and glycopeptides (e.g., vancomycin). These are all unrelated to Penicillins and are safe to use in the penicillin allergic patient.

- Amoxicillin - Ampicillin
- Benzathine penicillin - Benzylpenicillin
- Doxacillin
- Phenoxymethylpenicillin
- Procaine benzylpenicillin fortified

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Below is a list of documents that we acknowledge to have used as reference material in the development of these therapeutic guidelines and essential medicines list:

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1.USE OF MEDICINES IN SPECIAL POPULATIONS

1.1 Use of Medicines during Pregnancy and Breastfeeding

AVOID ALL MEDICATIONS during pregnancy especially during the 1st trimester unless advised by your medical practitioner. Prescribing in pregnancy/breastfeeding can present significant risks to the fetus and infant. In most cases, it is difficult to avoid use of medicines during pregnancy as some disease conditions pose significant risk of death to both the mother and the unborn child.

Medicines generally pose risks to the fetus at all stages of pregnancy; it is advisable to use medicines whose safety profile during pregnancy is known.

First Trimester: during this phase, medicines can cause congenital malformations (teratogenic); and the period of greatest risk is from the third to the eleventh week of pregnancy.

Second and Third Trimesters: during this phase, medicines can affect the growth or functional development of the fetus, or they can have toxic effects on fetal tissues.

Medicines given shortly before term or during labor can have adverse effects on labor or on the neonate after delivery. In some cases, effects of medicines used during pregnancy have a delayed onset and manifest later in life. Table 1.1 is a small list of medicines that have been shown to have significant effects on infants when exposed during pregnancy. Medicines should only be prescribed if the benefit to the mother and fetus outweigh the risks. While a small number of medicines have been shown to be teratogenic if used during pregnancy, it is good clinical practice to take great care when prescribing by considering all medicines as being potentially harmful to the fetus.

Table 1.1: Medicines with Significant Teratogenic or other Adverse Effects on the Fetus

Medicine Name	Trimester	Effect
Efavirenz	1st	Congenital abnormalities
Methotrexate	1st	Multiple congenital malformations
Methylthiouracil	All	Hypothyroidism
Metronidazole	1st	May be mutagenic (from animal studies)
Misoprostol	1st	Mobius sequence (facial paralysis)
Organic solvents	1st	Multiple malformations
Penicillamine	1st	Cutis laxa, other congenital malformations
Phenytoin	All	Fetal hydantoin syndrome
Propylthiouracil	All	Congenital goitre
Smoking (constituents of tobacco smoke)	All	Intrauterine growth retardation; prematurity; sudden infant death syndrome; perinatal complications
selective serotonin reuptake inhibitors	3rd	Neonatal abstinence syndrome, persistent pulmonary hypertension of the newborn
Tamoxifen	All	Increased risk of spontaneous abortion or fetal damage
Tetracycline	All	Discoloration and defects of teeth and altered bone growth
Valproic Acid	All	Neural tube defects, cardiac and limb malformations
Warfarin	1st	Hypoplastic nasal bridge, chondrodysplasia
	2nd	CNS malformations
	3rd	Risk of bleeding. Discontinue use 1 month before delivery.

The concentrations of medicines found in breast milk are mostly clinically insignificant to cause harm to the breastfeeding infant. It is advisable to take medications 30–60 minutes after nursing and 3-4 hours before the next feeding to allow for clearance from the mother's blood, and the concentrations in breast milk will be relatively low. Medicines for which no data is available on

their safety during breastfeeding should be avoided or breast-feeding discontinued while they are being given.

Table 1.2: Examples of Medicines to Avoid During Breastfeeding:

Medicine Class	Medicine to Avoid
Disease-modifying agents used in rheumatic disorders	Azathioprine, Cyclophosphamide, Methotrexate, Sulfasalazine
Anti-allergics & Medicines Used	Chlorpheniramine
Anticonvulsants/Antiepileptic's	Ethosuximide
Anti-infectives	Chloramphenicol (avoid if possible), Ciprofloxacin (avoid if possible), Doxycycline, Metronidazole, Clindamycin
Immunosuppressive/Cytotoxics	Avoid breastfeeding for all medicines of this class
Cardiovascular medicines	Atenolol (avoid if possible)
Diuretics	Amiloride (avoid if possible, may inhibit lactation); Furosemide (avoid if possible, may inhibit lactation); Hydrochlorothiazide (avoid if possible, may inhibit lactation); Spironolactone (avoid if possible, may inhibit lactation)
Hormones and Hormonal Contraceptives	Testosterone, Ethinylestradiol + Levonorgestrel; Ethinylestradiol + Norethisterone
Thyroid hormones and Anti-thyroid medicines	Potassium Iodide (monitor hypothyroidism)
Medicines used in Psychotic Disorders	Chlorpromazine, Fluphenazine, Haloperidol
Medicines used in Bipolar Disorders	Lithium Carbonate

Other Medicines

□ ***Tetracycline***: concentrations in breast milk are approximately 70% of maternal serum concentrations and present a risk of permanent tooth staining in the infant.

□ ***Isoniazid***: in breastmilk, may cause pyridoxine deficiency, mother should take pyridoxine supplements.

□ ***Barbiturates***: if taken in hypnotic doses by the mother can produce lethargy, sedation, and poor suck reflexes in the infant.

□ ***Diazepam***: can have a sedative effect on the infant, and because of its long half-life can result in significant drug accumulation

□ ***Azathioprine***: avoid during breastfeeding

Identifying and assessing risks of medicines during breastfeeding is a challenge. It is advisable to use medicines whose safety profile is already known and have been use for a long time.

Note: Always refer to literature when in doubt about the safety of a medicine being given to a breastfeeding or pregnant woman.

1.2 Use of Medicines in Pediatric Patients

In early child development organ systems are not yet well developed and as such pharmacokinetic processes of absorption, metabolism and excretion will be compromised. Dosing of medicines should be based on gestational age for infants below 1month.

Gestational age >37 weeks (term baby)

- First 2 days: *2 doses every 24 hours*
- 3 days to two 2 weeks: *3 doses every 24 hours*
- >2 weeks: *4 doses per 24 hours*

Gestational age <37 weeks (pre-term baby)

- First week: *2 doses per 24 hours*
- 1-4 weeks: *3 doses per 24 hours*
- >4 weeks: *4 doses per 24 hours*

Important Pediatric Definitions:

- Low birth weight: *below 2.5 kg at delivery*
- Preterm Neonate: *Born at less than 37 weeks' gestation*
- Term Neonate: *Born at 37 to 42 weeks' gestation*
- Post-term Neonate: *Born at greater than 42 weeks' gestation*
- Neonate: *from 0-28 days of age (first four weeks of life)*
- Infant: *from 28 days, up to 24 months of age*
- Child: *from 2 years, up to 11 years of age*
- Adolescent: *from 12 years, up to 18 years of age*

Table 1.3 Doses of Most Commonly Used Medicines in Pediatric Patients

Medicine Name	Route	Dosage	Frequency
Adrenaline 1:1000 1mg/ml injection	iv/im	0.01 mg/kg (=10mcg/kg)	-
Amoxicillin 125mg/5ml syrup/tablet	po	40mg/kg/dose	Every 8 hours
Atropine Sulphate 0.6mg/ml injection	iv/im/sc	0.01mg/kg	-
Benzylpenicillin (3g) 5 MU injection	iv/im	0.05MU/kg/dose	Every 6 hours
Chloramphenicol 1g injection or 125mg/5ml syrup	iv/po	12.5mg/kg/dose	Every 8-12 hours
Cloxacillin 500mg injection; 125mg/5ml syrup	iv/im/po	30mg/kg/dose	Every 6-12 hours
Cotrimoxazole 240mg/5ml syrup	po	24mg/kg/dose	Every 12 hours
Dexamethasone 5mg/ml injection	im	0.5mg/kg/dose	Every 6-8 hours
Diazepam 5mg/ml injection	iv	0.3mg/kg/dose repeat	-
Erythromycin 125mg/5ml suspension	po	40mg/kg/dose	Every 8 hours
Gentamicin 10mg/ml injection	im/iv	≥1500g=2.5mg/kg/dose <1500g=2.5mg/kg/dose	Every 12 hours once
Isoniazid 50mg/5ml syrup	po	10mg/kg/day	once
Metronidazole 5 mg/ml injection	iv	7.5mg/kg/dose	Every 8-12 hours
Nystatin 100 000units/ml	po	100 000u/dose	Every 6 hours
Sodium bicarbonate 4.2%/8.4% infusion	iv	5ml/kg of 4.2% slowly	-

*Please note: Also, refer to the specific disease condition for dose guide

Table 1.4: Medicines with Age and Weight Restrictions

Medicine Name	Age/Weight Restriction
Atazanavir	>25 kg
Atropine	>3 months
Benzyl Benzoate	>2 years
Betamethasone Topical Cream	Hydrocortisone preferred
Cefazolin	>1 month
Ceftriaxone	>41 weeks corrected gestational period
Darunavir	>3 years
Doxycycline	>8 years (except for serious infections)
Efavirenz	>3 years or > 10kg
Fluoxetine	>8 years
Ibuprofen	>3 months (except form for *patent ductus arteriosus)*
Mefloquine	>5kg or >3 months
Metoclopramide	Not in neonates
Nevirapine	>6 weeks
Ondansetron	>1 month
Silver Sulfadiazine	>2 months
Tetracaine	Not in preterm neonates
Trimethoprim	>6 months

1.3 Use of Medicines in Elderly Patients

Management of disease in the elderly requires a lot of care and consideration because of declining organ function. With increasing age comes changes in physiological and biochemical processes; this translates to changes in the way the elderly patients handle medicines. In general, most elderly patients receive multiple medications for multiple diseases; this increases the risk of adverse events that may be worse than the actual disease(s) affecting the patient resulting in reduced adherence to treatment.

In the care of the elderly it is critical to maintain a balance between management of multiple conditions and avoiding polypharmacy, thus nonpharmacological interventions should always be considered during their care. Despite the increased risk from use of medicines in the elderly a proper benefit to risk assessment should be done so that they are not denied life-saving treatment in fear of adverse events.

Manifestations of aging include:

- Reduced renal function
- Reduced sensitivity to some medicines, and increased sensitivity to others
- Reduction in hepatic function
- Lack of clarity between an adverse reaction to a medicine and disease symptoms e.g. confusion

To improve management of elderly patients the following actions should be considered:

- Review medicines at least once every three months or less depending on condition and type of medication
- Simplify the dosage schedule as much as possible limiting to once or twice daily regimens
- Instructions should be clear and legible
- Close relatives should be asked to supervise adherence to medication
- Doses of medicines should be reduced and avoid nephrotoxic agents as much as possible

1.3.1 Categories of Medicines of Concern in the Elderly

1.3.1.1 Antihypertensives

Treatment should begin with a low dose going up and treatment should be evaluated every 3-6 months. Because of the risk for hypokalemia, hyperglycemia, and hyperuricemia caused by thiazide diuretics, this class of medicines should be prescribed at a lower dosage in general. In addition, elderly patients have reduced plasma volume and thus aggressive diuretic therapy is not indicated.

Calcium channel blockers are generally safe and effective; Beta blockers are not as effective compared to calcium blockers when used in the elderly. ACE inhibitors may be used if there is evidence of heart failure in the patient. When using digoxin, a low maintenance dose should be used e.g. 0.625 to 1.25 mg due to reduced renal function and increased sensitivity. Signs of digoxin toxicity are nausea, vomiting, anorexia, visual disturbances and headache. During treatment, patients should be assessed for postural hypotension.

1.3.1.2 Oral Hypoglycemic

Do not use chlorpropamide as impaired renal function may increase risk of toxicity. Glibenclamide (2.5mg -15mg once a day) is the ideal medicine to use, it is important to monitor for hypoglycemia.

1.3.1.3 Hypnotic/Sedatives

The elderly is especially sensitive to medications that affect the Central Nervous System, and may show exaggerated effects from very small doses. Medicines in the Benzodiazepine group (e.g. diazepam) should be avoided because of significant impairment to cognitive function. Amitriptyline (12.5mg once at night) can be used intermittently for hypnosis/sedation.

1.3.1.4 Non-Steroidal Anti-Inflammatory Medicines

Gastrointestinal complications (erosions and bleeding) and renal complications (e.g. interstitial nephritis) associated with the use of these medicines means that their use in the elderly should be limited as much as possible. Paracetamol is a good alternative even though there is risk of hepatic events with long term use. If an NSAID has to be used lower doses should be administered, then magnesium trisilicate may be added to counter gastrointestinal side effects.

1.3.1.5 Antidiarrheal

Diarrhea is a common condition in the elderly as; the best way to manage it is a high fiber diet.

1.3.1.6 Major Tranquilizers

The cause of agitation should be investigated before initiating treatment with haloperidol (0.5mg). Chlorpromazine and Fluphenazine Deaconate should be avoided as much as possible because of irreversible side effects.

1.3.1.7 Diuretics

These should not be used on a long-term basis to treat simple gravitational edema which will usually respond to increased movement or raising the legs. A few days of diuretic treatment may speed the clearing of the edema, but it should rarely need continued drug therapy.

Note: Irrespective of condition or medicine, it is important to take extra care when managing elderly patients. Always do a proper risk to benefit assessment before initiating treatment with more than one medicine.

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2. INFECTIONS

2.1. Introduction

2.1.1 General Guidelines for Selecting an Antimicrobial Agent

Antimicrobial agents are the most commonly used class of medicines in all health systems over the world. There are multiple risks associated with irrational use of antimicrobial agents to the patient, population, and governments. These include but are not limited to increased cost of care, increased incidence of adverse medicine events, and development of resistance by microorganisms against commonly used agents.

2.1.2 Principles of Selecting an Antimicrobial Agent

- ***Choice of medicine:*** this should be based on spectrum of activity (narrow vs. wide), known efficacy, safety, previous clinical experience, cost, and potential for resistance.
- ***Prophylactic therapy:*** restricted to a limited range of medicines of proven efficacy in invasive procedures with a high risk of infection or where the consequences of infection are serious.
- ***Empirical therapy:*** based on local epidemiological data on potential pathogens and their patterns of antibiotic susceptibility.
- ***Directed antimicrobial therapy:*** for known microbes, therapy should include the most effective, least toxic and narrow spectrum antimicrobial medicines. Using broad-spectrum antimicrobials may result in selection of resistant microorganisms and superinfection.
- ***Choice of route:*** determined by the site and severity of infection. Topical antimicrobial therapy should be restricted to a few proven indications.
- ***Antimicrobial combinations:*** these have very few indications. These include:
  - to extend the spectrum of cover
  - to achieve a more rapid and complete bactericidal effect
  - to prevent the emergence of resistant micro-organisms e.g. tuberculosis and HIV

2.1.3 Systematic Approach for Selection of Antimicrobials

- ***Confirm the presence of infection***
  - Careful history and physical examination of the patient
  - Signs and symptoms of the disease(s) and presence of predisposing factors
- ***Identification of the pathogen***
  - Collection of infected material for staining, serology, culture and sensitivity testing
- ***Selection of appropriate therapy considering every infected site***
  - Consider host (age, allergies, pregnancy etc.) and medicine factors
- ***Monitor therapeutic response***
  - Carry out appropriate clinical assessments and laboratory tests
  - Assess for therapeutic failure

2.1.4 Medicine Interactions

Pharmacokinetic and Pharmacodynamic interactions between medicines occur frequently; however, most these are not clinically significant and may not require change in treatment regimen or more stringent monitoring. The table below is a summary of clinically significant pharmacokinetic interactions between commonly used antibiotics and other medicines.

Table 2.1: Commonly used Antimicrobials and Significant Medicine Interactions

Antimicrobial	Other Interacting Medicine	Mechanism of Action/Effect
Aminoglycosides	- Neuromuscular blocking agents - Amphotericin B (Neurotoxicity) - Cyclosporine (Neurotoxicity) - Furosemide (Ototoxicity) - NSAIDs (Neurotoxicity) - Radio contrast (Neurotoxicity) - Vancomycin (Neurotoxicity)	Additive adverse effects
Amphotericin B	Nephrotoxins (e.g., aminoglycosides, cyclosporine, foscarnet, pentamidine)	Additive adverse effects
Chloramphenicol	Phenytoin, Ethanol	Chloramphenicol inhibits metabolism
Isoniazid	- Carbamazepine - Phenytoin	Isoniazid reduces metabolism leads to (nausea, vomiting, nystagmus, ataxia)
Macrolides (e.g. Azithromycin, Erythromycin)	- Digoxin - Theophylline	-Decreased digoxin bioavailability and metabolism -Decreased metabolism of theophylline
Metronidazole	Ethanol	Disulfiram-like reaction
Penicillin/Cephalosporin	Probenecid, aspirin	Blocked excretion of β-lactams
Ciprofloxacin/Norfloxacin	Theophylline	Decreased metabolism of theophylline
Quinolones (e.g. ciprofloxacin)	- Class 1a & 3 anti-arrhythmic - Multivalent cations (antacids, iron, sucralfate, zinc, vitamins, dairy)	-Increased Q-T interval -Decreased absorption of quinolone
Rifampicin	Methadone, Propranolol, Protease Inhibitors, Oral Contraceptives, Warfarin	-Rifampicin induces metabolism of these drugs to below therapeutic levels
Tetracyclines	-Antacids, Iron, Calcium, Sucralfate -Digoxin	-Decreased absorption of tetracycline -Decreased digoxin bioavailability and metabolism

2.2. Management of Common Infectious Diseases

2.2.1 Brucellosis

Description: Brucellosis (aka Undulant fever, malta fever, abortus fever) is a bacterial infection of acute or insidious onset. Common as an occupational disease among people working with infected livestock or associated fresh animal products, for example butchers, farmers, abattoir workers, and vendors of contaminated roasted meat.

Causes: Eating undercooked meat or consuming unpasteurized/raw dairy products, breathing in the bacteria that cause brucellosis (inhalation), bacteria entering the body through skin wounds or mucous membranes.

- *Brucella abortus* (cattle)
- *Brucella canis* (dog)
- *Brucella melitensis* (goats and sheep) *most virulent form;
- *Brucella suis* (pigs)

Clinical Features: Symptoms are non-specific and may last for years.

- Unexplained or Intermittent (fluctuating) fever
- Aches, pains, and sweating
- Anorexia/weight loss, malaise, Orchitis (inflammation of the testes)
- Osteomyelitis of the vertebrae (uncommon but characteristic), depression

Diagnosis:

- Differential
  - Typhoid fever, Malaria
  - Trypanosomiasis (sleeping sickness), Tuberculosis
- Investigation
  - Blood serology
  - Isolation of the infectious agent from blood, bone marrow, or other tissues by culture

Treatment of Brucellosis:

Medicine Name	Level	Dose	Frequency	Duration
Adult or child >8 years:				
Doxycycline po	C	200 mg 1st day, then 100mg	Every 12 hours	6 weeks
plus				
Rifampicin po	C	600 mg	Every 24 hours	6 weeks
Child (<8 years):				
Rifampicin po	C	15 mg/kg/dose (max. 600 mg/day)	Every 24 hours	6 weeks
plus				
Cotrimoxazole po	C	5 mg/kg/dose	Every 12 hours	6 weeks

Prevention: Advice not to consume: undercooked meat and unpasteurized dairy products

2.2.2: Candidiasis

Description: An infection usually confined to the mucous membranes and external layers of the skin; associated with immunosuppressive illnesses, such as HIV/AIDS, diabetes, cancer and its treatment, prolonged antibiotic use, and steroids.

Causes: Candida albicans, transmitted by direct contact

Clinical Features: It may present with the following symptoms and signs

- Difficulty or pain on swallowing or vomiting
- Reluctance to take food, excessive salivation or crying upon feeding
- Diarrhea, epigastrium, and retrosternal pain
- Oral thrush (may be absent), Intertrigo, Vulvovaginitis, Paronychia (nail infection)

Diagnosis:

- *Differential:* Herpes simplex, Lymphoma, Kaposi's Sarcoma (rare)
- *Investigation:* Mostly a clinical diagnosis; Smear examination with a KOH preparation

Treatment of Oral Candidiasis:

Medicine Name	Level	Dose	Frequency	Duration
Adult:				
Nystatin po	C	1-2 tablets	Every 6 hours	10 days
or, Miconazole Oral Gel 2% po	C	One tablespoon	Every 12 hours	14 days
Child:				
Nystatin Suspension po	C	1-2mL after feeding	Every 6 hours	7 days
or				
Miconazole 2% Oral Gel po	C	2.5ml after feeding	Every 12 hours	7 days

Treatment of Esophageal Candidiasis:

Medicine Name	Level	Dose	Frequency	Duration
Adult:				
Fluconazole po	C	200mg on day 1, then 100mg	Once a day	14 days
Child:				
Fluconazole Suspension po	C	3-6mg/kg/dose	Once a day	7 days

Treatment of Vaginal Candidiasis:

Medicine Name	Level	Dose	Frequency	Duration
Clotrimazole Pessary	C	500mg	One dose only	Once

2.2.3: Chicken Pox

Description: A highly contagious childhood disease.

Causes: Varicella virus by droplet infection

Clinical Features:

- Mild fevers occur 10-20 days after exposure
- Characteristic vesicular rash appears in crops with faint erythematous macules, rapidly developing into papules and vesicles, which rupture easily and become septic
- Lesions of different ages (crops) exist together
- Complications may include septicemia, pneumonia, fulminating hemorrhagic varicella, and meningoencephalitis

Diagnosis:

- *Differential*
  - Impetigo, Multiple insect bites
  - Other viral infections with fever and skin rash
- *Investigation*: Virus isolation possible but not necessary

Symptomatic Treatment of Chicken Pox

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Calamine Lotion (topical)	C		Apply to affected areas every 12 hrs	Until clear
plus				
Chlorpheniramine po	C	4mg	Every 12 hours	3 days
Child				
Calamine Lotion (topical)	C		Apply to affected areas every 12 hrs	Until clear
plus				
Chlorpheniramine po	C	2mg	Every 12 hours	3 days

Treatment of Severe Chicken Pox

Medicine Name	Level	Dose	Frequency	Duration
Aciclovir po	C	200mg	Every 6 hours	10 days

2.2.4: Clinical Management of Viral Hemorrhagic Fever

2.2.4.1: Initial Response to a Suspected or Confirmed

a. Screening

- Take the temperature of the patient
- Ask the following questions:
  i. Any contact with someone in the previous 3 weeks who was ill with fever +/- bleeding or who died from an unexplained illness with fever +/-bleeding?
  ii. Any contact with other family members who are sick or have died from a disease with similar symptoms and signs?
  iii. Unexplained death of wild animals in the area?
  iv. History of contact with blood and body fluids of wild animals (especially monkeys, bats, rats)?
  v. History of visiting/exploring caves or working in mines infested with bats?
  vi. Did you have a tick bite or crushed a tick with your bare hands?
  vii. Is your home infested with rats?
  viii. Have you been the sexual partner of a known or suspected male case, as the virus remains present in semen up to 3 months after clinical recovery for Lassa, 12 months for Ebola?
  ix. Coming into contact with contaminated items, e.g. medical material, eating utensils, linens from infected patients. Note: the virus cannot survive very long in non-organic material, but can be present in material contaminated with body fluids (like needles or other medical material that is reused, dirty bed sheets...)
  x. Receiving healthcare from a provider who is also treating Ebola or Marburg patients and who is not taking appropriate infection control measures.

b. If you Suspect a case of VHF (Ebola/Lassa Fever)

- Call for help from OIC within the facility for further evaluation
- After further evaluation, the OIC will contact the district surveillance officer (DSO) and/or District Health Officer (DHO)
- Put on the appropriate Personal Protective Equipment (PPE)
- Transfer the patient to the holding/isolation area

c. Educate Patient if Conscious and Co-operative

- Educate the patient on what will happen next explain the reasons for the isolation/holding
- Explain the procedures you are following with respect to controlling transmission to the family, health workers and the community

d. Isolate the Patient

- Triage rapidly to a holding/isolation area

e. Notify/Refer the Patient

- Make every effort to reduce the waiting time between initially seeing the patient and notification/referral
- Develop a system to move patients quickly and reduce the time that others are exposed

2.2.4.2 Management of Lassa Fever

a. Transmission

The reservoir (host) of Lassa virus is a rodent called "multimammate rat" (*Mastomys Natalensis*). An infected rodent can excrete virus in urine for a lengthy period of time.

Transmission occurs by direct contact with infected rodents, person-to-person transmission may occur after exposure to virus in the blood, tissue, secretions, or excretions of a Lassa virus-infected individual.

b. Signs and Symptoms

Occur 1-3 weeks after the patient encounters the virus.

Mild symptoms: Slight fever, general malaise weakness, and headache.

Severe symptoms:

- Hemorrhaging (in gums, eyes, or nose, as examples), respiratory distress, repeated vomiting
- Facial swelling, pain in the chest, back, and abdomen, and shock
- Neurological problems: hearing loss, tremors, and encephalitis
- Death may occur within two weeks after symptom onset due to multi-organ failure.

Because the symptoms of Lassa fever are so varied and nonspecific, clinical diagnosis is often difficult. Lassa fever is also associated with occasional epidemics, during which the case-fatality rate can reach 50%.

c. Clinical Stages of Severe Lassa Disease

Stage 1 (days1-3)

- General weakness and malaise
- High fever, >39°C, constant with peaks of 40-41°C

Stage 2 (days 4-7)

- Sore throat (with white exudative patches) very common
- Headache; back, chest, side, or abdominal pain
- Conjunctivitis, nausea, vomiting and diarrhea
- Productive cough, proteinuria, low blood pressure (systolic <100 mm Hg), anemia

Stage 3 (after 7 days)

- Edema of the face and neck, convulsions
- Mucosal bleeding (mouth, nose, eyes), internal bleeding
- Encephalopathy with confusion or disorientation

Stage 4 (after 14 days)

- Coma may lead to death

d. Risk of Exposure

Risk of Lassa virus infection is greatest among those who live in or visit endemic regions (Sierra Leone, Liberia, Guinea, and Nigeria) and have exposure to the multimammate rat. Nosocomial infections are not common if protective measures and proper sterilization methods are used.

e. Diagnosis

Lassa fever is most often diagnosed by using enzyme-linked immunosorbent serologic assays (ELISA), which detect IgM and IgG antibodies as well as Lassa antigen. Reverse transcription-polymerase chain reaction (RT-PCR) can be used in the early stage of disease; this is the gold standard test for diagnosis of Lassa Fever.

f. Treatment of Lassa Fever

Medicine Name	Level	Adult Dose***	Frequency	Duration
Ribavirin iv*	HOS	Loading dose = 30mg/kg (max 2g)**	Once (Loading dose)	Once
then				
Ribavirin iv*	HOS	16mg/kg (maximum 1g)**	Every 6 hours	4 days
then				
Ribavirin iv*	HOS	8mg/kg (maximum 500mg)**	Every 8 hours	6 days

*Dilute ribavirin in 150 ml of 0.9% Normal Saline and infuse slowly

**Reduce the dose in patients known to have renal insufficiency (Creatinine Clearance <50ml/min)

***For children, the use of oral or iv Ribavirin has not been approved

It has been shown to be most effective when given early during the illness. Patients should also receive supportive care consisting of maintenance of appropriate fluid and electrolyte balance, oxygenation and blood pressure, as well as treatment of any other complicating infections.

g. Prevention

Transmission of the Lassa virus from its host to humans can be prevented by avoiding contact with Mastomys rodents, storing food away in rodent-proof containers and keeping the home clean help to discourage rodents from entering homes.

When caring for patients with Lassa fever, further transmission of the disease through person-to- person contact or nosocomial routes can be avoided by taking preventive precautions against contact with patient secretions (called VHF isolation precautions or barrier nursing methods). Such precautions include wearing protective clothing, such as masks, gloves, gowns, and goggles; using infection control measures, such as complete equipment sterilization; and isolating infected patients from contact with unprotected persons until the disease has run its course.

2.2.4.3 Management of Ebola Viral Disease

a. Clinical Features of Ebola Infection

The initial clinical manifestations of Ebola are non-specific and mimic many common infections making them difficult to diagnose early.

The incubation period (i.e., the period when the patient remains asymptomatic after exposure to a contact) can range from 2 to 21 days (typically 3-12 days).

EVD usually begins with a flu-like syndrome with fever and profound weakness, often accompanied by arthralgia, myalgia, headache, anorexia and hiccups. These are usually followed by gastrointestinal symptoms: nausea, vomiting, and diarrhea. Patients may also complain of dysphagia.

When present, bleeding is not an early presenting feature, but often only appears in the later stages of disease. It may manifest as overt bleeding or a combination of major and minor bleeding signs, but is frequently only minimal and sometimes solely internal (and therefore frequently missed).

- *Early clinical features of Ebola*
  - Intense tiredness, weakness, malaise
  - Conjunctivitis, Sudden onset of fever (defined as 38.0˚C axillary)*
  - Nausea and loss of appetite, Throat pain and difficulty swallowing
  - Headache, Abdominal pain, Myalgia (muscle pain)
  - Diarrhea (can be bloody or non-bloody)
  - Joint pain

- *Late Clinical Features of Ebola*
  - Hiccups, Confusion and irritability
  - Seizures, Chest pain
  - Diarrhea (watery or bloody), vomiting (sometimes bloody)
  - Skin rash
  - Internal and/or external bleeding including:
    - Oozing from puncture sites- epistaxis (bleeding from the nose)
    - Rashes suggestive of easy bleeding ecchymoses, petechiae, purpura)
    - Hematemesis (blood in vomitus), hemoptysis (blood in sputum)
    - Dark blood in stool (melena, hematochezia)
    - Unexplained vaginal bleeding in women, hematuria (blood in urine)
    - Miscarriage in pregnant woman
    - Respiratory distress

b. Clinical Management of Ebola

The following table summarizes symptomatic care for adults and children unless otherwise indicated. In many situations, access to certain drugs is limited and will prevent delivery of recommended 1st line interventions and therefore 2nd or 3rd line options will apply. Careful monitoring and evaluation of patients should be carried out always with systematic reporting of any side effects.

For further information on clinical management refer to *Liberia Ebola Virus Disease Clinical Management Manual.*

Table 2.2: Ebola Viral Disease Symptomatic Care

Symptom/Sign	Interventions Recommended	Remarks and Caveats
Pain	1st Line: **Paracetamol po/iv**	**Caveat**: hepatotoxicity, max daily dose 4g
	2nd Line: **Tramadol po/iv** 2nd Line: **Codeine po**	**Caveat:** hepatotoxicity; do not administer together with ondansetron
	3rd Line: **Morphine po/iv**	Can be used as 2nd line, issue with availability and use (many people are not familiar with the use of morphine), requires doctor prescription, important in terminally ill patients with excruciating pain **Caveat:** Respiratory Depression
	Avoid NSAID's	**Strong Recommendation**
Fever	1st Line: **Paracetamol po/iv**	Concerns for convulsions in children Caveat: 4g/day in adults & 75mg/kg/dose
	Avoid NSAID's	**Strong Recommendation**
Dyspepsia/Stomach Discomfort	1st Line: **Omeprazole** po, iv	
	2nd Line: **Magnesium Trisilicate**	
	3rd Line: **Ranitidine**	**Syrup based on availability**
	Avoid Cimetidine	
Confusion/Aggression	**Diazepam** po, iv **Haloperidol** po, im **Chlorpromazine** po, im	**-Always reason with patient in a calm and non-aggressive fashion** -Transient 4-point restraints to administer drugs (preferably oral or IM) is an option, need to have a clear plan to be discussed beforehand. **-Constant physical constraints is not an option if patient left unmonitored**
Hiccups	**Chlorpromazine**	
	Haloperidol, Metoclopramide	*risk-benefit unclear because of lack of data.*

Diarrhea	**Fluid Replacement PLUS Potassium**	Fluid replacement includes potassium, either IV or PO. Add IV calcium and magnesium, where electrolyte measurement is feasible
	Panel split, no consensus on specific therapy (more research needed), see comments as follows:	
	Loperamide	Risk-benefit unclear because of lack of data **Caveat:** if used, only with concomitant antibiotic therapy, under medical prescription, for short course, not in children.
	Zinc	No clear guidance, lack of data. More research required to determine benefit
	Antibiotics	These guidelines support the empiric use of antibiotics as needed
Vomiting	**1st line:** Ondansetron **2nd line**: Metoclopramide or Chlorpromazine (adults), Promethazine (children)	Preferred drug (based on availability) better safety profile, can be given to children (> 2 years). **Caveat:** Avoid in patients with arrhythmia; do not administer together with tramadol Metoclopramide may be less effective
Seizures	**Diazepam pr, iv** **Phenobarbital iv**	Approach patient with caution Phenobarbital: Increased mortality in children with cerebral malaria, difficult to administer (need a pump), can be given over 15 min in an ETU – (if resources available, then consider) **Caveat:** Concern for respiratory depression in combination of diazepam and phenobarbital Consider other causes of seizures: hypoglycemia (in adults); high fever, hypoglycemia, thiamine deficiency (in children)
Odynophagia /Ulcers	**1st line: Saline Mouth Wash, Lidocaine Rinse**	If thrush, Nystatin oral suspension, USP 100,000 units/mL Consider "Magic mouthwash cocktail": This consists of an antihistamine, antifungal, antacid and an analgesic or local anesthetic, such as: (equal parts) Benadryl, nystatin oral suspension, Mylanta liquid and Lidocaine Patient must be able to spit. Preferably, mix the mouthwash in the green zone and bring it to the red zone. **Caveat:** Mylanta contains Aluminum compounds)

c. Management of Common Ebola Viral Disease Sequelae in Ebola Survivors

Below is a summary of the management of common complications seen in EVD Survivors; refer to **Ebola Survivors Clinical Care Guidance** for more information.

I. SHOCK

EVD shock is LIKELY due to a combination of septic and hypovolemic shock and will likely respond to aggressive fluid resuscitation. The management of EVD shock should be as per the WHO guidelines for fluid resuscitation2, with IV Ringer's lactate as the preferred resuscitation fluid.

Resuscitation targets include normalization of pulse, urine output, and other physical exam findings suggestive of improved tissue perfusion. These targets should be utilized to monitor response to fluid therapy and help to determine whether further fluid therapy is required.

Special monitoring requirements in children include:

- ***Oxygen saturation*** (if available): Oxygen saturations should be maintained >93%.
- ***Blood glucose:*** As children, and particularly infants are at risk for hypoglycemia, symptomatic children (lethargy, history of vomiting, decreased oral intake) should have their levels checked. Treatment should follow current WHO guidelines. Empiric treatment of suspected hypoglycemia in a symptomatic child in an ETU without access to blood glucose monitoring should proceed without delay.

Systematic antibiotics therapy on admission is not recommended. Empiric antibiotic therapy can be considered for EVD children with significant abdominal symptoms (e.g. vomiting and diarrhea) and risk of secondary bacterial infections.

Children without signs of severe illness	Children with signs of severe illness
<5 years or <15 kg: ***Amoxicillin po***	With peripheral IV: ***Ceftriaxone iv/im***
>5 years or > 15kg: ***Cefixime po***	Without peripheral IV: - With signs of respiratory infection: ***Amoxicillin*** *or* ***cefixime po*** - No Signs of respiratory Infection: ***Cotrimoxazole***

II. MUSCULOSKELETAL

Post-EVD patients often have musculoskeletal pain. Characteristics include symmetrical and migratory in nature, affecting large joints with no inflammatory signs. One important goal in evaluating patients is distinguishing between inflammatory and non-inflammatory pathology. A small number of survivors will have inflammatory arthritis. This is currently the minority, but requires intervention.

History:

Define location and type of pain (burn, ache, dull), symptoms duration, factors making pain better or worse and any history of injury. Evaluate for systemic symptoms (fever, weight loss).

Physical exam to evaluate for signs of inflammatory arthritis:

- Palpate all peripheral joints for obvious signs of swelling, warmth, or tenderness
- Also, assess all peripheral joints range of motion
- Examine waist including sacroiliac joints, insertion of gluteal muscles, lateral ischial crest

Differential diagnosis: Rule out septic joint, gout, and osteoarthritis

Table 2.3: Features of Inflammatory Arthritis

Feature	Description
Aggravators and alleviators	i. onset after infection ii. Improvement with exercise iii. no improvement with rest iv. pain at night (with improvement upon getting up) v. increased pain and/or stiffness with prolonged sitting
Arthritis / Enthesitis	- Past or present swelling of joints or tendon sheaths - Pain around shoulder girdle, hips and knees are common in EVD survivors.
Uveitis anterior	Past or present uveitis anterior
Good response to NSAIDs	Pain relief after 48 hours of full dose NSAID
Duration	Greater than 3 months of inflammatory symptoms

Management-Inflammatory Conditions

-First Line Therapy

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Ibuprofen po	C	400 mg	Every 8 hours	5 days
or				
Diclofenac po	C	50 mg	Every 8 hrs or 12 hrs	5 days
Child**:** Ibuprofen po	C	10mg/kg	Every 8 hours	5 days

*If response is inadequate, consider adding paracetamol as below or using different NSAID.

-Second Line Therapy

Once daily NSAID if available (**i.e. meloxicam, piroxicam, celecoxib, etodolac XL**)

*This becomes first-line treatment if clear diagnosis of inflammatory arthritis is made and drug is available. Additional medications may be available at a referral center, seek specialty consultation as needed.
In patients not responding to NSAIDS after 7- 10 days;

- Give **Prednisolone 20mg orally daily for 7 days** (if no improvement, refer)

Management of Non-Inflammatory Conditions

Medicine Name	Level	Dose	Frequency	Duration
***Adult*:** Paracetamol po	C	1 gm	Every 6 hours	5 days
Address psychosocial issues that may be contributing, other measures (exercise, stretching, warm compresses)				
***Child*:** Paracetamol po	C	15 mg/kg	Every 6 hours	5 days

With both conditions, if adult patient still has inadequate response consider: - Referral
- Addition of Amitriptyline 25 mg once nocte - Or addition of tramadol 50-100 mg prn

Table 2.4: Indications for specialist referral

- Recurrent or persistent arthralgia that significantly impedes daily activities and quality of life and is refractory to at least 3 weeks of NSAID therapy and one week of prednisone therapy
- Spondyloarthropathy (i.e. spine and sacroiliac joint involvement)
- Arthritis with systemic illness or if suspicion of septic joint requiring aspiration, laboratory testing of aspirate and possible intravenous antibiotics
  - Joint aspiration should be performed under IPC precautions for EVD as described under *Infection prevention and control considerations in EVD survivors below* and the aspirate sent for RT-PCR test for Ebola.
  - If negative for Ebola, perform white blood cell count, gram and AFB stains, polarized light microscopy, and cultures for bacteria and TB as indicated and available

Referral to a rehabilitation specialist may be required for survivors for people with prolonged musculoskeletal pain and fatigue

In children, if symptoms persist consider referral for further evaluation. In adults, for moderate to severe pain, not responding to treatment and/or lasting longer then 4-6 weeks consider referral. Of note, for severe cases or cases that resemble Spondyloarthropathy (i.e. spine and sacroiliac joint involvement and history of uveitis) consider immediate referral.
Patient should be advised to take NSAID with food to avoid gastritis. If giving an NSAID for more than 2 weeks, serum creatinine should be obtained with follow up monitoring every 6 months.
Non-pharmaceutical management
If the person is experiencing significant mobility activities, they may benefit from a walking aid, such as a cane, walking frame or wheelchair, and should be referred to a local provider.

III. OCULAR

Eye problems are one of the most common complaints of EVD survivors. Eye conditions range from mild conditions such as dry eye syndrome to urgent conditions that can lead to blindness, namely uveitis.
When ocular complaints arise, early treatment is essential. Early referral to an eye specialist should be considered where specialist services are available. It is of critical importance that the provider can identify signs and symptoms of serious eye conditions. Urgent referral to an eye care provider and appropriate treatment can prevent blindness.

Guidelines for Clinical Evaluation of Ocular Complications

a) Evaluate for eye pain, irritation or redness, increased tearing or dry eye, light sensitivity, and decreased visual acuity.

b) Test of visual acuity by Tumbling E chart Snellen chart: Check unilateral and bilateral at presentation and with best correction.

c) Pupillary exam, specifically testing for relative afferent pupillary defect.

Within the first month after ETU discharge, when possible all patients should be referred to an eye specialist for a full examination, including:

- Dilated funduscopic examination
- Slit lamp examination
- Measurement of intraocular pressure

Differential diagnosis of eye pain/redness/irritation:

- Bacterial, viral, or allergic conjunctivitis, dry eye syndrome
- Ocular surface disease from sunlight exposure
- Corneal ulcer, acute angle closure glaucoma
- Scleritis, trauma, uveitis due to other viruses

Differential diagnosis of decreased visual acuity:

- Cataract, Refractive error (presbyopia, myopia, hyperopia, and/or astigmatism)
- Retinal scars from other pathogens (such as Toxoplasma gondii, Treponema pallidum [i.e. syphilis], Onchocerca volvulus, and measles virus)
- Post-traumatic pathology (e.g. corneal scars or optic nerve damage)
- Vitamin A deficiency, glaucoma, retinal detachment

Management of eye pain/redness/irritation:

- Exclude other infectious etiologies such as syphilis and HIV through serologic testing of the blood
- If ocular surface disease suspected, treat with artificial tears for topical lubrication
- If uveitis suspected, immediate treatment is required, with immediate referral to an ophthalmologist or other eye care specialist where available. While referring, treat as follows:

  □ **Prednisone 1% eye drops every 1-2 hours (reduce as improvement)**

  and

  □ **Cyclopentolate 1% eye drops, 1 drop four times a day**

If no resolution after 7 days of topical prednisone and cyclopentolate, or if predominantly posterior/intermediate, or if panuveitis is suspected, consider adding systemic corticosteroids (adults) or methotrexate (children), following dosages and considerations as described under Treatment of Arthritis.

Indications for Referral to an Eye Specialist

Urgent referral is indicated if EVD-survivors are presenting with any of the following:

- Evidence of Uveitis especially intermediate, posterior or pan-uveitis and all cases of uveitis that do not respond to 7 days of topical therapy as described above.
- These are medical emergencies for which oral corticosteroids (adults) or methotrexate (children) may be required.
- All children <10 years of age (it may be difficult to ascertain a history of ocular symptoms in this group)
- Pain in one or both eyes, decreased visual acuity based on Snellen test; absent red reflex in one or both eyes; Decreased vision or vision loss of any cause following EVD
- Pupillary abnormalities or optic nerve dysfunction (i.e. optic disc edema/swelling, optic nerve pallor)

IV. AUDITORY

Tinnitus and hearing loss have been reported in up to 27% of EVD survivors, although the causal link between these findings and EVD remains to be determined. The course and duration of these complications is not yet well described.

It is important to appropriately evaluate a survivor when they present with an auditory disorder so that treatment options may be made available.

a) Tinnitus

Tinnitus is the perception of sound in the absence of an external auditory stimulus; as such, tinnitus is a symptom, not a disease. It is often high pitched but may present as a whistling, hissing, humming or buzzing sound. It is may be only heard by the patient (subjective or objective when heard through a stethoscope placed over head and neck structures near the patient's ear.

- *Symptoms associated with Tinnitus:*
  - Difficulty getting to sleep or maintaining sleep, difficulty concentrating (ie. reading)
  - Increased anxiety, stress
  - Depression/suicide/hopelessness
  - Work may be affected
  - Sensitivity to sound, pressure/fullness in ears, difficulties with balance
- *Evaluation of Tinnitus:*
  - History taking including; questions of onset, description, location, possible cause (noise, stress, drugs – e.g. Quinine) and severity.
- *Physical exam* - Otoscopy to evaluate the ear canal and tympanic membrane.
- Differential diagnosis and/or hearing loss:
  - Otitis Media
  - Accumulation of wax
  - Drug side effects – e.g. Quinine
  - Temporal Mandibular Joint Disorders
- *Management plan*:
  - Counseling and psychosocial support to reassure the client
  - Sound therapy:
    - Relax and listen to natural sounds, instrumental music, ticking clock in the room, experiment with different sounds until you find a sound that works for you.
    - Avoid silence
    - Tinnitus Retraining Therapy (TRT)
    - Hearing Aids, use of Maskers or Tinnitus instruments
    - Medication – e.g. anti-depressants, anxiolytics
    - Protection from loud noises, support groups, stress management

b) Hearing Loss: It may be unilateral or bilateral.

- *Evaluation of a patient with hearing loss*
  - History and physical examination, including assessment for decreased hearing, tinnitus, aural fullness, and vertigo
  - Whispered voice screening test
  - Tuning fork tests (Weber and Rinne testing): 256 Hz and 512 Hz

- Otoscopic examination of ear canal and tympanic membrane
- If present, determine if hearing loss is unilateral or bilateral.

- *Differential Diagnosis*
  - Pre-EVD existing diminished hearing; acute labyrinthitis
  - Cerumen accumulation (i.e. "ear wax"), Otitis media Treatment
  - Once the above differential diagnosis is excluded, addressing hearing loss may involve strategies to help family, friends and teachers communicate better with the affected person.

Treatment of acute labyrinthitis is most efficacious when administered within 10 days (and ideally 72 hours) after symptom onset. Patients should therefore be educated upon ETU discharge to seek immediate medical attention if auditory symptoms develop. Acute labyrinthitis will often resolve on its own. The vestibular sedative Prochlorperazine may be given to reduce vertigo while awaiting resolution:

Treatment of Acute Labyrinthitis

Medicine Name	Level	Dose	Frequency	Duration
Adult: Prochlorperazine po	C	5-10 mg	Every 6-8 hours	5 days
Child (weight based)				
Prochlorperazine po	C	<10 kg	contraindicated	contraindicated
		- 10-13kg=2.5mg	Every 12-24 hours	5 days
		- 13-18kg=2.5mg	Every 8 hours	5 days
		- 18-39kg=2.5mg	Every 8 hours	5 days

- Oral corticosteroids are sometimes prescribed for acute labyrinthitis, although their efficacy is unclear. Decisions to use corticosteroids for this condition should generally be left up to specialists in otolaryngology.

Treatment of Otitis Media:

Medicine Name	Level	Dose	Frequency	Duration
Adult: Amoxicillin po	C	250mg	Every 8 hours	10 days
Child: Amoxicillin po	C	40-90 mg/kg	Every 8-12 hours	10 days

Table 2.6: Indications for ENT Specialist Referral

Persistent hearing loss or tinnitus necessitating audiometry if not otherwise available
- ☐ Need for ear wax removal or hearing aids
- ☐ Sensorineural hearing Loss – evidenced by Rinne, Weber, Whisper/Voice test
- ☐ Conductive hearing loss, after confirmed clear auditory canals
- ☐ Referral to a rehabilitation specialist may be required for people with permanent or severe hearing loss, as well as training resources on primary ear and hearing care

V. ABDOMINAL

While abdominal complaints are common in EVD patients, little is currently known about post-EVD specific abdominal pain. Therefore, one should first consider urgent or common conditions causing abdominal pain and perform appropriate history and examination.

History:

- Location (epigastric or specific quadrant)
- Exacerbating conditions (eating, movement, lying down); Characteristics (cramping, burning, stabbing)
- GI symptoms (diarrhea, constipation, bloody stools, mucus, fever, bitter taste in mouth)
- Duration; Association with systemic symptoms such as fever, chills, weight loss, prolonged anorexia

***Physical Exam*:**

- Vital signs (fever with normal pulse, consider typhoid), jaundice
- Crepitations (can get referred pain from pneumonia);
- Bowel sounds distention, rebound or guarding (signs of peritonitis)
- Point of maximum tenderness, overlying skin changes; Organomegaly (hepatosplenomegaly)

***Management*:**

a . Post EVD Abdominal Pain and Cramping – common complaints. First rule out all other diagnoses.

- Unclear which regimen is most effective at this time. Consider a trial of antispasmodics if available. Consider starting omeprazole, cimetidine, ranitidine and/or paracetamol.

Acute abdomen – rebound or guarding, decreased bowel sounds, pain with heel tap

b. Typhoid - Widal 1:160 or greater, fever with relative bradycardia

Treatment of Typhoid

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Ciprofloxacin po	C	500-700 mg	Every 12 hours	5-14 days
plus				
Cotrimoxazole po	C	960 mg	Every 12 hours	14 days
or				
Chloramphenicol im/iv/po	C	1 g	Every 6 hours	14 days
Child				
Ciprofloxacin po	C	10-15mg/kg/dose	Every 12 hours	14 days
plus				
Cotrimoxazole po	C	24 mg/kg/dose	Every 12 hours	14 days
or				
Chloramphenicol iv/im	C	25 mg/kg/dose	Every 6 hours	14 days

*Remember risk of aplastic anemia with chloramphenicol;

**If peritoneal signs or concern for perforation, immediately refer for surgical evaluation.

c. Helminthic Infections (worms) Consider empiric treatment

Albendazole: *Adults*: 400 mg, single dose *Pediatric*: 200mg for 12-23 months old.

Mebendazole: *Adult:* 500 mg, single dose *Child <2 yrs.:* 250 mg, single dose

d. Gastritis and Gastroesophageal Reflux

Epigastric, pain worse at night, initially relieved by food then recurs, GERD associated with bitter taste

a. Omeprazole 40 mg po qhs

b. Consider dietary and behavior modifications (evaluation triggering food or alcohol consumed, avoid eating before bedtime)

e. Appendicitis - Right lower quadrant pain.

May start in upper abdomen or periumbilical and migrate to the right lower quadrant. Associated with anorexia, fever, elevated white blood cell count. Will generally progress to perforation and a surgical abdomen if untreated.

If suspicious, refer for ultrasound or CT scan if available, surgical evaluation at a minimum.

f. Diverticulitis – Left lower quadrant pain and tenderness

Co-trimoxazole: Adult: 960 mg every 12 hrs for 14 days.

This is not a condition seen in the pediatric population. Can be associated with abscess or perforation so if severe pain, associated with peritoneal signs, or fever refer for surgical evaluation

Always consider other causes of abdominal pain, especially those that may require surgical management including ovarian or testicular torsion, ectopic pregnancy, incarcerated hernias, young children <6 years may also present with intussusception.

g . Renal Disease

When investigated, proteinuria along with acute renal insufficiency characterized by elevated blood urea nitrogen and creatinine can be seen in both the early and late stages during the clinical course of EVD. However, there is paucity of data regarding the long-term kidney complications among EVD survivors. Anecdotal reports in Liberia reveal that there is a proportion of EVD survivors presenting with generalized body swelling. As part of routine follow-up, assessment of kidney function should be done through detailed history, physical examination and laboratory investigation – see laboratory tests at follow-up

Table 2.7 Indications for Referral to a Specialist Physician

- Peripheral and/or facial body swelling
- Proteinuria noted on 2 or more tests
- Elevated or worsening creatinine levels on 2 or more tests

h. Neurology

Headache, memory impairment, peripheral neuropathy, and tremor appear to be common after EVD recovery. Less common neurologic sequelae include myopathy, seizures, and Parkinsonism. The causal link of these conditions with EVD remains to be determined. Biological factors as well as stress, depression, and other psychosocial mediators may be implicated. Mental health sequelae are specifically discussed in the section below.

i. Headache

Headache may be localized (frontal +/- parietal) and intermittent in character with no obvious aggravating factors. Assessment is important, as there are multiple etiologies.

- History, location, frequency and timing (waking from sleep, wake with headache or develop throughout day, gradual or acute onset)
- Type of pain (knife like, band of pressure, pounding)
- Precipitating factors: Evaluate for and have increased concern if associated visual symptoms, altered mental status or other neurologic symptoms, associated nausea, seizures or concomitant fever
- Physical exam: BP, tenderness to palpation, nuchal rigidity, fundoscopy exam for papilledema, assess for focal neurologic deficits and refer if present.
- Laboratory evaluation: malaria smear or rapid malaria test, consider blood count and chemistry depending on associated symptoms
- *If patient has fever, vision changes, severe and sudden onset or focal neurologic deficits consider meningitis, encephalitis, hemorrhagic or ischemic stroke, or tumor and treat or refer as indicated further evaluation.

Management: Paracetamol – ***adult***: 500 mg qid, ***pediatric***: 15mg/kg qid

Address psychosocial issues that may be contributing. Conservative measure (exercise, sleep habits, improve diet)

If response is inadequate, consider:

- Addition of NSAID (ibuprofen 400 mg tid or Diclofenac 50 mg bid) for 7-14 days. If patient responds, continue NSAID for at least 4 weeks and reassess.

* If giving an NSAID for more than 4 weeks, serum creatinine should be obtained.

- If patient still has no response, for adults consider; addition of amitriptyline 10-50 mg qid addition of fluoxetine 20 mg daily; or addition of tramadol 50-100 mg q 6 hr.

Differential diagnosis of headache

- Migraine, tension, or cluster headache
- Headache related to other infections (sinusitis, influenza, etc), acute meningitis/meningoencephalitis, chronic meningitis
- Idiopathic intracranial hypertension
- Intracranial tumor, hydrocephalus, subarachnoid hemorrhage, temporal arteritis

Differential diagnosis of peripheral neuropathy:

- Nutritional deficiencies (B12 and other B vitamins),
- Infections (HIV, syphilis)
- Endocrine abnormalities (diabetes mellitus, hypothyroidism), exposures (heavy metals)
- Compression neuropathies (carpal tunnel syndrome)
- Autoimmune, paraproteinemia

Treatment of peripheral neuropathy with Amitriptyline

Differential diagnosis of tremors:

- Parkinson disease, Liver dysfunction
- Metabolic dysfunction (hyperthyroidism)
- Enhanced physiologic tremor, benign essential tremor
- Alcohol withdrawal, intoxications
- Exposures (heavy metals such as manganese)

Treatment of tremors:

- Postural/action tremor similar to benign essential tremor that interferes with activities of daily living: Propranolol, titrating up to 120 - 320mg total daily as needed and tolerated.

Differential diagnosis of seizures:

Idiopathic seizures

- Metabolic derangement (hypoglycemia, uremia, hypocalcemia, etc.)
- Alcohol withdrawal
- Stroke-related
- Post-traumatic
- Infection-related (meningitis, encephalitis), Intoxications/medication-related.

Treatment of seizures

- ***First line*:** Phenytoin 100 mg orally nightly, increasing up to 400 mg daily as needed
- ***Second line*:** Carbamazepine 200 mg orally twice a day, increasing as needed by 200mg/day at weekly intervals to a maximum of 1600 mg/day

Considerations

- These drugs may cause severe rash, blood dyscrasias, and hepatotoxicity
- Long term use of phenytoin can lead to osteopenia.
- CBC and LFTs should be monitored after initiation of either drug.
- Both drugs are contraindicated in pregnancy. In females of childbearing potential, consider supplementation with folic acid.
- If seizures are untreated or refractory to medication, patients should not drive or operate heavy machinery, and should not do certain activities (such as swimming) without supervision.
- For an acute seizure lasting more than 2 minutes, 10 mg rectal diazepam can be given

Table 2.8 Indications for referral to neurologist

- ☐ Refractory or worsening headaches, headaches with focal deficits, headaches with papilledema on exam
- ☐ Headache accompanied by meningeal signs, including fever, neck stiffness, or altered consciousness (this is a medical emergency)
- ☐ Refractory neuropathic pain or muscle weakness
- ☐ Seizure lasting more than 10 minutes (this is a medical emergency) or episodes of altered consciousness, confusion, jerking or limbs which may be indicative of seizures
- ☐ Suspicion of Parkinson's disease

2.2.5 Leprosy

The disease can be classified based on clinical manifestations and skin smear results. Patients showing negative smears at all sites are grouped as paucibacillary leprosy (PB), while those showing positive smears at any site are grouped as having multibacillary leprosy (MB). A positive skin smear should be treated with a medicine regimen of MDT for multibacillary (MB) leprosy irrespective of clinical presentation.

Clinical manifestations based on the number of skin lesions and nerves involved to determine whether it's multibacillary (MB) and paucibacillary (PB) leprosy. Patients with multibacillary disease are not treated with the regimen for the paucibacillary form of the disease.

Table 2.9: Classification of Leprosy

Site	Paucibacillary Leprosy	Multibacillary Leprosy
Skin lesions	1-5 lesions asymmetrically distributed with definite loss of sensation	More than 5 lesions. Distributed more symmetrically. With or without loss of sensation
Nerve enlargement	Only nerve trunk involved	Many nerve trunks involved

2.2.5.1 : Treatment of Paucibacillary Patients (PB)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Dapsone po	HC	100 mg	Once a day	6 months
plus				
Rifampicin po-supervised dose	HC	600 mg	Once a month	6 months
Child				
Dapsone po	HC	1-2 mg/kg	Once a day	6 months
plus				
Rifampicin po-supervised dose	HC	10-15 mg/kg*	Once a month	6 months

**not less than 150 mg of rifampicin*

2.2.5.2: Treatment of Multibacillary Leprosy (MB)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Dapsone po	HC	100mg	Once a day	12 months
plus				
Clofazimine po	HC	50mg	Once a day	12 months
plus				
Clofazimine po-supervised dose	HC	300mg	Once a month	12 months
plus				
Rifampicin po	HC	600mg	Once a month	12 months
Child				
Dapsone po	HC	1-2mg/kg	Once a day	12 months
plus				
Clofazimine po	HC	0.5-1.0mg/kg	Once a day	12 months
plus				
Clofazimine po-supervised dose	HC	5-10mg/kg	Once a month	12 months
plus				
Rifampicin po	HC	10-15mg/kg	Once a month	12 months

2.2.5.3: Management of Severe Erythema Nodosum Leprosum (ENL) Reactions

General principles:

i. Severe ENL reaction can be recurrent and chronic and may vary in its presentation

ii. The management of severe ENL should be at a referral center by a Physician

Definition:

Severe ENL reactions include:

- Numerous ENL nodules with high fever, ENL nodules and neuritis
- Ulcerating and pustular ENL
- Recurrent episodes of ENL
- Involvement of other organs (e.g. eyes, testes, lymph nodes and joints)

Management with corticosteroids:

i) If patient is still on anti-leprosy treatment, continue the standard course with MDT

ii) Use an analgesic medicine to control fever and pain.

iii) Use prednisolone: not exceeding 1 mg/kg body weight for 12 weeks.

Management with Clofazimine and Corticosteroids:

Indicated for patients with severe ENL who are not responding satisfactorily to treatment with corticosteroids or where the risk of toxicity with corticosteroids is high.

- If still on anti-leprosy treatment, continue the standard course with MDT.
- Use an analgesic medicine to control fever and pain
- Use prednisolone: not exceeding 1 mg/kg bodyweight
- Start Clofazimine 100 mg three times a day for maximum of 12 weeks
- Complete the standard course of prednisolone
- Continue Clofazimine: Taper the dose of Clofazimine to 100 mg twice a day for 12 weeks and then 100 mg once a day for 12-24 weeks.

Note:

- If the MDT treatment is already completed the management of ENL there is no need to restart MDT.
- The total duration of a standard course of corticosteroids (prednisolone) is 12 weeks.
- The total duration of treatment with high dosage Clofazimine should not exceed 12 months.
- It takes about 4-6 weeks for Clofazimine to take full effect in controlling ENL.

2.2.6 Meningitis

Choice of treatment depends on whether the organisms have been identified. If causative organism is not known;

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Ceftriaxone iv	HC	2g iv/im	Once/twice a day	14 days
or				
Chloramphenicol	HOS	1g iv, change to 500-750mg po if there is clinical improvement	Every 6 hours	14 days
Child				
Ceftriaxone iv	HC	50-100mg/kg	Every 12 hours	14 days
or				
Chloramphenicol	HOS	25mg/kg/dose	Every 6 hours	14 days

2.2.6.1: Meningitis Due to *Cryptococcus Neoformans* (Cryptococcal meningitis)

This is an AIDS-defining illness WHO Stage 4 that can also occur due to Immune Reconstitution Syndrome. Severe headache is common due to raised intracranial pressure.

***General measures*:** Therapeutic lumbar puncture is indicated to lower pressure in symptomatic patients and should be done with pressure monitoring.

Treatment of Adults

Medicine Name	Level	Adult Dose	Frequency	Duration
Induction				
Amphotericin B infusion +	HOS	1mg/kg/day in dextrose 5%	Over 4 hours	14 days
Flucytosine infusion	HOS	100mg/kg/day		
or				
Amphotericin B infusion+	HOS	0.7-1 mg/kg/day	Once a day	5-7 days
Fluconazole po	HC	800mg/day	Once a day	14 days
or				
Fluconazole po ±	HC	1200mg/day	Once a day	14 days
Flucytosine infusion	HOS	100mg/kg/day	Once a day	14 days
Consolidation				
then Fluconazole po	HC	800mg	Once a day	8 weeks

Treatment for adolescents and children;

Medicine	Level	Adolescent and Children Dose	Frequency	Duration
Induction				
Amphotericin B infusion ±	HOS	0.7-1mg/kg/day in dextrose 5%±	Over 4 hours	14 days
Flucytosine infusion	HOS	100mg/kg/day		
or				
Amphotericin B infusion+	HOS	0.7-1 mg/kg/day +	Once a day	14 days
Fluconazole po	HC	12mg/kg/day (max 800mg/day)	Once a day	14 days
or				
Fluconazole po	HC	12mg/kg/day (max1200mg/day) ±	Once a day	14 days
± Flucytosine infusion	HOS	100mg/kg/day	Once a day	14 days
Consolidation				
then Fluconazole po	HC	6-12mg/kg/day (up to 400mg- 800mg/day)	Once a day	8 weeks

2.2.6.2: Meningitis Due to Streptococcus pneumoniae

The signs and symptoms of meningitis normally develop 3-7 days' post-exposure. The early signs of meningitis can resemble the symptoms of influenza.

In adult's symptoms can include:

- fever, distinct and severe headache, stiff neck, nausea, vomiting, photophobia (light sensitivity)
- lack of interest in eating or drinking, seizures, sleepiness, an altered mental status (confusion).

In infants, symptoms can include:

- constant crying, excessive sleepiness and irritability
- inactivity, poor feeding, high fever, stiffness in the baby's body or neck
- seizures, or a bulge in the soft spot on top of a baby's head (fontanel).

Management

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Benzylpenicillin iv/im	C	3-4 MU	Every 4 hours	10-14 days
or				
Ceftriaxone iv/im	HC	2 g	Once/twice a day	10-14 days
Child				
Benzylpenicillin iv/im	C	100000 IU/kg/dose	Every 4 hours	10-14 days
or				
Ceftriaxone iv/im	HC	50-100 mg/kg/dose	Once/twice a day	10-14 days

2.2.6.3 Management of Meningitis Due to Hemophilus influenzae

Medicine Name	Level	Dose	Frequency	Duration
Before sensitivity tests: ***Adults***				
Ceftriaxone iv/im	HC	1g	Every 12 hours	7-10 days
If bacteria is sensitive to Chloramphenicol change to				
Chloramphenicol iv	HOS	2-3g	Every 4-6 hours	5-7 days
Before sensitivity tests: ***Child***				
Ceftriaxone iv/im	HC	50-100mg/kg	Every 12 hours	7-10 days
If bacteria is sensitive to Chloramphenicol change to				
Chloramphenicol iv	HOS	25mg/kg/dose	Every 4-6 hours	5-7 days

2.2.6.4 Meningitis Due to *Neisseria Meningitidis*

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Chloramphenicol iv	HOS	1g	Every 6 hours	14 days
Once there is clinical improvement for the patient, change patient to;				
Chloramphenicol po	HOS	500-750mg	Every 6 hours	Until course completion
Child				
Chloramphenicol iv	HOS	25 mg/kg/dose	Every 6 hours	14 days
Once there is clinical improvement for the patient, change patient to;				
Chloramphenicol po	HOS	25mg/kg/dose	Every 6 hours	Until course completion

2.2.7 Plague

Case definition: Any person with rapid onset of fever, chills, headache, severe malaise, prostration with extremely painful welling of lymph nodes, or cough with blood-stained sputum, chest pain and difficulty in breathing in an area known to have plague. Plague is caused by the bacteria ***Yersinia Pestis***, a zoonotic bacterium, usually found in small animals and their fleas.

Management of Plague:

Medicine Name	Level	Adult Dose	Frequency	Duration
Adult: Chloramphenicol iv/im	HOS	12.5-25mg/kg	Every 6 hours	10 days
Child: Chloramphenicol iv/im	HOS	6.25 – 12.5mg/kg/dose	Every 6 hours	10 days

Prophylaxis while nursing and for contacts: Doxycycline po 100mg every 12 hours 10 days

2.2.8 Rheumatic Fever

Management of a Rheumatic Attack

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Benzathine Penicillin im	C	0.6 MU (0.72g)	One dose only	Single dose
or				
Penicillin V po	C	500 mg	Every 6 hours	10 days
or				
Erythromycin po (if allergic to above)	C	500 mg	Every 6 hours	10 days
Child				
Benzathine Penicillin im	C	<5 yrs.=0.15MU (0.18g) 5-10yrs=0.3MU (0.36g) >10 years=0.6MU(0.72g)	One dose only	Single dose
or				
Penicillin V po	C	<5 yrs.=125mg 5-10yrs=250mg >10 years=500mg	Every 6 hours	10 days
or				
Erythromycin po	C	10 mg/kg/dose	Every 6 hours	10 days

Management of Acute Arthritis and Carditis:

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	25mg/kg	Every 6 hours	As needed
Reduce dose of aspirin if tinnitus and other toxic symptoms develop				
In severe carditis with development of increasing heart failure or failure of response to Aspirin, add				
Prednisolone po	C	1-2 mg/kg	Once a day	3-4 weeks then review

2.2.9: Septicemia

Management of Septicemia

Medicine	Level	Dose	Frequency	Duration
Adult				
Gentamicin iv/im	HC	1.5-2.0mg/kg	Every 8 hours	3-5 days
plus, Ampicillin iv	C	200 mg/kg	Every 3-4 hours	3-5 days
or Chloramphenicol iv	HOS	750mg	Every 6 hours	3-5 days
Child				
Gentamicin iv/im	HC	3.5-4.0mg/kg	Every 8 hours	3-5 days
plus, Ampicillin iv	C	50mg/kg	Every 3-4 hours	3-5 days
or Chloramphenicol iv	HOS	25mg/kg/dose	Every 6 hours	3-5 days

2.2.10 Typhoid Fever (Enteric Fever)

Typhoid fever is caused by Salmonella typhi, a Gram-negative bacterium. The infection is transmitted by ingestion of fecal contaminated food or water.

Case Definition: Any person with gradual onset of steadily increasing and then persistently high fever, chills, malaise, headache, sore throat, cough, and sometimes abdominal pain and constipation or diarrhea.

Clinical features: Varies from a mild illness with low grade fever, malaise and dry cough to a severe clinical picture with abdominal discomfort, altered mental status and multiple complications.

Case Management: Antimicrobial therapy for treatment of Typhoid fever

Medicine Name	Level	Dose	Frequency	Duration
i) Susceptibility: Fully Sensitive				
Adult				
Ciprofloxacin po	C	500-750mg	Every 12 hours	14 days
or Chloramphenicol im/iv	HOS	1g	Every 6 hours	14 days
Child				
Ciprofloxacin po	C	15mg/kg/dose	Every 12 hours	14 days
or Chloramphenicol im/iv	HOS	25mg/kg/dose	Every 6 hours	14 days
ii)Susceptibility: Multidrug Resistant				
Adult				
Ciprofloxacin po	C	500mg-750mg	Every 12 hours	14 days
or Azithromycin po	HOS	500mg	Once a day	3 days
Child				
Ciprofloxacin po	C	15mg/kg	Every 12 hours	14 days
or Azithromycin po	HOS	10mg/kg	Once a day	3 days
iii) Susceptibility: Quinolone Resistant				
Adult				
Azithromycin po	HOS	500mg	Once a day	3 days
Child				
Azithromycin po	HOS	10mg/kg	Once a day	3 days

Treatment of Carriers

An individual is a chronic carrier if he or she is asymptomatic and continues to have positive stool or rectal swab cultures for Salmonella typhi a year following recovery from acute illness. ***Ciprofloxacin po 750mg twice a day for 4weeks***

2.2.11 Giardiasis

Medicine Name	Level	Dose	Frequency	Duration
Adult: Metronidazole po	C	2 g	Once a day	3 days
Child: Metronidazole po	C	30 mg/kg/dose (max 1.2 g)	Once a day	3 days

2.2.12 Bacillary Dysentery (Shigellosis)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Ciprofloxacin po	C	1 g	Single dose	Once
In Pregnancy				
Chloramphenicol po	HOS	500mg	Every 8 hours	5 days
Child >3 months				
Cotrimoxazole po	C	24 mg/kg/dose	Every 12 hours	5 days
or Ciprofloxacin po	C	30mg/kg/dose	Every 12 hours	3 days

2.2.13 Cholera

Case Definition*:* Rice-watery diarrhea, with or without vomiting, causing severe dehydration or death

In suspected cases notify the County Medical Director immediately, and obtain current cholera guidelines. Rehydration is most important. The mainstay of cholera management is rehydration, intravenously or orally.

The use of antibiotics is strictly limited to very few indications such as:

i. Severe dehydration

ii. High attack rate within a household

iii. As prophylaxis

Management

- Do not give ciprofloxacin to pregnant women.
- Start antibiotics after the patient is rehydrated and vomiting has stopped – usually after 4-6hrs. Always confirm recommended medicines for the outbreak
- Note: Up to 90% of patients with cholera only require prompt oral rehydration. Severely dehydrated patients need IV fluids and antimicrobials.
- Give oral rehydration salts (ORS) -**or**- IV fluids, e.g., Ringer's lactate, per degree of dehydration. Keep maintenance fluid to at least 4-5 liters daily.

-and-

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Doxycycline po	C	300 mg	Single dose	Once
or Ciprofloxacin po	C	1 g	Single dose	Once
In Pregnancy				
Erythromycin po	C	500mg	Every 6 hours	3 days
Child				
Ciprofloxacin po	C	30mg/kg/dose	Every 12 hours	3 days
or Erythromycin po	C	<2yrs=125 mg	Every 6 hours	3 days
		2-8yrs=250 mg	Every 6 hours	3 days

*Always confirm the current updates on medicines for cholera

2.2.14: Amebiasis

Medicine Name	Level	Dose	Frequency	Duration
Adult: Metronidazole po	C	800 mg	Every 8 hours	10 days
Child: Metronidazole po	C	10mg/kg/dose	Every 8 hours	10 days
If a patient is a known carrier (luminal) and has tissue amebiasis (Liver, Lung, Ameboma)				
Adult: Metronidazole po	C	800 mg	Every 8 hours	10 days
Child: Metronidazole po	C	10mg/kg/dose	Every 8 hours	10 days

2.2.15: Management of Viral Hepatitis

Viral hepatitis refers to the clinically important hepatotropic viruses responsible for hepatitis A (HAV), hepatitis B (HBV), delta hepatitis, hepatitis C (HCV), and hepatitis E.

2.2.15.1 Hepatitis B

HBV belongs to the hepadnavirus family; it is a hepatotoxic virus, and liver injury occurs through immune-mediated killing of infected liver cells. HBV is a leading cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Transmission of HBV occurs sexually, parenterally, and perinatally.

There are three phases of HBV infection:

i. Incubation period for HBV is 4 to 10 weeks during which patients are highly infectious

ii. Symptomatic phase with intermittent flares of hepatitis and marked increases in aminotransferase serum

iii. Seroconversion to anti–hepatitis B core antigen (anti-HBcAg). Patients who continue to have detectable hepatitis B surface antigen (HbsAg) and HBcAg and a high serum titer of HBV DNA for longer than 6 months have chronic HBV

Clinical Presentation of Hepatitis B

- Easy fatigability, anxiety, anorexia, and malaise
- Ascites, jaundice, variceal bleeding, and hepatic encephalopathy can manifest with liver decompensation
- Hepatic encephalopathy is associated with hyperexcitability, impaired mentation, confusion, and coma
- Vomiting and seizures

Diagnosis

- Icteric sclera, skin, and secretions
- Decreased bowel sounds, increased abdominal girth, and detectable fluid wave
- Asterixis, Spider angiomata

Laboratory tests

- Presence of hepatitis B surface antigen for >6 months
- Intermittent elevations of hepatic transaminase (alanine transaminase [ALT] and aspartate transaminase [AST]) and hepatitis B virus DNA >20,000 IU/mL (105 copies/mL or 108 copies/L)
- Liver biopsies for pathologic classification as chronic persistent hepatitis, chronic active hepatitis, or cirrhosis

Prevention

Prophylaxis of HBV can be achieved by vaccination or by passive immunity in post-exposure cases with HBV Ig. Two products are available for prevention of HBV infection:

- HBV vaccine, which provides active immunity
- HBV Ig, which provides temporary passive immunity

The goal of immunization against viral hepatitis is prevention of the short-term viremia that can lead to transmission of infection, clinical disease, and chronic HBV infection. Side effects of the vaccines include soreness at the injection site, headache, fatigue, irritability, and fever.

Recommendations for HBV Vaccination

- Infants, adolescents, including all previously unvaccinated children <19 years old
- All unvaccinated adults at risk for infection
- All unvaccinated adults seeking vaccination (specific risk factor not required)
- Household contacts and sex partners of persons with chronic HBV infection and healthcare and public safety workers with exposure to blood in the workplace
- Clients and staff of institutions for the developmentally disabled
- International travelers to regions with high or intermediate levels (HBsAg prevalence ≥2%) of endemic HBV
- Recipients of clotting factor concentrates; Sexually transmitted disease patients
- HIV patient/HIV-tested patients; Persons with chronic liver disease

Treatment

Nucleos(t)ide analogues with a high barrier to drug resistance should be used.

Treatment of Chronic Hepatitis B

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Tenofovir po	HC	300 mg	Once a day	Daily
or Tenofovir + Lamivudine po	HC	245 mg + 200mg/300mg	Once a day	Daily
If patient has decompensated liver disease				
Entecavir po	HOS	1 mg	Once a day	Daily
If patient has compensated liver disease and lamivudine naive				
Entecavir po	HOS	0.5 mg	Once a day	Daily
Child				
Tenofovir po (>12 years and at least 35 kg)	HC	300 mg	Once a day	Daily
or Entecavir (>2 years and at least 10 kg wt) give @ 0.05 mg/ml	HOS	10-11 kg=3 ml >11-14 kg=4 ml >14-17 kg=5 ml >17-20 kg=6 ml >20-23 kg=7 ml >23-26 kg=8 ml >26-30 kg=9 ml >30 kg=10ml	Once a day	Daily

Effective contraceptive methods should be used by patient during treatment with Entecavir to avoid pregnancy.

In the case where there is HBV/HIV co-infection

	Preferred First Line Regimen	Alternative First Line Regimen
Adults and adolescents (including pregnant and breastfeeding women and adults with TB coinfection and HBV coinfection)	TDF + 3TC (or FTC) + EFV as a fixed-dose combination	-AZT + 3TC + EFV -AZT + 3TC + NVP -TDF + 3TC (or FTC) + NVP
Children ≥3 years	ABC + 3TC + EFV	-ABC + 3TC + NVP -AZT + 3TC + EFV -AZT + 3TC + NVP -TDF + 3TC (or FTC) + EFV -TDF + 3TC (or FTC) + NVP
Children <3 years	ABC (or AZT) + 3TC + LPV/r	-ABC + 3TC + NVP -AZT + 3TC + NVP

2.2.15.2 Hepatitis C Transmission

HCV is the most common blood-borne pathogen. Transmission may occur by sexual contact; hemodialysis; or household, occupational, or perinatal exposure. In up to 85% of patients, acute HCV infection leads to chronic infection defined by persistently detectable HCV RNA for 6 months or more. The hepatitis C virus is a blood borne virus. It is most commonly transmitted through:

- injecting drug use through the sharing of injection equipment;
- in health care settings due to the reuse or inadequate sterilization of medical equipment, especially syringes and needles;
- the transfusion of unscreened blood and blood products;

HCV can also be transmitted sexually and can be passed from an infected mother to her baby; however these modes of transmission are much less common

Hepatitis C is not spread through breast milk, food or water or by casual contact such as hugging, kissing and sharing food or drinks with an infected person.

Clinical Presentation

The incubation period for hepatitis C is 2 weeks to 6 months. Following initial infection, approximately 80% of people do not exhibit any symptoms.

- Fever, fatigue, decreased appetite, nausea
- Vomiting, abdominal pain, dark urine
- Grey-colored feces, joint pain and jaundice (yellowing of skin and the whites of the eyes)
- Right upper quadrant pain, nausea, or poor appetite
- Cirrhosis progressing to decompensated cirrhosis or hepatocellular carcinoma.

Diagnosis

The diagnosis of HCV infection is confirmed with a reactive enzyme immunoassay for anti-HCV. Serum transaminase values are elevated within 4 to 12 weeks after exposure.

Treatment- Goals of Treatment:

Eradication of HCV infection, which prevents the development of chronic HCV infection and sequelae

Treatment of Hepatitis C is very expensive. Refer for expert management.

2.3. Infection Prevention and Control

Transmission of infections in healthcare facilities can be prevented and controlled through the application of basic infection control prevention and control practices.

The two tiers or categories of infection control prevention and practices are:

a) Standard precautions

b) Transmission based precautions.

The goal of this two-tier/category system is to minimize risk of infection and maximize safety level within healthcare facilities.

Categories of Infection Control Practices:

a) ***Standard Precautions*** - must be applied to all patients always, regardless of diagnosis/infectious status.

b) ***Transmission based precautions*** - are specific to modes of transmission (e.g. airborne, droplet or contact).

a. Standard Precautions

Treating all patients in the healthcare facility with the same basic level of "standard" precautions involves work practices that are essential to provide a high level of protection to patients, healthcare workers and visitors.

These precautions include the following:

- Hand hygiene (hand washing, alcohol-based hand rub)
- Use of personal protective equipment when handling blood substances, excretions and secretions.
- Appropriate handling of patient care equipment and soiled linen.
- Prevention of needle stick/sharp injuries.
- Environmental cleaning and spills management.
- Appropriate handling of waste

Hand Hygiene

Appropriate hand washing can significantly decrease micro-organisms acquired on the hands by contact with body fluids and contaminated surfaces. Hand washing breaks the chain of infection transmission and reduces person to person transmission.

NB: Hand washing or hand antisepsis is the simplest and most cost- effective way of preventing the transmission of infection and thus reducing the incidence of healthcare associated infections.

Types of Hand Hygiene

i. Hand washing is usually limited to hands and wrists, the hands are washed for a minimum 40-60 seconds with hand washing soap and water.
ii. Alcohol-based hand rubs: Perform hand hygiene with a waterless alcohol-based hand rub for 20-30 seconds. This is appropriate for hands that are not visibly soiled.
iii. Surgical hand antisepsis: This decreases transient micro-organisms and confers a prolonged effect. The hands and forearms are washed thoroughly with an antiseptic soap for a minimum 2-3 minutes and dried with a sterile towel. This is required before performing invasive procedures.

NB: Hands should be dried with sterile towels.

Use of Personal Protective Equipment

Types:

- Gloves
- Boots or shoes cover
- Caps
- Masks
- Gowns
- Plastic Aprons
- Protective eye wear/Goggles/Face shield

Gloves

Reduce the incidence of hand contamination with infective material which in turn reduces the opportunity for personnel to become infected and/or the organisms to spread to other personnel and/or patients. Gloves however should not replace hand washing.

Gloves are to be worn when handling the following materials:

- Blood
- All body fluids and body secretions

Gloves should be removed before handling clean items (e.g. phone, door knobs or patients' charts.) After removing gloves, wash hands thoroughly.

Important points to remember when using gloves:

- Use gloves when there is potential exposure to blood, body fluids, excretions or secretions.
- Change gloves between patients, between procedures on the same patient.
- Remove gloves before leaving the patient's bedside and perform hand hygiene immediately with alcohol-based hand rub solution.
- Discard gloves after attending to each patient.

Boots/shoe covers

- These are used to protect the wearer from splashes of blood, body fluids, secretions and excretions.
- Shoe covers should be disposable and waterproof.
- Waterproof boots should be washable.

Caps

- Disposable and waterproof caps should completely cover the hair.

Masks

- A surgical mask reduces the risk of healthcare providers from getting infected from illnesses that spread through droplets such as varicella (Chicken pox) and meningococcal diseases (meningococcal meningitis.)
- A N95 mask reduces the risk of healthcare providers from inhaling respiratory pathogens that are transmitted via the airborne route such as TB, or MDR TB.

NB: To reduce the spread of infection, the appropriate mask should be worn by healthcare providers, visitors and patients when a patient is suffering from a communicable disease that is spread via the airborne or droplet route.

The patient with a communicable disease via the droplet or airborne route should wear a surgical mask when being transferred to other departments or hospitals or in shared rooms to prevent spread of infection. Disposable masks are for single use only and should be discarded as soon as they become wet.

Precautions

- Masks should not be worn around the neck
- Masks cannot be worn with bearded faces.
- Masks should completely seal the face at all times to ensure maximized efficiency in filtering of micro-organisms.

Gowns

- Gowns are worn to protect the wearer's clothing/uniform from possible contamination with micro-organisms.
- Use gown once for one patient and discard.
- Healthcare workers should remove gowns before leaving the unit.

Recommendations for use of gowns

- Use of lab coats, scrub suits should not be considered an effective barrier to microorganisms.
- Fluid-resistant gowns are worn to protect the wearers from exposure to blood, body fluids, secretions and excretions.

Plastic Aprons

- A plastic apron decreases the risk of the wearers' uniform from contact with contaminated body fluids.
- The inside of the apron is considered clean; the outside is considered contaminated.
- Wash hands thoroughly after removing apron.

Protective eyewear/Goggles/Face shields

Should be worn at all times during patient contact where there is a possibility that patients' body fluids may splash or spray onto the care giver's face/eyes (e.g. during suctioning, intubation, endoscopy and cleaning of instruments used for these procedures)

- During all dental, surgical, laboratory and post mortem procedures.
- Full face shields may also be used to reduce the risk of contamination of the healthcare worker's eyes and mouth in high risk situations.

Re-usable goggles should be washed and decontaminated after removal and in-between use.

Please note: All protective equipment should be removed after task is complete.

Needles and other sharp instruments and devices.

All equipment contaminated with blood or other body fluids should be handled with special care. Keep in mind these recommendations:

- Never recap needles
- Never bend or break needles
- Never disconnect needles before disposal
- Immediately dispose of all syringes and needles, scalpel blades and other sharp instruments, after use, in a leak-proof, puncture resistant "sharps" container.

b. Transmission based precautions

These are designed to supplement standard precautions protocols and must always be used in conjunction with Standard Precautions. Transmission-based precautions provide additional safety by facilitating a concerted effort to control the spread of specific types of microorganisms. Whilst mostly used for diagnosed infections, they are also useful when a specific diagnosis is suspected.

Transmission based precautions are divided into 3 basic categories:

i. Contact
ii. Droplet
iii. Airborne

Contact Precautions:

- Reduces the risk of transmission of organisms from infected or colonized patient through direct or indirect contact. (e.g. Herpes Simplex, Viral Hemorrhagic Fever)
- *Precautions include*: Hand gloving/Patient placement/Hand washing/Use of aprons and gowns/Patient care equipment/Patient transport

Droplet Precautions:

- Reduces the risk of nosocomial transmission of pathogens spread by large droplets particles usually within one meter (e.g. Mumps, Diphtheria, Hemophilus and Influenza.)
- Droplets may be expelled during: Sneezing/Coughing/Talking - Teach cough hygiene i.e. cover mouth when coughing
- *Precautions include*: Patient Placement/Respiratory protection/Patient transportation.

Airborne Precautions:

- Designed to provide protection from extremely tiny airborne pathogenic particles which may be suspended in the air for an extended period of time.
- Used for patients known or suspected to be infected with microorganisms transmitted by airborne route (e.g. TB)
- *Precautions include:* Respiratory Protection/Patient placement/Patient transport

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3. PARASITIC DISEASES

3.1 Helminthic Infections

Prevention: transmission can be reduced by thorough cooking of meat and fish, use of latrines, wearing shoes, washing hands. Attention to the hands and nails is particularly important in the case of pinworm. Education to prevent re-infection is very important.

The diagnosis should be confirmed by examination of stool for helminths and stool microscopy for eggs; peri-anal swab placed in saline for pinworm.

In the case of pinworm, threadworms (enterobius), the whole family should be treated.

Caution: Safety in pregnancy has not been established for Albendazole; do NOT use in the first trimester of pregnancy. In most cases, treatment can be given AFTER delivery.

3.1.1: Ascariasis (Roundworm)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	One dose only	once
or				
Mebendazole	C	500mg	One dose only	once
Child (less than 2 years)				
Albendazole	C	200mg	One dose only	once
or				
Mebendazole	C	250mg	One dose only	once

3.1.2: Enterobiasis (Threadworm)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	One dose only	once
or				
Mebendazole	C	500mg	One dose only	once
Child (less than 2 years)				
Albendazole	C	200mg	One dose only	once
or				
Mebendazole	C	250mg	One dose only	once

3.1.3: Tapeworm and Strongyloides

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	Once a day	3 days
or				
Mebendazole	C	500mg	Once a day	3 days
Child (less than 2 years)				
Albendazole	C	200mg	Once a day	3 days
or				
Mebendazole	C	250mg	Once a day	3 days

**Note: If not cured after 3 weeks, repeat the course.*

3.1.4: Cutaneous Larva Migrans (sandworm)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	Once a day	7 days
or				
Mebendazole	C	500mg	Once a day	7 days
Child (less than 2 years)				
Albendazole	C	200mg	Once a day	7 days
or				
Mebendazole	C	250mg	Once a day	7 days

3.1.5: Hookworm

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	One dose only	once
or				
Mebendazole	C	500mg	One dose only	once
Child (less than 2 years)				
Albendazole	C	200mg	One dose only	once
or				
Mebendazole	C	250mg	One dose only	once

A one-month course of Ferrous Sulphate should be added for a patient with confirmed hookworm infection.

Dosing by weight of Ferrous Sulphate:

- if 6 - <10kg - 12mg once a day for 30 days
- if 1-3yrs - 18mg once a day for 30 days
- if 3-5yrs - 24mg once a day for 30 days

3.1.6: Cysticercosis and Neurocysticercosis

Cysticercosis develops when the larvae of *Taenia Solium* invade body and develop in the muscles, skin and eyes. If larvae invade the central nervous system, the infection leads to Neurocysticercosis. Symptoms of Neurocysticercosis can include chronic headaches, blindness, seizures, meningitis and dementia. Specialist inpatient treatment is required.

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole po	C	400mg	Twice a day	8-30 days
or				
Praziquantel po	C	17mg/kg	Every 8 hours	15 days
plus Prednisolone po	C	15mg	Every 12 hours	15 days
Child (less than 2 years)				
Albendazole	C	15mg/kg	Twice a day	8-30 days
or				
Praziquantel po	C	17mg/kg	Every 8 hours	15 days
plus Prednisolone po	C	15mg	Every 12 hours	15 days

3.1.7: Onchocerciasis (River Blindness)

Caused by the parasitic worm *Onchocerca volvulus*. It is transmitted to humans through exposure to repeated bites of infected blackflies of the genus *Similium*.

Symptoms include severe itching, disfiguring skin conditions and visual impairment, including permanent blindness.

Medicine Name	Level	Dose	Frequency	Duration
Ivermectin po	C	150µg/kg	Once per year	Once only

Not recommended for children <5 years or nursing mothers. No food or alcohol to be taken within 2 hrs of taking the medicine. Retreatment may be required after 6 months or 1 year depending on signs and symptoms.

3.1.8: Trichuriasis (Whipworm Infestation)

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Albendazole	C	400mg	One dose only	Once
or				
Mebendazole	C	500mg	One dose only	Once
Child (less than 2 years)				
Albendazole	C	200mg	One dose only	Once
or				
Mebendazole	C	250mg	One dose only	once

3.2: BILHARZIA (Schistosomiasis Infection)

Schistosomiasis is an acute and chronic disease caused by blood flukes (trematode worms) of the genus Schistosoma.

General Guidelines

Clinics without microscopes can treat *Schistosoma hematobium* infection on the basis of visible hematuria or positive urine strip test for blood and or protein in children and adolescents.

Most patients with *S. Mansoni* infection have minimal or no symptoms unless there is heavy infestation. Infection should be suspected in young patients with unexplained iron deficiency anemia, hepatosplenomegaly or non-resolving chronic salmonella infections.

Schistosomiasis Hematobium

Medicine Name	Level	Dose	Frequency	Duration
Praziquantel po	C	40mg/kg	Single dose	Once

Schistosomiasis Mansoni

Medicine Name	Level	Dose	Frequency	Duration
Praziquantel po	C	60mg/kg	Single dose	Once

General notes:

Do not give Praziquantel in pregnancy, treat after delivery. Praziquantel is generally available as a double-scored 600mg tablets.

Using a 40mg/kg body weight dose, the patient should be given a dose to the nearest quarter tablet (150mg). Treatment with Praziquantel will also have eliminated any roundworm and tapeworm infections.

Katayama Syndrome

This is a severe immunological reaction to recent heavy infection with *Schistosoma Mansoni* or *hematobium* causing fever and acute serum sickness.

Medicine Name	Level	Dose	Frequency	Duration
Praziquantel po ***plus***	C	40mg/kg	Single dose	Repeat after two weeks
Prednisolone po	C	50mg, reduce by 5mg daily	Once a day	Till dose titration is over

3.3 Malaria

Management of Malaria

Malaria is endemic in Liberia and the entire population of about 4.2 million is at risk of the disease. According to data from the ***Health Facility Survey (HFS, 2013)*** malaria accounted for:

- 42% of outpatient department attendance and 39% of in-patient deaths overall
- 49% of outpatient department attendance and 55% of in-patient deaths among children under 5
- 28% of outpatient department attendance and 26% of in-patient deaths among pregnant women

3.3.1 Current recommended malaria treatment

3.3.1.1; Uncomplicated malaria: Artesunate + Amodiaquine (ASAQ) Fixed Dose Combination (FDC); with two alternatives:

Weight*	Age	Table Content	Dosage
≥4.5kg < 9kg	2 to 11 months	25mg AS + 67.5mg AQ	1 tablet/day X 3 days
≥9kg < 18kg	1 to 5 years	50mg AS + 135mg AQ	1 tablet/day X 3 days
≥18kg < 36kg	6 to 13 years	100mg AS + 270mg AQ	1 tablet/day X 3 days
≥36kg	≥ to 14 years	100mg AS + 270mg AQ	2 tablet/day X 3 days

ALTERNATIVES: Artemether + Lumefantrine Fixed Dose Combination

Artemether =20mg + Lumefantrine = 120mg						
Weight range *	**Day 1**		**Day 2**		**Day 3**	
	Immediately after diagnosis/ onset of symptoms	8 hours after previous dose	12 hours after previous dose	12 hours after previous dose	12 hours after previous dose	12 hours after previous dose
From 5kg up to 15kg	1 tablet	1 tablet	1 tablet	1 tablet	1 tablet	1 tablet
From 15kg up to 25kg	2 tablets	2 tablets	2 tablets	2 tablets	2 tablets	2 tablets
From 25kg up to 35kg	3 tablets	3 tablets	3 tablets	3 tablets	3 tablets	3 tablets
From 35kg (or ≥ 12 years)	4 tablets	4 tablets	4 tablets	4 tablets	4 tablets	3tablets

*Treat infants weighing <5 kg with uncomplicated *P. falciparium* malaria with ACT at the same mg/kg body weight target dose as for children weighing 5 kg. ***(WHO 3rd ed. 2015)***

□ **For pregnant women -** 1st trimester the drug of choice is oral quinine. Adults (with an average weight of 60 kg)

- ○ Dose is 30 mg/kg/day (24 hours) divided tid or bid for 7 days
- ○ Oral quinine is formulated as 300mg tablets
- ○ Usual outpatient dose for increased compliance is 3 tablets twice a day

□ **For pregnant women** - 2nd and 3rd trimester: the drug of choice is an ACT (**Artesunate + Amodiaquine FDC or Artesunate + Lumefantrine FDC**); oral quinine where artemisinin based treatment not available

*Treat infants weighing <5 kg with uncomplicated P. falciparium malaria with ACT at the same mg/kg body weight target dose as for children weighing 5 kg. **(WHO 3rd ed. 2015)**

3.3.1.2: Complicated/severe malaria:

- Parenteral (IV/IM) Artesunate followed by ACT
- IM Artemether followed by ACT
- Parenteral Quinine followed by oral Quinine or ACT

Pre-referral for severe/complicated malaria

- Rectal Artesunate for children <6 years
- IM Artemether or Artesunate for adults or children >5 (and children <6 where rectal Artesunate is not available)
- IM Quinine where artemisinin based treatment not available –

Intermittent Preventive Treatment in pregnancy (IPTp)

- Sulfadoxine-Pyrimethamine (SP) should be administered during 2nd trimester (as early as 13 weeks) and should be repeated one month apart until delivery.
  - The first IPTp-SP dose should be administered as early as possible during the second trimester of gestation (after 12 weeks)
  - Each IPTp-SP dose should be given one month (four weeks) apart during ANC visits when eligible; each dose consists of 3 tablets of SP (each containing Sulfadoxine 500mg/Pyrimethamine 25 mg)
  - IPTp-SP can be administered up to the time of delivery, without safety concerns
  - IPTp-SP should ideally be administered as Directly Observed Therapy (DOT)
  - SP can be given either on an empty stomach or with food
  - Folic acid at a daily dose equal or above 5 mg should not be given together with SP as this dosage counteracts the efficacy of SP as an anti-malarial. Therefore, WHO recommends a daily folic acid supplementation for pregnant women at the lower dose of 0.4 mg. In the absence of folic acid at a dose of 0.4 mg in Liberia, the Ferrous Sulfate + Folic Acid tablet known as "FIFA" can be used without counteracting with SP, since FIFA contains 200mg of ferrous sulfate and 0.4 mg of folic acid.
  - SP should not be administered to HIV positive pregnant women receiving cotrimoxazole

3.3.2: Malaria Case Management

Every person presenting with fever should be evaluated for malaria with a test and treated appropriately based on the results of that test. Fever may be found alone or with one or more of the following symptoms/signs below:

- Headache, Pain in muscles and joints
- Vomiting, Fatigue / Tiredness
- Refusal to eat or play (especially in children)

Case Definition of Complicated Malaria: a patient who presents with one or more danger signs or symptoms is observed in a patient with a positive test.

The danger signs and symptoms of complicated malaria are:

- Persistent fever beyond 48 hours
- Inability to feed, drink or breastfeed

- Persistent vomiting or vomiting everything
- Convulsions
- Lethargy or unconsciousness
- Inability to sit or stand
- Fast/Difficulty in breathing
- Getting weaker and sicker

3.3.3: Management of Malaria will occur at 5 levels

i. Household (Family)
ii. Community (by Community Health Workers)
iii. Private Sector (pharmacies and medicine stores)
iv. Clinic/Health Center
v. Hospital

3.3.3.1: Management of Fever at the Community Level (iCCM)

Community Health Workers (CHWs) should first look for danger signs. *If any, the child should be referred immediately to the nearest health facility for prompt treatment.*

If the child has no danger signs, the CHWs should do the following:

- Measure body temperature (preferably an infrared thermometer). If a thermometer other than an infrared is used, it should be disinfected immediately after use.
- Reduce body temperature by: a cold sponge bath and administer paracetamol (10-15 mg/kg stat)
- Perform mRDT observing all standard precautionary measures.
  - If mRDT is positive, administer antimalarial drug (fixed dose ACT) according to national guidelines
  - Do follow-up
- If the sick child does not respond to treatment within 48 hours (2 days), refer the sick child to the nearest health facility.
  - If mRDT is negative, look for other causes of fever according to the ICCM protocol
  - If other causes cannot be identified according to the ICCM protocol, refer the sick child to the nearest health facility
  - Do follow up
- Advise the caregiver and the household members on the use of malaria preventive measures:
  - LLINs (long Lasting Insecticide Nets)
  - IPTp (Intermittent Preventative Therapy)
  - Prompt diagnosis and treatment of malaria

3.3.3.2: Management of Fever at the Private Sector (Pharmacies and Medicine Stores)

Dispensers should first look for danger signs. *If any, refer immediately to nearest health facility for prompt treatment.*

If no danger signs, Dispenser should do the following:

- Perform mRDT using all standard precaution methods
  - If mRDT is positive, administer antimalarial drug (fixed dose ACT) according to national guidelines
  - Provide instruction to seek care at a health facility if fever persists after completing treatment.
- If mRDT is negative, refer to the nearest health facility.

3.3.3.3: Management of fever at the clinic level:

Health care workers should look for danger signs that cannot be managed at that level of care. *If such danger sign(s) is/are present, give malaria pre-referral treatment using all standard precaution methods and refer immediately to nearest higher*-level *health facility.*

If no danger signs, the health care worker should do the following:

- Perform a mRDT/Microscopy test for malaria
  - If the test is positive, administer antimalarial drug (fixed dose ACT) according to national guidelines
  - If test is negative, evaluate for other causes of fever and manage accordingly

3.3.3.4: Management of fever at Health Centers and Hospitals

Health care workers should look for danger signs that cannot be managed at that level of care. *If such danger sign(s) is/are present, give malaria pre-referral treatment using all standard precaution methods and refer immediately to nearest higher*-level *health facility.*

If no danger signs, the health care worker should do the following:

- Perform a test for malaria
  - If the test is positive for malaria, treat for malaria as per the protocol
  - If test is negative, evaluate for other causes of fever

The management of malaria is based on the individual patient's history, physical examination and laboratory confirmation.

***Patient's history*:** the health worker should ask about the following:

- Fever or hot body?
- When was the onset (hours, days)?
- History of danger signs? (Convulsion, prostration, etc)
- Is there a history of travel (people coming in from non-endemic country to Liberia)?
- For women, chance that she is pregnant? (female of child bearing age)
- Has patient taken any drug or herbs? If yes, specify, (with particular attention to any anti- malarial)
- Any ill person in the family, household or community or history of contact with sick person?

Clinical features:

- Fever, headache
- Joint pains or joints weakness
- Body pains
- Diarrhea (especially in children), vomiting
- Loss of appetite
- Tiredness
- Bitterness in the mouth

Malaria can be defined as complicated when one or more danger signs or symptoms are observed in a patient with a positive test.

The danger signs and symptoms of complicated malaria are:

- Persistent fever beyond 48 hours
- Inability to feed, drink or breastfeed
- Persistent vomiting or vomiting everything
- Convulsions

- Lethargy or unconsciousness
- Inability to sit or stand
- Fast/Difficulty in breathing
- Getting weaker and sicker

3.3.4: Treatment Protocols

3.3.4.1: Uncomplicated malaria

- *First line of treatment*: Amodiaquine + Artesunate FDC
- *Alternative treatment*: Artemether- Lumefantrine FDC
- *Pregnant women in their 1st trimester, the first line of treatment is*: Oral Quinine.

If there is persistence fever 48 hours after administration of Artesunate + Amodiaquine and microscopy still positive, then administer Artemether-Lumefantrine (A=20mg L=120mg) or oral quinine as an alternative treatment.

Note: Treat infants weighing <5 kg with uncomplicated *P. falciparum* malaria with ACT at the same mg/kg body weight target dose as for children weighing 5 kg. (***WHO third edition 2015***)

3.3.4.2: Severe/Complicated malaria

Some Clinical features: Consider the possibility of severe malaria in patients with any of the clinical features and /or syndromes listed below:

- Altered consciousness (behavior changes, confusion, delirium, psychosis, coma)
- Convulsions
- Inability to eat/drink or breastfeed
- Severe anemia or extreme pallor (i.e. Hb <5g/dl or Ht < 15 %)
- Difficulty in breathing (pulmonary edema, respiratory distress syndrome)
- Circulatory collapse or shock (faint or weak pulse, cold extremities)
- Hemoglobinuria (very dark colored urine)
- Kidney failure (Little or no urine in well-hydrated patient)
- Jaundice (yellowish coloration of eyes)
- Spontaneous bleeding (mouth, nose, skin, eyes): Disseminated Intravascular coagulation
- Prostration, i.e. generalized weakness so that the patient cannot stand or sit up without assistance

3.3.4.2.1: Treatment of severe/complicated malaria at Health Centers and Hospitals: General Measures:

- Maintain airway, Breathing and Circulation (ABCs of critical care)
- Establish an intravenous (I.V.) line
- Patient should be admitted to intensive care unit if available
- If parasitological confirmation of malaria is not readily available, a blood specimen should be taken *and treatment started on the basis of the clinical presentation*.
- Access the fluid requirement based on body weight and set up the appropriate volume to run in the first four hours (For children, 10-15ml/kg and adult 500ml) D5% in water or Normal saline recommended.
- Reduce body temperature if greater than 380C by vigorous sponging and fanning (relatives can help with this task) and administer antipyretic
- Control convulsions: first, correct any detectable cause of convulsions (hypoglycemia, hyperpyrexia, etc.).
- Monitor urine output constantly and look for the appearance of dark colored urine

- Unconscious patients should receive meticulous/intensive nursing care. Indwelling urinary catheters should be inserted and removed as soon as they are no longer necessary.
- Monitor patient's level of consciousness using the appropriate Coma Scale Specific Antimalarial therapy

Severe/Complicated malaria must be treated with:

Medicine Name	Code	Dose	Frequency	Duration
Artesunate im/iv	C	Loading dose=2.4mg/kg	Initial dose	once
		Maintenance dose = 2.4mg/kg	Every 12 hours	1 day only
then				
ACT po	C		Every 12 hours	3 days

* Artesunate can be continue up to maximum of 7days

* Children weighing < 20kg should receive a higher dose of Artesunate Injection (3mg/kg/dose) thank larger children and adults (2.4 mg/kg/dose) to ensure equivalent exposure to the drug.

Medicine Name	Code	Dose	Frequency	Duration
Artemether im/iv	HC	Loading dose=3.2mg/kg	Initial dose	Once (day 1)
		Maintenance dose = 1.6mg/kg	Every 24 hours	2 days
then				
ACT po	C		Every 12 hours	3 days

*A minimum of 3 doses of IM Artemether should be given before changing to oral treatment. Quinine - Doses of Quinine must be calculated based on 30mg /kg/ body weight/day

Protocol for Intravenous Administration

To administer Quinine intravenous for adults the following should be done:

- Calculate the total dose of Quinine di-hydrochloride (30 mg/kg/day) to be administered every 8 hours. (Quinine di-hydrochloride is available in 300mg/ml or 600 mg/2ml ampules.)
- Add the appropriate dose of quinine calculated to 500ml of dextrose in water (D5/W)
- Allow the infusion to run for 4 hrs (calculate the number of drops per minute) and repeat the same protocol every 8 hrs
- Give 20 ml of dextrose 50% IV before each quinine infusion - Administer at minimum of 3 quinine infusions in 24 hours.
- When patient is able to tolerate oral medication prescribe one of the following:
  - Oral quinine to complete the full course of 7 days (for example if the patient received 1-day IV provide 6 days of oral quinine as above).
  - ACT: provide usual 3-day course.

Intramuscular

Give bid (after every12 hrs) on the anterior thigh of the patient (not on the buttocks)

Quinine for intramuscular injection in children and adults should be diluted as follows:

For Quinine dihydrochloride:

- 300mg/ml add 4 ml of Normal Saline (0.9%) solution this gives diluted quinine of 5 ml. After this dilution, each ml of this mixture is equivalent to 30mg of quinine.
  - 600mg/2ml add 8ml of Normal Saline (0.9%) solution. This gives diluted quinine of 10ml. After this dilution, each ml of this mixture is equivalent to 60mg of quinine

Note: Never give quinine by bolus (intravenous injection.)

3.3.4.2.2 Management of severe malaria in pregnant women

Pregnant women with malaria must be treated promptly because the disease is more severe in pregnancy and is associated with high parasitemia which is dangerous for mother and fetus.

Parenteral Artesunate is the first line therapy. It is recommended that health workers use Artesunate injectable for the treatment of severe malaria; however, Quinine and Artemether injectable can be used in cases where Artesunate injectable are not available or in special situations unlike neo-natal malaria. Quinine is safe in pregnancy and is not associated with uterine stimulation or fetal distress. However, if a pregnant woman has fever due to malaria and pre-existing uterine stimulation and quinine is to be administered do the following:

- Treat with Paracetamol to reduce the fever
- Administer Tocolytic (salbutamol recommended). Tocolytic drugs are used to manage uterine contraction: Treat with Salbutamol 10 mg in 1L IV fluid (start at 10 drops/minute).

If contractions persist, increase infusion rate by 10 drops per minute every 30 minutes until contractions stop or maternal pulse exceeds 120 beats per minute, then reduce infusion rate by 10 drops. Use with caution if the woman is anemic.

3.3.4.2.3 Management of Severe Malaria in Children

Antimalarial drugs should be given parenterally within the first 24 hours and replace with oral antimalarial if patient can tolerate. If after 24 hours the patient is still unable to tolerate oral antimalarial drugs, continue with parenteral medication and monitor.

Calculate the dose of malaria medicines per body weight (mg/kg of body weight).

For children weighing below 20kg:

- the recommended dose of Artesunate is 3mg/kg body weight given intravenously or intramuscularly at admission 0hr, then 12hr and 24hr.
- Change to oral ACT if patient can tolerate. If not continue with parenteral treatment for a maximum of 7 days.
- If patient does not recover after 7 days of treatment, re-assess for other causes. Artemether or quinine is an acceptable alternative if parenteral Artesunate is not available:
  - artemether at 3.2mg/kg body weight intramuscularly given at admission, then 1.6mg/kg body weight per day;
  - or quinine at 20mg salt/kg body weight at admission (intravenous infusion or divided intramuscular injection), then 10mg/kg body weight every 8h; the infusion rate should not exceed 5mg salt/kg body weight per hour. Intramuscular injections should be given into the anterior thigh and not the buttock.

3.3.4: Management of Common Complications

3.3.4.1: Dehydration

- The best clinical indication of moderate to severe dehydration in children are decreased peripheral perfusion, deep breathing, decreased skin turgor, raised blood urea (>6.5mmol/L), increased thirst, loss of about 3-4 % of total weight
- Treat with ringer lactate or isotonic saline with frequent examination of jugular venous pressure, blood pressure and observation of breathing rate and auscultation of the chest.

Note: Consider oral methods of hydration while attempting IV access or if IV access not possible.

3.3.4.2: Convulsions

Children*:* treat with Diazepam 0.5 mg/kg rectally or Diazepam 0.3 mg/kg IV as slow bolus

- If Convulsion persists, give up to 2 doses within 24 hours, except where there is a good facility for monitoring and managing respiratory depression.
- If no progress, then treat with Phenobarbital 10-15 mg /kg IM STAT. Look for other causes and treat accordingly.
- Treat hypoglycemia with D50% (1ml/kg) for children and 20 to 50 ml slow IV for adults.

Adults*:* treat with Diazepam 10 mg IV and repeat if necessary without exceeding 20 mg per day

Reduce fever with paracetamol in children and adults

3.3.4.3: Hypoglycemia

In conscious patients, hypoglycemia may present with classic symptoms of anxiety, sweating, dilatation of the pupils, breathlessness, labored and noisy breathing, oliguria, a feeling of coldness, tachycardia and light-headedness.

Deterioration in the level of consciousness may be the only sign of hypoglycemia. If possible, confirm by biochemical testing (routine blood sugar).

Hypoglycemia can be found in:

- Patients with severe malaria, especially young children.
- Patients treated with quinine, as a result of quinine- induced hyper-insulinemia
- Pregnant women, either on admission or following quinine treatment

Management of hypoglycemia

- Treat with 50% Glucose by IV bolus injection
- *Children:* 1ml/kg for children in equal dilution (distilled water or normal saline).
- *Adults:* 20ml of 50% glucose
  - Follow with IV infusion of 5% or 10% glucose
  - Encourage feeding of the patient
  - Continue to monitor blood glucose level

3.3.4.4: Hyperpyrexia

- Temperature >38^0C
- *Management of hyperpyrexia*
  - Reduce body temperature by vigorous sponging and fanning (relatives can help with this task)
  - Administer antipyretic: Paracetamol 15 mg/kg p.o., nasogastric tube or suppository)

3.3.4.5: Anemia

- The rate of development and the degree of anemia depends on the severity of parasitemia
- Children with severe anemia (Hemoglobin <5mg/dl or Hematocrit 15% and less) may present with extreme weakness, tachycardia and dyspnea. Anemia may present with cerebral manifestation (confusion, restlessness, coma, and retinal hemorrhages) and/or cardiopulmonary manifestations (gallop rhythm, cardiac failure, murmur and pulmonary edema).
- In children <5years, anemia should be assessed in palm of the hands or sole of the feet
- The need for blood transfusion must be assessed with great care in each individual patient.
- A hematocrit of less than 15% in a normally hydrated child is an indication for blood transfusion with utmost urgency.

Management of Anemia:

- Recommended dose for transfusion
  - Children: 10-15ml/kg of packed cells is recommended for transfusion
  - In patient with complication such as bleeding: whole blood 20ml/kg
- All blood must be screened, especially for HIV, hepatitis, malaria etc. and transfused within 3 to 4 hours.
  - Furosemide (Lasix) 1-2 mg/kg up to a maximum of 20 mg may be given IV to avoid fluid overload if whole blood has to be given or if the patient has sign of cardiac failure.
  - If the patient has cardiac failure, digoxin should be given before blood transfusion is given
    - Children: 0.01 to 0.04mg/kg
    - Adult: 0.5 mg single dose then 0.25 mg every 8h) Note: in Adult, dose should not exceed 1g/24h.

3.3.4.6: Cerebral malaria

Clinical Features:

- Disorientation
- Convulsions are common in both children and adults
- Retinal hemorrhages are associated with poor prognosis in adults
- Abnormalities of eyes movement (disconjugate gaze)
- Fixed jaw closure and tooth grinding
- Mild neck stiffness
- Symmetrical upper motor neuron lesions: decerebrate rigidity; decorticate rigidity (arms flexed and legs stretched) and opisthotonous (cerebrospinal fluid is clear with normal cell count)
- CSF Protein and lactic acid are raised
- Coma

Features in children

- The earliest symptom of cerebral malaria in children is usually Fever (37.5-410C) followed by failure to eat or drink. Vomiting and cough are common.
- The history of symptoms preceding coma may be brief: 1 –2 days
- A child who loses consciousness after a febrile convulsion should not be considered to have cerebral malaria unless coma persists for more than 30 minutes after convulsion
- The depth of coma may be assessed using the Blantyre or Glasgow coma scales;
- Always exclude or treat hypoglycemia
  - Convulsions are common before or after the onset of coma; They are significantly associated with morbidity and sequelae;
  - In patients with profound coma, corneal reflexes and doll's eye movement may be absent;
  - In some children, extreme opisthotonous may lead to a mistaken diagnosis of tetanus or meningitis.

Monitoring of Comatose patient

A coma score is based on the patient's ability to move and speak in response to commands and painful stimuli. In infants who have not yet acquired speech, you can assess the cry and the child's ability to watch its mother's face and also the response to pain. You may grade coma according to the following scales:

- The Blantyre Coma Scale (Modified Glasgow Coma Scale) is suitable for children aged about 9 months to 5 years However; measurement of coma in younger children is difficult. It is better to describe how the child responds to a standard painful stimulus.
- The Glasgow Coma Scale is suitable for children above 5 years of age and adults.

N.B.: To obtain the Glasgow coma score, obtain the score for each section, then add the figures to obtain a total.

Treatment of Cerebral Malaria

- *Care of the unconscious patient*: Clinicians should always ensure that Airway, Breathing and Circulation (ABCs) of an unconscious patient are well established in all cases in addition to meticulous/intensive nursing care.
- *Symptomatic treatment*: Increased body temperature, convulsion and others presenting symptoms should be fully controlled.
- *Control of body temperature*: by tepid sponging or fanning, if the fever is not controlled, appropriate antipyretic (paracetamol) may be used.
- *Control of convulsions*: convulsions can be controlled with rectal diazepam 0.5mg/kg or intravenous diazepam 0.3mg/kg for children and 10 mg for adult given slowly. If the convulsion persists, the dose can be repeated every 15-20 minutes, but the total dose should not exceed 20 mg in one hour for children. After a total of three doses of diazepam, for repeated and uncontrolled seizures in children and adults, phenobarbitone 15-20mg/kg body weight by slow intravenous injection (not more than 50mg/min) over 15 to 20 minutes can be used. The maintenance dose is 5mg/kg IV/IM in 24 hours to prevent further seizures.

The following drugs have been used or suggested for the treatment of cerebral malaria but are now considered of no beneficial effect and should be avoided:

- ☐ Corticosteroids (hydrocortisone, dexamethasone, etc)
- ☐ Other anti-inflammatory agents (naproxen, ibuprofen, ASA, diclofenac sodium, etc)
- ☐ Agents given for cerebral edema (urea, mannitol)
- ☐ Low molecular weight dextran; Epinephrine (adrenaline); Heparin

3.3.4.7: Hemoglobinuria:

The urine is dark, tests strongly positive for blood (hemoglobin) but contains no red blood cells on microscopy. Plasma may also be dark, due to hemoglobin freed from red cells.

- Continue appropriate Antimalarial treatment
- Transfuse fresh blood to maintain hematocrit above 20 %
- Monitor jugular or central venous pressure to avoid fluid overload and hypovolemia
  - Treat with Furosemide 20 mg IV
- If oliguria develops and blood urea and serum creatinine levels rise, peritoneal dialysis or hemodialysis may be required

3.3.4.8 Renal Failure:

- Renal failure as complication of malaria is virtually confined to adults
- There is a rise in serum creatinine and urea, oliguria and eventually anuria due to acute tubular necrosis.
- The acute renal failure due to severe malaria is usually reversible

Management of renal failure:

- Exclude dehydration (hypovolemia) by clinical examination, including measurement of jugular or central venous pressure, and blood pressure drop between the patients lying supine and when 45^0 propped up
- Carefully infuse isotonic saline until venous pressure is between 0 and 5cm H_2O
- Give Furosemide IV to induce diuresis

- Closely monitor the urine out put on an hourly basis
- Peritoneal dialysis or hemodialysis is indicated if the patient remains oliguric after adequate rehydration and the blood urea and creatinine rise progressively

3.3.4.9: Spontaneous Bleeding and Disseminated Intravascular Coagulation:

- Bleeding gums, epistaxis, petechiae, and subconjunctival hemorrhages may occur.
- Disseminated intravascular coagulation, complicated by clinically significant bleeding (hematemesis or melena), occurs in fewer than 10% of patient and is common in nonimmune patients
- Thrombocytopenia is common, and is not related to other measures of coagulation or to fibrinogen concentrations.

Management

- Transfuse fresh whole blood or platelets as required. All blood must be screened, especially for HIV, hepatitis, malaria etc. and transfused within 3 to 4 hours
- If the prothrombin or partial thromboplastin times are prolonged, treat with vitamin K 10 mg by slow IV

3.3.4.10: Circulatory collapse

- Some patients are in a state of collapse, with a systolic blood pressure less than 80 mmHg in the supine position (less than 50mmHg in children), a cold, clammy, cyanotic skin, constricted peripheral veins and rapid feeble pulse. This picture may be associated with a complicating Gram-negative septicemia
- Circulatory collapse is also seen in patients with pulmonary edema or metabolic acidosis, and following massive gastrointestinal hemorrhage
- Dehydration with hypovolemia may also contribute to hypotension
- Possible sites of associated infection should be sought (e.g. lung, urinary tract (especially if there is an indwelling catheter), meningitis, IV sites …)

Management

- Correct hypovolemia with appropriate plasma expander (screened fresh blood, plasma or dextran)
- Take a blood culture and start patient on broad–spectrum antibiotic immediately. Once the results of blood culture and sensitivity testing are available, give the appropriate plasma antibiotic
- Maintain central venous pressure between 0 and 5 cm H_2O

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4. DISEASES OF THE DIGESTIVE SYSTEM

4.1: Constipation

Patients usually use the term constipation to mean that their feces are too hard, they do not defecate often enough, defecation causes straining or there is a sense of incomplete evacuation. Complaints of diarrhea alternating with constipation may indicate a large bowel cancer especially in those aged forty (40) and above. In children and the elderly, it may indicate chronic constipation with spurious diarrhea. Prolonged use of laxatives is very common in the community and may be habitual. Their chronic use must be discouraged to avoid hypokalemia and its consequences.

Causes

- Diet deficient in roughage
- Ignoring the urge to defecate e.g. due to immobility
- Myxoedema, Irritable bowel syndrome
- Hypercalcemia
- Drugs e.g. atropine, codeine phosphate, morphine, tricyclic antidepressants, disopyramide
- Lazy bowel from chronic laxative use including 'herbal' preparations should be ascertained
- Lack of exercise, Carcinoma of the rectum and sigmoid colon
- Foreign body in the gut, Pelvic mass e.g. fibroid, fetus
- Any gastrointestinal obstruction, a ganglionic and acquired megacolon

Clinical Presentation

- Constipation, if associated with frequent high-pitched bowel sounds or absent bowel sounds

Diagnosis

- Stool routine examination, stool for occult blood
- Sigmoidoscopy/Colonoscopy

Treatment - Objectives

To identify possible cause of constipation and relieve constipation

Non-pharmacological treatment: Adherence to an appropriate diet and regular exercise; with adequate amounts of fiber and fluid (four to six 250 ml glasses of fluid per day).

Pharmacological treatment

Medicine	Level	Dose	Duration	Frequency
Adults - Bisacodyl po	C	10-20 mg	Once at night	3 days
Child - Bisacodyl po	C	5 mg	Once at night	3 days

4.2 Dental Abscess

REFER for drainage and extraction of the infected tooth.

Medicine	Level	Dose	Duration	Frequency
Adults - Phenoxymethylpenicillin po	C	500 mg	Every 6 hours	7 days
Child - Phenoxymethylpenicillin po	C	10-20 mg/kg/dose	Every 6 hours	7 days
or				
Adults - Amoxicillin po	C	500 mg	Every 8 hours	7 days
Child - Amoxicillin po	C	25 mg/kg/dose	Every 8 hours	7 days
plus				
Adults - Paracetamol po	C	I g	Every 8 hours	3 days
Child - Paracetamol po	C	10 mg/kg	Every 8 hours	3 days

4.3 Dental Caries/Cavities

Dental caries or cavities, more commonly known as tooth decay, are caused by a breakdown of the tooth enamel. This breakdown is the result of bacteria on teeth that breakdown foods and produce acid that destroys tooth enamel and results in tooth decay. REFER to a dental specialist for management, fillings or extraction.

Medicine Name	Level	Dose	Duration	Frequency
Adults Paracetamol po	C	I g	Every 8 hours	3 days

4.4 Diarrhea

4.4.1: Children

Majority of deaths from diarrhea among children below 5 years can be prevented by:

- Homemade oral rehydration salt at the onset of diarrhea;
- Exclusive breastfeeding for 6 months and continuing breastfeeding with solids throughout the attack of diarrhea to prevent malnutrition;
- Educating mothers to know when to take the child to a health facility;
- Correct assessment, treatment and continued feeding at the health facility level;
- Treatment of invasive diarrhea (bloody stool) with antibiotics;
- Clear instructions on discharge from the health facility for continuing above treatments and when it may be necessary to return for further treatment;
- Referring to hospital for investigation and treatment: severe malnutrition, persistent diarrhea (lasting > 14 days);

No anti-diarrheal or antiemetic medicines should be given to a child, give;

Medicine Name	Level	Dose	Duration	Frequency
Zinc Sulphate po	C	>6 months=20 mg/day	Every 8 hours	14 days
		<6 months=10mg/day	Every 8 hours	14 days

Determine:

- For how long the child has had diarrhea and is there blood in the stool?
- Look if:
  - the child lethargic or unconscious?
  - Eyes sunken?
  - Able to drink or drinking poorly
  - Drinking eagerly or thirsty?
  - Pinch the skin of the abdomen: Does it go back very slowly (longer than 2 seconds)?
  - For persistent or chronic diarrhea: Treat as in dehydration.

Table 4.1 Classification of Diarrhea

Signs	Dehydration	Management
Two or more of the following signs: - Lethargic or unconscious - Sunken eyes - Not able to drink or drinking poorly - Skin pinch goes back very slowly	***Severe Dehydration***	- Initiate treatment for severe dehydration - Or if another severe classification* – refer urgently to hospital with caregiver giving frequent sips of oral rehydration fluid or by nasogastric tube on the way. - Advise mother to continue breastfeeding. - If the child is 2 years or older and there is cholera in your area, give antibiotic for cholera.
Two or more of the following signs: - Restless or irritable - Sunken eyes - Drinks eagerly or thirsty - Skin pinch goes back slowly	***Some dehydration***	- Give fluid and food for some dehydration. - *If child also has a severe classification from another main symptom refer urgently to hospital with caregiver giving frequent sips of oral rehydration fluid on the way. Advise mother to continue breastfeeding. - Advise mother when to return urgently - Follow -up in 2 days if not improving.
Not enough signs to classify as 'some' or severe dehydration	***No dehydration***	- Give fluid and food to treat diarrhea at home - Advise caregiver when to return immediately - Follow -up in 2 days if not improving

Treating Diarrhea at Home

Educate the mother on the 3 Rules of Home Treatment:

- Give extra fluid
- Continue feeding - When to return
- Explain function of ORT (oral rehydration therapy) to mother; Give extra fluid (as much as the child will take)

Tell the mother:

- Breastfeed frequently and for longer each feed
- If the child is exclusively breastfed, give Sugar Salt Solution in addition to breast milk
- If the child is not exclusively breastfed, give food-based fluids available at home
- It is especially important to give ORT at home when the child cannot return to a clinic if the diarrhea gets worse.

Treating Severe Dehydration

Quickly Start intravenous fluid immediately:

- Amount of fluid: 30 ml per kg body weight in 1 hour
- Type of fluid: ½ strength Darrow's solution in 2.5% dextrose iv
- ***or*** Ringers lactate iv
- ***or*** if above unavailable 0.9% sodium chloride solution iv

If the child can drink, give oral rehydration therapy while the infusion is being set up.

Caution: if child malnourished or is a neonate then reassess after one hour

If response good (Good response: child regaining consciousness and radial pulses easily palpable or child passing good quantity of urine)

- Response may be poor if child is hypoglycemic:
- Continue intravenous fluid at 10ml per kg body weight per hour for next 5 hours
- Give oral rehydration therapy (about 5mls per kg body weight per hour) as soon as the child can drink

If response poor (Poor response: child remains unconscious or radial pulses weak or undetectable and no urine passed)

- Repeat 30 ml per kg body weight in next hour
- Then continue intravenous fluid at 10 ml per kg body weight per hour for next 4 hours
- Continue to assess hydration status and general condition hourly

If intravenous fluid cannot be started, given by nasogastric tube while awaiting referral

- Give 20ml per kg body weight per hour for 6 hours
- Reassess hourly: if there is repeated vomiting or abdominal distension, give fluid more slowly refer urgently to hospital.
- Reassess hydration status 6 hours after starting fluids

Persistent diarrhea

- Severe persistent diarrhea is diarrhea lasting 14days or more and patient is dehydrated. Start rehydration and refer to hospital.
- Persistent diarrhea is diarrhea lasting more than 14days or more but no dehydration. Advise on feeding, give vitamin A, and follow up in 5days.

General notes: persistent diarrhea

- If breastfeeding, give more frequent, longer breast feeds, day and night
- Milk feeds should be mixed with maize meal porridge to reduce the concentration of lactose
- Sour milk is better tolerated than fresh milk
- Give fermented porridge if available

Indications for Antibiotics in Diarrhea:

Medicine Name	Level	Pediatric Dose	Duration	Frequency
Bloody diarrhea, cramps and fever (dysentery):				
Ciprofloxacin po	C	5-17 years = 20mg/kg (max 1.5 g)	Every 12 hours	5 days
For intestinal amebiasis:				
Metronidazole po	C	10mg/kg	Every 8 hours	5 days

Composition of Fluids

Home-made Oral Rehydration Salt (Salt and Sugar Solution)

- 6 level teaspoons of any household sugar (white or brown),
- ½ level teaspoon of salt (coarse salt may have to be ground fine), dissolved in
- 1000ml of clean water measured in any 1000ml bottle (soft drink, oil etc). [The water is boiled only if from a contaminated source and is cooled before adding ingredients.]

Oral Rehydration Solution for Children: Low Osmolarity ORS

It has low levels of glucose and salt to achieve osmolarity of 245mOsm/L resulting in improved efficacy and decreased stool output. It is safe and effective even in children with cholera.

Made in hospital pharmacies as follows:

Ingredient	Weight
Sodium Chloride	2.6 g
Trisodium Citrate Hydrate	2.9 g
Potassium Chloride	1.5 g
Glucose, anhydrous	13.5 g
Water	To 1 liter

4.5 Gastritis (Heart Burn)

Gastritis is an inflammation, irritation, or erosion of the lining of the stomach. It can occur suddenly (acute) or gradually (chronic).

Causes:

- *Helicobacter pylori* (H. pylori), Pernicious anemia
- Bile reflux, Infections caused by bacteria and viruses
- Aspirin, Nonsteroidal anti-inflammatory medicines, Potassium supplements, Iron tablets, Cancer chemotherapy medications

Symptoms:

- Nausea or recurrent upset stomach
- Abdominal bloating and pain
- Vomiting, Indigestion
- Burning or gnawing feeling in the stomach between meals or at night
- Hiccups, Loss of appetite
- Vomiting blood or coffee ground-like material
- Black, tarry stools

Diagnosis

- Upper Endoscopy
- Blood tests
- Fecal occult blood test (stool test)

Treatment

Medicine	Level	Dose	Frequency	Duration
Magnesium Trisilicate Compound po	C	2 tablets	Every 8 hours	As needed
or				
Adult: Ranitidine po	HC	150 mg	Every 12 hours	6 weeks
Child (8-18 years): Ranitidine po	HC	150 mg	Every 12 hours	6 weeks
or				
If vomiting, add Metoclopramide im	HC	10 mg	Every 8 hours	As needed

4.6 Hemorrhoids (Piles)

Hemorrhoids are enlarged, displaced anal cushions derived from engorged veins. First degree hemorrhoids remain in the rectum. Second degree hemorrhoids prolapse, but reduce spontaneously, whereas third degree hemorrhoids prolapse and have to be replaced manually or remain prolapsed permanently until repaired. Hemorrhoids developing during pregnancy should be managed conservatively as most will resolve after delivery. No treatment is required for hemorrhoids that are asymptomatic.

Causes

- Increased intra-abdominal pressure e.g. chronic cough, pregnancy, intra-abdominal or pelvic tumors
- Familial predisposition
- Whipworm (*Trichuris trichiura*)
- Anorectal tumors (secondary hemorrhoids)

Clinical Presentation

- Passage of bright red blood at defecation
- Mucoid discharge
- Swelling at anus

- Perianal irritation or itch (pruritus ani)
- Discomfort after opening bowels
- Pain occurs only during an acute attack of prolapse with thrombosis, congestion and edema

Signs

- Inspection of the anus may be normal
- Redundant folds of skin (skin tags) may be seen in the position of the hemorrhoids and straining may show the hemorrhoids. In third degree hemorrhoids, there is a swelling at the anus
- Encourage high fiber diet and adequate fluid intake.
- Avoid constipation.
- Careful anal hygiene plus saline baths.

Medicine Name	Level	Dose	Frequency	Duration
Bismuth Subgallate with 1% hydrocortisone ointment, rectally	HC	One application	Every 12 hours	As required

If there are signs of infection;

Medicine Name	Level	Dose	Frequency	Duration
Amoxicillin po	C	500 mg	Every 8 hours	7 days
plus, Metronidazole po	C	400 mg	Every 8 hours	7 days
or				
Ciprofloxacin po	C	500 mg	Every 12 hours	7 days
plus, Metronidazole po	C	400 mg	Every 8 hours	7 days

4.7 Peptic Ulcers

Eradication of *Helicobacter pylori* as well as acid suppression therapy are important targets in management of peptic ulcers.

Precipitating factors:

- Causes such as NSAIDs, cigarettes and alcohol should be withdrawn. - Stop smoking and avoid alcohol.
- Medicines to be avoided: all non-steroidal anti-inflammatory agents, aspirin/aspirin compounds, and steroids.
- Antacids will alleviate symptoms in most cases
- Patients with persistent symptoms or recurrent ulcers should be referred to a specialist.

Causes

- Excessive secretion of gastric acid
- Inadequate protection of the lining of the stomach and duodenum against digestion by acid and pepsin - *Helicobacter pylori (H. pylori)* infection

To manage dyspepsia associated with ulcers:

Medicine Name	Level	Dose	Frequency	Duration
Magnesium Trisilicate po	C	2 tablets	Every 6 hours	As needed

To eradicate H. pylori,

Medicine Name	Level	Dose	Frequency	Duration
Amoxicillin po	C	500 mg	Every 8 hours	14 days
plus				
Metronidazole po	C	400 mg	Every 8 hours	14 days
plus				
Ranitidine po	HC	150 mg	Every 12 hours	14 days
plus				
Omeprazole po	HC	20 mg	Every 12 hours	14 days

Note: Aspirin and other NSAIDS are contraindicated in patients with peptic ulcers.

Managing a Complicated Duodenal Ulcer:

This usually involves bleeding and/or perforation. This requires emergency referral to the Specialists. - Need maintenance anti-secretory therapy

- For recurrent ulcers on endoscopy, repeat course at same dose.
- For persistent (non-healing) ulcers on endoscopy, repeat course at following doses:

Medicine	Level	Dose	Frequency	Duration
Ranitidine po	HC	150 mg	Once at night	Continual
or				
Omeprazole po	HC	20 mg	Once per day	Continual

References:

1. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey ML. 9th Edition Pharmacotherapy: A Pathophysiologic Approach: McGraw-Hill Education/Medical; 2014.
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5. DISEASES OF THE RESPIRATORY SYSTEM

5.1 Asthma

5.1.1Agents and Events Triggering Asthma

- ***Respiratory infection***: Respiratory syncytial virus (RSV), rhinovirus, influenza, parainfluenza, *Mycoplasma pneumonia, Chlamydia*
- ***Allergens***: Airborne pollens (grass, trees, weeds), house-dust mites, animal danders, cockroaches, fungi
- ***Environment***: Cold air, fog, ozone, sulfur dioxide, nitrogen dioxide, tobacco smoke, wood smoke
- ***Emotions***: Anxiety, stress, laughter
- ***Exercise***: Particularly in cold, dry climate
- ***Drugs/preservatives***: Aspirin, NSAIDs (cyclooxygenase inhibitors), sulfites, benzalkonium chloride, nonselective β -blockers
- ***Occupational stimuli***: Bakers (flour dust); farmers (hay mold); spice and enzyme workers; printers (arabic gum); chemical workers (azo dyes, anthraquinone, ethylenediamine, toluene diisocyanates, polyvinyl chloride); plastics, rubber, and wood workers (formaldehyde, western cedar, dimethylethanolamine, anhydrides)

5.1.2 General Measures in Asthma

Asthma education should be viewed as a continuous process with regular re-enforcing during patient visits to the care giver. All patients should be treated with maintenance inhaled steroids unless the patient has mild intermittent asthma as evidenced by the odd chest tightness once in every 4 months or so. Any patient with asthma who requires hospital emergency treatment or admission should be prescribed an inhaled steroid for maintenance therapy.

Attention should be paid to the following:

- Domestic allergens e.g. house dust mite (carpets), cats, and cockroaches
- Environmental aero-allergens
- Allergic rhinitis and sinusitis
- Gastro-esophageal reflux disease (GERD)
- Emotional problems
- Smoking
- Work related dusts, fumes, vapors and gases

The aims of asthma management are total control of symptoms as indicated by:

- Normal activities of life (work, school, sports)
- Normal sleep with no waking up at night (i.e. no nocturnal cough)
- Normal lung function

If the above is not achievable, partial control is second best. Uncontrolled asthma should be referred to a specialist. The management of asthma in children is similar to that in adults. However, children under 18 months may not respond well to bronchodilators.

5.1.3 Clinical Presentation: *Chronic Asthma*

General

Asthma is a disease of exacerbation and remission, so the patient may not have any signs or symptoms at the time of exam.

Symptoms

The patient may complain of episodes of dyspnea, chest tightness, coughing (particularly at night), wheezing, or a whistling sound when breathing. These often occur in association with exercise, but also occur spontaneously or in association with known allergens.

Signs

Expiratory wheezing on auscultation, dry hacking cough, or signs of atopy (allergic rhinitis and/or eczema) may occur.

Treatment of Chronic Asthma - *Mild Intermittent Asthma*

Medicine Name	Level	Dose	Frequency	Duration
Salbutamol Inhaler	C	100-200 micrograms	As needed, or before exercise	

Treatment of Chronic Asthma - *Mild Chronic Asthma*

Medicine Name	Level	Dose	Frequency	Duration
Beclomethasone Inhaler (100mcg/puff)	HC	200-400 micrograms	Twice daily	Continual
plus				
Salbutamol Inhaler	C	100-200 micrograms	As required	Continual

Treatment of Chronic Asthma - *Moderate Chronic Asthma*

Medicine Name	Level	Dose	Frequency	Duration
Beclomethasone Inhaler (100mcg/puff)	HC	200 micrograms	Twice daily	Continual
plus				
Salbutamol Inhaler	C	200 micrograms	As required	Continual

Treatment of Chronic Asthma - *Severe Chronic Asthma*

Medicine Name	Level	Dose	Frequency	Duration
Beclomethasone Inhaler (100mcg/puff)	HC	400 micrograms	2-4 times daily	continual
plus				
Prednisolone po	HC	2.5-10 mg	Once in the morning	continual
plus				
Salbutamol inhaler	C	100-200 micrograms	As required	As needed

5.1.4 Clinical Presentation: *Acute Severe Asthma*

General

An episode can progress over several days or hours (usual scenario) or progresses rapidly over 1 to 2 hours.

Symptoms

- The patient is anxious in acute distress and complains of severe dyspnea, shortness of breath, chest tightness, or burning.
- The patient is only able to say a few words with each breath. Symptoms are unresponsive to usual measures (short acting inhaled β_2 -agonist administration).

Signs

Signs include expiratory and inspiratory wheezing on auscultation (breath sounds may be diminished with very severe obstruction), dry hacking cough, tachypnea, tachycardia, pale or cyanotic skin, hyper-inflated chest with intercostal and supraclavicular retractions, and hypoxic seizures if very severe.

The primary goal is prevention of life-threatening asthma by early recognition of signs of deterioration and early intervention.

As such, the principal goals of treatment include:

- Correction of significant hypoxemia
- Rapid reversal of airflow obstruction
- Reduction of the likelihood of relapse of the exacerbation or future recurrence of severe airflow obstruction
- Development of a written asthma action plan in case of a further exacerbation

Treatment

Humidified oxygen by mask at high concentration (6 liters/min) is important. Give:

Medicine Name	Level	Dose	Frequency	Duration
Salbutamol nebulized (in saline or sterile water)	HC	5mg	repeat at ½ - 1-hour intervals, then every 2-4 hours until recovered	
plus				
Oxygen	HC	6 liters/min		
or				
Adrenaline 1:1000 sc useful when no nebulizer available	C	0.5ml	1-2 hourly as required	
plus, prednisolone po	HC	40mg	once a day (mornings)	10 days

If poor responses to initial nebulizer therapy or attack severe add: Hydrocortisone iv 200mg once only (unless oral dosing not possible)

Asthma in Children Acute Attacks – *Children*

Medicine Name	Level	Dose	Frequency	Duration
Salbutamol nebulized	HC	<5 years=2.5mg/2ml >5 years=5mg/2ml	Repeat 2 times in the first hour, then every 4 hours until recovery	
or				
Salbutamol inhaler	C	100-200micrograms (1-2 puffs)	As required	

If nebulization facilities are not available, or response is poor:

Medicine Name	Level	Dose	Frequency	Duration
Adrenaline 1:1000 sc	C	0.01mg/kg	Repeat 2 times at 20-minute intervals	
plus				
Prednisolone po	HC	1-2mg/kg	Once a day	3-5 days

Severe Attacks in Children

Medicine Name	Level	Dose	Frequency	Duration
Hydrocortisone iv/im	C	4-8mg/kg once only, then 2-4 mg/kg	6 hourly	
then, Prednisolone po	HC	1-2mg/kg	Once a day	5 days

Maintenance Therapy

1. Do not keep children on long term beta-2 stimulant medicines (e.g. salbutamol) if they are mostly asymptomatic.
2. Do not use antibiotics routinely in treating known asthmatics with wheeze.

Mild asthma - children

Mild or intermittent asthma mainly associated with respiratory infections:

Medicine Name	Level	Dose	Frequency	Duration
Salbutamol inhaler	C	100-200 micrograms	As required	Intermittent

Moderate asthma in children

May be triggered by infections, allergies, exercise; treatment is the same as for mild asthma.

Severe Asthma in Children

Medicine Name	Level	Dose	Frequency	Duration
Beclomethasone Inhaler (100mcg/puff)	HC	50-100 micrograms	3-4 times daily	continual
or				
Prednisolone po	HC	1-2mg/kg	Once in the morning	reduce dose to lowest

5.2 Acute Bronchitis

Bronchitis refers to an inflammatory condition of the large elements of the tracheobronchial tree that is usually associated with a generalized respiratory infection. Acute bronchitis occurs in all ages, and during the winter months.

Acute bronchitis is caused by respiratory viruses, common cold viruses including rhinovirus and coronavirus and lower respiratory tract pathogens including influenza virus, adenovirus, and respiratory syncytial virus, account for the majority of cases. *Mycoplasma pneumoniae* also appears to be a frequent cause of acute bronchitis. Other bacterial causes are *Chlamydia pneumoniae* and *Bordetella pertussis.*

Clinical Presentation

- Upper respiratory infection, complaints are usually non-specific such as malaise and headache, coryza, and sore throat.
- Cough is very common in acute bronchitis is initially nonproductive but progresses, yielding mucopurulent sputum.

Diagnosis

- Chest examination may reveal rhonchi and coarse, moist rales bilaterally.
- Bacterial cultures of sputum not important.

Treatment of Viral and Mild Bronchitis

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	600 mg	Every 8 hours	When needed
or				
Paracetamol po	C	1 g	Every 8 hours	When needed

5.3 Chronic Bronchitis (in exacerbation)

Chronic bronchitis is a result of several contributing factors, including cigarette smoking; exposure to occupational dusts, fumes, and environmental pollution; host factors (genetic factors); and bacterial or viral infections.

Chronic bronchitis is defined clinically as the presence of a chronic cough productive of sputum lasting more than 3 consecutive months of the year for 2 consecutive years without an underlying etiology of bronchiectasis or tuberculosis

Clinical Presentation

- Mild to severe cough, incessant coughing productive of purulent sputum.
- Cyanosis in advanced disease

Diagnosis:

Physical examination

- Chest auscultation to identify inspiratory and expiratory rales, rhonchi.

- Normal vesicular breathing sounds are diminished
- Clubbing of digits (advanced disease)
- Obesity

Laboratory tests

- Erythrocytosis (advanced disease)
- Pulmonary function tests: Decreased vital capacity and prolonged expiratory flow

Medicine Name	Level	Dose	Frequency	Duration
Adults Cotrimoxazole po	C	960 mg	Every 12 hours	5 days
or				
Amoxicillin po	C	500 mg	Every 8 hours	5 days

5.4 Coryza (Common Cold)

Common cold is a viral disease that does not require antibiotics.

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Aspirin po	C	600 mg	Every 8 hours	3 days
plus, Ascorbic Acid (Vitamin C)	C	50 mg	Every 12 hours	3 days
Child				
Paracetamol po	C	100 mg	Every 8 hours	3 days
plus, Ascorbic acid (Vitamin C)	C	25 mg	Every 12 hours	3 days

5.5 Acute Laryngitis

Acute laryngitis – There is sore throat, painful dry cough and hoarseness of the voice.

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Amoxicillin po	C	500 mg	Every 8 hours	7 days
plus, Aspirin po	C	600 mg	Every 8 hours	3 days
Child				
Amoxicillin po	C	15 mg/kg/dose	Every 8 hours	7 days
plus, Paracetamol po	C	100 mg	Every 8 hours	3 days

5.6 Pertussis (Whooping Cough)

Pertussis is most severe in young infants who have not yet been immunized. After an incubation period of 7–10 days, the child has fever, usually with a cough and nasal discharge that are clinically indistinguishable from the common cough and cold. In the second week, there is paroxysmal coughing that can be recognized as pertussis. The episodes of coughing can continue for 3 months or longer. The child is infectious for up to 3 weeks after the onset of bouts of whooping cough.

Fluid intake and maintenance of nutrition are crucial in the management of whooping cough. Cough mixtures, sedatives, mucolytics, and antihistamines are of no value at all and should not be given. Antibiotics are indicated only if a patient is seen within a period of one week after contracting the disease and is given for the purpose of preventing the spread of the disease to others or when the whooping cough is complicated with pneumonia or otitis media. The following is then given—

Treatment:

Medicine Name	Level	Dose	Frequency	Duration
Erythromycin po	C	12.5mg/kg/dose	Every 6 hours	10 days

5.7 Pneumonia in Children

Treatment of Pneumonia in Infants 1 week to 2 months

Medicine Name	Level	1 week – 2 months' age	Frequency	Duration
Benzylpenicillin im/iv	C	50000 IU/kg	Every 6 hours	5 days
plus, Chloramphenicol iv	HOS	40 mg/kg	Every 6 hours	5 days
After referral and admission				
Ampicillin im/iv	C	50mg/kg	Every 6 hours	3 days
plus, Gentamicin iv	HOS	2.5 mg/kg	Every 8 hours	3 days

Treatment of Pneumonia in Children 2-59 months with Severe Pneumonia

Medicine Name	Level	Dose	Frequency	Duration
Ampicillin iv/im	C	50mg/kg/dose	Every 6 hours	5 days
or				
Benzylpenicillin iv/im	C	50000IU/kg	Every 6 hours	5 days
plus				
Gentamicin im/iv	HOS	7.5mg/kg	Once a day	5 days

Ceftriaxone should be used as a second-line treatment in children with severe pneumonia having failed on the first-line treatment: **Ceftriaxone iv: 100 mg/kg once daily for 5 days**

Note: *Ampicillin (or Benzylpenicillin when ampicillin is not available) plus gentamicin or ceftriaxone are recommended as a first-line antibiotic regimen for HIV-infected and -exposed infants and for children under 5 years of age with chest indrawing pneumonia or severe pneumonia.*

For HIV-infected and -exposed infants and for children with chest indrawing pneumonia or severe pneumonia, who do not respond to treatment with ampicillin or penicillin plus gentamicin, ceftriaxone alone is recommended for use as second-line treatment.

Doses of amoxicillin for children 2-59 months of age with pneumonia

TOOL	Category of Pneumonia	Age/Weight of Child	Dosage of Amoxicillin Dispersible Tablets (250mg)
IMCI tool for professional health workers at health facilities: revised	Fast breathing and chest indrawing pneumonia	2 months up to 12 months (4 – <10 kg)	1 tab twice a day ^{x} 5 days (10 tabs)
		12 months up to 3 years (10–<14 kg)	2 tabs twice a day ^{x} 5 days (20 tabs)
		3 years up to 5 years (14–19 kg)	3 tabs twice a day ^{x} 5 days (30 tabs)

Treatment of Pneumonia in Children >5 Years and Adults Management of Moderate Pneumonia

Medicine name	Level	Dose	Frequency	Duration
Amoxicillin po	C	500 mg	Every 8 hours	5 days
or Erythromycin po	C	500 mg	Every 6 hours	5 days 14 days (if atypical pneumonia)

Management of Severe Pneumonia (Hospitalized Patients)

Medicine name	Level	Dose	Frequency	Duration
Benzylpenicillin im/iv	C	2 MU	Every 4-6 hours	5 days
or Chloramphenicol	HC	1 g	Every 6 hours	7 days

5.8 Pneumococcal Pneumonia

Treatment of Pneumococcal Pneumonia

Medicine name	Level	Dose	Frequency	Duration
Benzylpenicillin im	C	50 000IU/kg	Every 6 hours	2 days

5.9 Pneumocystis Jirovecii Pneumonia (PCP)

An opportunistic infection caused by *Pneumocystis jirovecii*. Patients present with progressive shortness of breath and possibly cyanosed with few or no chest signs.

Clinical Presentation

- Fever and dyspnea
- Tachypnea, with or without rales or rhonchi -Nonproductive or mildly productive cough
- The onset of *P. jirovecii pneumonia* (PCP) occurs over a period of weeks

Medicine name	Level	Dose	Frequency	Duration
Adult: Cotrimoxazole po	C	1920mg	3 times a day	21 days
Child: Cotrimoxazole po	C	10mg/kg/dose	Every 12 hours	21 days

In case of allergy to cotrimoxazole

Medicine name	Level	Dose	Frequency	Duration
Clindamycin po	HOS	450-600mg	Every 6 hours	21 days
plus				
Primaquine po	HC	50mg	Once a day	21 days

Pneumonia Due to Staphylococcus Aureus If any tachypnea or cyanosis is present, add:

Medicine name	Level	Dose	Frequency	Duration
Prednisolone po	HC	40mg	Twice a day	5 days
then Prednisolone po	HC	40mg	Once a day	5 days
then Prednisolone po	HC	20mg	Once a day	11 days

5.10 Pneumonia due to *Staphylococcus Aureus*

Medicine name	Level	Dose	Frequency	Duration
Adults and Children>5 years				
Cloxacillin/Ampicillin im/iv	HOS	1-2 g	Every 6 hours	14 days
plus, Gentamicin iv	HOS	7.5 mg/kg	Every 12 hours	14 days
Child < 5 years				
Cloxacillin/Ampicillin im/iv	HOS	50 mg/kg (max 2g)	Every 6 hours	14 days
plus, Gentamicin iv	HOS	7.5 mg/kg	Every 12 hours	14 days
Child 2 months – 5 years				
Cloxacillin/Ampicillin im/iv	HOS	25-50 mg/kg (max 2g)	Every 6 hours	14 days
plus, Gentamicin iv	HOS	7.5 mg/kg	Every 12 hours	14 days

5.11 Tonsillitis

Medicine name	Level	Dose	Frequency	Duration
Adult: Phenoxymethylpenicillin *po*	C	500 mg	Every 6 hours	5 days
Child*:* Phenoxymethylpenicillin *po*	C	250 mg	Every 6 hours	5 days

5.12 Tuberculosis

Note: Also, refer to the updated **National Tuberculosis and Leprosy Program Manual**

Tuberculosis is a notifiable, chronic, infectious, and debilitating disease caused by *Mycobacterium tuberculosis*. It mainly affects the lungs (pulmonary TB) but can affect other sites as well (extra pulmonary TB).

5.12.1: Signs and Symptoms of Tuberculosis Disease

The most common symptom of Tuberculosis is persistent cough for 2 weeks or more duration. Other symptoms of TB are:

- Fever, especially evening rise (night sweat)
- Pain in the chest
- Loss of weight and malaise
- Loss of appetite
- Coughing up blood-stained sputum
- Shortness of breath and Tiredness

Symptoms of extra-pulmonary tuberculosis depend on the organ involved.

In addition to the general symptoms described above, patients may also have symptoms related to the organ(s) affected by TB:

- Swollen glands (TB lymphadenopathy)
- Severe backache sometimes with difficulties in walking (Spinal TB)
- Swollen Joints (TB arthritis)
- Abdominal pain and distention (TB peritonitis)
- Intermittent diarrhea, sometimes with blood (TB bowel)
- Recurrent urinary infections, which are culture unresponsive to antibiotics (renal TB)

5.12.2: Diagnosis

Sputum Collection

All presumptive cases of pulmonary TB should submit at least two sputum specimens for microscopic examination and when possible, at least one early-morning specimen should be obtained, as sputum collected at this time has the highest yield.

Diagnostic Methods

Microscopy

- Light and LED Microscopy
- Same-day -diagnosis MTB and drug resistance
- Xpert MTB/RIF (pulmonary extra pulmonary and paediatric samples)
- Line Probe Assays (LPA) for the detection of MTB and rifampicin resistance conferring mutations in AFB smear positive sputum or MTB cultures

Culture-based technologies

- Commercial liquid culture systems and rapid speciation
- Non-commercial culture and Drug Sensitivity Testing (MODS-*Microscopic Observation Drug Sensitivity Assay*, NRA-*Nitrate Reduction Assay*)
- DST plays an important role to identify and treat patients with drug resistant TB. The reliability of DST (performed under optimal circumstances) varies with the drug tested.

Gene Xpert

- It is a newer and more sensitive method of diagnosing TB from sputum samples called MTB/RIF. It detects TB in patients as well as presence or absence of Rifampicin Resistance.

5.12.3: Treatment of TB

The treatment strategy for TB is based on is based on standardized Directly Observed Treatment Short course chemotherapy (DOTS) regimen and proper case management to ensure completion of treatment and cure. A patient centered treatment approach with support and involvement of the community to provide patient friendly treatment should be considered.

Aims of treatment

- To cure the patient of TB
- To prevent death from active TB or its late effects
- To prevent relapse of TB
- To decrease transmission of TB in the community
- To prevent the emergence of drug resistant TB Directly Observed Therapy (DOT)

Directly Observed Therapy is one element of the recommended DOTS strategy for treatment of TB patient. An observer watches and helps the patient to swallow the anti-TB medicines. This ensures treatment of the entire course

- With the right medicines
- In the right doses
- At the right intervals

Principles of treatment in children

The principles of treatment of TB in children are the same as for the treatment of TB in adults. The main objectives of anti-TB treatment are to:

- Cure the patient of TB;
- Prevent death from TB disease or its late effects;
- Prevent relapse of TB;
- Prevent the development and transmission of drug-resistant TB;
- Reduce transmission of TB to others;
- Achieve all this with minimal toxicity

Prevention of TB

i. *BCG vaccination:* BCG vaccination should not be given to infants or children with known HIV infection because of the risk of disseminated BCG disease.

ii. *Primary prophylaxis:* Children living with HIV who are more than 12 months of age and who are unlikely to have TB disease on symptom-based screening and have no contact with a TB case: 6 months of Isoniazid Preventative Therapy (IPT) (10 mg/kg per day, maximum dose 300 mg/day)

Anti TB Medicines and dosages

First Line Drugs (FLDs) for treatment of Drug Susceptible TB

Drug	Action	Dosage in mg/kg body weight	
		Children	Adults
Isoniazid (INH or H)	Bactericidal	10 – 20 (Max 300 mg)	5 (Max 300 mg)
Rifampicin (R)	Bactericidal	10 – 20 (Max 600 mg)	10 (Max 600 mg)
Ethambutol (E)	Bacteriostatic	15 – 25	15 – 25
Pyrazinamide (P)	Sterilizing	15 – 20	15 – 30
Streptomycin (S) injectable	Bactericidal	20 – 40	15 (Max 1 gm)

Fixed dose combinations (FDC) of drugs are used in treatment. FDC dosages by body weight are described as below.

Doses in Children

Weight	Intensive phase: 2($R_{60}H_{30}Z_{150}$) (56 days)	Continuation phase 4($R_{60}H_{30}$) (112 days)
<7kg	1 tab	1 tab
8-9 kg	1.5 tabs	1.5 tabs
10-14 kg	2 tabs	2 tabs
15-19 kg	3 tabs	3 tabs
20-24 kg	4 tabs	4 tabs
25-29 kg	5 tabs	5 tabs

Dosage in Adults

Weight	Intensive phase: 2($R_{150}H_{75}Z_{400}E_{275}$) (56 days)	Continuation phase 4($R_{150}H_{75}$) (112 days)
30-38 kg	2 tabs	2 tabs
39-54 kg	3 tabs	3 tabs
55-70 kg	4 tabs	4 tabs
>70 kg	5 tabs	5 tabs

Streptomycin dosage by Weight

Weight	Intensive phase: (56 days)
5-10 kg	15 mg/kg/day
11-20 kg	15 mg/kg/day
21-30 kg	500 mg/day
31-50 kg	750 mg/day
>50 kg	1000 mg/day

NB: Patients older than 50 should not exceed a dose of 750 mg/day of streptomycin. Pregnant women should not receive streptomycin.

5.12.5: Management of Adverse Medicine Events

Minor adverse medicine events: cause only relatively little discomfort and are often respond to symptomatic treatment. In general, a patient who develops minor side-effects should continue the anti-TB treatment.
Major adverse medicine events: cause serious health hazards where anti-tuberculosis medicines should be stopped immediately, and the patient is referred to hospital for management.
Some medicine adverse effects can be prevented; for example, INH induced peripheral neuropathy which usually presents as numbness or a tingling or burning sensation of the hands or feet and occurs more commonly in pregnant women and in people with HIV infection, alcohol dependency, malnutrition, diabetes, chronic liver disease and renal failure.
These patients should receive preventive treatment with pyridoxine, 10 mg/day along with their anti TB medicines.

Minor Adverse Medicine Effects

Minor side effects	Drugs Responsible	Management
Orange or Red urine	Rifampicin	- Reassurance. Patient should be informed at the start of treatment that it is normal
Burning, numbness or tingling of hands or feet	Isoniazid	- Continue ATT; Give Pyridoxine 50 – 75 mg daily
Drowsiness	Isoniazid	- Continue ATT, Reassure and give drugs at bedtime
Anorexia, nausea, abdominal pain	Rifampicin, Isoniazid, Pyrazinamide	Continue ATT; Give drugs after meals or at bedtime; advise antacids; advise to take medicines slowly over 45 mins with sips of water
Joint Pain	Pyrazinamide	Continue ATT; NSAIDs and Paracetamol

Management of Major side effects

Side Effects	Medicine	Management
Skin rash with or without itching	H, R, Z, S	Stop Anti-TB drugs
Deafness (No wax on otoscopy)	Streptomycin	Stop streptomycin
Dizziness (Vertigo & Nystagmus)	Streptomycin	Stop streptomycin
Jaundice & Hepatitis (Other causes excluded)	H, R, Z	Stop Anti-TB drugs
Confusion – suspected drug induced acute liver failure	Most drugs	Stop Anti-TB drugs
Visual impairment (Other causes excluded)	Ethambutol	Stop Ethambutol
Shock, purpura, ac renal failure	Rifampicin	Stop Rifampicin
Decreased urine output	Streptomycin	Stop streptomycin

Management of Medicine Induced hepatitis

All the first line anti-TB drugs, isoniazid, pyrazinamide and rifampicin can all cause liver damage while asymptomatic jaundice without evidence of hepatitis is caused by Rifampicin. All other possible causes of hepatitis should be ruled to label it as hepatitis induced by the TB regimen.

- If the patient is severely ill with TB and it is considered unsafe to stop TB treatment or the signs and symptoms do not resolve, and the liver disease is severe, then a non-hepatotoxic regimen consisting of streptomycin, ethambutol and a fluoroquinolone should be started and continued for a total of 18–24 months.
- If TB treatment has been stopped, it is necessary to wait for liver function tests to revert to normal and clinical symptoms (nausea, abdominal pain) to resolve before reintroducing the anti- TB drugs.
- If it is not possible to perform liver function tests, it is advisable to wait an extra 2 weeks after resolution of jaundice and upper abdominal tenderness before restarting TB treatment.
- Once drug-induced hepatitis has resolved, the drugs are reintroduced one at a time. If symptoms recur or liver function tests become abnormal as the drugs are reintroduced, the last drug added should be stopped. It is advised to start with rifampicin because it is less likely than isoniazid or pyrazinamide to cause hepatotoxicity and is the most effective agent.
- After 3-7 days, isoniazid may be reintroduced. In patients who have experienced jaundice but tolerate the reintroduction of rifampicin and isoniazid, it is advisable to avoid pyrazinamide.
- Alternative regimens depend on which drug is implicated as the cause of the hepatitis. If rifampicin is implicated, a suggested regimen without rifampicin is 2 months of isoniazid, ethambutol and streptomycin followed by 10 months of isoniazid and ethambutol. If isoniazid cannot be used, 6–9 months of rifampicin, PZA and ethambutol to be considered.

- If PZA is discontinued before the patient has completed the intensive phase, the total duration of isoniazid and rifampicin therapy may be extended to 9 months. If neither INH nor rifampicin can be used, the non-hepatotoxic regimen consisting of streptomycin, ethambutol and f luoroquinolone should be continued for a total of 18–24 months.
- If loose anti TB drugs are not available; the following approach has been successful, which depends on whether the hepatitis with jaundice occurred during the intensive or the continuation phase.
- When hepatitis with jaundice occurs during the intensive phase with HREZ, once hepatitis has resolved, restart the same drugs EXCEPT replace pyrazinamide with streptomycin to complete the 2-month course of initial therapy, followed by rifampicin and isoniazid for the 6-month continuation phase.
- When hepatitis with jaundice occurs during the continuation phase: once hepatitis has resolved, restart INH and rifampicin to complete the 4-month continuation phase of therapy.

Standard Approach to Re-Introduction of Anti-Tuberculosis Medicines After a Reaction.

Day	Drug
1	INH-25mg
2	INH-50mg
3	INH-100mg
4	INH-300mg
5	INH-300mg + R-150mg
6	INH-300mg + R-3000mg
7	INH-300mg + R-450mg
8	INH-300mg + R-600mg depending on weight
9	INH-300mg + R-600mg + E-400mg
10	INH-300mg + R-6000mg + E-800mg
11	INH-300mg + R-600mg + E 1.2g (weight dependent)
12	INH-300mg + R-600mg + E 1.2g + Z 500mg
13	INH-300mg + R-600mg + E 1.2g + Z 1.0g
14	INH-300mg + R-600mg + E 1.2g + Z 1.5g
15	INH-300mg + R-600mg + E 1.2g + Z 2.0g (weight dependent)

The dose is gradually increased over 3 days. This procedure is repeated, adding in one drug at a time. A reaction after adding a drug identifies that drug as the one responsible for the reaction.

A clinician may decide to suspend treatment until adverse event has subsided, and then reintroduce the anti-TB drugs slowly. This process should not take longer than 15 days.

5.12.6: TB and HIV

Tuberculosis is the strongest risk factor for early mortality in HIV patient and is a leading cause of death among people living with HIV/AIDS (PLHV).

Diagnosis of TB

The diagnosis of TB in HIV infected patients is often difficult because:

- The sputum smear examinations tend to be negative more often, particularly in the late stages of HIV infection.
- X-ray abnormalities are often atypical.
- The Tuberculin skin test is often negative due to immune-suppression
- All HIV positive patient should be diagnosed using Xpert MTB/Rif assay as early as possible and the diagnostic algorithm be followed for treatment.

Important aspects of treatment in HIV- TB co-infected patients

In TB/HIV co-infection, priority is to treat anti-TB treatments. Current WHO guidelines recommend that TB treatment should be commenced first, and ART commenced subsequently as soon as possible and within the first 8 weeks of starting anti-TB treatments.

- Anti-TB treatment in HIV positive patients is as same as for that of HIV negative TB patients.
- It is important that these patients should receive Directly Observed Treatment. (DOT). Effective treatment using DOTS can cure TB, prevent the spread of the disease and prolong the life of HIV patients.
- Adverse reactions to anti-TB drugs are more common in HIV positive patients and drug interactions occur between anti-TB and anti-retroviral drugs.
- In case of simultaneous Ant-TB and ART treatment, Nevirapine is replaced with Efavirenz during ART or Rifampicin is replaced with Ethambutol in case of resistance against Efavirenz is noticed.
- Because of concerns related to teratogenicity, Efavirenz should not be used in women of childbearing potential without adequate contraception, nor should it be used for women who are in the first trimester of pregnancy.
- Alternatives are also needed for patients who are intolerant to Efavirenz or are infected with a strain of HIV that is resistant to NNRTIs. For these patients, a Nevirapine based regimen or a triple NRTI regimen is to be used
- Paradoxical exacerbation of symptoms, signs and radiographic manifestations of TB with simultaneous administration of anti-TB drugs and anti-retroviral drugs. This is known as Immune Reconstitution Inflammatory Syndrome (IRIS).
- The rate of recurrence of TB after completion of treatment is higher in HIV positive patients than in HIV negative TB patients.
- The case fatality rate is higher in HIV positive TB patients than in HIV negative TB patients. The excess deaths in TB/HIV patients are partly due to the tuberculosis itself and partly due to other HIV related problems.
- Cotrimoxazole Prophylactic treatment is given throughout the ATT course for minimizing the other opportunistic infections.

Screening of TB patients for HIV

All the TB patients should be screened for HIV at the time of diagnosis or at a subsequent visit if not screened at the initial visits. Screening should be done after provider initiated voluntary counselling and testing (PICT).

Screening of HIV patients for TB

All HIV infected patients should be screened for TB at the time of the diagnosis and subsequently whenever it is suspected. Patients are referred from HIV Clinics to the TB diagnostic laboratory for this purpose. For those patients who are found to have tuberculous disease anti-TB treatment should be commenced immediately

Isoniazid Preventive Therapy (IPT)

TB preventive therapy with isoniazid (INH 5mg/kg daily up to a maximum 300mg per day) for 6 months has been shown to decrease the risk of TB disease in those with latent TB and is part of the package of care for people living with HIV

- It is critical to exclude active TB before starting preventive therapy. This avoids the provision of INH monotherapy to clients with active TB who require a full course of TB treatment.

- TB preventive therapy is beneficial to HIV positive people with latent TB
- Patients requiring or on ART are not eligible as the added benefits of INH prophylaxis are unclear and the additional pill burden undesirable.
- Patients already on INH preventive therapy who start ART can complete their INH preventive therapy
- The patient should be screened for TB symptoms to exclude active tuberculosis and should be specifically enquired about all of the signs and symptoms of TB. If symptomatic, the patient should be investigated for TB.
- If the patient has no symptoms of TB, has not had TB in the last 2 years, does not have liver disease or alcoholism and is not eligible for ART, a tuberculin (Mantoux) skin test should be done and if positive to be started on INH preventive therapy

Cotrimoxazole preventive therapy (CPT) to all HIV positive TB patients

- Cotrimoxazole preventive therapy should be initiated as soon as possible in all HIV positive patients along with Anti-TB treatment.
- It is given in a daily adult dose of 960mg (Sulfamethoxazole 800 mg and trimethoprim 160 mg)
- Cotrimoxazole preventive therapy substantially reduces mortality in HIV-positive TB patients. The exact mode of activity is not clear but cotrimoxazole is known to prevent other opportunistic infections like Pneumocystis jirovecii, Toxoplasma, diarrhea and malaria and is likely to have an impact on a range of bacterial infections in HIV-positive TB patients.

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6. DISEASES OF THE GENITO-URINARY SYSTEM

6.1 Acute Cystitis

The condition is caused by *E. coli*; empiric therapy can be initiated without a urine culture. Usually presents with dysuria, frequency, urgency and suprapubic pain; in men dysuria more commonly indicates a sexually transmitted infection (STI). Always exclude a Sexually Transmitted Infection, with Urinary Tract Infection; urine is often cloudy and smelly.

For uncomplicated infections, ensure high fluid intake and give:

Medicine Name	Level	Dose	Frequency	Duration
Sodium bicarbonate 5%		5g in 100ml water	Every 12 hours	As needed
Adult: Cotrimoxazole po	C	960 mg	Every 12 hours	3 days
Child: Cotrimoxazole po	C	24 mg/kg	Every 12 hours	3 days
or				
Adult: Ciprofloxacin po	C	500 mg	Single dose	once

6.2: Acute Glomerulonephritis

Glomerulonephritis is a collection of glomerular diseases mediated by different immunologic pathogenic mechanisms, resulting in varied clinical presentation and therapeutic outcomes.

Signs and Symptoms

These can be:

- Nephritic in nature (hematuria, hypertension, and edema) characterized by inflammatory injury, or
- Nephrotic in nature (edema, weight gain, fatigue), characterized by proteinuria

Diagnosis

Laboratory tests for proteinuria, hyperlipidemia, and lipiduria

Treatment

The management of patients with glomerulonephritis involves specific pharmacologic therapy for the glomerular disease and supportive measures to prevent and/or treat hypertension, edema, and progression of renal disease.

For patients with nephrotic syndrome; supportive therapy to manage extra-renal complications of heavy proteinuria (hypoalbuminemia, hyperlipidemia, and thromboembolism).

Edema:

Medicine	Level	Dose	Frequency	Duration
Furosemide po	HC	80 mg	Every 12 hours	Until edema is controlled

Hypertension:

Medicine	Level	Dose	Frequency	Duration
Enalapril po	HC	10 mg	Every 12 hours	Long term

6.3 Acute Pyelonephritis

The presentation of high-grade fever (>38.3°C) and severe flank pain should be treated as acute pyelonephritis. Severely ill patients with pyelonephritis should be hospitalized and IV drugs administered initially. Milder cases may be managed with oral antibiotics in an outpatient setting.

Diagnosis

- A Gram stain
- Urinalysis
- Culture and sensitivities

Treatment: In the mild case

Medicine Name	Level	Dose	Frequency	Duration
Ciprofloxacin po	C	500 mg	Every 12 hours	14 days
or				
Adult: Cotrimoxazole po	C	960 mg	Every 12 hours	14 days
Child: Cotrimoxazole po	C	24 mg/kg/dose	Every 12 hours	14 days
or				
Adult: Amoxicillin po	C	500 mg	Every 8 hours	14 days
Child: Amoxicillin po	C	15 mg/kg/dose	Every 8 hours	14 days

If a patient is seriously ill;

Medicine Name	Level	Dose	Frequency	Duration
Gentamicin im/iv	HOS	2.5 mg/kg	Every 8 hours	7 days

*continuously monitor for renal function while patient is on Gentamicin

6.4 Acute Renal Failure

Some cases of acute renal failure (or acute kidney injury) are due to ischemic or toxic injury to the kidney and are reversible if treatment is instituted promptly i.e. within hours not days.

Established Acute Renal Failure (or acute kidney injury)

Consider sepsis, malaria, acute glomerulonephritis, acute tubular necrosis, myeloma, nephrotoxic medicines such as gentamicin and NSAID's, and other causes such as acute -on- chronic renal failure.

Management of Renal Failure

- *First line:* Exclude dehydration in all cases. Give adequate rehydration. Patient should show response within hours (not days).
- *Second line:* If the patient fails to respond to adequate rehydration and fluid challenge with sodium chloride 0.9% [not dextrose 5%] within 24 hours and condition is deteriorating, referral for dialysis is indicated.
- *Third line:* Start dialysis or consult dialysis team sooner rather than later so that they monitor the patient.

6.5 Prescribing in Renal Impairment/Renal Failure

Avoid medicines that are eliminated via the kidneys or reduce the dose of the medicine if no alternative available. In most cases reducing the dose by half should be adequate.

Table 6.1: Medicines that should be Avoided or Dose Adjusted in case of Renal Failure

Medicine	Comments
Analgesics:	
Aspirin, Indomethacin	Avoid, use of paracetamol
Codeine Phosphate, Pethidine	Reduce dose by 25%-50%
Anti-TB Medicines	
Ethambutol, Streptomycin	Avoid
Pyrazinamide	Reduce dose by 50%
Isoniazid	Maximum daily dose 200mg
Antibiotics	
Penicillins/Cephalosporin	Reduce dose by 50% in advanced failure
Aminoglycosides (Gentamicin)	Reduce dose and frequency: Use with extreme caution if no alternative. Use loading dose of 1mg/kg gentamicin, then use maintenance dose of 1mg/kg as well, once daily in moderate renal failure and once on alternate days for advanced renal failure.
Nitrofurantoin, Nalidixic Acid	Avoid
Cotrimoxazole	Avoid
Doxycycline	May be used safely

Cardiovascular	
Atenolol, captopril, enalapril	Reduce dose by 50%
Digoxin	Use smaller loading/maintenance dose
Diuretics	
Amiloride, spironolactone, thiazides	Avoid
Furosemide	High doses needed if renal failure is severe
Potassium supplements	Avoid
Antiretroviral	
Zidovudine, Lamivudine	Reduce dose
Other Medicines	
Metformin	Avoid, risk of lactic acidosis
Glibenclamide	Use with Caution
Allopurinol	Reduce dose (maximum 200mg)
Phenobarbitone, benzodiazepines	Use 25% of normal dose or avoid

References:

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7. HIV/AIDS AND SEXUALLY TRANSMITTED INFECTIONS

7.1 Management of HIV Infection

7.1.1: Goals of Antiretroviral Therapy (ART)

The primary goals of ART are:

- To improve quality of life
- Epidemiological (reduce HIV-related morbidity and mortality)
- Virological (provide maximal and durable suppression of viral load)
- Immunological (restore and/or preserve immune function).

The secondary goal is to reduce the risk of transmission of HIV to other people including mother to child transmission and among people in sero-discordant relationships. These goals are achieved by maximal suppression of viral replication for as long as possible using well-tolerated and sustainable treatment. With prolonged viral suppression, the CD4 lymphocyte count usually increases, which is accompanied by partial restoration of pathogen-specific immune function.

7.1.2: Classes of ARV Agents and Their Mechanisms of Action

The most commonly used ARV agents inhibit 1 of 3 key HIV enzymes that are required by the virus for intracellular replication

- *Reverse transcriptase*: essential for completion of the early stages of HIV replication
- *Protease*: required for the assembly and maturation of fully infectious viral progeny
- *Integrase*: required for the integration of proviral DNA into the host chromosomal DNA. Currently, available antiretroviral drug classes for management of HIV Infection include:

***Nucleoside Reverse Transcriptase Inhibitors (NRTIs)*:** They block HIV reverse transcriptase and prevent the copying of the viral genetic code (RNA) into the genetic code (DNA) of infected host cells. The resulting DNA is incomplete and cannot create new virus.

***Nucleotide Reverse Transcriptase Inhibitors (NtRTIs)*:** These act at the same stage of the viral life cycle as the NRTIs. In clinical practice they are viewed as an expansion of the NRTI Class.

***Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)*:** This block HIV reverse transcriptase and prevent the copying of the viral genetic code (RNA) into the genetic code (DNA) of infected host cells by binding to the enzyme and making the active site ineffective.

***Protease Inhibitors (PIs)*:** These work at the last stage of the virus reproductive cycle. They block the enzyme protease and prevent the assembly and release of HIV particles from infected cells.

***Fusion Inhibitors (FIs)*:** These medications prevent the virus from entering the host cell. They are not yet available in Liberia because they are not recommended protocol for the country.

***Integrase Inhibitors(II's)*:** These medications catalyze the insertion of viral DNA into the host genome derived from reverse transcription of HIV RNA. They are not yet available in Liberia because they are not recommended protocol for the country.

7.1.3: Preferred and Alternative First-Line Art Regimens

Adults:

- TDF + 3TC (or FTC) + EFV (preferred)
- AZT + 3TC + EFV (or NVP) (preferred)
- TDF + 3TC (or FTC) + NVP (alternative)

Pregnant/breastfeeding women:

- TDF + 3TC (or FTC) + EFV (preferred)
- AZT + 3TC + EFV (or NVP) (preferred)
- TDF + 3TC (or FTC) + NVP (alternative)

Adolescents

- TDF + 3TC (or FTC) + EFV (preferred)
- AZT + 3TC + EFV (or NVP) (preferred)
- TDF (or ABC) + 3TC (or FTC) + EFV (preferred)
- TDF (or ABC) + 3TC (or FTC) + NVP (Alternative first-line regimens)

Children 3 years to less than 10 years

- ABC + 3TC + EFV (preferred)
- ABC + 3TC + NVP (preferred)
- AZT + 3TC + EFV (or NVP) (preferred)
- TDF + 3TC (or FTC) + EFV (or NVP) (alternative first line regimen)

Children less than 3 years

- ABC (or AZT) + 3TC + LPV/r (Preferred first-line regimen)
- ABC (or AZT) + 3TC + NVP (Alternative first-line regimen)

7.1.4: Infant Prophylaxis

Infants born to mothers with HIV who are at high risk of acquiring HIV-1 should receive dual prophylaxis with daily AZT and NVP for the first 6 weeks of life, whether they are breastfed or formula-fed (strong recommendation, moderate quality evidence).

Breastfed infants who are at high risk of acquiring HIV-1 including those first identified as exposed to HIV during the postpartum period, should continue infant prophylaxis for an additional 6 weeks (total of 12 weeks of infant prophylaxis) using either AZT and NVP or NVP alone (conditional recommendation, low quality evidence).

Infants of mothers who are receiving ART and are breastfeeding should receive 6 weeks of infant prophylaxis with daily NVP. If infants are receiving replacement feeding, they should be given 4 to 6 weeks of infant prophylaxis with daily NVP (or twice-daily AZT) (strong recommendation, moderate quality evidence for breastfeeding infants; strong recommendation, low quality evidence for infants receiving only replacement feeding).

7.1.5: The Approach to HIV Care

7.1.5.1: Clinical Categories of Patients

Patients that are seen for care fall into one of three clinical categories with specific clinical goals of treatment as outlined below. Patients in any of the three categories are strongly advised to come to the treatment clinic for continuous care.

a. Clinically asymptomatic HIV (mildly immune-suppressed)

HIV positive individuals who are asymptomatic and have high CD4 cell counts will come to the clinic for periodic monitoring. The goals of care for these patients are to delay progression by treating or preventing opportunistic infections, preventing onward transmission of HIV, providing information on healthy life styles, and enhancing the likelihood of success of future treatment by improving adherence to prophylactic medications and visits. With the advent of widespread CD4 count monitoring, some patients who are clinically asymptomatic may have CD4 counts $\leq$500 cells/mm^3 and therefore are eligible for ART.

b. Symptomatic HIV (moderately immune-suppressed)

HIV positive individuals who have significantly compromised immune systems but may not be eligible for ART will come to clinic for closer monitoring. The goals of care are to delay progression by preventing and treating opportunistic infections and to enhance the likelihood of success of future treatment by improving adherence to medications and visits. With the advent of widespread CD4 count monitoring, some patients who are moderately immune-suppressed but not yet WHO stage III and IV may still have CD4 counts ≤500 cells/mm^3, and therefore are eligible for ART.

c. Advanced or severe HIV (treatment-ready patients)

HIV positive individuals who are eligible for ART as detailed in the criteria in later chapters will be started on treatment and monitored at a treatment facility. The goals of treatment and care are to reduce morbidity and mortality by aggressively suppressing viral load, and preventing and treating opportunistic infections in order to maximize the benefits of treatment by encouraging consistent adherence to ART.

7.1.5.2 Importance of differentiating HIV-1 vs HIV-2

The majority of HIV infections in Liberia are likely due to HIV-1; however, HIV-2 is endemic in many West African countries. Testing algorithms have been developed to differentiate HIV-1 vs. HIV-2 infection and treatment recommendations are provided for both HIV-1 and HIV-2.

It is essential to determine the type of HIV infection (HIV-1, HIV-2, or HIV-1/HIV-2 coinfection) for each patient. This information should be recorded clearly in the patient record. Different medicines are needed to treat different types of HIV.

a. Testing when Virological (DNA PCR) testing unavailable

Antibody testing cannot be used to make a *definitive* diagnosis of HIV in children less than 18 months of age. However, since the value of the test depends on how quickly maternal antibody levels decline in infants; it *may* be useful to use the antibody tests in infants as young as 9 months of age. Most uninfected infants will have lost maternal antibodies by this age, and a negative result can *exclude HIV infection* provided the infant ceased breastfeeding at least three months earlier.

Where Virological testing is unavailable, presumptive severe HIV diagnosis may be made in an HIV antibody-positive child < 18 months who is symptomatic with 2 or more of the following:

- Oral candidiasis (thrush)
- Severe pneumonia requiring oxygen
- Severe wasting/malnutrition
- Severe sepsis requiring injectable antibiotics

Confirmation of diagnosis is NOT required prior to starting ART in symptomatic children less than 18 months.

If a child is diagnosed with HIV infection on the basis of one virological or antibody test—a confirmatory HIV antibody test should be performed when the child is at least 18 months of age and has discontinued breastfeeding for 3 months. If a child is confirmed to be HIV negative, the cotrimoxazole started at the age of 6 weeks can be stopped.

b. HIV Counseling: Adherence and Disclosure

The main objectives of counseling in the context of HIV are:

- To assist the client to cope with their HIV status at the time of testing;
- To promote adherence once the patient is considered eligible to commence therapy;

- To educate the patient in preventing transmission of HIV to others;
- To minimize the risk of additional exposure to or re-infection by HIV.

The essential features of counseling include creating the environment for acceptance by the client, providing time to absorb news about the diagnosis of HIV, and allowing the client to react and express concerns.

7.1.5.3: Adherence

The importance of strict adherence to clinical appointments and treatment with ARV drugs is essential. Near perfect pill taking is required to achieve maximal viral suppression – anything less than this leads rapidly to the development of viral resistance and hence, too much earlier treatment failure.

a. Adherence Counseling

Educating patients effectively and assessing their understanding can be very time consuming and labor intensive, but it is never time wasted. Counseling on HIV and the importance of adherence to care and treatment should begin on the first patient visit and should be reinforced during all visits by all members of the HIV focal team. It should be stressed that adherence is essential to not only ART but to clinic appointments, non-ART medications such as CPT, and healthy living.

Patients must be aware that ARV treatment is a life-long commitment. A person who takes ARV drugs erratically will not only receive minimal benefit, but also will still suffer the side effects and potentially limit his future treatment options. It is important that all patients demonstrate an understanding of these concepts before starting treatment. A patient who stops taking ARV drugs will rapidly lose any benefit he may have received. His increased immunity will disappear as the virus flourishes and CD4 cells are destroyed.

ARV providers that do not seriously address the complex issue of adherence will fail in their objective of helping their patients, and on a public health level they will cause the development of multi-drug resistant strains of HIV within the population they serve.

7.1.5.4: Patient Assessment for Treatment

a. Initial Clinical Assessment of HIV Positive Adults, Adolescents and Infants:

WHO clinical staging providers should conduct a thorough history and physical examination to exclude opportunistic conditions and to allow correct determination of WHO clinical staging. This should include the following:

- Assessment of symptoms and signs of OIs, TB and STIs
- Illnesses, especially those requiring hospitalization
- Other conditions: histories of Hepatitis B, injection drug use, alcohol abuse or psychiatric illness
- Medication history: e.g. previous use of ARV drugs (including ARV drugs for PEP), and any other
- In women, pregnancy status and the risk of pregnancy and reproductive plans
- For children, use road to health booklet to assess growth, development & immunization status; determine breastfeeding status and history of previous exposure to ARVs e.g. for PMTCT
- Full physical examination: including height, weight, examination of skin and documentation of any pre-existing peripheral neuropathy

b. Clinical Staging

WHO clinical staging for adults and adolescents provides details of the specific staging events and the criteria for recognizing them in adults and adolescents. Clinical staging should be used in deciding whether to start ART.

Table 7.1: WHO clinical staging of HIV in adults and adolescents

CLINICAL STAGE 1 - Asymptomatic
Asymptomatic
Persistent generalized lymphadenopathy
CLINICAL STAGE 2 - Mild Symptoms
Unexplained moderate weight loss (<10% of presumed or measured body weight)
Recurrent respiratory tract infections (sinusitis, tonsillitis, otitis media and pharyngitis)
Herpes zoster
Angular cheilitis
Recurrent oral ulcerations
Papular pruritic eruptions
Seborrheic dermatitis
Fungal nail infections
CLINICAL STAGE 3 - Advanced Symptoms
Unexplained severe weight loss (>10% of presumed or measured body weight)
Unexplained chronic diarrhea for longer than one month
Unexplained persistent fever (above 37.5^{o}C intermittent or constant, for longer than one month)
Persistent oral candidiasis
Oral hairy leukoplakia
Pulmonary tuberculosis
Severe bacterial infections (such as pneumonia, empyema, Pyomyositis, bone or joint infection, meningitis or bacteremia)
Acute necrotizing ulcerative stomatitis, gingivitis or periodontitis
Unexplained anemia (<8 g/dl), neutropenia (<0.5 ^{x} 10^{9} per liter)
and/or chronic thrombocytopenia (<50 ^{x} 10^{9} per liter)
CLINICAL STAGE 4 - Severe Symptoms
HIV wasting syndrome (BMI <18 kg/m^{2})
Pneumocystis Jirovecii pneumonia
Recurrent severe bacterial pneumonia
Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month's duration or visceral at any site)
Esophageal candidiasis (or candidiasis of trachea, bronchi or lungs)
Extra-pulmonary tuberculosis
Kaposi's sarcoma
Cytomegalovirus infection (retinitis or infection or other organs)
Central nervous system toxoplasmosis
HIV encephalopathy
Extra-pulmonary Cryptococcosis (including meningitis)
Disseminated non-tuberculosis mycobacterial infection
Progressive multifocal leukoencephalopathy
Chronic cryptosporidiosis
Chronic Isosporiasis
Disseminated mycosis (extra-pulmonary histoplasmosis or Coccidioidomycosis)
Lymphoma (cerebral or B-cell non-Hodgkin)
Invasive cervical carcinoma
Atypical disseminated Leishmaniasis
Symptomatic HIV-associated nephropathy or HIV-associated cardiomyopathy

c. Prophylaxis against HIV-associated Infections with Cotrimoxazole Preventive Therapy (CPT)
Cotrimoxazole (CTX or TMP-SMX) is an essential aspect of HIV care. Its use can improve survival independently of specific HIV treatment with ARVs. Specifically, the preventive activity of cotrimoxazole is effective against: bacterial pneumonia (streptococcus pneumonia), bacteremia (salmonella species), pneumocystis jirovecii pneumonia (PCP), diarrhea (salmonella, isospora belli), and toxoplasmosis. In children in particular, CPT also protects against malaria, otitis media, sinusitis, cellulitis, and septicemia.

Steps to initiating CPT

i. Identify potential recipients:
- HIV+ adults, adolescents and children
- HIV-exposed children from 6 weeks of age (see below: CPT in Children)

ii. Take medical history

iii. Conduct physical examination

iv. Counsel on OIs in HIV infection

v. Treat pre-existing OIs

vi. Screen for contraindications to cotrimoxazole
- Known allergy to sulfa-containing drugs (which include cotrimoxazole and Sulfadoxine-Pyrimethamine [Fansidar])
- Kidney or liver disease
- Seriously ill patients (Refer for specialized medical care)

vii. Counsel patient on:
- Drug adherence
- Possible side effects of cotrimoxazole:
  - Skin eruptions, which may be severe (Stevens Johnson syndrome)
  - Nephritis (kidney disease); Hepatitis (liver disease)
  - Anemia and other signs of bone-marrow suppression; Hyperkalemia

For most patients, the benefit of CPT should far outweigh the risk.

CPT in Adults and Adolescents

All HIV-positive individuals should begin CPT. This includes all pregnant and lactating women with HIV, regardless of gestational age.

Cotrimoxazole Dosage:
- 1 double strength tablet (Trimethoprim (TMP) 160 mg + Sulfamethoxazole (SMX) 800 mg) QD; **or**
- 2 single strength (TMP 80 mg + SMX 400 mg) tablets QD

Table 7.2 Management of Cotrimoxazole-related rashes

Toxicity	Clinical Description	Recommendation
Grade 1	Erythema	Continue CPT with careful and repeated observation and follow-up. Provide symptomatic treatment, such as antihistamines, if available.
Grade 2	Diffuse maculopapular rash, dry desquamation	Continue CPT with careful and repeated observation and follow-up. Provide symptomatic treatment, such as antihistamines, if available.
Grade 3	Vesiculation, mucosal ulceration	Cotrimoxazole should be discontinued until the adverse effect has completely resolved (usually two weeks), and then desensitization can be considered (see Table 7.3).
Grade 4	Exfoliative dermatitis, Stevens-Johnson syndrome or erythema multiform, moist desquamation	Cotrimoxazole should be permanently discontinued.

Table 7.3 Plan for cotrimoxazole desensitization

Step	Dose
Day 1	80 mg sulfamethoxazole + 16 mg trimethoprim (2 ml of oral suspension)
Day 2	160 mg sulfamethoxazole + 32 mg trimethoprim (4 ml of oral suspension)
Day 3	240 mg sulfamethoxazole + 48 mg trimethoprim (6 ml of oral suspension)
Day 4	320 mg sulfamethoxazole + 64 mg trimethoprim (8 ml of oral suspension)
Day 5	One single-strength sulfamethoxazole-trimethoprim tablet (400 mg sulfamethoxazole + 80 mg
Day 6 Onwards	Two single-strength sulfamethoxazole-trimethoprim tablets or one double-strength tablet (800 mg sulfamethoxazole + 160 mg trimethoprim)

Table 7.4: Dose of Cotrimoxazole for in infants and children

Age	Suspension Per 5ml (200/40mg)	Pediatric tablet (100/20mg)	Single Strength adult tablet (400/80mg)	Double Strength adult tablet (800/160mg)
< 6 months	2.5ml	1 tablet	¼ tablet	--
6 months - 5yrs	5 ml	2 tablets	½ tablet	--
6-14 years	10 ml	4 tablets	1 tablet	½ tablet
>14 years	--	--	2 tablets	tablet

7.1.6: When to start Antiretroviral Therapy

ART should be offered to all persons who are eligible in a comprehensive manner, which means that the persons should have access to on-going HIV adherence counseling, baseline and routine periodic laboratory investigation, management of OIs, routine treatment monitoring and follow-up. The process of initiating ART should involve initial counseling and education. Part of the initial assessment should include:

- Readiness to commence therapy
- Understanding that it is a lifelong therapy
- Understanding the importance of adherence to treatment
- Side effects, Access to nutritional support
- Family and peer support

a. When to start ART is recommended according to age category below;

i. Infants

Initiate ART for all HIV-infected infants diagnosed in the first year of life, irrespective of CD4 count or WHO clinical stage.

ii. Children

- ART should be initiated in all children infected with HIV below five years of age, regardless of WHO clinical stage or CD4 cell count
- ART should be initiated in all HIV-infected children five years of age and older, regardless of WHO clinical stage
- ART should be initiated in all children infected with HIV with severe or advanced symptomatic disease (WHO clinical stage 3 or 4) regardless of age and CD4 cell count
- ART should be initiated in any child younger than 18 months of age who has been given a presumptive clinical diagnosis of HIV infection

iii. Adults and Adolescents

- All patients with confirmed HIV should be started on ART irrespective of CD4 cell count
- All symptomatic patients (WHO clinical stage 3 & 4) should initiate ART irrespective of CD4 cell count

- All patients with HIV/HBV co-infection with evidence of active liver disease (elevated ALT), cirrhosis or other evidence of chronic liver disease regardless of CD4 count or clinical stage
- Initiate ART in all pregnant and breastfeeding women as soon as diagnosed regardless of CD4 cell count or clinical stage
- Partners with HIV in sero-discordant couples should be offered ART to reduce HIV transmission to uninfected partners regardless of CD4 count or clinical stage

Preferred First Line Regimen for HIV-1 Adults and Adolescents

For all treatment naïve patients, the preferred first line regimen choice is:

TDF + 3TC + EFV (300mg + 300mg + 600mg QD)

Dosing

Fixed dose combinations of the medications should be used whenever possible.

- Phase one (2 weeks): TDF 300mg + 3TC 300mg + EFV 600mg QD
- Phase two:(monthly) Continue regimen as above

Preferred first line regimen for HIV-1 in children less than 3 years old

A LPV/r-based regimen should be used as first-line ART for all children infected with HIV-1 younger than three years (36 months) of age, regardless of NNRTI exposure. If LPV/r is not feasible, treatment should be initiated with a NVP-based regimen.

(ABC or AZT + 3TC) + LPV/r (FDC Tablet form)

Preferred first line regimen for children infected with HIV-1 three years to less than 10 years old and adolescents weighing less than 35 kg: AZT (or ABC) + 3TC + EFV

Preferred first line regimen for adolescents infected with HIV-1 (10 to 19 years old) weighing 35 kg or more: TDF + 3TC + EFV

Table 7.5: Summary of recommended first-line ART regimens for children and adolescents

	Children 3 years to less than 10 years and adolescents < 35 kg	**Adolescents (10 to 19 years) ≥ 35 kg**
Preferred	-ABC + 3TC + EFV	-TDF + 3TC (or FTC) + EFV
Alternatives	-ABC + 3TC + NVP -AZT + 3TC + EFV -AZT + 3TC + NVP -TDF + 3TC (or FTC) + EFV (or NVP)	-AZT + 3TC + EFV -AZT + 3TC + NVP -TDF + 3TC (or FTC) + NVP

Preferred first line regimen for HIV-2 or HIV-1 & HIV-2 co-infection

NNRTIs (Nevirapine and Efavirenz) are not effective against HIV-2. Treatment with triple NRTIs is not preferred for HIV-1 or HIV-2. Therefore, patients with HIV-2 alone or who are co-infected with HIV-1 and HIV-2 should be treated with 2 NRTIs and a PI:

The preferred first line regimen for HIV-2 *or* HIV-1 and HIV-2 co-infection:

Adults/Adolescents	(TDF+3TC) + LPV/r (300mg/300mg) QD +200/50mg (heat stable) x2 pills BID
Infants and Children< 3years	(AZT+3TC) + LVP/r
Children ≥ 3years	(TDF+3TC) + LPV/r

Note: ATV/r (300mg/100mg QD) can be substituted for LPV/r for adults. It is not currently licensed for use in children.

b. Antiretroviral Therapy in Pregnant Women

Triple antiretroviral therapy during and after pregnancy is the most effective way to prevent mother to child transmission of HIV. All HIV positive pregnant or breastfeeding mothers should be started on an appropriate regimen. This regimen should be continued through the entire pregnancy period and for life.

General concepts for ART in pregnant women

- Start cotrimoxazole prophylaxis for ALL pregnant women regardless of CD4 count and gestational age.
- Careful notes should be taken of the following:
  - Do not give S-P (Fansidar) if the woman is on cotrimoxazole.
  - Always recommend, and, if possible, provide insecticide-treated nets.
  - Screen and treat all pregnant women for STIs, Hepatitis and TB.

When to start ART in pregnant women: clinical and immunological criteria

All HIV positive pregnant or breastfeeding women, irrespective of WHO clinical stage and CD4 count, meet the clinical criteria for starting antiretroviral treatment. Antiretroviral therapy should be started as soon as the woman is confirmed to be HIV positive and psychologically ready to begin life-long triple-antiretroviral therapy.

Antiretroviral therapy (ART) for pregnant women who have HIV-1

TDF+3TC (or FTC) +EFV is recommended as first line ART in pregnant and breastfeeding women, including pregnant women in first trimester and women of childbearing age

Pregnant and breastfeeding women with HIV-1

First Line	TDF+3TC+EFV (300mg + 300 mg + 600mg) QD

An alternative should be based on AZT+3TC + NVP or LPV/r*

Pregnant Women with HIV-1 who have Active Tuberculosis

- Appropriate and rapid treatment of TB is critical for all HIV positive patients. HIV positive patients who have TB should be treated at a facility where the staff is trained to provide treatment for TB and HIV.
- TB treatment should always be started before the treatment for HIV.ART should be initiated in all HIV positive women co infected with TB, including those with drug resistant TB irrespective of the CD4 count. Anti-TB drugs should be initiated first followed by ART as soon as possible after client tolerates TB treatment.
- Any patient with suspected TB should be screened with two (2) sputum smears, chest x-ray and GeneXpert whenever possible. Lymph node aspirates and examination of CSF (in suspected TB meningitis) can also help with the diagnosis.
- Recommended regimens for pregnant women with TB who require ART:
  - ***TDF+3TC+EFV (300mg+300mg+600mg) QD***

Table 7.6: Recommended regimens for pregnant women with TB, Hepatitis or anemia

Preferred if Anemia	Preferred if TB	Preferred if Hepatitis
TDF+ 3TC + EFV	TDF+3TC+ EFV (or LPV/r)	TDF +3TC+EFV
TDF + 3TC + NVP	AZT+3TC+ EFV (or LPV/r)	TDF+ 3TC+LPV/r

Pregnant women who have HIV-1 with active hepatitis B

In cases of pregnant women infected with HIV and presenting active hepatitis B, the ART regimen should always contain a TDF and 3TC backbone, the recommended regimen is: ***TDF + 3TC + EFV***

For pregnant women with HIV-2 or HIV-1&HIV-2 co-infection, NVP and EFV are not effective against HIV-2 and should not be used. ART regimens are different depending on which type of HIV (HIV-1, HIV-2, or HIV-1&HIV-2 co-infection) the mother has. It is important to know the type of HIV the mother has.

Table 7.7: Recommended regimens for pregnant women with HIV-2 or HIV-1&2 co- infection

First Line	TDF + 3TC + LPV/r (300mg + 300mg (QD) + 400/100mg BID
Second Line	AZT + 3TC + LVP/r (300mg+150mg BID) + 400/100mg BID

- *ATV/r (300mg/100mg QD) can be used in place of LPV/r.*

Table 7.8: ART used during pregnancy and breastfeeding according to HIV type

HIV-1 (only)	HIV-2 (only)	HIV-1 & HIV-2 Co-infection
TDF+3TC+EFV	(TDF+3TC) + LPV/r	(TDF+3TC) + LPV/r

HIV-2 is weaker than HIV-1, and is not easily transmitted to the child. NVP and EFV are not effective against HIV-2 and in this case they should not be used.

7.1.7: Care and Treatment for HIV Exposed Infants

- All children born to HIV positive mothers, regardless of whether the mother is receiving ART or not are considered HIV exposed infants.
- All HIV exposed infants should receive appropriate ARV prophylaxis to prevent mother to child transmission and be followed regularly.
- Antiretroviral prophylaxis given soon after birth to all HIV-exposed infants is effective in reducing mother-to-child transmission whether maternal ARVs are received or not, and forms the basis of a post-exposure prophylaxis strategy. In order to reduce post exposure prophylaxis, ARVs should start as early as possible after birth.
- Antiretroviral prophylaxis using NVP is effective in reducing transmission through breast milk.
- The following scheme can be used for ARVs in infant according to the infant feeding mode
  a) Artificial feeding: Daily NVP for 6 weeks or Sd-NVP follow by AZT twice daily for 6 weeks
  b) Breastfeeding infant (with mother receiving ART) should receive:
    - *Daily NVP for 6 weeks*
      - Breastfeeding infants (with mothers who had been initiated on ART within 4 weeks prior to delivery, during labor and delivery or post-partum) should receive:
    - *Daily NVP for 12 weeks*
      - Breastfeeding infants (with mother interrupting ART during breastfeeding) should receive: Daily NVP during period of maternal ART interruption. This could be stopped six weeks after maternal ART is re-started or 1 week after cessation of breast feeding

Table 7.9: Dosing guide for ARVs:

WEIGHT	***BREAST FEEDING INFANTS*** NVP Once Daily for the First Six (6) Weeks	***NON-BREASTFEEDING INFANTS*** sd-NVP followed by AZT twice daily for Six (6) weeks or NVP Once daily for Six (6) weeks
< 2.5 kg	10 mg (1 ml)	10 mg (1 ml)
> 2.5 – 5.0 kg	15 mg (1.5 ml)	15 mg (1.5 ml)
From six weeks to six months (if extended prophylaxis)		
All	20 mg (2 ml)	-
From six to nine months (if extended prophylaxis)		
All	30 mg (3 ml)	-
From nine months to one week after cessation of breastfeeding		
All	40 mg (4 ml)	-

ART for Children

An AZT or ABC regimen has been selected as the preferred first line regimen for children with HIV- 1 because of the availability in pediatric fixed dose combinations

- ABC (or AZT) + 3TC+ LPV/r (For children less than 3yrs of age) **or**
- ABC + 3TC + EFV (For children 3yrs to less than 10yrs or adolescent weighing <35kg) **or**
- TDF + 3TC + EFV (For children 10 -19yrs or adolescent weighing >35kg)

The ARV prescription must be carefully discussed with the caregiver

- Re-calculate and clearly document the dose of medication at each visit (based on weight band according to WHO 2013 recommendations), total volume of medications required, and prescribe enough medication until next visit.
- Provide detailed description of drugs, explain exact dosing schedule to caregiver, instructions should be clearly written on the container. Caregivers should be asked to demonstrate how they give medications regularly during follow-up.
- Demonstrate use of syringe and cups to measure medications as appropriate.

7.1.8: ARV Treatment: Toxicity and Management

a. Managing side effects

Unpleasant side effects such as nausea, headache, malaise, dizziness, nightmares and insomnia are common when starting ARV drugs and all patients should be warned to expect them. They are distressing but usually tolerable and tend to subside within a few weeks

Table 7.10: Management of common ARV side effects

Side effect	Drugs Responsible	Action to be taken
Anemia	AZT	-Measure Hemoglobin -Provide iron, folic acid, Mebendazole and dietary advice as needed and based upon MCV -If anemia is severe and resistant to treatment, substitute
Confusion; nightmares; somnolence; behavior and/or personality changes	EFV	-Rule out other causes of mental status changes -Give EFV at bedtime -Check appropriate dose/drug administration
Diarrhea	All NRTIs, NNRTIs, and especially PIs. *Less frequent with 3TC*	-Provide ORS for maintenance of hydration (“homemade” or pre-packaged) -Loperamide if symptoms are severe
Fatigue	Many of the ARVs	-Screening examination and lab assessment to rule out anemia, hepatitis, and lactic acidosis -Provide reassurance and continued monitoring
Fever with or without other symptoms	NVP or ABC hypersensitivity reactions; however, patients on all ARVs may	-Differential diagnosis includes: -Opportunistic Infections; Immune Reconstitution; and ABC or NVP Hypersensitivity
GI intolerance; abdominal discomfort; cramps; fever	NNRTIs, and especially PIs. Less frequent with, 3TC, and ABC	Rule out more serious adverse events (perform examination and do appropriate lab tests to rule out pancreatitis [amylase, lipase] for patients on, ddI; and hepatitis [ALT, AST] for patients on NVP).

Headache	Many of the ARVs	-Rule out anemia. Check for neck stiffness, mental status changes, neurologic deficits. Consider lumbar puncture if other signs/symptoms present (to rule out Cryptococcal Meningitis). -Provide paracetamol
Jaundice (indirect hyperbilirubinemia)	ATV (Atazanavir, a Protease Inhibitor)	-Generally asymptomatic except for icterus. (without ALT elevation) -No need for substitution unless demanded by patient for cosmetic reasons (then substitute another PI)
Lipoatrophy and/or Lipodystrophy	All NRTIs	-Early Replacement of the suspected ARV drug (e.g., substitute TDF or ABC). -Consider dietary adjustments and physical conditioning exercises.
Nausea; vomiting	All ARVs	-Rule out pancreatitis, hepatitis -May use promethazine, metoclopramide -Dietary modifications (ORS, liquids and bland diet)
Rash (mild)	NVP, EFV	-Rule out severe NVP reaction (monitor clinical status, check ALT) Substitute the-Remove drug that caused the problem if possible. -Provide symptomatic treatment, (e.g. hydrocortisone cream,

7.1.9 First-line Treatment Failure and Recommended Second-line Regimens

a. Assessing Treatment Failure in Adults and Adolescents

The decision that treatment has failed should be based on all available evidence: complete clinical assessment and (if available) CD4 count and viral load. OIs that occurred during the first 6 months should be treated as IRIS and excluded. In particular, it is vital to investigate adherence in these circumstances. Poor adherence to treatment is the most common reason for treatment failure. Changing to a second-line regimen will achieve nothing if adherence is not addressed. Consider using home visits, counseling, community health workers, accompaniers or peers, and other methods to help assure adherence.

Table 7.11: Clinical, CD4 cell count, and virological definitions of treatment failure for adherent patients on a first-line ARV regimen for at least 6 months.

Treatment failure— defined as a combination of the following:	
Clinical failure	‣ New or recurrent OI, malignancy, pulmonary TB, severe bacterial infections (must distinguish from immune reconstitution syndrome). ‣ New or recurrent WHO Stage 4 condition.[a,b,c] ‣ Significant (>10%) Weight loss after stabilization or gain without other explanation
Immunological (CD4 cell) failure	‣ Fall of CD4 count to pre-therapy baseline (or below); or 50 % fall from the on-treatment peak value (if known)[d]; or CD4 levels do not rise from the baseline after 6 months[e]
Virological Failure	‣ Plasma viral load above 1,000 copies/ml[f]

a. Current event must be differentiated from the immune reconstitution inflammatory syndrome.

b. Certain WHO clinical Stage 3 conditions (e.g. pulmonary TB, severe bacterial infections) may be an indication of treatment failure and thus require consideration of second-line therapy.

c. Some WHO clinical Stage 4 conditions (lymph node TB, uncomplicated TB pleural disease, esophageal candidiasis, recurrent bacterial pneumonia) may not be indications of treatment failure and thus do not require consideration of second-line therapy.

d. Without concomitant infection to cause transient CD4 cell decrease.

e. If a cut-off value is desired, WHO suggests considering the presence of treatment failure if the CD4 count remains persistently less than -100 cells/mm3 over 6 months (although if less than 100 at baseline, it may take 12 months or more to rise above this level).

f. The optimal viral load value at which ART should be switched has not been defined. However, values of more than 1,000 copies/ml have been associated with subsequent clinical regression and appreciable CD4 cell count decline.

Detailed Recommendations for Switching To Second Line ART Regimens In Adults And Adolescents

		1st-line Regimens	***2nd-Line Regimens[1]***	***Alternative 2nd-Line Regimens[1]***
HIV-1	Preferred Regimen	TDF + 3TC + EFV	AZT + 3TC4 + PI[1]	3TC + ABC + PI[1]
	Alternative	AZT + 3TC + EFV	TDF[5] + 3TC + PI[1]	3TC + ABC + PI[1]
	2nd Alternative	AZT + 3TC +NVP[2,3]	TDF + 3TC[4] + PI[1]	3TC + ABC + PI[1]
	3rd Alternative	TDF + 3TC + NVP	AZT + 3TC + PI	
HIV-2 or HIV-1&HIV-2 Co-infection[1]	Preferred Regimen	TDF + 3TC4 + PI[1]	AZT +3TC4 + PI[1]	ABC + 3TC + PI[1]
	Alternative	AZT + 3TC + PI	TDF + 3TC + PI[1]	3TC + ABC + PI[1]

[1]LPV/r or ATV/r are recommended as the preferred PI. If neither LPV/r nor ATV/r are available, NFV may be used.
[3]NVP should be given QD for first 2 weeks. If no or mild NVP toxicity, then increase dose to BID.
[4]At the physician's discretion, AZT can be used with 3TC in the second line, creating a four-drug regimen (particularly when FDC is available).

7.1.10 Management of HIV in the presence of other diseases: Tuberculosis, Hepatitis B, Kidney and Liver disease

7.1.10.1: Tuberculosis co-infection

HIV and TB often appear in the same patient. Up to 50% of patients with TB are co-infected with HIV in Africa, so TB diagnosis is a vital entry point for care and treatment services.

TB-HIV co-management: All TB/HIV co-infected individuals are eligible for ART irrespective of CD4 and WHO clinical stage

TB treatment with DOTS should be started promptly in cases with active TB and HIV. Priority should be given to anti-TB treatment when there is co-infection with HIV.

a. Treatment Recommendations for HIV and TB Co-infection Use of EFV

An EFV containing regimen is the preferred choice in all cases of co-administration of ART with rifampicin-containing TB treatment.

- For women who commence EFV, if treatment with EFV is to continue postpartum, effective contraception should be provided.
- EFV should not be used in children younger than 3 years old or <10kg. If EFV is contraindicated In cases where Efavirenz is contradicted, (e.g., age <3 years old, <10 kg body weight) or the patient does not tolerate it (mental status changes), there are three options:
- *Preferred Option*: Use a triple NRTI regimen (AZT/3TC/ABC or, AZT/3TC/TDF)
- *Alternative*: Use a PI-based regimen e.g., AZT/3TC/ LPV/r Note: due to interaction with rifampicin, it is important to double the dose of LPV/r
- *Alternative*: NVP may be continued in selected cases, with close clinical and laboratory monitoring (i.e. monthly ALT). In the presence of rifampicin, a run-in dose of NVP is not needed (i.e. the 200 mg BID dose can be started immediately). The standard dose of NVP does not need to be changed.

b. Starting ART in patients with TB

i. Start the patient on pyridoxine, 25 mg QD (if not already started)

ii. Do pre-emptive counseling:

- Treatment of TB while on ART involves taking a large number of tablets which can decrease a patient's ability to adhere to both ARV and TB treatment drugs.
- When ART is started, TB symptoms may temporarily worsen as a result of immune reconstitution inflammatory syndrome.

- Consider using a general community health volunteer to help ensure adherence and monitor for side effects or other problems with treatment.

c. Begin antiretroviral treatment

For all TB and HIV co-infected patients; in order of preference, the preferred regimen options are:

i. TDF/3TC/EFV

ii.AZT/3TC/EFV

If Efavirenz (EFV) is not available or not tolerated the alternative regimen options (in order of preference):

i. TDF/3TC/AZT

ii.AZT/3TC/ABC

PI at double of the normal dose or occasionally NVP may be used where there is no alternative. Once TB treatment is completed, switch ABC or PI back to NVP.

d. Children with TB who require ART

- Start TB treatment first.
- Start ART treatment as soon as possible once TB therapy is established and tolerated.
- To choose the ART treatment:
  - Avoid NVP-containing regimens
  - Do not use EFV-containing regimens in children < 10kg or < 3 years. Use ABC instead. Once TB treatment is complete, switch ABC back to NVP.

Table 7.12: Summary of choice of ARV drugs in TB/HIV co-infected ARV-naïve children

Patient Category	Rifampicin-Based Anti-TB (NVP contraindicated)
Children age below 3 years or weight < 10kg*	AZT / 3TC / ABC
Children age above 3 years and weight >10kg< 35kg*	AZT / 3TC / EFV

7.1.10.2: Hepatitis B Co-infection

All HIV/HBV/HCV co-infected individuals are eligible for ART irrespective of CD4 and WHO clinical stage. Hepatitis B infection is endemic in Liberia. Individuals with HIV/HBV/HCV co-infection have a threefold to six-fold increased risk of developing chronic HBV/HCV infection, an increased risk of fibrosis and cirrhosis and a 17-fold increased risk of death compared to HBV/HCV-infected individuals without HIV infection. Early initiation of HBV/HCV-active combination ART reduces liver- related disease in co-infected individuals. 3TC and TDF are effective against both HIV and Hepatitis B and should be used in combination as part of first line treatment in Hepatitis B/HIV co-infection. Once 3TC and TDF are removed, there is a chance that the Hepatitis B will return.

- ***First-line regimen:*** *TDF+3TC + EFV (300mg + 300mg + 600mg) QD*
  - If TDF is not available, use *AZT 300mg BID/3TC 150mg BID+EFV 600mg QD.*
- ***Second-line regimen:*** The second-line regimen should include 3TC:
  - *(TDF + 3TC) + LPV/r (300mg+300mg) QD + 400/100mg BID*

If patient was originally on AZT, switch AZT to: TDF/3TC (300mg/300mg) QD, OR ABC (300mg BID)

Table 7.13: Dosages of antiretroviral drugs for adults and adolescents

Drug class/ drug	Dose
Nucleoside RTIs	
Abacavir (ABC)	300 mg twice daily
Lamivudine (3TC)	150 mg twice daily or 300 mg once daily
Zidovudine (AZT)	300 mg twice daily.
Nucleotide RTI	
Tenofovir (TDF)	300 mg once daily
Non-nucleoside RTIs	
Efavirenz (EFV)	600 mg once daily
Nevirapine (NVP)	200 mg daily for the first 14 days, then 200 mg twice daily
Protease Inhibitors	
Lopinavir/ ritonavir(LPV/r)	400 mg/ 100 mg twice daily
Atazanavir/ritonavir(ATV/r)	300 mg/100mg once daily
Available FDCs Strength	
AZT/3TC/NVP	300mg/150mg/200mg twice daily; 60mg/30mg/50mg twice daily
AZT/3TC	300mg/150mg twice daily; 60mg/30mg twice daily
TDF/3TC/EFV	300mg/300mg/600mg once daily

Table 7.14: For children weighing < 3kg, calculate ARV dosages using body weight or surface area to meet target dosing according to the following table:

Drug and Formulation	Target Dose
Nucleoside Reverse Transcriptase Inhibitors (NRTIs)	
Zidovudine (AZT): *10mg/ml oral solution, 100mg and 200mg capsules, 300mg tablets*	180-240mg/m2/dose, twice daily (up to 300mg)
Lamivudine (3TC): *10 mg/ml oral solution, 150mg tabs*	4mg/kg/dose, twice daily (up to 150mg)
Abacavir (ABC): *20mg/ml oral solution, 300mg tablets*	8 mg/kg/dose twice daily (<16 yrs old)
Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)	
Efavirenz (EFV):*30mg/ml, 50mg, 100mg, 200mg capsules, 600mg tablets*	19.5 mg/kg/day (syrup) or 15 mg/kg/day (capsule/tablet) *NOTE*: EFV is not for use in children < 3yrs or <10kg
Nevirapine (NVP): *10mg/ml oral suspension, 200mg tablets*	160-200mg/m^2/dose twice daily (after tolerating initiating dose of once daily)
Protease Inhibitors (PIs)	
Lopinavir/ritonavir (LPV/r): *80mg/ml LPV plus 20mg/ml ritonavir oral solution; 200mg/50mg heat stable tablets*	*LPV target doses:* ‣ 5-7.9 kg: 16mg/kg/dose twice daily ‣ 8-9.9kg: 14mg/kg/dose twice daily ‣ 10-13.9kg: 12mg/kg/dose twice daily ‣ 14-39.9kg: 10mg/kg/dose twice daily ‣ Max of 400mg LPV/100mg ritonavir daily

7.2 Sexually Transmitted Infections

7.2.1: Urethral Discharge Syndrome (Male)

Description: Urethritis, or inflammation of the urethra, is a common finding in sexually transmitted diseases.

Causes: A number of diseases, usually spread by sexual intercourse, produce similar manifestations in men and may be difficult to distinguish clinically:

- *Gonorrhea*: caused by the bacterium *Neisseria gonorrhoeae*

- *Nongonococcal urethritis*: Most commonly caused by *Chlamydia trachomatis*. Other organisms seen with urethritis include *Mycoplasma genitalium* and *Trichomonas vaginalis*

Clinical Features: Not all patients may have symptoms, particularly for nongonococcal urethritis. Symptoms usually manifest five to eight days after exposure.

- Dysuria (burning on urination)
- Urethral discharge
- Pruritus at urethral meatus

Differential diagnosis:

- Cystitis (infection of the bladder)
- Prostatitis (infection of the prostate)

***Investigation*:**

Urine nucleic acid amplification testing (NAAT) for gonorrhea/chlamydia. Urine dipstick usually shows positive leukocyte esterase

Treatment: Treat both patient and partner

Medicine Name	Level	Dose	Frequency	Duration
Adult				
Ceftriaxone IM	HC	250mg	Once	---
or				
Cefixime po	HC	400mg	Once	---
and				
Doxycycline po	C	100mg	Every 12 hours	7 days
If partner is pregnant, replace doxycycline:				
Erythromycin po	C	500 mg	Every 6 hours	7 days
If suspect trichomoniasis (recurrent or persistent discharge)				
Metronidazole po	C	2 g	Once	---

7.2.2 Abnormal Vaginal Discharge Syndrome (Vaginitis)

Description: Vaginitis refers to inflammation of the vagina, and most commonly presents with vaginal discharge. It is commonly seen in infections, but also has many non-infectious causes. Other infections such as cervicitis may also cause vaginal discharge.

Causes:

The majority of causes for vaginitis are infectious, which can include both sexually transmitted and non-sexually transmitted infections.

- Bacterial vaginosis (usually multiple organisms)
- Candida vulvovaginitis
- Trichomoniasis
- Vaginal atrophy (mostly in postmenopausal women)
- Cervicitis can also present with vaginal discharge, and presents similarly to vaginitis. The most common causes of cervicitis are sexually transmitted.
- Neisseria gonorrhoeae
- Chlamydia trachomatis

Clinical features:

- Vaginal discharge, which includes changes in amount, color or odor of discharge
- Pruritus

- Burning
- Dysuria (burning on urination)
- Dyspareunia (pain with sexual intercourse)

***Differential diagnosis*:**

- As noted above, there are many causes, both infectious and non-infectious, of vaginitis.

***Investigation*:**

- Microscopy of vaginal secretions
- Bimanual and speculum examination
- Vaginal secretion nucleic acid amplification testing (NAAT) for gonorrhea/chlamydia

***Treatment*:**

If lower abdominal pain present, do NOT use following table and see below for Pelvic Inflammatory Disease

Medicine Name	Level	Dose	Frequency	Duration
Adult- *In the absence of microscopy or confirmatory testing, treat empirically for gonorrhea, chlamydia, bacterial vaginosis, and trichomonas vaginalis*				
Ceftriaxone im	HC	250mg	Once	---
or				
Cefixime po	HC	400mg	Once	---
plus				
Doxycycline po	C	100mg	Every 12 hours	7 days
If pregnant, replace with				
Erythromycin po	C	500mg	Every 6 hours	7 days
plus				
Metronidazole po	C	2g	Once	---
If curd-like discharge, vulva erythema/excoriations, or yeast cells on microscopy, treat for candida vulvovaginitis				
Fluconazole po	HC	150mg	Once	---
For pregnancy				
Clotrimazole intravaginal tablet	C	500mg	Once at night	---
or				
Nystatin pessary	C	100,000 IU	Once a day at night	14 days

7.2.3 Lower Abdominal Pain Syndrome and Pelvic Inflammatory Disease (PID) Syndrome

Description: Pelvic Inflammatory Disease is an acute infection of the upper genital track, and includes the uterus, fallopian tubes and/or the ovaries. It happens most often in young, sexually active women and if not properly treated, can lead to infertility, ectopic pregnancies, and chronic pain.

Causes:

Majority of cases are from sexually transmitted diseases

- Chlamydia trachomatis
- Neisseria gonorrhoeae

A small number of cases are caused by other organisms

- Enteric organisms:
  - Escherichia coli
  - Bacteroides fragilis

- Group B streptococci, Campylobacter spp.

- Respiratory organisms:
  - Haemophilus influenza
  - Streptococcus pneumoniae
  - Staphylococcus aureus

Clinical features:

PID is difficult to diagnose, and there should be a low threshold to admit patients. Reasons to hospitalize include uncertain diagnosis, suspected pelvic abscess, pregnancy, or failure to respond to outpatient therapy. Symptoms usually present acutely, less than two weeks' duration.

- Bilateral lower abdominal pain
- Dysparunia (pain with sexual intercourse)
- Abnormal uterine bleeding

In some patients, untreated PID may progress to tubo-ovarian abscess, which may present with the following

- Fevers
- Severe abdominal pain

Differential diagnosis:

- Ectopic pregnancy, Cystitis (bladder infection)
- Appendicitis, Diverticulitis
- Endometriosis
- Ovarian torsion Ovarian cyst

Investigation:

- Pregnancy test
- Vaginal secretion nucleic acid amplification testing (NAAT) for gonorrhea/chlamydia Microscopy of vaginal secretion

Treatment:

Medicine Name	Level	Dose	Frequency	Duration
Adult: *Outpatient therapy:*				
Ceftriaxone im	HC	250mg	Once	---
or				
Cefixime po	HC	400mg	Once	---
plus				
Doxycycline po	C	100mg	Every 12 hours	14 days
plus				
Metronidazole po	C	500mg	Every 12 hours	14 days
Note: It is rare for pelvic inflammatory disease to occur during pregnancy, should consider alternative diagnoses. If confirmed pregnancy, doxycycline is contraindicated.				
Adult: *Inpatient therapy*				
Ceftriaxone IM	HC	250mg	Once a day	Continued until at least two days after patient is improved, followed by doxycycline 100mg twice daily for 14 days
plus				
Doxycycline po	C	100mg	Every 12 hours	
Metronidazole po	C	500mg	Every 12 hours	

7.2.4: Genital Ulcer Disease Syndrome

Description: Genital ulcers can be from a number of different etiologies, the majority of which are sexually transmitted diseases.

Causes: Infectious causes of genital ulcers

- Herpes simplex virus (HSV)
- Treponema pallidum (syphilis)
- *Hemophilus ducreyi* (chancroid)
- Chlamydia trachomatis serovars L1-3 (the same organisms that cause lymphogranuloma venereum/LGV)
- *Klebsiella granulomatis* (granuloma inguinale)

***Clinical features*:** Clinical findings of genital ulcers usually do not point to a single etiology. Certain features are more common to some etiologies, but examination alone is usually not enough to make a diagnosis.

- *Painless ulcers:* Syphilis, LGV and granuloma inguinal are usually painless Painful ulcers: HSV and chancroids are usually painful
- *Multiple ulcers*: HSV and chancroids may present with multiple ulcers Single ulcers: Syphilis usually presents with single ulcer
- *Vesicles*: classically seen with HSV Differential diagnosis:

In addition to infectious etiologies, non-infectious etiologies such as Behcet's disease, neoplasms and trauma can also cause ulceration

***Investigation*:**

Laboratory testing for genital ulcers is often not sensitive, and should not delay empiric treatment. Possible testing includes:

- Treponemal testing or nontreponemal serological screening (RPR)
- Viral cultures

***Treatment*:** *Treat both patient and partner*

Medicine Name	Level	Dose	Frequency	Duration
Adult: If only vesicles are present, treat for HSV2				
Aciclovir po	HOS	400mg	Every 8 hours	7 days
If RPR positive, also treat for syphilis				
Benzathine Benzylpenicillin im	C	2.4 million IU	Once	---
If there are no vesicles are present, treat for syphilis and chancroid				
Benzathine Benzylpenicillin im	C	2.4 million IU	Once	---
plus				
Ciprofloxacin po	C	500 mg	Every 12 hours	3 days
If pregnant				
Ceftriaxone IM	HC	250mg	Once	---
or				
Erythromycin po (in penicillin allergy)	C	500 MG	Every 6 hours	7 days
Patient should be followed-up in 7 days. If no improvement, patient will need referral for work-up of other				

7.2.5 Inguinal Swelling (Bubo)

Description: Inguinal swelling is enlarged lymph nodes in the groin area, and frequently seen in infectious processes.

Causes:

- Hemophilus ducreyi (chancroid)
- Chlamydia trachomatis serovars L1-3 (lymphogranuloma venereum/LGV)

***Clinical features*:**

- Painful, fluctuant swelling of the groin area
- Often associated with genital ulcers

***Differential Diagnosis*:**

- Localized and systemic infections can cause swelling of the lymph nodes. These include:
  - Tuberculosis
  - Infections of the lower limb

***Investigation*:** Laboratory findings are often non-specific and determining diagnosis can be difficult

- Patients with genital disease should have testing for Chlamydia trachomatis (via culture or nucleic acid amplification test)
- Needle aspiration should be attempted on fluctuant lymph nodes
- Cultures may be attempted if needle aspiration of bubo is obtained

Treatment of Inguinal Swelling

Medicine Name	Level	Dose	Frequency	Duration
Adult:				
Ciprofloxacin po	C	500mg	Every 12 hours	3 days
plus				
Doxycycline	C	100mg	Every 12 hours	14 days
If pregnant				
Erythromycin po	C	500mg	Every 6 hours	14 days

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8. COMPLICATIONS OF PREGNANCY, CHILDBIRTH, AND PEURPERIUM

8.1: Abortion (Spontaneous/Induced)

If patient is bleeding manage as below;

Medicine Name	Level	Dose	Frequency	Duration
Misoprostol po	C	600 mg (oral)	Single dose	once
		400 mg (sublingual)	Single dose	once
plus				
Amoxicillin po	C	500 mg	Every 8 hours	7 days
or				
Doxycycline po	C	100 mg	Every 12 hours	7 days
Metronidazole po	C	400 mg	Every 8 hours	7 days

8.2: Anemia in Pregnancy

Deworm the patient first with Albendazole (400 mg)/Mebendazole (500 mg) in 2nd trimester;

Medicine Name	Level	Dose	Frequency	Duration
Ferrous Sulfate po	C	200 mg	Every 8 hours	30 days
plus				
Folic Acid po	C	5 mg	Every 24 hours	30 days

8.3: Breast Abscess

Perform incision and drain the abscess;

Medicine Name	Level	Dose	Frequency	Duration
Erythromycin po	C	500 mg	Every 6 hours	5 days

8.4: Dysmenorrhea

The medicines re mainly used for management of pain associated with Dysmenorrhea;

Medicine Name	Level	Dose	Frequency	Duration
Acetylsalicylic Acid po	C	600 mg	Every 8 hours	3 days
or				
Paracetamol po	C	1 g	Every 8 hours	3 days

8.5: Hyperemesis Gravidarum

Hyperemesis Gravidarum is severe vomiting in pregnancy.

Medicine Name	Level	Dose	Frequency	Duration
Chlorpromazine po	HC	25 mg	Every 6 hours	When necessary
or				
Metoclopramide po	HC	10 mg	Every 6 hours	When necessary

8.6: Postpartum Hemorrhage

Blood loss is more than 500 ml.

Prevention:

Medicine Name	Level	Dose	Frequency	Duration
Oxytocin im/iv	C	10 IU	once	once
Or				
Misoprostol po/sublingual	C	600 micrograms	once	once

Treatment:

Medicine Name	Level	Dose	Frequency	Duration
Oxytocin im/iv	C	10-40 IU	once	once
Or				
Misoprostol po/sublingual	C	800 micrograms	once	once

8.7: Puerperal Sepsis

Treat with a combination of antibiotics until the patient is fever free for 48 hrs:

Medicine Name	Level	Dose	Frequency	Duration
Ampicillin iv	C	2 g	Every 6 hours	3 days
plus				
Gentamicin iv	HOS	5mg/kg	Every 24 hours	3 days
plus				
Metronidazole iv	C	500 mg	Every 8 hours	3 doses

If fever persists after 72 hrs of starting antibiotics, re-evaluate and revise the diagnosis.

-or-

REFER to higher medical level.

8.8: Retained Placenta

This term refers to a failure of delivery of placenta within 30 min of delivery of the baby. Set up an IV infusion:

Medicine Name	Level	Dose	Frequency	Duration
Amoxicillin po	C	500 mg	Every 8 hours	5 days
plus				
Erythromycin po	C	500 mg	Every 6 hours	5 days
plus				
Metronidazole po	C	400 mg	Every 8 hours	5 days

REFER to hospital immediately.

8.9 Severe Pre-Eclampsia

- Preeclampsia is defined by the new onset of elevated blood pressure; ≥140 mm Hg (systolic) or ≥90 mm Hg (diastolic), and proteinuria (≥ 0.3 g in 24-hour urine collection) after 20 weeks of gestation.
- Severe preeclampsia is defined by blood pressure ≥160 mm Hg (systolic) or ≥110 mm Hg (diastolic) on two occasions; and proteinuria (≥5 g in a 24-hour urine collection).

Risk factors for Pre-eclampsia

- Pregnancy induced
- Chromosomal abnormalities; Hydatidiform mole; Hydrops fetalis

- Multifetal pregnancy; Oocyte donation or donor insemination
- Structural congenital anomalies; Urinary tract infection
- Maternal specific factors:
  - age greater than 35 years
  - age less than 20 years
- Black race; Family history of preeclampsia; Nulliparity
- Preeclampsia in a previous pregnancy
- Specific medical conditions: gestational diabetes, type I diabetes, obesity, chronic hypertension, renal disease, thrombophilias
- Stress
- Paternal specific factors:
  - First-time father
  - Previously fathered a preeclamptic pregnancy in another woman

Clinical Presentation

The clinical presentation of preeclampsia may be insidious or fulminant. May be asymptomatic at the time they are found to have hypertension and proteinuria.

- Visual disturbances
- Severe headache
- Upper abdominal pain
- Oliguria (<500 ml of urine in 24 hours)
- Pulmonary edema or cyanosis

Diagnosis

New onset of elevated blood pressure and proteinuria after 20 weeks of gestation. Proteinuria and hypertension must both be present for a diagnosis of preeclampsia to be made.

Laboratory Evaluations (where available)

- Hemoglobin level
- Hematocrit
- Platelet count
- Urine protein collection (12 or 24 hour)
- Serum creatinine level
- Serum uric acid level

Treatment

The main goals are to prevent eclamptic seizures and control hypertension.

Using Magnesium Sulfate:

i. Loading dose of Magnesium Sulphate-

- Give 4 g of 20% magnesium sulfate solution IV over 5 min.
- Follow promptly with 10 g of 50% magnesium sulfate solution. Administer 5 g in each buttock deep IM with 1ml of 2% lignocaine in the same syringe.
- If convulsions recur after 15 min, give 2 g of 50% magnesium sulfate solution IV over 5 min.

ii. Maintenance dose of Magnesium Sulphate-

- Give 5 g of 50% magnesium sulfate solution with 1ml of 2% lignocaine in the same syringe by deep IM injection into alternate buttocks every 4 hrs.

- Continue treatment for 24 hrs after delivery or last convulsion, whichever occurs last. If 50% solution is not available, give 1g of 20% magnesium sulfate solution IV every hour by continuous infusion.

WARNING:

- Monitor for signs of magnesium toxicity:
  - Respiratory rate
  - Patellar reflexes
  - Urinary output
- If signs of toxicity occur, give ANTIDOTE for magnesium sulfate:
  - Calcium gluconate 1-2 g slow IV, and repeat as needed until respiratory rate increases.

If magnesium sulfate is not available, give diazepam as an alternative, as follows:

i. Loading dose of Diazepam-

Diazepam 10 mg IV slowly over 2 min. If convulsions recur, repeat loading dose

ii.Maintenance dose of Diazepam-

Diazepam 40 mg in 500 ml normal saline or Ringer's lactate.

WARNING: Maternal respiratory depression may occur if dose exceeds 30 mg in 1hr. Assist respiration, if necessary. Do not give more than 100 mg in 24 hrs.

8.10: Neonatal Infections

Symptoms are often non-specific and may include danger signs:

- unable to breastfeed
- convulsions
- drowsy, respiratory rate less than 20 or cessation of breath
- respiratory rate>60 breaths per minute, grunting
- chest indrawing, central cyanosis.

Serious Bacterial infections can also have other danger signs:

- deep jaundice
- abdominal distention or localized signs to include painful joints or joint swelling
- skin pustules
- umbilical redness extending to skin surrounding umbilicus
- bulging fontanelle.

High Risk:

- *Major Risk factors:*
  - Neonate born to mother with fever 37.4^{o}C during delivery or post-delivery
  - Ruptured membranes > 24 hours before delivery
  - Foul smelling amniotic fluid (chorioamnionitis)

Minor Risk Factors:

- Birth Weight < 2 kg
- Resuscitation at birth with manual ventilation
- Meconium stained amniotic fluid

Guide for Gentamicin Dosing in Infants

Premature or full-term neonates up to 7days old			
Weight	**Age**	**Dose**	**Frequency**
less than 1000 gm	28 weeks	2.5 mg/kg	once every 24 hours
more than 1000 gm	>28weeks	2.5 mg/kg	every 12 hours
Neonates more than 7 days old			
Weight		**Dose**	**Frequency**
less than 1200 gm		2.5 mg/kg	every 12 hours
more than 1200 gm		2.5 mg/kg	every 8 hours

8.10.1: Prophylaxis of Neonatal Sepsis:

Ampicillin and Gentamicin x 48 hours (see dosing below). If patient does not develop danger signs can discontinue and observe for another 48 hours. If no signs of infection take patient off antibiotics can discharge home.

Treatment of Neonatal Sepsis:

If fever or danger signs during the first 48 hours of life, then treat for infection:

1st line:

Medicine Name	Level	Dose	Frequency	Duration
If < 2kg birth weight				
Ampicillin iv	C	50 mg/kg	Every 12 hours	7 days
Benzylpenicillin iv	C	0.1 MU/kg	Every 12 hours	7 days
plus				
Gentamicin iv	HOS	3 mg/kg	Once a day	5 days
If >2 kg birth weight				
Ampicillin iv	C	50 mg/kg	Every 8 hours	7 days
or				
Benzylpenicillin iv	C	0.1 MU/kg	Every 8 hours	7 days
plus				
Gentamicin iv	HOS	5 mg/kg	Once a day	5 days

If no gentamicin present, substitute with chloramphenicol**: 25 m/kg/dose twice a day**

Treatment Duration:

- Symptomatic neonatal infections: treatment of 10-14 days, if there is improvement within 24 hours on therapy can consider 7- day course

If Meningitis is suspected:

Medicine Name	Level	Dose	Frequency	Duration
Benzylpenicillin iv/im	C	0.1 MU/kg	Every 12 hours	14-21 days
plus				
Gentamicin iv/im	HOS	3 mg/kg	Once a day	14-21 days
plus				
Chloramphenicol iv	HOS	12.5 mg/kg	Every 12 hours	14-21 days

For special circumstances:

Add Cloxacillin if skin pustules or abscesses present:

- Cloxacillin 25-50 mg/kg per dose every 12 hours in first week of life.
- Cloxacillin 25-50 mg/kg per dose every 8 hours in weeks 2-4 of life.

Consider malaria smear and treat with quinine per protocol if positive.

8.11: Umbilical Stump Infection

Infection of the umbilical cord after birth, can be a result of unhygienic methods of cutting the cord or lack of hygienic care of the umbilical cord stump until it falls off. The umbilical stump needs to be kept clean and dry until it falls off.

Clinical Presentation:

Characterized by oozing, pus, redness around umbilicus, inflammation may also be present.

Prevention

Chlorhexidine application daily until stump falls off. No other materials to be applied to stump.

Treatment:

In the case that infection has occurred, treat as follows:

Medicine Name	Level	Dose	Frequency	Duration
Ampicillin iv	C	50 mg/kg	Every 8 hours	5 days
or				
Benzylpenicillin iv	C	0.1 MU/kg	Every 8 hours	5 days
plus				
Gentamicin iv	HOS	5 mg/kg	Once a day	5 days

8.12: Conjuctivitis

- Mild symptoms and sticky eyes:
  - Teach mother to wash eyes with clean water or breastmilk.
  - **Tetracycline Eye Ointment** or **Chloramphenicol Eye Ointment** every 6 hours for 5 days.
- If severe symptoms characterized by lots of puss and swelling of eyes, then treat for gonorrhea with:
  - **Ceftriaxone 50 mg/kg IV x 1** and eye ointments as above for mild infection.

8.13: Necrotizing Enterocolitis

Abdominal infection that usually occurs in preterm children and usually at time of feeding.

Clinical Presentation:

- Abdominal distention; Tenderness
- Bile stained vomit; Blood in stool
- Other non-specific signs of infection can also occur.

Supportive care:

- Avoid enteral feeds; Place nasogastric tube for continuous drainage
- Oxygen, intravenous fluids, warmth
- Can reintroduce breastmilk gradually when abdomen soft, non-tender, no bilious vomiting and passing stools without blood.

Treatment:

Medicine Name	Level	Dose	Frequency	Duration
Ampicillin iv	C	50 mg/kg	Every 8 hours	10 days
or				
Benzylpenicillin iv	C	0.1 MU/kg	Every 8 hours	10 days
plus				
Gentamicin iv	HOS	5 mg/kg	Once a day	10 days
plus				
Metronidazole iv	HC	7.5 mg/kg/dose	Every 8 hours	10 days

REFER to a specialist for diagnosis and further treatment

8.14: Neonatal Tetanus

***Onset*:** 3-14 days' post-delivery

Risk factors:

- Home delivery
- Cutting of umbilical cord with dirty instruments

Clinical Presentation:

- Spasms; Irritability
- Trismus (unable to open jaw); Trouble feeding

Treatment:

Medicine Name	Level	Dose	Frequency	Duration
Benzylpenicillin iv	C	0.05 MU/kg	Every 12 hours	7 days
or				
Procaine Penicillin im	C	50 mg/kg	Once a day	7 days
plus				
Tetanus Immunoglobulin	C	0.5 ml	Once only	One dose

To control muscle spasms that may occur;

Medicine Name	Level	Dose	Frequency	Duration
Diazepam iv	C	0.25 mg/kg	Every 8 hours	Based on response
plus				
Phenobarbitone iv	HOS	2.5 mg/kg	Every 12 hours	When needed

8.15: Supportive Care for the Sick Neonate

Thermal environment:

- Check infant's temperature regularly with goal of 36.5ºC–37.5°C (97.7–99.5°F) rectal, or 36.0ºC–37.0°C (96.8–98.6°F) axillary.
- Keep the young infant dry and well wrapped.
- Place a hat/bonnet on baby's head to minimize heat loss.
- Place all babies <2.5 kg in close skin-to-skin contact (Kangaroo care) 24 hours a day
- Do not uncover for long periods of time for exam as this may cause chills.
- Neonates should not routinely be given PCM or diclofenac
- Undressing child and controlling environment.

Fluid Management:

- Encourage mother to breastfeed every 2-3 hours even at nighttime. This will help prevent low blood sugar
- If poor suck or unable to breastfeed, then can give expressed breast milk through NG tube.
- If unable to breastfeed and nasogastric feeding unavailable or contraindicated, then consider IV fluid hydration.
- Increase the amount of fluid given over the first 3–5 days (total amount, oral and IV).
  - *Day 1*: 60 ml/kg/day
  - *Day 2*: 90 ml/kg/day
  - *Day 3*: 120 ml/kg/day
  - Then increase to 150 ml/kg/day
- When babies are tolerating oral feeds well, this might be increased to 180 ml/kg/day after some days.

- When giving IV fluids, do not exceed this volume unless the baby is dehydrated or under phototherapy or a radiant heater. This amount is the TOTAL fluid intake a baby needs and oral intake must be taken into account when calculating IV rates. Give more fluid if under radiant heater (^{x} 1.2-1.5)
- Do NOT use IV glucose and water (without sodium) AFTER the first 3 days of life. Babies over 3 days of age need some sodium (for example, 0.18% saline/IV fluid formulations)

Oxygen Therapy:

- Signs of hypoxia (low oxygen) include:
  - central cyanosis, grunting with every breath
  - difficulty in feeding due to respiratory distress
  - chest wall in-drawing
- Head nodding that is associated with breathing
- Check Oxygen level if available using pulse oximeter.
  - If <90% or signs as above without ability to check oxygen, then proceed to give oxygen with nasal cannula.
- Goal oxygen level of 92-95%, discontinue when infant can maintain >90%.

8.16: Hypoglycemia

Risk Factors:

- Inability to feed or lack of alternative forms of nutrition
- Infants with infections are at high risk as are
  - Babies born to mothers with diabetes
  - Babies born to mothers treated with labetalol
  - Babies <2.5 kg or > 4 kg

Clinical Presentation:

- Jitteriness, weakness
- Lethargy, unconsciousness
- Convulsions

Diagnosis:

- Glucose levels <2.5 mmol/liter or <45 mg/dl

Treatment:

- If unconscious or with convulsion give 5 ml/kg of Dextrose 10% immediately.
- Otherwise place to breast and administer 5 ml/kg of Dextrose 10% IV or 1 ml/kg of Dextrose 50% orally if unable to give IV
- Breastfeed every 3 hours or give via nasogastric tube.

8.17: Hypoxic Ischemic Encephalopathy

Results from birth asphyxia or lack of blood flow and oxygen to the brain.

Risk factors:

- Apgar <5 at 5 minutes
- Delayed first breath or cry and required resuscitation

Clinical Presentation:

- Convulsions; Apnea
- Poor tone
- Inability to suck

Prognosis:

- if tone remains poor at 1 week of age then prognosis very poor.
- Recovery indicated by return of muscle tone and ability to suck.

Treatment:

- Avoid hyperthermia (Goal temp <37.5^{o}C)
- Treat convulsions:
  - Phenobarbital 15 mg/kg x1
  - Can give additional doses of 10 mg/kg for persistent convulsions up to max of 40 mg/kg/day.

8.18: Convulsions

Symptom:

- Twitching or jitteriness
- Rhythmic movements of jaw or lip
- Staring, extension of extremities
- Clenching of fists.

Treatment:

- Check for hypoglycemia then,
  - ***Phenobarbital 15 mg/kg x1****, additional doses of 10 mg/kg for persistent convulsions up to 40 mg/kg/day.*

8.19: Neonatal Hemorrhage Prophylaxis

At birth or upon first presentation < 2 weeks of age:

Medicine Name	Level	Dose	Frequency	Duration
Vitamin K im	HOS	1 mg	Once only at birth	

8.20: Apnea of Prematurity

Caffeine citrate and aminophylline prevent apnea (stopping breathing) in premature babies.

1st Line:

- Caffeine citrate:
  - *Loading dose:* 20 mg/kg orally or IV (given slowly over 30 minutes).
  - *Maintenance dose:* 5 mg/kg daily

2nd Line:

- Aminophylline if caffeine is not available
  - *Loading Dose:* 10 mg/kg orally or by intravenous injection over 15-30 minutes.
  - *Maintenance Dosing:* 2.5 mg/kg every 12 hours ^{X} 1 week, then 4 mg/kg every 12 hours ^{X} 2-4 weeks
  - If an apnea monitor is available, it should be used

Table 8.1 Mixtures for IV Fluid Preparations

Glucose 10% IV Fluid from Glucose 5% and Glucose 50% **(Use premixed Glucose 10% if available, if not use mixture as below)** 1. Remove 28 ml from 250 ml bag of Glucose 5% 2. Add 28 ml Glucose 50% to bag in Step 1 (i.e. 250ml bag of Glucose 5%) 3. Mix bag to make Glucose 10%
Glucose 10% & ¼ Ringers Lactate (RL) from Glucose 5%, Glucose 50%, and Ringers Lactate 1. Remove 95 ml from 250 ml bag of Glucose 5% 2. Add 35 ml Glucose 50% to bag in step 1 3. Add 60 ml Ringers Lactate (RL) to bag in step 2 4. Mix bag to make Glucose 10% ¼ Ringers Lactate
Glucose 10% & ¼ Ringers Lactate (RL) from Glucose 5%, Glucose 50%, and Ringers Lactate 1. Remove 75 ml from 250 ml bag of Glucose 5% 2. Add 15 ml Glucose 50% to bag in step 1 3. Add 60 ml Ringers Lactate (RL) to bag in step 2 4. Mix bag to make Glucose 10% ¼ Ringers Lactate
Glucose 10% & ¼ Normal Saline (NS) from Glucose 5%, Glucose 50%, and Normal Saline (NS) 1. Remove 95 ml from 250 ml bag of Glucose 5% 2. Add 35 ml Glucose 50% to bag in step 1 3. Add 60 ml Normal Saline (NS) to bag in step 2 4. Mix bag to make Glucose 10% ¼ Normal Saline
Glucose 10% & ¼ Normal Saline (NS) from Glucose 5%, Glucose 50%, and Normal Saline (NS) 1. Remove 75 ml from 250 ml bag of Glucose 5% 2. Add 15 ml Glucose 50% to bag in step 1 3. Add 60 ml Normal Saline (NS) to bag in step 2 4. Mix bag to make Glucose 10% ¼ Normal Saline

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9. SKIN DISEASES

The overall objectives in the management of skin disorders are:

- To eradicate infection and prevent transmission
- To treat infection and relieve pain
- To identify and treat any predisposing condition

9.1: Bacterial Skin Infections

9.1.1: Boil (Furuncle)

A boil or furuncle is a deep bacterial (*Staphylococcus aureus*) infection of the hair follicles. A superficial infection is called folliculitis and a group of boils in an area is termed a carbuncle. Patients with recurrent boils or carbuncles should be screened for diabetes mellitus and/or immunodeficiency.

Clinical Presentation:

- Single or multiple swellings on the skin which may discharge pus
- Painful swellings on the skin
- Purulent swellings on the skin in single or multiple areas of skin
- Swellings may be warm and/or tender

Diagnosis:

- FBC
- Fasting blood glucose (if diabetes suspected)
- HIV status (if immunodeficiency suspected)

Treatment:

- Non-pharmacological treatment
- Incision and drainage; if boil becomes fluctuant and large
- Wound dressing

Pharmacological Treatment

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Cloxacillin po	C	500mg	Every 6 hours	7 days
or				
Erythromycin po	C	500mg	Every 6 hours	7 days
Children				
Cloxacillin po	C	<1 year = 62.5mg	Every 6 hours	7 days
		1-5 years = 125mg	Every 6 hours	7 days
		5-12 years = 250mg	Every 6 hours	7 days
or				
Erythromycin po	C	<1 year = 62.5mg	Every 6 hours	7 days
		1-5 years = 125mg	Every 6 hours	7 days
		5-12 years = 250mg	Every 6 hours	7 days

If patient has folliculitis topical ichthammol (20%) will suffice.

REFER if further management is required for underlying condition.

9.1.2: Impetigo

It is a contagious superficial bacterial (Staphylococcus aureus and/or Streptococcus Pyogenes) skin infection that mainly affects school children and infants; also, associated with scabies, eczema, lice infestation and herpes simplex infection. It can be prevented by good hygiene, regular hand- washing,

trimming of fingernails to reduce breaking of the skin through scratching, and discouraging the sharing of towels and clothing.

Clinical Presentation

- Blisters and sores on the body or scalp.
- Superficial, fragile blisters and irregular spreading sores with shiny, yellow crusts.

Diagnosis

- Microscopy and culture of the exudate from the blisters (only for recurrent cases).

Treatment

- Uncomplicated Impetigo may be treated by cleaning the affected area with Chlorhexidine 0.05% solution.

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Cloxacillin po	C	500mg	Every 6 hours	7 days
or				
Erythromycin po	C	500mg	Every 6 hours	7 days
Children				
Cloxacillin po	C	<1year=62.5mg	Every 6 hours	7 days
		1-5yrs=125mg	Every 6 hours	7 days
		5-12yrs=250mg	Every 6 hours	7 days
or				
Erythromycin po	C	<1year=62.5mg	Every 6 hours	7 days
		1-5yrs=125mg	Every 6 hours	7 days
		5-12yrs=250mg	Every 6 hours	7 days

Severe cases if Impetigo should be referred for further treatment.

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Benzyl penicillin iv/im	C	2MU	Every 6 hours	7 days
plus				
Cloxacillin iv	C	500mg	Every 6 hours	7 days
Children				
Benzyl penicillin iv/im	C	0.25MU/kg/dose	Every 6 hours	7 days
plus				
Cloxacillin iv	C	2-10yrs=125mg	Every 6 hours	7 days
		<2yrs=62.5 mg	Every 6 hours	7 days

In cases of Penicillin allergy use *Erythromycin* in the same dosage schedule.

9.1.3: Tropical Ulcer

It is a chronic ulcerative skin lesion caused by a polymicrobial infection including mycobacteria. Usually common among poor people with malnutrition and poor hygiene. The majority of ulcers occur in the lower third of the leg.

Clinical Presentation

Stage 1

- Trauma, painful swelling, blister with blood-stained discharge leading to an oval lesion which spreads rapidly.

Stage 2

- Necrosis with yellowish/black sloughs, which separate to form ulcer with raised and thickened edge. Floor has early bleeding granulations and foul smelling yellowish discharge

Stage 3

- Symptoms subside or may go into a chronic stage

Diagnosis

- Swab for Culture & Sensitivity
- X- ray

Treatment: *Acute Condition*

- Clean the wound with chlorhexidine solution 0.05% or hydrogen peroxide solution 6%
- Excise the necrotic edges
- Elevate and rest the leg
- Perform daily dressing If not responding:

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Metronidazole po	C	200mg	Every 8 hours	5 days
plus				
Cotrimoxazole po	C	960mg	Every 12 hours	5 days
Children				
Metronidazole po	C	35-50mg/kg per dose	Every 8 hours	5 days
plus				
Cotrimoxazole po	C	24mg/kg per dose	Every 12 hours	5 days

9.2 Fungal Skin Infections

9.2.1: Superficial Infection

This is a common fungal skin infection, usually found in children on the scalp and body (ringworm), skin folds, (armpits, groins and skin below the breast) as well as the hands, feet and nails caused by dermatophytes and fungi, which invade dead tissue of the skin and its appendages (stratum corneum, nails and hair), e.g. athletes foot, ringworm.

Clinical Presentation

- Pale round scaly patches with thickened edges and clear center on the skin
- Scaly bald patches of the scalp
- Distorted discolored nails
- Altered pigmentation of skin folds with maceration
- Complications may include cellulitis, fungal invasion of toenails (onychomycosis)

***Treatment*:** *Non-Pharmacological*

- Good hygiene and wearing loose clothes
- Open footwear

Medicine Name	Level	Dose	Frequency	Duration
Clotrimazole 1% topical cream	C	Apply to affected area twice a day until skin is clear and continue for 10 days after lesions have healed		
or				
Miconazole 1% topical cream	C			

In cases where rash is extensive, and nails or scalp is affected then:

Medicine Name	Level	Dose	Frequency	Duration
Adults				‣4 weeks (skin and scalp) ‣6-9 months (nails and hands) ‣9-12 months (toes)
Griseofulvin po	C	500mg	Once a day	
Children				‣4 weeks (skin and scalp) ‣6-9 months (nails and hands) ‣9-12 months (toes)
Griseofulvin po	C	≤ 5 years=125 mg 6-12 years=250 mg	Once a day	

Note:

- Advise patient on the need to persist with the long duration treatments
- Personal foot hygiene is important
- Griseofulvin should be taken with a fatty meal and should not be used for Tinea Versicolor (pityriasis)
- Risk of teratogenicity, women planning pregnancy should wait a month after stopping Griseofulvin;
- Men should avoid Griseofulvin when planning to have a child.

9.2.2: Tinea Versicolor

This is a common contagious fungal infection that should not be treated using topical steroids; appropriate anti-fungal medication should give complete clearance. This infection is caused by *Pityrosporum orbicularis/Malassezia furfur*

Clinical Presentations

- Macular rash
- Diffusely scaly depigmented patches in the dark skin and hyper-pigmented in the light skin
- Superficial scrapping produces a white scaly characteristic patch

Diagnosis

- Microscopical examination of skin scrapings

Treatment:

- *Non-pharmacological treatment*
  - ‣Good personal hygiene
  - ‣Avoid sharing bath towels, sponges and clothing
- *Pharmacological Intervention*

Medicine Name	Level	Dose	Frequency	Duration
Clotrimazole 1% cream	C	Apply to affected area every 12 hours until skin is clear and continue for 10 days after lesions have healed		
or, Miconazole 1% cream	C	Apply to affected area every 12 hours until skin is clear and continue for 10 days after lesions have healed		

9.3 Viral Skin Infections

9.3.1: Herpes Simplex and Herpes Genitalis

This is commonly called “cold sores” and usually occurs around the lips, gums and in adults the genitals, as well. Recurrence is common on previously affected skin areas. This viral infection is transmitted by direct contact and characterized by a localized primary lesion, latency, and recurrence. This condition is caused by Herpes simplex virus types 1 and 2.

Clinical Presentation:

- *Herpes simplex type 1: Primary infection*
  - ‣ May be asymptomatic

- Fever, malaise, gingivostomatitis, and vesicular lesions in the oropharynx
- Generalized cutaneous eruptions
- Meningoencephalitis and chronic eczema may be a complication

- *Herpes simplex type 1: Reactivation of primary infection*
  - Herpes labials which can be severe in the immunosuppressed
- *Herpes simplex type 2*
  - Primary and recurrent infections can be asymptomatic
  - Vesicular lesions in the genital area
  - Aseptic meningitis or disseminated visceral infection in the newborn may occur as complications

Diagnosis:

- Good history taking, and physical examination are very important in making a diagnosis
- Cytology and Serological tests

Prevention:

- Provide health education on personal hygiene
- Avoiding direct contact with infected people
- Using gloves and condoms as applicable

Treatment:

-Symptomatic treatment: Clean lesions with antiseptic solution, e.g. chlorhexidine solution 0.05% and apply Aciclovir cream to affected areas

Medicine Name	Level	Dose (adult and child)	Frequency	Duration
Aciclovir (5%) Topical	C	Apply to lesions at first sign of attack	Every 4 hours	5-10 days

- Treatment using oral medication; for non-genital ulcers

Medicine Name	Level	Dose	Frequency	Duration
Adults:				
Aciclovir po	HOS	400mg	Every 5 hours	5 days (longer if new lesions appear)
Children		1 month-1 year=200mg		
Aciclovir po	HOS	2-17 years=400mg	Every 5 hours	5 days (longer if new lesions appear)

Treatment using oral medication; for genital ulcers

Medicine Name	Level	Dose	Frequency	Duration
Adults				
Aciclovir po	HOS	400mg	Every 8 hours	5 days (longer if new lesions appear)
If severe, adults				
Aciclovir iv	HOS	5mg/kg	Every 8 hours	5 days

9.3.2: Herpes Zoster (Shingles)

An acute infection primarily of the dorsal root ganglia. It is characterized by a vesicular eruption in areas supplied by peripheral sensory nerves in the affected root ganglia. This infection is caused by Varicella zoster virus, usually reactivated from the posterior root ganglia by reduced immunity

Clinical Presentation:

- Chills, fever and malaise
- Crops of vesicles, which are very painful, typically unilateral, and involve the side supplied by affected nerve

Differential diagnosis

- Chickenpox
- Herpes simplex

Treatment

- Symptomatic and supportive treatment
- Clean the lesions with an antiseptic solution, e.g. chlorhexidine solution 0.05%
- Apply calamine lotion 2-3 times daily

Medicine Name	Level	Dose	Frequency	Duration
Adults Aciclovir po	C	800mg	Every 5 hours	7-10 days
Children		1 month – 1 year = 200mg	Every 6 hours	5 days
Aciclovir po	C	2 – years = 400mg	Every 6 hours	5 days
		6-11 years = 800mg	Every 6 hours	5 days
		12-17 years = 800mg	Every 5 hours	5 days

For infections involving the eye refer to an Eye Specialist. Advise patient to take plenty of fluids when taking Aciclovir to prevent renal complications.

9.4: Other Skin Diseases

9.4.1. (a) Eczema (Dermatitis)

Eczema is an itchy reaction of the skin to a number of factors, either exogenous (e.g. contact dermatitis) or endogenous (e.g. seborrhea and atopy). Papules, blisters (vesicles, pustules and bullae) and oozing characterize the lesions when acute. There is thickening (lichenification), prominent skin lines and scaling when chronic.

9.4.1 (b) Atopic Eczema

This presents as a remitting and relapsing itchy condition of the face, wrists, ankles, cubital and popliteal fossae. Onset is in childhood often with a familial background of atopy (asthma, hay fever, eosinophilia and similar skin problem). Spontaneous resolution often occurs by teenage.

9.4.1 (c) Seborrheic Eczema and Dandruff

This presents as a scaly weeping rash of the scalp, eyebrows, perinasal and periauricular skins; sometimes it presents as hypopigmented macules.

It occurs in infancy, adolescence or adulthood. It may be associated with dandruff and Pityrosporum ovale infection. Extensive forms are associated with immunosuppressive states, particularly AIDS.

9.4.1 (d) Contact Eczema

It may be an irritant (concentration dependent) or allergic (idiosyncratic) reaction to specific chemicals such as metals, rubber etc. In contrast to the endogenous types, the skin reaction is confined to the areas directly in contact with the offending chemical.

Cause

- Allergic dermatitis: Allergic reaction to food, chemicals, or other substances
- Atopic dermatitis: Unknown
- Immunosuppression

Clinical Presentation

- Vesicles (acute stage)
- Itchy rash commonly with dry rough scaly skin - Scaly weeping rash
- Hypo-pigmented macules

- Erythema, Fissures, Scaly rash
- Lichenification (thickened skin)

Differential diagnosis

- Seborrheic dermatitis

Treatment

- Remove the cause if known
- Emollients like aqueous cream and 2% salicylic acid ointment can be used in atopic eczema.

Medicine Name	Level	Dose (adult and child)	Frequency	Duration
Hydrocortisone cream 1%	C	Apply to affected area	Every 12 hours	5 days
If no improvement, switch to				
Betamethasone cream 0.1%	HC	Apply sparingly to affected area	Every 12 hours	Until improvement

9.4.2: Psoriasis

Acute infection of the outer layer of the skin caused by Streptococcus or Staphylococcus infection.

Clinical Presentation

- Common in children
- Lesions usually on face, head, and hands as small brown crusts on an erythematous base
- Large flaccid bullae containing pus and serum are formed commonly in the axilla and groin

Diagnosis

- Pemphigus (differential)

Investigations

- Pus swab for Gram stain
- Culture and Sensitivity

Management

- Clean affected area with chlorhexidine solution 0.05% or hydrogen peroxide solution 6%, and apply GV on the cleaned areas use of antibiotics if infection becomes systemic. Cloxacillin po

9.4.3: Scabies

Contagious skin disease associated with severe itch caused by a parasitic mite, *Sarcopterus scabiei hominis*. It is transmitted by close personal contact

Clinical Presentation

- Intense pruritic eruption of wheals, papules, vesicles, and thread-like burrows
- Common in flexural areas, i.e. wrists and inter-digital creases, axillae, nipples, buttocks, and genitalia
- Secondary infection is common and may lead to glomerulonephritis

Diagnosis: Differential

- Papular urticarial, Chickenpox
- Pyoderma, Drug eruptions
- Atopic dermatitis, Seborrheic dermatitis, Onchocerciasis

Treatment

- Wash (scrub) the body well
- Apply benzyl benzoate lotion 25% to the whole body from the scalp to the soles of the feet but taking care to avoid contact with the eyes
- Repeat twice more with an interval of 24 hours between applications and no bathing for 72 hours after the first application

- For children, dilute the lotion with an equal part of water before application to give a strength of 12.5%

Supporting measures:

- Wash patient's clothing and bedding, and use a hot iron to eliminate the eggs or (if this is not possible) leave items outside exposed to the air to prevent reinfestation

Prevention

- Personal hygiene (washing clothes and regular bathing)
- Avoid close contact with infected people

9.4.4: Urticaria or Skin Allergy

- An acute, sub-acute or chronic inflammation of the skin, caused by endogenous or exogenous agents. Urticaria is an itchy skin rash.

Causes

- Endogenous: Familial, also associated with other allergic diseases
- Exogenous: Agents include sunlight, chemicals, certain foods, insect bites

Clinical Presentation

- Inflammation of the skin with vesicles, redness, edema, oozing, or wheals that may/may not be well demarcated
- Contact dermatitis: May be localized to the point of contact or generalized
- Seborrheic dermatitis: Presents with excessive dandruff, papules and crusting
- Nummular dermatitis: Presents with coin-shaped lesions that may be wide spread

Diagnosis

- Fungal and bacterial infections of the skin
- Helminth infestations

Treatment (5-day course)

- Establish the cause and treat accordingly
- Identify what patient is allergic to by a process of elimination
- Apply calamine lotion 15% 1-2 times daily
- Give an analgesic e.g. paracetamol for any pain or discomfort as necessary.
- *Avoid acetylsalicylic acid*
- *Give Adult:*
  - ***chlorphenamine 4 mg every 8 hours*** *&* *Child:* ***Chlorpheniramine 2 mg per dose***
- *Alternative:*
  - ***promethazine hydrochloride 25mg at night****; increase to every 12 hours if necessary - Promethazine Child: 1mg/kg daily in 1-2 divided doses*

Prevention

- Avoid contact with known allergens
- Treat helminth infections

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10. DISEASES OF THE CARDIOVASCULAR SYSTEM

10.1: Arrhythmias

Arrhythmia is loss of cardiac rhythm, especially irregularity of heartbeat. These can be classified into supraventricular arrhythmias, ventricular arrhythmias, and bradyarrhythmia's.

a. Supraventricular Arrhythmias

Common supraventricular tachycardias requiring drug treatment are atrial fibrillation (AF), atrial flutter, and paroxysmal supraventricular tachycardia (PSVT). Arrhythmias that do not require drug therapy are premature atrial complexes, sinus arrhythmia, and sinus tachycardia

- *Atrial Fibrillation and Atrial Flutter:* Patient has extremely rapid (400–600 atrial beats/min) and disorganized atrial activation.
- Paroxysmal Supraventricular Tachycardia caused by reentry

b. Ventricular Arrhythmias

- *Premature Ventricular Complexes:* Premature ventricular complexes (PVCs) can occur in patients with or without heart disease.
- *Ventricular Tachycardia:* Ventricular tachycardia (VT) is defined by three or more repetitive PVCs occurring at a rate greater than 100 beats/min. It is a wide QRS tachycardia that may result acutely from severe electrolyte abnormalities (hypokalemia or hypomagnesemia), hypoxia, drug toxicity (eg, digoxin), or (most commonly) during an acute myocardial infarction (MI) or ischemia complicated by heart failure (HF).
- *Ventricular Proarrhythmia:* refers to the development of a significant new arrhythmia
- Ventricular Fibrillation (VF) is electrical anarchy of the ventricle resulting in no cardia output and cardiovascular collapse.

c. Bradyarrhythmias

Sinus bradyarrhythmias (heart rate <60 beats/min) are common, especially in young, athletically active individuals, and are usually asymptomatic and do not require intervention.

Causes

- Rheumatic heart disease; Hypertension; Thyrotoxicosis; Cardiomyopathy
- Electrolyte abnormalities (hypokalemia); Ischemic heart disease; Pericardial disease
- Excessive ingestion of caffeine (e.g. in tea or coffee)

Clinical Presentation

- Palpitation; Dizziness; Chest discomfort; difficulty in breathing
- Sudden collapse; Sudden death; fast pulse; Regular (sinus tachycardia or paroxysmal atrial tachycardia)
- Irregularly irregular (atrial fibrillation, atrial flutter, frequent ventricular ectopics); Slow pulse
  - Regular (sinus bradycardia, complete heart block)
  - Irregular (sick sinus syndrome)
  - Pulse deficit (apical rate faster than radial pulse rate): Atrial fibrillation, atrial flutter

Diagnosis

- Electrocardiogram (ECG)
- Cardiac auscultation can reveal the irregularly irregular pulse characteristic of AF.
- Based on ECG findings, AV block is usually categorized as 1st, 2nd, 3rd degree AV block.

Treatment

- *Objectives*
  - To control the heart rate and restore sinus rhythm
  - To control ventricular rate and prevent or treat associated complications
  - To treat the underlying condition e.g. thyrotoxicosis
  - To prevent thromboembolism

Treatment

- *Non-pharmacological treatment*
  - Reassure the patient
  - Avoid excessive intake of alcohol, coffee or tea (if these are possible precipitating factors)
  - Massage of the carotid sinus on one side for a few seconds.
  - This may terminate an attack of paroxysmal supraventricular tachycardia.
  - If the duration is less than 48 hours, patients may need immediate cardioversion

Management of Atrial fibrillation

Medicine Name	Level	Dose	Frequency	Duration
Atenolol po	HC	50-100 mg	Once a day	As required
or				
Verapamil po	HC	40-120 mg	Every 8 hours	Review patient

**Refer patient to specialist if arrhythmia lasts for more than 48 hours*

If there is poor control of ventricular response, add:

Medicine Name	Level	Dose	Frequency	Duration
Digoxin po	HOS	0.25-0.5 mg then; 0.125-0.25 mg once a day	Every 8 hours Every 24 hours	First 24 hours then; long term

For chronic atrial fibrillation:

Medicine Name	Level	Dose	Frequency	Duration
Warfarin po	HOS	10 mg, then adjust according to INR	Once a day	3 days

Paroxysmal supraventricular tachycardia

Medicine Name	Level	Dose	Frequency	Duration
Verapamil po	HC	40-120 mg	Every 8 hours	Long term

10.2 Congestive Heart Failure

Heart failure (HF) is a progressive clinical syndrome caused by inability of the heart to pump sufficient blood to meet the body's metabolic needs. HF can result from any disorder that reduces ventricular filling (diastolic dysfunction) and/or myocardial contractility (systolic dysfunction). ***While there are many forms of heart failure, in this current version of the guidelines we only discuss management of heart failure where congestion symptoms occur, commonly known as Congestive Heart Failure***

Causes

- Systolic dysfunction (decreased contractility) is caused by:
  - Reduced muscle mass (e.g., myocardial infarction [MI])
  - Dilated cardiomyopathies
- Ventricular hypertrophy caused by:
  - pressure overload (e.g., systemic or pulmonary hypertension & aortic/pulmonic valve stenosis)

- volume overload (e.g., valvular regurgitation, shunts, high-output states)

- Diastolic dysfunction (restriction in ventricular filling) are:
  - increased ventricular stiffness
  - infiltrative myocardial diseases
  - myocardial ischemia and MI
  - mitral or tricuspid valve stenosis
  - pericardial disease (e.g, pericarditis and pericardial tamponade).

The leading causes of HF are coronary artery disease and hypertension. Medicines may precipitate or exacerbate HF because of their negative inotropic, cardiotoxic, or sodium- and water-retaining properties.

Clinical Presentation

- Left Heart Failure
  - Breathlessness on exertion; Breathlessness on lying flat; Intermittent breathlessness at night
  - Wheezing; Cough with frothy blood-stained sputum; Easy fatigability
  - Tachypnea, Tachycardia; Basal crepitations, Occasional rhonchi
  - Gallop rhythm; Displaced apex beat; Cardiac murmur
- Right Heart Failure
  - Swelling of the feet and lower extremities; Abdominal swelling and discomfort
  - Tachycardia; Pitting pedal edema; Ascites
  - Tender, Smooth, soft hepatomegaly
  - Raised jugular venous pressure; Gallop rhythm in children
  - Failure to thrive and difficulty in feeding

Diagnosis

- FBC; Blood urea; electrolytes and creatinine; Thyroid function tests; Liver function test
- Cardiac enzymes; if myocardial infarction is suspected
- ECG; Chest X-ray; Echocardiography

Treatment - *Objectives*

- To relieve symptoms and improve quality of life
- To improve cardiac output
- To treat the precipitating cause
- To treat complications
- *Non-pharmacological treatment*
  - Reduce salt intake; Reduce weight in overweight and obese individuals
  - Avoid alcohol; Avoid smoking
  - Encourage moderate exercise

Treatment of Moderate Heart Failure

Medicine Name	Level	Dose	Frequency	Duration
Adults: Furosemide po	C	40-80 mg	Every 12 hours	Daily
plus, Enalapril po	HC	5-20 mg	Once a day	Daily
plus, Spironolactone	HOS	25-50 mg	Once a day	Daily
+/- Potassium Chloride	HC	600 mg-1.2 g	Once a day	Daily
+/- Digoxin po	HOS	0.25 mg-0.5 mg, then 0.125-0.25mg	Every 8 hours Once a day	First 24 hours Daily

*if enalapril is not available patient can be switched to captopril in the short term, but patient should be monitored for rebound congestive heart failure

If patient has edema and is bed ridden add;

Medicine	Level	Dose	Frequency	Duration
Heparin sc	HOS	5000 units	Every 8 hours	As required

If patient has acute pulmonary edema: Prop up the patient in bed and give 40% oxygen by mask and,

Medicine	Level	Dose	Frequency	Duration
Morphine iv	HOS	5-10 mg	Slowly over 1-2 minutes; repeat every 15 minutes	
plus, Furosemide iv	HC	40-80 mg	Repeat as required	

10.3 Hypertension

Adults

Hypertension is defined as persistently elevated arterial blood pressure (BP) isolated systolic hypertension is diastolic blood pressure (DBP) values less than 90 mm Hg and systolic blood pressure (SBP) values of 140 mm Hg or more.

Hypertensive crisis (BP >180/120 mm Hg) may be categorized as hypertensive emergency (extreme BP elevation with acute or progressing target-organ damage) or hypertensive urgency (high BP elevation without acute or progressing target-organ injury). This is a condition in which the blood pressure of an adult is persistently higher than 140/90 mmHg in a non-diabetic, or above 130/80 mmHg in a diabetic, based on the average of two or more properly measured blood pressure readings.

Causes

- *Primary hypertension*: In the majority of patients no specific underlying cause is identified. Risk factors associated with this type of hypertension include increasing age, family history, excess body weight, excessive alcohol intake.
- *Humoral abnormalities* involving the renin–angiotensin–aldosterone system (RAAS), natriuretic hormone, or insulin resistance and hyperinsulinemia;
- *Secondary hypertension*: In about 10% of cases, hypertension may be due to a kidney disease, endocrine disorder, renal artery stenosis or coarctation of the aorta.

Main causes of death are cerebrovascular accidents, cardiovascular (CV) events, and renal failure. Probability of premature death correlates with the severity of BP elevation.

Clinical Presentation

Patient can asymptomatic at the initial stages. Occasionally, patients may complain of:

- Headache; Palpitation; Dizziness
- Easy fatigability; Blood pressure of >140/90 mmHg

Diagnosis

- FBC, Urinalysis
- Blood urea, electrolytes and creatinine
- Blood glucose, Serum lipids, Serum uric acid; Chest X-ray, ECG

Table 10.1 Classification of Blood Pressure in Adults

Classification	Systolic (mm Hg)		Diastolic (mm Hg)
Normal	≤ 130	**and**	< 80
Prehypertension	130 - 139	**or**	80-89
Stage 1 hypertension	140 – 159	**or**	90-99

Stage 2 hypertension	≥ 160	**or**	≥ 100

Treatment

- *Objectives*
  - To reduce blood pressure levels to 140/90 mmHg or less (130/80 mmHg or less in diabetics)
  - To prevent cardiovascular, cerebrovascular and renal complications
  - To identify and manage secondary hypertension appropriately
- *Non-pharmacological treatment*
  - Reduce salt intake
  - Reduce animal fat intake
  - Ensure regular fruit and vegetable intake
  - Weight reduction in obese and overweight individuals
  - Regular exercise e.g. brisk walking for 30 minutes 3 times a week
  - Reduction in alcohol consumption
  - Cessation of smoking

First Line Management of Hypertension - Thiazides

Medicine Name	Level	Dose	Frequency	Duration
Hydrochlorothiazide po	C	12.5 mg-25 mg	Once a day	Daily

The medicine causes an increase in plasma glucose, uric acid, cholesterol and reduced potassium and magnesium.

First Line Management of Hypertension –Calcium Channel Blockers

Medicine Name	Level	Dose	Frequency	Duration
Nifedipine (slow release) po	C	10-40 mg	Every 12 hours	Daily
or				
Amlodipine po	HOS	5-10 mg	Once a day	Daily

Vasodilator effects such as headache and facial flushing can occur; peripheral edema

Second Line Management of Hypertension-ACE Inhibitors

Medicine Name	Level	Dose	Frequency	Duration
Enalapril po	HC	5-40 mg	Once a day	Daily
or				
Lisinopril po	HOS	5-40 mg	Once a day	Daily

Adverse events include cough in 10-25%, angioedema, postural hypotension and occasionally syncope, particularly in patients with a low plasma volume due to diuretic treatment. All ACE inhibitors can cause excessive hypotension and renal failure.
An alternative to ACE inhibitor when cough develops are Angiotensin-receptor blockers such as Losartan.
Caution: concomitant potassium supplements or potassium retaining medicines should be avoided, or used only with careful monitoring of serum potassium

Second Line Management of Hypertension-Angiotensin Receptor Blockers

Medicine Name	Level	Dose	Frequency	Duration
Losartan po	HOS	25-100 mg	Every 12 hours	Daily

Second Line Management of Hypertension-Beta Blockers

Medicine Name	Level	Dose	Frequency	Duration
Atenolol po	HC	50 mg	Once a day	Daily

Unwanted side effects include precipitation or exacerbation of asthma, heart failure, impaired glucose control, fatigue and peripheral vascular disease.

Severe Hypertension (Diastolic >120mmHg)

Emergency intravenous therapy or sublingual nifedipine is rarely required and is potentially dangerous (may result in stroke, renal failure or myocardial infarction).

Indications for emergency treatment:

- Left ventricular failure with pulmonary edema
- Hypertensive encephalopathy; Acute aortic dissection; Severe pre-eclampsia
- Recent stroke requires caution as rapid lowering of blood pressure may worsen neurological deficit
- Sub-lingual nifedipine should be restricted for severe hypertension with aortic dissection.

Medicine Name	Level	Dose	Frequency	Duration
Hydralazine im/iv	HC	20 mg	As needed until desired BP is reached	
then, hydralazine po	HC	100-200mg	Once daily	

10.4 Rheumatic Heart Disease

This is a febrile illness presenting with inflammation of several systems, mainly the joints and heart; cause permanent damage to the heart in developing countries.

The onset of symptoms occurs 1-3 weeks after the throat infection.

Cause:

It is a complication of untreated or inadequately treated Group A streptococcal infection of the throat.

Symptoms

- Persistent fever
- Joint pain which moves from one joint to another (knees, ankles, wrists, elbows)
- Palpitations, Easy fatigability, Chest pain

Diagnosis

- FBC (raised white cell count); ESR - raised
- Sickling status; Chest X-ray (heart may be enlarged)
- Throat swab for culture
- Electrocardiogram, Echocardiogram

Treatment

Medicine Name	Level	Dose	Frequency	Duration
***Adult*:** Benzathine Penicillin im (1.44g=2.4MU)	C	2.4 MU (1.44g)	monthly	21-30 years
Child<12 years: Benzathine Penicillin im	C	1.2 MU (0.72g)	monthly	21-30 years
or				
Amoxicillin po	C	250 mg	Once a day	lifelong
In penicillin allergy use;				
Adults: Erythromycin po	C	250 mg	Every 12 hours	21-30 years
child<12 years: Erythromycin po	C	125-250 mg	Every 12 hours	21-30 years

10.5 Venous Thromboembolism

Venous thromboembolism (VTE) results from clot formation in the venous circulation and is manifested as *deep vein thrombosis* (DVT) and *pulmonary embolism* (PE).

Clinical Presentation

Many patients never develop symptoms from the acute event

Symptoms of DVT:

- Unilateral leg swelling, pain
- Tenderness, erythema, and warmth
- Physical signs may include a palpable cord and a positive Homan sign.

Symptoms of PE:

- Cough, chest pain or tightness
- Shortness of breath palpitations, hemoptysis
- Dizziness, or lightheadedness

Signs of PE:

- Tachypnea, tachycardia
- Diaphoresis, cyanosis, hypotension, shock, and cardiovascular collapse
- Post-thrombotic syndrome may produce chronic lower extremity swelling, pain, tenderness, skin discoloration, and ulceration.

Diagnosis

- Identifying risk factors (e.g., increased age, major surgery, previous VTE, trauma, malignancy, hypercoagulable states, medicine therapy).
- Radiographic contrast studies (venography, pulmonary angiography) are the most accurate and reliable method for VTE diagnosis.
- Noninvasive tests (e.g., compression ultrasound, computed tomography scan, ventilation-perfusion scan) are often used for initial evaluation of patients with suspected VTE.

Treatment *– Goals*

- to prevent development of PE and post-thrombotic syndrome
- reduce morbidity and mortality from the acute event
- minimize adverse effects and cost of treatment.

Medicine Name	Level	Dose	Frequency	Duration
Heparin iv	HOS	5000-10000 IU initially, then boluses of 25000-40000IU/day	Every 6-8 hours	
plus, Warfarin po	HOS	15mg 1st day then, 2.5-7.5mg/day	7.5 mg every 12 hours Single dose	One day Once

Watch for bleeding, and monitor prothrombin time.

Antidotes

- Protamine sulfate (50 mg/5 ml ampoule) is a heparin ANTIDOTE (to reverse heparin toxicity); 50 mg of protamine sulfate reverses the action of 5,000 IU of heparin.
- Phytomenadione/vitamin K (10 mg/ml/ampoule) is a warfarin ANTIDOTE. Give 2-20 mg by slow IV

10.6 Angina Pectoris

Minimize risk factors with particular attention to:

- cessation of smoking; weight reduction if obese;
- control of hypertension.
- control of hypercholesterolemia
- control of diabetes

- encouragement of exercise and minimize stressful life style

Treatment of Stable angina/ infrequent attacks:

Medicine Name	Level	Dose	Frequency	Duration
*Aspirin po	C	75-150 mg	Once a day	daily
plus, **Glyceryl Trinitrate sublingual	HC	500 micrograms	Not more than 3 tablets every 15 minutes	

**Aspirin is contraindicated in patient with known or previous history of ulcers*

********Glyceryl trinitrate deteriorates on storage, should be kept in original container and discarded 3 months after opening*

Treatment of Stable angina/ infrequent attacks:

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	75-150 mg	Once a day	daily
plus, Isosorbide Dinitrate po	HC	10-40 mg	Every 8 hours	daily
If there is no response;				
Atenolol po	HC	50-100 mg	Once a day	daily
+/- Nifedipine slow release	C	10-20 mg	Every 12 hours	daily

Treatment of Unstable Angina: This is angina of new onset or brought by minimum exertion.

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	75-150 mg	Once a day	daily
and Isosorbide Dinitrate po	HC	10-40 mg	Every 8 hours	daily

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11. DISEASES OF THE NERVOUS SYSTEM AND MENTAL DISORDERS

11.1: Neurological Disorders

11.1.1: Evaluation of Neurologic Illness

The clinical neurologic history and examination are very important in neurologic diagnosis and management. The patient's history can determine the main symptoms, the mode of onset (gradual or sudden), progression over time (maximal at onset or steadily gaining intensity), and associated illnesses/risk factors.

11.1.2: Epilepsy

Epilepsy is a condition characterized by *repeated seizures* due to a disorder of the brain cells. Seizures are caused by:

- *Metabolic disorders*: hypoglycemia, electrolyte imbalance, hyperbilirubinemia
- *Infections*: meningitis, encephalitis, cerebral malaria, Cysticercosis, febrile illness, tetanus
- *Trauma*: head injury, birth trauma, hypothermia, anoxia
- *Toxins*: alcohol withdrawal, drug withdrawals, lead poisoning
- Cerebral edema
- *Congenital*: tuberous sclerosis, microcephaly, hydrocephalus
- Some factors that precipitate seizures include:
  - Flashing lights (resulting in reflex epilepsy); Hyperventilation
  - Lower alertness, sleep itself and lack of enough sleep
  - Emotion, Physical stress
  - Special smells, sounds or sensations of touch
  - Alcohol, hormonal changes, e.g., during menses
  - High fever, Overhydration

Types of Seizures

- *Partial Seizures (seizures beginning locally)*
  - i. Simple partial seizures (consciousness not impaired)
    - With motor symptoms
    - With somatosensory or special sensory symptoms
    - With autonomic symptoms and psychic symptoms
  - ii. Complex partial seizures (with impairment of consciousness)
    - Beginning as simple partial seizures and progressing to impairment of consciousness
      - With no other features
      - With automatisms
    - With impairment of consciousness at onset
      - With no other features
      - With automatisms
  - iii. Partial seizures secondary generalized
- *Generalized Seizures (bilaterally symmetrical and without local onset)*
  - i. Absence seizures and Atypical absence seizures
  - ii. Myoclonic seizures; Clonic seizures
  - iii. Tonic seizures
  - iv. Tonic-clonic seizures; Atonic seizures

First line treatment for Partial Seizures:

Medicine Name	Level	Dose	Frequency	Duration
Adult: Carbamazepine po	C	400 mg	Every 12 hours	4 weeks
Child: Carbamazepine po	C	10 mg/kg	Every 12 hours	4 weeks
or Phenobarbitone po (for neonates)	C	Loading dose: 20mg/kg, then maintenance 5 mg/kg	Every 24 hours	

Second line treatment*: If seizures persist add:*

Medicine Name	Level	Dose	Frequency	Duration
Phenytoin po	C	300 mg	Every 12 hours	4 weeks

Management of Generalized Seizures

Medicine Name	Level	Dose	Frequency	Duration
Adult: Phenytoin po	C	100 mg	Every 8 hours	Continual
or Carbamazepine po	C	200 mg	Every 12 hours	Continual
or Phenobarbitone po	C	60 mg	Every 12 hours	Continual
Child Phenytoin po		5 mg/kg (max=300mg per day)	Every 12 hours	Continual
or Carbamazepine po	C	10-20 mg.kg	Every 12 hours	Continual
or Phenobarbitone po	C	8 mg/kg	Every 12 hours	Continual

Note: Treat for at least 2 yrs. If there are no further epileptic attacks 2 yrs after the last attack, taper off the dose before stopping.

11.1.3: Status Epilepticus

A seizure or a series of seizures continuing for more than 30 minutes, or recurrent seizures without regaining consciousness in-between, for more than 30 minutes. Many cases do not occur in known epileptic patients – always consider possible underlying causes such as stroke or brain abscess.

Prescribing diazepam 10mg i.v. every time a seizure occurs should be avoided.

Medicine Name	Level	Dose	Frequency	Duration
Diazepam iv (not im)	C	10 mg	Over 2-3 minutes	Repeat after 5 minutes if no response

Monitor for depressed respiration

If seizures persist after 30 minutes, give:

Medicine Name	Level	Dose	Frequency	Duration
Phenobarbitone iv/im	HOS	10-15 mg/kg/minute of infusion	Infusion given over ten minutes	

Status Epilepticus in Children:

First protect the airway and give oxygen if available. At clinic level (C) give:

Medicine Name	Level	Dose	Frequency	Duration
Dextrose 50% iv	C	10-20 ml	Once only	
plus, Diazepam pr	C	5 mg	Repeat once only	

11.1.4: Headache

This may be primary or secondary:

- In secondary headache or facial pain treat specifically for the underlying cause (e.g. meningitis, sinusitis, malaria) and use aspirin 600mg every 4 hours as analgesic.

Primary headache is either of tension type (muscle contraction headache), migraine, or a combination or atypical.

Treatment of primary headache

Tension -Bilateral; dull; band-like, worse as the day wears on; no nausea; frontal or occipital in site; often daily; can continue activities.

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	600 mg	Every 4 hours	When needed

Do not exceed 10 days of continuous dosing.

Social circumstances may precipitate these headaches; counselling in relaxation therapy (muscle relaxation) will help. Lifestyle changes may help (lunchtime rest, more sleep), and physiotherapy if local muscle spasm and tenderness.

Avoid opiates (e.g. codeine compounds) and benzodiazepines as they particularly can cause rebound headache and habituation.

If headache persists for more than six weeks, add:

Medicine Name	Level	Dose	Frequency	Duration
Amitriptyline po	C	25-150 mg	At night	2 months

Cluster Headaches

Medicine Name	Level	Dose	Frequency	Duration
Amitriptyline po	C	25 mg	At night	When needed

11.1.5 Migraine

Characteristics

- Unilateral (occasionally bilateral) throbbing attacks
- Last hours to days; with nausea ± vomiting
- Photophobia, sometimes preceded by visual aura; often have to lie down.

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	600 mg	Every 4 hours	When needed
or , Paracetamol	C	1 g	Every 6 hours	When needed
plus, Metoclopramide po	C	10 mg	One dose at onset	
plus, Ergotamine po	C	1 mg	At onset, repeat after one hour if needed	

If the migraines are disabling:

Medicine Name	Level	Dose	Frequency	Duration
Adult: Propranolol po	HC	20 mg	Every 8 hours	3 months
or, Amitriptyline po	C	25 mg	At night	3 months
Child*:* Propranolol po	HC	10 mg	Every 8 hours	3 months

- Ergotamine should not be taken more than twice in 24 hours, with a minimum of two days before the next dose, and not as a prophylactic treatment (excess ergotamine causes ergotism *severe headache, vomiting, gangrene of extremities and rebound headache*). It should be avoided in pregnancy.
- Ergotamine should not be used in children under 12 years

11.1.6: Pain Management

Pain is a subjective, unpleasant, sensory, and emotional experience associated with actual or potential tissue damage or described in terms of such damage. It may be classified as acute, chronic, or cancer pain.

Clinical Presentation

- Patients may be in acute distress or display no noticeable suffering.
- Acute pain can be sharp or dull, burning, shock-like, tingling, shooting, radiating, fluctuating in intensity, varying in location, and occurring in a temporal relationship with an obvious noxious stimulus
- Chronic pain can present similarly and often occurs without a temporal relationship with a noxious stimulus. Over time, the chronic pain presentation may change (e.g., sharp to dull, obvious to vague).
- Acute pain can cause hypertension, tachycardia, diaphoresis, mydriasis, and pallor. These signs are seldom present in chronic pain.
- In acute pain, outcomes of treatment are generally predictable. In chronic pain, comorbid conditions are often present, and outcomes of treatment are often unpredictable.

Diagnosis

- Pain is always subjective; thus, pain is best diagnosed based on patient description, history, and physical examination
- Mental factors may lower the pain threshold (e.g., anxiety, depression, fatigue, anger, and fear). Behavioral, cognitive, social, and cultural factors may also affect the pain experience.

Treatment *- Goals of Treatment:*

- To minimize pain, maximize functioning
- provide reasonable comfort and quality of life at the lowest effective analgesic dose.
- With chronic pain, goals may include rehabilitation and resolution of psychosocial issues.

First line:

Medicine Name	Level	Dose	Frequency	Duration
Aspirin po	C	600 mg	Every 4 hours	3 days
or Paracetamol	C	1 g	Every 6 hours	3 days
or Ibuprofen	C	200-400 mg	Every 6 hours	3 days

For moderate pain:

Medicine Name	Level	Dose	Frequency	Duration
Diclofenac po	C	25-50 mg	Every 8-12 hours	5 days
or Ibuprofen po	C	200-400 mg	Every 8 hours	5 days

i. Severe Pain

Morphine is the medicine of choice preferably administered through the oral route (alternative rectally or parenterally (s.c., i.m., i.v.)). Morphine is always given 4 hourly, and a "breakthrough pain" dose may be added at ANY time, the dose added being 60 – 100% of the current 4-hrly dose.

Medicine Name	Level	Dose	Frequency	Duration
Morphine im	HOS	10 mg	Every 4 hours	Review pain control
or Morphine po	HOS	5-10 mg	Every 4 hours	Review pain management

If patient experiences severe nausea and vomiting due to morphine:

Medicine Name	Level	Dose	Frequency	Duration
Metoclopramide po	C	10-20 mg	Every 8 hours	3 days

If patient complaints of drowsiness, dizziness, confusion; reassure the patient to continue treatment as the effects go away after three days.

In the rare case of an allergy to Morphine:

Medicine Name	Level	Dose	Frequency	Duration
Pethidine im	HOS	50-100 mg	Every 2-3 hours	When needed

ii. ***Neuropathic Pain*** (trigeminal neuralgia, post herpetic neuralgia, peripheral neuralgia)

Medicine Name	Level	Dose	Frequency	Duration
Carbamazepine po	C	100 mg	Every 12 hours	When needed
+/- Amitriptyline po	C	25-75mg	Once at night	When needed

iii. Pain in Children

Children do not complain of pain as such regular assessment for pain is important

Mild Pain

Medicine Name	Level	Dose	Frequency	Duration
Paracetamol po/pr	C	100 mg	Every 4-6 hours	3 days
or Ibuprofen po	C	10 mg/kg	Every 8 hours	3 days

Moderate Pain

Medicine Name	Level	Dose	Frequency	Duration
Paracetamol po/pr	C	100 mg	Every 4-6 hours	3 days
or Ibuprofen po	C	10 mg/kg	Every 8 hours	3 days

11.1.7: Parkinson's Disease

Clinical Presentation

PD develops insidiously and progresses slowly. It is relatively asymptomatic until profound depletion (70%–80%) of substantia nigral pars compacta neurons has occurred.

Initial symptoms may be sensory, but as the disease progresses, one or more classic primary features presents:

- resting tremor
- rigidity
- bradykinesia
- postural instability that may lead to falls

Diagnosis

Presence of bradykinesia (along with resting tremor and/or rigidity), prominent asymmetry, and a positive response to dopaminergic medication.

Other symptoms may include: decreased dexterity, difficulty arising from a chair, postural instability, festinating gait, dysarthria, difficulty swallowing, reduced facial expression, freezing at initiation of movement, hypophonia, micrographia, bladder disturbances, constipation, blood pressure changes, dementia, anxiety, depression, sleepiness, insomnia, obstructive sleep apnea.

Treatment *- Goals of Treatment:*

- minimize symptoms, disability, and side effects while maintaining quality of life

General Approach for Management of Tremors

Medicine Name	Level	Dose	Frequency	Duration
Benzhexol po	C	2-5 mg	Every 8 hours	Until symptoms subside

When patient requires treatment with Levodopa:

Medicine Name	Level	Dose	Frequency	Duration
Levodopa (250 mg) + Carbidopa (25 mg)	HOS	¼ tablet	Every 8 hours	

11.2: Psychiatric Disorders

11.2.1: Anxiety Neurosis

11.2.1.1: Generalized Anxiety Disorders

Excessive anxiety and worry about events or activities occurring on most days, for at least 6 months.

Causes

- Life experiences
- Environmental factors
- Personality
- Genetics

Clinical Presentation

- Excessive anxiety and worry occurring on most days, for at least 6 months
- The anxiety or worry is associated with at least 3 of the following
  - Muscle tension (often reported as pain in various parts like neck, trunk or headaches)
  - Crawling and burning sensation around the body
  - Restlessness or feeling on edge
  - Being easily fatigued
  - Difficulty concentrating or mind going blank; Irritability
  - Sleep disturbance (difficulty falling asleep or frequent wakening); Palpitations
  - Restlessness; Sweating
  - Anxious mood; Tachycardia

Treatment – *Objectives*

- To reduce anxiety
- To attain relief of somatic symptoms

Treatment - *Non-pharmacological treatment*

- Reassurance about the absence of physical disease once they are ruled out
- Teach relaxation methods
- Encourage regular exercise
- Encourage healthy social activities
- Psychotherapy

Treatment – *Pharmacological*

Medicine Name	Level	Dose	Frequency	Duration
Diazepam po	C	2-5 mg	Every 12 hours	2 weeks
or, Propranolol po	HC	20 – 80 mg	Every 12 hours	2 weeks

11.2.2: Panic Disorders

A pattern of recurrent unexpected attacks of intense fear or discomfort over a discrete period. Panic disorders are accompanied by persistent concern about having another attack or worrying about implications of having an attack.

Causes: Contributing factors e.g., Stress, Genetics

Clinical Presentation

- Fear of dying or going 'crazy', palpitations, pounding heart or rapid heart rate
- Trembling or shaking, sensation of shortness of breath, feeling of choking
- Chest pain or discomfort, feeling dizzy, unsteady or faint
- Numbness or tingling sensations, chills or hot flushes
- Derealization (feeling of unreality) or depersonalization (feeling detached from oneself)
- Nausea or abdominal distress

Treatment *- Non-pharmacological treatment*

- Rebreathing into a paper bag. (Do not use a polythene bag)
- Panic disorder patients should be advised to eliminate caffeine containing foods e.g., coffee, tea, cola and chocolates, from their diet as they tend to worsen anxiety.
- Relaxation Training
- Cognitive Therapy

Treatment *- Pharmacological treatment*

Medicine Name	Level	Dose	Frequency	Duration
Diazepam po	C	5-10 mg	Once at night	7 days (maximum)
or, Fluoxetine po	C	20 mg	One dose in the morning	7 days (maximum)

11.2.3: Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is a chronic lifelong condition usually starting from childhood. It is characterized by inattention, poor concentration and hyperactivity or impulsivity that interferes with functioning at home and school and in relationships. The symptoms of ADHD must be present most of the time and in at least 2 different settings, for example, at home and school. The child must have these symptoms for at least 6 months and they must be more prominent than others of their age.

Causes

There may be a family history and sometimes difficulties with the child's birth

Clinical Presentation

- Easily distracted
- May not follow instructions or listen when spoken to
- Leaves tasks unfinished
- Makes careless mistakes
- Have trouble sitting still and run around at inappropriate times
- Tend to be clumsy and occasionally destructive

Treatment*-Non-pharmacological treatment*

- Behavioral control parents, teachers and other caregivers should be taught to reward good behavior, set fixed schedules and help the child organize everyday items and tasks

Treatment *- Refer for Specialist Treatment*

REFER-All children suspected to have ADHD should be referred to a child psychiatrist or pediatrician for management.

11.2.4 Depression

Depression is a mood disorder that occurs in all age groups although the symptoms may be different in children. Most cases of suicide or attempted suicide are from depression. One should not dismiss or take for granted statements made by patients such as “I want to die”, “life is not worth living”, “I am fed up with

life". All cases of attempted suicide should be referred to a psychiatrist after initial management of the presenting complication e.g. self-inflicted accident or poisoning. Recurrent depression or unipolar depression is treated differently (with antidepressants) from bipolar depression, which responds more to mood stabilizers.

Causes

- Genetic, familial
- Environmental and Psychosocial factors
- Endocrine disorders e.g. hypothyroidism, Cushing's syndrome
- Post-traumatic stress

Clinical Presentation

- The diagnostic criteria for major depression relies on the presence of at least five of the following symptoms experienced every day for at least two-weeks.
- Depressed mood, loss of interest or pleasure
- Significant weight loss or gain; Insomnia or sleeping too much
- Psychomotor agitation or retardation; Fatigue or loss of energy
- Feelings of worthlessness or excessive guilt
- Impaired thinking or concentration; indecisiveness
- Multiple bodily complaints; Suicidal thoughts/thoughts of death
- Hallucinations/delusions of morbid themes in severe cases

In children

- Truancy or refusal to go to school; Poor school performance
- Bedwetting in a previously 'dry' child; Odd behavior, aggression or defiance
- Irritability; Appetite changes

Treatment: *Non-pharmacological treatment*

- Counselling, psychotherapy

Treatment: *Pharmacological treatment*

Medicine Name	Level	Dose	Frequency	Duration
Adults & children >8 years: Fluoxetine po	C	20-60 mg	Single dose morning	daily
Children: Fluoxetine po	C	5-15 mg	Every 12 hours	daily
or				
Adults & children >8 years: Amitriptyline po	C	25-50 mg	Early evening once	daily
Children: Amitriptyline po	C	5-15 mg	Every 12 hours	daily

- After an episode of depression, continue antidepressants for at least 6 months, as there is a high risk of relapse in this period.
- Stop antidepressants immediately if manic swing occurs. Admit patients with suicidal tendencies and keep under close observation.

Refer: Refer the following to a psychiatrist

- Patients with typical, hysterical or phobic features
- Patients who do not respond to treatment
- Children suspected to suffer from depression

11.2.5: Schizophrenia

Schizophrenia is probably the most severe and potentially disabling form of mental illness and occurs in about 1% of the people in every community worldwide. Schizophrenia may present as an acute or chronic illness. The clinical features include characteristic 'positive' or 'negative' symptoms, deterioration in social, work or interpersonal relationships and continued evidence of disturbed behavior for at least 6 months. Psychosis associated with substance abuse and mood disorders with psychotic features may mimic schizophrenia.

Causes

- Genetics, Birth defects
- Environmental triggers
- Illicit drugs use

Clinical Presentation

- *'Positive' symptoms*
  - Hallucinations, Delusions
  - Incoherent speech or illogicality
  - Odd or disorganized behavior
- *Disorders of thought possession 'Negative' symptoms*
  - Poverty of speech or of content of speech
  - Apathy, Reduced social contact or withdrawal
  - Flattened effect (showing little facial expressive responses)
  - Delusions may be persecutory (undue suspicion) or totally bizarre like being controlled or being made to feel emotions or sensations.
  - Hallucinations may involve any of the senses, but auditory ones are most common; experienced as voices speaking clearly or in mumbled tones.
  - Disorders of thought possession include feeling of the patient's thoughts being accessible to others. Motor disorders often occur but are not essential for diagnosis

Treatment - Refer to a psychiatrist

Non-pharmacological treatment: Supportive psychotherapy and rehabilitation

Pharmacological treatment - In acute attack:

Medicine Name	Level	Dose	Frequency	Duration
Chlorpromazine iv/po	HOS	100-150 mg	Every 6-8 hours	3 days
or, Haloperidol po	C	5-10 mg	Every 6-8 hours	3 days
Maintenance doses as below				
Risperidone po	C	1-4 mg	Every 12 hours	Daily
or, Chlorpromazine po	C	100-600 mg	Every 8 hours	Daily
or, Fluphenazine Decanoate im	HOS	25 mg	Once every month	Monthly

Adjunct treatment: Antiparkinsonian drugs should only be used if reactions occur or when antipsychotics are administered at higher doses likely to cause reactions.

Medicine Name	Level	Dose	Frequency	Duration
Benzhexol po	C	2.5-5 mg	Every 8 hours	Until symptoms subside
or, Biperidine po	C	1-2 mg	Every 8 hours	Until symptoms subside

Duration of Treatment

A clearly diagnosed schizophrenic patient must be on medication for at least 18 months after remission of symptoms for a first episode. After two or more episodes, especially if they follow within a year or two of each other treatment should probably continue for life although 'drug holidays' may be discussed from time to time.

Refer

Since a diagnosis of schizophrenia carries probable lifelong implications and treatment maybe of life long duration:

- Refer after treatment of acute episode
- Refer recurrent cases
- Refer patients who cannot be controlled with drugs and may require electroconvulsive therapy.

11.2.6: Bipolar Disorders

Bipolar disorders are a form of mood disorder in which patient's experience mood swings between the two extremes of mood disorder depression and mania. Bipolar Disorder is referred to in older literature as Manic-Depressive illness. It is important to note that the affected patient usually presents with one predominant mood state at a time, either Depression or Mania. A single manic episode and a history of depression qualify for classification as Bipolar Disorder. A current episode of depression without a past manic episode or with a past history of depression is not diagnostic of Bipolar Disorder. Repeated depressive episodes are diagnosed as recurrent depression.

Causes

The cause is not known but there is a tendency to run in families

- Genetic factors seem to play a role.
- Occasionally, substance (cocaine, marijuana, amphetamine) abuse may precipitate the condition.
- Thyrotoxicosis can mimic mania and must be excluded.

Clinical Presentation

- Persistently elevated mood euphoria, expansiveness, feeling 'high' or irritability.
- Over activity and excessive talking
- Making of grandiose claims
- Reduced sleep
- Reckless spending and being overly generous
- Sexual disinhibition
- Increased appetite

Treatment*-Non-pharmacological treatment* - Psychotherapy

Treatment*-Pharmacological treatment*

Medicine Name	Level	Dose	Frequency	Duration
Lithium Carbonate po	HOS	900-1200 mg	Every 24 hours	Daily
or, Carbamazepine po	C	200 mg	Every 8 hours	Daily
or, Risperidone po	C	1-4 mg	Every 12 hours	Daily

Note: Continue or resume definitive treatment with mood stabilizers e.g. Lithium, Carbamazepine or Valproic acid for known patients with bipolar disorder. Check blood levels of mood stabilizers where feasible. The benzodiazepines are withdrawn as soon as the patient is calm, but this should be done by slowly tapering the dose. The antipsychotics are continued at a dose just enough to control the symptoms and should be continued for at least 3-4 weeks.

Refer:

- All patients suffering a first episode must be referred
- Non-response of patients to treatment after one month
- All children

11.2.7: Alcoholism

Dependence on alcohol and development of related problems is a common and often unrecognized disorder. Alcoholism is often associated with many physical health problems. The greatest problem is the recognition and diagnosis of alcoholism since affected individuals are often in denial of their problem. They under-declare the amount and frequency of alcohol consumption and usually appear in hospital only with complications. The coexistence of other psychiatric illnesses like Depression with alcoholism is common.

Causes: Genetic, familial and environmental factors are all important.

Clinical Presentation

- Recurrent use of alcohol resulting in failure to fulfill major obligations at work, school or home. - Recurrent use in situations where it is physically hazardous e.g. Driving
- Continued use despite having persistent or recurrent social, legal or interpersonal problems caused by effects of alcohol
- Development of tolerance; Withdrawal syndromes
- Taking increasingly larger amounts over longer periods than intended
- Previous unsuccessful attempts at stopping
- Reddening of lips, Smooth red palms - Painless enlargement of liver
- Bruises from minor accidents - Parotid gland enlargement

Treatment: *Pharmacological treatment*

- Uncomplicated Alcohol Dependence
  - Phase 1-Detoxification (Best achieved under in-patient conditions admit for one week)
  - Outpatient care possible for the highly motivated.
- Stop all alcohol use Diazepam, oral, as follows:
  - **1st week**
    - Day 1: 10-20 mg 12 hourly
    - Day 2: 10-20 mg 12 hourly
    - Day 3: 5-10 mg 12 hourly
    - Day 4: 5-10 mg 12 hourly
    - Day 5: 10 mg at night
    - Day 6: 10 mg at night
    - Day 7: 5 mg at night
  - **2nd week**
    - 5 mg once daily for 2-7 days then STOP.

Alcohol Withdrawal Syndromes

These occur following sudden withdrawal from alcohol. They are often seen in patients admitted to hospital for other problems e.g. arising from accidents or physical illnesses, which keep them from drinking.

11.2.8 Drug and Substance Abusers

It is a condition that arises from the repeated use of a drug or other substance of abuse on aperiodic or continuous basis leading to physical, social, or occupational problems.

Causes

- *Social factors*
  - Peer pressure; Idleness/unemployment; Isolation; Social pressures
  - Poverty; Cultural use; Increased availability
- *Psychological factors*
  - Other psychiatric disorders e.g. anxiety; depression
  - Stress; Adolescent development changes

Commonly abused drugs

- Alcohol; Tobacco; Cannabis (ganja, bhangi, marijuana, weed)
- Heroin; Cocaine

Presenting features

- Change in behavior, e.g. excessive irritability
- Change in function, e.g. decline in school/work performance; Loss of interest
- Episodes of intoxication e.g. slurred speech, staggering gait
- Involvement in illegal activities, e.g. rape, theft
- Change in appearance e.g. weight loss, red eyes, puffy face, unkempt, untidy
- Financial difficulties, e.g. stealing, unpaid debts; Relationship problems, e.g. increased conflicts, communication breakdown

Management

- Psychosocial therapy (counselling); Treat presenting symptoms, e.g. Delirium
- If necessary, refer to higher level for detoxification

Prevention

- Health education on dangers of drug abuse; Employment/recreational opportunities
- Encourage social and cultural values; Attempt to reduce availability of drugs of abuse in the community

References

1. BNF for Children: BMJ Group, Pharmaceutical Press, & RCPCH Publications Limited; September 2015-2016.
2. British National Formulary (BNF) - 74: BMJ Group, Pharmaceutical Press, & RCPCH Publications Ltd; September 2017 - March 2018.
3. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey ML. 9th Edition Pharmacotherapy: A Pathophysiologic Approach: McGraw-Hill Education/Medical; 2014.
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5. WHO Model List of Essential Medicines for ChildrenApril 2017. www.who.int (accessed.

12. DISEASES OF BLOOD AND BLOOD FORMING ORGANS

12.1 Anemia

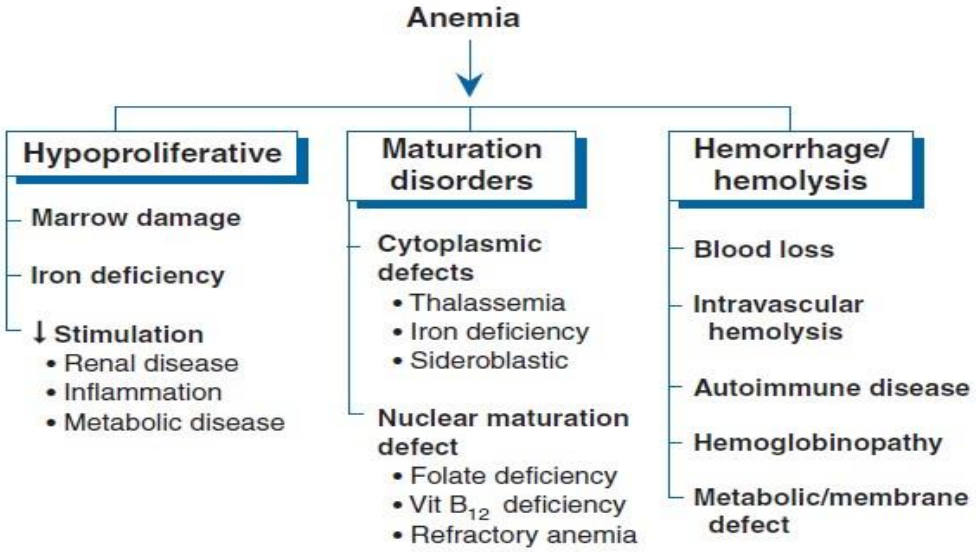
Anemias are a group of diseases characterized by a decrease in hemoglobin (Hb) or red blood cells (RBCs), resulting in decreased oxygen-carrying capacity of blood.

The World Health Organization defines anemia as:

- Hb less than 13 g/dL (<130 g/L ***or*** <8.07 mmol/L) in men
- Hb less than 12 g/dL (<120 g/L ***or*** <7.45 mmol/L) in women.

Causes

The functional classifications of anemias are described below.



Adapted from Pharmacotherapy handbook, 9th Edition

Morphologic classifications:

- Macrocytic cells are larger than normal and are associated with deficiencies of vitamin B_{12} or folic acid
- Microcytic cells are smaller than normal and are associated with iron deficiency
- Normocytic anemia may be associated with recent blood loss or chronic disease

***i. Iron-deficiency anemia (IDA)*:**

- Caused by inadequate dietary intake; Inadequate gastrointestinal (GI) absorption
- Increased iron demand (e.g., pregnancy); Blood loss, and chronic diseases

ii. Vitamin B_{12} and folic acid–deficiency anemias:

- Inadequate dietary intake; Decreased absorption, and inadequate utilization

iii. Folic acid–deficiency anemia:

- Hyper-utilization due to pregnancy; hemolytic anemia; Myelofibrosis; malignancy
- Chronic inflammatory disorders; Long-term dialysis; or growth spurt
- Drugs can cause anemia by reducing absorption of folate (e.g., phenytoin) or through folate antagonism (e.g., methotrexate)

iv. Anemia of inflammation (AI) describes both anemia of chronic disease and anemia of critical illness

- Infectious or inflammatory processes
- Tissue injury, and conditions associated with release of proinflammatory cytokines.

Clinical Presentation

- Cardiorespiratory symptoms such as tachycardia, light-headedness, and breathlessness (acute)
- Chronic anemia is characterized by weakness, fatigue, headache, symptoms of heart failure, vertigo, faintness, cold sensitivity, pallor, and loss of skin tone.
- IDA is characterized by glossal pain, smooth tongue, reduced salivary flow, pica (compulsive eating of nonfood items), and pagophagia (compulsive eating of ice) seen when Hb concentration is less than 9 g/dL (<90 g/L ***or*** <5.59 mmol/L).
- Neurologic effects (e.g., numbness and ataxia) of vitamin B_{12} deficiency may occur in absence of anemia.
- Psychiatric findings, including irritability, depression
- Age-related reductions in bone marrow reserve can render elderly patients more susceptible to anemia caused by multiple minor and often unrecognized diseases (e.g., nutritional deficiencies) that negatively affect erythropoiesis.
- Pediatric anemias are often due to a primary hematologic abnormality

a. Iron Deficiency Anemia

Medicine name	Level	Dose	Frequency	Duration
Adult: Ferrous Sulphate po	C	200 mg	Every 8 hours	3 months
Child: Ferrous Sulphate po	C	40 mg <1yr= 20 mg	Every 8 hours	3 months

b. Megaloblastic Anemia Treatment-due to Vitamin B_{12} deficiency

Medicine name	Level	Dose	Frequency	Duration
Hydroxocabalamin (Vitamin B12) im	HC	1 mg	daily	3 days
		Then 1 mg weekly for 3 weeks, and 1 mg monthly for 3 months, then every 3 months for a year		

c. Folic Acid Deficiency - Occurs in most prolonged hemolytic anemias, pregnancy, and seasonally in dry areas with no access to fresh vegetables, in malabsorption up to 15mg daily may be required.

Medicine name	Level	Dose	Frequency	Duration
Folic acid po	C	5 mg	Once daily	3 months

d. Sickle Cell Anemia

Medicine name	Level	Dose	Frequency	Duration
Folic acid po	C	5 mg	Once daily	For life
plus, Penicillin V po	C	250 mg	Once a day	For life

e. Thalassemia – *treatment*

- Signs and symptoms are usually mild with thalassemia minor and little, if any, treatment is needed. - People with severe beta-thalassemia will need blood transfusions (can cause iron overload, use Deferasirox to remove the excess iron)

Treatments for Moderate to Severe Thalassemia

- Frequent blood transfusions
- Stem cell transplant (bone marrow transplant)

References:

1. WHO Model List of Essential Medicines for ChildrenApril 2017. www.who.int (accessed.
2. WHO Model List of Essential Medicines (20th List)2017. www.who.int (accessed.
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13. ENDOCRINE AND METABOLIC DISORDERS

13.1 Adrenal Gland Disorders

- Hyperfunction of the adrenal glands involves excess production of the adrenal hormones cortisol (resulting in Cushing syndrome) or aldosterone (resulting in hyperaldosteronism).
- Adrenal gland hypofunction is associated with primary (Addison disease) or secondary adrenal insufficiency.

13.1.1: Cushing Syndrome Cause

Cushing syndrome results from effects of supraphysiologic glucocorticoid levels originating from either exogenous administration or endogenous overproduction by the adrenal gland (adrenocorticotropic hormone [ACTH]-dependent) or by abnormal adrenocortical tissues (ACTH-independent).

Ectopic ACTH syndrome refers to excessive ACTH production resulting from an endocrine or non-endocrine tumor, usually of the pancreas, thyroid, or lung (e.g., small-cell lung cancer).

Clinical Presentation

- Central obesity and facial rounding (90% of patients)
- Peripheral obesity and fat accumulation occur in 50% of patients
- Fat accumulation in the dorsocervical area (buffalo hump) is nonspecific
- Patients are often described as having moon facies and a buffalo hump.
- Myopathy or muscular weakness, abdominal striae, hypertension, glucose intolerance
- Psychiatric changes, gonadal dysfunction, and amenorrhea and hirsutism in women

Diagnosis

- Plasma ACTH test; adrenal vein catheterization
- Adrenal, chest, or abdominal computed tomography (CT)
- Corticotrophin-releasing hormone (CRH) stimulation test

Treatment

- *Goals of Treatment:*
  - Limit morbidity and mortality and return the patient to a normal functional state
- *Non-Pharmacologic Therapy*
  - Treatment of choice for both ACTH-dependent and ACTH-independent Cushing syndrome is surgical resection of offending tumors.
- *Pharmacologic Therapy*
  - Pharmacotherapy is generally used as secondary treatments in preoperative patients or as adjunctive therapy in postoperative patients awaiting response. Rarely, monotherapy is used as a palliative treatment when surgery is not indicated.

REFER to an endocrinology specialist for management.

13.1.2: Adrenal Insufficiency (Addison's Disease)

Cause

- Primary adrenal insufficiency (**Addison disease**) involves the destruction of all regions of the adrenal cortex. There are deficiencies of cortisol, aldosterone, and the various androgens, and levels of CRH and ACTH increase in a compensatory manner.
- Medications that inhibit cortisol synthesis (e.g., ketoconazole) or accelerate cortisol metabolism (e.g., phenytoin, rifampin, phenobarbitone) can also cause primary adrenal insufficiency.

- Secondary adrenal insufficiency most commonly results from exogenous corticosteroid use, leading to suppression of the hypothalamic-pituitary-adrenal axis and decreased ACTH release, resulting in impaired androgen and cortisol production.
- Progestins (e.g., medroxyprogesterone acetate) have also been reported to induce secondary adrenal insufficiency.

Clinical Presentation

- Weight loss, dehydration
- Hyponatremia, hyperkalemia, and elevated blood urea nitrogen
- Hyperpigmentation

Diagnosis- Insulin hypoglycemia test and the CRH stimulation test.

Treatment

- *Goals of Treatment*
  - Limit morbidity and mortality
  - Return the patient to a normal functional state
  - Prevent episodes of acute adrenal insufficiency.
- *Non-pharmacologic Interventions*
  - Inform patients of treatment complications, expected outcomes, proper medication administration and adherence, and possible side effects.

Pharmacotherapy

Medicine Name	Level	Dose	Frequency	Duration
Hydrocortisone im	C	15-25 mg	Every 12 hours	Continual, review after 6-8 weeks
or, Prednisolone po	C	2.5 mg	Every 12 hours	Continual, review after 6-8 weeks

Mineralocorticoid replacement therapy is to minimize development of hyperkalemia.

Medicine Name	Level	Dose	Frequency	Duration
Hydrocortisone im	C	15-25 mg	Every 8 hours	7 days
or, Prednisolone po	C	5 mg	Once a day	7 days

Pharmacotherapy of Acute Adrenal Insufficiency

Acute adrenal insufficiency (also known as adrenal crisis or Addisonian crisis) represents an endocrine emergency. Stressful situations, surgery, infection, and trauma are potential events that increase adrenal requirements, especially in patients with some underlying adrenal or pituitary insufficiency.

The most common cause of adrenal crisis is abrupt withdrawal of exogenous glucocorticoids in patients receiving chronic treatment that resulted in hypothalamic pituitary-adrenal-axis suppression.

Medicine Name	Level	Dose	Frequency	Duration
Hydrocortisone iv/im	C	100 mg (rapid infusion) then 100-200mg	Every 24 hours	3 days
If patient stabilizes, switch to:				
Prednisolone po	C	5 mg	Once a day	7 days

13.2 Diabetes Mellitus

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism.

Cause

- ***Type 1 DM (insulin dependent diabetes mellitus)***
  - 5%–10% of cases usually develop in childhood or early adulthood
  - Results from autoimmune-mediated destruction of pancreatic β-cells, resulting in absolute deficiency of insulin. The autoimmune process is mediated by macrophages and T lymphocytes with autoantibodies to β-cell antigens (e.g., islet cell antibody, insulin antibodies).
- ***Type 2 DM (non-insulin dependent diabetes)***
  - 90% of cases are characterized by a combination of insulin resistance and relative insulin deficiency
  - Insulin resistance is manifested by increased lipolysis and free fatty acid production, increased hepatic glucose production, and decreased skeletal muscle uptake of glucose.
- ***Other causes of diabetes:***
  - Endocrine disorders (e.g., acromegaly, Cushing syndrome)
  - Gestational diabetes mellitus (GDM)
  - Diseases of the exocrine pancreas (e.g., pancreatitis)
  - Medications (e.g., glucocorticoids, pentamidine, niacin, α-interferon).
- **Complications of Diabetes Mellitus**
  - Microvascular complications
    - Retinopathy
    - Neuropathy
    - Nephropathy
  - Macrovascular complications:
    - Coronary heart disease
    - Stroke
    - Peripheral vascular disease

Clinical Presentation

- ***Type 1 Diabetes Mellitus***
  - Initial symptoms are polyuria, polydipsia, polyphagia, weight loss, and lethargy accompanied by hyperglycemia
  - Diabetic ketoacidosis if insulin is withheld or under conditions of severe stress.
- ***Type 2 Diabetes Mellitus***
  - Often asymptomatic and may be diagnosed secondary to unrelated blood testing
  - Lethargy, polyuria, nocturia, and polydipsia can be present
  - Overweight or obese

Diagnosis

- Criteria for diagnosis of DM include any one of the following:

i. A1C of 6.5% or more
ii. Fasting (no caloric intake for at least 8 hours) plasma glucose of 126 mg/dL (7.0 mmol/L) or more
iii. Two-hour plasma glucose of 200 mg/dL (11.1 mmol/L) or more during an oral glucose tolerance test (OGTT) using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water
iv. Random plasma glucose concentration of 200 mg/dL (11.1 mmol/L) or more with classic symptoms of hyperglycemia or hyperglycemic crisis

v. In the absence of unequivocal hyperglycemia, criteria 1 through 3 should be confirmed by repeat testing
   - Normal fasting plasma glucose (FPG) is less than 100 mg/dL (5.6 mmol/L).
   - Impaired fasting glucose (IFG) is FPG 100 to 125 mg/dL (5.6–6.9 mmol/L).
   - Impaired glucose tolerance (IGT) is diagnosed when the 2-hour post load sample of OGTT is 140 to 199 mg per dL (7.8–11.0 mmol/L).
   - Pregnant women should undergo risk assessment for GDM at first prenatal visit and have glucose testing if at high risk (e.g., positive family history, personal history of GDM, marked obesity, or member of a high-risk ethnic group)

Treatment

- *Goals of Treatment*
  - Reduce symptoms
  - Reduce risk of microvascular and macrovascular complications, reduce mortality, and improve quality of life.
  - Maintain desirable plasma glucose and A1C levels
- *General Approach*
  - Early treatment reduces risk of microvascular disease complications
  - Aggressive management of cardiovascular risk factors (i.e., smoking cessation, treatment of dyslipidemia, intensive blood pressure [BP] control, and antiplatelet therapy) is needed to reduce macrovascular disease risk.
- *Non-Pharmacologic Therapy*
  - Medical nutrition therapy is recommended for all patients
  - For type 1 DM, regulation of insulin administration with a balanced diet to achieve and maintain healthy body weight
  - The meal plan should be moderate in carbohydrates and low in saturated fat, with a focus on balanced meals
  - Patients with type 2 DM often require caloric restriction to promote weight less.
  - Aerobic exercise can improve insulin sensitivity and glycemic control and may reduce cardiovascular risk factors, contribute to weight loss or maintenance, and improve well-being.

Diabetes in Pregnancy

- Pregnant diabetics require management before and throughout pregnancy. Some women may develop diabetes while pregnant (gestational diabetes), usually in the second trimester.
- Strict blood sugar control preconceptually is advised.
- Good blood sugar control with insulin, diet and exercise in essential
- Blood sugar control should be kept strictly within the range 4-6 mmol/L
- Control should be measured by regular blood sugar profile (admit and take 4 hourly blood glucose levels for 24 hours). Insulin requirements will increase as pregnancy progresses, so profiles will be necessary at frequent intervals of approximately 2 weeks.
- Oral anti-diabetic medicines should not be used in pregnancy

Type 1 Diabetes Management (Insulin Dependent Diabetes Mellitus)

Insulin zinc suspension.

Adult: Lente insulin 40 IU/ml (Lente insulin is 2/3 of the 24-hr requirement of soluble insulin, and it should be used after establishing the 24-hr requirement of soluble insulin)

Child: 10-50 IU once daily subcutaneously **-or-**

Soluble insuli n (40 IU/ml)

Adult: 40-100 IU SC daily in 3 divided doses before meals

Child: 40-80 IU in three divided doses before meals

Note: Avoid using propranolol or other Beta-blockers in diabetics because they mask hypoglycemic symptoms. If required, use alternative Antihypertensives.

For a patient with confirmed diabetic ketoacidosis:

- Soluble insulin: 10-20 IU IM every hour
- Monitor urine and blood sugar hourly.
- Treat any dehydration with normal saline or 5% dextrose when blood sugar has fallen below 250 mg for 5 days.
- Potassium chloride: 1 g every 8 hrs for 5 days

REFER to hospital immediately.

In a case of hypoglycemia

Dextrose 50% injection: 20-50 ml, IV; can also give oral glucose or sugar before coma sets in.

Type 2 Diabetes Management (Non-Insulin Dependent Diabetes Mellitus)

Medicine Name	Level	Dose	Frequency	Duration
Metformin po	C	500mg – 1 g	Every 12 hours	Continual
If control of glucose is not good;				
add Glibenclamide po	C	5 mg – 10 mg	Every 12 hours	Continual

Elderly patients should take 2.5 mg instead of 5 mg of Glibenclamide because of hypoglycemia risk.

13.3 Thyroid Disorders

Thyroid disorders involve thyroid hormone production or secretion and result in alterations in metabolic stability.

13.3.1 Thyrotoxicosis (Hyperthyroidism)

Thyrotoxicosis results when tissues are exposed to excessive levels of T_4, T_3, or both. Painless (silent, lymphocytic, or postpartum) thyroiditis is a common cause of thyrotoxicosis.

Thyrotoxicosis factitia is produced by ingestion of exogenous thyroid hormone. This may occur when thyroid hormone is used for inappropriate indications, excessive doses are used for accepted medical indications, there is accidental ingestion, or it is used surreptitiously. Amiodarone may induce thyrotoxicosis (2%–3% of patients) or hypothyroidism

Clinical Presentation

- Nervousness, anxiety, palpitations, emotional lability, easy fatigability
- Heat intolerance, weight loss concurrent with increased appetite
- Increased frequency of bowel movements, proximal muscle weakness, scanty or irregular menses
- Physical signs:
  - Warm, smooth, moist skin and unusually fine hair;
  - Separation of the ends of the fingernails from the nail beds (onycholysis)

- Retraction of the eyelids and lagging of the upper lid behind the globe upon downward gaze (lid lag)
- Tachycardia at rest, widened pulse pressure, and systolic ejection murmur
- Occasional gynecomastia in men; fine tremor of the protruded tongue and outstretched hands
- Hyperactive deep tendon reflexes.

- Graves' disease is manifested by hyperthyroidism, diffuse thyroid enlargement, and extrathyroidal findings of exophthalmos, pretibial myxedema, and thyroid acropachy.
- In subacute thyroiditis:
  - Severe pain in the thyroid region extending to the ear
  - Fever, malaise, myalgia, and signs and symptoms of thyrotoxicosis
- Thyroid storm is a life-threatening medical emergency characterized by:
  - Decompensated thyrotoxicosis
  - High fever (often >39.4°C [103°F])
  - Tachycardia, tachypnea
  - Dehydration, delirium, coma, nausea, vomiting, and diarrhea

Diagnosis

- Elevated 24-hour radioactive iodine uptake (RAIU) indicates true hyperthyroidism: the patient's thyroid gland is overproducing T_4, T_3, or both (normal RAIU 10%–30%).
- TSH-induced hyperthyroidism is diagnosed by evidence of peripheral hypermetabolism, diffuse thyroid gland enlargement, elevated free thyroid hormone levels, and elevated serum immunoreactive TSH concentrations

Treatment

- *Goals of Treatment*
  - Eliminate excess thyroid hormone
  - Minimize symptoms and long-term consequences
  - Provide individualized therapy based on the type and severity of disease, patient age and gender
- *Non-pharmacologic Therapy*
  - Surgical removal of the thyroid gland should be considered in patients with a large gland(>80 g), severe ophthalmopathy, or lack of remission on antithyroid drug treatment.
- *Pharmacologic Therapy*

Medicine Name	Code	Dose	Frequency	Duration
Propranolol po	C	40-240 mg	Every 8 hours	ongoing

Treatment of Graves Disease

Medicine Name	Code	Dose	Frequency	Duration
Carbimazole po	HOS	20-60 mg (0.5 mg/kg)	*Once a day until euthyroid, then reduce dose to 5-20 mg daily*	

CAUTION: May induce bone marrow suppression; advise patient to report sore throat or other signs of infection. Stop medicine immediately if neutropenic. Minor rashes are not an indication to stop treatment.

Treatment of Toxic Nodular Goitre

Medicine Name	Code	Dose	Frequency	Duration
Aq. Iodine Solution (Lugol's iodine) 130mg Iodine/ml	HC	0.1-0.3 ml diluted in water	Every 8 hours	10-14 days before surgery

13.3.2: Hypothyroidism

Cause

- Most patients have primary hypothyroidism due to thyroid gland failure from chronic autoimmune thyroiditis (Hashimoto's disease).
- Iatrogenic hypothyroidism follows exposure to destructive amounts of radiation, after total thyroidectomy, or with excessive Thionamide doses used to treat hyperthyroidism.
- Other causes of primary hypothyroidism include:
  - iodine deficiency
  - enzymatic defects within the thyroid
  - thyroid hypoplasia
  - ingestion of goitrogens

-Secondary hypothyroidism due to pituitary failure is uncommon

-Pituitary insufficiency may be caused by:

- destruction of thyrotropes' by pituitary tumors • surgical therapy
- external pituitary radiation
- postpartum pituitary necrosis (Sheehan syndrome)
- trauma, and infiltrative processes of the pituitary (e.g., metastatic tumors, tuberculosis).

Clinical Presentation

- Dry skin, cold intolerance, weight gain
- Constipation, weakness, lethargy, fatigue
- Muscle cramps, myalgia, stiffness, and loss of ambition or energy
- In children, thyroid hormone deficiency may manifest as growth or intellectual retardation

Physical signs include:

- coarse skin and hair, cold or dry skin
- periorbital puffiness, bradycardia, and slowed or hoarse speech
- Objective weakness (with proximal muscles affected more than distal muscles) and slow relaxation of deep tendon reflexes are common
- Reversible neurologic syndromes such as carpal tunnel syndrome, polyneuropathy, and cerebellar dysfunction may also occur.

Most patients with secondary hypothyroidism due to inadequate TSH production have clinical signs of generalized pituitary insufficiency, such as abnormal menses and decreased libido, or evidence of a pituitary adenoma, such as visual field defects, galactorrhea, or acromegaloid features.

Diagnosis

A rise in TSH level is the first evidence of primary hypothyroidism

Treatment of Hypothyroidism

- Goals of Treatment:
  - Restore thyroid hormone concentrations in tissue
  - Provide symptomatic relief
  - Prevent neurologic deficits in newborns and children
  - Reverse the biochemical abnormalities of hypothyroidism

Pharmacological Intervention

Medicine Name	Level	Dose	Frequency	Duratio
Adult				
Levothyroxine po	HOS	0.1-0.2 micrograms (2-4 tablets) gradually increase by 25-50 micrograms every 4 weeks; to a maintenance dose of 100-200 micrograms	Once daily in the morning before food	
Child				
Levothyroxine po	HOS	1.0 micrograms for the first 6 months; then adjust according to response to a maximum of 100 micrograms	Once daily in the morning before food	

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14. NUTRITIONAL DISORDERS

14.1 Infant and Young Child Feeding

14.1.1: Breastfeeding

Breastfeeding is a natural act however adoption of optimal breastfeeding practices is a learned behavior that must be supported and encouraged by health workers.

During Maternity (Antenatal and Postnatal) Care Sessions

- All pregnant women must be informed, educated, counseled, encouraged, and supported to initiate and establish breastfeeding within an hour after birth, and to exclusively breastfeed for the first six months of life.
- **Note:** Exclusive breastfeeding means that an infant receives only breast milk (including expressed breast milk or breast milk from a wet nurse), and no other liquids or solids, not even water, with the exception (only upon medical advice) of oral rehydration solution, drops or syrups consisting of vitamins, minerals supplements or medicines.

During Birth

- Immediate newborn care entails that health workers put the newborn on mother's chest in skin- to-skin contact.
- When the newborn shows feeding cues, support the mother and only when necessary, guide the newborn to move toward the beast.
- Counsel and support to ensure proper positioning and attachment.
  - The newborn's body should be straight, not bent or twisted.
  - The infant should be facing the breast with the newborn's nose opposite her nipple and chin.
  - The newborn's whole body should be supported, not just the head and neck.
- Assess and ensure good attachment and effective suckling of the newborn.
  - More of the areola is visible above the newborn's top lip than below the lower lip.
  - The newborn's mouth is wide open.
  - The newborn's lower lip is curled outwards.
  - The newborn's chin is touching or almost touching the beast.
  - The newborn takes slow, deep suckles followed by a visible or audible swallow with some pauses.
  - The newborn's cheeks remain rounded during the feed.
  - Suckling is comfortable and pain free to the mother and newborn.
- Ensure that colostrum is given. Colostrum should neither be withheld to the newborn nor thrown away.

During In-Patient Stay

- Observe rooming-in by keeping mothers and infants to remain in the same bed or room together 24 hours a day. Mother and her child should not be separated.
- Encourage breastfeeding on demand day and night.
- Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding children.
- Regularly check for any changes in feeding practices and schedule, and request from the mother to alert health workers once difficulty in breastfeeding is experienced.
- Assess breastfeeding of each child before discharge.
  - Commend mothers on their efforts, and encourage them to continue exclusive breastfeeding by demand at home until the child reaches six months of age.

- Refer mothers to trained community workers/volunteers/traditional midwives and recognized breastfeeding/mothers groups to guarantee support and adoption of optimal infant and young child feeding practices.

During Outpatient Visits of Mothers/Caregivers and/or Child

- Inquire about breastfeeding practices.
- If applicable, assess and ensure proper positioning, good attachment, and effective suckling of the child.
- For mothers and caregivers of infants below six months, reassure that the mother has enough breast milk
- for the infant's needs, and no additional liquid (not even water) or food should be given to the infant.
- Commend, counsel, and support mothers and caregivers to exclusively breastfeed by demand from birth up to six months, and continue breastfeeding until the child reaches two years of age.
- Refer mothers and caregivers to trained community workers/volunteers/traditional midwives and recognized breastfeeding/mothers groups to guarantee support and adoption of optimal infant and young child feeding practices.

14.1.2: Appropriate Feeding in Exceptionally Difficult Circumstances

There are exceptional circumstances when breastfeeding is difficult to establish or sustain. Conditions of children such as blocked nose, jaundice, thrush, cleft lip and palate, tongue tie, Down syndrome, cerebral palsy may interfere with breastfeeding. Maternal conditions such as inverted or flat nipple, breast abscess, hepatitis, mastitis, tuberculosis, and HIV may pose a concern. However, breastfeeding is still possible despite of these challenges.

CONDITION	MANAGEMENT
Blocked duct	i. The mother should feed from the affected breast frequently and gently massage the breast over the lump while her child is suckling. ii. Some mothers find it helpful to apply warm compresses, and to vary the position of the baby (across her body or under her arm). ii. Sometimes after gentle massage over the lump, a string of the thickened milk comes out through the nipple, followed by a stream of milk, and rapid relief of the blocked duct.
Blocked nose	i. Teach mother/caregiver to use drops of breast milk, and clear the child's nose by making a wick with a twist of tissue. ii. Advice to give shorter more frequent breastfeeds, allowing the child time to pause and breathe through the mouth until the nose clears.
Breast abscess	Breastfeeding should continue the unaffected breast; feeding from the affected breast can resume once treatment has started.
Breast engorgement	i. The mother must remove the breast milk. If the child can attach well and suckle, then she should breastfeed as frequently as the child is willing. If the child is not able to attach and suckle effectively, she should express her milk by hand or with a pump a few times until the breasts are softer, so that the child can attach better, and get child to breastfeed frequently. ii. She can apply warm compresses to the breast or take a warm shower before expressing, which helps the milk to flow. She can use cold compresses after feeding or expressing, which helps to reduce the edema. iii. Engorgement occurs less often in baby-friendly hospitals which help mothers to start breastfeeding soon after delivery.

Cleft lip and palate	i. The child should be referred for surgery, which usually takes place in one or more stages after some months. It is important for the child to grow and to be well nourished before undergoing surgery. ii. The mother can be helped to hold the child in an upright sitting position at the breast with the child's legs on either side of the mother's thigh. This makes swallowing easier and may help the child to breastfeed, fully or partially. ii. She can express her milk and feed it to the child by cup or spoon until surgical help is available, or an orthopedic device is provided to facilitate breastfeeding. iv. The family may need a great deal of support and help to accept the child, to persist with feeding, and to believe that the child will look almost normal and will be able to lead a normal life if he or she has surgery.
Full breasts	The child needs to be well attached, and to breastfeed frequently to remove the milk. The fullness decreases after a feed, and after a few days the breasts become more comfortable as milk production adjusts to the child's needs.
Inverted or flat nipple	i. The mother should feed from the affected breast frequently and gently massage the breast over the lump while her child is suckling. ii. Some mothers find it helpful to apply warm compresses, and to vary the position of the child (across her body or under her arm). ii. Sometimes after gentle massage over the lump, a string of the thickened milk comes out through the nipple, followed by a stream of milk, and rapid relief of the blocked duct.
Jaundice (Child is sleepy and suckles less or poorly)	i. Taking more breast milk helps jaundice to clear more quickly, so the mother/caregiver should be encouraged to breastfeed as often as the child is willing. ii. Mother/caregiver can also express breast milk after feeds and give some extra by cup or tube. ii. If child is fed on expressed breast milk, child should give 20%extra.
Hepatitis	Infants should be given hepatitis B vaccine, within the first 48 hours or as soon as possible thereafter. Breastfeeding should continue.
Herpes Simplex Virus Type 1	Direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved.
HIV	i. Exclusive breastfeeding is recommended for HIV-infected mothers for the first six months of life. ii. Antiretroviral (ARV) interventions to either the HIV-infected mother or HIV-exposed infant can significantly reduce the risk of postnatal transmission of HIV through breastfeeding. iii. Start Cotrimoxazole preventive therapy (CPT) at six weeks of age or as soon as possible thereafter. iv. Follow the DNA PCR testing and preventive therapy procedures for infants exposed to HIV through breastfeeding as per the Integrated Guidelines for HIV and AIDS Services in Liberia
Mastitis	If breastfeeding is very painful, milk must be removed by expression to prevent progression of the condition.
Sore or fissured nipple	i. The mother should be helped to improve her child's position and attachment. Often, as soon as the child is well attached, the pain is less. ii. The child can continue breastfeeding normally. ii. There is no need to rest the breast– the nipple will heal quickly when it is no longer being damaged.
Thrush (Child may take short feeds only, or may refuse to feed)	The mother's nipple and the child's mouth should both be treated with nystatin. i. Nystatin suspension 100,000 IU/ml; apply 1 ml by dropper to child's mouth 4 times daily after breastfeeds for 7 days, or as long as the mother is being treated. ii. Nystatin cream 100,000 IU/ml; apply to nipples 4 times daily after breastfeeds. Continue to apply for 7 days after lesions have healed.
Tongue tie	If tongue-tie is causing problems with feeding, the child will need referring for cutting of the frenulum. This is effective and can now be done simply andsafely.

14.1.3: Exceptional Acceptable Medical Reasons for Use of Breastmilk Substitutes

Exceptionally, medical conditions of either the mother or the infant pose a major health concern that alternative feeding option of infants is needed to prevent sickness, malnutrition, and death. Based on the assessment of a health worker of the following medical conditions, infants may be provided with the appropriate breastmilk substitutes:

- Infants with classic galactosemia: a special galactose-free formula is needed.
- Infants with maple syrup urine disease: a special formula free of leucine, isoleucine and valine is needed.
- Infants with phenylketonuria: a special phenylalanine-free formula is needed (some breastfeeding is possible, under careful monitoring).
- Mother is tested as positive for Ebola.
- A lactating female EVD survivor who is tested, and Ebola Virus RNA is detected, breastfeeding should be suspended, and the breast milk retested every 48 hours until two consecutive "undetected" results are obtained.

Alternative feeding of infants below six months is determined only by a health worker upon assessment of the exceptional acceptable medical condition for use of breastmilk substitutes. Breast milk should be replaced with a sustainable appropriate breast milk substitute.

14.1.3.1 Guidelines for the Provision of Breastmilk Substitutes

Where possible, the use of liquid ***ready-to-use infant formula (ruif)*** is recommended which is a less risky option than powdered infant formula since it does not require reconstitution with water. The procurement, management, and distribution of breastmilk substitutes should be strictly controlled and comply with the international code on the regulation of breastmilk substitutes. There are no special preparations needed in using liquid ***ruif*** however appropriate hygiene, infection prevention and control, and food safety measures must be strictly observed.

Based on assessment of a health worker following set criteria, an alternative feeding option for infants below six months is needed to curtail the worsening or the transmission of the diseases while ensuring nutritional care and support to the infant, and prevent malnutrition. In this case, where separation of child from mother is necessary, lactation must be encouraged and maintained.

- There are no special preparations needed in using ***ruif*** however appropriate hygiene, infection prevention and control, and food safety measures must be strictly observed.
- Instruct the mothers and caregivers to use of cups are safe alternative in feeding infants with ***ruif.*** Prepare the cup to be used for feeding and place where feeding will take place. The use of feeding bottles and teats must be prohibited because they are difficult to clean thus may pose health risks.
- Give a bottle of ***ruif*** from the stock, and place near the cup.
- Instruct mothers and caregivers to wash hands with water and soap before touching and feeding the infant.
- Instruct mothers and caregivers to open the bottle of ***ruif*** and pour the recommended quantity (see below) into the clean and disinfected cup.
- Instruct mothers and caregivers to hold the infant in semi-upright position and hold the cup at the infant's lips so that milk just reaches the infants' lips.
- Be patient in feeding as infant takes the milk with his/her tongue, sucks or sips. Do not pour milk into the infant's mouth.
- After feeding, ensure that mothers and caregivers clean and disinfect cup following appropriate infection

prevention and control procedures.

- Once open, ***ruif*** may be stored safely for no more than two hours. After two hours, discard leftover milk.
- Infants must be fed on demand. Do not restrict or force fed the infant.
- Infants will be fed with ***ruif*** daily until they reach six months. Recommended amount per feed of ***ruif*** for their age (see below) are indicative while the frequency or number of feeds per day must be respected.

Age in Months	Average Weight in Kg	Amount of Ruif Per Day in ML	Number of Feeds Per Day	Size of Feed in Ml
0 - 1	3	450 ML	8	60 ML
1 – 2	4	600 ML	7	90 ML
2 – 3	5	750 ML	6	120 ML
3 – 4	5	750 ML	6	120 ML
4 – 5	6	900 ML	6	120 ML
5 – 6	6	900 ML	6	120 ML

Once infant reaches six months old, infant will be assessed for malnutrition, and if not malnourished, fed with adequate complementary food.

14.1.4: Complementary Feeding

After 6 months of age, it becomes increasingly difficult for breastfed infants to meet their nutrient needs from human milk alone. Complementary feeding starts at 6 months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding.

- Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age while continuing to breastfeed.
- Continue frequent, on-demand breastfeeding until 2 years of age or beyond.
- Guide the mother and caregiver to provide timely, appropriate and adequate locally sourced, nutrient-dense complementary food.
- Support the mother and caregiver to practice responsive feeding, applying the principles of psychosocial care.
- Instruct the mother and caregiver to observe good hygiene and proper food handling.
- Encourage the mother and caregiver to gradually increase food consistency and variety as the infant grows older, adapting to the infant's requirements and abilities.
- Increase the number of times that the child is fed complementary foods as the child gets older.
- The use fortified complementary foods or vitamin-mineral supplements such as micronutrient powder for the infant must be encouraged.
- Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, favorite foods. After illness, give food more often than usual and encourage the child to eat more.

14.1.4.1 Home food fortification using micronutrient powder (MNP)

Home fortification of foods with multiple MNP is recommended to improve iron status and reduce anemia among infants and children 6–23 months of age. Home fortification is an innovation to improve diet quality of young children at the point of use. In malaria-endemic areas, the provision of iron should be implemented in conjunction with measures to prevent, diagnose and treat malaria.

The micronutrient powder contains a lipid based encapsulated iron to prevent the "rusty" taste of iron.

It contains 15 vitamins and minerals and the Recommended Nutrient Intake (RNI) per day needed by children 6-23 months old.

The MNP contains the following nutrients and amounts:

Vitamin or mineral	Amount per 1-g sachet
Vitamin A	400 µg
Vitamin D	5.0 µg
Vitamin E	5.0 mg
Vitamin C	30.0 mg
Thiamine (Vitamin B_1)	0.5 mg
Riboflavin (Vitamin B_2)	0.5 mg
Niacin (Vitamin B_3)	6.0 mg
Pyridoxine (Vitamin B_6)	0.5 mg
Cobalamin (Vitamin B_{12})	0.9 µg
Folic Acid	150.0 µg
Iron	10.0 mg
Zinc	4.1 mg
Copper	0.56 mg
Selenium	17.0 µg
Iodine	90.0 µg

Eligibility: The target beneficiaries are 6-23 months old children.

Disqualification

- Children 6-23 months old suffering from severe anemia, severely malnourished, pneumonia, HIV, tuberculosis, and malaria. These children have to be referred immediately to the health facility or to a medical doctor.
- Children presently enrolled in the IMAM program or presently taking ready-to-use-therapeutic food (RUTF), CSB ++
- Children <6 months and children >23 months' old

Dosage

- A flexible consumption, 3 to 4 times per week.
- One box (30 sachets) of MNP will be given to the mother good for two months' consumption.

Administration

- Assess child's medical condition in relation to the conditions stipulated in the disqualification section.
- Educate the mothers on the benefits and use of MNP including managing side effects. A food demonstration and a return demonstration in a group setting is required to demonstrate the proper use of the MNPs.
  - Set aside the right amount of home-cooked semi-solid food a child can eat at one time.
  - Tear open the sachet at the bottom part indicated by the arrow.
  - Add all the contents of one sachet to the child's semi-solid food.
  - Mix it well.
  - Feed the child with the food mixed with MNP in a comfortable manner.
  - MNP must be mixed with semi-solid complementary food. 1 sachet must be used per day. MNP does not alter the color, odor or taste of the food it has been mixed in.
- MNP are supplied to a child for 6 months, and after six months, the child be registered again to the programme for reenrollment.

14.2: Severe Acute Malnutrition

Acute malnutrition is caused by a decrease in food consumption and/or illness. Sudden weight loss, anorexia, or poor appetite, and medical complications are clinical signs indicating or aggravating the severity of acute malnutrition. Severe acute malnutrition (SAM) is one the two forms of acute malnutrition. A child with SAM is highly vulnerable and has a high risk of death.

14.2.1: Admission Criteria

Anyone that fulfills any of the criteria in the following table has severe acute malnutrition (SAM).

AGE	ADMISSION CRITERIA FOR ROUTINE PROGRAM
Less than 6 Months	See separate section for these infants.
6 months to 8 years (120 cm)	W/h - w/l <-3 z score (who2006 standards unisex table); or Muac < 11.5 cm; or Presence of bilateral edema (+ & ++ admission to otp; +++ admission to ipf)
8 years (120 cm) to 18 years	W/h < 70% nchs; or Presence of bilateral edema (+ & ++ admission to otp; +++ admission to ipf)
Adults	MUAC < 16.0 cm with recent weight loss; or BMI < 16 with recent weight loss; or Presence of bilateral edema (unless there is another clear-cut cause)

Due to vulnerability of the children to death and in the situation where resources are limited, it is only in an emergency, admissions can be extended to adolescent and adults.

14.2.2: Type of Admission

A patient with severe acute malnutrition can be admitted for either an outpatient (OTP) care or inpatient (IPF) care.

FACTOR	IN-PATIENT CARE	OUT-PATIENT CARE
Choice of caretaker (at any stage of management)	‣Caretaker chooses to start, continue or transfer to IPF. ‣The caretaker's wishes must be respected.	Caretaker chooses to start, continue or transfer to OTP. The caretaker's wishes **must** be respected.
Appetite	Failed or equivocal Appetite test	Passes Appetite test
Bilateral Edema	‣Bilateral pitting edema Grade 3 (+++) ‣Both Marasmus and Kwashiorkor (W/H<-3Z score and bilateral edema)	In most countries: Kwashiorkor with bilateral pitting edema Grade 1 to 2 (+ and ++)
Skin	Open skin lesions	No open skin lesions
Medical complications	Any severe illness, using the IMCI criteria – respiratory tract infection, severe anemia, clinical vitamin-A deficiency, dehydration, fever, lethargy, measles rash, etc.	Alert with no medical complications
Candidiasis	Presence of severe candidiasis or other signs of severe immune-incompetence	Absence of candidiasis
Caretaker	No suitable or willing caretaker.	Reasonable home circumstances and a willing caretaker

14.2.3: Appetite Test

14.2.3.1: Rationale

- Reasonably accurate assessment of the appetite is often the only way to differentiate a complicated from an uncomplicated case of SAM. Other signs (IMCI) of severe illness are less reliable in the severely malnourished child.
- The best sign of severe metabolic-malnutrition is a reduction in appetite, and the appetite test is the most important criterion to decide if a patient should be sent for in- or out- patient management.

- A poor appetite means that the child has a significant infection or a major metabolic abnormality such as liver dysfunction, electrolyte imbalance, and cell membrane damage or damaged biochemical pathways. These are the patients at immediate risk of death. Furthermore, a child with a poor appetite will not take sufficient amounts of the therapeutic diet at home to prevent deterioration.

14.2.3.2: Administration

- Either gives the RUTF directly or puts a small amount on her finger and gives it to the child.
- The mother/other children/siblings must not consume any of the RUTF.
- Do not force the child to take the RUTF.
- The child MUST be offered plenty of water to drink from a cup during the test.

Amount of RUTF that should be taken to assess the appetite test of SAM children

APPETITE TEST "Moderate" is the minimum amount that malnourished patients should take to pass the appetite test						
BODY WEIGHT	**PASTE IN SACHETS (PROPORTION OF WHOLE SACHET**			**PASTE IN CONTAINERS (ML or GRAMS)**		
	poor	**moderate**	**good**	**poor**	**moderate**	**good**
Less than 4 kg	<⅛	⅛ -- ¼	>¼	<15	15 -- 25	>25
4 – 6.9	<¼	¼ -- ⅓	>⅓	<25	25 -- 30	>35
7 – 9.9	<⅓	⅓ -- ½	>½	<35	35 -- 50	>50
10 – 14.9	<½	½ --¾	>¾	<50	50 -- 75	>75
15 - 29	<¾	¾ --1	>1	<100	100 -- 150	>150
Over 30 kg	<1	>1		<150	>150	

14.2.4: Surveillance Care

14.2.4.1: OTP

FREQUENCY	**OUT-PATIENT**
MUAC is taken	Every week
Weight and edema	Every week
Appetite test is done	Routinely or whenever there is poor weight gain
Body temperature is measured	Every week
The IMCI clinical signs (stool, vomiting, etc.)	Every week
Height/Length is measured	At admission and at any time if child substitution is
W/H z score can be calculated	As required the day of admission and discharge

14.2.4.2: IPF

SURVEILLANCE IN IPF (NOTED IN THE MULTICHART)	**FREQUENCY**
Weight	Every day
Degree of edema (0 to +++)	Every day
Body temperature is measured	Twice per day
The standard clinical signs (stool, vomiting, dehydration, cough, respiration and liver size) are assessed and noted in multi-chart	Every day
A record is taken (on the intake part of the multi-chart) if the patient is absent, vomits or refuses a feed, and whether the patient is fed by Naso-Gastric Tube (NGT) or is given an IV infusion or transfusion. There are appropriate places for these to be recorded each day	Every day
MUAC is taken	Every week
Height/Length is measured	At admission
W/H z score can be calculated	At admission

14.2.5: OTP Management

14.2.5.1: Diet

The RUTF can be kept safely for several days after the package is opened provided it is protected from insects and rodents. It is also used in day-care management when RUTF is given for feeding overnight, at weekends or during staff shortages.

Amounts of RUTF to give per day and week

Class of Weight (KG)	RUTF Paste		RUTF Sachets (92g)		BP100®	
	Grams Per Day	Grams Per Week	Sachet Per Day	Sachet Per Week	Bars Per Day	Bars Per Week
3.0 – 3.4	105	750	1 ¼	8	2	14
3.5 – 4.9	130	900	1 ½	10	2 ½	17 ½
5.0 – 6.9	200	1400	2	15	4	28
7.0 – 9.9	260	1800	3	20	5	35
10.0 – 14.9	400	2800	4	30	7	49
15.0 – 19.9	450	3200	5	35	9	63
20.0 – 29.9	500	3500	6	40	10	70
30.0 – 39.9	650	4500	7	50	12	84
40.0 – 60.0	700	5000	8	55	14	98

For patients that are being transferred to an OTP from an IPF, a transfer form needs to be filled in with the SAM-NUMBER; sufficient RUTF should be given to last until the next day of operation of the OTP site closest to the child's home. The IPF should inform the OTP site by phone when a transfer is being made. For children that are first admitted directly into OTP, the amount of RUTF should be enough for the next visit to the OTP distribution site.

- For breast-fed children, always give breast milk before the RUTF.
- RUTF is a food and a medicine for malnourished patients only. It should not be shared with the other family members even if the patient does not consume all the diet offered. Opened packets of RUTF can be kept safely and eaten later – the other family members should not eat any that is left over at a particular meal.
- Wash the patient's hands and face with soap and water before feeding.
- These patients often only have moderate appetites during the first few weeks and eat slowly. They must be fed separately from any other children in the household. The patient can keep the RUTF with him/her to eat it steadily throughout the day – it is not necessary to have set meal times if the food is with the patient all the time. However, with children, the caretaker should attend to the child every 3-4 hours at least and encourage the child, or give small regular meals of RUTF at these times. Tell the mother how much her child should eat each day (this is given in the look-up table).
- Explain that for the first week or two the patient will probably not finish all the RUTF given. The mother should not be upset by this as excess has been given, but as the child recovers his/her appetite will improve so that all the diet will be taken later on in recovery. Uneaten RUTF should not be taken by other members of the family but returned to the OTP – as the child improves s/he will start to consume nearly all the food.
- Explain that RUTF is the only food the patient needs to recover during her/his time in the program. It contains all the ingredients that the patient needs to recover and is really like a special medicine. It is not necessary to give other foods prior to RUTF.

- Tell the caretaker that there are special medical nutrients and milk powder inside the RUTF, and that it is not just peanut butter. Tell her that all the nutrients are needed by the child to recover and that if the child does not take sufficient RUTF then they will not get enough of these medical nutrients. Normal food does not contain the right amounts and balance of these nutrients.
- Explain that the illness has damaged the child's intestine so that the normal family food is not sufficient for the child and may even cause some diarrhea. Tell the mother that some common foods will delay the recovery of her child. If the child asks for other foods small amounts can be given but she should always give the RUTF before other foods and at a different time from regular family meals.
- Never mix the RUTF with other foods. Most cereals and beans contain anti-nutrients and inhibitors of absorption that make the special nutrients in the RUTF that the child needs to recover unavailable for the child. If other foods are given they should be given at a separate time from the RUTF.
- Explain that the child must NEVER be force fed and should always offer plenty of clean water to drink while eating RUTF.
- Explain that the career should have an attentive, caring attitude while feeding the child; talk, sing and play with the child to stimulate appetite and development.

14.2.5.2: Systematic Treatment

The RUTF already contains all the nutrients required to treat the malnourished child (provided that the caretaker gives sufficient RUTF to the child – the need to give sufficient to the child and not to share the RUTF needs to be emphasized to the caretaker at admission to the program).

- Additional potassium, magnesium or zinc should not be given to the patients. Such a "double dose", one coming from the diet and the other prescribed, is potentially toxic. Additional potassium should never be given with these diets.
- For children with diarrhea on RUTF or other therapeutic food containing zinc it is not advisable to give additional zinc as this can increase the mortality rate.

Drugs	Routine Medicines	Dosage
Amoxicillin	1 dose at admission + treatment for 7 days at home for new admissions only	See table below
Albendazole 400mg or Mebendazole 500 mg	1 dose on the 4th week (4th visit) for all patients	<1 year: *Nil* 1 to 2 years: *½ tablet* >= 2 years: *1 tablet*
Malaria treatment	- For patients > 5kg Artesunate/Amodiaquine, once per day for 3 consecutive days (D1, D2, D3) - For patients =< 5kg Paracheck at admission and treatment according to the result	See table below
Measles vaccine (over the age of 9 months and without a vaccination card)	1 vaccine on the 4th week (4th visit)	Give only a second dose to those that have been given measles vaccine as in-patients.
Vitamin A	1 dose on the 4th week (4th visit) – all patients, if child has not received vitamin A supplements in the past 4 months	-6 to 11 months: *One blue capsule (100,000IU = 30,000ug)* -12 months and more: *Two blue capsules or 1 red capsule (200,000IU = 60,000ug)*
Folic Acid	1 dose (2.5 mg) at admission only if clinical signs of anemia	

[1]Large dose vitamin A and folic acid supplements are omitted on admission and additional zinc is not given because the RUTF contains generous amounts of these nutrients. This simplifies the procedure at the OTP site. It is therefore very important that the patient is actually given adequate amounts of RUTF at home and that the instructions on use are carefully explained to the caretaker and understood by the outreach workers and community volunteers.

Weight (kg)	Amoxicillin (50 – 100 mg/kg/d) Dosage – twice per day	
	in mg	Cap/tab (250mg)
<5kg	125 mg * 2	½ cap.*2
5 – 10	250 mg * 2	1 cap * 2
10 – 20	500 mg * 2	2 cap * 2
20 - 35	750 mg * 2	3 cap * 2
> 35	1000 mg * 2	4 cap * 2

Weight (kg)	Table content: Artesunate (AS) (4mg/kg) + Amodiaquine(AQ) base (10mg/kg)	Dosage
≥ 5 kg < 9kg	25mg AS + 67.5mg AQ	1 tablet/day x 3 days
≥ 9kg < 18kg	50mg AS + 135mg AQ	1 tablet/day x 3 days
≥ 18kg < 36kg	100mg AS + 270mg AQ	1 tablet/day x 3 days
≥ 36kg	100mg AS + 270mg AQ	2 tablet/day x 3 days

14.2.5.3: Failure to respond to treatment

Failure to respond to standard treatment can be due to social, nutritional, psychiatric or medical problems. An attempt to diagnose the difficulty should first be made by OTP staff. In particular, the IPF has less capacity to investigate social problems than OTP staff. Transfer to the IPF should not be the first response when a patient fails to respond. If inadequate social circumstances are suspected as the main cause of failure in OTP, do an appetite test, then a home visit or supervised trail of feeding at the health center (attending daily for 3 days) before transfer to the IPF.

Criteria for Failure to Respond	Time After Admission
Failure to gain any weight (non-edematous children)	21 days
Weight loss since admission to program (non-edematous children)	14 days
Failure to start to lose edema	14 days
Edema still present	21 days
Failure of Appetite test	At any visit
Weight loss of 5% of body weight (non-edematous children)	At any visit
Weight loss for two successive visits	At any visit
Failure to start to gain weight satisfactorily after loss of edema (kwashiorkor) or from day 14 (marasmus) onwards.	At any visit

14.2.6: IPF Management

14.2.6.1 Diet

Pre-packaged F75, F100 and RUTF, cups, mixer, drinking water, sugar, ReSoMal, measuring jugs. If the pre-packaged F75 and F100 are not available alternative recipes for making these diets should be given. The pre-packaged commercial F75 is preferred because it has a lower osmolarity and passes through a nasogastric tube.

Acute Phase

- Add either one large packet of F75 (410g) to 2 liters of water or one small packet of F75 (102.5g) to 500 ml of water.
- Where small numbers of children are being treated as in-patients, do not order the large packets of F75.
  - The amount of powder in the red-scoop "Nutriset" varies with the degree to which the powder is compressed into the scoop-if there is moderate compression then one scoop should be added to 21ml of water: if the powder is uncompressed then one scoop should be added to 18ml of water.
  - The red scoop "Nutriset" comes with the box of F75 packets.
  - Do not use any other scoop, or spoon or other measures as this can lead to either an over-concentrated diet (vomiting, osmotic diarrhea, hypernatremia dehydration, etc.), or over- dilute diet (failure to recover, deterioration).

Amounts of F75 to give during Acute-phase (or Phase 1)

Class of Weight (Kg)	8 Feeds Per Day (ML for Each Feed)	6 Feeds Per Day (ML for Each Feed)	5 Feeds Per Day (ML for Each Feed)
2.0 - 2.1	40 ml per feed	50 ml per feed	65 ml per feed
2.2 - 2.4	45 ml per feed	60 ml per feed	70 ml per feed
2.5 - 2.7	50 ml per feed	65 ml per feed	75 ml per feed
2.8 – 2.9	55 ml per feed	70 ml per feed	80 ml per feed
3.0 - 3.4	60 ml per feed	75 ml per feed	85 ml per feed
3.5 – 3.9	65 ml per feed	80 ml per feed	95 ml per feed
4.0 – 4.4	70 ml per feed	85 ml per feed	110 ml per feed
4.5 – 4.9	80 ml per feed	95 ml per feed	120 ml per feed
5.0 – 5.4	90 ml per feed	110 ml per feed	130 ml per feed
5.5 – 5.9	100 ml per feed	120 ml per feed	150 ml per feed
6 – 6.9	110 ml per feed	140 ml per feed	175 ml per feed
7 – 7.9	125 ml per feed	160 ml per feed	200 ml per feed
8 – 8.9	140 ml per feed	180 ml per feed	225 ml per feed
9 – 9.9	155 ml per feed	190 ml per feed	250 ml per feed
10 – 10.9	170 ml per feed	200 ml per feed	275 ml per feed
11 – 11.9	190 ml per feed	230 ml per feed	275 ml per feed
12 – 12.9	205 ml per feed	250 ml per feed	300 ml per feed
13 – 13.9	230 ml per feed	275 ml per feed	350 ml per feed
14 – 14.9	250 ml per feed	290 ml per feed	375 ml per feed
15 – 19.9	260 ml per feed	300 ml per feed	400 ml per feed
20 – 24.9	290 ml per feed	320 ml per feed	450 ml per feed
25 – 29.9	300 ml per feed	350 ml per feed	450 ml per feed
30 – 39.9	320 ml per feed	370 ml per feed	500 ml per feed
40 – 60	350 ml per feed	400 ml per feed	500 ml per feed

Transition Phase

There is no "fixed" time that a child should remain in the acute phase-individual children differ. It is expected that the most severely ill children will remain in the acute phase for longer than average and the less severely complicated cases and those that respond readily to treatment a shorter time.

Transfer a patient from Acute-phase to Transition Phase when all the following are present:

- Return of appetite;
- Beginning of loss of edema (Normally judged by an appropriate and proportionate weight loss as the edema starts to subside, and;
- The patient appears to be clinically recovering

Patients with gross edema (+++) should wait in Acute-phase at least until their edema has reduced to moderate (++) edema. These patients are particularly vulnerable.

Amounts of RUTF to give per 24hr in Transition phase

Class of Weight (Kg)	Paste in Grams	Paste Sachets	Bars Bars	Total Kcal
3 - 3.4	90	1.00	1.5	500
3.5 - 3.9	100	1.00	1.5	550
4 - 4.9	110	1.25	2.0	600
5 - 5.9	130	1.50	2.5	700
6 - 6.9	150	1.75	3.0	800
7 - 7.9	180	2.00	3.5	1000
8 - 8.9	200	2.00	3.5	1100
9 - 9.9	220	2.50	4.0	1200
10 - 11.9	250	3.00	4.5	1350
12 - 14.9	300	3.50	6.0	1600
15 – 24.9	370	4.00	7.0	2000
25 - 39	450	5.00	8.0	2500
40 - 60	500	6.00	10.0	2700

NOTE: If both F100 and RUTF are being given, they can be substituted based on 100ml of F100 = 20g of RUTF.

Amounts of F100 to give for 6-5 feeds per day in Transition phase

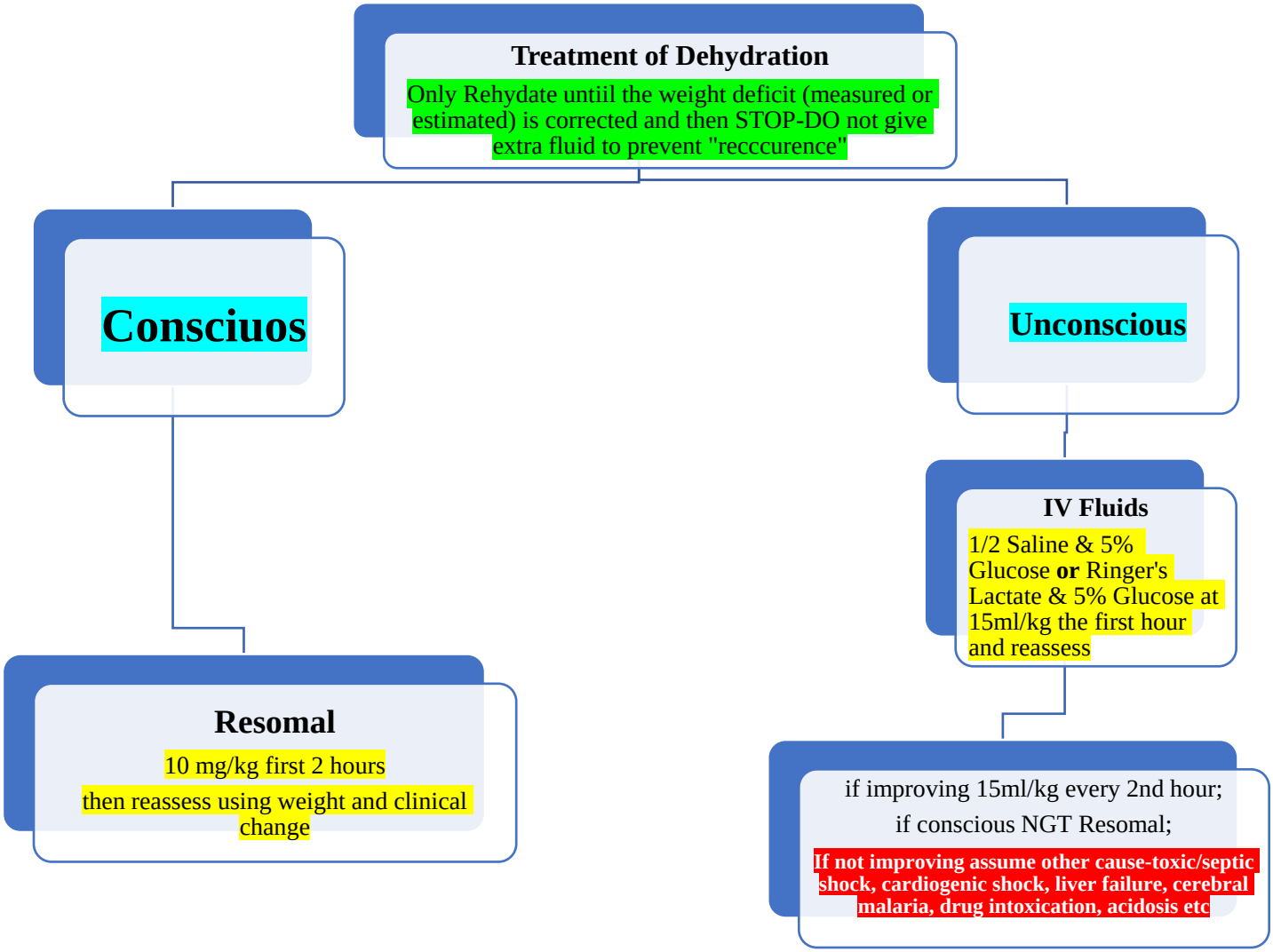
Class of Weight (Kg)	6 Feeds Per Day	5 Feeds Per Day
Less than 3.0	F100 full strength should not be used	
3.0 - 3.4	75 ml per feed	85 ml per feed
3.5 – 3.9	80	95
4.0 – 4.4	85	110
4.5 – 4.9	95	120
5.0 – 5.4	110	130
5.5 – 5.9	120	150
6 – 6.9	140	175
7 – 7.9	160	200
8 – 8.9	180	225
9 – 9.9	190	250
10 – 10.9	200	275
11 – 11.9	230	275
12 – 12.9	250	300

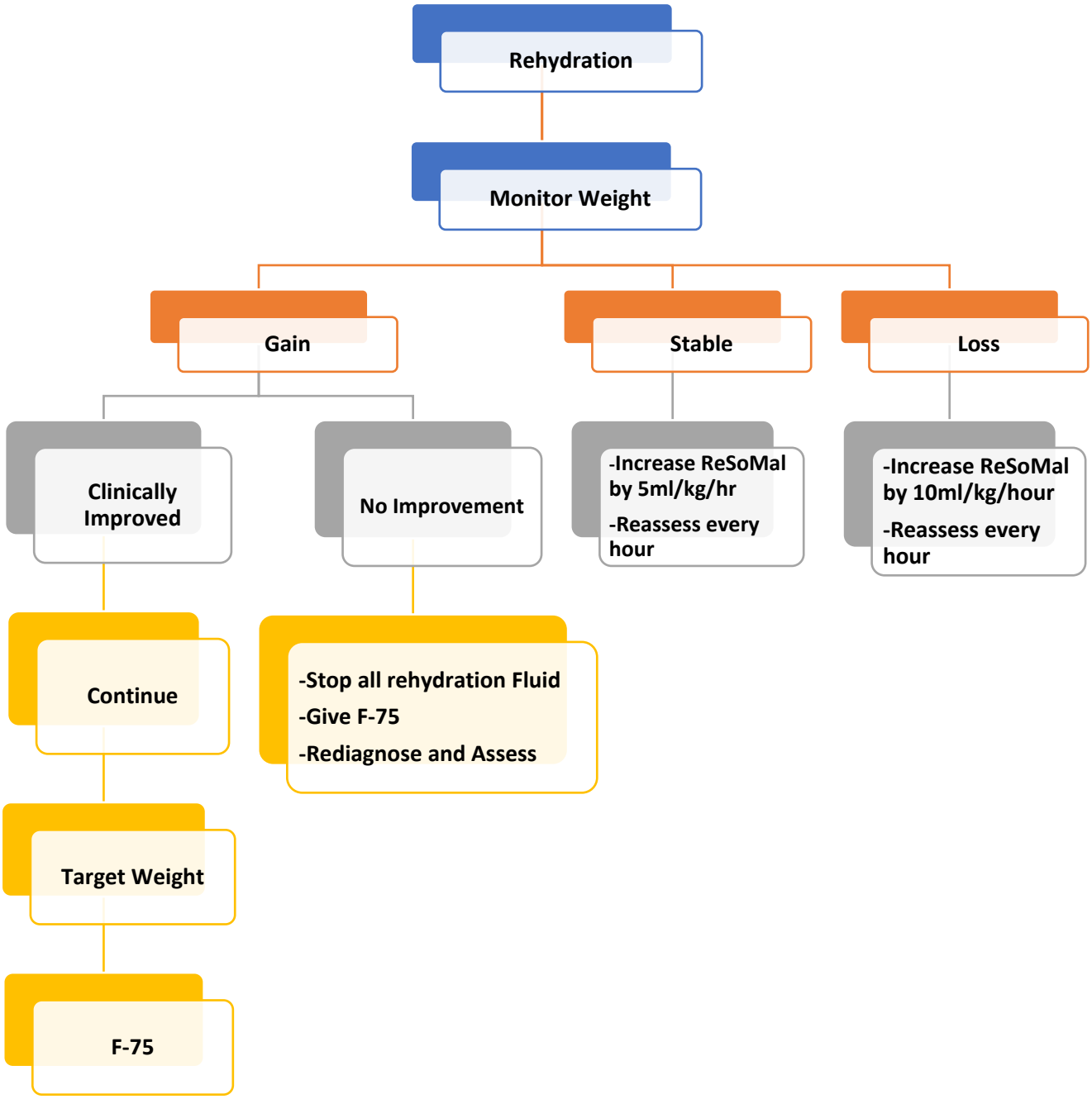
13 – 13.9	275	350
14 – 14.9	290	375
15 – 19.9	300	400
20 – 24.9	320	450
25 – 29.9	350	450
30 – 39.9	370	500
40 – 60	400	500

14.2.6.2 Medical Complications

When a patient develops a complication, always transfer him/her to Acute-phase for treatment (in-patients are transferred back to acute-phase if they are in transition phase; out-patients are referred to the IPF if suitable transport is available and the in-patient facility is within a reasonable distance of the OTP site, otherwise where feasible, attempts to start phase 1 and treat the complications should be started before transport in consultation by phone with the IPF).

In treating medical complications of children with severe acute malnutrition, please refer to the **Operational Guidelines for the Integrated Management of Acute Malnutrition – Liberia 2012.**




Rehydration
Monitor Weight
Gain
Stable
Loss
Clinically Improved
No Improvement
-Increase ReSoMal by 5ml/kg/hr
-Reassess every hour
-Increase ReSoMal by 10ml/kg/hour
-Reassess every hour
Continue
-Stop all rehydration Fluid
-Give F-75
-Rediagnose and Assess
Target Weight
F-75

14.2.6.3: Systematic Treatment

Systematic Treatment	Direct Admission Only to In-Patient (Acute-Phase- IPF)
Antibiotic	Every day in Acute-phase + 4 more days in Transition or until transfer to OTP
Malaria	ACT (Artemisinin Combined Therapy)
Measles vaccine (from 9 months)	1 vaccine at admission if no card (second will be given in OTP)

- Some of the drugs used in treating malaria are potentially more toxic in the malnourished than in well-nourished patients and should be avoided if possible. Combinations containing amodiaquine should be avoided in the SAM children until their safety is confirmed in this group of children.
- Do NOT give oral or intravenous infusions of quinine to SAM patients for at least the first two weeks of treatment. In severely malnourished patients' quinine often induces prolonged and dangerous hypotension, hypoglycemia, arrhythmia and cardiac arrest. There is only a small difference between the therapeutic dose and the toxic dose.
- Treated mosquito-nets should be on all the beds in the IPF.

14.2.6.4: Failure to respond

It is usually only when children fulfil the criteria for "failure-to-respond" that they need to have an extensive history and examination, or laboratory investigations conducted. Skilled staff time and resources should be mainly directed to training, supervision and diagnosis and management of the few children who fail-to-respond to the standard treatment. Failure-to-respond to standard treatment is a "diagnosis" in its own right. For OTP, the most common reasons for failure are social; social and psychological reasons can also cause failure to respond in in-patients although this is less likely. Note that the day of admission is counted as day 0, so that day 1 is the day after admission.

Criteria for Failure To Respond	Time After Admission
Failure to improve/regain appetite	Day 4
Failure to start to lose edema	Day 4
Edema still present	Day 10
Failure to fulfil the criteria for recovery-phase (OTP)	Day 10
Clinical Deterioration After admission	At any time

14.2.6.5: Criteria to progress from transition phase to OTP

- Patient must have a good appetite-This means taking at least 90% of the RUTF (or F100) prescribed for transition phase.
- For Edematous patients (kwashiorkor):
  - If there is a definite and steady reduction in edema.
  - If there is a capable caretaker.
  - If the caretaker agrees to out-patient treatment.
  - If there are reasonable home circumstances.
  - If there is a sustained supply of RUTF.
  - If an OTP program is in operation in the area close to the patient's home

A patient transferring from one to another phase of treatment, one as an in-patient and the other as an outpatient, is still under the care of the IMAM program for this episode of severe malnutrition; this is not a "discharge" from the in-patient facility but an internal transfer to another part of the same program-nevertheless the IPF records this as "successful treatment".

Discharge Criteria

Age	Discharge Criteria for Routine Program (SAM)
6 months - 8 years	W/H or W/L ≥ -1.5z score (two consecutive visit) and/or MUAC ≥ 12.5cm and No edema for 14 days
Age	**Discharge Criteria in Emergency Situation (SAM)**
8 - 18 years	W/H ≥ 85% NCHS and No edema for 14 days
Adults	MUAC ≥ 18.5 cm or BMI ≥ 17.5 and No edema for 14 days

14.3 Prevention and Control of Micronutrient Deficiency

14.3.1: Vitamin A Supplementation and Deworming Among Children Under Five (5)

Universal distribution of a single, large dose of vitamin A supplements and single dose of deworming tablets is done in a 6-month interval twice a year.

14.3.1.1 Eligibility and Dosage

Children are grouped according to age based on the dosage of vitamin A supplements appropriate for the age group:

- Children 6 to 11 months to receive 100,000IU vitamin A supplements
- Children 12 to 59 months to receive 200,000IU vitamin A supplements and deworming tablets (500mg Mebendazole, chewable tablets)

14.3.1.2 Administration

- Check the child health card and ensure child has not received vitamin A supplements within the past 4 months.
- Cut the appropriate dosage vitamin capsule and drop the oil to the child's mouth.
- Give the deworming tablet to children who are big enough to chew the tablet otherwise, crush the tablet using a clean tablespoon and administer to the child.
- It is best to give the child water when administering deworming to prevent choking.

14.3.2 Iron Folate Supplements Among Pregnant Women

Daily oral iron and folic acid supplementation is recommended as part of the antenatal care to reduce the risk of low birth weight, maternal anemia and iron deficiency.

14.3.2.1: Eligibility and Dosage

All pregnant adolescents and adult women must be provided with iron folate supplements containing 30–60 mg of elemental iron and 400 µg (0.4 mg) folic acid.

14.3.2.2: Administration

- Throughout pregnancy. Iron and folic acid supplementation should begin as early as possible during the first antenatal care visit.
- Pregnant women must be instructed to take one supplement daily for the duration of the pregnancy.

References

1. Liberia MoH. Operational Guidelines for the Integrated Management of Acute Malnutrition. 2012.
2. WHO Model List of Essential Medicines (20th List)2017. www.who.int (accessed.

15. DISEASES OF THE EYE, EAR, NOSE AND THROAT

15.1 Conjuctivitis

Differential Diagnosis

a. Acute bacterial conjunctivitis:

- Purulent discharge, No itching
- May affect one or both eyes
- Recurrences may not occur

b. Viral conjunctivitis:

- watery discharge or none
- no itching, can occur to one or both eyes
- recurrences are unusual

c. Allergic conjunctivitis:

- mucoid discharge, marked itching
- affects both eyes, recurrences occur

d. Chronic, endemic trachoma

- discharge may be absent or can be purulent
- itching is absent, affects both eyes
- chronic recurrence

Acute Bacterial Conjunctivitis:

Medicine Name	Level	Dose	Frequency	Duration
Tetracycline 1% eye ointment	C	Apply to affected eye	Every 8 hours	7 days
or, Chloramphenicol 1% eye ointment	C	Apply to affected eye	Every 6 hours	7 days

Allergic Conjunctivitis

Medicine Name	Level	Dose	Frequency	Duration
Dexamethasone 1% eye ointment	HOS	Apply to affected eye	Every 6-12 hours	7 days
or, Dexamethasone 0.1% eye drops	HOS	1-2 drops	Every 1-2 hours when	7 days

Associated Allergy and Infection

Medicine Name	Level	Dose	Frequency	Duration
Neomycin + betamethasone 1% eye drops	HOS	1-2 drops	Every 1-2 hours when awake	7 days
or, Chloramphenicol + betamethasone eye	HOS	1-2 drops	Every 1-2 hours when awake	7 days
or, Gentamicin + Betamethasone 1% eye drops	HOS	1-2 drops	Every 1-2 hours when awake	7 days

15.2: Chlamydia Infections

Medicine Name	Level	Dose	Frequency	Duration
Tetracycline eye ointment	C	Apply into affected	Every 6 hours	21 days
or, Erythromycin 250 mg	C	250 mg	Every 6 hours	21 days
or, Gentamicin + Betamethasone 1% eye drops	HOS	1-2 drops	Every 1-2 hours when awake	7 days

15.3: Opthalmia Neonatorum

Medicine Name	Level	Dose	Frequency	Duration
Benzylpenicillin im	C	50000IU/kg	Every 12 hours	5 days

15.4 Otitis Externa

- Presentations vary depending on cause
- Itchiness of canal, ulcers on the externa auditory canal, inflamed canal, occasional discharges from canal
- Otoscopy to assess the canal and tympanic membrane. Inflamed external ear (auricle and external auditory canal)

Medicine Name	Level	Dose	Frequency	Duration
Chloramphenicol and dexamethasone ear drops	C	2 drops into the ear	Every 12	10 days
or, Ciprofloxacin and dexamethasone ear drops	C	2 drops into the ear	Every 12	10 days

If a fungal infection is suspected, give clotrimazole ear drops twice daily for 2 months.

15.5: Otitis Media

Patient presents with fever, chills and irritability. Most common under 2 years of age. Examination shows irritable child, tympanic membrane inflamed and bulging.

Natural history:

□ 60% resolve in 24hrs

□ 80% by 48hrs

□ 88% 4-7 days

□ 20% remaining by 3 months

Streptococcus pneumonia (35%), *Hemophilus influenza* (23%), *Moraxella catarrhali*s (14%) form most organisms that cause otitis media.

Medicine Name	Level	Dose	Frequency	Duration
Adult: Amoxicillin po	C	500 mg	Every 8 hours	7 days
or, Amoxicillin and clavulanic acid po	HOS	80mg/kg	Every 12 hours	10 days
Child: Amoxicillin po	C	40mg/kg/dose	Every 8 hours	7 days
or, Amoxicillin and clavulanic acid po	HOS	6.4 mg/kg	Every 12 hours	10 days

15.6 Trachoma

Medicine Name	Level	Dose	Frequency	Duration
Adult: Tetracycline eye ointment	C	apply	Every 12 hours	28 days
plus, Cotrimoxazole po	C	960 mg	Every 12 hours	14 days
or, Erythromycin po	C	500 mg	Every 6 hours	14 days
Child: Tetracycline eye ointment	C	apply	Every 12 hours	28 days
plus, Cotrimoxazole po	C	24 mg/kg/dose	Every 12 hours	14 days
or, Erythromycin po	C	10-15 mg/kg/dose	Every 6 hours	14 days

15.7 Vitamin A Deficiency (Xerophthalmia)

Retinol (vitamin A) to be given every 2 weeks for a total of 3 doses in the following amounts:

- <6 months = 50,000 IU
- 6-11 months = 100,000 IU
- 1-6 years = 200,000 IU
- >6 years = 200,000 IU

Vitamin A can also be given prophylactically to children and lactating mothers for the target conditions and diseases listed in table 15.6 at the dose by age given above.

Table 15.1 When to Give Vitamin A

Disease or Condition	Dosage
Measles, severe diarrhea, severe	‣1st dose at diagnosis ‣2nd dose 2 weeks later ‣3rd dose 6 weeks
Acute respiratory infection	One dose at diagnosis of pneumonia and TB
Lactating mothers	‣1st dose of 200,000 IU at delivery; ‣2nd dose 1 month after

15.8 Acute Rhinosinusitis

Clinical Presentation

Patients will complain of nasal blockage, rhinorrhea, facial pain. Nasal discharge may become purulent when bacterial infection occurs.

Cause:

- Rhinovirus
- Adenovirus
- Influenza virus.

Treatment

Can be managed with analgesia and plenty of fluids. In the case where there is evidence of bacterial infection;

Medicine Name	Level	Dose	Frequency	Duration
Amoxicillin po	C	500 mg	Every 8 hours	7 days

References

1. WHO Model List of Essential Medicines (20th List)2017. www.who.int (accessed.
2. WHO Model List of Essential Medicines for ChildrenApril 2017. www.who.int (accessed.
3. Standard Treatment Guidelines for Ghana. 6th ed. Accra: Ministry of Health (GNDP) Ghana; 2010.
4. BNF for Children: BMJ Group, Pharmaceutical Press, & RCPCH Publications Limited; September 2015-2016.
5. British National Formulary (BNF) - 74: BMJ Group, Pharmaceutical Press, & RCPCH Publications Ltd; September 2017 - March 2018.

16. INJURIES, ACCIDENTS, AND POISONING

16.1: Bites

16.1.1: Animal Bite-Rabies

16.1.1.1: If the Animal Was Identified

Quarantine the animal for 10 days while feeding it. If the animal does not show any signs of rabies infection, it may be released. If the animal was infected, it should die within 10 days. If it shows signs of rabies infection, the animal should be killed, and the head put in a polythene bag and sent to the veterinary department for verification of the infection.

Meanwhile, treat the patient:

- Do surgical toilet.
- Do not suture the wound.
- Give systemic antibiotic **-plus-** anti-tetanus serum (ATS)

If results indicate rabies infection in the dog, then give anti-rabies vaccine.

16.1.1.2: If the Animal Was Not Identified

- Do surgical toilet.
- Give systemic antibiotics, ATS, and anti-rabies vaccine.

Note: Anti-rabies vaccine is very expensive and should be used only when there is an absolute need.

16.1.2: Human Bite

- Clean the wound with chlorhexidine solution 0.5%
- If not fully immunized, give tetanus toxoid (TT) as per immunization schedule Give antibiotics such as:

Medicine	Level	Dose	Frequency	Duration
Adult				
Benzylpenicillin im	C	1-2 MU	Every 6 hours	5 days
or, Erythromycin po	C	250 mg	Every 6 hours	5 days
or, Metronidazole po	C	400 mg	Every 8 hours	5 days
Child				
Benzylpenicillin im	C	0.2 MU/kg/day	In divided doses	5 days
or, Erythromycin po	C	12.5 mg/kg	Every 6 hours	5 days

16.1.3: Snake Bite

Antivenom polyvalent, 5 ml/ampoule. 10-100 ml sc or IM ATS -**or**- TT as per immunization schedule.

Note: Do not give antivenom if there is no sign of poisoning. The signs are bleeding (i.e., hematuria, oozing from the site, hematemesis), paralysis, and failure of collected blood to clot within 5-15 min.

16.1.4: Insect Bite

Medicine	Level	Dose	Frequency	Duration
Adult				
Chlorpheniramine po	C	4 mg	Every 6 hours	3 days
Child				
or, Chlorpheniramine po	C	<2yrs=1 mg	Every 12 hours	3 days
or, Erythromycin po	C	2-5yrs=1 mg	Every 4-6 hours	3 days
		6-12yre=2 mg	Every 4-6 hours	3 days

16.2 Fractures

16.2.1: Simple Fractures-General Management

- Clear the airway and treat the shock.
- Immobilize the affected part with a splint; give special attention to neck or spinal injuries. REFER the patient for further management
- Give an analgesic to relieve pain.

Medicine	Level	Dose	Frequency	Duration
Adult: Diclofenac po	C	50 mg	Every 8 hours	5 days
Child: Paracetamol po	C	10 mg/kg	Every 8 hours	3 days
or, Ibuprofen po	C	10 mg/kg	Every 8 hours	3 days

If there is need for a stronger analgesic,

Medicine	Level	Dose	Frequency	Duration
Adult: Pethidine im	C	4 mg	Every 6 hours	3 days
Child: Pethidine im	C	2 months-12 years=0.5-2mg/kg 12-18 years=50-100 mg/kg	Every 4-6 hours Every 4-6 hours	3 days 3 days

WARNING: Pethidine should not be given for rib fractures or head injuries because it induces respiratory depression.

16.2.2: Compound Fractures

General Management

Same as in simple fractures but in addition:

- Stop the bleeding
- Carry out surgical toilet
- Manage any anemia accordingly. Give ATS as in burns.

Notes:

- The first aid management of fractures can be done at the district level, and then REFER the patient as soon as possible for further management.
- Check the blood circulation distant to the affected

16.3 Foreign Body in the Eye

Foreign body in the eye should be removed by an eye specialist or someone knowledgeable in that field. REFER if no specialists are available.

16.4 Foreign Body in the Ear

16.4.1: Round Object

- If near the ear opening, hook with a hooked instrument and remove it.
- If deep inside the ear, clean with clean, lukewarm water.

WARNING: Do not syringe if the foreign body is a seed, but REFER immediately to a specialist.

16.4.2: Insect

Kill the insect with oil, and syringe the ear with clean lukewarm water.

16.5 Foreign Body in the Nose

Try blowing out the foreign body forcefully by blocking the unaffected nostril and blowing through the mouth. If this fails—

- Remove round objects with a hook
- Grasp insects with fine forceps

16.6 Injuries

16.6.1: Burns

REFER. The following categories of burns should be managed in the hospital:

- Burns of the face neck, head, joints, and perineum
- Burns covering more than 9% of the body
- Any third-degree burns

Management

Do the following:

- Clean the wound with chlorhexidine solution 0.5% **or**
- Physiological saline
  - Dress the wound with a paraffin gauze dressing plus dry gauze on top. Change the dressing every 2 days.
  - If paraffin gauze is not available, use Silver Sulfadiazine cream for topical application
  - If not fully immunized, give ATS 1,500 IU SC or IM and TT as per immunization schedule
  - Give an antibiotic:

Medicine	Level	Dose	Frequency	Duration
Adult				
Benzylpenicillin im	C	1-2 MU	Every 6 hours	5 days
or, Erythromycin po	C	250 mg	Every 6 hours	5 days
Child				
Benzylpenicillin im	C	0.2 MU/kg/day	In divided doses	5 days
or, Erythromycin po	C	12.5 mg/kg	Every 6 hours	5 days

Fluid replacement should be administered in cases where patient has 3rd degree burns.

16.6.2: Bruises and Minor Cuts

- Clean the wound with chlorhexidine solution 0.5%
- If not fully immunized or if the wound is suspected to be contaminated, give anti-tetanus serum (ATS) 1,500 IU SC or IM.
- If not fully immunized, give TT as per immunization schedule.
- If grossly contaminated, give antibiotics such as—

Medicine	Level	Dose	Frequency	Duration
Adult: Benzylpenicillin im	C	1-2 MU	Every 6 hours	5 days
or, Erythromycin po	C	250 mg	Every 6 hours	5 days
Child: Benzylpenicillin im	C	0.2 MU/kg/day	In divided doses	5 days
or, Erythromycin po	C	12.5 mg/kg	Every 6 hours	5 days

16.6.3: Wounds

- Ascertain the cause of the wound if possible.
- Clean the wound with chlorhexidine solution 0.5% or physiological saline.
- Explore the wound to ascertain extent of damage.
- If clean and fresh (i.e., <12 hrs), suture under local anesthesia (lignocaine hydrochloride 1%).

Note: Gunshot and dog and human bite wounds should *not* be sutured.

- If wound is suspected to be contaminated, give ATS 1,500 IU or IM.
- If not fully immunized, give TT as per immunization schedule

If an antibiotic is necessary;

Medicine	Level	Dose	Frequency	Duration
Adult: Benzylpenicillin im	C	1-2 MU	Every 6 hours	5 days
or, Erythromycin po	C	250 mg	Every 6 hours	5 days
Child: Benzylpenicillin im	C	0.2 MU/kg/day	In divided doses	5 days
or, Erythromycin po	C	12.5 mg/kg	Every 6 hours	5 days

16.6.4: Head Injuries

16.6.4.1: If There Are Signs of Cerebral Edema

Give supportive treatment—

i. Nurse in a semi-prone position
ii. Keep a head injury chart to monitor the Glasgow coma scale, pupil size, and neurological signs.
iii. Withhold or use IV fluids with caution.

Medicine	Level	Dose	Frequency	Duration
Adult: Furosemide iv	HC	40 mg	Every 8 hours	2 days
Child: Furosemide iv	HC	1 mg/kg	Every 8 hours	2 days

16.6.4.2: Open Head Injury

REFER immediately after giving the initial dose of antibiotics and first aid as for wounds

WARNING: Do not sedate the patient.

16.6.4.3: Closed Head Injury

Treat as for cerebral edema

16.7 Poisoning

16.7.1: General Measures

16.7.1.1: Respiration

Respiration is often impaired in unconscious patients. Use these measures—

- Ensure the airway is cleared and maintained by inserting an airway if available.
- Position the patient in semi-prone position to minimize risk of inhalation.
- Assist ventilation if necessary.

16.7.1.2: Blood Pressure

Hypotension is common in severe poisoning with central nervous system depressants. Use these measures—

- A systolic BP <70 mmHg may cause irreversible brain or renal damage.
- Carry the patient head down on the stretcher and nurse in this position in the ambulance.
- Give oxygen to correct hypoxia.
- Set up an IV infusion.

Note: Fluid depletion without hypotension is common after prolonged coma and after aspirin poisoning due to vomiting, sweating, and hyperpnoea. Hypertension is less common but may be associated with sympathomimetic poisoning (e.g., amphetamines, cocaine).

16.7.1.3: Heart

Cardiac conduction defects and arrhythmias may occur in acute poisoning, especially with tricyclic antidepressants but these often respond to correction of any hypoxia or acidosis.

16.7.1.4: Body Temperature

Hypothermia may develop in patients with prolonged unconsciousness, especially after an overdose of barbiturates or phenothiazines (e.g., chlorpromazine, trifluoperazine).

Treat by covering the patient with a blanket.

16.7.1.5: Convulsions

Do not treat single brief convulsions. If convulsions are prolonged or recur frequently, give:

Medicine	Level	Dose	Frequency	Duration
Adult: Diazepam iv	C	10mg	once	Repeat if necessary
Child: Diazepam iv	C	400 micrograms (0.4 mg/kg)	once	Repeat if necessary

16.7.2: Acetylsalicylic Acid Poisoning

- Gastric lavage is worthwhile up to 4 hrs after poisoning because stomach emptying is delayed.
- Use activated charcoal, 50 g; repeat as needed every 4 hrs, to delay absorption of any remaining salicylate.
- Monitor and manage fluid and electrolytes to correct acidosis, hyperpyrexia, hypokalemia, and dehydration.
- Watch for hypoglycemia; treat with **glucose 50% as IV bolus**. **Adult:** 20 ml. **Child:** 1 ml/kg
- Anticipate and treat convulsions.
- Monitor airway circulation

16.7.3: Barbiturate Poisoning

Monitor vital signs and—

- Perform gastric lavage.
- Give Ipecacuanha syrup to induce vomiting.
- Give activated charcoal (50 g) to absorb poison.

16.7.4 Food Poisoning

- Establish the cause and treat accordingly.
- Give oral or IV fluids for rehydration as required.
- For pain, give paracetamol.
  - ***Adult:*** 1 g every 4-6 hrs (max: 4 g daily).
  - ***Child:*** 10 mg/kg per dose
- If the poisoning is bacterial in origin and diarrhea persists or is severe (i.e., more than 5 stools per day, bloody, and/or with fever), give an antibiotic for 3-7 days, depending on response—

Medicine	Level	Dose	Frequency	Duration
Adult				
Cotrimoxazole po	C	960 mg	Every 12 hours	5 days
or, Erythromycin po	C	500 mg	Every 6 hours	5 days
or, Ciprofloxacin po	C	500 mg	Every 12 hours	5 days
Child				
Cotrimoxazole po	C	24 mg/kg/dose	Every 12 hours	5 days
or, Erythromycin po	C	10 mg/kg	Every 6 hours	5 days
or, Ciprofloxacin po	C	10 mg/kg	Every 12 hours	5 days

16.7.5: Iron Poisoning

Deferoxamine, 15 mg/kg/hr by continuous IV Sodium chloride 0.9% or dextrose 5% infusion

16.7.6: Methyl Alcohol Poisoning

- If taken within 2 hrs, do gastric aspiration and lavage.
- Correct metabolic acidosis with oral sodium bicarbonate solution 5% and leave the solution in the stomach.
- In severe cases:
  - Give sodium bicarbonate 8.4%. 50 ml by slow IV, and monitor plasma.
  - Give 30-35 ml of alcohol 40% (e.g., whisky, brandy) in 100 ml of water every 3 hrs until acidosis is corrected.

16.7.7: Opium or Morphine Poisoning

Medicine	Level	Dose	Frequency	Duration
Adult: Naloxone iv	HOS	0.8-2.0 mg	Until respiratory function improves	
Child: Naloxone iv	HOS	10 micrograms/kg	Until respiratory function improves	

If respiratory function does not improve:

- ***Adult:*** Repeat dose every 5 min to a maximum of 10 mg total dose.
- ***Child:*** Give one subsequent dose of 100 micrograms/kg.

16.7.8: Organophosphate Poisoning

Gastric lavage if the poison was ingested

Medicine	Level	Dose	Frequency	Duration
Adult: Atropine iv/im	C	2.0 mg	Repeat dose every 20-30 minutes till atropinization	
Child: Atropine iv/im	C	20 micrograms/kg/dose	Repeat dose every 20-30 minutes till atropinization	

In moderate to severe poisoning only and if not responding to atropine:

- Pralidoxime Mesylate (HOS level) - 30 mg/kg IM
- Followed by 1-2 more doses at 4-6 hour intervals, depending on the severity of the poisoning and response to treatment

16.7.9: Paraffin Poisoning

- The main danger is damage to lung tissue.
- ***Avoid gastric lavage or use of an emetic because it may lead to inhalation causing pneumonitis.***
- Give plenty of oral fluids (preferably milk).
- Give activated charcoal (50 g) and repeat as necessary every 4 hours or 25 g repeated as necessary every 2 hours.

16.7.10: Rat Poisoning (Warfarin Poisoning)

- Give activated charcoal (50 g) and repeat as necessary every 4 hours or 25 g repeated as necessary every 2 hours, to absorb any remaining poison.
- If there is major bleeding, give Phytomenadione (vitamin K1), 5 mg IV

16.7.11: Paracetamol Poisoning

If poisoning took place <2 hrs before:

- Empty the stomach to remove any remaining medicine using gastric lavage or an emetic.
- Despite few significant early symptoms, TRANSFER patient to hospital immediately. Maximal liver damage occurs 3-4 days after poisoning.
- If poisoning took place > 12 hrs before:

Medicine	Level	Dose	Frequency	Duration
Methionine po	HOS	2.5 g	Repeat 3 times at 4-hour intervals	

-or -

In hospital setting: **Acetylcysteine - 200 mg/ml injection in 10 ml ampoule.**

Medicine	Level	Dose	Frequency	Duration
Adult & Child: Acetylcysteine iv	HOS	Initially: 150 g/kg over 15 minutes, then 50 mg/kg over 4 hours, then 100 mg/kg over 16 hours		

Administration: Dilute the requisite dose in glucose IV infusion solution, 5% as follows—

- *Adult and child >12 years*: 200 ml/kg over 15 minutes, then 500 ml over 4 hrs, then 1 liter over 16 hrs
- *Child <12 years with body weight over 20 kg:* Initially 100 ml/kg over 15 min, then 250 ml over 4 hrs, then 500 ml over 16 hrs
- *Child <12 years with body weight under 20 kg:* Initially 3 mg/kg over 15 min, the 7 ml/kg over 4 hrs, then 14 ml/kg over 16 hrs

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17. DISEASES OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE

17.1 Pyogenic Arthritis (Septic Arthritis)

An acute inflammation of joints after bacterial infection; early initiation of treatment allows for good prognosis. Antibiotic treatment, including initial parenteral and subsequent oral preparations, must be continued for a total of 6 weeks.

Causes

- *Staphylococcus aureus* in majority of cases
- Streptococcus pyogenes and Pneumococci
- *Hemophilus influenzae* in infants
- Salmonella in sickle cell disease

Clinical Presentation

- Sudden onset, large joints usually affected
- Pain, fever
- Restriction of movement of limbs
- Joint abnormalities, Warm to touch and tender
- Swollen with effusion, limitation of movement

Diagnosis

- FBC, Sickling /Hb Electrophoresis
- Erythrocyte sedimentation rate (ESR)
- Aspiration of joint effusion (fluid is turbid with polymorphs) for Gram stain and culture
- Blood culture, Urethral swab

Treatment

- *Treatment objectives*
  - To relieve pain
  - To treat infection
  - To prevent joint damage
- *Non-pharmacological treatment*
  - Rest affected joint e.g. splinting or traction during acute phase
  - Joint aspiration
- *Pharmacological treatment*

Medicine Name	Level	Dose	Frequency	Duration
Cloxacillin iv	HOS	1-2g	4 times a day	4-6 weeks

- Culture and sensitivity should guide antibiotic choice where available.
- Erythrocyte Sedimentation Rate (ESR) is useful in monitoring response.
- Duration of therapy may be reduced if fever and toxicity have resolved, and if X-ray is normal.
- Switch to oral therapy when a good response is achieved.

17.2 Gout

Gout involves hyperuricemia, recurrent attacks of acute arthritis with monosodium urate (MSU) crystals in synovial fluid leukocytes, deposits of MSU crystals in tissues in and around joints (tophi), interstitial renal disease, and uric acid nephrolithiasis.

Cause

- Uric acid is the end product of purine degradation. An increased urate pool in individuals with gout may result from overproduction or underexcretion.
- Overproduction of uric acid may result from abnormalities in enzyme systems that regulate purine metabolism (e.g., increased activity of phosphoribosyl pyrophosphate [PRPP]synthetase or deficiency of hypoxanthine-guanine phosphoribosyl transferase[HGPRT]).
- Cytotoxic medicines can result in overproduction of uric acid due to lysis and the breakdown of cellular matter.
- Medicines that decrease renal uric acid clearance include diuretics, nicotinic acid, salicylates (<2 g/day), ethanol pyrazinamide, levodopa, ethambutol, cyclosporine, and cytotoxic drugs.

17.2.1: Acute Gout Attack

Characterized by rapid onset of excruciating pain, swelling, and inflammation; attack is typically monoarticular, most often affecting the first metatarsophalangeal joint (podagra), and then, in order of frequency, the insteps, ankles, heels, knees, wrists, fingers, and elbows.

Medicine Name	Level	Dose	Frequency	Duration
Ibuprofen po	C	400-800 mg	Every 6-8 hours	3 days, review
or, Colchicine po	HC	0.5-1mg (max=6mg/day)	Every 4 hours	2 days

*Avoid aspirin. Avoid diuretics. Do not treat with allopurinol or uricosuric medicines.

17.2.2: Chronic Gout

Treat acute attacks as they occur. Stop thiazide diuretics, avoid dehydration.

Medicine Name	Level	Adult dose	Frequency	Duration
Allopurinol po	HC	300mg	once a day	continual

17.3 Osteoarthritis

Osteoarthritis (OA) is a common, progressive disorder affecting primarily weight-bearing diarthrodial joints, characterized by progressive deterioration and loss of articular cartilage, osteophyte formation, and pain, limitation of motion, deformity, and disability.

Cause

- Primary (idiopathic) OA, the most common type, has no known cause.
- Secondary OA is associated with a known cause, such as trauma, metabolic or endocrine disorders, and congenital factors.
- Pain may result from distention of the synovial capsule by increased joint fluid; microfracture; periosteal irritation; or damage to ligaments, synovium, or the meniscus.

Clinical Presentation

- Risk factors include:
  - Increasing age, obesity
  - Repetitive use through work or leisure activities
  - Joint trauma, and genetic predisposition.
- Limitation of motion, stiffness, crepitus, and deformities may occur. Patients with lower extremity involvement may report weakness or instability.
- Upon arising, joint stiffness typically lasts less than 30 minutes and resolves with motion.
- Presence of warm, red, and tender joints suggests inflammatory synovitis.

- Physical examination of affected joints reveals tenderness, crepitus, and possibly enlargement

Diagnosis

Diagnosis is made through patient history, physician examination, radiologic findings, and laboratory testing.

Treatment

- *Goals of Treatment*
  - Educate patient, family members, and caregivers
  - Relieve pain and stiffness
  - Maintain or improve joint mobility
  - Limit functional impairment
  - Maintain or improve quality of life
- *Non-Pharmacologic Therapy*
  - Educate patient about disease process and extent, prognosis, and treatment
  - Promote dietary counseling, exercise, and weight loss program for overweight patients
  - Physical therapy—with heat or cold treatments and an exercise program—helps maintain range of motion and reduce pain and need for analgesics
  - Assistive and orthotic devices (canes, walkers, braces, heel cups, insoles) can be used during exercise or daily activities

Medicine Name	Level	Adult dose	Frequency	Duration
Aspirin po	C	300-600mg	4 hourly	review
or, Ibuprofen po	C	200-400mg	3 times a day	review
or, Diclofenac po	HC	25 -50mg	3 times a day	Review

17.4: Osteomyelitis

This is infection of bone. It is a blood-borne infection from a septic focus or following trauma. However, direct infection of the bone may also occur in fractured bones that communicate with the exterior (i.e. compound fractures). It may be acute or chronic. It is common in children and individuals with sickle cell disease.

Pharmacological treatment with antibiotics should be by the parenteral route for two weeks followed by the oral route for 4 weeks.

Causes

- *Staphylococcus aureus* (commonest organism) ; *E. Coli*
- Proteus
- Pseudomonas *Hemophilus Influenza* (in children)
- Streptococcus (common in sickle cell disease)
- Salmonella (common in sickle cell disease)

Clinical Presentation

- High fever (>38°C)
- Pain in the affected part and unwillingness to move the affected part
- Limited voluntary movement of affected part
- Local swelling, warmth and tenderness
- Definite fluctuant abscess over a bone
- Anemia especially in patients with sickle cell disease

Diagnosis

- FBC, Erythrocyte Sedimentation Rate
- X-ray of the affected bone (may be normal initially but new bone formation in the line of the elevated periosteum is seen after 10 to 14 days of onset)
- Blood culture or pus for culture if possible

Treatment

- *Treatment objectives*
  - To relieve pain
  - To eradicate infection
  - To prevent complications e.g. pathological fractures, chronic Osteomyelitis
- *Non-pharmacological treatment*
  - Splinting of affected limb in Plaster of Paris (POP) back slab or other suitable splint
  - Tepid sponging
  - Surgery where indicated
- *Pharmacological treatment*
  - IV fluids and blood transfusion if indicated

Medicine Name	Level	Dose	Frequency	Duration
Adult: Cloxacillin iv	HOS	250-500 mg	Every 6 hours	5 days
Child: Cloxacillin iv	HOS	6-12 years = 250-500mg 1-5 years = 125-250 mg <1 year = 62.5 mg	Every 6 hours	5 days

17.5: Pyomyositis

Inflammation of muscle leading to pus formation and deep-seated muscle abscess.

Causes

- Bacterial infection (commonly *Staphylococcus aureus*)
- Trauma

Clinical Presentation

- Most commonly localized in one muscle; usually large striated muscle
- History of trauma, fever, painful swelling of the involved muscle
- Affected area is hot, swollen, and tender
- Fluctuation when pus forms
- Differentiate from Cellulitis, Boils, Osteomyelitis, Peritonitis (in Pyomyositis of abdominal muscles)

Diagnosis

- Full blood count and Culture and Sensitivity
- Pus: Culture & Sensitivity

Treatment

- Elevate and immobilize affected limb (where relevant)
- Check frequently for pus formation

Medicine Name	Level	Dose	Frequency	Duration
Adult: Cloxacillin iv/im	HOS	2 g	Every 6 hours	7 days
Child: Cloxacillin iv/im	HOS	2 g	Every 6 hours	7 days

When patient shows signs of improvement switch to on oral antibiotic:

Medicine Name	Level	Dose	Frequency	Duration
Adult: Cloxacillin po	HC	500 mg	Every 6 hours	To course completion
Child: Cloxacillin po	HC	<2 years = 125 mg/dose 2-10 year = 250 mg/dose	Every 6 hours	To course completion

17.6: Management of Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a chronic, progressive inflammatory disorder of unknown etiology characterized by polyarticular symmetric joint involvement and systemic manifestations.

Cause

- RA results from dysregulation of humoral and cell-mediated immunity
- End results is a loss of joint space and joint motion, bony fusion (ankylosis), joint subluxation, tendon contractures, and chronic deformity.

Clinical Presentation

- Nonspecific prodromal symptoms:
  - Fatigue, weakness, low-grade fever
  - Anorexia, and joint pain
  - Stiffness and myalgias may precede development of synovitis
- Joint involvement tends to be symmetric and affect small joints of the hands, wrists, and feet; elbows, shoulders, hips, knees, and ankles may also be affected.

Treatment

- *Goals of Treatment*
  - The goal is to induce complete remission or low disease activity
  - Additional goals are to control disease activity and joint pain, maintain ability to function in daily activities, slow destructive joint changes, and delay disability
- *Non-Pharmacologic Therapy*
  - Adequate rest, weight reduction if obese
  - Occupational therapy, physical therapy, and use of assistive devices
- *Pharmacotherapy*

To reduce the impact caused by the erosive damage of progressive rheumatoid arthritis, early diagnosis and initiation of treatment with NSAIDs, Disease Modifying Anti-Rheumatic Medicines (DMARDs) (Chloroquine, Methotrexate and Sulfasalazine), and low dose steroids in the presence of severe inflammation or vasculitis is necessary. Disease modifying medicines are the mainstay of treatment to minimize erosions and deformities.

NSAID's

Medicine Name	Level	Dose	Frequency	Duration
Ibuprofen po	C	200-400 mg	Every 8 hours	Review change in inflammation
or, Diclofenac po	C	25-50 mg	Every 8 hours	Review change in inflammation

Disease Modifying Anti-Rheumatic Medicines (DMARD's)

Medicine Name	Level	Dose	Frequency	Duration
Methotrexate po	HOS	5-25 mg	Once a week	Review
or, Chloroquine po	C	150 mg	Once a day	Review
If required add:				
Prednisolone po	C	2.5-10 mg	Once a day	Short period of time

Chloroquine: patient should be monitored for eye problems if on treatment for more than 6 months, treatment with chloroquine should not exceed 2 years.

Methotrexate: patient should be monitored for Full Blood Counts (FBC) and Liver Function Tests (LFT) every 3 months

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18. FAMILY PLANNING

The key objective of FP is to ensure that individuals of child bearing age plan their families so that all children are born when wanted, expected, and welcome. The health benefits of FP also play a major role in protecting the lives of infants, children, women, and the family as a whole.

The key steps to be followed in provision of FP services are to:

i. Provide information about FP to different groups of child bearing age
ii. Counsel clients at high risk on the use of FP services
iii. Counsel clients to make an informed choice of FP method without cohesion
iv. Obtain and record clients' history
v. Perform physical assessment
vi. Perform pelvic examination for all female clients
vii. Manage client for chosen FP method
viii. Educate clients on the side effects of family planning
ix. Observe clients' privacy

18.1 Condom (Male)

Indications:

- Individual of child bearing age where one or both partners are HIV infected, even if they are using another FP method
- Individuals of child bearing age needing an immediately effective method
- Individuals of child bearing age waiting to rule out suspected pregnancy
- Individuals of child bearing age needing protection against exposure to STIs including HIV/AIDS
- Individuals of child bearing age for whom a back-up method is needed when woman is starting or has forgotten to take oral contraceptives
- Couples who prefer this FP method

Advantages:

- Men play role in planning their family.
- Male condoms protect against STl and HIV infection.

Disadvantages:

- Some men may have difficulty maintaining an erection with condom on.
- Male condoms may cause insensitivity of the penis.
- Some men may experience occasional hypersensitivity to latex or lubricants.

Management:

- Ensure that client understands correct use, storage, and disposal.
- Supply at least 40 condoms per visit.
- Advise clients to return for more before they run out.

18.2 Condom (Female)

A female condom is a soft plastic pre-lubricated sheath with an inner and outer ring which is inserted into the vagina before intercourse.

Indications:

- Same as for the male condoms
- Women whose partners will not use the male condom
- Where there is allergy or hypersensitivity to condom latex

Advantages:

- Women play active role in planning their family.
- Female condom can be inserted before intercourse and so does not interrupt sexual spontaneity.
- Use is not dependent on male erection and does not require immediate withdrawal after ejaculation.
- It protects against STl and HIV infections.
- No special storage is required.

Disadvantages:

- It requires special training and practice to use correctly.
- It is a new product with limited public awareness.

Management:

- Ensure client understands correct use, storage, and disposal.
- Supply at least 40 female condoms per visit.
- Advise client to return for more before they run out.

18.3 Combined Oral Contraceptive Pill

The combined oral contraceptive (COC) pill contains an estrogen plus a progestogen, the types and quantities of which may vary in different preparations.

Indications:

- Women <35 years needing highly effective FP method
- Non-breastfeeding clients or breastfeeding clients after 6 months postpartum
- Clients with dysmenorrheal
- Clients with heavy periods or ovulation pain
- Clients concerned by irregular menstrual cycles

Contraindications:

- Diastolic BP >100 mmHg - Cardiac disease
- Thromboembolic disease - Active liver disease
- Within 2 weeks of childbirth
- When major surgery planned within 4 weeks
- Unexplained abnormal vaginal bleeding
- Known or suspected cervical cancer
- Undiagnosed breast lumps or breast cancer
- Pregnancy (known or suspected)

***Risk factors*:** If patient falls into any 2 of the following categories, recommend progesterone- only or non-hormonal FP method:

- Smoking (especially if >10 cigarettes/day)
- Age >35 years
- Diabetes mellitus

Disadvantages and common side-effects:

- Spotting, nausea, and vomiting within first few months
- May cause headaches and weight gain
- Effectiveness dependent on regular daily dosage
- Suppresses lactation

- Medicine interactions reduce effectiveness including:
  - Medicines which increase hepatic enzyme activity (e.g., rifampicin [especially], carbamazepine, Griseofulvin, Nevirapine, phenytoin, phenobarbitone)
  - Short courses of some broad-spectrum antibiotics (e.g., ampicillin, amoxicillin, doxycycline)
  - An additional FP method must be used during course of treatment and for at least 7 days after completion of treatment with the above medicines.

Complications and warning signs:

- Severe headaches + blurred vision
- Depression
- Acute severe abdominal pain
- Chest pain plus dyspnea
- Swelling or pain in calf muscle

Management:

- Give 3 cycles of COC and explain carefully:
  - How to take the tablets
  - That strict compliance is essential
  - What to do if doses are missed or there are side- effects or warning signs
  - **If starting COC within 5 days of period:**
  - Supply, and show how to use back-up FP method
  - Ask client to return when < 7 tablets remain in last cycle

18.4 Progesterone-Only Pill

The progesterone-only pill (POP) is also known as the *mini pill.*

Indications:

- Breastfeeding clients after 3 weeks postpartum
- Women who cannot take COC but prefer to use pills
- Women > 40 years

Contraindications:

- Breast or genital malignancy (known or suspected)
- Pregnancy (known or suspected)
- Undiagnosed vaginal bleeding

Disadvantages and common side-effects:

- Spotting, amenorrhea
- Unpredictable irregular periods
- Not as effective as COC
- Medicine interactions: effectiveness reduced by medicines that increase hepatic enzyme activity

Management:

- Give 3 cycles of POP.
- Explain carefully how to take the tablets and what to do if doses are missed or if there are side-effects.
  - Supply and show how to use back-up FP methods for first 14 days of first packet (e.g., condoms or abstention from sex).

- Ask client to return 11 weeks after start of using POP. Use the last pill packet to show the client when this will be.

18.5 Injectable Progestogen-Only Contraceptive

This method is a slowly absorbed depot IM injection which provides contraceptive protection for 3 months.

Indications:

- Proven fertile women who require long-term contraception
- Breastfeeding postpartum women
- Known or suspected HIV-positive women who need an effective FP method
- Women with sickle-cell disease
- Women who cannot use COC because of estrogen content
- Women who do not want more children but do not (yet) want voluntary surgical contraception - Women awaiting surgical contraception

Contraindications:

- Same as for POP
- Women without proven fertility unless have HIV/AIDS

Disadvantages and common side-effects:

- Amenorrhea, often after first injection and after 9-12 months of use
- Can cause heavy prolonged vaginal bleeding during first 1-2 months after injection
- Weight gain
- Loss of libido, delayed return to fertility of up to 10 months after stopping injection

Complications and warning signs:

- Headaches
- Heavy vaginal bleeding
- Severe abdominal pain
- Excessive weight gain

Management:

- Medroxyprogesterone acetate depot injection 150 mg deep IM into deltoid or buttock muscle. Do not rub the area as this increases absorption and shortens depot effect
- If given after day 1-7 of menstrual cycle, advise client to:
  - Abstain from sex or use a back-up FP method (e.g., condoms) for the first 7 days after injection
  - Return for the next dose on some specific date 12 weeks after the injection (if client returns >2-4 weeks later than the date advised, rule out pregnancy before giving the next dose)
  - Watch for side-effects; advise on likely side- effects ○ Return promptly if there are any warning signs

18.6 Intrauterine Device

An intrauterine device (IUD) is an easily reversible long-term, non-hormonal FP method effective for up to 8 years, which can be inserted as soon as 6 weeks postpartum (e.g., Copper T380A).

Indications:

- Women in stable monogamous relationships wanting long-term contraception
- Breastfeeding mothers
- When hormonal FP methods are contraindicated

Contraindications:

- Pregnancy (known or suspected)
- Pelvic inflammatory disease (PID) or history of it in last 3 months
- Undiagnosed abnormal uterine bleeding
- Women at risk of STIs, including HIV (e.g., women who have, or whose partners have, multiple sexual partners)
- Reduced immunity (e.g., from diabetes mellitus or HIV/AIDS)
- Known or suspected cancer of pelvic organs
- Severe anemia or heavy menstrual bleeding

Disadvantages and common side-effects:

- Mild cramps during first 3-5 days after insertion
- Longer and heavier menstrual blood loss in first 3 months
- Vaginal discharge in first 3 months
- Spotting or bleeding between periods
- Increased cramping pains during menstruation

Complications and warning signs:

- Lower abdominal pain
- Foul-smelling vaginal discharge
- Missed period
- Displaced IUD or missing strings
- Prolonged vaginal bleeding
- PID

Management:

- Insert the IUD closely following recommended procedures and explaining to the client as each step is undertaken.
- Carefully explain possible side-effects and what to do if they should arise.
- Advise client to:
  - Abstain from intercourse for 7 days after insertion
  - Avoid douching
  - Not have more than one sexual partner
  - Check each sanitary pad before disposal to ensure the IUD has not been expelled, in which case to use an alternative FP method and return to the clinic
  - Check after menstruation is finished to ensure the IUD is still in place; explain how to check
- Report to the clinic promptly if she experiences—
  - Late period or pregnancy
  - Abdominal pain during intercourse
  - Exposure to STl
  - Feeling unwell with chills or fever
  - Shorter, longer, or missing strings
  - Feeling the hard part of IUD in vagina or at cervix
  - Use condoms if there is any risk of STIs including HIV

18.7 Progestogen-Only Subdermal Implant

This method uses flexible progestogen-releasing plastic rods surgically inserted under the skin of the woman's upper arm and provides contraceptive protection for 5 yrs (e.g., Norplant®).

Indications: Women wanting long-term highly effective but not permanent contraception where alternative FP methods are inappropriate or undesirable

Contraindications: Same as for POP

Advantages:

- Highly effective (1-3% failure rate)
- No delay in return to fertility after removal
- Long-acting
- Low level of user responsibility

Disadvantages and common side-effects:

- Irregular bleeding, spotting, or heavy bleeding in first few months; amenorrhea
- Possibility of local infection at insertion site
- Must be surgically inserted and removed by specially trained service provider
- May not be as effective in women >70 kg

Warning signs (require urgent return to clinic):

- Heavy vaginal bleeding
- Severe chest pain
- Pus, bleeding, or pain at insertion site on arm

Management:

- Insert the implant subdermally, under the skin of the upper arm following recommended procedures. - Carefully explain warning signs and need to return if they occur.
- Advise client to return:
  - After 2 weeks to examine implant site
  - After 3 months for first routine follow-up
  - Annually until implant removed for routine follow-up

18.8 Natural FP: Cervical Mucus Method

The cervical mucus method (CMM) is a fertility awareness-based method of FP which relies on the change in the nature of vaginal mucus during the menstrual cycle to detect the fertile time. During this time, the couple avoids pregnancy by changing sexual behavior as follows:

- Abstaining from sexual intercourse; avoiding vaginal sex completely (also called *periodic abstinence)*
- Using withdrawal; taking the penis out of the vagina before ejaculation (also called *coitus interruptus)*
- Using barriers methods (e.g., condoms)

Guidance on the correct use of the method is available only at centers with specially trained service providers.

Management:

- Ensure client understands how the method works.
- Explain how to distinguish the different types of mucus.
- Show client how to complete the CMM chart.
- Carry out a practice or trial period of at least 3 cycles.
- Confirm that the chart is correctly filled in.

- Advise client to:
  - Always use condoms as well as CMM if there is any risk of exposure to STIs or HIV
  - Return on a specific follow-up date after one menstrual cycle

18.9 Natural FP: Lactational Amenorrhea Method

The lactational amenorrhea method (LAM) relies on the suppression of ovulation through breastfeeding exclusively as a means of contraception. Guidance on the correct use of the method is available only at centers with trained service providers.

Management:

- Ensure client understands how the method works.
- Explain to client that she must:
  - Breastfeed her child on demand, on both breasts at least 10 times during day and night
  - Not give the child any solid foods or other liquids apart from breast milk
- Advise the client that LAM will no longer be an effective FP method and that she will then need to use another FP method if—
  - The baby does not feed regularly on demand
  - Menstruation resumes
- Advise the client to—
  - Use condoms as well as LAM if there is any risk of exposure to STIs or HIV.
  - Return after 3 months for a routine follow-up or earlier if she has any problem or wants to change to another FP method.

18.10: Voluntary Surgical Contraception for Men: Vasectomy

Voluntary surgical contraception (VSC) for men is a permanent FP method that involves a minor operation carried out under local anesthetic to cut and tie the two sperm-carrying tubes (vas deferens). It is available only at centers with specially trained service providers.

Indications:

- Fully aware, counseled clients who have voluntarily signed the consent form
- Males of couples:
  - Who have definitely reached their desired family size and want no more children
  - Where the woman cannot risk another pregnancy because of age or health problems

Management:

- Ensure client understands how the method works and that it is permanent, not reversible, and highly effective.
- Explain to client that:
  - Vasectomy is not castration and sexual ability and activity are not affected.
  - The procedure is not immediately effective, and that the client will need to use a condom for at least 15 ejaculations after the operation.
- After the operation, advise client:
  - On wound care
  - To return for routine follow-up after 7 days or earlier if there is fever, excessive swelling, pus, or tenderness at the site of operation

18.11: Voluntary Surgical Contraception for Women: Tubal Ligation

VSC for women is a permanent FP method that involves a minor 15-min operation carried out under local anesthetic to cut and tie the two egg-carrying fallopian tubes. It is available only at centers with specially trained service providers.

Indications: Same as for vasectomy but for females

Management:

- Ensure client understands how the method works and that it is:
  - Permanent and irreversible
  - Highly and immediately effective
- Explain to client that there may be some discomfort or pain over the small wound for a few days.
- Advise client:
  - On wound care
  - To use condoms if there is any risk of exposure to STIs or HIV
  - To return after 7 days for routine follow-up or earlier if there is fever, excessive swelling, pus, or tenderness at the site of operation

References

1. WHO Model List of Essential Medicines for ChildrenApril 2017. www.who.int (accessed.
2. WHO Model List of Essential Medicines (20th List)2017. www.who.int (accessed.
3. BNF for Children: BMJ Group, Pharmaceutical Press, & RCPCH Publications Limited; September 2015-2016.
4. British National Formulary (BNF) - 74: BMJ Group, Pharmaceutical Press, & RCPCH Publications Ltd; September 2017 - March 2018.

19. SYMPTOMS, SIGNS, AND ILL-DEFINED CONDITIONS

19.1: Anaphylactic Shock

19.1.1: Adult

Adrenaline (epinephrine) injection 1 in 1,000 (1 mg/ml).

- 0.5-1.0 mg IM; repeat initially (several times if necessary) every 10 min according to BP, pulse rate, and respiratory function until improvement occurs

19.1.2: Child

Adrenaline (epinephrine) injection: 0.1 mg/kg or 0.25 mg diluted in 10 ml of saline IV or IM slowly.

- Give an antihistamine as useful adjunctive treatment (e.g., promethazine hydrochloride 25-50 mg by deep IM or slow IV Give <25 mg/min as a diluted solution of 2.5mg/ml in water for injections: max: 100 mg)
  - *Child 1-5 years*: 5 mg by deep IM.
  - *Child 6-10 years*: 6.25-12.5 mg by deep IM; repeat dose every 8 hrs for 24-48 hrs to prevent relapse.

19.1.3: Severely Affected Patients

Hydrocortisone, 100 mg/vial.

- *Adult:* 200 mg IM or slow IV stat.
- *Child <1 year:* 25mg
- *Child 1-5 years:* 50 mg.
- *Child 6-12 years:* 100 mg.
- Repeat adrenaline and hydrocortisone every 2-6 hrs as needed depending on the patient's progress.

19.2: Dehydration

19.2.1: No Dehydration and for Prevention

Continue or increase breastfeeding—

- If child exclusively breastfed, give ORS or clean water in addition to milk.
- If child not exclusively breastfed, give one or more cups of ORS, soup, rice-water, yoghurt drinks, and clean water.
- In addition to the usual fluid intake, give ORS after each loose stool or episode of vomiting.
  - *<2 years:* 50-100 ml
  - *2 years and over:* 100-200 ml
- Give frequent small sips from a cup.
- If child vomits, wait 10 min, then give more.

19.2.2: Some Dehydration

Give ORS during the first 4 hrs.

- Give frequent small sips from a cup.
- If the child wants more than is shown in the table, give more as required.
- If the child vomits, wait 10 min, then continue more slowly.
- For infants <6 months who are not breastfed, also give 100-200 ml of clean water during the first 4 hrs.
- Reassess the patient frequently (every 30-60 min) for the classification of dehydration and the selection of the treatment plan.

19.2.3: Severe Dehydration

Start IV fluids line immediately. If the child can drink, give ORS while the drip is setup.

Give 100 ml/kg of compound sodium lactate infusion (Hartmann's solution or Ringer's lactate solution)

-or-

Half-strength Darrow's solution in glucose 2.5%

-or-

Sodium chloride infusion 0.9%; divide the IV fluid as shown in **table 19.1 and 19.2**

As soon as the patient can drink—usually after 3-4hrs in infants or 1-2 hrs in children—give ORS 5ml/kg/hr. Continue to reassess the patient frequently.

Table 19.1 How to Divide IV Fluid

Age	First give 30 ml/kg in	Then give 70 ml/kg in
<2 years	1 hour	5 hours
2-5 years	30 min	2.5 hours

Table 19.2 Older Children and Adults

Degree of Dehydration	Rehydration Fluid	Route	Volume to give in the first 4hrs
Mild	ORS	Oral	25 ml/kg
Moderate	ORS	Oral	50 ml/kg
Severe	SLC Mnf	IV	50 ml/kg
[a]SLC = sodium lac	Tate compound in	Infusion	

If sodium lactate compound IV infusion (Ringer's lactate) is not available, use half-strength Darrow's solution in glucose 2.5%

-or-

Sodium chloride infusion 0.9%

19.3: Febrile Convulsions

- Paracetamol 10 mg/kg every 8 hrs as needed.
- Diazepam 500 micrograms/kg rectally
  - Max: 10 mg
  - Repeat as needed after 10 min
  - If diazepam rectal dose-form is not available, use diazepam injection solution and give the same dose rectally using the syringe after removing the needle.

19.4: Hypoglycemia

Oral glucose or sugar (before coma sets in); 10-20g in 200 ml water (2-4 teaspoons) is usually taken initially and repeated after 15 min if necessary

— or —

If patient is unconscious, glucose 50% 20-50 ml IV, followed by 10% dextrose solution by drip at 5-10mg/kg/min until patient regains consciousness, then encourage oral sugary drinks.

References

1. WHO Model List of Essential Medicines (20th List)2017. www.who.int (accessed.
2. WHO Model List of Essential Medicines for ChildrenApril 2017. www.who.int (accessed.
3. British National Formulary (BNF) - 74: BMJ Group, Pharmaceutical Press, & RCPCH Publications Ltd; September 2017 - March 2018.
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5. Standard Treatment Guidelines for Ghana. 6th ed. Accra: Ministry of Health (GNDP) Ghana; 2010.

20. VACCINATION

20.1 General Introduction

Vaccines are biologic materials and are extremely sensitive to changes in temperature and lighting conditions. Cold chain refers to process of transportation and storage that enables vaccines to be kept at a consistent and constant temperature from the time the vaccine is manufactured until it is administered. Maintaining cold chain is vital to protecting vaccine potency.

Vaccines can be stored at positive temperatures (between +2^{o}C and 8^{o}C). A few can be stored at negative temperatures (between -15^{o}C and -23^{o}C). It is important to protect vaccines too much heat and also from freezing (unless otherwise specified by manufacturer). Any liquid vaccine that has been frozen or exposed to sub-zero temperatures should not be used.

Multi-dose vials should be handled with aseptic technique at all times during use. The first time a multi-dose vial is used, it should be labeled with the date. Unless otherwise noted by the manufacturer, the vial should be discarded after 30 days of first puncture.

Lyophilized or freeze-dried vaccines such as MMR, varicella, BCG, yellow fever, and Hib should be reconstituted immediately prior to use with the diluent provided by the manufacturer. Once reconstituted, should be used within one hour or discarded.

Some vaccines such as MMR, varicella and BCG are extremely sensitive to light exposure; and thus, should be protected from light by keeping them stored in manufacturers' packages.

Diluents included in the vaccine packaging should be stored between +2 ^{0}C and +8 ^{0}C. Diluents supplied separately can be stored outside the cold chain but must be cooled sufficiently before use to ensure that the vaccine and diluents are both at temperatures between +2 ^{0}C and +8 ^{0}C when they are reconstituted. Never freeze diluents. WHO recommended maximum length of storage for vaccines:

- 6-12 months at national level
- 3 months at provisional level
- 1-3 months at district level, and
- 1 month or less at health facility level.

Note: Each vial shows an expiry date; never use vaccine beyond its expiry date

20.2 Vaccination Administration and Vaccine Practices

- When sequentially administering multiple vaccines to children, give the most painful vaccine last (e.g. pneumococcal conjugate vaccine).
- No alcohol or antiseptic shall be used to clean the site of injection. A swab soaked in clean water shall be used to clean the injection site
- New Sterile Auto-Disable (AD) syringe and needle shall be used for each injection
- Vaccines at VVM stage 3 or 4 should not be used
- Freeze-dry vaccine (such as BCG, measles, yellow fever etc.) should be diluted only using the diluents provided by the manufacturer. Water or normal saline should not be used for reconstituting vaccines.
- Vaccine administered shall be recorded appropriately on the Road to Health Card/ Child Health Booklet/ Child Health Booklet and other records as determined by the MoH.

Never use any vaccine:

- After its expiry date
- When the vaccine vial monitor has changed to discard point
- If there has been contamination or loss of the vial labels

- Open only one vial or ampoule of a vaccine at a time and only when there is a child to vaccinate.
  - □ Remember to discard reconstituted vials of BCG, measles, and DPT-HepB + Hib after 6 hrs.
  - □ In a static unit, if there is a balance of doses left in a vial of TT and OPV at the end of a vaccination session, return the opened vial to the refrigerator for subsequent use.
  - □ Do not keep any opened vial for more than 4 weeks.

20.3 Pre-Vaccination Guide:

- Prepare an anaphylaxis response kit.
- The availability of protocols, equipment and drugs necessary for the management of anaphylaxis (see chapter 19) should be checked before each vaccination session. An anaphylaxis response kit should be on hand at all times and should contain:
  - Adrenaline 1:1000 (minimum of three ampoules – check expiry dates)
  - Minimum of three 1 mL syringes and 25 mm length needles (for intramuscular [IM] injection)
  - Cotton wool swabs
  - Pen and paper to record time of administration of adrenaline

20.4 Pre-vaccination screening checklist

Date of birth _____ Age today ____

Please check if the person including child to be vaccinated:

- is unwell
- has a disease that lowers immunity (e.g. leukemia, cancer, HIV/AIDS) or is having treatment that lowers immunity (e.g. oral steroid medicines such as cortisone and prednisone, radiotherapy, chemotherapy)
- is an infant of a mother who was receiving highly immunosuppressive therapy (e.g. biological disease modifying anti-rheumatic drugs (bDMARDs) during pregnancy
- has had a severe reaction following any vaccine- has any severe allergies (to anything)
- has had any vaccine in the past month
- has had an injection of immunoglobulin, or received any blood products or a whole blood transfusion within the past year
- is pregnant
- was a preterm infant
- has a chronic illness
- has a bleeding disorder
- is planning a pregnancy or anticipating parenthood
- is a parent, grandparent or carer of a newborn
- lives with someone who has a disease that lowers immunity (e.g. leukemia, cancer, HIV/AIDS), or lives with someone who is having treatment that lowers immunity (e.g. oral steroid medicines such as cortisone and prednisone, radiotherapy, chemotherapy)
- is planning travel
- has an occupation or lifestyle factor(s) for which vaccination may be needed (discuss with doctor/nurse)

20.5 Contraindications to Vaccination

a) The only contraindications to immunization are the following three rare situations:

- Anaphylaxis or a severe hypersensitivity reaction is absolutely contraindicated in subsequent doses of the same vaccine, persons with known allergy to a vaccine component should not be vaccinated with that vaccine
- BCG or yellow fever vaccines should not be given to a child with signs and symptoms of AIDS

- Second or subsequent doses of vaccine should not be given to a child who severally reacted to a previous dose of the same vaccine or antigen.

Note: an infant with known or suspected HIV infection and/or signs and symptoms of AIDS should receive measles vaccine at six months of age and again at nine months.

Live (both parenteral and oral) vaccines should not be administered during pregnancy and women should be advised to not to become pregnant within 28days of receiving a live vaccine.

b) The following are not contraindications. Infants with these conditions should be immunized.

- Allergy or asthma (except if there is a known allergy to a specific component of the vaccine mentioned above)
- Any minor illness, such as respiratory tract infections or diarrhea with temperature below 38.5°C - Family history of convulsions, seizures or fits
- Treatment with antibiotics
- Known or suspected HIV infection with no signs and symptoms of AIDS
- Child being breastfed
- Chronic illnesses such as chronic diseases of the heart, lung, kidney or liver
- Stable neurological conditions, such as cerebral palsy
- Premature or low-birth weight (vaccination should not be postponed)
- Recent or imminent surgery
- Malnutrition
- History of jaundice at birth

20.6 Vaccine Injection Techniques

a) Intramuscular Injection

- For intramuscular (IM) injection, use a 25-mm needle in most cases.
- Depending on the injection site, position the limb so as to relax the muscle into which the vaccine is to be injected.
- Pierce the skin at an angle of 90° to the skin, so the needle can be safely inserted to the hub. Provided an injection angle of >70° is used, the needle should reach the muscle layer.
- If using a 25-gauge needle for an IM vaccination, ensure the vaccine is injected slowly over a count of 5 seconds to avoid injection pain and muscle trauma.
- If you have drawn back on the syringe plunger before injecting a vaccine (which is not considered necessary), and a flash of blood appears in the needle hub, withdraw the needle and select a new site for injection.

b) Subcutaneous Injection

- For subcutaneous (SC) injection, administer the injection at a 45° angle to the skin.
- The standard needle for administering vaccines by SC injection is a 25 or 26-gauge needle, 16 mm in length.
- In the instance where a vaccine that is registered for administration only via the SC route is inadvertently administered via the IM route, the immune response to vaccines is unlikely to be affected. Therefore, it is usually not necessary to repeat doses.

c) Intradermal Injection

- For intradermal injection of BCG vaccine or Q fever skin test, a 26 or 27 gauge,10 mm needle is recommended.
- The intradermal injection technique requires special training, and should be performed only by a trained provider

20.7 Vaccination Schedule for Children

Table 20.1 displays the vaccination schedule for children. Refer also to the Expanded Programme on Immunization guidelines.

Table 20.1: Infant Immunization Schedule

Age	Vaccine	Route of administration	Injection site	Dose
At birth and up to 11 months	BCG	Intra-dermal	Upper left arm	0.05ml
At birth	OPV*	Oral	Mouth	2 drops
6 weeks	OPV1	Oral	Mouth	2 drops
	Rota 1	Oral	Mouth	2.0ml
	Penta1	Intra-muscular	Outer mid- left thigh	0.5ml
	Pneumo1	Intra-muscular	Outer mid-right thigh	0.5ml
10 weeks	OPV2	Oral	Mouth	2 drops
	Rota2	Oral	Mouth	2.0ml
	Penta2	Intra-muscular	Outer mid-thigh	0.5ml
	Pneumo2	Intra-muscular	Outer mid-right thigh	0.5ml
14 weeks	OPV3	Oral	Mouth	2 drops
	Rota 3	Oral	Mouth	2.0ml
	Penta 3	Intra-muscular	Outer mid-thigh	0.5ml
	Pneumo3	Intra-muscular	Outer mid-right thigh	0.5ml
9 Months	Measles	Subcutaneous	Upper Left arm	0.5ml
	Yellow Fever	Subcutaneous	Upper right arm	0.5ml

*at birth within the first one-week of birth

- For neonatal tetanus prevention, ensure hygienic infant deliveries include proper cutting and care of umbilical cords.

Table 20.2 Recommended Needle Size, Length and Angle for Administering Vaccines

Age or size of child/adult	Needle type	Angle of needle insertion
Infant, child or adult for IM vaccines	23 or 25 gauge, * 25 mm in length†	90° to skin plane
Preterm babies (<37 weeks gestation) up to 2 months of age; and/or very small infants	23 or 25 gauge, * 16 mm in length	90° to skin plane
Very large or obese patient	23 or 25 gauge, 38 mm in length	90° to skin plane
Subcutaneous injection in all persons	25 or 26 gauge, 16 mm in length	45° to skin plane

20.8 Vaccines in the EPI Schedule

20.8.1: BCG Vaccination

BCG vaccine reduces risk of pulmonary tuberculosis and provides substantial protection against disseminated forms of the disease in young children. BCG vaccine is usually administered to eligible infants by hospital staff soon after delivery. Injection technique is particularly important for BCG vaccination, which must be administered intradermally. Adverse events, such as regional lymphadenitis, are less common when vaccination is performed by trained staff.

20.8.2: Rotavirus Vaccination

RotaVirus is a disease caused by the virus called RotaVirus. This is the most common form of severe diarrheal disease in infants and children globally. Three main symptoms are fever, diarrhea and vomiting. Those who are most at risk are infants after the age of three months and older children if they are immunocompromised. Abdominal pain may also occur. Diarrhea usually stops after 3 to 7 days Young children can become dehydrated, requiring urgent treatment.

Rotarix™ is the approved vaccine against rotavirus. It is highly effective and safe and protects against severe forms of rotavirus disease. It does not protect against diarrhea caused by other agents. Rotavirus vaccine (Rotarix™) is a ready-to-use, oral vaccine in a liquid formulation, specially designed tube for direct oral administration.

1 tube = 1 dose; 1 tube has 1.5mL liquid.

Schedule for Rotavirus Vaccine

Rotavirus vaccine is given in a 2-dose schedule at 6 and 10 weeks of age. Rotavirus vaccine can be given at the same time as first and second doses of Penta. Maintain an interval of 4 weeks between doses

Route of Administration:

Rotavirus vaccine is given via the oral route.

Note: First dose of vaccine should be given before 15 weeks. Second dose has to be given before 32 weeks. 16 weeks is too late for 1st dose and 33 weeks is too late for 2nd dose

Contraindications:

Hypersensitivity after previous administration of rotavirus vaccines. Administration of Rotarix™ should be postponed in subjects suffering from diarrhea or vomiting and in need of rehydration therapy.

Concomitant Vaccination:

Rotavirus Vaccine can be given at the same time as pentavalent vaccine

Management of Side effects with Rotarix™

Infants may be more irritable. Some infants may also experience loss of appetite, fever, fatigue, diarrhea, and vomiting. After immunization, if an infant has fever (>39˚C), give paracetamol. With the new rotavirus vaccines, there seems to be a very small increased risk of intussusception (IS) in infants following rotavirus vaccination. Risk of intussusception appears to occur mainly in the first 1- 7 days following the first dose of rotavirus vaccine.

See section on management of managing AEFI (Adverse Events Following Immunization) in children:

20.8.3: Penta Valent Vaccine

Pentavalent vaccine is a combination of five vaccines-in-one that prevents **diphtheria, tetanus, whooping cough, hepatitis b and Hemophilus influenza type b**, all through a single dose. It is given at a schedule of 6, 10 and 14weeks.

20.8.4: Pneumococcal Vaccine

The 13-valent pneumococcal conjugate vaccine (13vPCV) is recommended for all children in a 3-dose infant vaccination schedule, replacing the 7-valent pneumococcal conjugate vaccine (7vPCV). Streptococcus pneumoniae (pneumococcus) remains a leading cause of serious illness, including bacteremia, meningitis, and pneumonia among children and adults worldwide. It is also a major cause of sinusitis and acute otitis media (AOM). The most commonly reported adverse reactions within 7 days after each dose of PCV13 are injection-site reactions, fever, decreased appetite, irritability, and increased or decreased sleep.

PCV13 is administered intramuscularly as a 0.5-mL dose and is available in latex-free, single- dose, prefilled syringes. PCV13 can be administered concurrently with vaccines containing the following antigens with no adverse effects on immunogenicity or safety diphtheria, tetanus, acellular pertussis, Hemophilus influenza type b, inactivated poliomyelitis, rotavirus, hepatitis-B, meningococcal serogroup C, measles, mumps, rubella. PCV13 can be administered at the same time as other routine childhood vaccinations if administered in a separate syringe at a separate injection site. Apnea following intramuscular vaccination has been observed in some infants born prematurely.

20.9 Adolescent and Adult Vaccination Requirements, and Vaccination for International Travel

20.9.1: HPV Vaccination

Human papilloma virus (HPV) is a DNA virus which infects the epithelium. Over 100 serotypes identified of which 13 are responsible for cancer ("high risk type"). SeroTypes16 and 18 are responsible 70% of cervical genital cancer. HPV is easily transmitted by sexual contact.

HPV infection is one of the most common STIs in the world. The infection is usually contracted during the adolescence.

Primary Prevention of HPV disease involved vaccination of the eligible population with the HPV Vaccine.

HPV Vaccine (Gardasil®):

- Is a quadrivalent, liquid vaccine and prevents precancerous lesions from HPV types 16 and 18 and anogenital warts from HPV types 6 and 11.
- Administer HPV by intramuscular injection (IM) injection to girls 9 to 13 yrs. Dosage interval for HPV Vaccine (Gardasil®) is six months between 1st dose and 2nd dose in girls 9-13 year olds.
- Each dose of HPV equals 0.5mls of the vaccine.

Note:

If the interval between the 1st and 2nd dose is less than 6 months, then a 3rd dose is recommended (at least 6 months after the first dose).

- In older and immunocompromised persons/HIV+ Persons Give as a 3-dose schedule.
- For girls 15 years and older - 1st dose is at fifteen years, `2nd dose at one to two months after the first dose and 3rd dose at least six months after the first dose.
- For immunocompromised persons – 1st dose is given as soon as possible after nine years, 2nd dose is given 1-2 months after the first dose and the 3rd dose is given at least six months after the first dose.

Contraindications to vaccination

If the person has a severe allergic reaction to a vaccine component or following a prior dose and if the person has a moderate or severe acute illness (defer until symptoms improve).

Adverse Reaction

Most common adverse reaction to HPV vaccination is local reaction at the vaccine reaction site (Pain, redness, swelling).

20.9.2 Vaccination against Tetanus Toxoid.

Immunize all pregnant women and women of childbearing age (15-45 years) against tetanus. Give TT vaccine 0.5 ml IM into the left upper arm or upper outer thigh as indicated in table 20.8.1 Women of children bearing age should get 3 doses spaced at initial dose (0-), then 1- and 6- month intervals.

High-risk groups such as farm workers, military personnel, miners, and road traffic accident victims should also be vaccinated according to the schedule for pregnant women or women of childbearing age as in the

table above. First 2 doses should be at least 4 weeks apart; third dose to be given 6-12 months after second dose.

Table 20.3: Vaccination Schedule Against Tetanus Toxoid

Vaccine	Recommended Timing
TT1 (1st dose)	At first contact with the girl or woman, at the first prenatal visit, or as early as possible during pregnancy
TT2 (2nd dose)	At least 4 weeks after TT1
TT3 (3rd dose)	At least 6 months after TT2 or as early as possible during a subsequent pregnancy
TT4 (4th dose)	At least 1 year after TT3 or as early as possible during a subsequent pregnancy
TT5 (5th dose)	At least 1 year after TT4 or as early as possible during a subsequent pregnancy

Notes: Store TT at +2 °C to +8 °C. Do not freeze TT.

- ***Prophylaxis in At-Risk Patients***
  - Any patient who has contaminated wounds, bites, or burns is at risk of contracting tetanus.
- ***General measures:***
  - Ensure adequate surgical toilet and proper care of wounds
- ***Passive immunization:***
  - Give IM tetanus immunoglobulin human (TIG):
    - *Child <5 years:* 75 IU
    - *Child 5-10 years:* 125 IU
    - *Child >10 years and adult:* 250 IU

Note: Double the dose if heavy contamination suspected or if it has been more than 24 hrs since injury was sustained.

  - Alternative-Use only if TIG is not available:
  - ATS (tetanus antitoxin) 1,500 IU deep SC or IM
- ***Active immunization:***
  - For partially immunized or unimmunized patients:
    - Give a booster dose for patients who are partially immunized
    - Give a full course of vaccination for those who are not immunized at all
  - For fully immunized patients who have had five doses of TT administered at the correct intervals, but last dose given >30 years ago, give one booster dose of TT 0.5 ml deep SC or IM.

Notes:

- Fully immunized patients who have had a booster dose within the last 10 years do not need treatment with ATS or Antitetanus immunoglobulin, human, or TT vaccination
- Giving TIG or TT to a fully immunized person may cause an unpleasant reaction (e.g., redness, itching, swelling, fever), but with a severe injury this discomfort is justified.

20.9.3: Hepatitis B Vaccination

Hepatitis B vaccine for adolescents and adults is recommended. Hepatitis B vaccination is done preferably after testing for hepatitis B infection (HBsAg and anti-HBs). Vaccination is recommended for high-risk groups such as health workers (particularly those in clinical settings and health workers in training), intravenous drugs users, and persons who frequently receive blood transfusions.

Give three doses using either of the following schedules: 0, 1, 6 months or 0, 2, 4 months. A dose of 0.5 ml is given IM on the deltoid muscle (upper arm). Injections of hepatitis B vaccine should not be given on the buttocks because of low immune response, decreased protective antibody response, and risks of injury to the sciatic nerve. The storage temperature for the vaccine is 2 °C to 8 °C.

20.9.4: Yellow Fever Vaccination

The yellow fever 17D vaccine is live attenuated, and it is reconstituted before use. Ideally, it should be used within 1 hr after reconstitution. A dose of 0.5 ml given SC on the upper arm as a single dose. The storage temperature for the vaccine is 2 °C to 8 °C. Immunity is almost life long, but for international travel, the international travel certificate is valid for only 10 yrs.

20.9.5: Vaccination in the Context of an Outbreak

Please refer to the relevant outbreak disease guidelines and the **Liberia National Immunization Policy**.

20.10 Storage of Vaccines

- Store vaccines in health units at +2°C to +8°C, but do not keep them for longer than 6 weeks.
- In district and central vaccine stores that have freezers, polio vaccine must be stored for prolonged periods at -20°C.
- Do not freeze any vaccines except OPV; but other freeze-dried vaccines, such as Measles, Yellow Fever and BCG are acceptable to be frozen.
- Never freeze the diluents for BCG, Measles, and Yellow Fever vaccines.
- Never use the diluents provided for vaccines to mix other injections.
- Do not vaccinate in direct sunlight (always carry out immunization in a building or under shade).
- Carefully follow the recommended procedures to maintain the cold chain for all vaccines (e.g., ensure continuous supply of power or gas, record refrigerator temperature twice daily, and use the sponge method during each immunization session).
- Record every vaccination done in the child register and tally sheet. Use the child register for tracking drop-outs.
- Only trained vaccinator should handle or administer vaccines

References:

1. Liberia MoH. Liberian Immunization Policy.

21. REPORTING ADVERSE MEDICINE REACTIONS AND ADVERSE EVENTS FOLLOWING IMMUNIZATION

Advances in modern medicine have resulted in an increasing number of medical and health products being available for use in patient management. Monitoring the safety and effectiveness of medicines and medical devices is essential as a way of ensuring patient safety and quality of health products. Adverse medicine reactions that occur during treatment of diseases can be serious and life threatening, and in some cases worse than the actual disease itself.

Adverse medicine reactions are defined as *a reaction which is noxious and unintended, and which occurs at doses normally used in humans for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function*; this also includes lack of effectiveness.

Adverse medicine reactions can be prevented in a number of ways:

- never prescribe a medicine unless there is a good indication
- avoid use of medicines in pregnant women unless benefit outweighs risk
- a careful history of patient medicine use, allergies and idiosyncrasies should be noted
- prescribe as few medicines as possible and give very clear instructions to the patient
- prescribe medicines you are familiar with
- consider if excipients (e.g. coloring agents) may be contributing to the adverse reaction - avoid use of multiple medicines (polypharmacy) in elderly patients

21.1 Methods in Adverse Medicine Reaction Monitoring and Reporting

Monitoring and reporting of adverse reaction experiences by patients during treatment is part of the practice of Pharmacovigilance.

Pharmacovigilance: is the science and activities relating to the *detection, assessment, understanding,* and *prevention* of adverse effects or any other drug-related problem" (WHO definition).

The scope of Pharmacovigilance has increased over the years to include reporting of:

- medication errors
- counterfeit or substandard medicines
- lack of efficacy of medicines
- misuse and/or abuse of medicines
- interaction between medicines

There are three methods that can be used by a health care professional or an institution to report adverse medicine reactions;

1. **Spontaneous Reporting:** also, called voluntary reporting; no active measures are taken to look for adverse effects other than the encouragement of health professionals and others to report safety concerns. This is the most common form of pharmacovigilance; a spontaneous report is an unsolicited communication by health-care professionals or consumers that describes one or more ADRs in a patient who was given one or more medicinal products and that does not derive from a study or any organized data collection scheme.
2. **Targeted Spontaneous Reporting:** this is a variant of spontaneous reporting. It focuses on capturing ADRs in a well-defined group of patients on treatment. Health professionals in charge of a well- defined group of patients (e.g. patients on treatment for drug-resistant TB) report reactions suspected to be caused by medicines used to treat the disease.

3. Active Surveillance: active measures are taken to detect adverse events, done by active follow-up after treatment and the events may be detected by asking patients directly or screening patient records.

Best clinical practices in management of adverse medicine reactions also include reporting of the reactions to the local medicines regulatory authority, the Liberian Medicines and Health Products Regulatory Authority. All known and suspected adverse medicine reactions and poor quality medicinal products should be reported to the LMHRA using the forms attached (see appendix 1 and 2).

References

1. WHO. A Practical Handbook on the Pharmacovigilance of Medicines Used in the Treatment of Tuberculosis: Enhancing the Safety of TB Patients. Geneva: WHO; 2012.
2. Safety of Medicines: A Guide to Detecting and Reporting Adverse Drug Reactions 2002. (accessed.
3. Guideline for the Pharmacovigilance System in Liberia2013. (accessed.

REPUBLIC OF LIBERIA

LIBERIA MEDICINES & HEALTH PRODUCTS REGULATORY (LMHRA)

NATIONAL PHARMACOVIGILANCE CENTER

SUSPECTED ADVERSE DRUGS REACTION REPORTING FORM

A) PATIENT INFORMATION

Patient Initial: _____ *Age:* _____ *Sex:* _____ *Weight(Kg):* _____ *Height(ft):* _____

B) SUSPECTED ADVERSE REACTIONS

Time of Onset _____ **minutes/hours/days/month**

C) MEDICATION(S)/PRODUCT(S) USED DURING THE PERIOD

Name of Item (INN and Branded)	If Vaccine	Batch No.	Manufacturer	Dose Used	Route of Administration	Date of Treatment Started	Ended	Motive of Treatment

Check if: Self-medication ☐ Pharmacodependence ☐ Therapeutic error ☐

Vaccine Batch No.: _____ Diluent Batch No.: _____

Place of vaccination: _____ Public ☐ Private ☐ Campaign ☐ Date: _____

Seriousness of the reaction:

- ☐ Death (dd/mm/yy): _____
- ☐ Life threatening
- ☐ Hospitalization – initial or prolonged
- ☐ Disability
- ☐ Required intervention to permanent impairment or disorder
- ☐ Other

D) OUTCOME

- ☐ Fatal
- ☐ Recovered (Date: _____)
- ☐ Continuing
- ☐ Unknown
- ☐ Recovering
- ☐ Other (Specify): _____

E) REPORTER'S INFORMATION

Name of Reporter: _____ Phone No.: _____

☐ Pharmacist ☐ Physician ☐ Physician Assistant ☐ Nurse ☐ Midwife ☐ Others (Specify): _____

Email Address: _____ County: _____ District: _____

Health Facility: _____ Department: _____

Date: _____ Signature: _____

Once completed, please send copy of the form to the below address:

VP Road, Tubman Boulevard, Old Road, Sinkor, 1000 Monrovia 10 Liberia

Tel: +231 (0) 886-530270 / 777281914 Email: jgoteh@gmail.com / libmhra@gmail.com; website: www.libmhra.org

"Thanks For Taking Your Time To Report."

REPUBLIC OF LIBERIA
LIBERIA MEDICINES & HEALTH PRODUCTS REGULATORY AUTHORITY (LMHRA)
DEPARTMENT OF PHARMACOVIGILANCE & MEDICINES INFORMATION

FORM FOR REPORTING POOR QUALITY MEDICINAL PRODUCTS

Name of Facility :_____ **District Name:**_____ **County:** _____

Facility Address:_____ **Facility Telephone:** _____

PRODUCT IDENTITY

Brand Name				Generic Name			
Batch/lot number		Date of manufacture		Date of Expiry		Date of Receipt	
Name of Manufacturer				Country of origin			
Name of distributor/ supplier		Distributor / supplier's Address					

PRODUCT INFORMATION (Tick appropriate box)	COMPLAINT (Tick appropriate box/boxes)
Oral Tablet / Capsules ☐	Color Change ☐
Oral Suspension / Syrup ☐	Separating ☐
Injection ☐	Powder / Crumbling ☐
Diluents ☐	Caking ☐
Powder for Reconstitution of Suspension ☐	Molding ☐
Powder for Reconstitution of Injection Eye ☐	Change of odor ☐
Drops ☐	Mislabeling ☐
Nebulizer Solution ☐	Incomplete Package ☐
Cream / Ointment / Limens / Past ☐	Other: _____
Other _____	

Describe complaint in detail:

STORAGE CONDITION

Does the product require refrigeration?	Yes	No	Other detail (if necessary)
Was product available at facility?	Yes	No	
Was product dispensed and returned by client?	Yes	No	
Was product stored according to manufacturer LMHRA recommendation?	Yes	No	

Comments (if any)

Name of Reporter:	Contact Number:
Job Title:	Signature:
Email Address:	Date:

Once completed, please send copy to the below address:
VP Road, Tubman Boulevard, Old Road, Sinkor, Monrovia-Liberia
Tel: +23(0)1 886 530270/777281914 email: libmhra@gmail.com/jgoteh@gmail.com website: www.liblmhra.org

FORMULAS FOR CALCULATING MEDICINE DOSES

These days most package inserts and products come with ideal dosage guides that make it easy to administer medicines to patients, even those with organ dysfunction which may require dose adjustments. However, in the rare case that these may not be available there are certain formulas that can guide dosing decisions. Below are a few examples of those formulas, most texts in Pharmacology and Pharmacokinetics have these dosing guides and should be consulted when needed. This is important when administering medicines that have a narrow therapeutic index like Gentamicin.

1. Calculating IV Flow Rate, Infusion Time, And Total Volume

$$- Flow\ rate\ (mL/hr) = \frac{total\ volume\ (mL)}{Infusion\ Time}$$

$$- Infusion\ Rate\ (hr) = \frac{total\ volume\ (mL)}{Flow\ rate\ (\frac{mL}{hr})}$$

$$- Total\ Volume\ (mL) = Flow\ rate\ \left(\frac{mL}{hr}\right) \text{x}\ Infusion\ time\ (hr)$$

2. Cockcroft-Gault Equation: to estimate creatinine clearance in a patient

eCrCl = [((140-age) x weight)/ (72 x S_{cr})] x 0.85 **if female**

eCrCl = [((140-age) x weight)/ (72 x S_{cr})] **if male**

3. Dosing in Pediatric patients – used when adult doses are given without pediatric dose

3.1 Young's Rule (by Age): $dose = adult\ dose\ x\ \frac{Age\ (years)}{Age+12}$

3.2 Clark's Rule (by Weight): $dose = adult\ dose\ x\ \frac{Weight\ (kg)}{70}$ **or** $dose = adult\ dose\ x\ \frac{Weight\ (lbs)}{150}$

3.3 Fried's Rule: $dose = \frac{(Age\ in\ months)x(Adult\ Dose)}{150}$; used for infants and children up to 1-2 years

PRESENTATIONOF INFORMATION IN THE ESSENTIAL MEDICINES LIST

Medicine Names

The international nonproprietary names (INN), or generic names, are used throughout the list. Generic names should be used for prescribing and labelling (including dispensing) of medicines, except where no such generic or suitable alternative nonproprietary name exists.

Order of Sections

Medicines are arranged in alphabetical order by the Anatomical Therapeutic Chemical groups following the same basic arrangement as the "2015 WHO Model List of Essential Medicines" with additional sections included. The following have been added to the Essential Medicines List

- Medicines in Rheumatoid Arthritis
- Medicines for Hepatitis B & C
- Medicines for Lassa Fever
- Nutritional Commodities

Presentation in Essential Medicines List

The medications under the sections are listed in the following format:

Medicine Name (INN)	Strength	Form	Facility Level
Atropine	1 mg/ml	Injection	HC

Level of Use

For each item, the lowest level of health care facility at which the item may be used is indicated as shown below. This designation is in line with diagnostic and clinical skills expected to be available at the level. In certain cases, the use of an item is further restricted to a facility where a specific type of clinical and/or diagnostic expertise is available (e.g., certain ophthalmologic or psychiatric preparations).

Abbreviation	Health Care Facility
C	Clinic
HC	Health Centre
HOS	Hospital
REF	Referral Hospital
R	Restricted Use (needs high level diagnostic or clinical skills available at specialized institutions)

Notes:

Diagnostic facilities: Health facility levels have different degrees of laboratory diagnostic support facilities available.

Drug availability: All the items listed for health centre levels up to hospital levels are expected to be available at all times from the Liberian Central Medical Stores (LCMS). Restricted and referral level medicines will be available from the LCMS only at the request of the relevant institution. It is, therefore, important that accurate estimates for the annual requirements for these items are made by the institutions concerned well in advance and the information forwarded to the CMS so that sufficient quantities of the required items may be procured and held in stock.

Medicine Name	Strength	Form	Facility Level
1. Medicines Used in Anesthesia			
1.1 General Anesthetics and Oxygen			
1.1.1 Inhalational Medicines			
Halothane	99.9% v/v	Inhalation	HOS
Isoflurane	100% v/v	Inhalation	HOS
Nitrous Oxide	100% v/v	Inhalation	REF
Oxygen (Medical)	100%	Inhalation	HC
1.1.2 Injectable Medicines			
Ketamine	50 mg/ml	Injection	HOS
Thiopental	1 g	Injection	HOS
1.2 Local Anesthetic			
Bupivacaine Injection	0.25%; 0.5% (hydrochloride) in vial	Injection	HOS
‣*Injection for spinal anesthesia*	0.5% (hydrochloride) mixed 7.5% glucose solution	Injection	HOS
Lidocaine (Plain)	1%; 2% (hydrochloride) in vial	Injection	C
	2%; 4%	Topical	HC
‣*Lidocaine (spinal anesthesia)*	5% (hydrochloride) in 2 ml ampoule to be mixed with 7.5% glucose	Injection	HOS
Lidocaine + Epinephrine (Adrenaline)	2% (hydrochloride) + Epinephrine 1:80 000	Dental Cartridge	HOS
	1%; 2% (hydrochloride/sulfate) + Epinephrine 1:200 000 in vial	Injection	HOS
Ephedrine	30 mg/ml (hydrochloride)	Injection	REF
1.3 Pre-Operative Medication and Sedation for Short Term Procedures			
Atropine	1 mg/ml (sulfate)	Injection	C
Diazepam	5 mg/ml; 10 mg/2ml	Injection	C
Midazolam	1 mg/ml; 10mg/ml	Injection	HOS
	2 mg/ml; 5 mg/ml; 10 mg/ml	Solution	HOS
	7.5 mg; 15 mg	Tablet	HOS
Morphine	10 mg/ml	Injection	HOS
1.4 Medical Gases			
Oxygen	100% (for management of hypoxemia)	Inhalation	HC
2. Medicines for Pain and Palliative Care			
2.1 Non-opioids and Non-Steroidal Anti-Inflammatory Medicines			
Acetylsalicylic Acid	80 mg; 100 mg; 300 mg; 500 mg	Tablet	C
	100 mg; 300 mg; 500 mg	Suppository	HC
Diclofenac	25 mg; 50 mg	Tablet	C
	25 mg/ml (3 ml)	Injection	C
Ibuprofen	200 mg; 400 mg; 600 mg	Tablet	C
	200 mg/5ml	Oral Liquid	C
Paracetamol	125 mg/5ml	Oral Liquid	C
	100 mg; 250 mg; 500 mg	Tablet	C
	100 mg	Suppository	C

Medicine Name	Strength	Form	Facility Level
2.2 Opioid Analgesics			
Morphine	10 mg; 15 mg; 30 mg; 60 mg;	Tablet	HOS
	100 mg; 200 mg	Tablet (Slow release)	HOS
	20 mg; 200 mg	Granules	HOS
	10 mg/ml	Injection	HOS
	10 mg/5ml	Oral Liquid	HOS
Pethidine	50 mg/ml	Injection	HOS
2.3 Steroidal Anti-Inflammatory Medicines			
Prednisolone	5 mg; 25 mg	Tablet	HC
	5 mg/ml	Oral Liquid	HC
	0.5%; 1%	Eye drops	HOS
Dexamethasone	0.5 mg; 0.75 mg; 1.5 mg; 2 mg	Tablet	HC
	4 mg/ml	Injection	HOS
	0.5 mg/2ml; 2 mg/5ml	Oral Liquid	HOS
	0.05%	Eye Ointment	HOS
Hydrocortisone	100 mg	Injection	C
	1%	Topical	C
	5 mg; 10 mg; 20 mg	Tablet	HC
3. Antiallergics and Medicines Used in Anaphylaxis			
Chlorpheniramine	4 mg	Tablet	C
	10 mg/ml	Injection	HC
Dexamethasone	0.5 mg; 0.75 mg; 1.5 mg; 2 mg	Tablet	HC
	4 mg/ml	Injection	HOS
	0.5 mg/2ml; 2 mg/5ml	Oral Liquid	HOS
Epinephrine (Adrenaline)	100 micrograms/ml; 1 mg/ml	Injection	C
Hydrocortisone	100 mg	Injection	C
Loratadine	1 mg/ml	Oral Liquid	HOS
	10 mg	Tablet	HOS
Prednisolone	5 mg; 25 mg	Tablet	HC
	5 mg/ml	Oral Liquid	HC
Promethazine	25 mg	Tablet	HC
	5 mg/ml	Oral Liquid	C
4. Antidotes and Other Substances Used in Poisonings			
4.1 Non-Specific			
Charcoal Activated	250 mg	Powder	C
4.2 Specific			
Acetylcysteine	200 mg/ml	Injection	HOS
	10%; 20%	Oral Liquid	HOS
Atropine	1 mg/ml	Injection	C
Benztropine Mesylate	1 mg/ml	Injection	HOS

Medicine Name	Strength	Form	Facility Level
Calcium Folinate (Folinic Acid)	15 mg	Tablet	HOS
	3 mg/ml	Injection	HOS
Calcium Gluconate	100 mg/ml	Injection	HC
Deferoxamine (sc, im, iv)	500 mg	Injection	HOS
Dimercaprol	50 mg/ml	Injection	HOS
Methylthionium Chloride (Methylene Blue)	10 mg/ml	Injection	HOS
Naloxone	400 micrograms/ml	Injection	HOS
Penicillamine	250 mg	Tablet	HOS
Pralidoxime	200 mg/ml	Injection	HOS
5.Anticonvulsants/Antiepileptics			
Carbamazepine	100 mg; 200 mg	Tablet	C
	100 mg/5ml	Oral Liquid	C
Diazepam	5 mg/ml (0.5 ml; 2 ml; 4 ml tubes)	Gel/Rectal	C
	2 mg; 5 mg	Tablet	C
	10 mg/2ml	Injection	C
Ethosuximide	250 mg	Capsule	HOS
	250 mg/5ml	Oral Liquid	HOS
Lorazepam	2 mg/ml; 4 mg/ml	Injection	HC
Magnesium Sulfate (*for management of eclampsia and severe eclampsia only)*	0.5 g/ml	Injection	C
Midazolam	5 mg/ml; 10 mg/ml	Oral Liquid	HOS
	1 mg/ml; 10 mg/ml	Injection	HOS
Phenobarbitone	200 mg/ml	Injection	HOS
	15 mg/ml	Oral Liquid	HOS
	15 mg; 30 mg; 50 mg; 60 mg; 100 mg	Tablet	C
Phenytoin	25 mg; 50 mg; 100 mg	Tablet	C
	50 mg	Tablet	C
	50 mg/ml	Injection	C
	25 mg/5ml	Oral Liquid	C
Valproic Acid	100 mg	Tablet	C
(Sodium Valproate)	200 mg; 500 mg	Tablet	C
	200 mg/5ml	Oral Liquid	C
6.Anti-Infective Medicines			
6.1 Anthelminthics			
6.1.1 Intestinal Anthelminthics			
Albendazole	400 mg (chewable)	Tablet	C
Mebendazole	100 mg; 500 mg	Tablet	C
Praziquantel	150 mg; 600 mg	Tablet	C
6.1.2 Antifilarials			
Albendazole	400 mg (chewable)	Tablet	C
Ivermectin	3 mg	Tablet	C

Medicine Name	Strength	Form	Facility Level
6.1.3 Antischistosomals and other Antitrematode medicines			
Praziquantel	150 mg; 600 mg	Tablet	C
Triclabendazole	250 mg	Tablet	HC

6.2 Antibacterials

To assist in the development of tools for Liberia's antibiotic stewardship and to reduce antimicrobial resistance, three different categories of Antibacterials were developed – ***ACCESS***, ***WATCH*** and ***RESERVE*** groups.

ACCESS Antibiotics-Group 1

Antibiotics that were 1st or 2nd choice antibiotics in at least one of the reviewed syndromes are designated as key ACCESS antibiotics, emphasizing their role as the antibiotics that should be *widely available*, *affordable* and *quality-assured*. Selected ACCESS antibiotics may also be included in the WATCH group.

6.2.1 Beta-Lactam Medicines	6.2.2 Other Antibacterials
- Amoxicillin; Amoxicillin + Clavulanic Acid	- Amikacin; Azithromycin
- Ampicillin; Benzathine Benzylpenicillin	- Chloramphenicol; Ciprofloxacin
- Benzylpenicillin; Cefalexin	- Clindamycin; Doxycycline
- Cloxacillin; Phenoxymethylpenicillin	- Gentamicin; Metronidazole
- Procaine Benzylpenicillin	- Sulfamethoxazole + Trimethoprim

WATCH Antibiotics- Group 2

This group includes antibiotic classes that have *higher resistance potential* and so are recommended as 1st or 2nd choice treatments only for a specific, limited number of indications. These medicines should be prioritized as key targets of Liberia's stewardship programs and monitoring. This group includes most of the highest priority agents among the Critically Important Antimicrobials for Human Medicine and/or antibiotics that are at relatively high risk of selection of bacterial resistance.

Watch group antibiotics
‣Quinolones and fluoroquinolones: *e.g. ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin*
‣3rd-generation cephalosporins (with or without beta-lactamase inhibitor): *e.g. cefixime, ceftriaxone, cefotaxime*
‣Macrolides: *e.g. azithromycin, clarithromycin, erythromycin*
‣Glycopeptides: *e.g. teicoplanin, vancomycin*
‣Antipseudomonal penicillins + beta-lactamase inhibitor: *e.g. piperacillin-tazobactam*
‣Carbapenems: *e.g. meropenem*

RESERVE Antibiotics- Group 3

This group includes antibiotics that should be treated as *"last resort"* options that should be accessible, but whose use should be *tailored to highly specific patients and settings*, when all alternatives have failed (*e.g., serious, life-threatening infections due to multi-drug resistant bacteria*). These medicines could be protected and prioritized as key targets of Liberia's antibiotic stewardship programs involving monitoring and utilization reporting, to preserve their effectiveness.

Reserve group antibiotics
‣4th generation cephalosporins: *e.g. cefepime*
‣5th generation cephalosporins *e.g. ceftaroline*
‣Polymyxins: *e.g. polymyxin B, colistin*
‣Fosfomycin (IV)
‣Oxazolidinones: *e.g. linezolid*
‣Daptomycin
‣Tigecycline

Medicine Name	Strength	Form	Facility Level
6.2 Antibacterials			
6.2.1 Beta-Lactam Medicines			
Amoxicillin 1st choice for: ‣ *community acquired pneumonia (mild to moderate)* ‣ *community acquired pneumonia (severe)* ‣ *complicated severe acute malnutrition* ‣ *exacerbations of COPD* ‣ *lower urinary tract infections; otitis media* ‣ *pharyngitis* ‣ *sepsis in neonates and children; sinusitis* ‣ *uncomplicated severe acute malnutrition* 2nd choice for: ‣ *acute bacterial meningitis*	125 mg/5ml; 250 mg/5ml (Powder)	Oral Liquid	C
	250 mg	Tablet	C
	250 mg; 500 mg	Capsule	C
Amoxicillin + Clavulanic Acid 1st choice for: ‣ *community acquired pneumonia (severe)* ‣ *complicated intraabdominal infections (mild to moderate)* ‣ *exacerbations of COPD* ‣ *hospital acquired pneumonia* ‣ *low-risk febrile neutropenia* ‣ *lower urinary tract infections; sinusitis* ‣ *skin and soft tissue infections* 2nd choice for: ‣ *bone and joint infections* ‣ *community-acquired pneumonia (mild to moderate)* ‣ *community acquired pneumonia (severe)* ‣ *otitis media*	250mg+62.5mg/5ml; 125mg+31.25 mg/5ml	Oral Liquid	HOS
	500 mg + 125 mg	Tablet	HOS
Ampicillin 1st Choice for: ‣ *community acquired pneumonia (severe)* ‣ *complicated severe acute malnutrition* ‣ *sepsis in neonates and children* 2nd Choice for: ‣ *acute bacterial meningitis*	500 mg; 1 g	Powder for Injection	C
Benzathine Benzylpenicillin 1st choice for: *Syphilis*	900 mg benzylpenicillin (=1.2milliom IU/5ml); 1.44 g benzylpenicillin (=2.4 million IU/5ml)	Powder for Injection	C
Benzylpenicillin 1st Choice for: ‣ *community acquired pneumonia (severe)* ‣ *complicated severe acute malnutrition* ‣ *sepsis in neonates and children* ‣ *syphilis* 2nd Choice for: ‣ *acute bacterial meningitis*	600 mg (=1 million IU); 3 g (=5 million IU)	Powder for injection	C

Medicine Name	Strength	Form	Facility Level
Cefalexin 2nd Choice for: ‣ *exacerbations of COPD* ‣ *pharyngitis* ‣ *skin and soft tissue infections*	125 mg/5ml; 250 mg/5ml	Powder for	HC
	250 mg	Capsule	HC
Cefixime (WATCH GROUP) 2nd Choice for: ‣ acute invasive bacterial diarrhoea / dysentery ‣ Neisseria gonorrhoeae	400 mg	Capsule	HC
Ceftriaxone (WATCH GROUP) 1st Choice for: ‣ *acute bacterial meningitis* ‣ *community acquired pneumonia (severe)* ‣ *complicated intraabdominal infections (mild to moderate)* ‣ *complicated intrabdominal infections (severe)* ‣ *hospital acquired pneumonia* ‣ *Neisseria gonorrhoeae* ‣ *pyelonephritis or prostatitis (severe)* 2nd choice for: ‣ *acute invasive bacterial diarrhoea / dysentery* ‣ *bone and joint infections* ‣ *pyelonephritis or prostatitis (mild to moderate)* ‣ *sepsis in neonates and children*	250 mg; 500 mg; 1 g	Powder for injection	HC
Cloxacillin 1st Choice for: ‣ *bone and joint infections* ‣ *skin and soft tissue infections* 2nd Choice for: ‣ *sepsis in neonates and children*	250 mg; 500 mg	Capsule	C
	500 mg; 1 g	Powder for	HOS
	125 mg/5ml	Powder for oral liquid	C
Imipenem + Cilastatin ‣ *For life-threatening hospital acquired infection due to suspected/proven multi-drug resistance*	250 mg + 250 mg; 500 mg + 500 mg	Powder for injection	HOS
Phenoxymethyl Penicillin 1st choice for: ‣ *community acquired pneumonia (mild to moderate)* ‣ *pharyngitis*	250 mg	Tablet	C
	250 mg/5ml	Powder for oral liquid	C
Procaine benzylpenicillin 1st Choice & 2nd Choice for: Syphilis	1 g (=1 million IU); 3 g (=3 million IU)	Powder for Injection	C

Medicine Name	Strength	Form	Facility Level
6.2.2 Other Antibacterials			
Azithromycin (WATCH GROUP) 1st Choice for: ‣ *Chlamydia trachomatis* ‣ *cholera [c]* ‣ *Neisseria gonorrhoeae* SECOND CHOICE for: ‣ *acute invasive bacterial diarrhoea / dysentery* ‣ *Neisseria gonorrhoeae*	250 mg; 500 mg	Tablet/Capsul	HOS
	200 mg/5ml	Oral Liquid	HOS
	1.5%	Eye Drops Solution	HOS
Chloramphenicol 2nd choice for: ‣ *Acute Bacterial Meningitis*	250 mg	Capsule	C
	0.50%	Eye Drops	C
	125 mg/5ml	Oral Liquid	C
	0.5 g/ml	Oily Suspension	HOS
	1 g	Powder for	HOS
Ciprofloxacin (WATCH GROUP) 1st Choice for ‣ *acute invasive bacterial diarrhoea / dysentery* ‣ *low-risk febrile neutropenia* ‣ *pyelonephritis or prostatitis (mild to moderate)* *2nd choice for:* ‣ *cholera* ‣ *complicated intraabdominal infections (mild to moderate)*	250 mg; 500 mg	Tablet	C
	200 mg/100ml	Solution for	HC
	250 mg/5ml	Oral Liquid	HC
Sulfamethoxazole + Trimethoprim	200 mg + 40 mg/5ml	Oral Liquid	C
	100mg+20mg; 400mg+80mg; 800mg+ 160mg	Tablet	C
	80 mg + 16 mg/ml	Injection	HOS
Doxycycline *1st Choice* ‣ *Chlamydia trachomatis* ‣ *cholera* 2nd choice ‣ *cholera* **[c]** ‣ *community acquired pneumonia (mild to moderate)* ‣ *exacerbations of COPD*	50 mg; 100 mg	Capsule/Tabl	C
	25 mg/5ml; 50 mg/5ml	Oral Liquid	HOS
Erythromycin	250 mg	Tablet	C
	500 mg (Powder)	Injection	HC
	125 mg/5ml (Powder)	Oral Liquid	C
Gentamicin 1st Choice ‣ *community acquired pneumonia (severe)* ‣ *complicated severe acute malnutrition* ‣ *sepsis in neonates and children*	10 mg/ml; 40 mg/ml; 80 mg/2ml	injection	HOS
	0.30%	Eye drops	HC

Medicine Name	Strength	Form	Facility Level
Metronidazole 1st choice: ‣ *C. difficile infection* ‣ *complicated intraabdominal infections (mild to moderate)* ‣ *complicated intrabdominal infections (severe)* ‣ *Trichomonas vaginalis* 2nd choice ‣ *complicated intraabdominal infections (mild to moderate)*	200 mg/5ml	Oral Liquid	C
	200 mg; 250 mg; 400 mg; 500 mg	Tablet	C
	500 mg/100ml	Injection	C
	500 mg; 1 g	Suppository	C
Nitrofurantoin 1st choice: *lower urinary tract infections*	50 mg; 100 mg	Tablet	HC
Vancomycin 2nd Choice : *C. difficile infection*	250 mg	Powder for injection	REF
Fosfomycin	2 g; 4 g	Powder for injection	REF
6.2.3 Anti-Leprosy Medicines Medicines used in the treatment of leprosy should never be used except in combination. Combination therapy is essential to prevent the emergence of drug resistance. Colour-coded blister packs (MDT blister packs) containing standard two-medicine (paucibacillary leprosy) or three-medicine (multibacillary leprosy) combinations for adult and childhood leprosy should be used.			
Clofazimine	50 mg; 100 mg	Capsule	HC
Dapsone	25 mg; 50 mg; 100 mg	Tablet	HC
Rifampicin	150 mg; 300 mg	Capsule	HC
6.2.4 Anti-Tuberculosis Medicines			
Ethambutol	100 mg; 400 mg	Tablet	HC
	25 mg/ml	Oral Liquid	HC
Ethambutol + Isoniazid	400 mg + 150 mg	Tablet	HC
Ethambutol + Isoniazid + Pyrazinamide + Rifampicin	275 mg + 75 mg + 400 mg + 150 mg	Tablet	HC
Ethambutol + Isoniazid + Rifampicin	275 mg + 75 mg + 150 mg	Tablet	HC
Isoniazid	50 mg/5 ml	Oral Liquid	HC
	100 mg; 300 mg	tablet	HC
Isoniazid + Pyrazinamide + Rifampicin (FDC)	75 mg + 400 mg +150 mg	Tablet	HC
Isoniazid + Rifampicin (FDC)	75 mg + 150 mg; 150 mg + 300 mg	Tablet	HC
Pyrazinamide	30 mg/ml	Oral Liquid	HC
	400 mg	Tablet	HC
	150 mg	Tablet	HC
Rifampicin	20 mg/ml	Oral liquid	HC
	150 mg; 300 mg	Capsule	HC
Streptomycin	1 g	Powder for	HC

Medicine Name	Strength	Form	Facility Level
6.2.4.1 Multi-Dug Resistant Tuberculosis Reserve second-line drugs for the treatment of multidrug-resistant tuberculosis (MDR-TB) should be used in specialized centres adhering to WHO standards for TB control.			
Amikacin	100 mg; 500 mg; 1 g (as sulfate)	Powder for Injection	HOS
Capreomycin	1 g (as sulfate)	Powder for Injection	HOS
Cycloserine	250 mg	Tablet	HOS
Ethionamide	125 mg; 250 mg	Tablet	HOS
Kanamycin	1 g	Powder for	HOS
Levofloxacin	250 mg; 500 mg; 750 mg	Tablet	HOS
Moxifloxacin	400 mg	Tablet	HOS
p-aminosalicylic acid	500 mg	Tablet	HOS
6.3 Anti-Fungal Medicines			
Amphotericin B	50 mg	Powder for	HOS
Clotrimazole	100 mg; 500 mg	Vaginal	C
	1%; 2%	Vaginal	C
	1%	Topical	C
	1%	Ear Drops	HOS
Fluconazole	50 mg; 200 mg	Capsule	HC
	2 mg/ml	Injection	HC
	50 mg/5ml	Oral Liquid	HC
Flucytosine	250 mg	Capsule	HOS
	2.5 g/250ml	Infusion	HOS
Griseofulvin	125 mg/5ml	Oral Liquid	C
	125 mg; 250 mg; 500 mg	Tablet	C
Miconazole	2%	Vaginal	C
	2%	Topical	C
	2%	Oral Gel	C
Nystatin	100 000IU	Lozenge	C
	50 mg/5ml; 100 000 IU/ml	Oral Liquid	C
	100 000 IU/ml	Pessary	C
	100 000IU; 500 000IU	Tablet	C
6.4 Antiviral Medicines ***6.4.1 Anti-Herpes Medicines***			
Aciclovir	400 mg	Tablet	HOS
	200 mg/5ml	Oral Liquid	HOS
	250 mg	Powder for injection	HOS
	3% w/w	Eye ointment	HC

Medicine Name	Strength	Form	Facility Level
6.4.2 Antiretroviral Medicines: ***6.4.2.1 Nucleoside/Nucleotide Reverse Transcriptase Inhibitors (NRTI's)***			
Abacavir (ABC)	300 mg	Tablet	HC
	100 mg/5ml	Oral Liquid	HC
Lamivudine (3TC)	50 mg/5ml	Oral Liquid	HC
	150 mg; 300 mg	Tablet	HC
Tenofovir Disoproxil Fumarate (TDF)	300 mg	Tablet	HC
Zidovudine (ZDV or AZT)	300 mg	Tablet	C
	100 mg; 250 mg	Capsule	C
	10 mg/ml	Injection	HC
	50 mg/5ml	Oral Liquid	C
6.4.2.2 Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI's)			
Efavirenz (EFV, EFZ)	50 mg; 100mg; 200 mg	Capsule	HC
	200 mg (scored); 600 mg	Tablet	HC
Nevirapine (NVP)	50 mg (dispersible); 200 mg	Tablet	C
	50 mg/5ml	Oral Liquid	C
6.4.2.3 Protease Inhibitors (PI's)			
Atazanavir	100 mg; 150 mg; 300 mg	Tablet	HC
Darunavir	75 mg; 400 mg; 600 mg; 800 mg	Tablet	HC
Lopinavir/Ritonavir (LPV/r)	100 mg + 25 mg; 200 mg + 50 mg	Tablet (heat	HC
	400 mg + 100 mg/5ml	Oral Liquid	HC
Ritonavir	400 mg/5ml	Oral Liquid	HC
	25 mg; 100 mg	Tablet (heat	HC
6.4.2.4 Integrase Inhibitors			
Dolutegravir	50 mg	Tablet	HOS
Raltegravir - *For use in pregnant women and in Second line regimens*	25 mg; 100 mg; 400 mg	Tablet	HOS
6.4.2.5 Fixed Dose Combinations (FDC's)			
Abacavir + Lamivudine	60 mg + 30 mg	Tablet	HC
Tenofovir + Emtricitabine + Efavirenz	300 mg + 200 mg + 600 mg	Tablet	HC
Tenofovir + Lamivudine Efavirenz	300 mg + 300 mg + 600 mg	Tablet	HC
Tenofovir + Emtricitabine	300 mg + 200 mg	Tablet	HC
Tenofovir + Lamivudine	300 mg + 300 mg	Tablet	HC
Zidovudine + Lamivudine + Nevirapine	60 mg + 30 mg + 50 mg	Tablet	HC
	300 mg + 150 mg + 200 mg	Tablet	HC
Zidovudine + Lamivudine	60 mg + 30 mg	Tablet	HC
	300 mg + 150 mg	Tablet	HC
6.4.3 Other antivirals			
Ribavirin	800 mg; 1 g	Injection for	HOS
	200 mg; 400 mg; 600 mg	Tablet	HOS
Valganciclovir	450 mg	Tablet	HOS
	50 mg/ml	Oral Liquid	HOS

Medicine Name	Strength	Form	Facility Level
6.4.4 Anti-Hepatitis Medicines			
6.4.4.1 Medicines for Hepatitis B			
6.4.4.1.1 Nucleoside/Nucleotide Reverse Transcriptase Inhibitors			
Entecavir	0.05 mg/ml	Oral Liquid	HOS
	0.5 mg; 1 mg	Tablet	HOS
Lamivudine (3TC)	150 mg; 300 mg	Tablet	HOS
Tenofovir Disoproxil Fumarate (TDF)	300 mg	Tablet	HC
6.4.4.2 Medicines for Hepatitis C			
6.4.4.2.1 Nucleotide Polymerase Inhibitor			
Sofosbuvir	400 mg	Tablet	HOS
6.4.4.2.2 Protease Inhibitors			
Simeprevir	150 mg	Capsule	HOS
6.4.4.2.3 NS5A Inhibitors			
Daclatasvir	30 mg	Tablet	HOS
6.4.4.2.4 Non-Nucleoside Polymerase Inhibitors			
Dasabuvir	250 mg	Tablet	HOS
6.5 Antiprotozoal Medicines			
6.5.1 Antimoebic and Anti-Giardiasis Medicines			
Metronidazole	200 mg/5ml	Oral Liquid	C
	200 mg; 250 mg; 400 mg; 500 mg	Tablet	C
	500 mg/100ml	Injection	C
	500 mg; 1 g	Suppository	C
Tinidazole	500 mg	Tablet	HOS
6.5.2 Anti-Leishmaniasis Medicines			
Amphotericin B	50 mg	Powder for	HOS
6.5.3 Anti-Malarial Medicines			
6.5.3.1 For Curative Treatment			
Amodiaquine (used in combination with Artesunate 50 mg)	200 mg	Tablet	C
Artemether (Severe malaria only)	20 mg/ml; 40 mg/ml; 80 mg/ml	Injection	C
Artemether + Lumefantrine	20 mg + 120 mg; 20 mg + 120 mg (dispersible)	Tablet	C
Artesunate	60 mg	Injection	HC
	50 mg; 200 mg	Rectal	HC
	50 mg	Tablet	C
Artesunate + Amodiaquine	25mg+67.5mg; 50mg+135mg; 100mg+270 mg	Tablet	C
Artesunate + Mefloquine	25 mg + 55 mg; 100 mg + 220 mg	Tablet	C
Doxycycline	50 mg; 100 mg	Capsule	C
Quinine Hydrochloride	300 mg/ml	Injection	HOS
	300 mg	Tablet	C

Medicine Name	Strength	Form	Facility Level
6.5.3.2 For Prophylaxis			
Doxycycline	50 mg; 100 mg	Capsule	C
Sulfadoxine + Pyrimethamine	500 mg + 25 mg	Tablet	C
6.5.4 Anti-Pneumocystosis and Anti-toxoplasmosis Medicines			
Sulfamethoxazole + Trimethoprim	80 mg + 16 mg/5ml	Injection	HOS
	200 mg + 40 mg/5ml	Oral Liquid	C
	100 mg + 20 mg; 400 mg + 80 mg	Tablet	C
Pentamidine	500 mg	Tablet	HOS
6.5.5 Anti-trichomoniasis Medicines			
Metronidazole	200 mg; 250 mg; 400 mg; 500 mg	Tablet	C
	500 mg/100ml	Injection	C
	500 mg; 1 g	Suppository	C
	200 mg/5 ml	Oral Liquid	C
Tinidazole	500 mg	Tablet	HOS
7. Antimigraine Medicines			
7.1 For treatment of an Acute Attack			
Acetylsalicylic Acid	300 mg; 500 mg	Tablet	C
Ergotamine Tartrate	1 mg	Tablet	C
Ibuprofen	200 mg; 400 mg; 600 mg	Tablet	C
	200 mg/5ml	Oral Liquid	C
Paracetamol	125 mg/5ml	Oral Liquid	C
	100 mg; 250 mg; 500 mg	Tablet	C
7.2 For prophylaxis			
Propranolol	20 mg; 40 mg; 80 mg	Tablet	HC
8. Antineoplastics and Immunosuppressives			
8.1 Immunosuppressive Medicines			
Azathioprine	50 mg (scored)	Tablet	HOS
	100 mg	Powder for	HOS
Ciclosporin	25 mg	Capsule	HOS
8.2 Cytotoxic Medicines			
Bleomycin	15 mg	Powder for Injection	HOS
Cisplatin	50 mg/50 ml; 100 mg/100 ml	Injection	HOS
Cyclophosphamide	25 mg	Tablet	HOS
	500 mg	Powder for Injection	HOS
Docetaxil	20 ml/ml; 40 mg/ml	Injection	HOS
Doxorubicin	10 mg; 50 mg	Powder for injection	HOS
5-Fluorouracil	50 mg/ml	Injection	HOS

Medicine Name	Strength	Form	Facility Level
Methotrexate	2.5 mg	Tablet	HOS
	50 mg/10ml	Powder for Injection	HOS
Rituximab	100 mg/10ml; 500 mg/50ml	Injection	HOS
Vinblastine	10 mg	Powder for	HOS
Vincristine	1 mg; 5 mg	Powder for	HOS
8.3 Hormones and Anti-Hormones			
Anastrozole	1 mg	Tablet	HOS
Dexamethasone	4 mg/ml	Injection	HOS
	0.5 mg/5ml; 2 mg/5ml	Oral Liquid	HOS
	0.5 mg; 0.75 mg; 1.5 mg; 2 mg; 4 mg	Tablet	HC
Hydrocortisone	100 mg	Powder for	HOS
	5 mg; 10 mg; 20 mg	Tablet	HOS
Leuprorelin Acetate	45 mg	Injection	HOS
Prednisolone	5 mg; 25 mg	Tablet	HC
	5 mg/ml	Oral Liquid	HC
Tamoxifen	10 mg; 20 mg	Tablet	HOS
9. Antiparkinsonism Medicines			
Benzhexol	2 mg; 5 mg	Tablet	C
	10 mg/5ml	Injection	HOS
Biperiden	5 mg/ml	Injection	HOS
	2 mg	Tablet	HOS
Levodopa + Carbidopa	100 mg + 10 mg; 100 mg + 25 mg; 250 mg + 25 mg	Tablet	HOS
Trihexyphenidyl	2 mg	Tablet	C
10. Medicines Affecting the Blood			
10.1 Anti-Anemia medicines			
Ferrous Sulphate	25 mg/ml	Oral Liquid	C
	60 mg; 200 mg	Tablet	C
Ferrous Sulphate + Folic Acid	60 mg + 400 micrograms	Tablet	C
Folic Acid	400 micrograms; 1 mg; 5 mg	Tablet	C
10.2 Medicines Affecting Co-Agulation			
Heparin	1000 IU/ml; 5000 IU/ml 20000 IU/ml	Injection	HOS
Phytomenadione (Vitamin K_1)	1 mg/ ml; 10 mg/ml	Injection	HOS
	10 mg	Tablet	HOS
Protamine Sulfate	10 mg/ml	Injection	HOS
Warfarin	1 mg; 2 mg; 5 mg	Tablet	HOS
11. Blood Products of Human Origin and Plasma Substitutes			
11.1 Plasma Substitutes			
Dextran	70% normal saline	Injectable	HOS
Haemaccel	500 ml	Infusion	HC

Medicine Name	Strength	Form	Facility Level
12. Cardiovascular Medicines			
12.1 Anti-Angina Medicines			
Atenolol	50 mg; 100 mg	Tablet	HC
Acetylsalicylic Acid	100 mg	Tablet	C
Bisoprolol	1.25 mg; 5 mg	Tablet	HC
Glyceryl trinitrate	500 micrograms	Tablet	HC
Isosorbide Dinitrate	5 mg	Tablet	HC
Verapamil	40 mg; 80 mg	Tablet	HC
Propranolol	20 mg; 40 mg; 80 mg	Tablet	HC
12.2 Anti-Arrhythmic Medicines			
Bisoprolol	1.25 mg; 5 mg	Tablet	HC
Digoxin	0.25 mg; 62.5 micrograms	Tablet	HOS
	50 micrograms/ml	Oral Liquid	HOS
	250 micrograms/ml	Injection	HOS
Epinephrine (Adrenaline)	100 micrograms/ml; 1 mg/ml	Injection	C
Lidocaine	2%	Injection	C
Verapamil	2.5 mg/ml	Injection	HC
	40 mg; 80 mg	Tablet	HC
12.3 Antihypertensive Medicines			
Amlodipine	5 mg	Tablet	HOS
Bisoprolol	1.25 mg; 5 mg	Tablet	HC
Enalapril	2.5 mg; 5 mg	Tablet	HC
Hydralazine	25 mg; 50 mg	Tablet	HC
	20 mg	Powder for Injection	HC
Hydrochlorothiazide	12.5 mg; 25 mg	Tablet	C
	50 mg/ml	Oral Liquid	HC
Lisinopril	5 mg; 10 mg; 20 mg	Tablet	HOS
Losartan	25 mg; 50 mg	Tablet	HOS
Nifedipine	10 mg; 20 mg	Tablet	C
	10 mg	Capsule	C
Propranolol	20 mg; 40 mg; 80 mg	Tablet	HC
12.4 Lipid Lowering Medicines			
Simvastatin	5 mg; 10 mg; 20 mg; 40 mg	Tablet	HOS
12.5 Antihypertensive Medicines During Pregnancy			
Methyldopa – *use only in management of pregnancy induced hypertension (PIH)*	250 mg	Tablet	C
12.6 Medicines used in Heart Failure			
Bisoprolol	1.25 mg; 5 mg	Tablet	HC
Digoxin	0.25 mg	Tablet	HOS
	50 micrograms/ml	Oral Liquid	HOS
	250 micrograms/ml	Injection	HOS

Medicine Name	Strength	Form	Facility Level
Enalapril	2.5 mg; 5 mg	Tablet	HC
Furosemide	10 mg/ml	Injection	HC
	20 mg/5ml	Oral Liquid	HC
	10 mg; 20 mg; 40 mg	Tablet	HC
Hydrochlorothiazide	12.5 mg; 25 mg	Tablet	C
	50 mg/5ml	Oral Liquid	HC
Spironolactone	25 mg	Tablet	HOS
12.7 Medicines Used in Vascular Shock			
Epinephrine (Adrenaline)	100 micrograms/ml; 1 mg/ml	Injection	C
Hydrocortisone	100 mg	Powder for Injection	C
13. Dermatological Medicines			
13.1 Antifungal Medicines			
Benzoic Acid + Salicylic Acid	6% + 3%	Topical	C
Clotrimazole	1%	Topical	C
Miconazole	2%	Topical	C
Terbinafine	1%; 2%	Topical	HC
13.2 Anti-Infective Medicines			
Mupirocin	2%	Topical	HC
Neomycin + Bacitracin	5 mg + 500 IU	Topical	HC
Silver Sulfadiazine	1%	Topical	HC
13.3 Anti-Inflammatory and Anti-Pruritic Medicines			
Betamethasone	0.10%	Topical	HC
Calamine	15%	Topical	C
Hydrocortisone	1%	Topical	C
13.4 Medicines Affecting Skin Differentiation and Proliferation			
Coal Tar	1%	Solution	HC
Salicylic Acid	5%	Solution	HC
Urea	5%; 10%	Topical	HOS
13.5 Scabicides and Pediculicides			
Benzyl Benzoate	10%; 25%	Lotion	C
14. Diagnostic Agents			
14.1 Ophthalmic Preparations			
Atropine	0.1%; 0.5%; 1%	Eye Drops	HOS
Fluorescein	1%	Eye Drops	HOS
Rose Bengal	1%	Eye Drops	HOS
14.2 Radio-Contrast Media			
Barium Sulfate	75%	Aqueous	HOS
Diatrizoate	60%	Injection	HOS
Iodized Oil	38%	Injection	HOS
Iohexol	140 mg; 350 mg iodine/ml	Injection	HOS

Medicine Name	Strength	Form	Facility Level
Loglycamate	17%	Injection	HOS
Lopanoic Acid	500 mg	Tablet	HOS
Lothalamate	60%	Injection	HOS
15. Disinfectants and Antiseptics			
15.1 Antiseptics			
Chlorhexidine + Cetrimide	0.5% + 0.5%	Solution	C
Chlorhexidine	4%; 5%; 7.1%	Solution/Gel	C
Ethanol	70% (denatured)	Solution	C
Povidone Iodine	10%	Solution	C
Surgical Spirit	70%	Solution	C
15.2 Disinfectants			
Alcohol Based Hand Rub			
- *Containing ethanol*	80% v/v	Solution	C
- *Containing isopropyl alcohol*	75% v/v	Solution	C
Chlorine Based Compound	0.10%	Powder	C
Sodium Hypochlorite	5%	Solution	C
16. Diuretics			
Amiloride	5 mg	Tablet	HOS
Furosemide	10 mg/ml	Injection	HOS
	10 mg; 20 mg; 40 mg	Tablet	HC
	20 mg/5ml	Oral Liquid	HOS
Hydrochlorothiazide	12.5 mg; 25 mg	Tablet	C
	50 mg/ml	Oral Liquid	HC
Mannitol	20%	Injectable	HOS
Spironolactone	25 mg	Tablet	HOS
17. Gastrointestinal Medicines			
17.1 Anti-Ulcer Medicines			
Aluminium Hydroxide + Magnesium Trisilicate	400 mg	Tablet	C
Magnesium Trisilicate	500 mg	Tablet	C
Omeprazole	10 mg; 20 mg; 40 mg	Capsule	HC
	40 mg	Powder for	HC
	20 mg; 40 mg	Sachets	HC
17.2 Anti-emetic Medicines			
Dexamethasone	0.5 mg; 0.75 mg; 1.5 mg; 4 mg	Tablet	HC
	0.5 mg/ml; 2 mg/5ml	Oral Liquid	HC
	4 mg/ml	Injection	HC
Metoclopramide	10 mg	Tablet	C
	5 mg/ml	Injection	C
	5 mg/5ml	Oral Liquid	C

Medicine Name	Strength	Form	Facility Level
Ondansetron	4 mg/5ml	Oral Liquid	HOS
	2 mg/ml	Injection	HOS
	4 mg; 8 mg; 24 mg	Tablet	HOS
Promethazine	25 mg	Tablet	HC
	5 mg/5ml	Oral Liquid	HC
17.3 Anti-Inflammatory Medicines			
Bismuth Subgallate	200 mg	Suppository	HC
Sulfasalazine	500 mg	Suppository	HOS
	500 mg	Tablet	HOS
17.4 Laxatives			
Bisacodyl	5 mg	Tablet	C
	5 mg	Suppository	C
Lactulose	10 g/15ml	Oral/Rectal	HOS
17.5 Medicines Used in Diarrhea			
17.5.1 Oral Rehydration Salt			
Oral Rehydration Salt	Glucose: 75 mEq; Sodium: 75 mEq or mmol/L; Chloride: 65 mEq or mmol/L; Potassium: 20 mEq or mmol/L; Citrate: 10 mmol/L; Osmolarity: 245 mOsm/L; Glucose: 13.5 g/L; Sodium Chloride: 1.5 g/L; Trisodium Citrate Dihydrate: 2.9 g/L	Powder for dilution in 200 mL or 500 mL or 1 Litre	C
17.5.2 Medicines used for Diarrhoea			
Loperamide	2 mg	Tablet	HOS
Zinc Sulfate	20 mg (dispersible)	Tablet	C
18. Hormones, Other Endocrine Medicines and Contraceptives			
18.1 Adrenal Hormones and Synthetic Substitutes			
Dexamethasone	0.5 mg; 0.75 mg; 1.5 mg; 2 mg; 4 mg	Tablet	HC
	4 mg/ml	Injection	HOS
Hydrocortisone	5 mg; 10 mg; 20 mg	Tablet	HC
Prednisolone	5 mg; 25 mg	Tablet	HC
18.2 Androgens			
Methyltestosterone	5 mg	Tablet	HOS
Testosterone Enanthate	200 mg/ml	Injection	HOS
18.3 Contraceptives			
18.3.1 Oral Hormonal Contraceptives			
Ethinylestradiol + Levonorgestrel	30 micrograms + 150 micrograms; 30 micrograms + 300 micrograms; 50 micrograms + 250 micrograms	Tablet	C
Ethinylestradiol + Norethisterone	30 micrograms + 1 mg	Tablet	C
Levonorgestrel	30 micrograms; 750 micrograms; 1.5 mg	Tablet	C
Norethisterone	1 mg	Tablet	C
Norgestrel	75 micrograms	Tablet	C

Medicine Name	Strength	Form	Facility Level
18.3.1 Injectable Hormonal Contraceptives			
Estradiol Cypionate + Medroxyprogesterone acetate	5 mg + 25 mg	Injection	C
Medroxyprogesterone Acetate	150 mg/ml	Injection	C
Norethisterone Enantate	200 mg/ml	Injection	C
18.3.3 Intrauterine Devices			
Copper containing Device	99.99%	pc	HC
18.3.4 Barrier Methods			
Condoms (male and female)		pc	C
Diaphragms		pc	HOS
18.4 Estrogens			
Ethinylestradiol	0.5 mg	Tablet	C
18.5 Ovulation Inducers			
Clomiphene	50 mg	Tablet	HOS
18.6 Progestogens			
Medroxyprogesterone Acetate	5 mg	Tablet	C
Norethisterone	5 mg	Tablet	C
Levonorgestrel	36 mg	Tablet	C
18.7 Insulin and Other Antidiabetic Agents			
Glibenclamide	5 mg	Tablet	C
Insulin Isophane NPH	100 IU/ml; 10 ml	Injection	HC
Insulin Zinc Suspension	100 IU/ml	Injection	HC
Metformin	500 mg	Tablet	C
Soluble Insulin	100 IU/ml; 10 ml	Injection	HC
18.8 Thyroid Hormones and Anti-Thyroid Hormones			
Carbimazole	5 mg	Tablet	HOS
Iodine + Potassium Iodide (Lugol's Solution)	5% + 10% (130 mg)	Oral Liquid	HC
Levothyroxine	25 µg; 50 µg, 100 µg	Tablet	HOS
19. Immunologicals			
19.1 Diagnostic Agents			
Tuberculin PPD	100 IU/ml	Injection	HC
19.2 Sera and Immunoglobulins			
Antivenom polyvalent	50 ml	Injection	C
Antitetanus serum, human	1,500 IU	Injection	C
Diptheria Toxin	10000 IU; 20000IU	Injection	C
19.3 Vaccines-for Universal Immunization			
BCG freeze dried vaccine	0.05 ml	Injection	C
Diptheria vaccine	0.5 ml	Injection	C
DPT-HepB+Hib (pentavalent)	0.5 ml	Injection	C
HPV vaccine	0.5 ml	Injection	C
Measles freeze dried vaccine	0.5 ml	Injection	C
Polio vaccine	2 drops	Oral Liquid	C

Medicine Name	Strength	Form	Facility Level
Pneumococcal Conjugate Vaccine	0.5 ml	Injection	C
Rotavirus vaccine	2 ml	Oral Liquid	C
Tetanus toxoid vaccine	0.5 ml	Injection	C
Typhoid vaccine	0.5 ml	Injection	C
Rabies vaccine	1 ml	Injection	C
Yellow fever freeze dried vaccine	0.5 ml	Injection	C
Recommendations for some High-Risk Populations			
Cholera vaccine	1 mg	Injection	C
Hepatitis A vaccine	0.5 ml; 1 ml	Injection	C
Meningococcal Meningitis vaccine	0.5 ml	Injection	C
Rabies vaccine	1 ml	Injection	C
Typhoid vaccine	0.5 ml	Injection	C
20. Muscle Relaxants (Peripherally Acting) and Cholinesterase Inhibitors			
Neostigmine	0.5 mg/ml	Injection	HOS
Atracurium	10 mg/ml	Injection	HOS
Suxamethonium	50 mg/ml	Injection	HOS
Vecuronium	10 mg	Injection	HOS
21. Ophthalmological Preparations			
21.1 Anti-Infective Agents			
Aciclovir	3 % w/w	Eye ointment	HC
Azithromycin	1.50%	Eye drops	HOS
Chloramphenicol	0.50%	Eye	C
Gentamicin	0.30%	Eye drops	HOS
Ofloxacin	0.30%	Eye drops	HOS
Tetracycline	1%	Eye ointment	C
21.2 Anti-Inflammatory Agents			
Dexamethasone	0.05%	Eye drops Eye ointment	HOS
Prednisolone	0.5%; 1%	Eye drops	HOS
21.3 Local Anesthetics			
Tetracaine	0.50%	Eye drops	HOS
21.4 Miotics and Antiglaucoma Medicines			
Acetazolamide	250 mg	Tablet	HOS
Latanoprost	50 micrograms/ml	Eye Drops	HOS
Pilocarpine hydrochloride	2%	Eye Drops	HOS
Timolol Maleate	0.25%; 0.5%	Eye Drops	HOS
21.5 Mydriatics			
Atropine	0.1%; 0.5%; 1%	Eye Drops	HOS

Medicine Name	Strength	Form	Facility Level
22. Oxytocic's and Antioxytocics			
22.1 Oxytocics			
Ergometrine	200 micrograms/ml	Injection	C
Misoprostol	200 micrograms	Tablet	C
	25 micrograms	Vaginal tablet	C
Oxytocin	10 IU/ml	Injection	C
22.1 Anti-oxytocic's (Tocolytics)			
Nifedipine	10 mg	Capsule	C
Medicine Name	**Strength**	**Form**	**Facility Level**
Electrolyte Solutions for Dialysis		Solution for injection	HOS
23. Medicines Used for Mental and Behavioural Disorders			
23.1 Medicines Used in Psychotic Disorders			
Benzhexol	2 mg; 5 mg	Tablet	C
	10 mg/5ml	Injection	HOS
Chlorpromazine	100 mg	Tablet	C
	25 mg/5ml	Oral Liquid	C
	25 mg/2ml	Injection	HOS
Fluphenazine Decanoate	25 mg/ml	Injection	HOS
Haloperidol	5 mg/ml	Injection	HC
	2 mg; 5mg	Tablet	C
Risperidone	0.25 mg; 0.5 mg; 1 mg; 6 mg	Tablet	C
23.2 Medicine Used in Mood Disorders			
23.2.1 Depression Disorders			
Amitriptyline	25 mg; 75 mg	Tablet	C
Fluoxetine	20 mg	Tablet	C
Venlafaxine	75 mg	Capsule	C
23.2.2 Bipolar Disorders			
Carbamazepine	100 mg; 200 mg	Tablet	C
Lithium Carbonate	300 mg	Tablet	HOS
Valproic Acid (Sodium Valproate)	100 mg; 200 mg; 500 mg	Tablet	C
	200 mg/5ml	Oral Liquid	C
23.3 Medicines Used in Sleep Disorders and Generalized Anxiety			
Diazepam	2 mg; 5 mg	Tablet	C
	5 mg/ml; 10 mg/2ml	Injection	C
23.4 Medicines Used for Obsessive Compulsive Disorders or Panic Attacks			
Clomipramine	10 mg; 25 mg	Tablet	HOS
23.5 Medicines for Disorders due to Psychoactive Substance Abuse			
Buprenorphine	2 mg; 8 mg	Tablet	HOS
Methadone	5 mg/ml; 10 mg/ml	Oral Liquid	HOS

Medicine Name	Strength	Form	Facility Level
24. Medicines Acting on the Respiratory Tract			
24.1 Anti-asthmatic and Medicines Used for Chronic Obstructive Pulmonary Disease			
Beclomethasone aerosol	50 micrograms/dose; 100 micrograms/dose	Inhalation	HC
Epinephrine (Adrenaline)	100 micrograms/ml; 1 mg/ml	Injection	C
Hydrocortisone	100 mg	Powder for injection	C
Ipratropium Bromide	20 micrograms/metered dose	Inhalation	HOS
Prednisolone	5 mg; 25 mg	Tablet	HC
Salbutamol	50 micrograms/ml	Injection	HOS
	100 micrograms/dose	Inhalation	C
	100 micrograms/dose	Metered dose	C
	5 mg/ml	Solution for	HC
	4 mg	Tablet	C
25. Solutions Correcting Water, Electrolyte and Acid–Base Disturbances			
25.1 Oral			
Oral Rehydration Salt	Glucose: 75 mEq; Sodium: 75 mEq or mmol/L; Chloride: 65 mEq or mmol/L; Potassium: 20 mEq or mmol/L; Citrate: 10 mmol/L; Osmolarity: 245 mOsm/L; Glucose: 13.5 g/L; Sodium Chloride: 1.5 g/L; Trisodium Citrate Dihydrate: 2.9 g/L	Powder for Dilution in 200 mL or 500 mL or 1L	C
Potassium Chloride		Powder for Solution	HC
25.2 Parenteral			
Dextrose in Normal Saline	4% (in 0.18% normal saline); 5% (in 0.9 normal saline); 5% (in 0.45% normal saline)	Injectable solution	C
Dextrose	5% (isotonic); 10% (hypertonic); 50% (hypertonic)	Injectable solution	HC
Sodium Chloride	0.9%	Injectable	C
Ringer's Lactate	500 ml	Injectable	C
Sodium Hydrogen Carbonate	8.4%/10 ml	Solution	HOS
	1.4% (isotonic)	Injectable	HOS
25.3 Miscellaneous			
Water for Injection	2 ml; 5 ml; 10 ml	Injection	C
26. Vitamins and Minerals			
Ascorbic Acid	50 mg	Tablet	C
Calcium	500 mg; 300 mg (lactate)	Tablet	HC
	100 mg/ml (gluconate)	Injection	HC
Ergocalciferol	250 µg/ml (=10000IU/ml)	Oral Liquid	HOS
	1.25 mg (50000IU)	Tablet	HOS
Hydroxocabalamin (Vitamin B_{12})	1 mg/ml	Injection	HOS
Multivitamin		Tablet	C
Pyridoxine (Vitamin B_6)	25 mg	Tablet	C

Medicine Name	Strength	Form	Facility Level
Retinol (Vitamin A)	5 mg	Tablet	C
	50000 IU; 100000 IU; 200000 IU	Capsule	C
	100000 IU/ml	Oral oily	HC
	10000 IU	Tablet (sugar	HC
	100000 IU	Water	HOS
Riboflavin (Vitamin B_2)	5 mg	Tablet	HOS
Thiamine (Vitamin B_1)	50 mg	Tablet	HOS
27. Ear, Nose, and Throat Medicines			
27.1 Ear Preparations			
Clotrimazole	1%	Ear Drops	HOS
Gentamicin	0.30%	Ear Drops	HOS
27.2 Nasal Preparations			
Ephedrine	0.50%	Nasal Drops	HOS
Budesonide	100 micrograms/dose	Nasal Drops	HOS
27.3 Oropharyngeal Preparations			
Miconazole	2%	Oral Gel	C
28. Specific Medicines for Neonatal Care			
28.1 Medicines Administered to the Neonate			
Caffeine Citrate	20 mg/ml	Injection	HC
	20 mg/ml	Oral Liquid	HC
Chlorhexidine	7.1 % (digluconate) delivering 4% chlorhexidine (for umbilical cord care)	Solution	C
28.2 Medicine Administered to the Mother			
Dexamethasone	4 mg/ml (dexamethasone phosphate)	Injection	HOS
29. Medicines for Diseases of Joints			
29.1 Medicines Used to Treat Gout			
Allopurinol	100 mg	Tablet	HC
Colchicine	300 micrograms	Tablet	HC
Probenecid	500 mg	Injection	HC
29.2 Disease-modifying agents used in rheumatoid disorders (DMARDs)			
Chloroquine	100 mg; 150 mg	Tablet	HOS
Azathioprine	50 mg	Tablet	HOS
Methotrexate	2.5 mg	Tablet	HOS
Penicillamine	250 mg	Tablet	HOS
Sulfasalazine	500 mg	Tablet	HOS
29.3 Juvenile Joint Disease			
acetylsalicylic acid* (*acute or chronic use*) * *For use for rheumatic fever, juvenile arthritis, Kawasaki disease.*	100 mg; 300 mg	Tablet	C

Medicine Name	Strength	Form	Facility Level
30. Specialized Nutrition Products			
Multiple Micronutrient Powder	1 g	Sachet	C
Ready to Use Therapeutic Food, spread	92 g	Sachet	C (Selected IMAM OTP site)
F-75 therapeutic milk	10.25 g	Sachet	HOS (selected IMAM IPF site)
F-100 therapeutic milk	114 g	Sachet	HOS (selected IMAM IPF site)
ReSoMal	42 g	Sachet	HOS (Selected IMAM IPF site)

MEDICINES INDEX

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The *National Standard Therapeutic Guideline and Essential Medicines List for Liberia* are designed to provide updated, practical, and useful information for all levels of health facilities on the treatment of common conditions presenting in Liberia