

REPUBLIC OF RWANDA



MINISTRY OF HEALTH

**RWANDA STANDARD TREATMENT
GUIDELINES**

Executive Summary

**The 2022 Rwanda Standards Guidelines
and Essential Medicines List**

March 2022

FOREWORD

I have the pleasure to preface the 2022 Rwanda Standards Treatment Guidelines and the Essential Medicines List (STGs/EML). This is the second edition after the 2013 STGs and 2015 EML.

The development of the STGs/EML is an essential part of the improvement of the quality of health care delivery especially at the primary healthcare level. Rwanda is committed to the attainment of the 2030 SDGs and especially goal 3 i.e. "good health and well-being" with one its target to "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"

To attain the above-mentioned goals, special packaging of policies and strategies aligned to the Global Strategy for Women's, Children's and Adolescent's Health were developed through the MNCH strategic plan 2018- 2024 ensuring coordinated action to address cross-cutting health needs of our future. These guidelines have therefore integrated this plan accordingly

Equally important, this 2022 STGs/EML integrates Rwanda global commitment to the implementation of the One Health Policy that set-up policies, implementation strategies to prevent and control zoonotic diseases, plant diseases, food safety and specifically antimicrobial resistance. Rwanda has therefore set up a One Health Multi-sectoral Coordination Mechanism (OH-MCM) that will allow antimicrobial resistance surveillance, guide and monitor the use of antibiotics in Rwanda. This policy is in line with our commitment to the WHO Global Action Plan on Antimicrobial Resistance (2018). We have therefore for the first time customized the WHO AWARE classification of antibiotics as well as the antibiotics prescription guidance. This will help not only reduce the current trend of antimicrobial resistance but importantly ensure better quality of healthcare of our population by reducing the negative impact of multi-drug resistance in Rwanda.

While the above global commitments inform our strategic choices, the STGs/EML are grounded first and foremost in our national diseases burden and specifically at the primary health care level. It is our hope that these guidelines will bring more evidence-based practice, more transparency in the care provision as well as access to efficient, affordable, and available medications in the country.

I would finally wish to acknowledge the strategic technical and financial contribution of the WHO that made this work possible despite the challenging environment due to Covid-19 pandemic.

This work would not have been possible without the active involvement of the professional medical/pharmacy societies/associations, that reviewed the literature, held numerous online discussions, peer-reviewed several drafts and came up with the most suitable guidelines.

Several other partners provided support to this project in one way or another and I wish to thank all of them for their usual support

Dr. NGAMIJE M. Daniel
Minister of Health



● Executive Summary

-- | Introduction

The Rwanda Ministry of Health with the support of the WHO has initiated the process of updating the 2013 Standard Treatment Guidelines (STGs) and the 2015 Essential Medicines List (EML); the current version is therefore the final draft of the 2022 STGs/EMLs. Since 2013, there have been a tremendous growth of healthcare services in Rwanda with more district hospitals, health centers, health posts; the private sector has equally expanded beyond the Capital City bringing more providers in the country.

The decentralization of specialized care closer to the population has therefore brought more specialized workforce in the primary healthcare domain through the deployment of obstetricians and gynecologists, pediatricians, internists, general surgeons, anesthesiologists to district hospitals, and this has therefore expanded the district hospital service package.

The mounting pressure of non-communicable diseases (NCDs) in the community and especially diabetes, hypertension and asthma has expanded the scope of practice of nurses at the health centers making them de-facto prescribers on the ground upon the appropriate training and mentorship.

The current 2022 STGs/EMLs version includes the most common conditions/diseases as seen in the primary health setting with therefore main focus to the health centers and district hospitals. After a general guidance on best practice in the use of drugs, the 13 volumes cover:

- Volume1: Internal Medicine.**
- Volume2: Pediatrics.**
- Volume3: Obstetrics and Gynecology.**
- Volume4: Surgery.**
- Volume5: ENT.**
- Volume6: Dermatology.**

Volume7: Dentistry.

Volume 8: Ophthalmology.

Volume 9: Mental Health.

Volume10: Standards for a Safe Practice of Anesthesia and Pain Management in Rwanda.

Volume11: The Rational Use of Antibiotics in Rwanda.

Volume12: Adult and Pediatric Essential Medicines List

Volume13: Clinical guidelines for hypoxemia screening and oxygen therapy administration in neonates, children and adults.

Malaria, HIV, tuberculosis and cancer management are not detailed in the current version; these conditions remain national vertical programs coordinated by the Rwanda Biomedical Center (RBC).

The 2022 STGs/EML have introduced for the first time the guidelines on the use of antibiotics in Rwanda; this is indeed a preliminary step towards the implementation of the One Health Approach Policy that Rwanda has recently adopted. These guidelines used the WHO AWARE tool, the Rwanda disease burden, the available literature evidence and the expert opinion where necessary.

Special emphasis has been put on management of emergencies and appropriate flow-charts have been provided to ensure diagnosis, and treatment pathways are easier understood by all the providers at all levels. A syndromic approach to the most common symptoms in the community has also been proposed to ensure the standard management across the system.

The update of the EMLs has been the outcome of joint cooperation between clinicians and pharmacists ensuring that current standard medications are considered on the basis of their efficacy, availability, affordability and safety. The list was made against the two recommended WHO 2019 – EMLs (Pediatric and adult EML) and adjusting according to local disease burden and available data especially on antibiotic sensitivity pattern.

-- | Acknowledgement

The Ministry of Health wishes to acknowledge the support of various stakeholders in the making of the 2022 Standards Treatment Guidelines (STGs) and Essential Medicines List (EML). Without their contributions, it wouldn't have been possible to complete this work despite the restrictions made necessary by the Covid-19 Pandemics. The World Health Organization availed the required financial and technical support throughout the project and was flexible to adjust to the challenges brought about by the stringent environment.

The Ministry wishes to thank specifically all Rwanda Medical and Pharmacy Societies and Associations for their self-less spirit and gave their time to patiently review and update the previous 2013 STGs and 2015 EML spending very long hours online very often late in the night.

The HMIS staff in the MOH have not spared any effort to bring together 2018 – 2019 healthcare data to help shape the Rwanda diseases burden especially from health centers that has been used to set priority areas for the guidelines development.

The RBC's participation in the gathering of information retrieved from public hospitals' Electronic Medical Records (EMR) was essential in the gathering of common pathological conditions from district and provincial hospitals.

The Ministry also recognizes the important contribution of tertiary Hospitals including CHUK, CHUB and KFH that availed their microbiology data over 5 to 7 years that helped to profiling the antimicrobial resistance in Rwanda.

MTaP's financial intervention especially in the shaping of the antibiotic use guidelines has been a great input in the current work. World AIDS Campaign International (WACI) Health made a significant financial input to allowing a smooth running of the project.

Special recognition goes also to the Experts Taskforce appointed by the MOH upon recommendation by the Medical and Pharmacy Societies and Associations.

-- | Methodology

The development of the 2022 STGs/EML guidelines was launched on the 27 November 2020 by the MoH Steering Committee chaired by the Dr. Corneille Ntihabose, HoD Clinical Services, Dr. Parfait Uwariraye, HoD Planning with in attendance other stakeholders including the WHO, RBC, RSSB. Guidance was given on the main orientations of the new guidelines. Here were the main stages of the guidelines development.

Collection of data on epidemiological situation:

Week of 21 – 25 December 2020: was collected aggregated data on prevailing disease burden to allow an evidence-based profile of diseases burden especially in health centers.

On the 29 December 2020: Working visit at RBC health information unit

Fist two weeks January 2021: Further meetings with RSSB, Rwanda FDA, and RMP paved the way for continuous online consultation with their staff on drugs availability and affordability.

Desk review of existing documentation

While international medical specialties treatment guidelines are developed on the basis of peer-reviewed randomized papers with required standard levels of evidence, like in resource constraints countries, STG development relied essentially on the customization of international guidelines, available national and regional relevant peer-reviewed research production, local experts' opinion and shared regional practices.

The update of the existing STGs and EMLs was therefore based on the following sources (not exhaustive):

- a. Literature review (evidence-based approach where possible): where relevant local research is available, it is the main source of evidence; otherwise inspiration was sought from existing research from African setting.

- b. WHO Model List of Essential Medicines 21st edition (2019) has been used as a reference on new entrants in the proposed new STGs/EML.
- c. International Guidelines: international specialty guidelines including WHO guidelines were also adopted especially in child-maternal Health
- d. Expert opinion: where no reliable evidence from the literature was available, practice-based knowledge has been used to forge consensus.
- e. HMIS aggregated diseases burden data for 1 Jan 2019 – 31 Dec 2019 has been shared with all the specialties groups as a reference point.
- f. Data extracted from Hospitals' EMR diseases burden data for 1 Jan 2019 – 31 Dec 2019 was also used to focus on the burden of diseases from district hospitals.

The appointment of the Specialists Task-Force Committee

A committee of experts drawn from the medical specialties was appointed by the MoH to coordinate the scientific review of the 2013 STGs and 2015 EMLs that was carried out as an inter-specialty consultation, the review of existing evidence and the draft of the consensus (Draft 0). The team was composed as follows:

	Association/society	Focal point
1	The Rwanda Pediatric Association (RPA)	Prof. Musiime S.
2.	The Rwanda College of Physicians (RCP)	Dr. Muvunyi B.
2	The Rwanda Society of Obstetrics and Gynecology (RSOG)	Dr. Ruzigana G.
3	The Rwanda Surgical Society	Dr. Byiringiro F.
4	The Rwanda Psychiatric Society	Dr. Mudenge C.
5	The Rwanda Dental Surgeon Association (RDSA)	Dr. Bizimana A.

6	The Rwanda Ophthalmology Society (RSO)	Dr. Mutangana F.
7	The Rwanda Oncology Society (in formation)	Dr. Rubagumya F.
8	The Rwanda Otolaryngology and Neck Surgery Society (ROHNSS)	Dr. Mukara Kaitesi
9	The Rwanda Dermatology Society (RDS)	Dr. Amani A.
10	The Rwanda Society of Anesthesiologists (RSA)	Dr. Rudakemwa A.
11	The National Pharmacy Council	Dr. Hitayezu F.

The taskforce coordinated much larger teams of specialists and sub-specialists. The detailed list of participants will be found in the annexes.

Specialties' Draft 0

Several specialties wide consultations within the 10 main specialties through online workshops took place at specialists' own convenient time very often after working hours at their home places. Specialties have been advised to focus on primary health care and the national diseases burden, and where possible to use a syndromic approach for the benefit of especially provider from the health centers. All this exercise was done in a very difficult situation and all the teams basically worked online very often after normal work hours, as no face-to-face meeting was not possible.

Peer-review of specialties guidelines:

At least 2 online workshops (3 hours) per each of the 10 specialties brought together physicians and pharmacists to go through the draft and especially forge a consensus on the special attributes of the essential medicine list i.e. efficacy, availability, affordability and safety of chosen drugs. Each workshop was attended by various stakeholders drawn from main hospitals (physicians and pharmacists) and RSSB pharmacists. Following this long exercise, each specialty had produced a Draft 01

Peer-review workshops of the EMLs Draft 01

Five online workshops were organized particularly for pharmacists to forge a consensus on the availability, affordability, and cost-effectiveness of the proposed additional medicines to the existing adult and pediatric EML.

Steering Committee Review of draft 01

As per the work-plan, the Draft 01 was to be held. Given the size of the document, the Steering Committee sat 4 times on 23 April, 10 May, 14 May and 1 June 2021

Validation workshop

The validation workshop was to become the final step before submission of the final report. This three-day workshop bringing together at least 5 members from each specialty as well as representatives from district hospitals and health centers (at least 60 members). It took place on 30 August – 3 September 2021 at Musanze. The workshop was a very active interaction between clinicians, pharmacists, insurers and policy makers and was concluded with a sense of ownership from all sides.

New in the 2022 STGs/EML

- a. From the 2013 to 2022, most of the guidelines have been updated at all levels with special effort to include flow-charts and syndromic approach based on Rwanda disease burden at primary level to ensure the guidelines are easily understood at all levels

- b. The pediatric volume 2 has included detailed Emergency Triage Assessment and Treatment plus (ETAT+) guidelines that provide guidance on the management of most common emergency conditions in children presenting at the health facility; the volume includes also the neonatal care protocol as well to ensure neonatal deaths are reduced with the aim of meeting the 2030 STGs.

- c. The obstetrics and gynecology volume 3 has brought forward the newly validated obstetric care protocol together with gynecology care in the broader framework of the mother, child, adolescent health (MCAH)
- d. Since the decentralization of specialist care has been extended with the deployment of specialists in district hospitals (internal medicine, pediatrics, obstetrics and gynecology and general surgery), the service package has been adjusted including more drugs in the 2022 EML as per the WHO recommendation
- e. For the first time, guidelines for the use of antibiotics in Rwanda has been developed as a first step to fight the antimicrobial resistance in Rwanda (AMR); these guidelines include three components: (i) the Rwanda AWARE classification defining the most needed antibiotics (ACCESS group), the most delicate antibiotics (WATCH group) and the antibiotics of the last resort (RESERVE group)
- f. The volume 13 is also new in the STGs/EML and is about the Clinical guidelines for hypoxemia screening and oxygen therapy administration in neonates, children and adults. This is also a great input especially during this SARS-CoV-2 pandemic of intensive oxygen use

Recommendations on 2022 STGs/EML implementation

From experience across the world, the development of guidelines has always been the easy part. Implementation of guidelines is generally the most challenging endeavor about the guidelines. This issue has always been highlighted by various stakeholders during the development of the current guidelines and some recommendations were made especially by the Steering Committee. Here is a summary of the main ones:

- a. To enforce the compliance to the guidelines, there should be a binding instrument such as Ministerial Instruction inviting all prescribers to apply as much as possible the principles of management of the most common conditions as found in the 2022 STGs/EML.
- b. With regards to the antibiotics use in Rwanda, in the framework of One Health implementation, antimicrobial resistance (AMR) stewardship at both national and local facilities level is a necessary step if the antibiotic resistance threat is to be controlled.
- c. The streamlining of Drugs and Therapeutics Committees (DTCs) in health facilities and the set-up of a national reporting system are effective strategic programs to achieve the effective antimicrobial resistance (AMR) stewardship.
- d. The overall implementation of the STGs/EML will require an effective communication strategy as well as a continuous professional development (CPD) plan.
- e. There is need to develop a robust dissemination strategy and roadmap.
- f. To collaborate with Health professional associations and societies to identify experts that will be leading the dissemination and be trained as Trainers.

- g. The development of a mobile application would certainly be the easiest way of having the STGs/EML at our fingertips everywhere and all the time
- h. For effective implementation, it also was recommended that STGs/EMLs should be part of the necessary clinical guidelines for compliance with the relevant Rwanda accreditation standards



Republic of Rwanda
Ministry of Health

rbc Rwanda
Biomedical
Centre
Healthy People, Wealthy Nation



NATIONAL
NON-COMMUNICABLE DISEASES
MANAGEMENT GUIDELINES

NATIONAL
NON-COMMUNICABLE DISEASES
MANAGEMENT GUIDELINES

Publication Details:

Published by: Non-Communicable Diseases Division, Rwanda Biomedical Centre, Ministry of Health, Rwanda

With the technical and financial support from:



MEDTRONIC LABS

Publication date: February 2024

CONTENTS

FOREWORD.....	VII
ACKNOWLEDGMENT.....	VIII
SECTION I: PERIODIC HEALTH EXAMINATION	1
0. Introduction	1
I.A Hypertension	1
I.B Obesity	2
I.C Diabetes Mellitus	3
I.D Lipids Disorders	3
I.E Chronic Kidney Disease	4
I.F Community health education & immunization	6
SECTION II: CARDIOLOGY	14
II.A Adult Cardiology	14
II.A.1 Hypertension (HTN).....	14
II.A.2 Heart Failure.....	20
II.A.3 Acute Coronary Syndrome.....	23
II.A.4 Stroke.....	25
II.A.5 Rheumatic Heart Diseases.....	27
II.A.6 Anticoagulation Strategies for Patients with Prosthetic Valves	29
II.B Pediatric Cardiology	32
II.B.1 Congenital Heart Diseases	32
II.B.2 Heart Failure	36
II.B.3 Rheumatic Heart Diseases	37
II.B.4 Infective endocarditis	38
II.B.5 Cardiogenic Shock.....	39
SECTION III: DIABETES MELLITUS.....	40
III.A Management of Diabetes in outpatient	40
III.B Inpatient Diabetes Management	44
III.C Management of Diabetes in pregnancy	47
III.D Management of diabetic emergencies.....	50
III.E Diabetes Care in Pediatric Age.....	54
III.E.1 Management of Type 1 Diabetes Mellitus	54
III.E.2 Management of Diabetic Ketoacidosis (DKA).....	56
III.E.3 Management of Hypoglycaemia and Hyperglycaemia	58
III.E.3.1 Hypoglycemia	58
III.E.3.1 Hyperglycemia in a child who is not sick	59

SECTION IV: NEPHROLOGY	61
IV.A Adult Nephrology.....	61
IV.A.1 Chronic Kidney Disease.....	61
IV.A.1.1 Approach to a Patient with Chronic Kidney Disease	61
IV.A.1.2 Management of CKD per stage	62
IV.A.1.3 Management of Comorbidities.....	62
IV.A.1.4 Complications Management	64
IV.A.1.5 Electrolytes Imbalances: Hyperkalemia	67
IV.A.1.6 Management of Patients Post Renal Transplant	67
IV.B Pediatric Nephrology.....	69
IV.B.1 Chronic Kidney Disease in Children	69
IV.B.2 Urinary tract infection (UTI) and urinary tract abnormalities.....	72
IV.B.3 Acute Kidney Injury in Children	74
IV.B.4 Nephrotic Syndrome in Children.....	76
SECTION V: CHRONIC RESPIRATORY DISEASES	82
V.A Chronic Adult Respiratory Diseases.....	82
V.A.1 Asthma	82
V.A.2 Chronic Obstructive Pulmonary Disease (COPD)	87
V.B Chronic Pediatric Respiratory Diseases.....	89
V.B.1 Chronic allergic rhinitis in children	89
V.B.2 Chronic asthma in children.....	91
SECTION VI: PAIN MANAGEMENT AND PALLIATIVE CARE	93
VI.A Pain Management	93
VI.B Adult Palliative Care	96
VI.C Pediatric Palliative Care	101
SECTION VII: HAEMOPHILIA.....	104
VII.A Introduction.....	104
VII.B Diagnosis	104
VII.C General care of Haemophilia	107
VII.D Treatment of Haemophilia.....	108
VII.E Management of common complications.....	112
ANNEX	115

LIST OF FIGURE

Figure 1: Recommendations for BP measurements in the office and at home.....	1
Figure 2: Algorithm for Hypertension Screening	2
Figure 3: Algorithm for Diabetes Mellitus Screening	3
Figure 4: Algorithm for Chronic Kidney Disease Screening.....	4
Figure 5: Protocol for counseling on tobacco and alcohol cessation using the 5 steps 5 A approach.....	7
Figure 6: SBIRT: Screening, Brief Intervention, and Referral to Treatment	8
Figure 7: Recommendations for BP measurements in the office and at home from ESH 2023 Management of Hypertension.....	14
Figure 8: Illustrating BP goal with relation to medical condition Source JNC8.....	16
Figure 9: Algorithm for Management of Hypertension.....	17
Figure 10: Algorithm for Heart Failure Diagnosis and Management.....	21
Figure 11: Algorithm for Acute Coronary Syndromes (ACS) management at secondary care level.....	23
Figure 12: Visual illustration of ACS	24
Figure 13: Algorithm for Stroke Diagnosis and Management	25
Figure 14: Algorithm for Management of Rheumatic Heart Disease (RHD) at Secondary Care Level.....	27
Figure 15: Anticoagulation in pregnant women with Mechanical Heart valve.....	30
Figure 16: Algorithm with the initial evaluation and management of congenital heart diseases.....	34
Figure 17: Algorithm for the initial evaluation and management of heart failure in children.	36
Figure 18: Algorithm with the initial evaluation and management of RHD in children.....	37
Figure 19: Algorithm with the initial evaluation and management of IE in children.....	38
Figure 20: Algorithm with the initial evaluation and management of Cardiogenic shock in children.....	39
Figure 21: Algorithm for management of diabetes in outpatient department.....	40
Figure 22: Algorithm for type 2 diabetes pharmacological treatment.....	41
Figure 23: Algorithm for diabetes management in non-critically ill patients.....	45
Figure 24: Algorithm for screening and diagnosis of Gestational diabetes.....	48
Figure 25: Algorithm for management of Gestational diabetes.....	48
Figure 26: Algorithm for management of DKA and HHS	52
Figure 27: DKA Management – Limited Care Settings	57
Figure 28: Algorithm for management of hypoglycemia in children.....	59
Figure 29: Simplified approach to a patient with Chronic Kidney Disease.....	61
Figure 30: Chronic Kidney Diseases staging	62
Figure 31: Algorithm for Hypertension Management in CKD Patient.....	63
Figure 32: Algorithm for the management of a patient with Diabetes and CKD.....	64
Figure 33: Algorithm for Iron Supplementation.....	65
Figure 34: Algorithm for Erythropoiesis stimulating agents (ESA) therapy	65
Figure 35: Algorithm for Management of bone mineral disorder	66
Figure 36: Algorithm for management of hyperkalemia	67
Figure 37: Algorithm for CKD Management in children.....	70
Figure 38: Algorithm for Urinary tract infection clinical presentation and management	72

Figure 40: Algorithm for Acute kidney injury presentation and management.....	75
Figure 41: Initial presentation diagnostic flowchart	83
Figure 42: Algorithm for the management of Asthma (Adapted from Box 11. GINA 2022)	84
Figure 43: Algorithm for the management of chronic allergic rhinitis in children.....	89
Figure 44: Physical pain assessment	93
Figure 45: Stepwise management of pain	94
Figure 46: Palliative care in the trajectory of the patient's illness.....	96
Figure 47: Stages in palliative adapted from Hawley PJ pain symptom management 2014	96
Figure 48: Algorithm for common symptoms causes and management in Palliative Care	98
Figure 49: Algorithm for symptoms and its management in end of life care.....	99
Figure 50: Principles in pediatric palliative care.....	101
Figure 51: Pathway to haemophilia diagnosis	106

LIST OF TABLES

Table 1: Anthropometric measurements (Age ≥18 years).....	2
Table 2: WHO Alcohol Use Disorders Identification Test (AUDIT).....	9
Table 3: Features of alcohol withdrawal.....	10
Table 3: Hypertension Measurements	14
Table 4: BP Patterns Based on Office and Out-of-Office Measurements	15
Table 3: Diagnostic work-up for patients with hypertensive emergency	18
Table 4: Table of Hypertensive emergencies treatment choices with specific indications.....	18
Table 5: Treatment options in management of Diabetes in outpatient.....	41
Table 6: Management of Diabetes in Outpatient (available oral agents).....	42
Table 7: Insulin Type and Action	55
Table 8. HbA1c goals in CKD.....	63
Table 9. Follow-up of postrenal transplant patients	67
Table 10. Alerting laboratory values in CKD.....	67
Table 11. Follow-up plan for Kidney donor	68
Table 12. Classification of CKD in children	70
Table 13. Summary of urinary protein interpretation	77
Table 14: Asthma treatment options.....	85
Table 15: Inhaled Corticosteroids Dosage	86
Table 16: COPD assessment	87
Table 17: Treatment options	87
Table 18: Modified MRC Scale	87
Table 19: Composite score	87
Table 20: Corticosteroids dosage.....	91
Table 21: Type and characteristics of pain.....	93
Table 22: Opioids Equi-analgesic dose ratios.....	95
Table 23: Opioids to use or to avoid with chronic kidney disease.....	95
Table 24: Neonatal/Infant Pain Scale (NIPS)	101
Table 25: Pain management in Neonates.....	101
Table 26: Pain management in infant and older children.....	102
Table 27: Correlation of coagulation factor activity and disease severity in Haemophilia A or B	104
Table 28: Type of Bleed vs Factor Deficient	108
Table 29: Type of blood product vs FVII or FIX contained per bag	109
Table 30: DDAVP dosage	109
Table 31: Fluid restriction in a patient receiving DDAVP	109
Table 32: Type of Bleed vs Factor Deficient	110
Table 33: Recommended Plasma Factor Level and Duration of Administration	111

FOREWORD

It is with great pleasure and a sense of profound responsibility that we introduce the New National Non-Communicable Diseases (NCDs) Guidelines, Version 2024. These guidelines represent a significant milestone in our ongoing efforts to combat the growing burden of NCDs and promote the health and well-being of our population.

Non-Communicable Diseases, including cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases, continue to pose a significant threat to public health and socio-economic development worldwide. In Rwanda, like many other nations, the prevalence of NCDs has been on the rise, presenting complex challenges that require comprehensive and integrated approaches for prevention, diagnosis, treatment, and care.

The development of these guidelines is a testament to the unwavering commitment of the Government of Rwanda, in collaboration with our esteemed partners and stakeholders, to address the multifaceted nature of NCDs. Drawing upon the latest evidence-based practices, international standards, and the expertise of healthcare professionals, these guidelines provide a framework for delivering high-quality, patient-centered care across the continuum of NCD management. By promoting a holistic approach that encompasses primary prevention, early detection, timely intervention, and long-term management, we aim to mitigate the impact of NCDs on individuals, families, and communities.

As we embark on the implementation of these new guidelines, I urge all healthcare professionals, all stakeholders, and individuals to embrace their role in advancing NCD prevention and control efforts. Let us work together with determination and dedication to translate these guidelines into tangible actions that make a meaningful difference in the lives of our people.

I extend my heartfelt appreciation to all those who have contributed to the development of these guidelines, including the dedicated members of the technical working groups, Rwanda College of Physicians, Partners and the broader health professional's community. Your expertise, insights, and commitment have been instrumental in shaping this comprehensive resource for NCD management in Rwanda.

We are confident that these guidelines will serve as a strong tool in our collective endeavor to reduce the burden of NCDs and promote a healthier and more prosperous future for all Rwandans. Let us embrace this opportunity with optimism and determination, knowing that together, we can overcome the challenges posed by NCDs and build a brighter tomorrow for generations to come.



Prof. Claude Mambo Muvunyi
Director General
Rwanda Biomedical Centre



ACKNOWLEDGMENT

The development of the new National Non-Communicable Diseases (NCDs) Management Guidelines, Version 2024, has been a collaborative endeavor that would not have been possible without the invaluable contributions and support of numerous individuals, organizations, and institutions. On behalf of the Ministry and Rwanda Biomedical Centre, we extend our heartfelt gratitude to all partners and individuals that have actively contributed to the development of these guidelines.

Our special gratitude goes to Rwanda College of Physicians, for their expertise, guidance, and commitment provided throughout the development of these guidelines. Their dedication to advancing medical education, training, and research has been instrumental in shaping the clinical recommendations and best practices outlined in this document.

We extend our sincere appreciation to Medtronic Labs for their financial and technical support throughout the development process. Their partnership and collaboration have been essential in ensuring the comprehensive coverage of NCD management strategies and the integration of innovative solutions into these guidelines, ultimately enhancing the quality of care for individuals affected by NCDs.

Furthermore, we would like to acknowledge the contributions of the technical working groups, comprising healthcare professionals, researchers, policymakers, and civil society representatives, whose expertise and insights have enriched the content of these guidelines. Their dedication to improving NCD prevention, diagnosis, treatment, and care has been invaluable in shaping this comprehensive resource for healthcare practitioners and policymakers in Rwanda.

Lastly, we extend our appreciation to all individuals and organizations who have contributed to the development and dissemination of these guidelines, directly or indirectly. Your collective efforts have made a significant difference in our ongoing efforts to combat the burden of NCDs and promote the health and well-being of our population.

Together, we reaffirm our commitment to working collaboratively towards a healthier, more resilient society, where all individuals have access to NCDs prevention and control services, they need to live healthy and fulfilling lives.

SECTION I: PERIODIC HEALTH EXAMINATION

O. Introduction

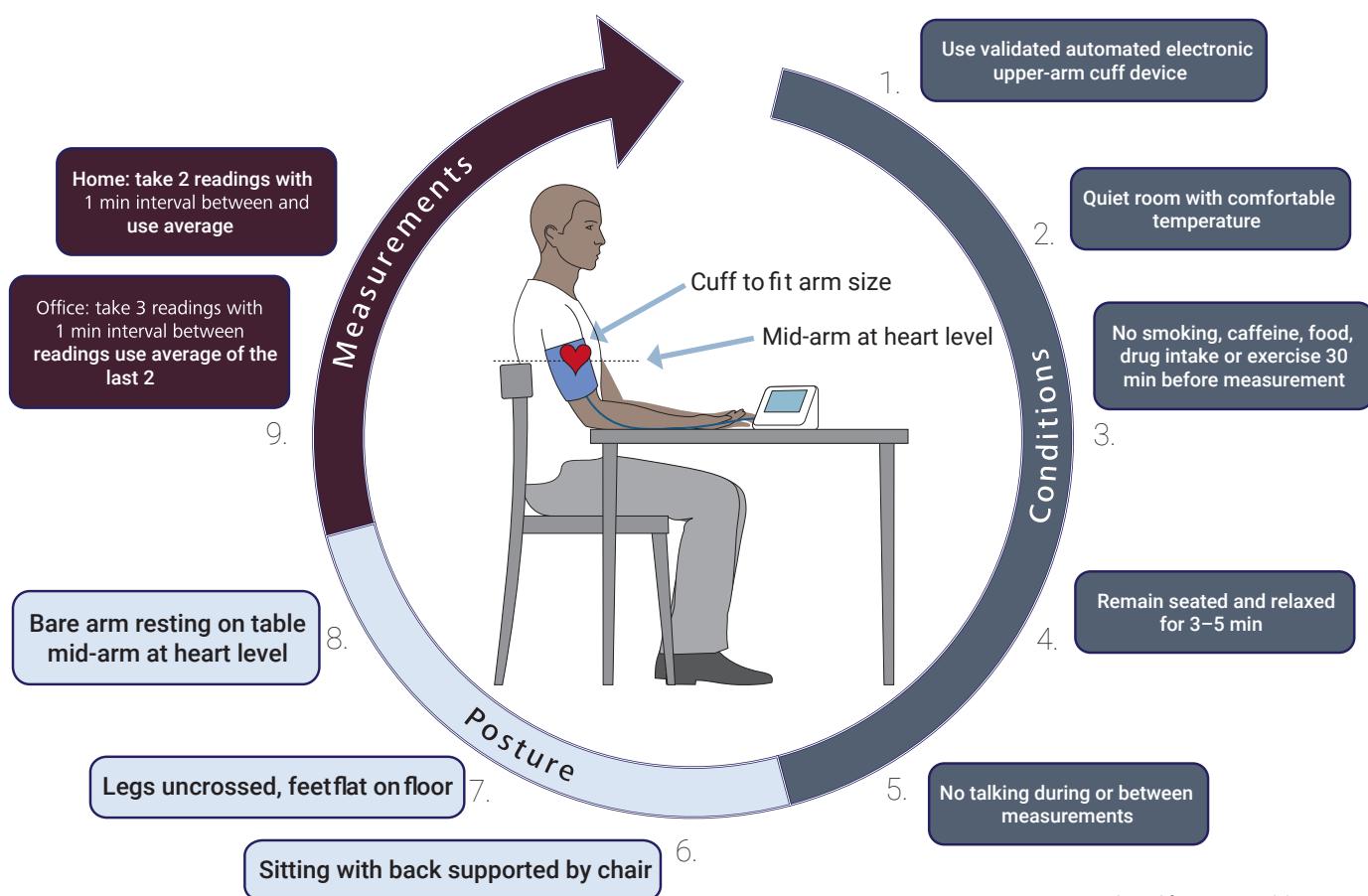
Periodic health examinations (PHE) are also known as check-up examinations. The PHE aims at identifying risk factors and early signs of the disease and also preventing future diseases using early interventions. It includes counseling, vaccination/immunization, investigations (labs, imaging, etc.), and physical examination tailored to the patient's gender and age.

I.A Hypertension



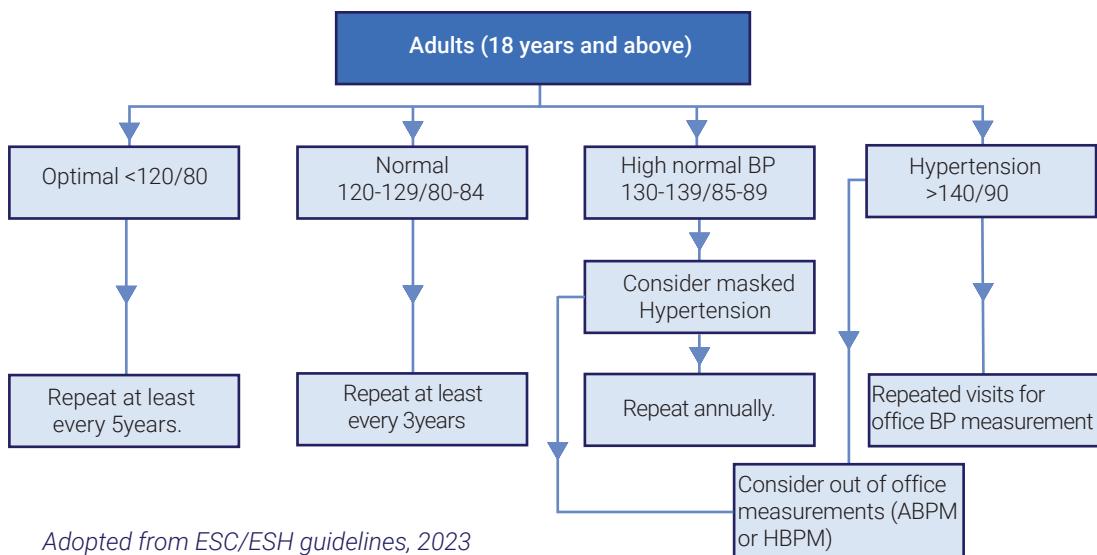
Hypertension is defined as systemic blood pressure of $\geq 140/90\text{mmHg}$. Controlling hypertension is associated with a reduction in heart failure, strokes, chronic kidney disease, and myocardial infarctions. Therefore, routine screening for hypertension is recommended (Grade A).

Figure 1: Recommendations for BP measurements in the office and at home



Adopted from ESH guidelines, 2023

Figure 2: Algorithm for Hypertension Screening



N.B: Ministry of Health recommends measuring Blood pressure yearly in people with ≥ 35 years

I.B Obesity



Obesity is associated with cardiovascular and cerebrovascular diseases, as well as some cancers and diabetes. Screen for obesity begins at the age of six (Grade B). The prevalence of obesity in Rwanda is estimated at 4.3% as per a recent STEPs survey.

Table 1: Anthropometric measurements (Age ≥ 18 years)

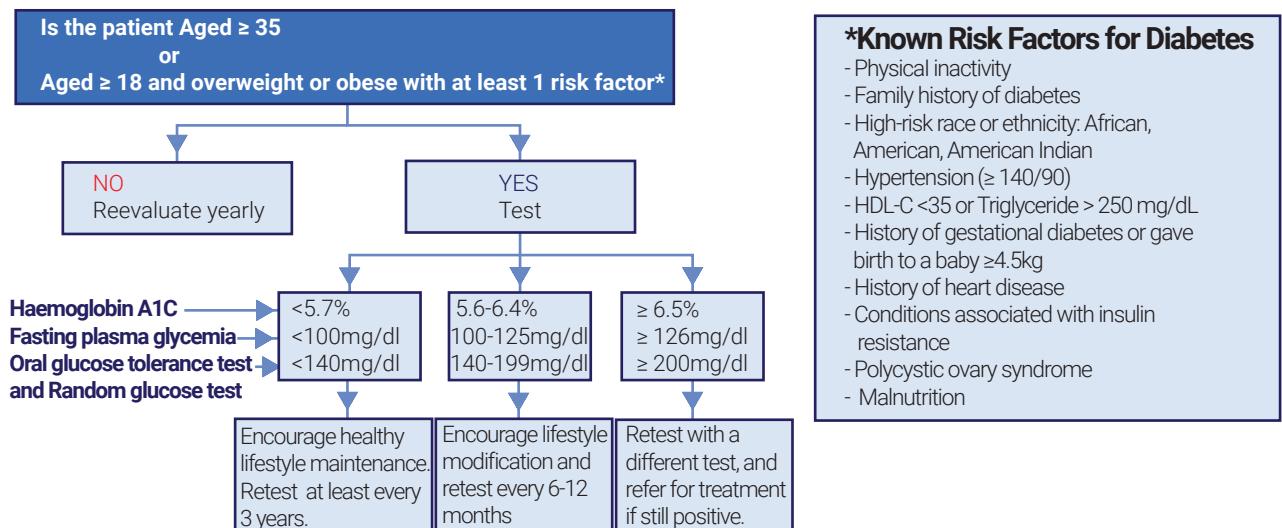
	BMI (kg/m^2) = The body mass divided by the square of the body height	Obesity class	Disease risk* (Relative to normal weight and waist circumference)	
				Men ≥ 102 cm and Women ≥ 88 cm
Underweight	<18.5		-	
Normal*	18.5-24.9		-	
Overweight	25-29.9		Increased	High
Obesity	30-34.9	Class 1	High	Very high
	35-39.9	Class 2	Very high	Very high
	≥ 40	Class 3	Extremely high	Extremely high

*Disease risk for hypertension, type 2 diabetes, and cardiovascular diseases.

*Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

I.C Diabetes Mellitus

Figure 3: Algorithm for Diabetes Mellitus Screening



Adapted from the American Diabetic Association Standard of Medical Care in Diabetes.

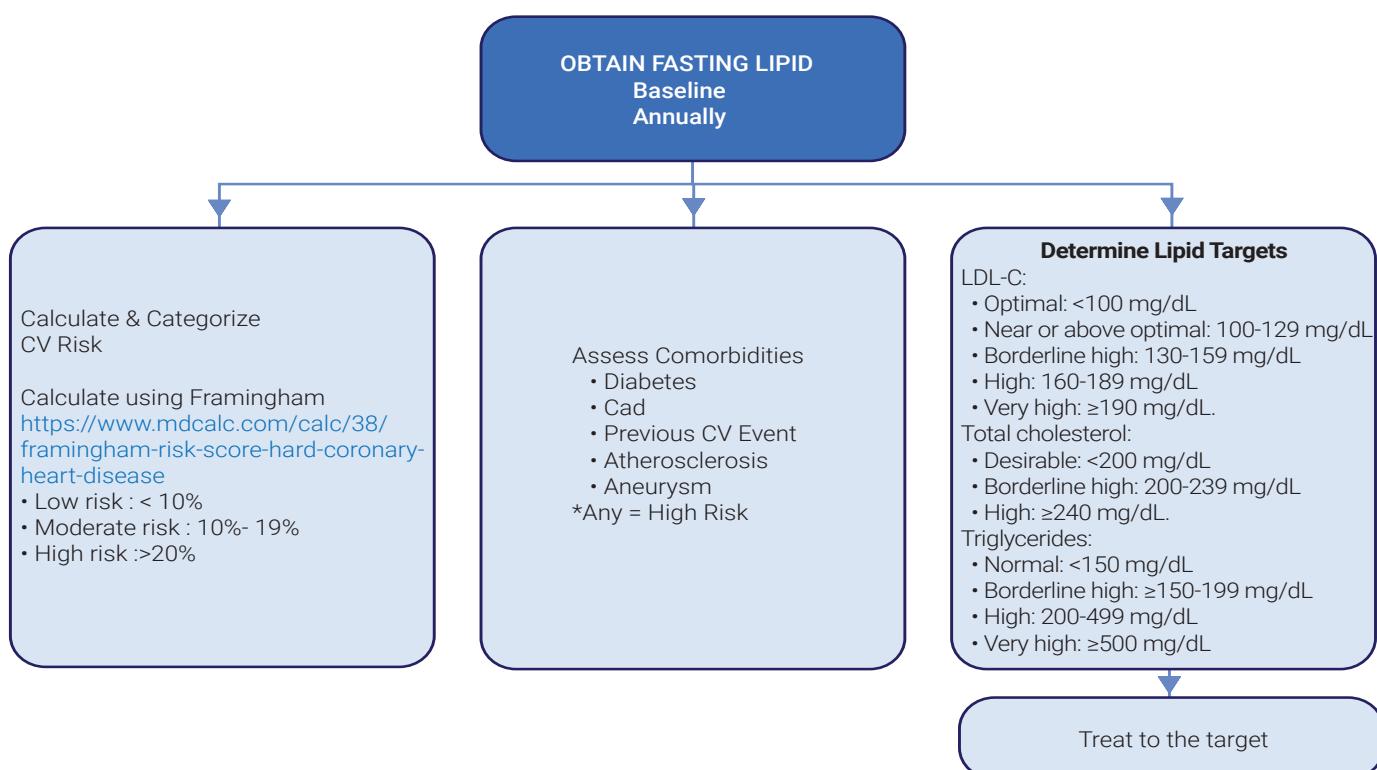
N.B: Ministry of Health recommends measuring glycemia yearly in people with ≥ 35 years

I.D Lipids Disorders



Screening guidelines for lipids disorders differ among experts. Cholesterol disorders screening is recommended in adult men aged ≥ 35 years, in women aged ≥ 40 years or menopausal and All adults with any of the following conditions regardless of age:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Diabetes • Cigarette smoking • Hypertension • Obesity (BMI) ≥ 27 kg/m² • Family History of Premature CAD • Clinical signs of Hyperlipidemia | <ul style="list-style-type: none"> • Evidence of Atherosclerosis • RA, SLE, Psoriasis • HIV infection on ARVs • EGFR < 60 mL/min/1.73m² • Erectile dysfunction • Screening children with a Family History of Hypercholesterolemia or chylomicronemia. |
|---|--|

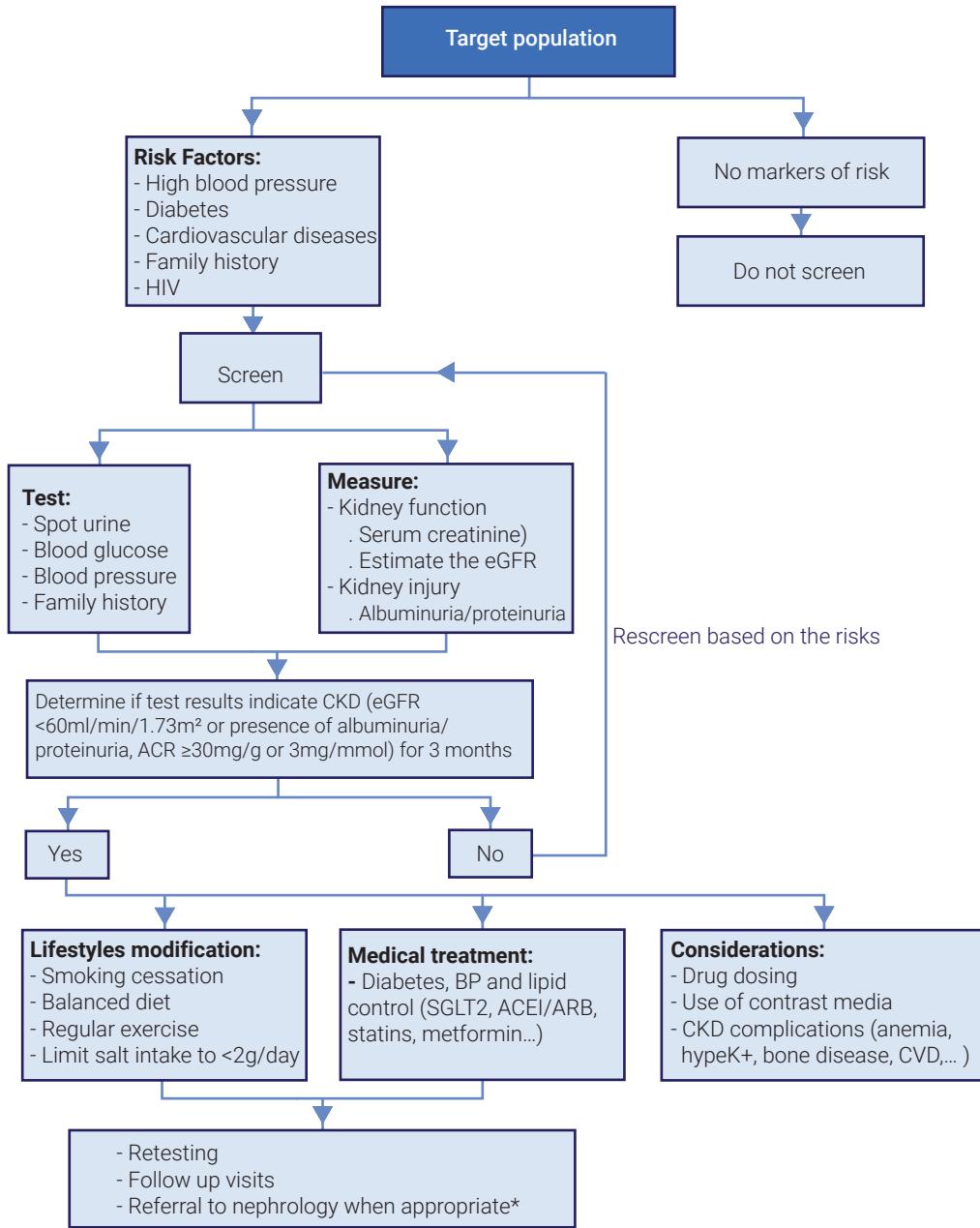


I.E Chronic Kidney Disease



Early kidney disease is usually asymptomatic.

Figure 4: Algorithm for Chronic Kidney Disease Screening.



Denotations

ABPM: Ambulatory Blood Pressure Monitoring, **ACEI/ARB:** Angiotensin Converting Enzyme Inhibitor/Angiotensin Receptor Blocker, **BMI:** Body Mass Index, **BP:** Blood Pressure, **DNA:** Deoxyribonucleic Acid, **ECG:** Electrocardiography, **eGFR:** estimated Glomerular Filtration Rate, **ESC/ESH:** European Society of Cardiology/European Society of Hypertension, **HBPM:** Home Blood Pressure Monitoring, **NCD:** Non -Communicable Disease, **PHE:** Periodic Health Examination, **SGLT2:** Sodium-Glucose Co-Transporter-2.

References

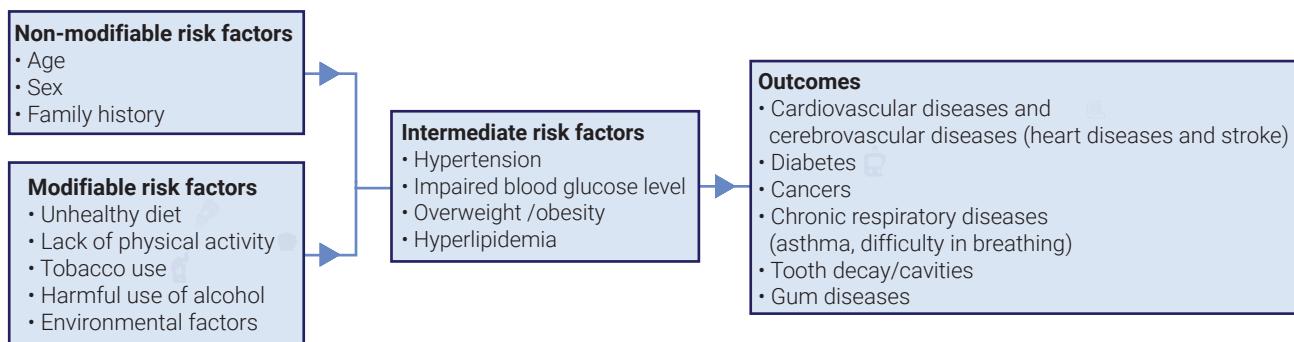
1. MacGregor GA, He FJ. Importance of controlling blood pressure. *Climacteric*. 2005;8(SUPPL. 3):13–8.
2. Krist AH, Davidson KW, Mangione CM, Cabana M, Caughey AB, Davis EM, et al. Screening for Hypertension in Adults: US Preventive Services Task Force Reaffirmation Recommendation Statement. *JAMA - J Am Med Assoc*. 2021;325(16):1650–6.
3. Burnier M. Treatment of hypertension in the elderly in 2017/2018 - what's new? *Expert Opin Pharmacother* [Internet]. 2019;20(15):1869–77. Available from: <https://doi.org/10.1080/14656566.2019.1638911>
4. Grossman DC, Bibbins-Domingo K, Curry SJ, Barry MJ, Davidson KW, Doubeni CA, et al. Screening for obesity in children and adolescents us preventive services task force recommendation statement. *JAMA - J Am Med Assoc*. 2017;317(23):2417–26.
5. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults -The Evidence Report. National Institutes of Health. *Obes Res*. 1998 Sep;6 Suppl 2:51S-209S.
6. Davidson KW, Barry MJ, Mangione CM, Cabana M, Caughey AB, Davis EM, et al. Screening for Prediabetes and Type 2 Diabetes: US Preventive Services Task Force Recommendation Statement. *JAMA - J Am Med Assoc*. 2021;326(8):736–43.
7. Native A, Indian A, American A, Glucose FP, Tolerance OG, Program P. Screen , Test , Refer. 2016;
8. Lin KW, Brown TR. Screening for lipid disorders in adults. *Am Fam Physician*. 2009;80(11):1281–2.
9. Curry SJ, Krist AH, Owens DK, Barry MJ, Caughey AB, Davidson KW, et al. Screening for cardiovascular disease risk with electrocardiography us preventive services task force recommendation statement. *JAMA - J Am Med Assoc*. 2018;319(22):2308–14.
10. Ckd Early Identification & Intervention Toolkit Isn-Kdigo Early Screening Booklet.

I.F Community health education & immunization

Introduction

Health checks, counseling, immunization, and evidence-based screening programs should be promoted and utilized in various settings according to risk assessments (age, gender, and risk factors).

NCDs Risk Factor



1. Smoking Cessation

- Smoking is a major single known risk factor for non-communicable diseases.
- WHO estimates that about 30% of the adult male global population smokes.

Methods of consuming tobacco products include inhalation.

- Smoking
- Chewing
- Sucking
- Snuff

Smoking contributes to:

- 71% of lung cancer cases
- 42% of chronic respiratory diseases nearly 10% of cardiovascular diseases and stroke
- 12% of male deaths
- 6% of female deaths in the world (references)

- Tobacco dependence must be assessed at the initiation of a smoking cessation program.
- The **Fagerstrom Questionnaire for Nicotine Dependence (FTND)** is a widely used short questionnaire.
- The information can be obtained in an interview, or the smokers can fill in the questionnaire themselves.
- The score ranges from 0–10 and the average of representative samples of smokers is usually in the range of 3–4 points.
- Ask time to the first cigarette in the morning and the number of cigarettes per day.

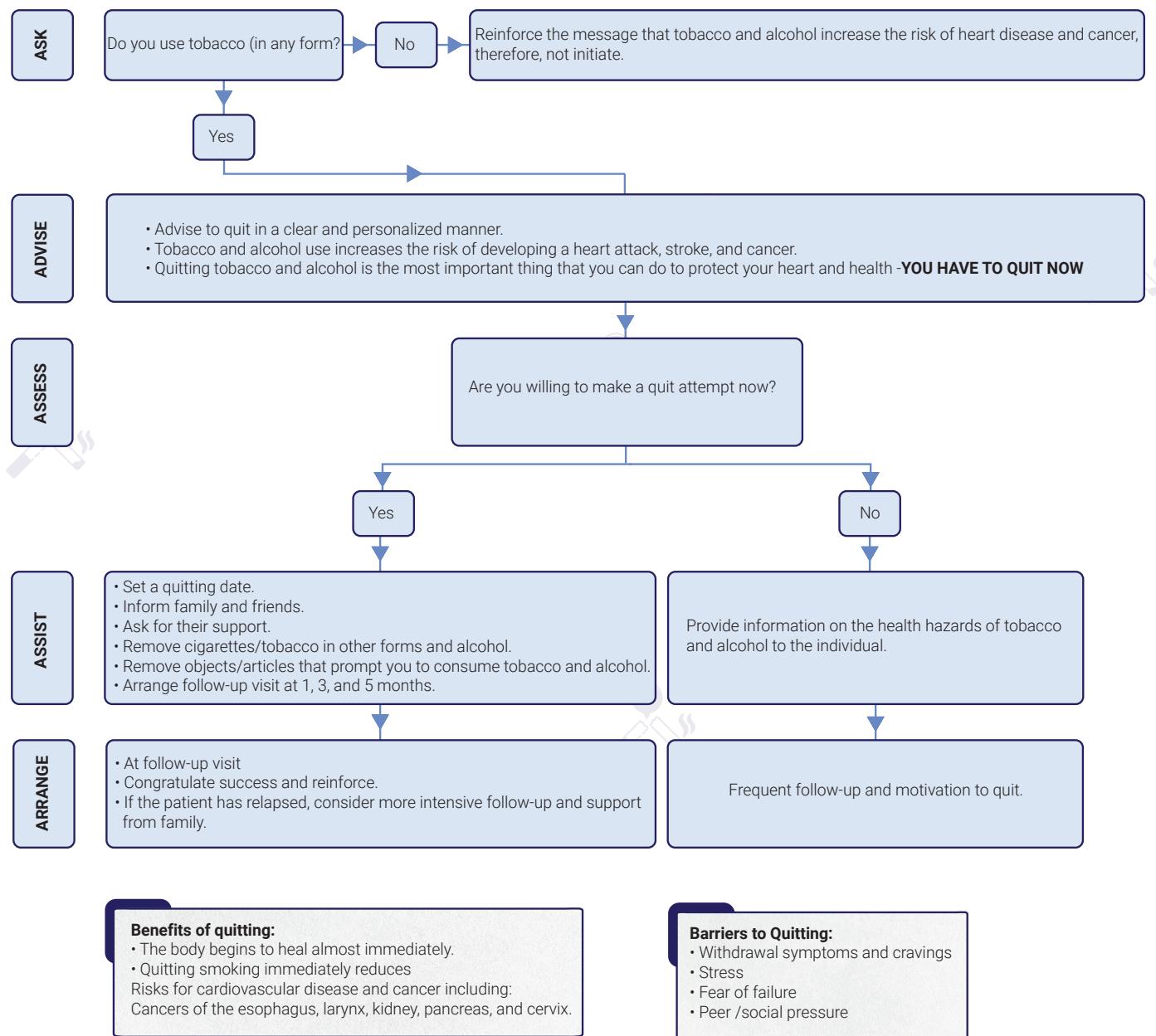
The Fagerstrom Test

How soon after you wake up do you smoke your first cigarette?	<ul style="list-style-type: none">After 60 minutes (0)31-60 minutes (1)6-30 minutes (2)Within 5 minutes (3)
Do you find it difficult to refrain from smoking in places where it is forbidden?	<ul style="list-style-type: none">No (0)Yes (1)
Which cigarette would you hate most to give up?	<ul style="list-style-type: none">The first in the morning (1)Any other (0)
How many cigarettes per day do you smoke?	<ul style="list-style-type: none">10 or less (0)11-20 (1)21-30 (2)31 or more (3)
Do you smoke more frequently during the first hours after awakening than during the rest of the day?	<ul style="list-style-type: none">No (0)Yes (1)
Do you smoke even if you are so ill that you are in bed most of the day?	<ul style="list-style-type: none">No (0)Yes (1)

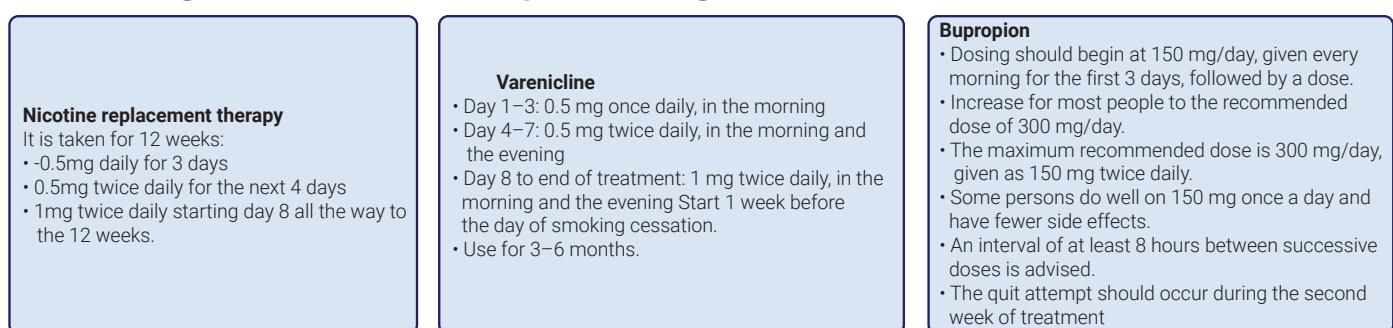
Interpretation of the score

SCORE	NICOTINE DEPENDENCE
0	No dependence
1-2	Low dependency
3-5	Moderately Dependent
6-8	Highly Dependent
9-10	Very Dependent

Figure 5: Protocol for counseling on tobacco and alcohol cessation using the 5 steps 5 A approach.



Pharmacological interventions to quit smoking.



2. Alcohol and Substance Use

Alcohol is a psychoactive substance with dependence-producing properties whose harmful use causes a large number of diseases, social and economic burdens in societies. Alcohol remains a leading risk factor for morbidity, disability, and mortality. Scientific evidence indicates alcohol is a component cause of more than 200 diseases and injury conditions.

Health Risks of Alcohol Use

- **Neuropsychiatric disorders (alcohol use disorders (AUD)):** withdrawal-induced seizure, depression, anxiety, and epilepsy.
- **Cardiovascular diseases:** ischemic heart diseases, stroke, hypertension, atrial fibrillation,
- **Gastrointestinal diseases:** liver cirrhosis, pancreatitis
- **Cancers:** oropharyngeal, laryngeal, esophageal, colon and rectum, liver, breast, and pancreatic cancer
- **Intentional injuries:** suicide and violence
- **Unintentional harm:** e.g.- fetal alcohol syndrome
- **Infectious diseases:** Pneumonia, tuberculosis
- **Sexually transmitted diseases including HIV.**

Calculation of units of Alcohol

Units of alcohol in a drink can be calculated using the formula: **Unit of alcohol = vol (in ml) X % alcohol/ 1000**

- Example: 1 bottle of 4.5% alc beer has $330 \times 4.5 / 1000 = 1.5$ units
- Local alcoholic beverages.
- Remember to calculate average alcohol consumption per occasion or weekly in units.

Prevention of Alcohol Use through Policy Intervention:

- Successful alcohol use prevention requires strong leadership, political commitment, inter-sectoral action, and sustained social awareness within the general population.

Terminologies and definitions

Alcohol dependence

Also known as alcoholism or alcohol dependence syndrome is defined as a cluster of behavioral, cognitive, and physiological phenomena that develop after repeated alcohol use and that typically include a strong desire to consume alcohol, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to alcohol use than to other activities and obligations, increased tolerance, and sometimes a physiological withdrawal state.

Heavy Episodic Drinking (HED)

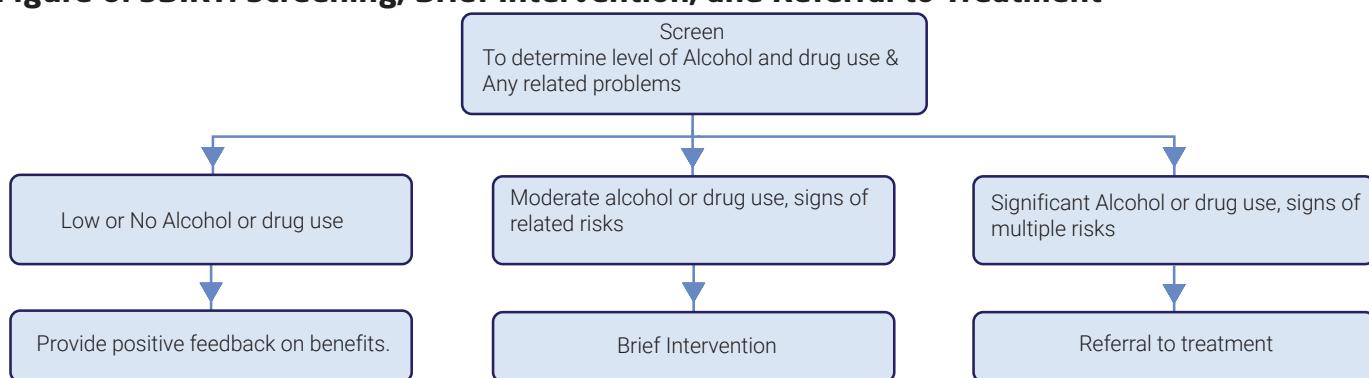
Defined as the consumption of 7.5 units of pure alcohol on at least one single occasion at least monthly. The volume of alcohol consumed on a single occasion is important for many acute consequences of drinking such as alcohol poisoning, injury, and violence, and is also important wherever intoxication is socially disapproved of. HED is associated with detrimental consequences even if the average level of alcohol consumption of the person concerned is relatively low.

Unrecorded alcohol

- Refers to alcohol that is not taxed in the country where it is consumed because it is usually produced, distributed, and sold outside the formal channels under government control.
- Unrecorded alcohol consumption in a country includes consumption of homemade or informally produced alcohol (legal or illegal), smuggled alcohol, alcohol intended for industrial or medical uses, and alcohol obtained through cross-border shopping (which is recorded in a different jurisdiction).
- Sometimes these alcoholic beverages are traditional drinks that are produced and consumed in the community or in homes. Home-made or informally produced alcoholic beverages are mostly fermented products made from sorghum, millet, maize, rice, wheat, or fruits.

Health Sector Response: Screening and Intervention for Alcohol

Figure 6: SBIRT: Screening, Brief Intervention, and Referral to Treatment



Screening for Harmful Alcohol Use

Ask: all adults coming to your clinic about alcohol use using the question 'Do you drink alcohol containing beverages?' If the answer to this question is yes, proceed to the next screening question.

1. Screening: NIAAA Single Screen Question for Alcohol

Q: How many times in the past year have you had X or more drinks in a day? (X= 5 or more for men and 4 or more for women)

2. For clients who screen positive for the Single Screen Question, use the WHO Alcohol Use Disorders Identification Test (AUDIT): Table below

Table 2: WHO Alcohol Use Disorders Identification Test (AUDIT)

1. How often do you have a drink containing alcohol?		6. How often during the last year have you needed a first drink in the morning to get yourself going after heavy drinking session?	
(0) Never [Skip to Qs 9-10] (1) Monthly or less (2) 2 to 4 times a month	(3) 2 to 3 times a week (4) 4 or more times a week	(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily
2. How many drinks containing alcohol do you have on a typical day when you are drinking?		7. How often during the last year have you had a feeling of guilt or remorse after drinking?	
(0) 1 or 2 (1) 3 or 4 (2) 5 or 6	(3) 7,8 , or 9 (4) 10 or more	(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily
3. How often do you have six or more drinks on one occasion?		8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?	
(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily	(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?		9. Have you or someone else been injured as a result of your drinking?	
(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily	(0) No (1) Yes but not in the last year (2) Yes, during the last year	
5. How often during the last year have you failed to do what was normally expected from you because of drinking?		10. Has a relative or friend or a doctor or another health worker has been concerned about your drinking or suggested you cut down?	
(0) Never (1) Less than monthly (2) Monthly	(3) Weekly (4) Daily or almost daily	(0) No (1) Yes but not in the last year (2) Yes, during the last year	
Record total of specific items here			

If the total is greater than the recommended cut-off, Consult user's manual

Scoring:

- 0 to 7 indicates low risk.
- 8 to 15 indicates increasing risk.
- 16 to 19 indicates higher risk,
- 20 or more indicates possible dependence.

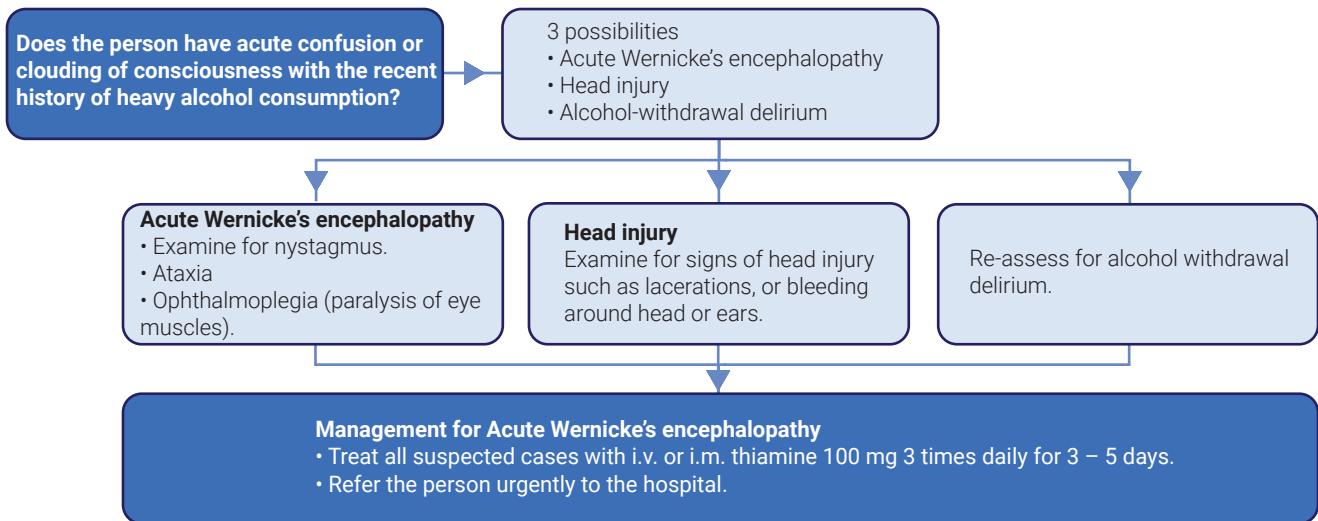
Brief Intervention (FRAMES is the acronym for brief intervention)

- **Feedback:** Given information about their substance use based on their risk assessment.
- **Responsibility:** Patients take personal responsibility to change their behaviors.
- **Advice:** Patients are advised in clear, respectful terms to decrease or abstain from substance use; encouraged to set goals to decrease substance use and to identify specific steps to reach those goals.
- **Menu** of options is discussed with the patient to achieve the desired goal.
- **Empathic** understanding of the patient's situation is necessary.
- **Self-efficacy:** Patients are encouraged to build on existing strengths to achieve desired goals.

Management of Alcohol-Induced Disorders

- Alcohol Intoxication

Look for: <ul style="list-style-type: none"> • Smell of alcohol on the breath • Slurred speech • Uninhibited behaviors 	Assess <ul style="list-style-type: none"> • Level of consciousness • Cognition and perception 	Management of alcohol intoxication: if the person has signs of severe intoxication (decreased level of consciousness) <ul style="list-style-type: none"> • Assess airway and breathing. • Put the person on their side to prevent aspiration. • Observe until the effect of alcohol has worn off • Refer to the hospital if necessary.
--	--	---



Alcohol withdrawal

Does the person have features of alcohol withdrawal? Alcohol withdrawal occurs following cessation of heavy alcohol consumption, typically between 6 hours and 6 days after the last drink. Look for the following features.

Table 3: Features of alcohol withdrawal

	Autonomic Hyperactivity	Gastrointestinal features	Cognitive and perceptual changes
Uncomplicated withdrawal features	<ul style="list-style-type: none"> • Sweating • Tachycardia • Hypertension • Tremors • Fever (generally lower than 38 Celsius) 	<ul style="list-style-type: none"> • Anorexia • Nausea • Vomiting • Dyspepsia • Diarrhea 	<ul style="list-style-type: none"> • Poor Concentration • Anxiety • Psychomotor agitation • Disturbed sleep / Vivid dreams
Severe withdrawal complications	Dehydration and electrolyte imbalances		<ul style="list-style-type: none"> • Seizures • Hallucinations or perceptual disturbances (Visual, Tactile, Auditory) • Delirium

3. Healthy diet

The diets people eat define their health status, while behaviors like physical activity and tobacco use modify the health outcome for the better or worse.

Increase in body mass index (BMI) is well known to increase the risk of heart disease, stroke, diabetes and certain type of cancers.

Due to increased urbanizations, consumptions of factory processed foods such as saturated fats, trans-fatty acids, products of animal protein, sugars and other energy dense foods has increased while level of physical activity on the contrary is slowing down

Causes and Health risks of obesity.

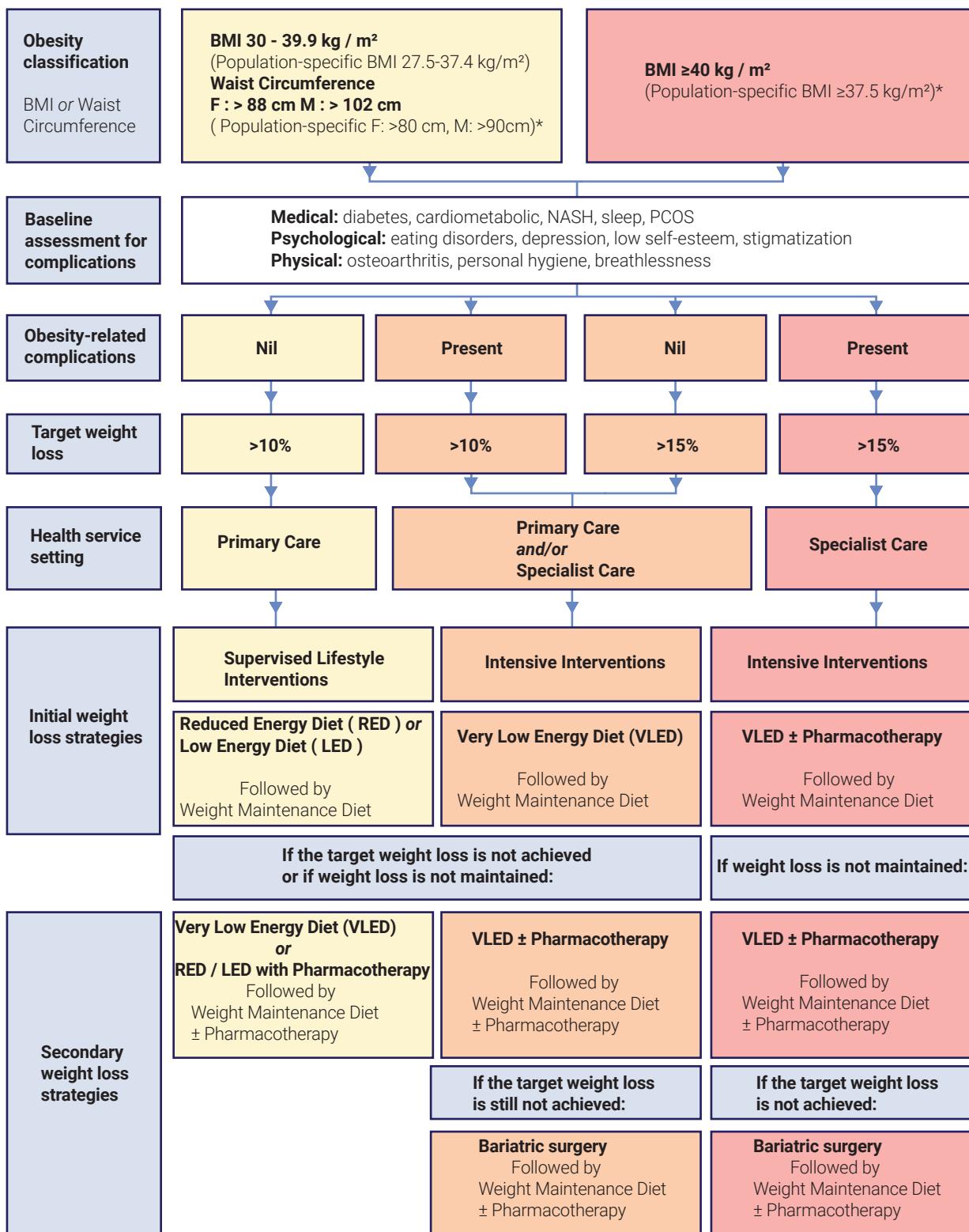
The main causes of becoming overweight/obese are:

- Family history (or tending towards becoming overweight/obese)
- Eating an unhealthy diet
- Lack of physical activity/low physical activity
- Presence of psychological factors- Depression, anxiety, stress, and low esteem can result in overeating.
- Hormonal imbalance in the body
- Over-feeding during infancy, childhood, and adolescence predisposes to overweight/ obesity during adulthood.

Being overweight/obese can result in health problems, such as:

- Cardiovascular diseases and metabolic diseases
- Musculoskeletal disorders (especially osteoarthritis – a disabling, degenerative disease of the joints)
- Sleep Disorder
- Cancer –cancer of breast, cervix, ovary, liver, gallbladder, kidney, colon, rectum and prostate
- Diseases of the joints
- Lung Disorders
- Formation of gallstones

Prevention & management of overweight and obesity

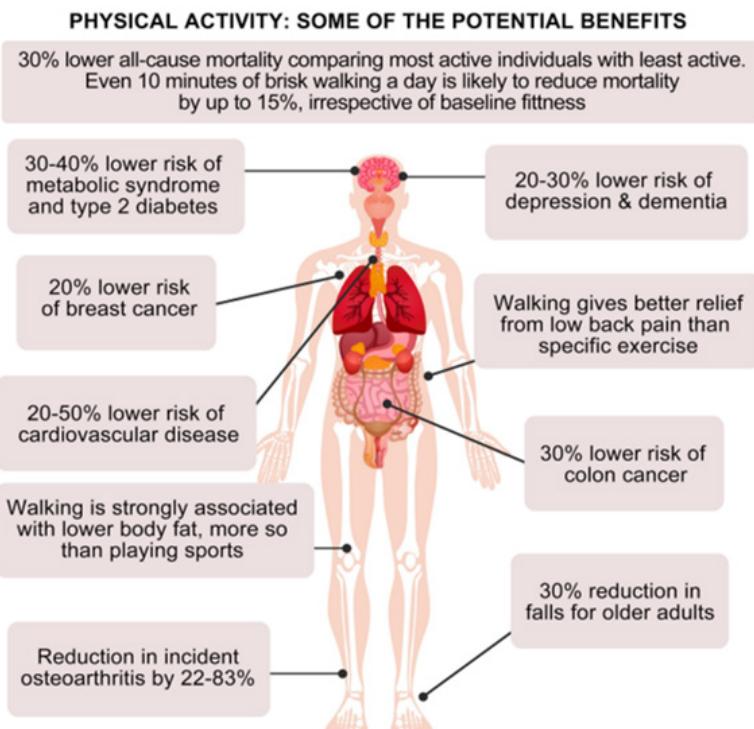


Dietary Counseling

DASH Eating plan		
The benefits: Lowers blood pressure and LDL "Bad" cholesterol		
 Eat This		 Limit This
 Vegetables		 Fatty meats
 Fruits		
 Whole grains		 Full-fat milk
 Fat - free or low - fat dairy		
 Fish		 Sugar-sweetened beverages
 Poultry		
 Beans		 Sweets
 Nuts & seeds		
 Vegetable oils		 Sodium intake

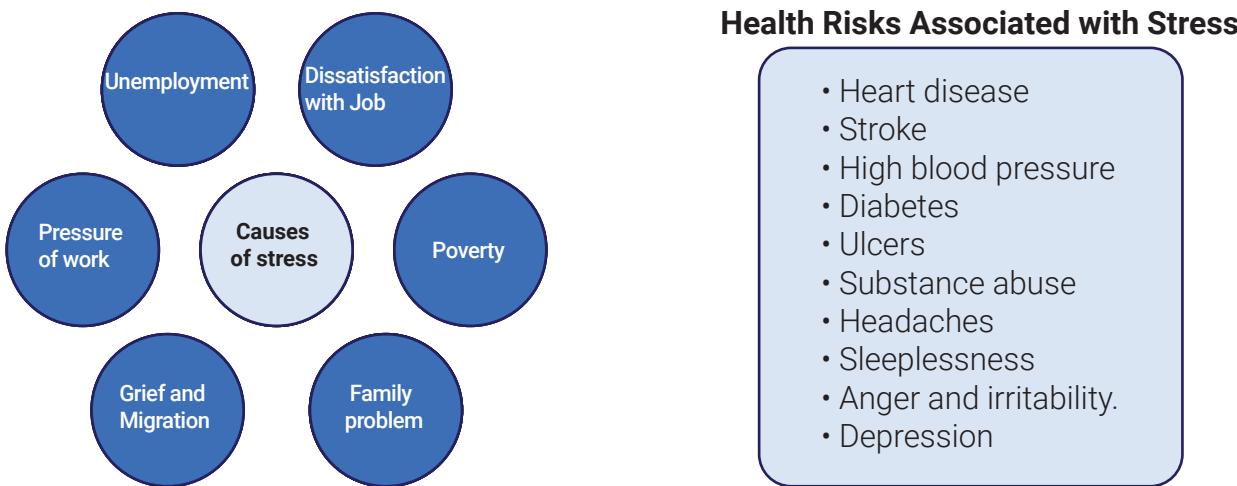
4. Physical activity

Aerobic exercises improve cardio-respiratory and muscular fitness, bone health, reduce the risk of NCDs and depression. Physical activity should be an integral part of excess weight therapy and weight maintenance. Initially, moderate levels of physical activity for 30 to 45 minutes at a time and 3 to 5 days per week or 150min /week should be encouraged.



5. Stress

Stress can affect the body (physical) or mind (mental) or both. Prolonged stress may affect the overall health of a person and affect her/his family as well.



Handling stress depends on an individual's personality. The negative effects of stress build up over a period of time. While we cannot totally control stressful situations in life, we can work towards taking simple steps as listed below that can help in maintaining health and improving the quality of life.



Denotations

BMI: Body Mass Index. **ED:** Erectile Dysfunction. **GORD:** Gastroesophageal Reflux Disease. **LED:** Low-Energy Diet. **LUTS:** Lower Urinary Tract symptoms. **NIAAA:** National Institute on Alcohol Abuse and Alcoholism. **NASH:** Non-Alcoholic Steatohepatitis. **OSA:** Obstructive Sleep Apnea. **PCOS:** Polycystic Ovary Syndrome. **RED:** Reduced Energy Diet. **SBIRT:** Screening, Brief Intervention, and Referral to Treatment. **VLED:** Very Low Energy diet. **WHO:** World Health Organization

References

1. A clinical practice guideline for treating tobacco use and dependence: 2008 update. American Journal of Preventive Medicine, 35, 158–176, <http://dx.doi.org/10.1016/j.amepre.2008.04.009>.
2. Physical Activity Guidelines Advisory Committee. 2018 physical activity guidelines Advisory Committee scientific report. Washington, DC: US Department of Health and Human Services, 2018



SECTION II: CARDIOLOGY

II.A Adult Cardiology

II.A.1 Hypertension (HTN)

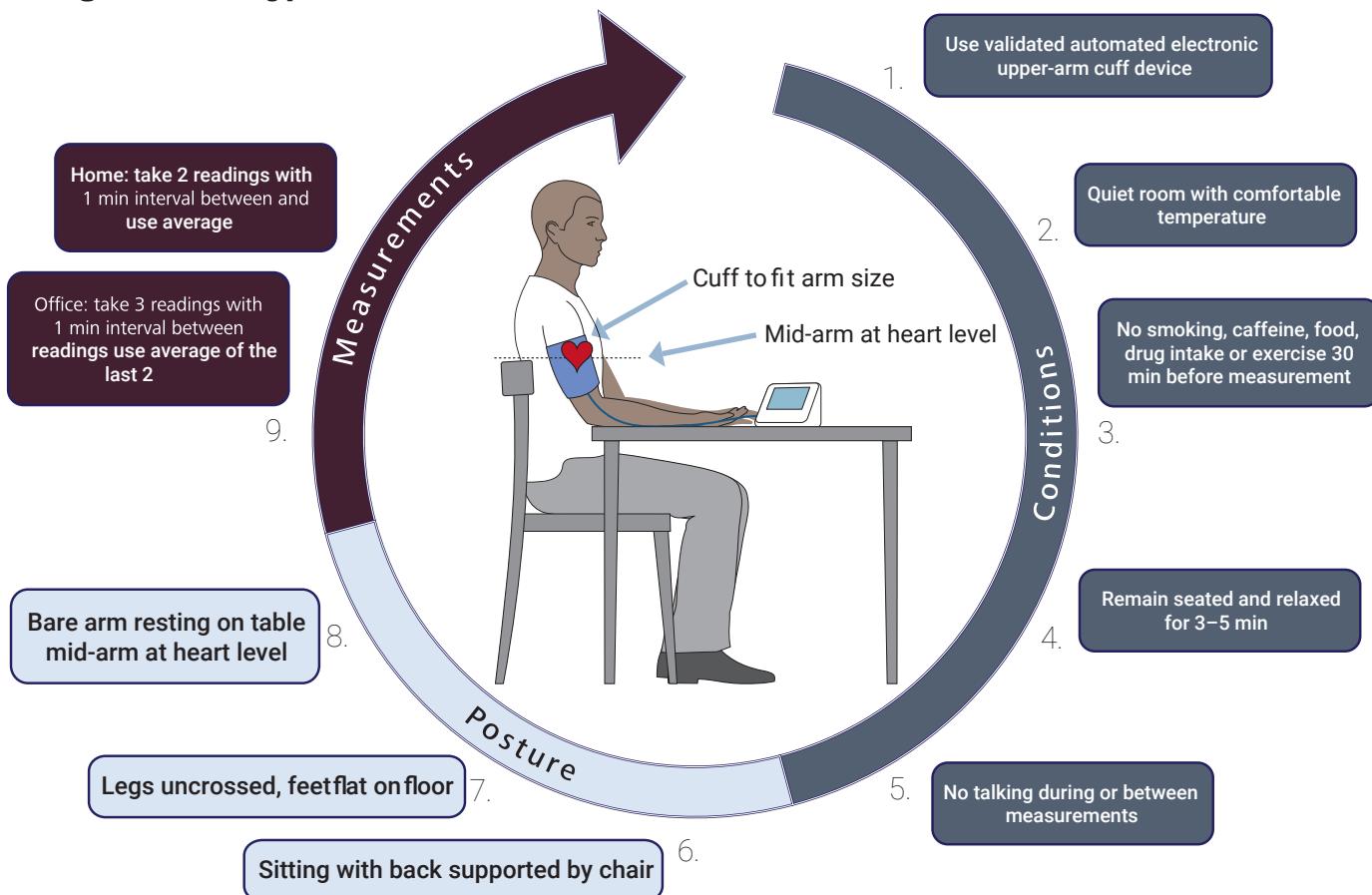
Definition: HTN is defined as systolic blood pressure (SBP) **≥140 mmHg** and/or a diastolic blood pressure (DBP) is **≥90 mmHg** following **repeated examination**. It is recommended to diagnose hypertension in 2 separate office visits (**within 4 weeks**), or unless BP **≥180/110 mmHg**, hypertension-related symptoms, or evidence of hypertension-mediated organ damage.

Classification of hypertension based on office/clinic blood pressure measurement

Table 3: Hypertension Measurements

Category	Systolic (mm Hg)	Diastolic (mmHg)
Normal BP	<130	and <85
High Normal BP	130-139	and/or 85-89
Grade 1 hypertension	140-159	and/or 90-99
Grade 2 hypertension	≥160	and/or ≥100
Grade 3 hypertension	≥180	and/or ≥110
Isolated Systolic Hypertension	≥140	and <90
Isolated Diastolic Hypertension	<140	and >90

Figure 7: Recommendations for BP measurements in the office and at home from ESH 2023 Management of Hypertension.



Adopted from ESH guidelines, 2023



Table 4: BP Patterns Based on Office and Out-of-Office Measurements

	Office/clinic BP/healthcare Setting	Home/non-healthcare setting
Normotensive	No hypertension	No hypertension
Sustained hypertension	Hypertension	Hypertension
Masked hypertension	No hypertension	Hypertension
White coat hypertension	Hypertension	No hypertension

Investigations

Health Center/Medicalized Health Center	District Hospital/PH/L2TH	Referral Hospital/UTH
Urea, creatinine, glycemia, HbA1c, Sodium, Potassium, Chloride, CBC, Albuminuria	<ul style="list-style-type: none"> • ECG • Echocardiogram* (by a trained clinician) • CXR • Urine chemistry& urine Albumin-Creatinine ratio • Urea creatinine, serum electrolytes • Lipid profile • Glycaemia, HbA1c, CBC • Fundus exam if indicated. 	Same as DH and Additional exams: Include transthoracic heart ultrasound by a cardiologist, stress ECG if indicated, abdominal ultrasound (focus on abdominal aorta and Kidney ultrasound including Doppler), Coronary Calcium score, Ankle-brachial index, Carotid artery ultrasound, ABPM measurement.

Other investigations according to suspected etiology or target organ damage (At DH, PH, RH, L2TH, and UTH)

Basic screening for HMOD	Aim
12 leads ECG	LVH, AV conduction abnormalities, arrhythmias, ischemia detection
Urine ACR and eGFR	Early detection of CKD
Echocardiography	Evaluation of structure, function, and detection of aortic aneurysm
Carotid Ultrasound	Evaluate for plaque, stenosis intima-media thickness
Abdominal ultrasound	Assess the Kidneys, check for Reno-vascular disease, abdominal aorta aneurysm
Coronary calcium score	Evaluate the extent of Coronary Calcium and predict CAD events.
Ankle Brachial Index	Evaluate the presence of Peripheral artery disease if <0.9
Fundoscopy	Evaluate for retinal microvascular changes
Cognitive function test	Screen for early stages of dementia
Brain Imaging (CT, MRI)	Evaluate Structural brain damage (once needed)

Management

Non Pharmaceutical management

Lifestyle modification:

- Smoking Cessation
- Control blood glucose and lipids
- DASH diet (refer to Periodic counseling and Health education protocol)
- Physical activity
 > Moderate-to-vigorous activity 150 min/week.



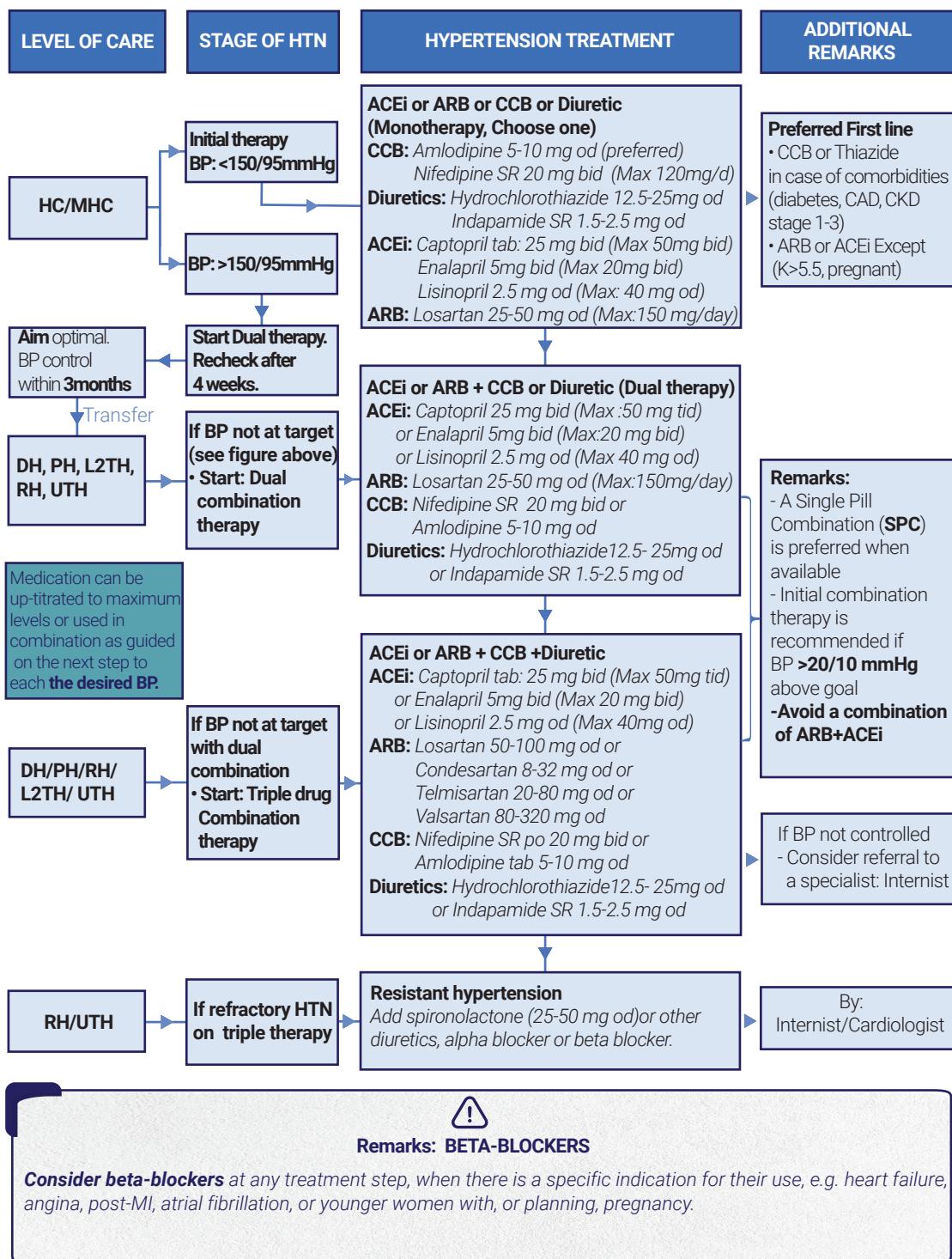
TARGET OFFICE/CLINIC BLOOD PRESSURE TREATMENT

Figure 8: Illustrating BP goal with relation to medical condition Source JNC8

Age Group	Office SBP treatment Target range (mmHg)					Office DBP treatment target range
	Hypertension	Diabetes	CKD	CAD	Stroke /TIA	
18-65 years	Target to 130 or lower if tolerated Not <120	Target to 130 or lower if tolerated Not <120	Target to <140 to 130 if tolerated	Target to 130 or lower if tolerated Not <120	Target to 130 or lower if tolerated Not <120	70-79
65-79 years	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	70-79
≥80 years	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	70-79
Office DBP treatment target range	70-79	70-79	70-79	70-79	70-79	



Figure 9: Algorithm for Management of Hypertension



Hypertension disorders in pregnancy

A. Pre-existing Hypertension: Hypertension preceding pregnancy or before 20 weeks of gestation and persisting 42 days Postpartum.

B. Gestational hypertension: develops **after 20** weeks gestation and usually resolves within **42 days** postpartum. It includes Pre-eclampsia and Transient Gestational hypertension.

C. Pre-existing Hypertension + superimposed Pre-eclampsia

D. Antenatal unclassified Hypertension: When BP is recorded at 20 weeks of gestation, reassessment is needed at or after 42days postpartum to reassess as Gestational hypertension or Pre-existing Hypertension



Recommendations for hypertensive disorders in pregnancy

- Antihypertensive drugs should be initiated when SBP ≥ 140 mmHg and or DBP ≥ 90 mmHg after a thorough assessment.
- For Any women with Pre-existing Hypertension (with or without superimposed preeclampsia) the target of BP control is $< 140/90$ mmHg
- For Any women with Gestational Hypertension (with or without pre-eclampsia) the target of BP control is $< 140/90$ mmHg
- Labetalol (per oral or IV) and Methyldopa are the **first-line** anti-hypertensive drugs
- Nifedipine extended-release (Max dose 120 mg/day) and Hydralazine is a recommended alternative
- Aspirin 100-150 mg od at bedtime is recommended for **weeks 11-35** in pregnant women with high and moderate pre-eclampsia risk.
- **BP $\geq 160/110$ mmHg** requires prompt medication and admission in pregnant women.

Hypertensive Emergency Management

Definition:

Hypertensive emergency: High blood pressure $> 180/120$ plus end-organ damage:

- » **Neurologic:** hypertensive encephalopathy, cerebral vascular accident/cerebral infarction, subarachnoid hemorrhage, intracranial hemorrhage
- » **Cardiovascular:** myocardial ischemia/infarction, acute left ventricular dysfunction, acute pulmonary edema, aortic dissection, unstable angina pectoris
- » **Other:** acute renal failure/insufficiency, retinopathy, eclampsia, microangiopathic hemolytic anemia.

Hypertensive urgency: SBP > 180 OR DBP > 120 without end-organ damage

Table 3: Diagnostic work-up for patients with hypertensive emergency

Table of diagnostic work-up for patients with hypertension emergency

Common tests for all potential causes

Fundoscopy, ECG, FBC, creatinine and electrolytes, urine albumin: creatinine ratio, urine microscopy for red cells and casts
Calculate eGFR, Pregnancy test for women with child bearing age

Specific tests by indication

Eg: Cardiac enzymes (troponin, CK-MB), echocardiography if chest pain
CXR (fluid overload)
CT chest-abdomen angiography if suspected aortic dissection
Renal ultrasound if suspected renal artery stenosis

Hypertensive emergency management

Goals:

- * Lower BP by 25% or to $< 180/120$ mmHg within 1 hour
- * Lower to $< 160/110$ mmHg for the next 2 to 6 hours

Table 4: Table of Hypertensive emergencies treatment choices with specific indications

Clinical presentation	Timeline and target BP	Firstline treatment	Alternative
Malignant HTN with or acute renal failure	Several hours Reduce MAP 20-50%	Labetalol Dose: 0.25-0.5 mg/kg iv bolus; 2-4 mg/min infusion until goal BP is reached. Thereafter 5-20 mg/h Nicardipine (if available) Dose: 5-15 mg/h IV infusion, starting dose 5 mg/h, increase every 15-30 min with 2.5 mg until goal BP, thereafter, decrease to 3 mg/h.	Nitroprusside



Hypertensive encephalopathy	Immediate reduce MAP 20-25%	Labetalol, Nicardipine (dose as above)	Nitroprusside
Acute ischemic stroke	Reduce BP if BP is $\geq 220/120$ mmHg or if thrombolysis is indicated and $BP > 185/110$	Labetalol, Nicardipine (dose as above)	
Acute hemorrhagic stroke	if systolic BP is 150-220 mm Hg, reduce SBP to 140-150 mm Hg within 1hr	Labetalol, Nicardipine (dose as above) Nitroprusside Dose: 0.25-5mcg/kg/min iv. infusion, increase by 8-10 mcg/kg/min every 5 min until goal BP.	Avoid hydralazine
ACS	Immediate reduce of SBP < 140 mmHg	Nitroglycerine Esmolol	Labetalol or Metoprolol
Acute aortic dissection	Immediate reduce of SBP < 120 mmHg	Nitroprusside (dose as above) Esmolol Dose: 0.5-1 mg/kg as iv bolus; 50-300 mcg/kg/min as iv. infusion	Labetalol, metoprolol
Eclampsia/severe pre-eclampsia/HELLP	Immediate reduce to SBP < 160 mmHg DBP < 105 mmHg	Labetalol/Nifedipine/Hydralazine/Nicardipine/ Magnesium sulfate Dose loading: 4-6g IV infusion over 15-20mins. Dose Maintenance: 1-2g/h as continuous infusion.	Consider delivery

!
Remarks

- **Hydralazine (Alternative treatment):** 10-20 mg IV
Caution: Once given can cause hypotensive side effect and can exacerbate angina symptoms and tachycardia, sometimes it's given with a B Blocker in order to counteract Sympathetic effect.
- **Nifedipine sublingual** is no longer recommended because of risk of hypotension and ischemia.

Denotations

ACEI: ACE inhibitor, **ARB:** Angiotensin receptor blocker, **ABI:** Ankle Brachial Index , **ACR:** Albumin creatinine ratio **BP:** blood pressure, **CAD:** coronary artery disease, **CCB:** Calcium channel blocker **CKD:** chronic kidney disease, **DBP:** diastolic blood pressure **DH:** district hospital, **ECG:** electrocardiograph **eGFR:** Estimated Glomerular filtration rate, **HC:** health center, **HELLP:** hemolysis, elevated liver enzymes low platelets, **HMOD:** Hypertension Mediated organ damage **HTN:** hypertension, **I.V:** Intravenous **L2TH:** level 2 teaching hospital, **MAP:** mean arterial pressure **MCG:** microgram **MHC:** medicalized health center, **PH:** provincial hospital, **RH:** referral hospital, **SBP:** systolic blood pressure **UTH:** University teaching hospital, **TIA:** Transient Ischemic attack

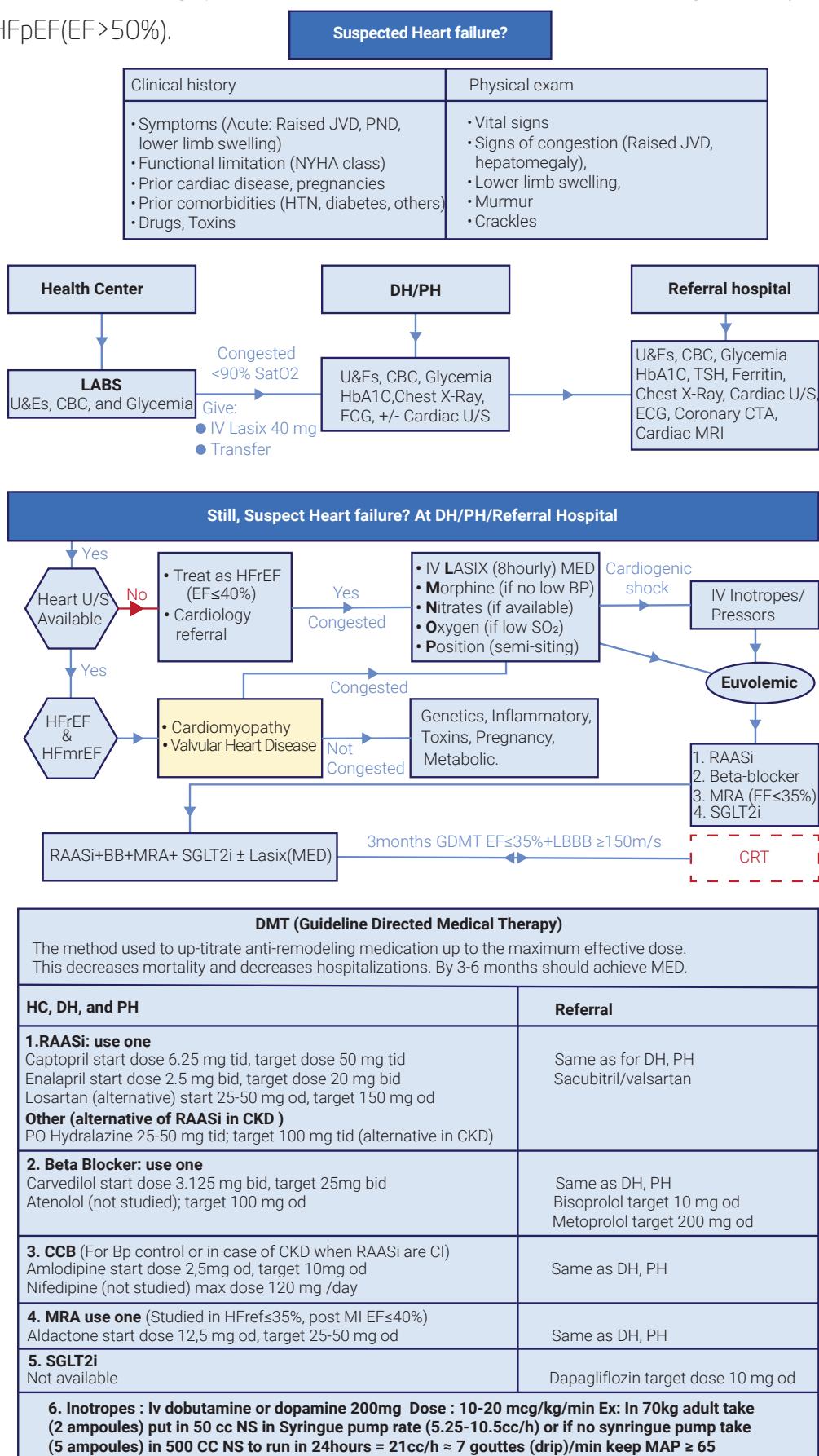
Reference

1. James PA, Ortiz E, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: (JNC8). JAMA. 2014 Feb 5;311(5):507-20.
2. European society of cardiology (Escardio)/European society of hypertension (ESH) guideline on management of hypertension 2023
3. American college of cardiology (AMA) guidelines on hypertension management, 2017
4. Rwanda standard of treatment guidelines, internal medicine volume I.
5. 7th edition of national essential medicines list for adult 2022 volume 14.
6. Cheung AK, Chang TI, Cushman WC, Furth SL, Hou FF, Ix JH, et al. KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease. Kidney Int. 2021 Mar 1;99(3):S1-87.



II.A.2 Heart Failure

Heart failure is a clinical syndrome arising from the inability of the heart to generate enough cardiac output to meet metabolic demands or the ability to do so on high filling pressure. The leading cause in Sub Saharan Africa is Hypertension, cardiomyopathies and RHD. HF is defined based on EF by HFrEF (EF≤40%), HFmrEF (EF41-49%), HFpEF(EF>50%).



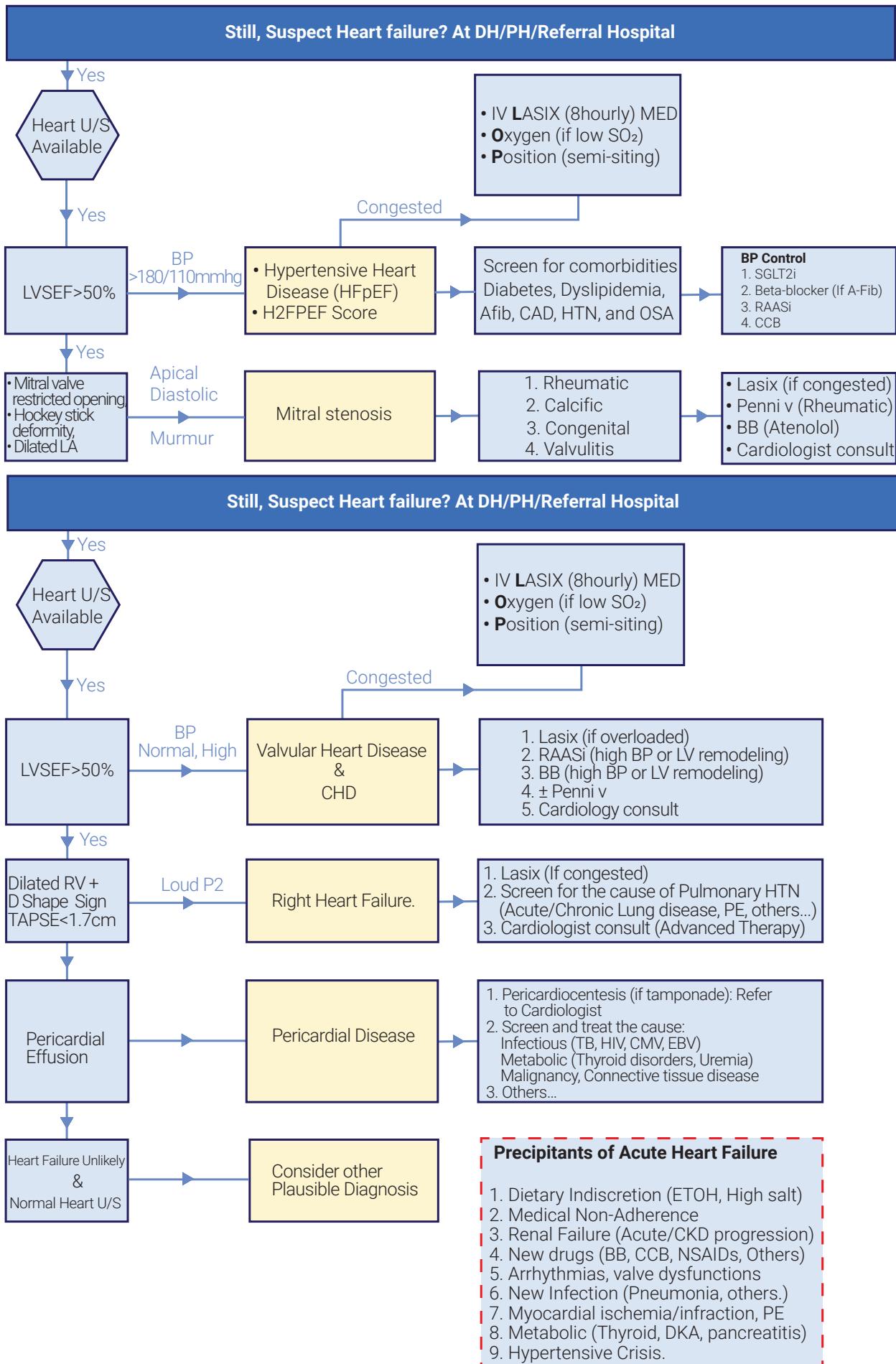


Figure 10: Algorithm for Heart Failure Diagnosis and Management



Denotations

ACEi: Angiotensin converting enzyme inhibitor, **A fib:** Atrial fibrillation, **ARB:** Angiotensin Receptor Blocker, **ARNi:** Angiotensin receptor neprylysin inhibitor, **BB:** Beta Blocker, **CAD:** Coronary artery disease, **CBC:** Complete blood count, **CCB:** calcium channel blocker, **CHD:** Congenital Heart disease, **CI:** Contra-indicated, **CRT:** Cardiac resynchronization therapy. **DKA:** Diabetes Ketoacidosis, **GDMT:** Guideline directed Medical therapy, **HB1AC:** Glycated hemoglobin, **HFrEF:** Heart failure with reduced ejection fraction, **HFmrEF:** Heart Failure with Mid-range ejection fraction , **HFpEF:** Heart failure with Preserved EF, **JVD:** Jugular venous distention, **LA:** Left atrium, **LV:** Left ventricle, **MED:** Maximum effective dose, **MRA:** Mineralocorticoid receptor antagonist, **NSAID:** Non steroid anti-inflammatory drugs, **NYHA:** New York Heart Association Functional classification, **OSA:** Obstructive sleep apnea, **PE:** Pulmonary embolism, **PND:** Paroxysmal Nocturnal dyspnea, **RAASi:** Renin Aldosterone angiotensin system inhibitor, **RHD:** Rheumatic Heart disease, **SGLT2i:** Sodium Glucose Transporter inhibitor, **SO2:** Oxygen Saturation, **TAPSE:** Trans annular plane systolic excursion.

References

1. Canadian cardiac society of cardiology, Heart failure management
2. AHA/ACC guideline on Heart failure management 2022
3. 7th edition of essential medicine list for medical adult 2022
4. Heart failure PIH cardiovascular training.
5. Rwanda Standard of treatment guidelines, Internal Medicine Volume1.



II.A.3 Acute Coronary Syndrome

ACS are caused by sudden reduction of blood supply to the heart. Each year 7 million people in the world are diagnosed with ACS. Risk factors include hypertension, diabetes, smoking, sedentary lifestyle, and dyslipidaemia. Prompt diagnosis and reperfusion therapy reduces its associated high mortality and morbidity.

Figure 11: Algorithm for Acute Coronary Syndromes (ACS) management at secondary care level.

Acute Coronary Syndromes (ACS) management at secondary care level.

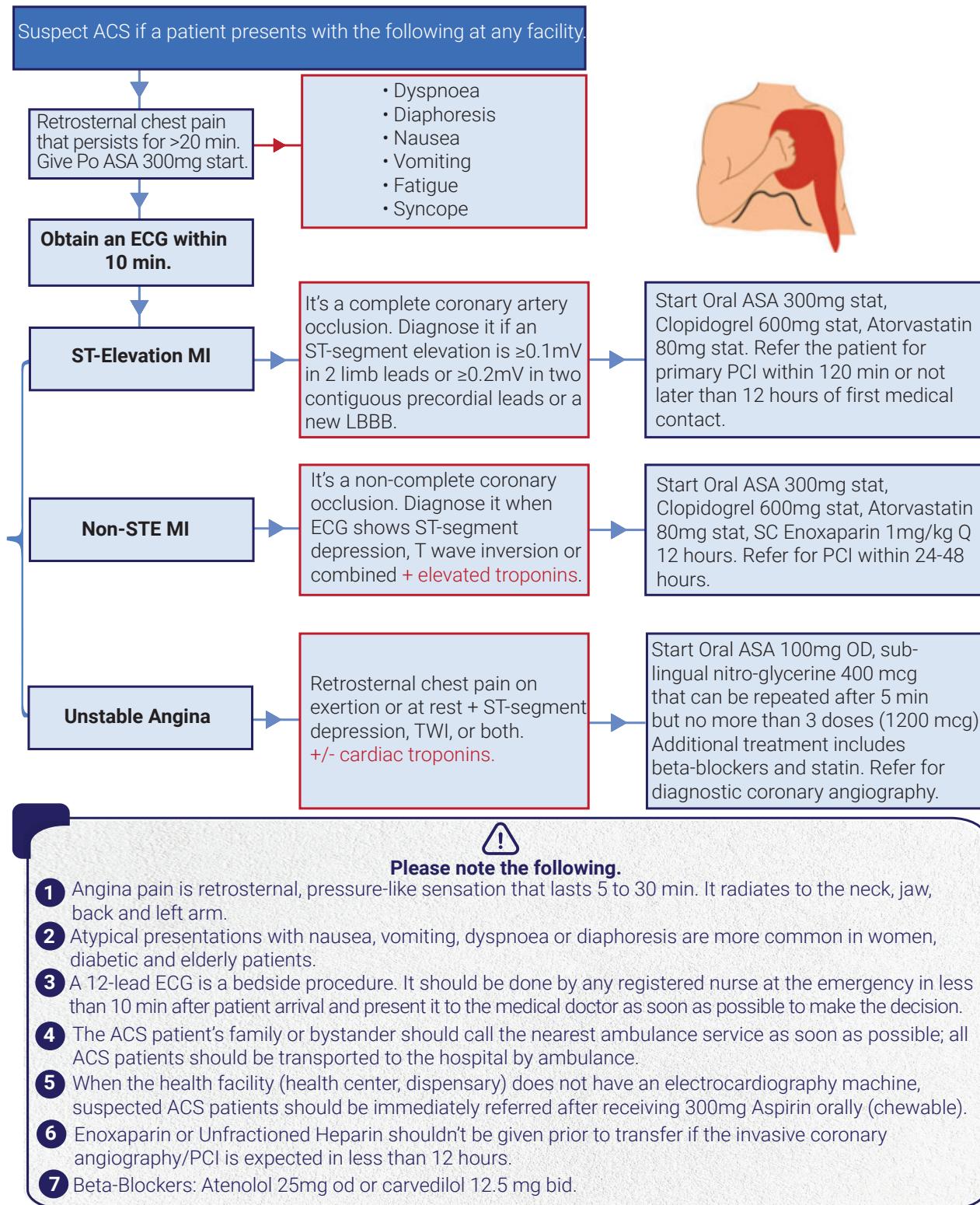
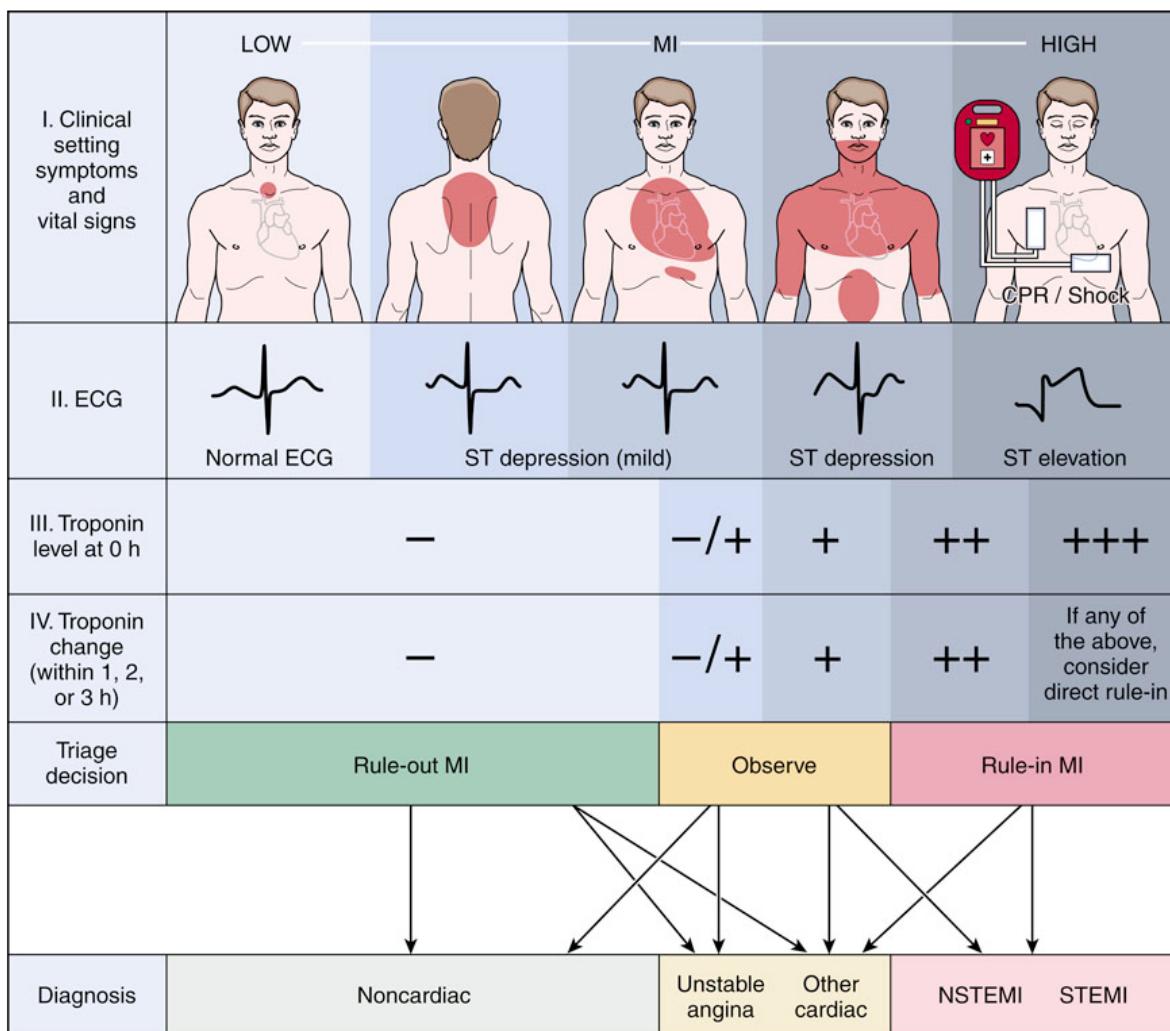




Figure 12: Visual illustration of ACS



Denotation

ACS: Acute Coronary Syndromes, **ASA:** Acetyl Salicylic Acid, **DH:** District Hospital, **ECG:** Electrocardiography, **HC:** Health Center, **MI:** Myocardial Infarction, **LBBB:** Left Bundle Branch Block, **PCI:** Percutaneous Coronary Intervention, **SC:** Subcutaneous, **TWI:** T-Wave Inversion

References

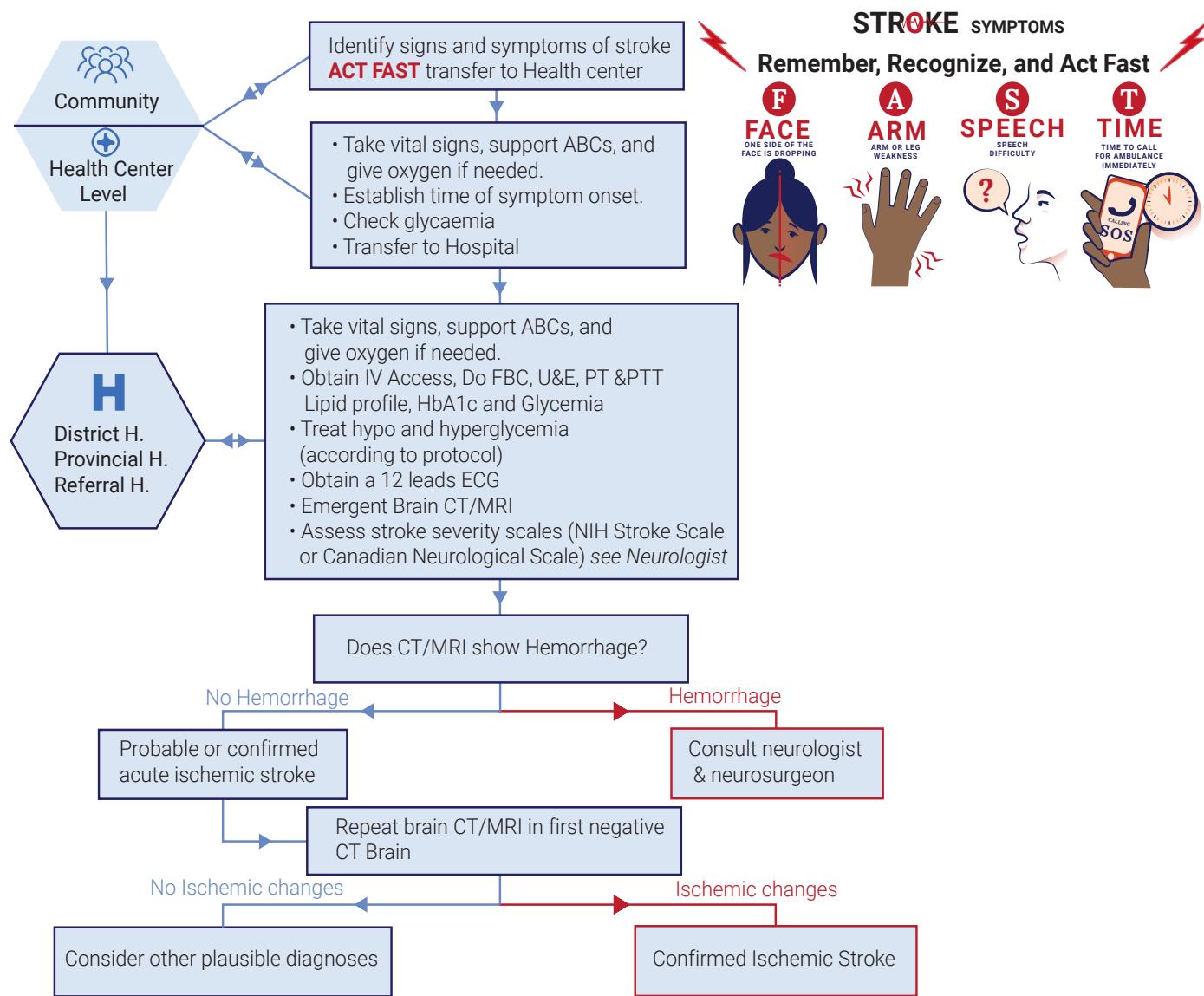
1. Bhatt DL, Lopes RD, Harrington RA. Diagnosis and Treatment of Acute Coronary Syndromes: A Review. *JAMA*. 2022;327(7):662-675. doi:10.1001/jama.2022.0358
2. Peter Libby; Braun Wald's Heart Disease 12th Edition
3. (Alexander & Rizzolo, 2023)



II.A.4 Stroke

Stroke is a clinical syndrome characterized by acute onset of focal cerebral loss of function lasting more than 24 hours or leading to death and no apparent cause rather than vascular origin. Hypertension, diabetes, dyslipidemia, presence of known cardiac disease (A fib, CHF, CAD.), Some medications (OCP, anti-coagulants), unhealthy lifestyles (Smoking, illicit drug uses, Alcohol abuse), age, sex, race and genetics remain some risk factors of Stroke. Its classified in both ischemic, hemorrhagic stroke and sub-arachnoid Hemorrhage.

Figure 13: Algorithm for Stroke Diagnosis and Management





Ischemic Stroke

Is the Patient a candidate for thrombolytic therapy?

Acute Stroke Management

01. IV Alteplase (0.9m/kg infused 10% bolus in 1min, rest over 1 hour) given if **3-4.5 hours** from Stroke symptoms onset.
No anticoagulation or anti-platelets within 24h of lysis.

02. IV labetalol (if **SBP ≥ 220 mmHg** or **DBP ≥ 120 mmHg** or active ischemic coronary heart disease, heart failure, aortic dissection, hypertensive encephalopathy, pre/eclampsia, 15 % lowering during the first 24 h and if lysis keep BP<180/105 mmHg)

03. Endovascular thrombectomy

04. Cerebral edema: HOB> 30°
Iv Mannitol, or Hemi-craniectomy.

Thrombolytic contra-indications

Absolute contra-indications	Relative contra-indications
<ol style="list-style-type: none"> 1. Any prior ICH 2. Intracranial neoplasm, aneurysm, AVM 3. Ischemic stroke within 3 months, 2 months' head/spine surgery 4. Bleeding diathesis 5. Suspected aortic dissection 6. Severe Uncontrolled HTN 	<ol style="list-style-type: none"> 1. Severe HTN SBP>180 or DBP>110 mmhg 2. Ischemic stroke >3months 3.CPR>10min, trauma/major surgery w/in 3weeks 4. Internal bleed within 2- 4 weeks, active PUD 5. Pregnancy 6. Non compressible vascular Punctures 7. Platelets <100 k, INR 1.7, PTT>40, glycemia<50 mg/dl

Secondary Stroke Prevention

01. Anti-platelets: AAS 100 mg OD

02. Anti-coagulants: consider in (A fib (CHA2DS2Vasc score), cardiac and paradoxical emboli (except endocarditis), hypercoagulable state) ex: NOACs (rivaroxaban 20mg OD) or Warfarin (INR **2-3**)

03. Statin: Atorvastatin 40-80mg od, or Rosuvastatin 20mg od (for life)

04. Blood pressure reduction
(24-48 h after stroke onset, goal blood pressure <130/<80 see *Hypertension protocol*)

05. Carotid re-vascularization

06. DVT prophylaxis: S/c Lovenox 40 mg od

07. Lifestyle modification Smoking cessation, management of obesity, diabetes, and metabolic syndrome, alcohol moderation/cessation.

Denotations

A fib: Atrial fibrillation, **ABC:** Airway, Breathing, Circulation, **CAD:** Coronary Artery Disease, **CBC:** Complete Blood Count, **CHF:** Congestive Heart Failure, **CPR:** Cardio-pulmonary Resuscitation, **HOB:** Head of Bed, **ICH:** Intracerebral Hemorrhage, **NIH stroke scale:** National Institute of Health stroke scale, **OCP:** Oral Contraceptive Pills, **U&E:** Renal function test & Electrolytes.

References

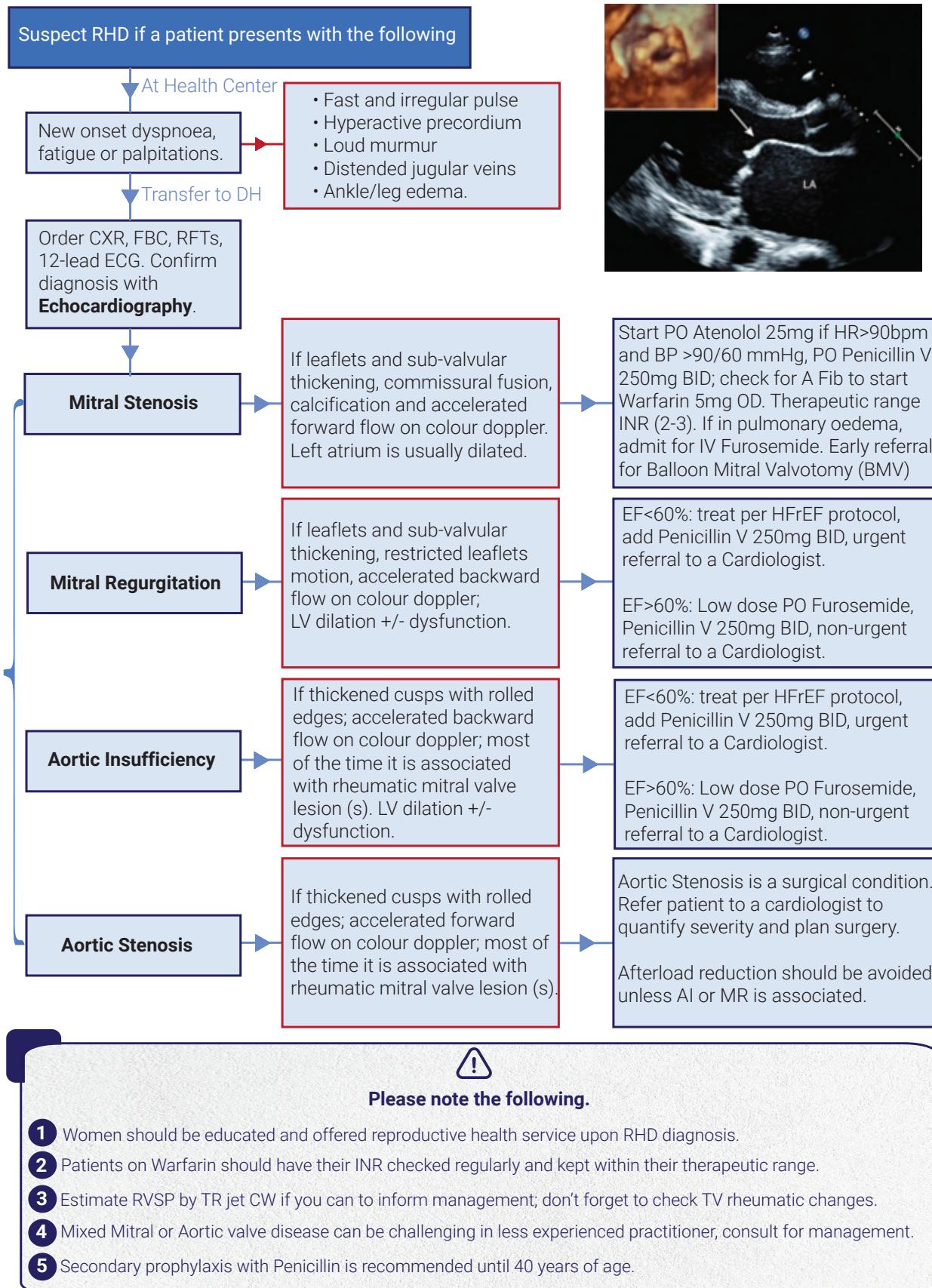
1. 2021 Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack: A Guideline from the American Heart Association/American Stroke Association
2. Adult stroke ACLS algorithm
3. ACT FAST stroke screening algorithm



II.A.5 Rheumatic Heart Diseases

RHD is defined as valvular damage caused by abnormal immune response to GAS infection in childhood. Globally, it causes 300,000 deaths annually. Early diagnosis is key to reducing related morbidity and mortality. Valves affected are Mitral, Aortic, Tricuspid and rarely Pulmonic.

Figure 14: Algorithm for Management of Rheumatic Heart Disease (RHD) at Secondary Care Level.





Denotations

AI: Aortic Insufficiency, **BID:** Twice a Day, **CXR:** Chest X-Ray, **DH:** District Hospital, **ECG:** Electrocardiography, **EF:** Ejection Fraction (of the Left Ventricle), **FBC:** Full Blood Count, **GAS:** Group A Streptococci, **HC:** Health center, **HFrEF:** Heart Failure with Reduced Ejection Fraction, **INR:** International Normalized Ratio, **MR:** Mitral Regurgitation, **OD:** Once a Day, **RHD:** Rheumatic Heart Disease, **RVSP:** Right Ventricle Systolic Pressure, **TR:** Tricuspid Regurgitation.

References

1. (Connolly et al., 2022)
2. (Reméanyi et al., 2012)
3. (Kumar et al., 2020)
4. (Marijon et al., n.d.)
5. (Beaton et al., 2012)
6. Scott D. Solomon. Essential Echocardiography: a companion to Braunwald's Heart Disease



II.A.6 Anticoagulation Strategies for Patients with Prosthetic Valves

Background

Factors for valve selection are based on the patient's:

- * Life expectancy
- * Lifestyle
- * Environmental factors
- * Bleeding and thromboembolic risks related to anticoagulation,
- * Potential for surgical or transcatheter reintervention
- * Informed patient preference.

Follow-up

It is paramount to identify the changes in clinical status, management of antithrombotic therapy, monitor complications, and valve function, and provide patient education.

- * Education on oral hygiene, antibiotic prophylaxis for stomatology procedures, education on danger signs not hearing audible clicks, fever, bleeding tendencies, and stroke signs.
- * A baseline post-operative trans-thoracic echocardiography is mandatory for evaluation of valve hemodynamics and ventricular function or earlier if needed.
- * For Patients with a prosthetic valve, with signs of valve dysfunction a repeat TTE, is recommended, if nonrevealing consider TEE, Cardiac CT, fluoroscopy
- * Periodic echocardiography is needed in prosthetic valves with the presence of systolic and diastolic dysfunction or another valve dysfunction.

Anti-Thrombotic Management.

Peri-operative Anti-Thrombotic Therapy Recommendation

- * MHVs require lifelong treatment with VKA guided by the INR.
- * NOACs currently have no role in patients with MHVs.
- * Treatment with VKA should be started on the first postoperative day in combination with bridging therapy. (*With therapeutic doses of either unfractionated heparin (UFH) or off-label use of low-molecular-weight heparin (LMWH), e.g.: lovenox until therapeutic INR is achieved.*)
- * Once a stable therapeutic INR is reached for 24 h, bridging (with UFH/LMWH) can be discontinued.

Postoperative Antithrombotic therapy

Valve position	INR target (Without additional risk factors)	INR target +any Prior thromboembolism Afib, Rheumatic Mitral stenosis, LVEF <35%	Use of aspirin 75mg od. Therapy	Valve types
Aortic or pulmonic	2.5 (2-3) low risk	3 (2.5-3.5) Low risk	No (except on X-valve)	On X-valve, low & High-risk valve
	3 (2.5-3.5) high risk	3.5 (3-4) High risk		
Mitral or tricuspid	3 (2.5-3.5) low risk	3 (2.5-3.5) Low risk	Not routinely	Low & high-risk valves
	3.5 (3-4) High risk	3.5 (3-4) High risk		

On X-valve when no other risk factor, target INR **2.5** for 3 months, then target **1.5-2**
Low-risk valve (Carbomedics, Medtronic Hall, Saint Jude, Sorin bicarbonate), **High-risk** (Starr Ed-wards & tilting disc valves)

- Once INR is therapeutic on stable maintenance VKA, INR should be checked monthly.
- Twice /month, INR checks when X aortic valve is used.
- Once INR is below target, dose up-titrating is mandatory, and checkup every (24-72 hours) until you reach the target.



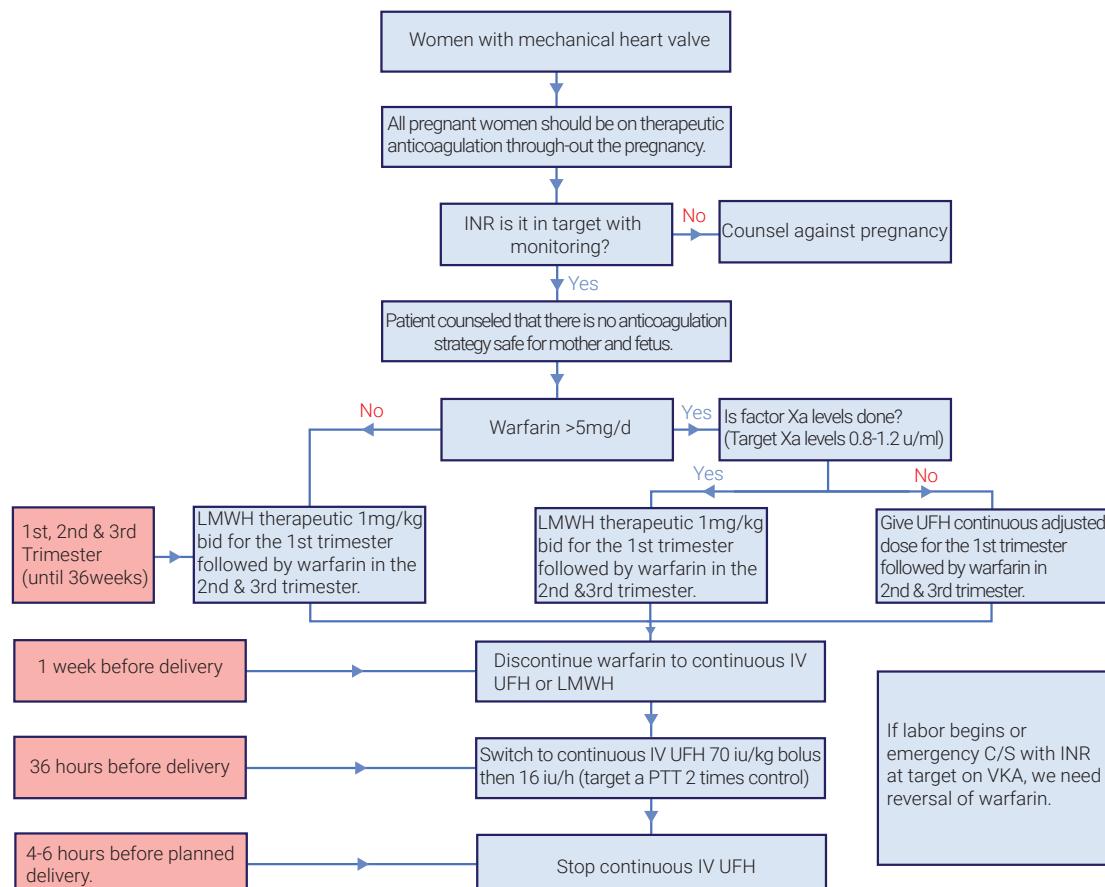
- When **INR>5 and <10** but no bleeding, hold VKA and monitor control after 2-3 days, resume VKA once the target is reached.
- When **INR>10**, but no bleeding, hold VKA \pm **oral vitamin K 1-2.5 mg start** (preferred), or IV Vitamin K 1mg-2.5 mg and resume when INR is the target, monitor INR every 2-3 days for 2 weeks.
- In case of major bleeding on warfarin on MHV, hold warfarin and give 4-factor PCC or FFP (when PCC is not available).
- For minor procedures (dental, cataract, skin incisions), after a multidisciplinary approach and labs, VKA are usually not held.
- For Major elective surgeries, hold warfarin with target INR <1.5, and bridge with therapeutic LMWH or UFH

Use of anticoagulation during pregnancy with prosthetic valves

Counseling is recommended for every woman of reproductive age with MHVs and should be referred and performed by a multidisciplinary team, including an obstetrician, cardiologist, and possibly a hematologist if available. Counseling should include:

1. Detailed discussion regarding risks associated with pregnancy and advantages and disadvantages associated with different anticoagulation options.
2. Ensuring that the women are aware of the teratogenic effects of warfarin and therefore the importance of early diagnosis of pregnancy in the first 6 weeks.
3. The management of the regimen that is chosen should be planned in detail.
4. Women with mechanical heart valves considering pregnancy should be counseled that pregnancy is high risk and that there is no anticoagulation strategy that is consistently safe for the mother and fetus.

Figure 15: Anticoagulation in pregnant women with Mechanical Heart valve.





Denotation

INR: International Normalized ratio, **LMWH:** Low molecular weight heparin, **LvsEF:** Left ventricular Ejection Fraction, **MHVs:** Mechanical heart valves, **TTE:** Trans-thoracic echocardiography, **TEE:** Trans-esophageal echocardiography, **UFH:** Unfractionated heparin, **VKA:** Vitamin K antagonists.

References

1. 2021 ESC/EACTS (European Society of Cardiology/European Association of Cardiothoracic Surgeons) Guidelines for the management of valvular heart disease

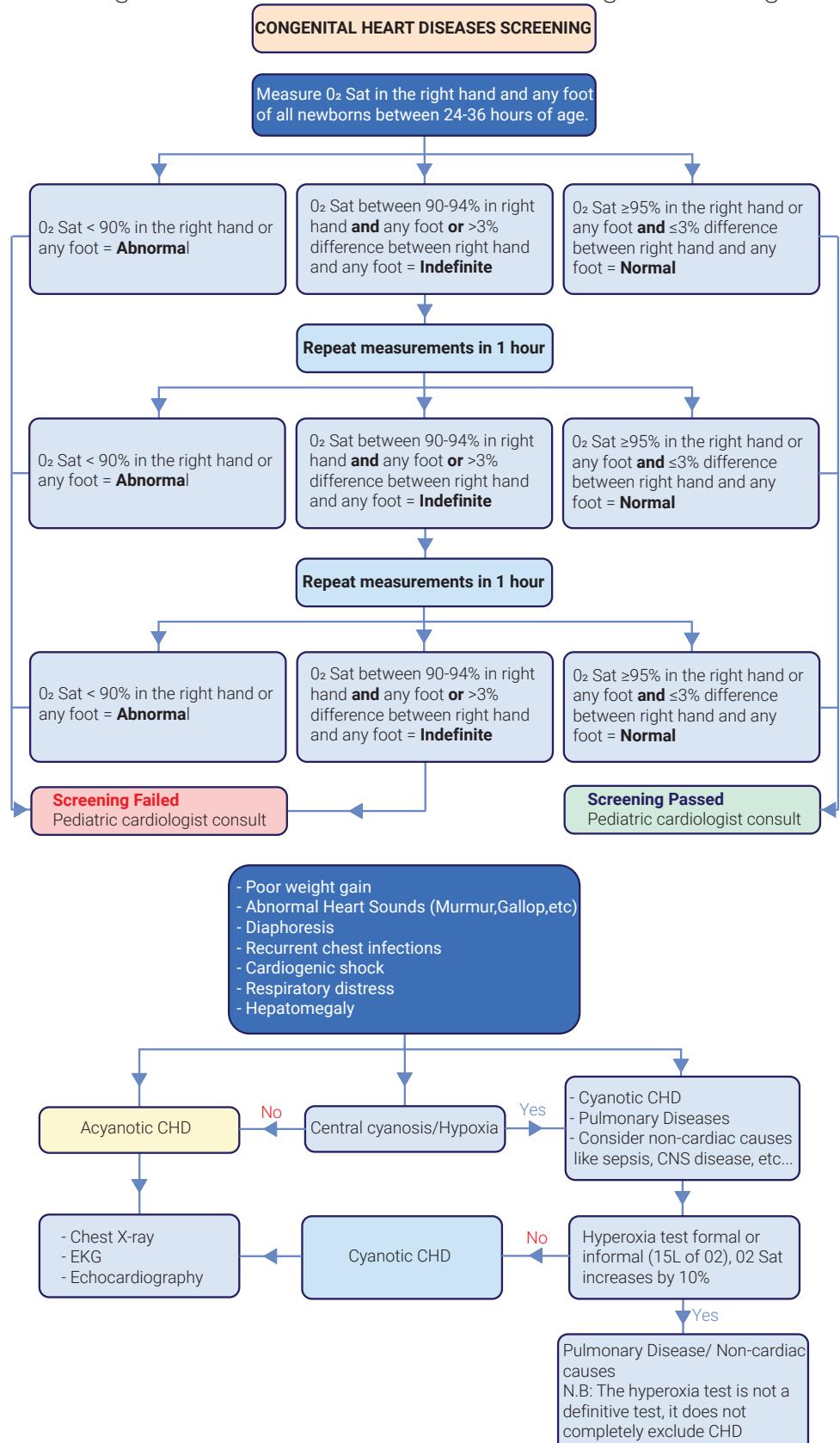


II.B Pediatric Cardiology

II.B.1 Congenital Heart Diseases

Structural abnormalities of the heart or great vessels present at birth. They fall into 2 major groups: Acyanotic and cyanotic.

Summarized below is the algorithm with the initial evaluation and management of congenital heart diseases.



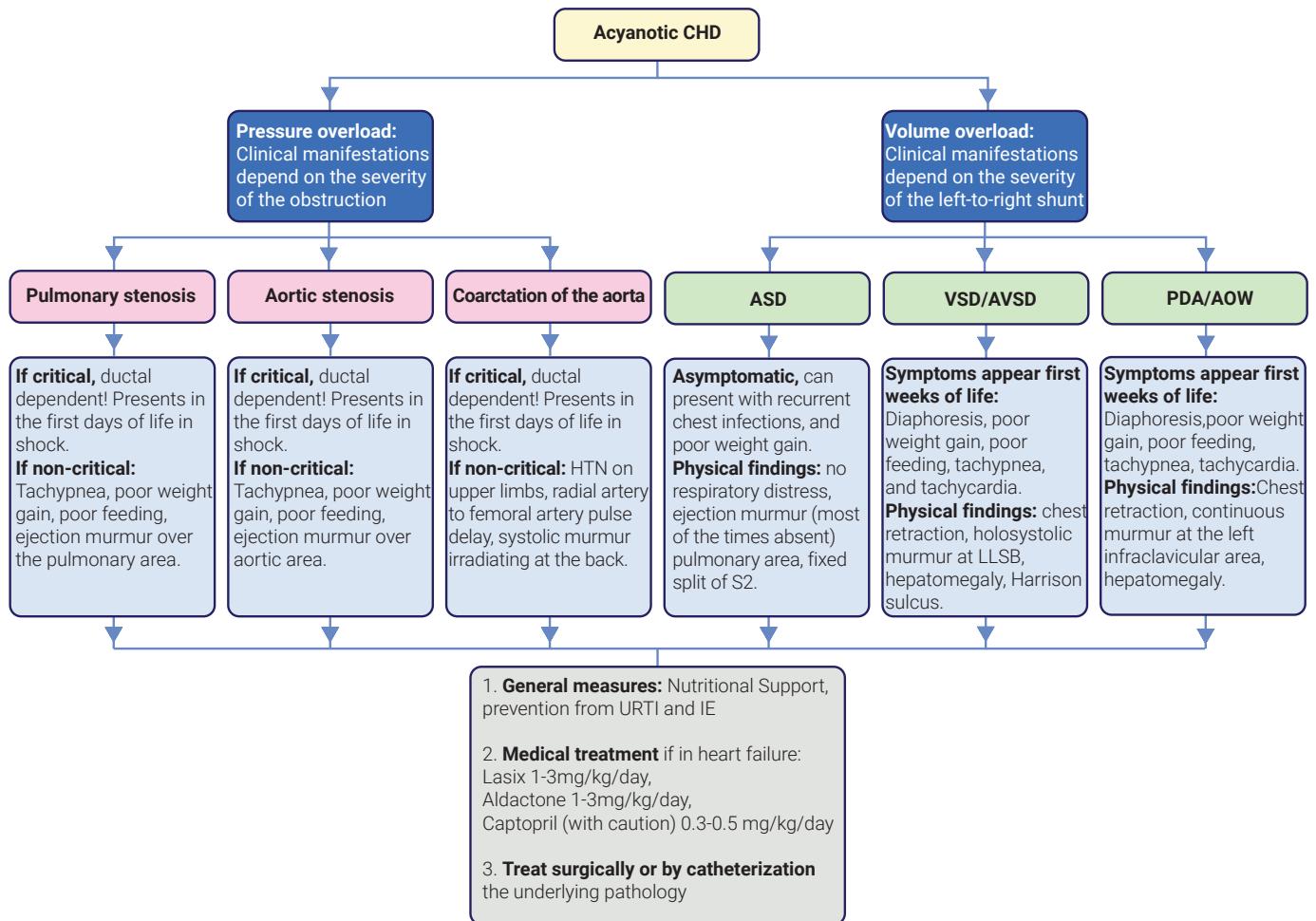
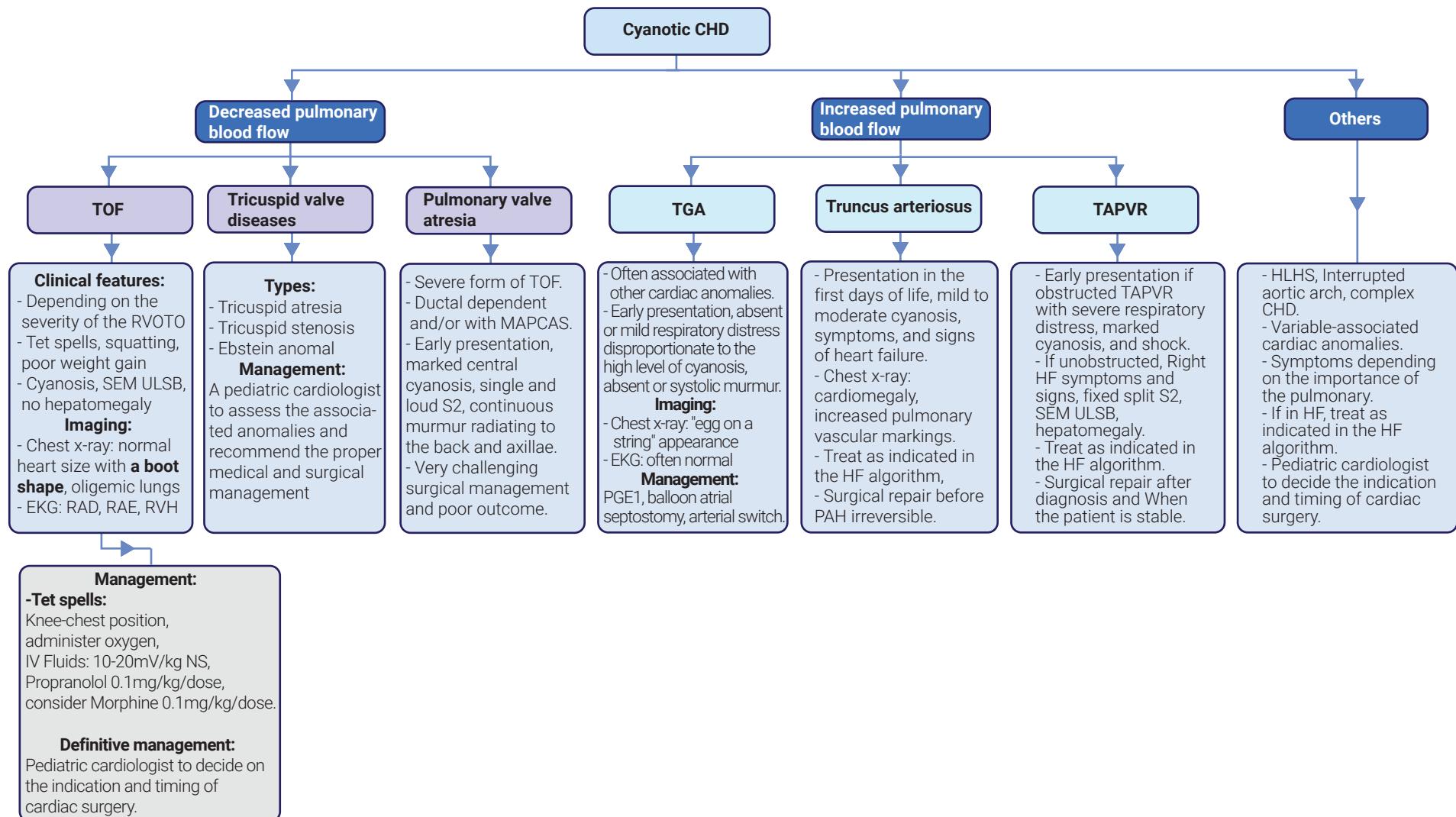




Figure 16: Algorithm with the initial evaluation and management of congenital heart diseases.





Denotations

ASD: Atrial Septal Defect, **APW:** Aorto pulmonary window, **CHD:** Congenital Heart Disease, **PDA:** Patent Ductus Arteriosus; **TOF:** Tetralogy of Fallot; **TGA:** Transposition of Great arteries; **TAPVR:** Total anomalous pulmonary venous return, **VSD:** Ventricular Septal Defect.

References

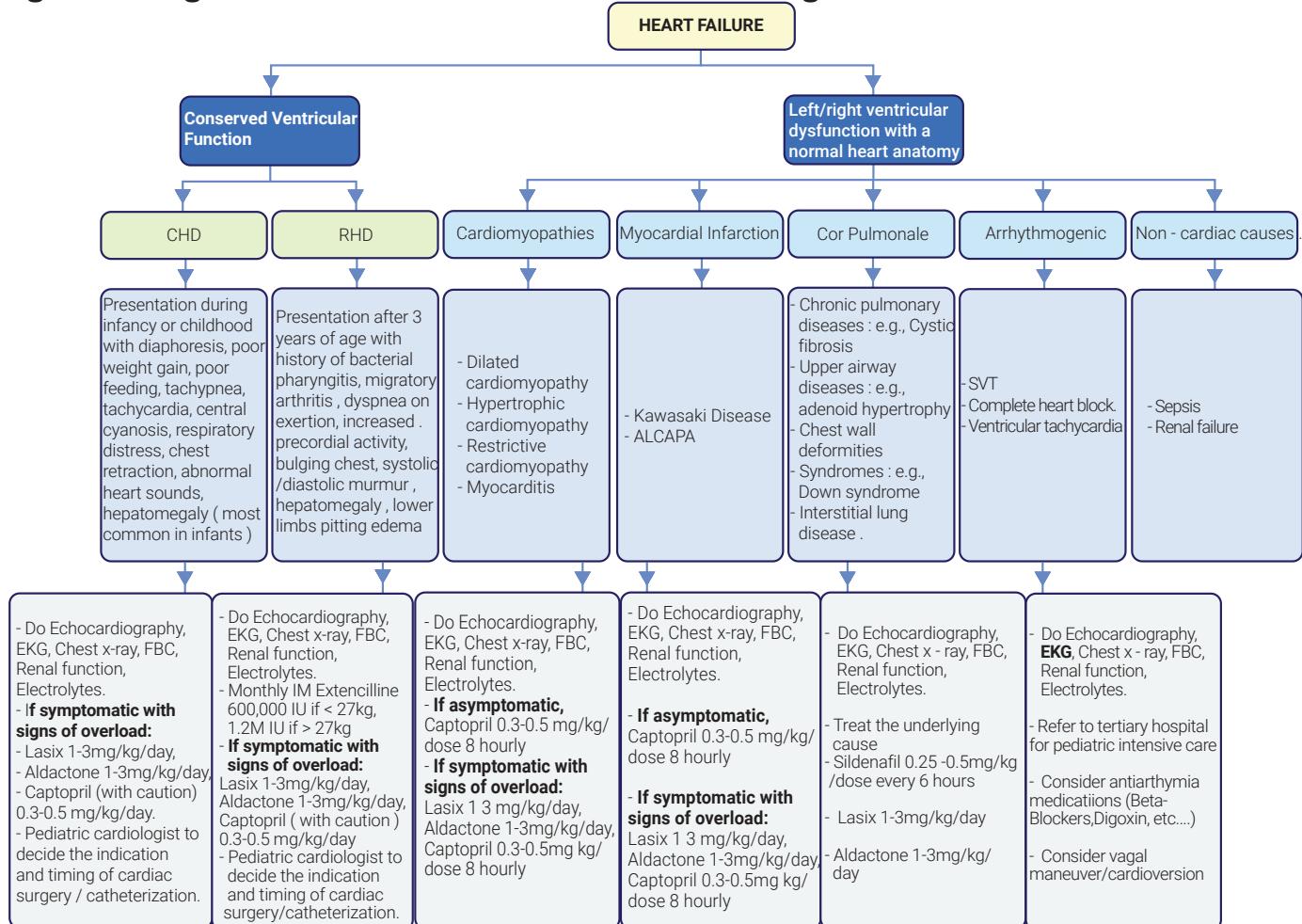
1. Altman CA, Fulton DR, Armsby C. Identifying newborns with critical congenital heart disease. UpToDate. Published August 1, 2022. https://www.uptodate.com/contents/identifying-newborns-with-critical-congenital-heart-disease?search=congenital%20heart%20disease&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1
2. Oster M, Fulton DR, Armsby C. Newborn screening for critical congenital heart disease using pulse oximetry. UpToDate. Published October 26, 2023. https://www.uptodate.com/contents/newborn-screening-for-critical-congenital-heart-disease-using-pulse-oximetry?search=congenital%20heart%20disease&source=search_result&selectedTitle=3~150&usage_type=default&display_rank=3



II.B.2 Heart Failure

Heart failure is a structural or functional cardiac disorder resulting from a ventricular dysfunction, volume, or pressure overload. Summarized below is the algorithm for the initial evaluation and management of heart failure in children.

Figure 17: Algorithm for the initial evaluation and management of heart failure in children.



Denotations

ALCAPA: Anomalous left coronary artery from the pulmonary artery; **CHD:** Congenital Heart Disease; **RHD:** Rheumatic Heart Disease; **SVT:** Supraventricular Tachycardia

References

1. Kirk R, Dipchand AI, Rosenthal DN, et al. The International Society for Heart and Lung Transplantation Guidelines for the management of pediatric heart failure: Executive summary. Journal of Heart and Lung Transplantation. 2014;33(9):888-909. doi:10.1016/j.healun.2014.06.002
2. MINISTRY OF HEALTH REPUBLIC OF RWANDA. RWANDA STANDARD TREATMENT GUIDELINES PEDIATRICS Volume 2.; 2022.

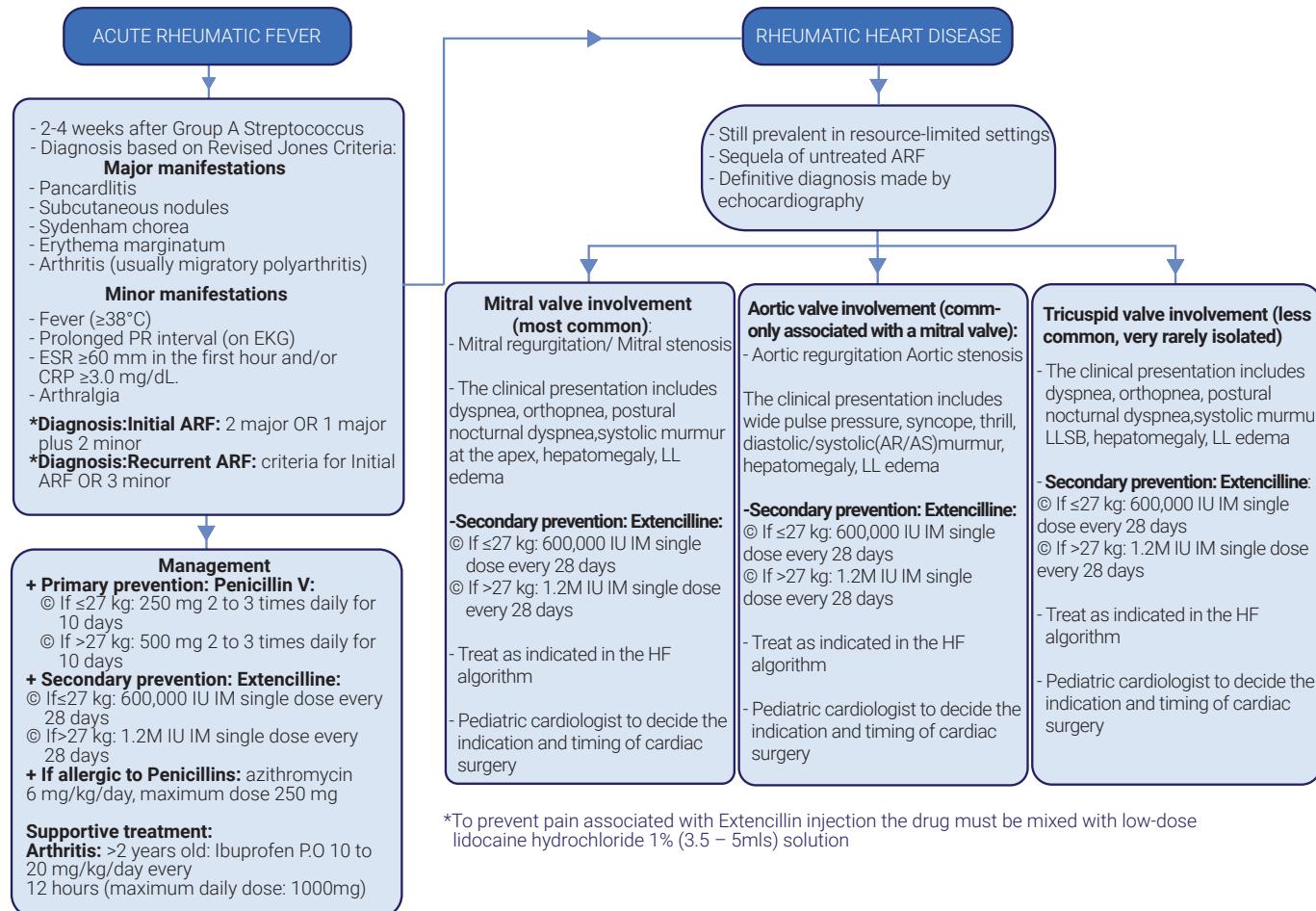


II.B.3 Rheumatic Heart Diseases

Rheumatic Heart Disease (RHD) is an inflammatory damage of the heart valves, as a complication of acute rheumatic fever. The mitral valve is the most commonly involved valve, although any valve may be affected.

Summarized below is the algorithm with the initial evaluation and management of RHD in children.

Figure 18: Algorithm with the initial evaluation and management of RHD in children



Denotations

RHD: Rheumatic Heart Disease

References

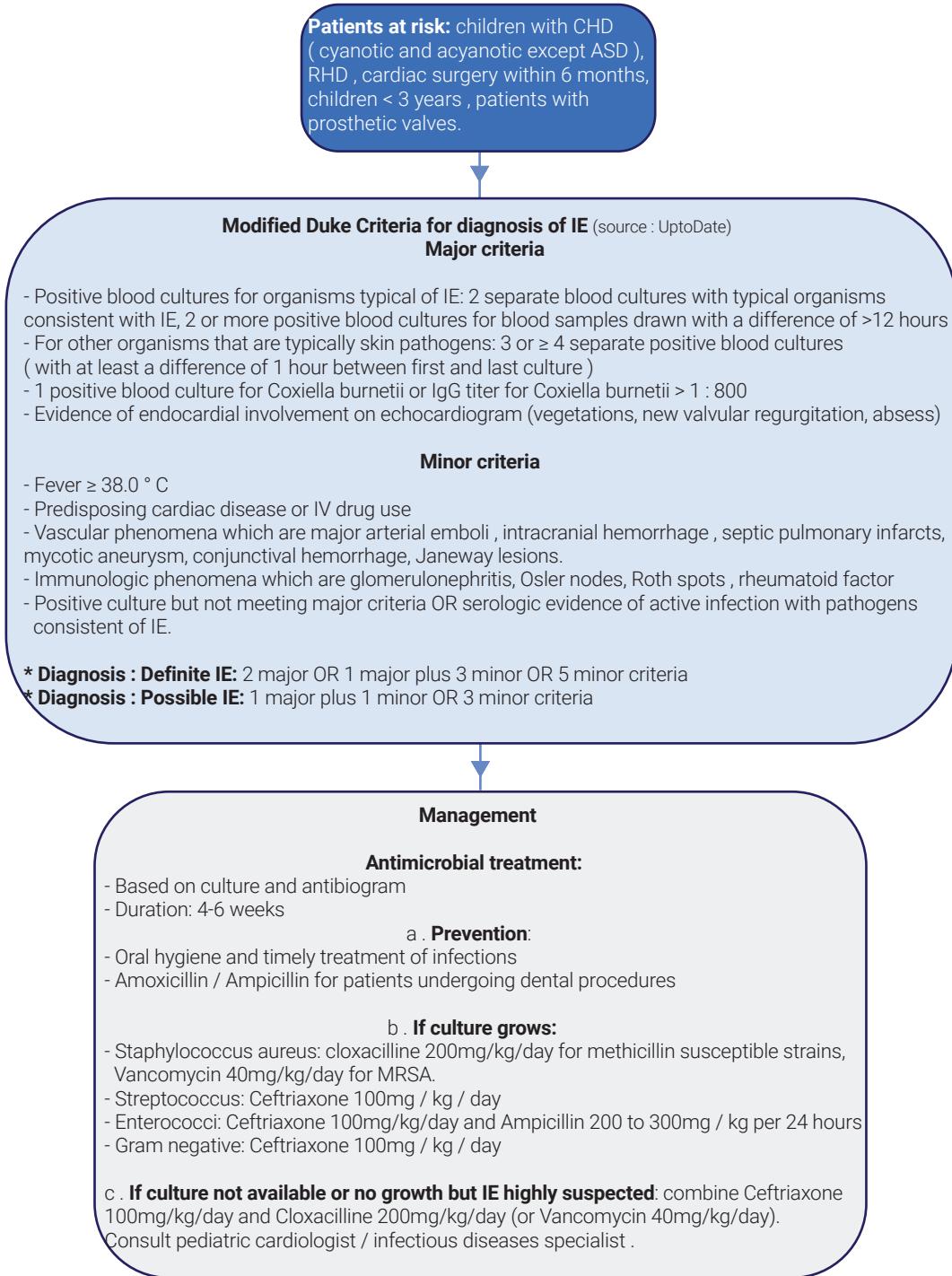
1. Steer A, Gibofsky A, Sundel R, Sexton DJ, TePas E. Acute rheumatic fever: Clinical manifestations and diagnosis. UpToDate. Published March 10, 2022. https://www.uptodate.com/contents/acute-rheumatic-fever-clinical-manifestations-and-diagnosis?search=acute%20rheumatic%20fever%20children&source=search_result&selectedTitle=1~112&usage_type=default&display_rank=1
2. Steer A, Gibofsky A, Sundel R, Sexton DJ, TePas E. Acute rheumatic fever: Treatment and prevention. UpToDate. Published June 23, 2022. https://www.uptodate.com/contents/acute-rheumatic-fever-treatment-and-prevention?search=acute%20rheumatic%20fever%20children&source=search_result&selectedTitle=2~112&usage_type=default&display_rank=2
3. Zühlke L, Peters F, Pellikka PA, Yeon SB. Clinical manifestations and diagnosis of rheumatic heart disease. UpToDate. Published June 30, 2022. https://www.uptodate.com/contents/clinical-manifestations-and-diagnosis-of-rheumatic-heart-disease?search=rheumatic%20heart%20disease&source=search_result&selectedTitle=1~136&usage_type=default&display_rank=1



II.B.4 Infective endocarditis

Infective Endocarditis (IE) is an infection of heart valves or the endocardium. The infection can result in damage of the heart valves and/or the endocardial tissue. Summarized below is the algorithm with the initial evaluation and management of IE in children.

Figure 19: Algorithm with the initial evaluation and management of IE in children.



Denotations

CHD: Congenital Heart Disease; **IE:** Infective Endocarditis; **RHD:** Rheumatic Heart Disease.

References

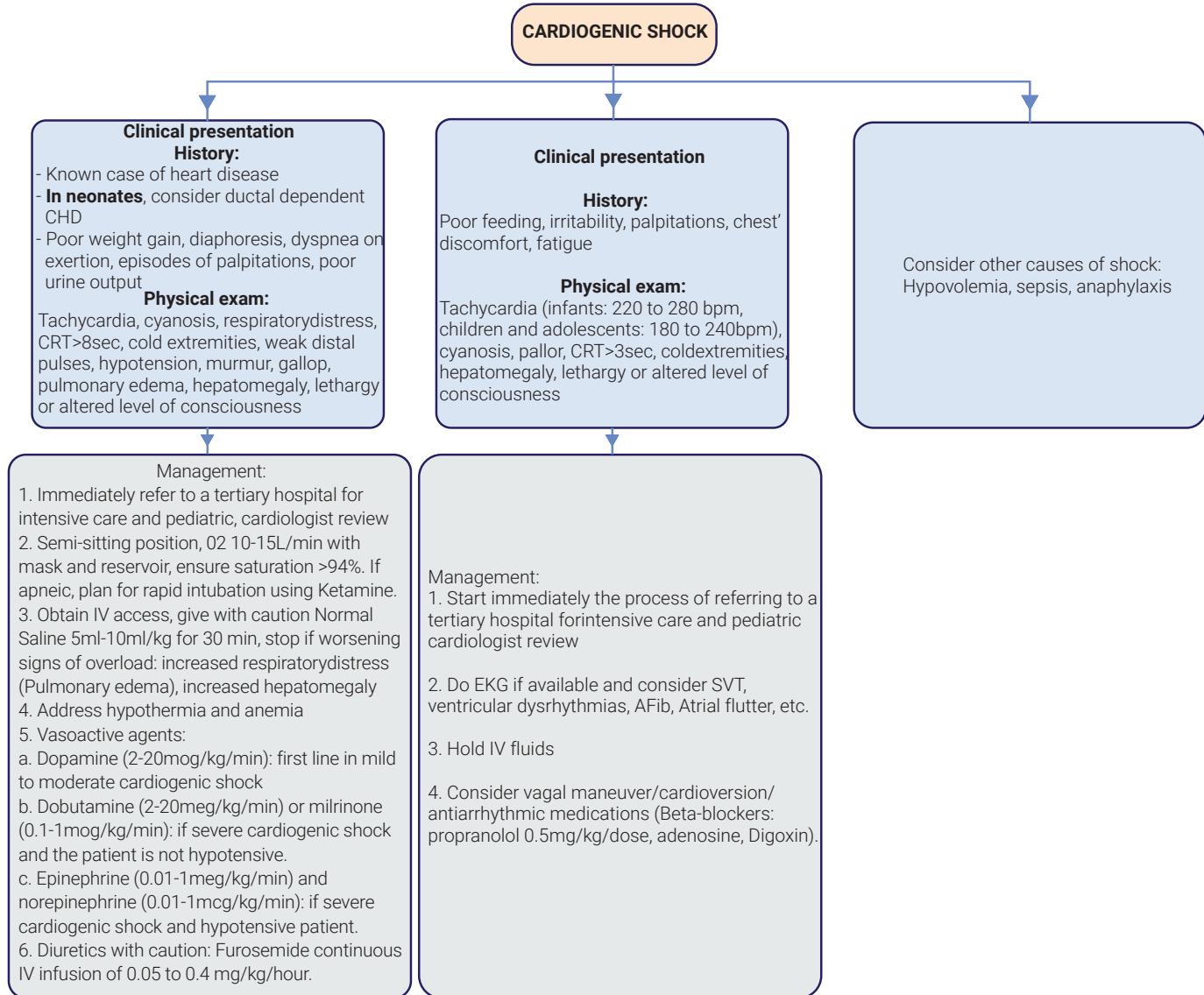
1. O'Brien SE, Fulton DR, Edwards MS, Armsby C. Infective endocarditis in children. UpToDate. Published August 22, 2023. https://www.uptodate.com/contents/infective-endocarditis-in-children?search=infective%20endocarditis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1



II.B.5 Cardiogenic Shock

Cardiogenic shock results from pump failure to provide the systemic oxygen requirement. The patient is usually known for an underlying cardiac disease but may also be newly diagnosed with a cardiac disease.

Figure 20: Algorithm with the initial evaluation and management of Cardiogenic shock in children.



Denotations

AFib: Atrial fibrillation, **CHD:** Congenital Heart Disease; **SVT:** Supraventricular Tachycardia.

References

1. Wooldridge G, Hitayezu J, Venkatasubbu P. Paediatric cardiogenic shock. Published online 2021. doi:10.1029/WFSA-D-19-00022

SECTION III: DIABETES MELLITUS

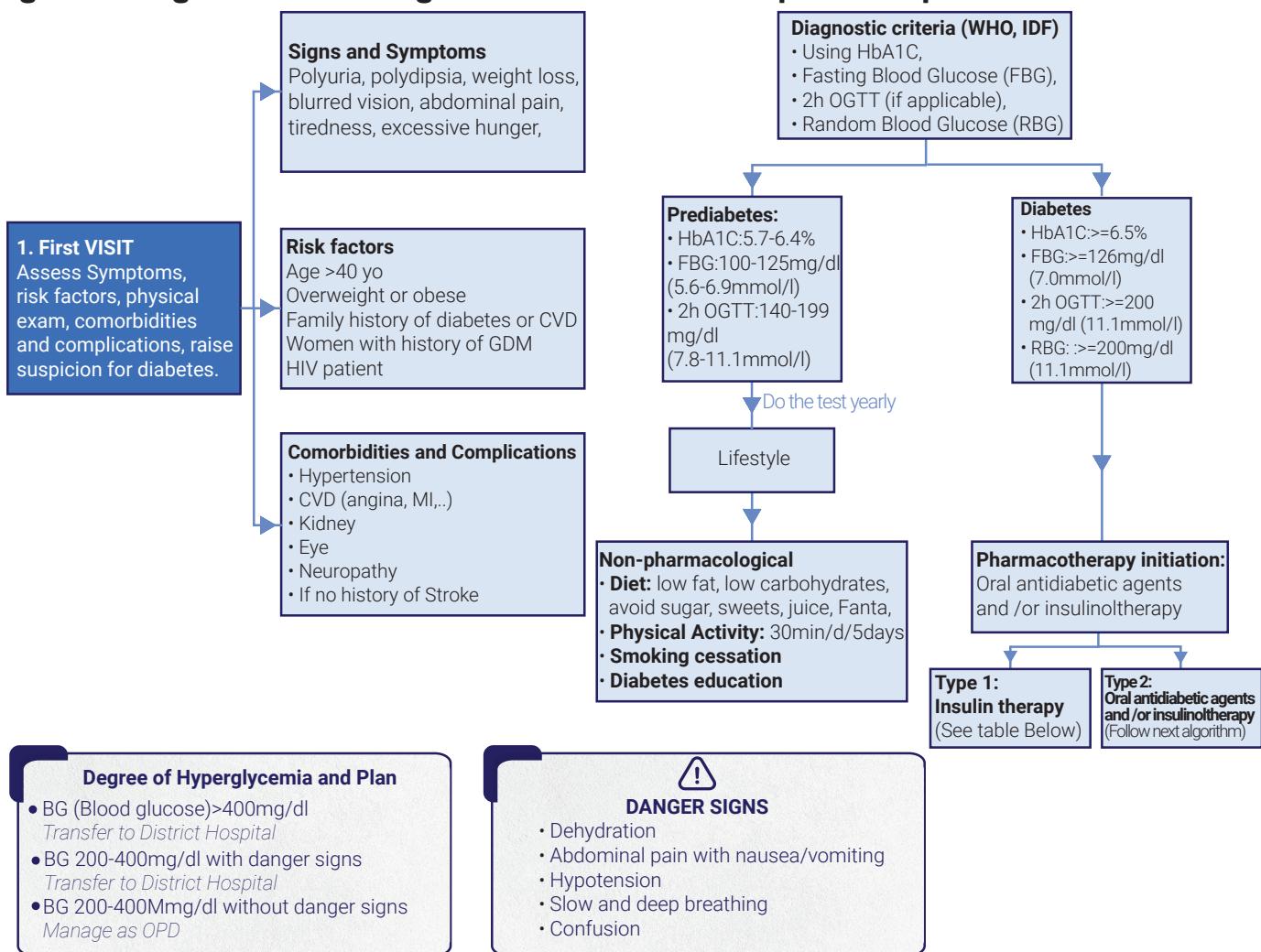
III.A Management of Diabetes in outpatient

1. Introduction

Definition: Diabetes mellitus is a chronic metabolic condition in which the pancreas no longer produces enough insulin (impaired insulin secretion) or cells stop responding to the insulin that is produced (insulin resistance) resulting in increased blood glucose.	
Classification	
Common types <ul style="list-style-type: none">• Type 1 diabetes: due to autoimmune b-cell destruction, usually leading to absolute insulin deficiency including latent autoimmune diabetes of adulthood)• Type 2 diabetes: due to a progressive loss of b-cell insulin secretion frequently on the background of insulin resistance)	Specific types of diabetes: <ul style="list-style-type: none">• Monogenic diabetes syndromes:<ul style="list-style-type: none">- Neonatal diabetes- Maturity-onset diabetes of the young• Diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis)• Drug- or chemical-induced diabetes: glucocorticoid use, treatment of HIV/AIDS, or after organ transplantation• Gestational diabetes mellitus (GDM): diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes before gestation.

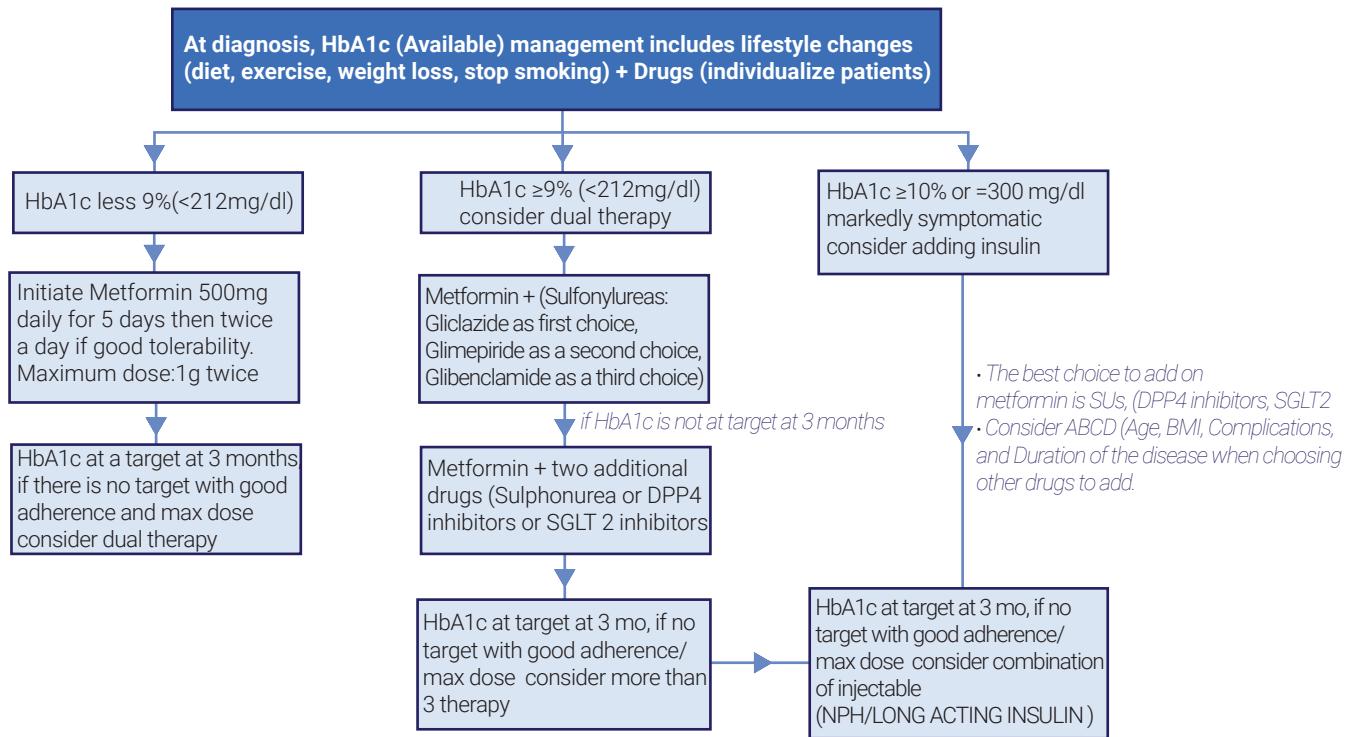
2. Management of diabetes in outpatient

Figure 21: Algorithm for management of diabetes in outpatient department.



3. Type 2 Diabetes pharmacological treatment

Figure 22: Algorithm for type 2 diabetes pharmacological treatment.



4. Indications of insulin therapy Absolute indications

- All Types 1 DM
 - Type2 DM with maximum dose, more than 3 oral drugs and not in target
 - Transient insulin therapy may be necessary in case of:
 - Type 2 Diabetes with acute complications
 - Perioperative period,
 - Acute infection,
 - Pregnancy...
 - Type 1 Diabetes
 - Type 2 Diabetes which does not respond to maximum dose of oral anti-diabetic agents and HbA1C>9% Secondary
- Insulin dosing:** 0.5U/kg/h (total daily dose)
- 2/3 morning (before breakfast), 1/3 evening (before dinner) for Insulin Lente
 - 70%: NPH or other long-acting insulin
 - 30%: Regular insulin

5. Outpatient Regimens

Table 5: Treatment options in management of Diabetes in outpatient

Breakfast	Lunch	Dinner	Bedtime	Advantages	Disadvantages
Intermediate +short acting (e.g.: NPH)	-	Intermediate +short acting -	-	Less injection/ day	Require usual physical activities and same calories /day
Short acting ± intermediate insulin (e.g. Regular)	Short acting insulin	Intermediate +short acting	Intermediate insulin	- Free Life style -No need of snacks Good glycemic control	Many injections/ day
Oral agents		± oral agent	Intermediate insulin	Less injections	Postprandial BG not well controlled

6. Available oral agents

Table 6: Management of Diabetes in Outpatient (available oral agents)

Classes	Dose/day	Dose interval	Dosage(tablets)	Side effects	Benefits
Sulfonylureas				Weight gain, hypoglycemia in elderly	
Gliclazide(Diamicron)	30-120MG	OD/BID	30, 60mg,80mg	Modified release formulations(less hypoglycemia)	Single use /day
Glimepiride(Amarel)	1-8mg	OD	1,2,3,4mg		Single use /day, many variety of dosage for CKD
Glibenclamide(Daonil)	5-10mg	OD/BID	5mg		
Biguanides					
Metformin	1000-2550mg	BID, TID	500,850,1000mg	Nausea, vomiting, abdominal pain, lactic acidosis	Weight loss No hypoglycemia Improve macrovascular outcomes
Non sulfonylurea secretagogues				Weight gain, hypoglycemia, expensive, frequent dosing	Targets postprandial glucose, mimic physiological insulin secretion
Repaglinide	1.5-16mg	TID-QID/meals	0.5,1.2mg		
Nateglinide	180-380mg	TID/meals	60,120mg		
DPP4-inhibitors				Delayed gastric emptying, increase insulin secretion,	No hypoglycemia, weight neutral
Vildagliptin(Galvus)	50mg	BID	50mg		
Sitagliptin	50,100mg	OD	50,100mg		
Teneligliptin	20 mg	OD			
SGLT-2 inhibitors				UTI, Euglycemic DKA	Promote weight loss, no hypoglycemia
Dapagliflozin(forxiga)	5,10mg	OD	5,10mg		
Canagliflozin	100,300mg	OD	100,300mg		
GLP-1 receptor agonists					
Liraglutide, Semaglutide etc	variable	Variable Up to once/week	variable	Expensive pancreatitis	Promote weight loss, no hypoglycemia

7. Screening for micro- vascular complications

Eye - Retinopathy screening (every year and at diagnosis for T2D) - Systematic - Every 3 to 6 months if retinopathy	Neuropathy (at every visit) - Do you have numbness or tingling in your hands or feet? - Have you ever felt like your hands or feet were being stuck with needles? - Do you have wounds on your legs that won't heal? - Monofilament testing	Nephropathy (kidneys) - Has a doctor or nurse ever told you that you have a problem with your kidneys? - Proteinuria (Every 6 months) - Creatinine (Once a year)
---	--	--

8. Screening for macro- vascular complications

Brain (stroke or TIA) Transient Ischemic Attack (TIA) - Have you felt sudden weakness on one side of your body that resolved immediately? - Have you had an episode where you had difficulty finding words?	Heart (Coronary Artery Disease) - Do you have chest pain that gets worse with or without exertion? - Have had a heart attack?	Peripheral Vascular - Do your legs ache after walking? - Do you realize a non-healing wound in your feet? - Do you experience an erectile problem (loss of libido)
--	--	--

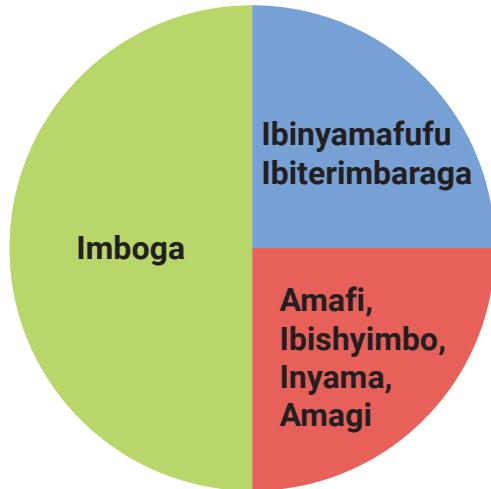
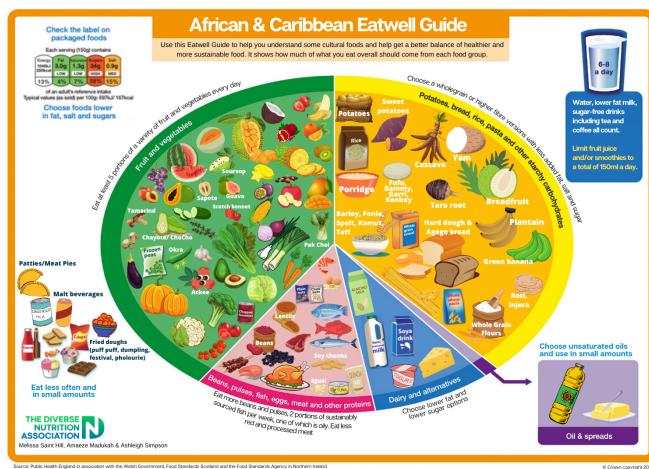
9. Screening for comorbidities

Screen for: HIV, Kidney Disease, Liver Disease, Hypertension, and dyslipidemia.

10. Management of Comorbidities and Complications

- Hypertension: target BP: if >130/80, Treat with ACEI (eg; captopril) or ARB (eg; losartan)
- Retinopathy: refer to ophthalmologist
- Nephropathy: if persistent proteinuria, start ACEI and refer to an Internist/Nephrologist
- Neuropathy: amitriptyline 25mg night, do foot exam at every visit
- Statins: All Diabetic patients above 40-75years, for other, if LDL-C:70-189mg/dl
- Aspirin therapy (75–162 mg/day) may be considered as a primary prevention strategy in those with diabetes who are at increased CV risk.

11. Diet education



Diet education

- ½ of the plate: Vegetables
- Carbohydrates: a small portion of 1 carbohydrate variety at each meal, then alternate (maize, rice, cassava, potatoes, sweat banana)
- Portion of protein (beans, fish, meat)
- Small amount of oil
- 1 or 2 varieties of fruits
- Avoid sugar, sweets, biscuits, cakes, juice.

12. Follow-up

At every visit

- Weight, Vital signs, (BMI, BP)
- Physical exams,
- Risk factors,
- Assess complications.
- Do FBG or RBG

3-6months

- HbA1c
- Urine protein

Annually

- Eye exam
- Creatinine

Lifestyle modifications

See above

Denotations

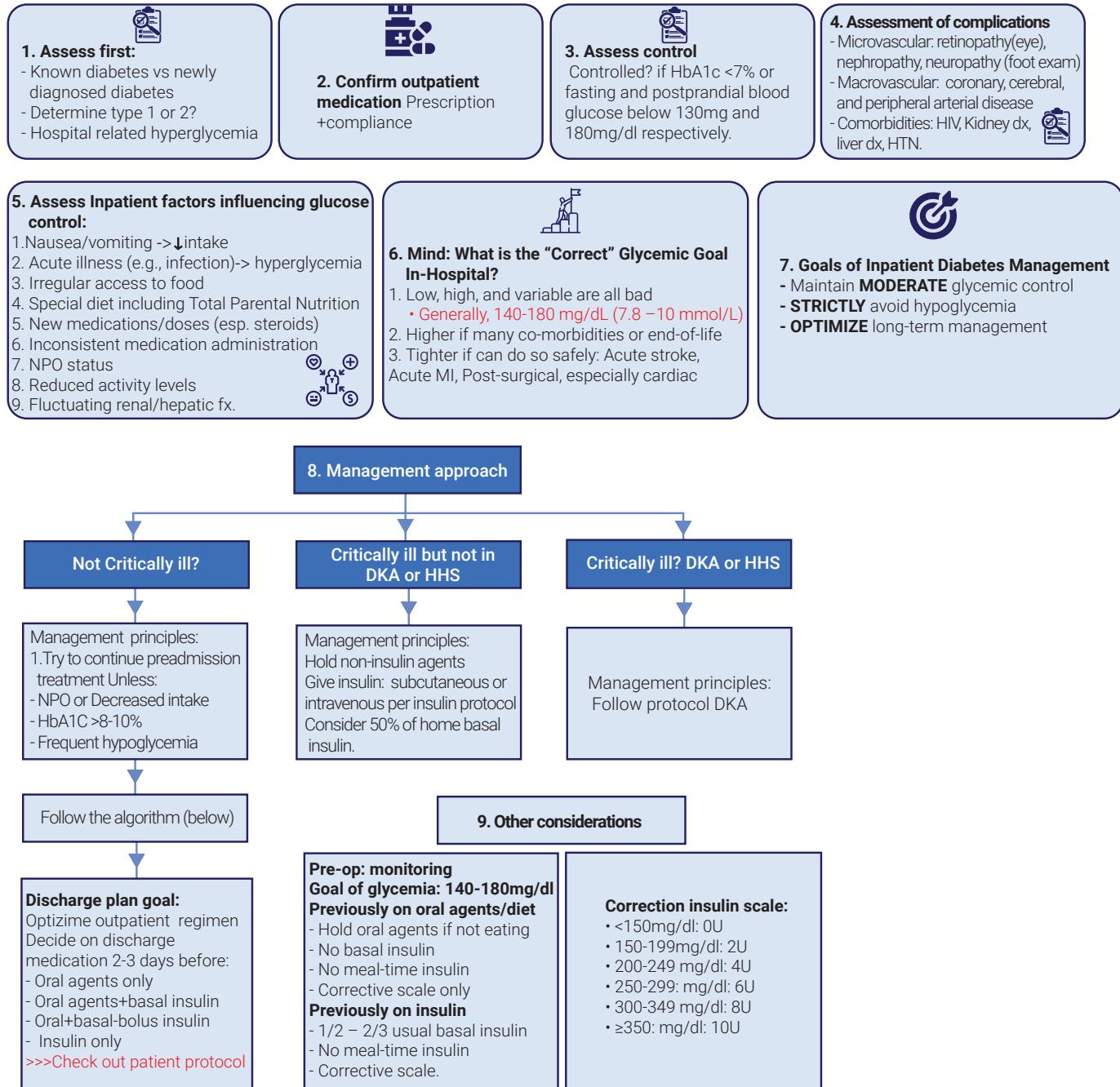
ACEI: Angiotensin Converting Enzymes Inhibitor, **ARB:** Angiotensin Receptor Blocker, **BMI:** Body Mass Index, **BP:** Blood Pressure, **CVD:** Cardiovascular Diseases, **DPP4i:** Dipeptidyl Peptidase-4 inhibitor, **FBG:** Fasting Blood Glucose, **HbA1C:** Glycated Hemoglobin, **HIV:** Human Immuno-Virus, **LDL:** Low Density Lipoprotein, **RBG:** Random Blood Glucose, **SGLT 2i:** Sodium-Glucose Transport Proteins-2 inhibitors,

References

- Standards of Medical Care in Diabetes—2022 Abridged for Primary Care Providers American Diabetes Association.
- The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD, 2021 European Association for the Study of Diabetes and American Diabetes Association
- IDF Diabetes Atlas 2021 – 10th edition | www.diabetesatlas.org

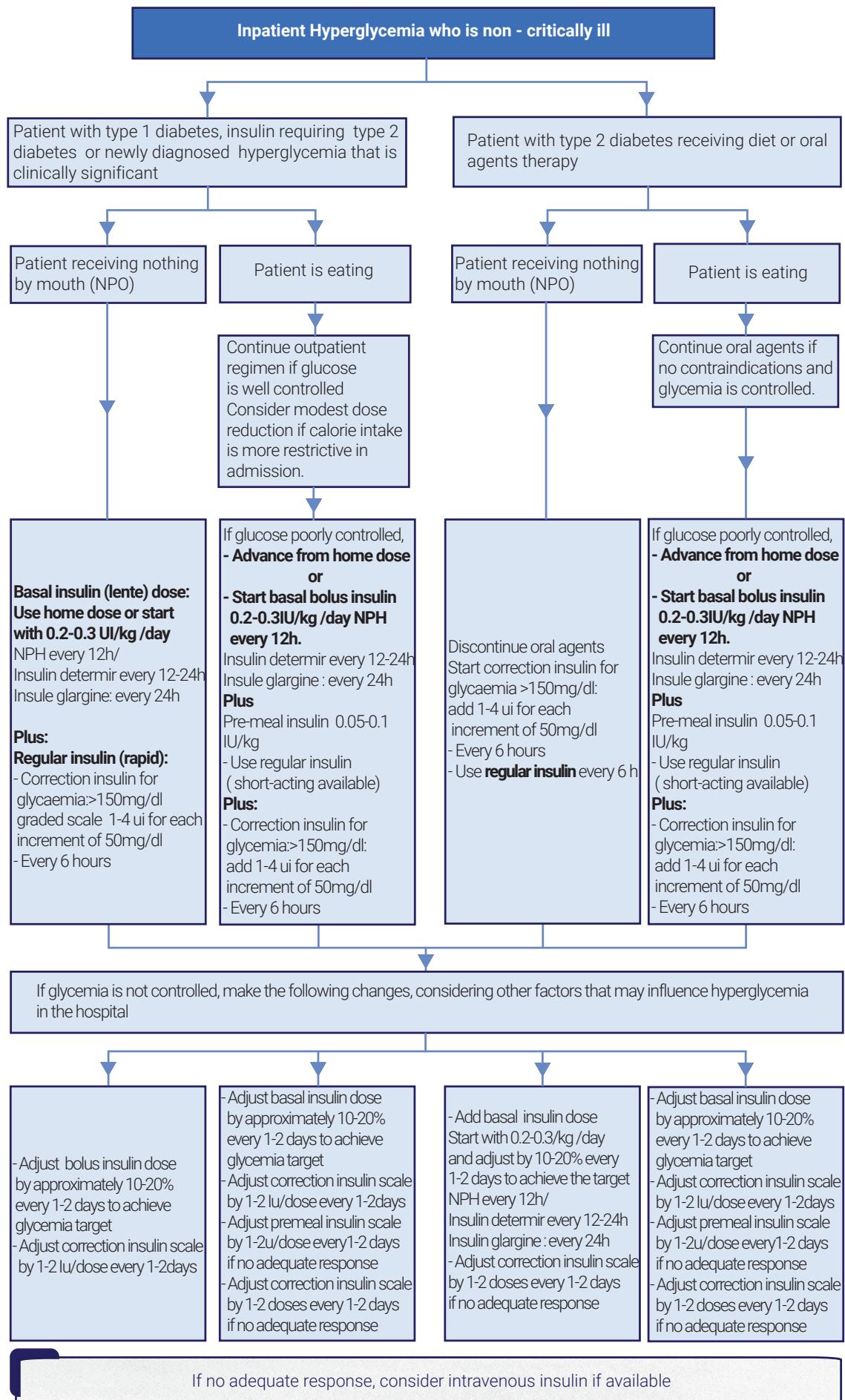
III.B Inpatient Diabetes Management

1. Inpatient Diabetes and Hyperglycemia Management guidelines



2. Algorithm for non critically ill patients

Figure 23: Algorithm for diabetes management in non-critically ill patients.



Denotations

DKA: Diabetes Keto-Acidosis, **HHS:** Hyperosmolar Hyperglycemia State, **NPO:** Nil Per Os

References

1. Rushakoff RJ. Inpatient Diabetes Management. 2019 Jan 7. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. PMID: 25905206
2. Kodner C, Anderson L, Pohlgeers K. Glucose Management in Hospitalized Patients. Am Fam Physician. 2017 Nov 15;96(10):648-654. PMID: 29431385
3. RWANDA STANDARD TREATMENT GUIDELINES | INTERNAL MEDICINE - | 2022
4. Silvio E. Inzucchi, M.D. Management of Hyperglycemia in the Hospital Setting, N Engl J Med 2006; 355:1903-1911, DOI: 10.1056/NEJMcp06009

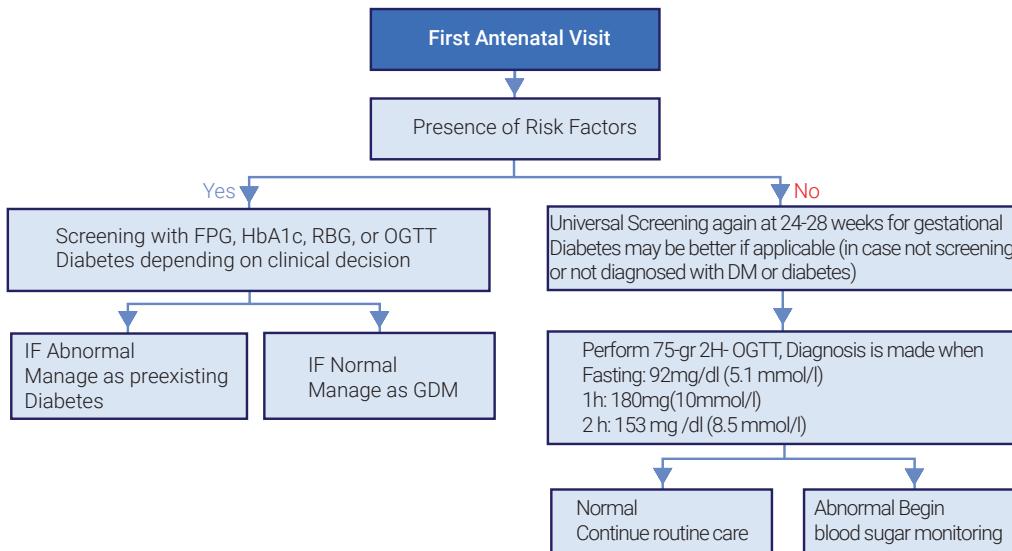
III.C Management of Diabetes in pregnancy

 1. Definition		
Gestational diabetes mellitus (GDM) is any degree of onset or first recognized during pregnancy impaired glucose tolerance	Glucose values fall into diagnostic ranges of either Impaired glucose tolerance (IGT) or Diabetes (DM)	
Diabetes in pregnancy		
Preexisting Diabetes	Gestational Diabetes	
Type 1	Preexisting Diabetes	
Type 2	 True GDM	
Usually at 24 -28 weeks		
 2. Screening		
<ul style="list-style-type: none"> Universal screening (screening every pregnant woman) is recommended by many guidelines. 		
 Risk factors		
<ul style="list-style-type: none"> Previous GDM Maternal age > 35 years Family history of diabetes (first-degree relative with diabetes) Obesity (BMI > 30 kg/m²) Previous macrosomia (birthweight > 4500g) Polycystic Ovary Syndrome Iatrogenic: glucocorticoids and antipsychotic medication Hypertension 	<ul style="list-style-type: none"> Prediabetes or Impaired glucose tolerance <ul style="list-style-type: none"> o HbA1c ≥ 5.7%, impaired glucose tolerance or impaired fasting glucose o HbA1c > 6.5%, diagnosis of preexisting diabetes <p>Note: symptoms may be unspecific</p>	
 3. Diagnosis Criteria (WHO)		
GDM, anytime in pregnancy: <ul style="list-style-type: none"> Fasting plasma glucose 5.1–6.9 mmol/L (92–125 mg/dL) 1-hour plasma glucose 10.0 mmol/L (180 mg/dL) following a 75g oral glucose load 2-hour plasma glucose 8.5–11.0 mmol/L (153–199 mg/dL) following a 75g oral glucose load 	Diabetes mellitus in pregnancy <ul style="list-style-type: none"> Fasting plasma glucose 7.0 mmol/L (126 mg/dL) 2-hour plasma glucose 11.1 mmol/L (200 mg/dL) following a 75g oral glucose load Random plasma glucose 11.1 mmol/L (200 mg/dL) in the presence of diabetes symptom <p>No role of HbA1c in the diagnosis of GDM</p>	
4. Management		
 Lifestyle modification	 Pharmacotherapy	 Glycemic goal
<ul style="list-style-type: none"> Exercise 30-60 min moderate intensity Diet: regular meal plan; 3 moderate-sized meals, 4 snacks, Low sugar 	<ul style="list-style-type: none"> Insulin if lifestyle DOESN'T work 0.7-1 unit/kg Metformin can be considered if no concerns with inadequate fetal growth. Start 500 mg with dinner and increase to 500 mg bd, max not beyond 2500. Glyburide is an alternative 	<ul style="list-style-type: none"> Fasting and pre-prandial blood glucose concentration: <95 mg/dL (5.3 mmol/L) One-hour postprandial blood glucose concentration: <140 mg/dL (7.8 mmol/L) Two-hour postprandial glucose concentration: <120 mg/dL (6.7 mmol/L) <p>Check HbA1c every 4-6 weeks, Goal below 6.5%</p>
5. Complications		
 Complications	 Maternal-Neonatal	 Fetal
Short term	<ul style="list-style-type: none"> Preeclampsia Gestational hypertension Hydramnios Urinary tract/vaginal infections Cesarean delivery Traumatic labor/perineal tears Postpartum hemorrhage Difficulty initiating and/or maintaining breastfeeding 	<ul style="list-style-type: none"> Stillbirth or Neonatal death Preterm birth Congenital malformations Macrosomia Cardiomyopathy Birth trauma: Shoulder dystocia Bone fracture or Brachial plexus injury Hypoglycemia Hyperbilirubinemia Respiratory distress syndrome
Long term	<ul style="list-style-type: none"> Recurrence of GDM Type 2 diabetes mellitus Hypertension Ischemic heart disease Nonalcoholic fatty liver disease Dyslipidemia Chronic kidney disease Metabolic syndrome Hyperinsulinemia 	<ul style="list-style-type: none"> Childhood obesity Excess abdominal adiposity Higher blood pressure Possible earlier onset cardiovascular disease Possible attention-deficit hyperactivity disorder Autism spectrum disorder

 6. Preconception Plan	
Prior pregnancy	<ul style="list-style-type: none"> Optimize modifiable risk factors (eg. BMI, diet, physical activity). Screening GLYCAEMIA in high-risk women For preexisting DM: Maintain HbA1c below 6% if and appropriate drugs: Insulin and metformin. Screen for complications
During pregnancy	<ul style="list-style-type: none"> Healthy diet, regular exercise >> unless there are obstetric contraindications. Possible personalized gestational weight gain. High-risk women: detect early DM in pregnancy (if preconception positive screening) Follow the protocol for all at 24 to 28 weeks gestation according to recommended screening and diagnostic criteria.
Postpartum	<ul style="list-style-type: none"> Early postpartum OGTT to assess glucose status. Regular long-term follow-up focused on diabetes and cardiovascular risk factor modification. Family lifestyle support: optimizing diet, physical activity, and weight in the offspring.

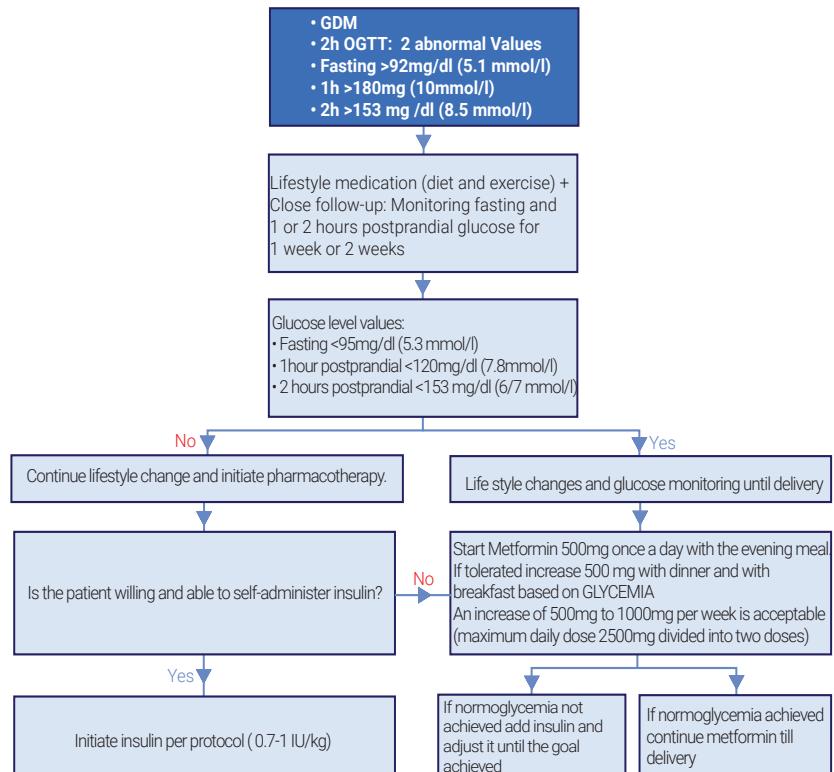
7. Screening and diagnosis

Figure 24: Algorithm for screening and diagnosis of Gestational diabetes.

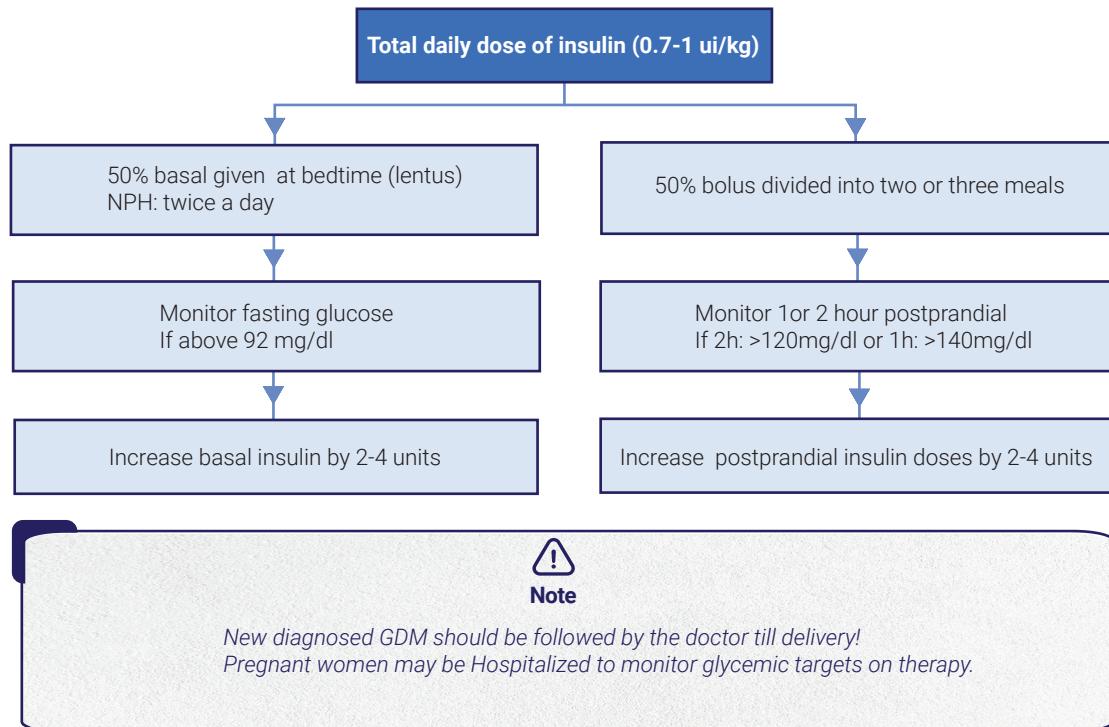


8. Management of Gestational Diabetes

Figure 25: Algorithm for management of Gestational diabetes.



9. Insulin protocol



Denotations

FPG: fasting glucose, **OGTT:** oral glucose tolerance test, **RBG:** Random blood sugar

References

1. Diabetes Care 2022;45(Suppl. 1):S232-S243 | <https://doi.org/10.2337/dc22-S015>
2. Macaulay S, Dunger DB, Norris SA (2014) Gestational Diabetes Mellitus in Africa: A Systematic Review. 3. PLoS ONE 9(6): e97871. doi: 10.1371/journal.pone.0097871
3. A Sweeting et al, "A Clinical Update on Gestational Diabetes Mellitus" Endocrine Reviews, 2022, 43, 763-793 <https://doi.org/10.1210/endrev/bnac003> Advance Access publication 18 January 2022 Review
4. INTERNATIONAL ASSOCIATION OF DIABETES AND PREGNANCY STUDY GROUPS CONSENSUS PANEL*
5. DIABETES CARE, VOLUME 33, NUMBER 3, MARCH 2010

III.D Management of diabetic emergencies

Management of diabetic emergencies

1. Introduction

Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) are two of the most serious acute complications of diabetes. DKA being characterized by ketoacidosis and hyperglycemia, while HHS usually has more severe hyperglycemia without ketoacidosis

DKA & HHS: diagnosis

Based on clinical evaluation and immediate bedside investigations. Features include polyuria, polydipsia, nausea, abdominal pain, fruity odor, confusion, Kussmaul breathing, dehydration

Diabetic Ketoacidosis

- Hyperglycemia: BG > 250 mg/dL
- Euglycemia < 250 mg/dL (pregnancy, SGLT2 use)
- Ketonuria or ketonemia: highly positive
- Acidosis pH < 7.3, low HCO₃ - < 10 mEq/L
- Anion gap > 12 (see formula)

Hyperosmolar Hyperglycemic State

- Severe Hyperglycemia: BG > 600 mg/dL
- Hyperosmolality: Effective serum osmolality > 320 mOsm/kg (see formula)
- neurologic signs: focal signs, obtundation, seizure, coma

DKA&HHS: Evaluation and Monitoring

Initial evaluation

- Vital signs, volume status (decreased skin turgor, dry axillae & oral mucosa, low JVP, tachycardia and hypotension), mental status
- Immediately: serum blood glucose, urine ketones
- Additional testing: FBC, electrolytes, FT, ABG
- Evaluate for precipitating causes: urinalysis, blood cultures, cardiac enzymes, EKG, CXR

Monitoring

- BG hourly
- Urinary ketones and serum pH for DKA and Serum Osm for HHS 4 hourly
- Electrolytes, primarily Na⁺ and K⁺ 4 hourly
- Mental status: expect improvement with treatment if DKA or HHS are the causes. Consider further evaluation if not improving
- Input/output, hydration status, vital signs hourly

2. Management

Fluids (correct hypovolemia & hyperosmolarity)

Insulin

Electrolytes

- If hemodynamically unstable, give 1 L over 30 minutes. May repeat this until stable
then
- If stable, administer 1-2L over 2 hr
then
- Subsequent management 250-500ml/hr based on vital signs, free water deficit, urine output
then
- Change fluids to 5% DNS or 5%Dextrose when BG is < 250

Initial Bolus

- If using continuous IV: 0.1 IU/kg once
- If continuous IV not available: 10 IU regular insulin IM and 10IU IV

Maintenance

- 0.1IU/kg/hr continuous IV until negative ketonuria
- If BG does not decrease by 50-70 mg/dL within 1 hr, increase rate by 50%

When BG < 250 mg/dL

- Decrease insulin to 50% of current rate
- Give dextrose 5% 250mls with 250mls NaCl
- Maintain BG 150-200 mg/dL until resolution (see criteria below)
- If continuous IV insulin not available, see below for alternative subcutaneous protocol

Potassium

- > 5.2 mEq/L → monitor
- 3.3-5.2 mEq/L → add 20-30 mEq/L to each liter of IVF
- < 3.3 mEq/L → add 20-40 mEq/L to IVF
- Goal: keep serum potassium in the range of 4 to 5 mEq/L
- EKG changes present → 20-30 mEq/hr and delay insulin until EKG normalizes
- If no EKG changes → 20 meq/L once urine function is adequate (> 50 ml/hr)

Bicarbonate (if PH and ICU are available, If not REFER)

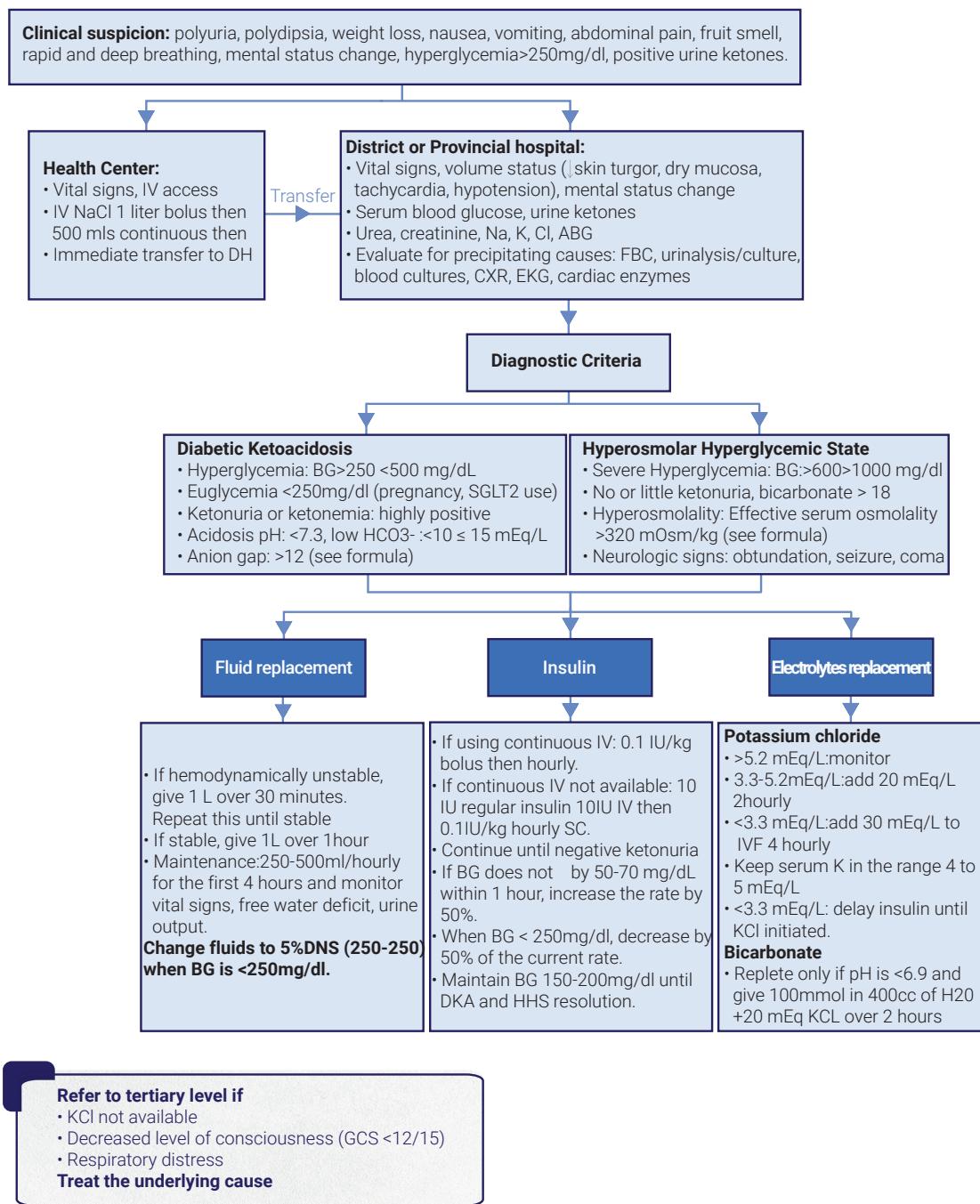
- Replete only if pH is < 6.9- > 100mmol in 400cc of H2O + 20 mEq KCL over 2 hrs.
- Bicarbonate repletion is often not needed

Criteria for resolution	Transition to long-acting insulin
<p>DKA:</p> <ul style="list-style-type: none"> • BG < 200 mg/dL + 2 or more of: HCO₃- ≥ 15 mEq/L or pH > 7.3 or anion gap ≤ 12mEq/L • Neg urine ketones if above not available (confirm repeat in 1-2 hrs) 	<p>HHS:</p> <ul style="list-style-type: none"> • BG <250-300 mg/dL • Improved mental status • Effective Osmolality ≤ 315 mOsm/kg <p>Continue continuous IV for 1-2 hrs after long acting started</p> <ul style="list-style-type: none"> • 0.4-0.6 u/kg for insulin naïve patients • NPH/Regular: based on inpatient DM protocol • Hold regular insulin if patient is not eating • May resume home regimen if previously on insulin
<p>Alternative Subcutaneous Insulin Protocol</p> <p>If continuous infusion not available, for mild/moderate DKA:</p> <ul style="list-style-type: none"> • Initial IV Bolus: 0.1 IU/kg given intravenously • Maintenance: 0.1 IU/kg subcutaneous q1-2 hr. (start immediately following bolus) 	<ul style="list-style-type: none"> • When BG <250 mg/dL, reduce dose by 50% • Continue until resolution of DKA or HHS. This regimen is not well validated and is modified from other protocols. Continuous IV is preferred as standard of care when available
<p>Useful Formulas</p> <ul style="list-style-type: none"> • Calculated Anion Gap (>12 is elevated) [Na⁺] - [Cl⁻ + HCO₃⁻] • Effective Serum Osmolality: 2x[Na⁺] + glucose/18 	<ul style="list-style-type: none"> • Corrected Serum Sodium: [Na⁺] + 1.6x [glucose (mg/dL) -100]/100 • Free Water Deficit: 0.6 x weight (kg) x[(Na⁺/140) -1]

- Treat underlying causes when identified or highly suspected.
- Mental status is expected to improve with treatment if DKA or HHS are the primary cause, consider further evaluation if not improving.

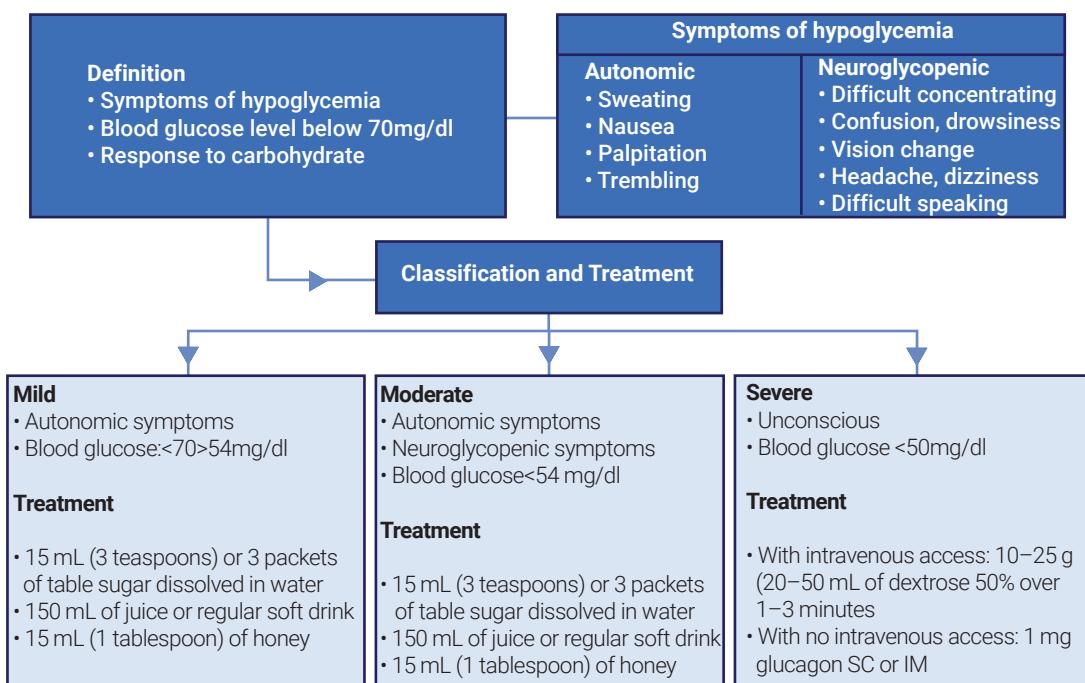
3. Management of DKA and HHS at peripheral health facilities

Figure 26: Algorithm for management of DKA and HHS



Monitoring	Resolution criteria	Transitioning to Subcutaneous insulin.
<ul style="list-style-type: none"> • BG hourly • Urine ketones, pH for DKA and Osms for HHS 4 hourly • Na+ and K+ 4 hourly • Mental status: expect improvement with treatment • Input/output, hydration status, vital signs hourly 	<ul style="list-style-type: none"> • BG < 200 mg/dL • HCO3- ≥15 mEq/L or pH >7.3 or anion gap ≤12mEq/L • Neg urine ketones • Improved mental status • Effective Osmolality ≤315 mOsm/kg 	<ul style="list-style-type: none"> • 0.4-0.6 u/kg for insulin naïve patients • NPH/Regular: based on inpatient DM protocol • Hold regular insulin if the patient is not eating • Resume home regimen if previously on insulin

4. Management of Hypoglycemia



Denotations

ABG: Arterial Blood Gas, **BG:** Blood Glucose, **CXR:** Chest X-ray, **DKA:** Diabetic Ketoacidosis, **EKG:** Electrocardiography, **FBC:** Full Blood Count, **HHS:** Hyperosmolar Hyperglycemic State, **IV:** Intravenous, **JVP:** Jugular Venous Pressure, **KCl:** Potassium Chloride, **UTI:** Urinary Tract Infection,

References

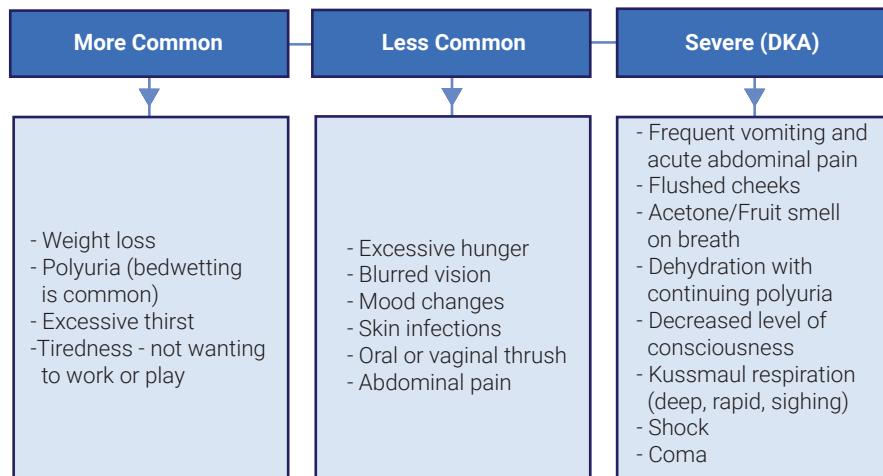
1. American diabetic association guidelines 2022
2. www.up to date
3. Joint British Diabetes Societies for Inpatient care. The Management of Diabetic Ketoacidosis in Adults. Jt Br Diabetes Soc [Internet]. 2021;(June):1–49. Available from: <https://www.bspd.org.uk/media/1798/bsped-dka-guideline-2020.pdf>
4. Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN. Hyperglycemic crises in adult patients with diabetes. Diabetes Care. 2009; Jul;32(7):1335-43. doi: 10.2337/dc09-9032

III.E Diabetes Care in Pediatric Age

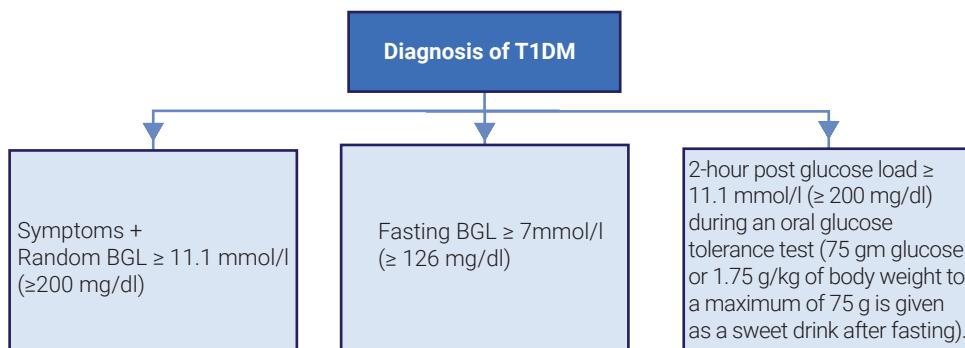
Type 1 Diabetes Mellitus (T1DM)

- T1DM is the most common autoimmune disorder in children and adolescents.
- Both genetic and environmental factors are important in determining an individual's risk, however the mechanisms are not fully understood.

Signs and symptoms



Diagnosis of T1DM



III.E.1 Management of Type 1 Diabetes Mellitus

All children with type 1 diabetes require insulin. Comprehensive diabetes management includes insulin treatment, blood glucose monitoring, nutritional management, physical activity, education, rules for sick days, and psychosocial support (see subsequent sections).

Insulin requirements

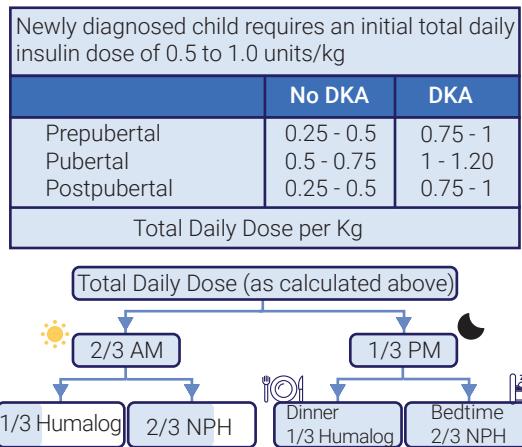
- Pre-pubertal children (outside the partial remission phase) usually require 0.7-1.0 IU/kg/day.
- During puberty, requirements may rise substantially above 1 and even up to 2 U/kg/day.
- The 'correct' dose of insulin is that which achieves the best attainable glycemic control for an individual child or adolescent, without causing obvious hypoglycemia and resulting in normal growth and development.

Table 7: Insulin Type and Action

Insulin type	Preparations	Onset of action	Peak of action	Duration of action	When to give
Rapid-acting	Aspart, Glulisine, Lispro	15-30 minutes	1-2 hours	3-5 hours	Immediately prior to meal
Short-acting (Regular)	Actrapid, Humulin R, Insuman Rapid	30-60 minutes	2-4 hours	5-8 hours	30 minutes prior to meal
Intermediate-acting	Humulin NPH, Protaphane, Insulatard,	2-4 hours	4-10 hours	12-24 hours	30 minutes prior to meal
Long-acting	Detemir	1-2 hours	6-12 hours	20-24 hours	Once or twice daily
	Glargine	2-4 hours	Relatively peakless	24 hours or less	Once or twice daily
	Basaglar	1-2 hours	4-12 hours	24 hours	Once or twice daily
Mixed	Rapid/long-acting mix or Short/long-acting mix 30/70 or 25/75	30 minutes	4-12 hours	8-24 hours	30 minutes prior to meal

The two most common regimens used are:

- * Twice-daily insulin using both short-acting and also intermediate-acting insulin. (If these insulins are not always available, pre-mixed insulin can be used as an alternative regimen).
- * Basal bolus regimen (the preferred option) - with short-acting insulin given with main meals (usually three times per day) and intermediate-acting insulin given once or twice daily (evening, or morning and evening).
- * Insulin dosage conventional therapy



Insulin can also be given by an insulin pump.

NB: Insulin requirements can decrease transiently following the initiation of insulin treatment.

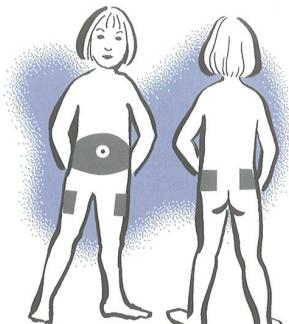
- It is important to advise the family of the transient nature of the honeymoon phase to avoid the false hope that diabetes is spontaneously disappearing.

Mixing Insulins in the same syringe

The short-acting insulin is generally drawn into the syringe first. If the intermediate-acting insulin is a "cloudy" insulin, mix by tipping the vial/bottle up and down 10 – 20 times. Do not shake the insulin as this damages the insulin.

Injection sites

Recommended sites for insulin injection



Insulin storage

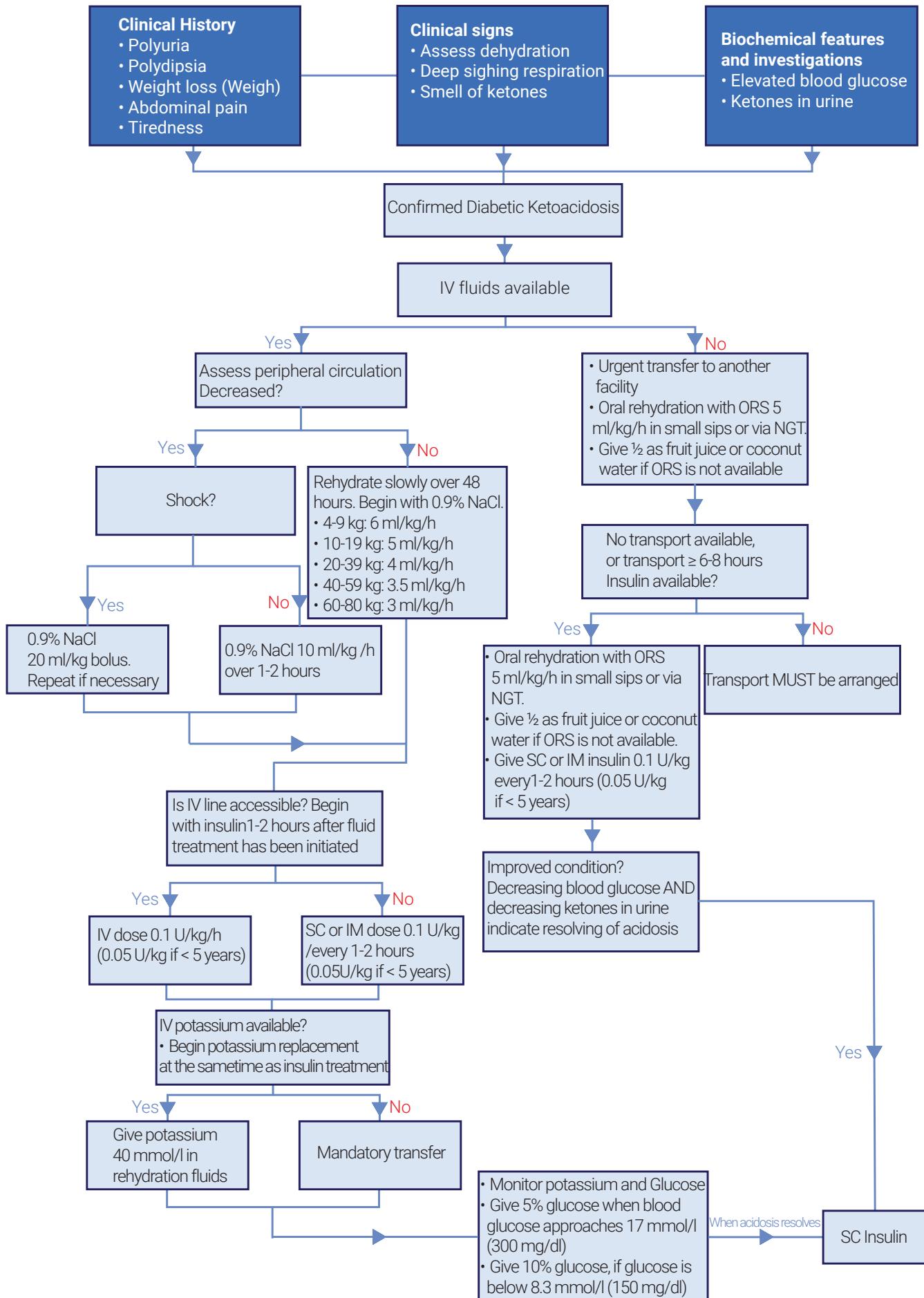
1. Unused insulin should be stored at 4-8°C in a refrigerator.
2. Insulin must never be frozen.
3. Direct sunlight or extreme heat (in hot climates or a vehicle) damages insulin.
4. Patients should not use insulins that have changed in appearance (clumping, frosting, precipitation, or discoloration).
5. After the first usage, an insulin vial should be discarded after 3 months if kept at 2-8°C or 4 weeks if kept at room temperature.

III.E.2 Management of Diabetic Ketoacidosis (DKA)

The biochemical criteria for DKA Diagnosis are:

- Hyperglycaemia (blood glucose >11mmol/l (~200 mg/dl)). In rare cases, blood glucose can be < 11 mmol/l; "euglycemic ketoacidosis"
- Venous pH <7.3 or bicarbonate <18 mmol/l
- Ketonaemia and ketonuria

Figure 27: DKA Management - Limited Care Settings



- Cerebral edema is the most common complication of DKA. It should be managed in ICU
- The treatment involves the use of mannitol and most of the time requires mechanical ventilation

III.E.3 Management of Hypoglycaemia and Hyperglycaemia

III.E.3.1 Hypoglycemia

Definition

Hypoglycemia occurs when the blood glucose level is $\leq 3.9 \text{ mmol/L}$ (70 mg/dl) or where there are symptoms of a hypo at a level close to this.

Causes

The main causes of hypoglycemia are:

- Delayed or missed meals (review reasons for this)
- Physical activity (where possible BGL should be checked prior to exercise, and extra carbohydrates should be eaten based on the BGL and the expected intensity and duration of the exercise).
- Not eating enough carbohydrates (assess timing, amount, and peak glucose effect of food eaten)
- Too much insulin (assess insulin profile, time of administration, peak and intensity of action)

Symptoms

Clinical Symptoms	Symptoms of Neuroglycopenia
Trembling/shaking	Inability to concentrate
Rapid heart rate	Blurred or double vision
Palpitations	Slurred speech
Sweating	Confusion/vagueness
Pallor	Dizziness/unsteady gait
Hunger	Loss of consciousness
Nausea	Seizures

Mild Hypoglycaemia occurs when the patient can recognize hypoglycemia and is able to self-treat without the assistance of others. BGL is $\leq 3.9 \text{ mmol/L}$ or $\leq 70 \text{ mg/dl}$.

Severe Hypoglycaemia is when the patient either loses consciousness has a seizure associated with low blood glucose or is unable to help him/herself.

Treatment of Hypoglycemia

Always stay with the person with hypoglycemia

Step 1

- Give fast-acting glucose immediately.
 - > 1/2 a cup of a sweet drink (fruit juice) or
 - > 3-4 teaspoons of sugar or honey

Step 2

- * If hypoglycemia is caused by a missed meal (but insulin has been taken as usual), follow with a meal including an appropriate amount of carbohydrates.

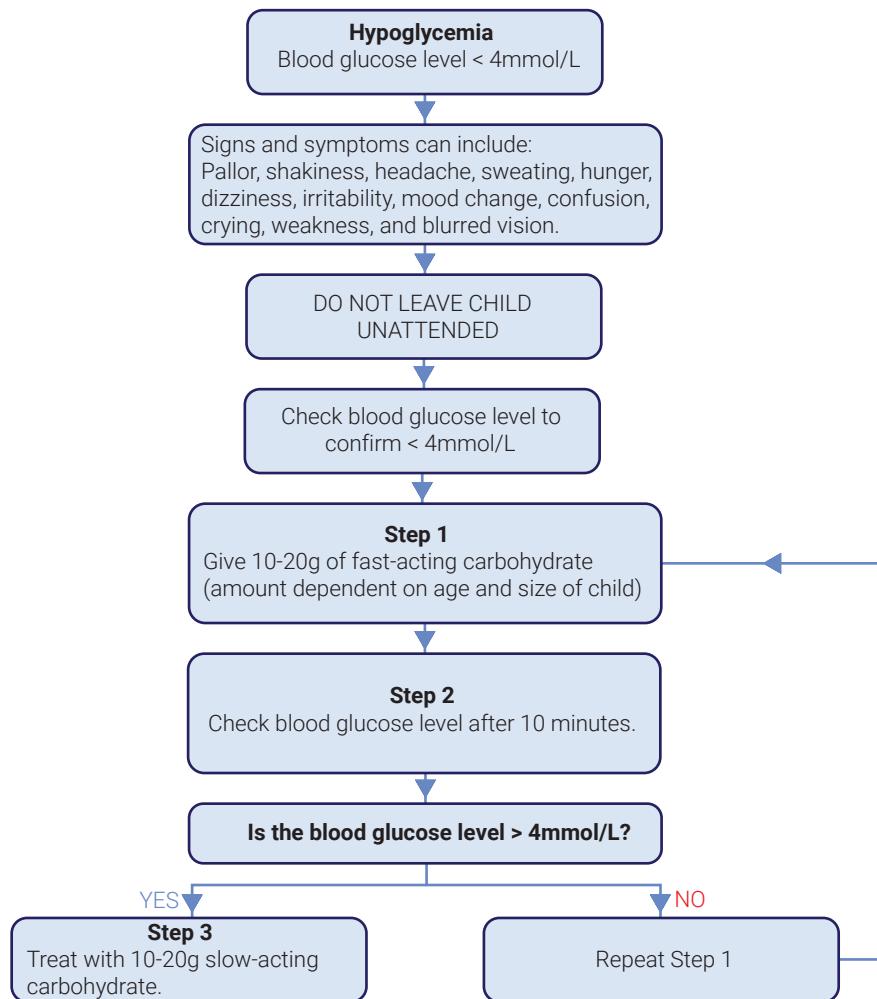
Where BG testing equipment is available, re-test blood glucose 10-15 minutes after treatment, to confirm the BGL is within normal limits ($> 100 \text{ mg/dl}$, 5.6 mmol/l). If the BGL remains low or symptoms persist, repeat Step 1.

If the patient is unconscious or convulsing and unable to take anything by mouth, lie them on their side and keep their airway clear – i.e., the ABC of resuscitation – airway, breathing, circulation.

Severe hypoglycemia with loss of consciousness ± convulsions (or if the child is vomiting)

- In the ambulatory setting SC or IM glucagon should be given (1 mg for children > 25kg and 0.5 mg for children < 25kg).
- In a hospital setting, IV glucose (10% dextrose, 2ml/kg) can be administered and should be given carefully and slowly over several minutes.

Figure 28: Algorithm for management of hypoglycemia in children



III.E.3.1 Hyperglycemia in a child who is not sick.

	Criteria for admission
<p>Hyperglycaemia can be treated with small doses of extra rapid-acting insulin. Give 10% of the child's usual total meal dose, rounded off to the nearest half or full unit. Adequate fluid intake is paramount. Elevated blood glucose results with moderate or large amounts of ketones. Give: 10-20% of a total daily dose of insulin as rapid-acting insulin repeated every 2-4 hours.</p> <p>When vomiting occurs in a child with diabetes, it should always be considered a sign of insulin deficiency (impending ketoacidosis) until proven otherwise. Strenuous exercise should be avoided.</p>	<p>In the presence of any of these:</p> <ul style="list-style-type: none"> • Very young children with diabetes, who may become dehydrated more rapidly than older children or adolescents. • Nausea or vomiting that prevents the child from drinking. • Parent's inability to check blood glucose at home • If supportive care cannot be ensured at home • If the acute illness is severe • If there is persistent ketonuria.

Consider transferring to an appropriate setting (well-equipped and available skill) if the child is not showing improvement.

Blood Glucose Monitoring

- Blood glucose monitoring should ideally be carried out 4-6 times a day,
- Urine glucose testing may be used as an alternative to blood glucose testing but provides less information.
- Ideally a record should be kept of blood glucose tests.

Recommended target blood glucose levels:

Before meals	4-7 mmol/l (72-126 mg/dl)
After meals	5-10 mmol/l (90-180 mg/dl)
At bed time	6-10 mmol/l (108-180 mg/dl)
At 3am	5-8 mmol/l (90-144 mg/dl)

When to Test Blood Glucose Levels (BGLs)

- Patterns of BGLs are generally more useful than single blood glucose readings, however, two tests per week are better than no tests at all. Should test strips be scarce, it is best to test at different times of the day a few days a week rather than the same time each day.

HbA1c

- HbA1c (glycated hemoglobin) provides information about average blood glucose levels over the last 2-3 months.
- Ideally HbA1c is measured four times per year.
- The target HbA1c for all age groups is a value less than 7.5% (58 mmol/mol).

Nutritional Management (including diabetic plate)	Diabetes Education
<ul style="list-style-type: none">• Children with diabetes need a healthy diet with food in amounts and proportions appropriate to the age and stage of growth.• Encourage the child to take the right dose of insulin for the right type and amount of food, and to eat the right amounts for that dose of insulin, at the right time.• Excessive restriction of carbohydrate intake to lower blood glucose levels should be avoided.• Prevention and management of hypoglycemia, particularly before, during, and after exercise should be addressed, especially in school settings.• Ideally there should be an experienced pediatric dietitian in the diabetes team.• Unexpected weight loss may be a sign of 1) illness (infections, coeliac disease etc.), 2) insulin omission, or 3) disordered eating.	<ul style="list-style-type: none">• We recommend peer education and support groups for diabetic children to learn from each other and exchange experiences.• Initial learning, started as soon as possible after diagnosis, should include simple, knowledge-based education and practical survival skills.• Myths and false beliefs surrounding diabetes (e.g., "catching" diabetes or diabetes caused by eating too many sweets) should be dispelled at diagnosis.• Diabetes education is most effective when based on self-management and is child- and parent-centred.• Where possible, diabetes education should be delivered by a multidisciplinary team (a doctor, nurse, dietitian, psychologist, social worker)• 24-hour telephone support should be provided.

Diabetes and Adolescence	Diabetes and School
<ul style="list-style-type: none">• Adolescence is a challenging period that brings many changes to the young person's life - physically, psychologically, and socially.• Adolescence and diabetes can be an uneasy mix, with diabetes seen as interference.• As adolescents assume increasing self-care and responsibility for their diabetes management, it is important for parents to take less of the initiative and assume a more secondary supporting role.• Giving too much or less responsibility must be avoided.• Encourage them to join diabetes camps and other group work targeting coping skills.• Alcohol consumption can increase the risk of and make it difficult to recognize the symptoms of hypoglycemia and should be discouraged.• Smoking causes an increased risk of complications and should be strongly discouraged.• Transition to adult care - All over the world, many youths with diabetes are lost to care for a period when transitioning from a pediatric to an adult clinic. It is crucial that every diabetes service finds effective local solutions for this problem.	<ul style="list-style-type: none">• Communicate clearly with the school and the child's teachers about the child's condition.• A simple individualized management plan should be developed as a guide to the school staff for managing the child at school.• Younger children require additional assistance and supervision in the school setting as they face a range of tasks and problems that are beyond their level of cognitive development.• School staff must be aware of the risk of hypoglycemia - symptoms, immediate treatment, and possible re-treatment - and that appropriate hypotreatment is always with the child.• Children may need to test their blood glucose prior to, during, and after physical activity be alert for signs of hypoglycemia, and receive immediate treatment.• Children may need to take insulin at school and are entitled to appropriate help in doing this.• Should a high blood glucose level (>15 mmol/l) occur, the child should be encouraged to drink water and may need to pass urine more frequently. Parents should be contacted by phone for advice regarding extra insulin.• Preparation for exams may be required such as taking the meter and strips into the room, carrying a hypo kit, and water being readily available. If there is hypoglycemia or pronounced hyperglycemia (>20 mmol/l, 360 mg/dl), the child's cognition and performance are negatively affected, and the child should be offered to redo the test another day.

References

1. ISPAD Clinical Practice Consensus Guidelines 2022.



SECTION IV: NEPHROLOGY

IV.A Adult Nephrology

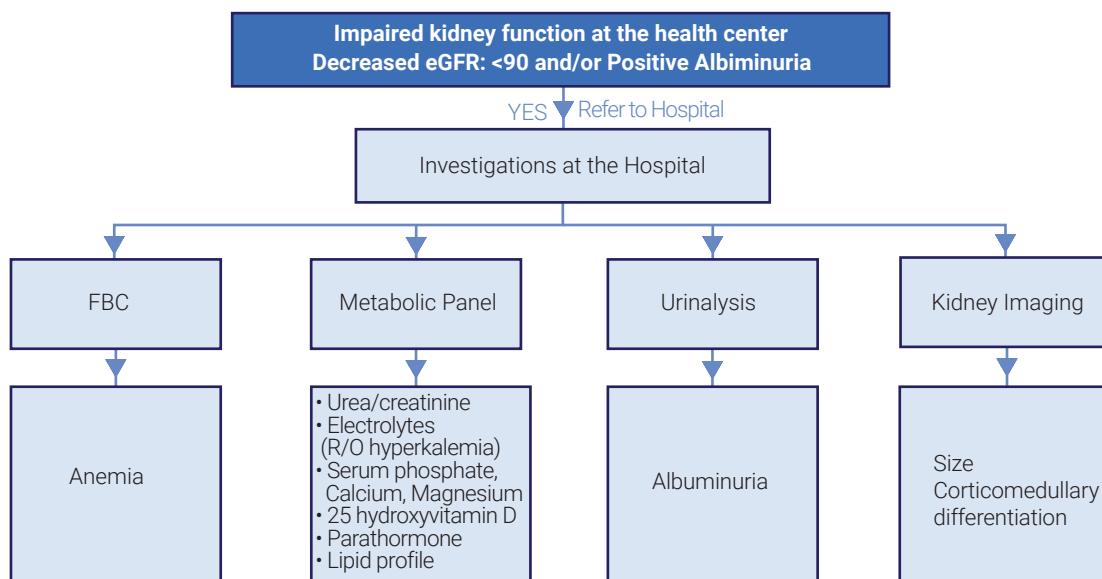
IV.A.1 Chronic Kidney Disease

Chronic kidney disease (CKD) is defined as abnormalities of kidney structure or function, present for > 3 months, with health implications.

Some of the risk factors of CKD include hypertension, diabetes, AKI, autoimmune diseases, urinary tract obstruction, drug toxicity, glomerular and vascular diseases, etc.

IV.A.1.1 Approach to a Patient with Chronic Kidney Disease

Figure 29: Simplified approach to a patient with Chronic Kidney Disease



Glomerular filtration rate estimation

CKD staging, done based on Glomerular filtration rate (eGFR), usually expressed in terms of milliliters per minute, is the volume of serum cleared by the kidneys and depends on age and body size. We recommend calculation based on e-GFR by CKD Epi equation in adults or Cockcroft-Gault equation.

$$\text{Cockcroft-Gault equation (ml/min): CrCl} = \frac{(140-\text{Age}) \times \text{Weight (kg)}}{\text{Cr(mg/dl)} \times 72}$$

* For women multiply by 0.85

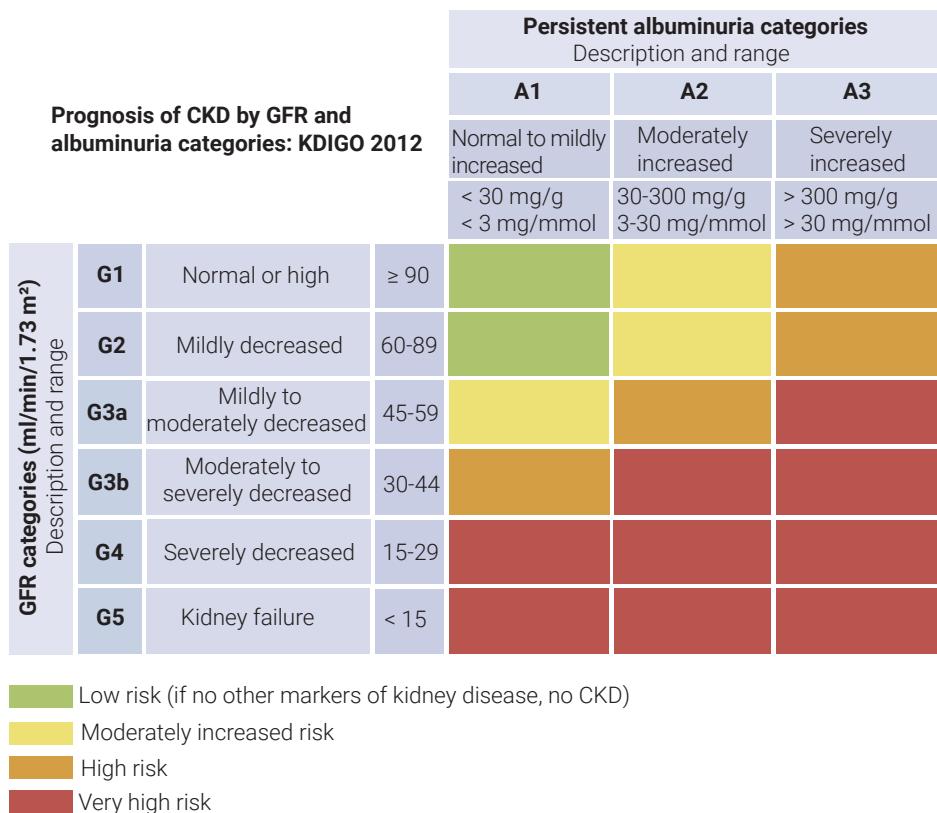


Classification and staging of CKD

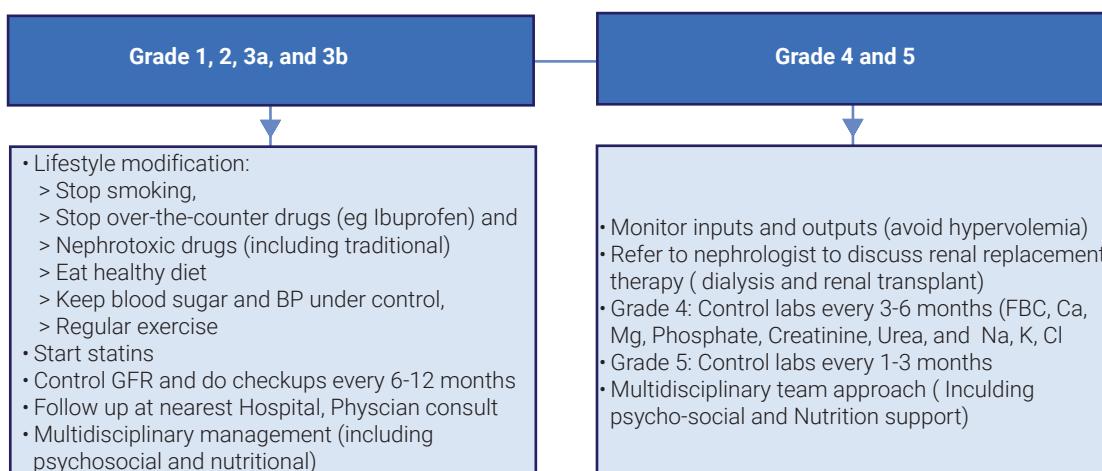
Figure 30: Chronic Kidney Diseases staging

Current Chronic Kidney Disease (CKD) nomenclature used by KDIGO.

CKD is classified based on Cause, GFR category (G1- G5), and Albuminuria category (A1- A3), abbreviated as CGA.



IV.A.1.2 Management of CKD per stage



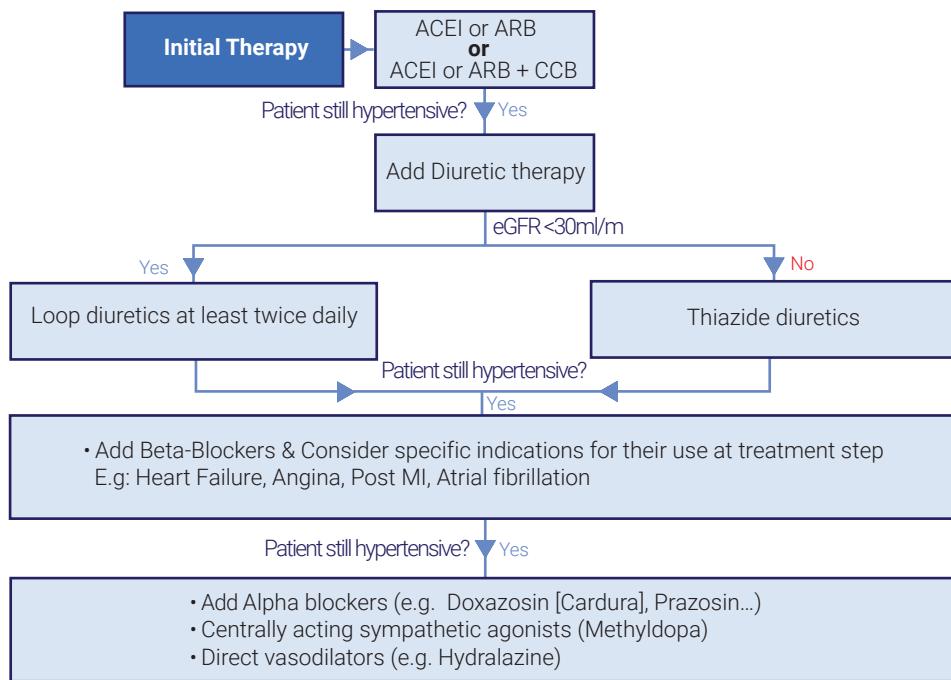
IV.A.1.3 Management of Comorbidities

1. Hypertension

80-85% of patients with CKD have hypertension, prevalence increases with a fall in GFR,

Targets tailored to patients 'age, comorbidities, medications tolerability, and side effects,

Figure 31: Algorithm for Hypertension Management in CKD Patient



*ACEI/ARB are first line in proteinuric CKD with proteinuria excretion of >500mg/dl as they slow CKD progression.
**Hold ACEIs or ARBs when eGFR < 20 ml/min (may induce hyperkalemia).

2. Diabetes

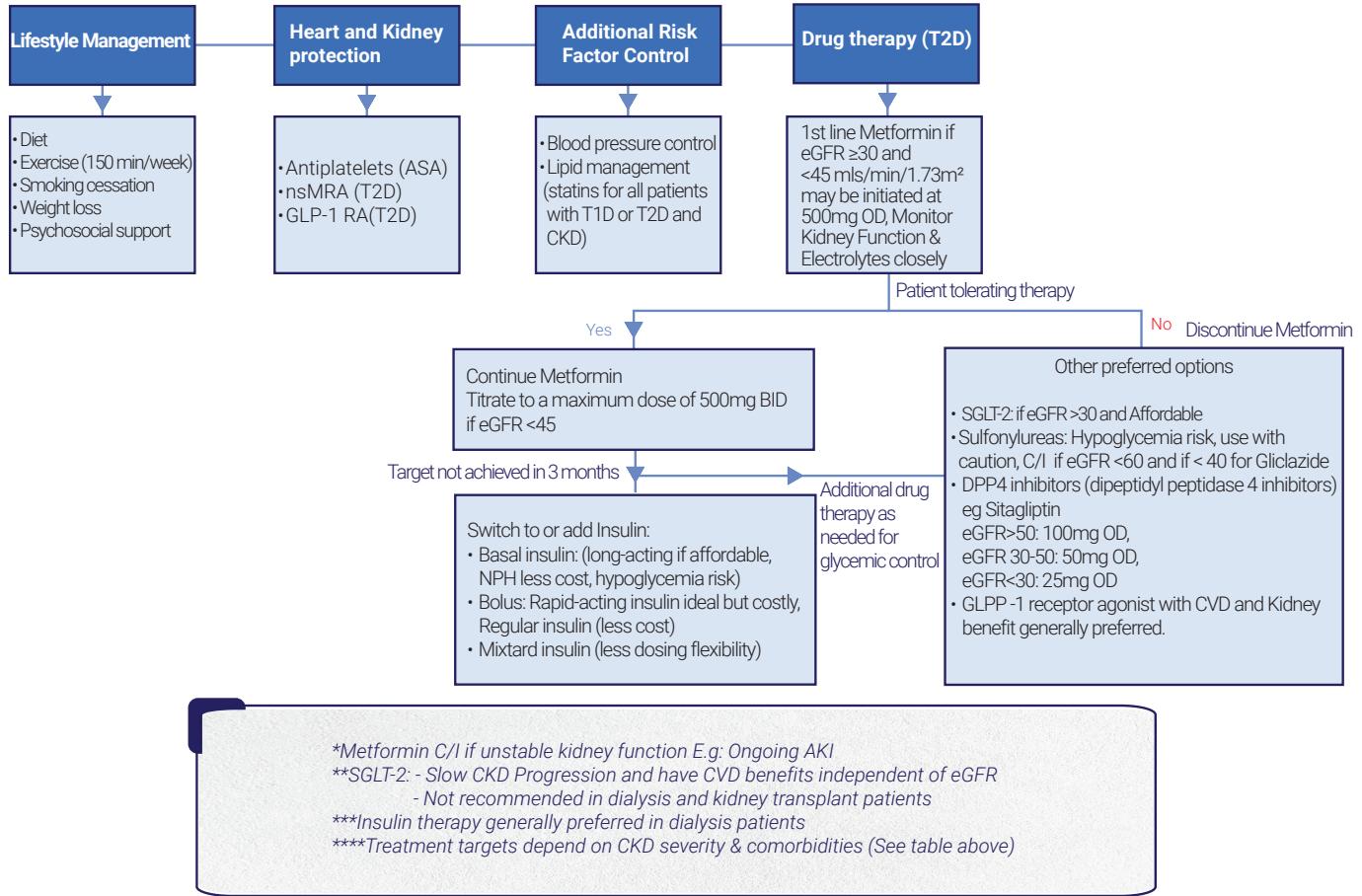
Glycemia monitoring and treatment targets

- HbA1c monitoring can be done twice a year or up to 4 times a year if not at goal or if there was a medication change.
- HbA1c measurement reliability reduces with advanced CKD (G4-G5), especially in dialysis patients.
- If HbA1c cannot be relied on, self-glucose monitoring can be done to prevent hypoglycemia.

Table 8. HbA_{1c} goals in CKD

Complications severity	Target HbA _{1c} < 6.5%	Target HbA _{1c} < 7%
Severity of ckd	CKD G1	CKD G5
Macro-vascular complications	Absent/minor	Present/severe
Comorbidities	Few	Many
Life expectancy	Long	Short
Hypoglycemia awareness	Present	Impaired
Resources for hypoglycemia management	Available	Scarce
Tendency of treatment to cause hypoglycemia	Low	High

Figure 32: Algorithm for the management of a patient with Diabetes and CKD.



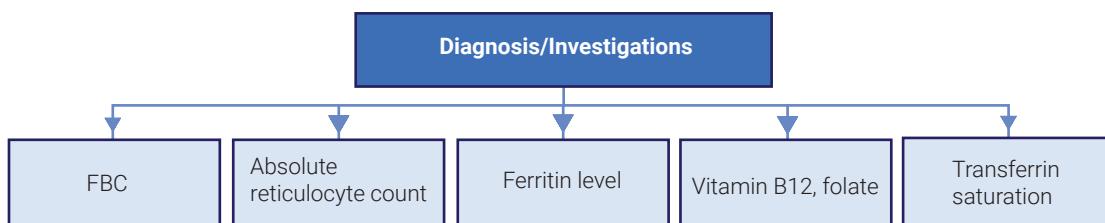
HIV and Hep B	HEPATITIS C
<ul style="list-style-type: none"> Do not give TDF if GFR<50min/ml, If hep B and CKD, give Entecavir (CrCl $\geq 50 \text{ mL/min}$: No dosage adjustment required > CrCl 30-49 mL/min: Reduce to 0.25 mg/day or 0.5 mg q48hr > CrCl 10-29 mL/min: Reduce to 0.15 mg/day or 0.5 mg q72hr > CrCl <10 mL/min, hemodialysis, or CAPD: 0.05 mg/day or 0.5 mg every 7 days 	<ul style="list-style-type: none"> Sofosbuvir (400mg) + Ledipasvir (90mg) Renal function should be monitored when SOF+LDV is given with TDF/TAF because this combination increases plasma levels of TDF/TAF SOF+LDV can be used in patients with eGFR $>30 \text{ ml/min}$.

IV.A.1.4 Complications Management

Approach to anemia in CKD

Anemia is defined as a Hb concentration $< 13.0 \text{ g/dL}$ for adult males and postmenopausal women, and an Hb $< 12 \text{ g/dL}$ for premenopausal women.

Anemia is a common complication of CKD due to repetitive blood sampling; blood loss and hemolysis; chronic inflammation; hyperparathyroidism and bone marrow fibrosis; shortened RBCs survival; Iron deficiency and relative erythropoietin deficiency.





Management of anemia in CKD

Blood transfusion for the management of anemia in CKD

Blood transfusion is rarely administered and must be avoided in anemia of CKD except in the following circumstances:

1. When rapid correction of anemia is required to stabilize the patient's condition e.g. acute Hemorrhage, unstable myocardial ischemia
2. When rapid pre-operative Hb correction is required
3. Symptomatic anemia with ESA resistance
4. Symptomatic anemia in which the risks of ESA therapy may outweigh the benefits

NB : Use leucocyte filter during transfusion if available to prevent rejection in potential transplant candidates

Figure 33: Algorithm for Iron Supplementation

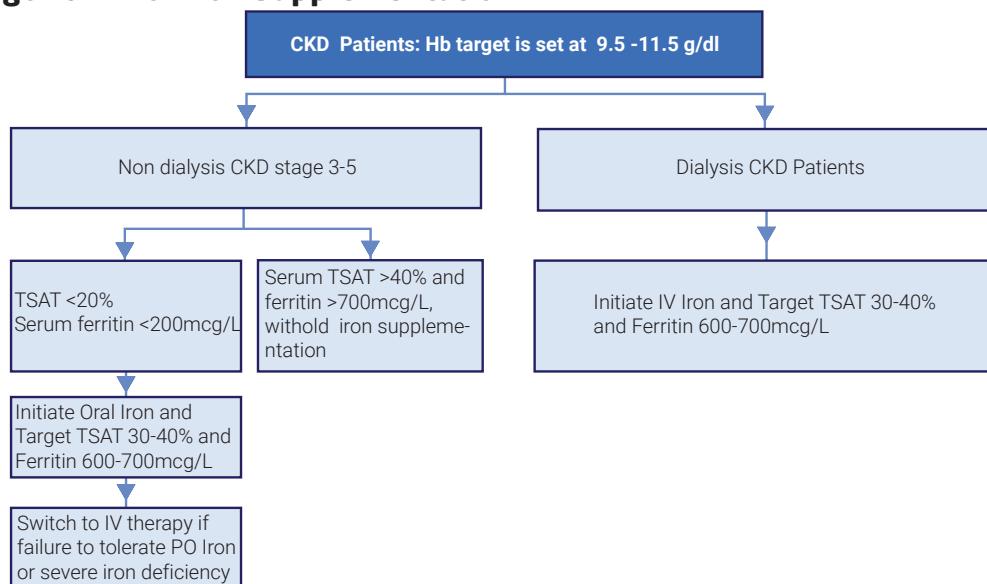
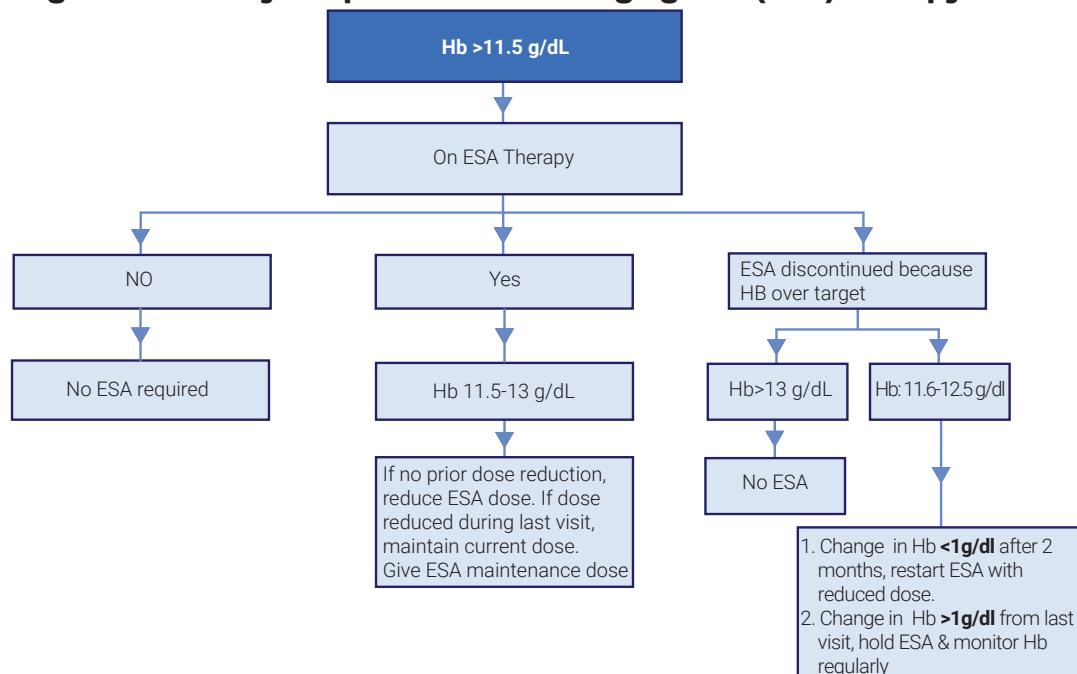


Figure 34: Algorithm for Erythropoiesis stimulating agents (ESA) therapy





Mineral bone disorder management

A systemic disorder of mineral and bone metabolism due to CKD manifested by either one or a combination of the following:

1. Abnormalities of calcium, phosphorus, Parathyroid Hormone (PTH), or vitamin D metabolism.
2. Abnormalities in bone turnover, mineralization, volume linear growth, strength, vascular or other soft-tissue calcification.

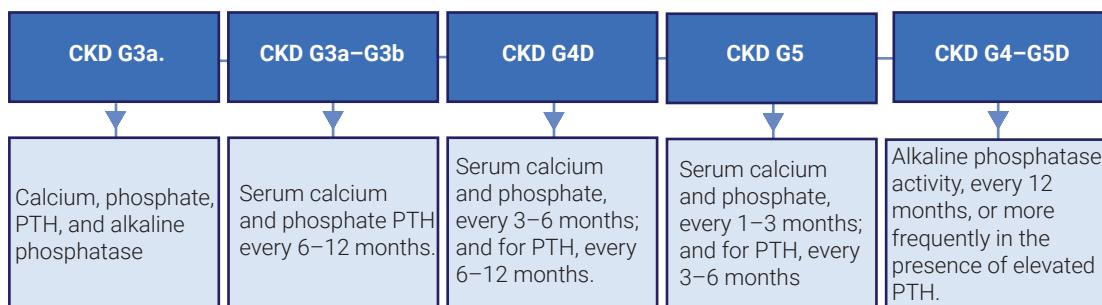
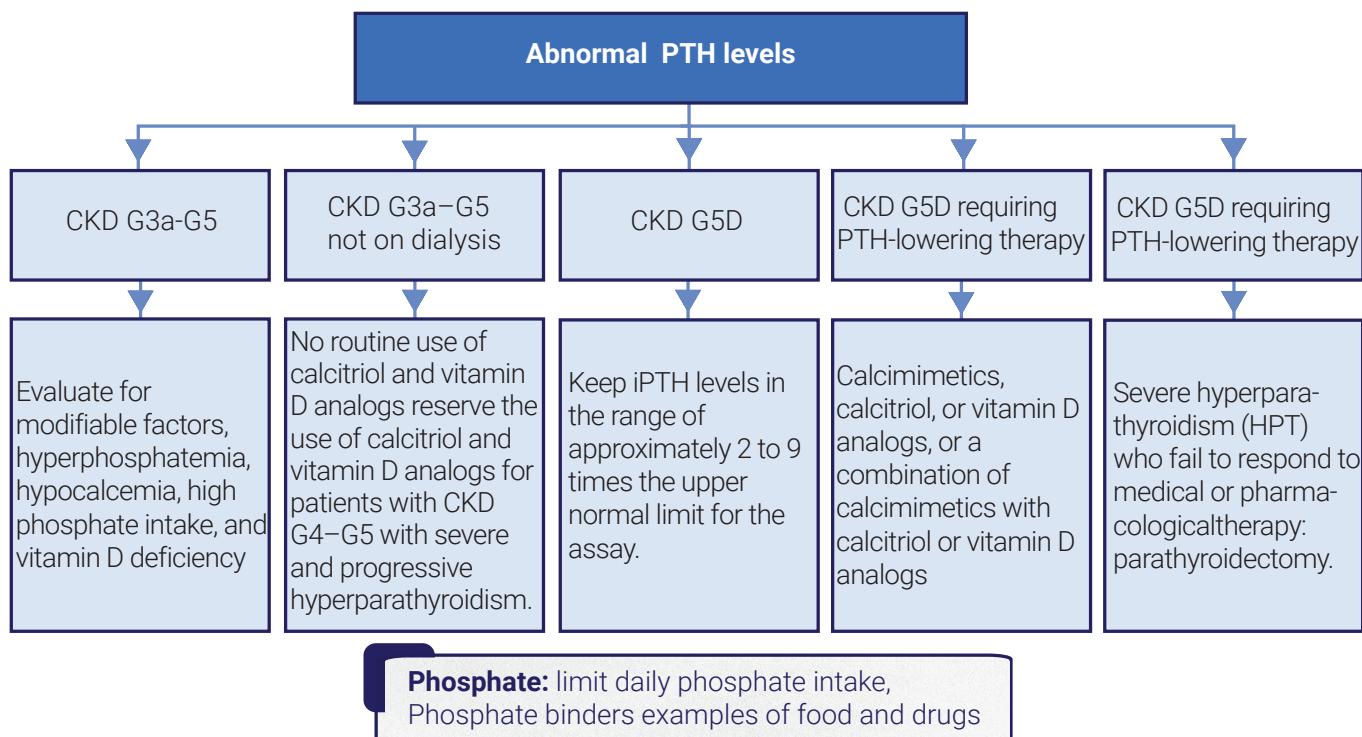
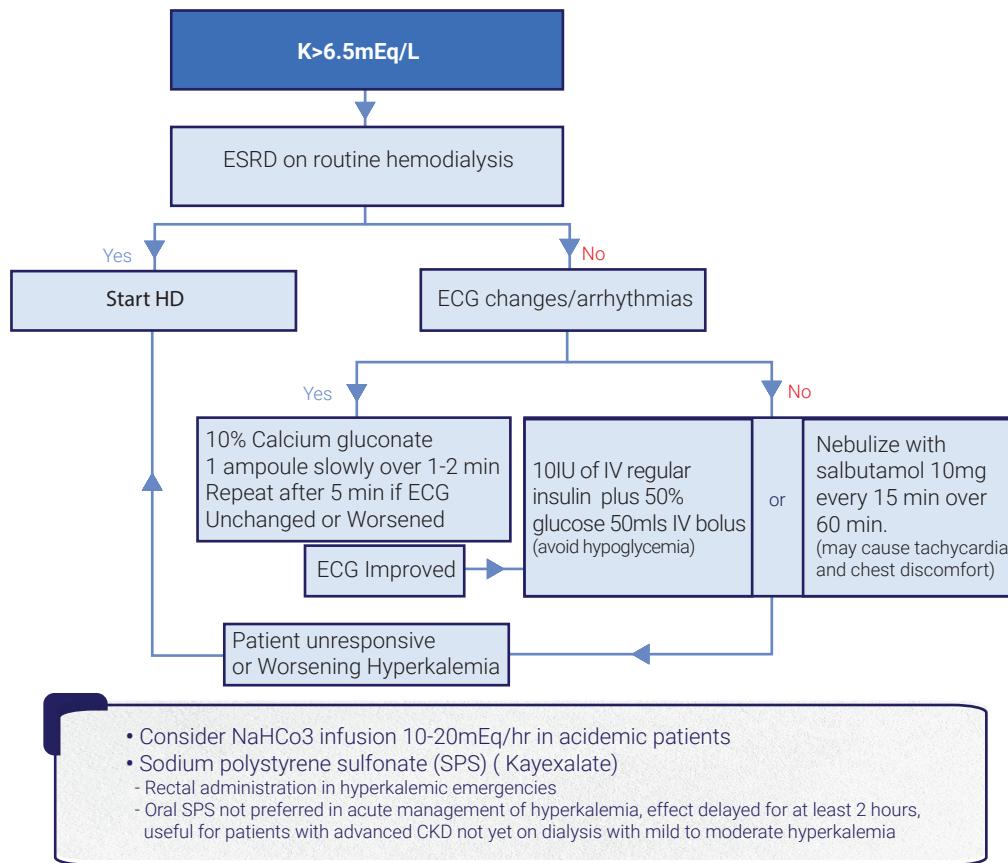


Figure 35: Algorithm for Management of bone mineral disorder



IV.A.1.5 Electrolytes Imbalances: Hyperkalemia

Figure 36: Algorithm for management of hyperkalemia



IV.A.1.6 Management of Patients Post Renal Transplant

1. Recipient

Kidney transplantation is the treatment of choice for patients with end stage renal disease. However transplant recipients require close follow up since they are on complex immunosuppressive regimens that render them susceptible to infection, malignancy and cardiovascular disease in addition to existing comorbidities due to or as a cause of underlying end stage renal disease. Patients **should not** be given any live or live attenuated vaccines after transplantation. The frequency of follow up varies among centers and depends upon the stability of the patient.

Table 9. Follow-up of postrenal transplant patients

Frequency of follow up in transplant clinic	Planned activities by Nephrologist
Twice weekly for the first month	FBC , FBS/RBS, U&E, CMP, Calcineurin (CNI) level, liver function tests, urinalysis
Biweekly for the second and third month	FBC, FBS/RBS, U&E, CMP, Calcineurin (CNI) level, liver function tests, urinalysis
Monthly for fourth month to one year	FBC, FBS/RBS, U&E, CMP, Calcineurin (CNI) level, liver function tests, urinalysis
Bimonthly for the second year	FBC, FBS/RBS, U&E, CMP, Calcineurin (CNI) level, liver function tests, urinalysis, lipids
Once every 3 months for third year onwards	FBC, FBS/RBS, U&E, CMP, Calcineurin (CNI) level, liver function tests, urinalysis, urine protein to creatinine ratio, lipids

*Critical values that must be communicated with the consultant nephrologist

Table 10. Alerting laboratory values in CKD

Time interval	Tacrolimus level	Alert value
0-30 days	8-10	<6 or >12
>30days	6-8	<5 or >10

Laboratory	Alert value
White blood cell	<2,000
Absolute neutrophil count	<1,000
Hemoglobin	< 7 Grams/dL
Platelet	<50,000
Serum Potassium	<2.5 meq/L or >6 meq/L
Serum Sodium	<12meq/L or >148 meq/L
Random Blood Sugar	>350mg/dL
Serum Creatinine	Increase in serum creat by >0.3mg/dL from baseline

2. Living Kidney Donor

Living kidney donors should be monitored for long term risk for developing hypertension and CKD for early detection and proper medical management. Parameters to monitor: BP, e-GFR, Albuminuria, overall health status & well-being.

Table 11. Follow-up plan for Kidney donor

Frequency of follow-up	Planned activity
Two weeks after donor nephrectomy	Transplant surgeon review
Six months after donor nephrectomy	Nephrologist review
Annually for life	Post-donation annual reassessment care focusing on: 1. BP, BMI, serum Creatinine with e-GFR, Albuminuria, fasting glucose &A1C. 2. Review and promotion of healthy lifestyle practices including exercise, diet, and avoidance of smoking. 3. Review of psychosocial health and well-being as it relates to their kidney donation experience.

Denotations

ACEI: Angiotensin-converting enzyme inhibitor, **AKI:** Acute kidney injury, **ARB:** Angiotensin receptor blocker, **ASA:** Aspirin, **BMI:** Body Mass Index, **CAD:** coronary artery disease, **CHF:** Congestive heart failure, **CKD:** Chronic kidney disease, **CMP:** complete metabolic panel, **CMP:** Complete Metabolic Panel, **CNI:** Calcineurin, **eGFR:** estimated glomerular filtration rate, **ESA:** Erythropoiesis stimulating agents, **FBC:** Full Blood Count, **FBS:** fasting blood sugar, **GLP-1 RA:** Glucagon-like peptide-1 receptor agonist, **HbA1c:** glycated hemoglobin, **nsMRA:** non-steroidal mineralocorticoid receptor antagonists, **RBS:** random blood sugar, **SGLT2i:** Sodium-glucose cotransporter 2 inhibitors, **T1D:** Type 1 diabetes, **T2D:** Type 2 diabetes, **TDF:** Tenofovir, **TSAT:** Transferrin saturation, the ratio of serum iron to total iron-binding capacity, **U&E:** urea, creatine, and electrolytes

References

1. Rossing P, Caramori ML, Chan JCN, Heerspink HJL, Hurst C, Khunti K, et al. Executive summary of the KDIGO 2022 Clinical Practice Guideline for Diabetes Management in Chronic Kidney Disease: an update based on rapidly emerging new evidence. *Kidney Int.* 2022 Nov 1;102(5):990-9.
2. Cheung AK, Chang TI, Cushman WC, Furth SL, Hou FF, Ix JH, et al. KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease. *Kidney Int.* 2021 Mar 1;99(3):S1-87.
3. Hahr AJ, Molitch ME. Management of Diabetes Mellitus in Patients With CKD: Core Curriculum 2022. Vol. 79, American Journal of Kidney Diseases. W.B. Saunders; 2022. p. 728-36.
4. Ikizler TA, Burrowes JD, Byham-Gray LD, Campbell KL, Carrero JJ, Chan W, et al. KDOQI Clinical Practice Guideline for Nutrition in CKD: 2020 Update. *American Journal of Kidney Diseases.* 2020 Sep 1;76(3):S1-107.
5. Ali S, Dave N, Virani SS, Navaneethan SD. Primary and Secondary Prevention of Cardiovascular Disease in Patients with Chronic Kidney Disease. Vol. 21, Current Atherosclerosis Reports. Current Medicine Group LLC 1; 2019.
6. British National society, guidelines for living donor kidney transplantation 2018
7. Ministry of health of Rwanda clinical guideline for living donor kidney transplantation 2022

IV.B Pediatric Nephrology

IV.B.1 Chronic Kidney Disease in Children

1. Definition

Chronic Kidney Disease (CKD) is defined by the following criteria:

(1) Kidney damage for ≥ 3 months, as evidenced by structural or functional abnormalities of the kidney, with or without decreased GFR, manifested by 1 or more of the following features: <ul style="list-style-type: none">• Abnormalities in the composition of the blood or urine• Abnormalities in imaging tests• Abnormalities on kidney biopsy (2) GFR $< 60 \text{ mL/min}/1.73 \text{ m}^2$ for ≥ 3 mo., with or without the other signs of kidney damage described above	 <ul style="list-style-type: none">• It is crucial to recognize children in the early stages of CKD for optimal evaluation and care.• Monitoring a child with CKD regularly provides an opportunity to control factors that can aggravate the progression of CKD.• The main treatable causes of CKD in children in developing countries are Urinary tract abnormalities, Acute kidney injury, and nephrotic syndrome.• The management of these diseases will be discussed separately.
---	---

2. Causes of CKD

The cause should be identified for planning management strategies and prognosis.

- Major causes of CKD in children are Congenital abnormalities of the kidney and urinary tract, reflux nephropathy, inherited disorders, glomerular diseases, renal stone, secondary to AKI, and Hemolytic Uremic Syndrome /thrombotic microangiopathy.

In < 5 years of age	In > 5 years of age
<ul style="list-style-type: none">• Congenital malformations:<ul style="list-style-type: none">> Hypoplastic/dysplastic kidneys> Reflux nephropathy> Obstructive uropathy> Posterior urethral valves• Metabolic/genetic disorders:<ul style="list-style-type: none">> Oxalosis> Polycystic kidney disease> Congenital nephrotic syndrome> Wilms' tumor 	<ul style="list-style-type: none">• Glomerular disease:<ul style="list-style-type: none">> Focal segmental glomerulosclerosis> Hemolytic uremic syndrome> Chronic glomerulonephritis> Alport's syndrome• Tubulointerstitial disease:<ul style="list-style-type: none">> Chronic tubulointerstitial nephritis> Cystinosis> Nephronophthisis> Nephrotoxic drugs   

3. Clinical presentation of CKD in children

 <p>High suspicion index of CKD</p> <ul style="list-style-type: none">• Abnormal renal imaging• Unexplained anemia• Failure to thrive, not explained by undernutrition or gastrointestinal disorders.• Bony deformities• Recurrent urinary infection• Polyuria• Systemic disease with known renal involvement• Hypertension• Persistent proteinuria and abnormal urine analysis	<p>Clinical Signs</p> <ul style="list-style-type: none">• Growth failure<ul style="list-style-type: none">> Inadequate caloric intake> Metabolic acidosis> Anemia> Chronic volume depletion> Anemia• Renal osteodystrophy• Hypertension• Hyperlipidemia• Cardiovascular problems<ul style="list-style-type: none">> Cardiomyopathy> Pericarditis> Arrhythmia due to fluid overload, Electrolyte disturbances• Neurological problems<ul style="list-style-type: none">> Headache> Seizures> Peripheral neuropathy• Bleeding tendency• Hyperkalemia• Hyponatremia• Hyperventilation• Renal concentration defect 
---	---

4. Classification of CKD

The CKD staging is done based on the Glomerular filtration rate (GFR) usually expressed in terms of milliliters per minute, which is the volume of serum cleared by the kidneys. It depends on age and body size.

CKD is classified into 5 stages according to estimated GFR.

Table 12. Classification of CKD in children

GFR Calculation

GFR (ml / min/ 1.73m²) calculation by Schwartz formula = k X Ht (cm) /Pcr (μmol/L)

GFR = 36.5 x height / serum creat in mmol

CKD Classification according to GFR

Stage	GFR	Features
1	≥90	Usually no symptoms,
2	60-89	Usually, no symptoms may develop biochemical imbalances
3	30-59	Biochemical abnormalities present, anemia, poor growth
4	15-29	More severe symptoms
5	<15	ESRD, Renal replacement therapy

5. Investigation and Diagnosis

Laboratory investigation	Imaging
 <ul style="list-style-type: none"> FBC Urinalysis, a 24-hour urine collection for protein excretion. Serum creatinine (estimation of GFR) Serum and urinary protein Electrolytes and CMP (Na+, Cl-, K+, Ca2+, Mg, P04) 	1. Renal ultrasound 
	Other Studies in selected cases <ol style="list-style-type: none"> Voiding cystourethrogram (VCUG) for suspicion of CAKUT (such as PUV's, VUR) MRI or CT-scan when better resolution and visualization than that provided by ultrasound is needed. A vascular imaging procedure: <ol style="list-style-type: none"> Doppler sonography of the renal arteries. Magnetic resonance angiography (MRA). Renal biopsy (usually indicated in glomerular diseases)

6. Approach to CKD Management

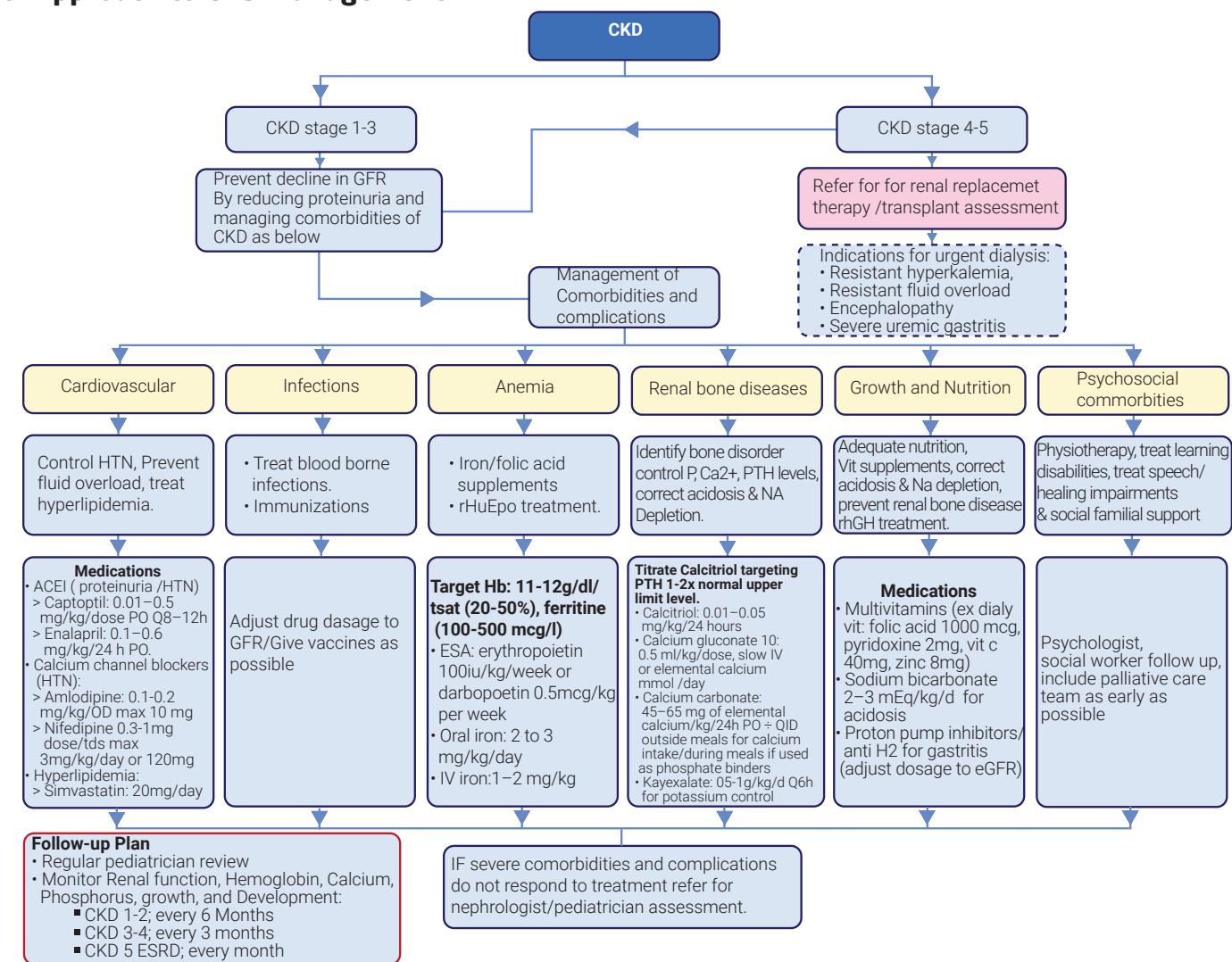


Figure 37: Algorithm for CKD Management in children



7. Conclusion

- CKD in children often presents with vague and subtle clinical manifestations.
- It is crucial to recognize children in early stages of CKD for optimal evaluation and care.
- Management of children with CKD calls for a multidisciplinary team approach.

Denotations

CAKUT: Congenital abnormalities of Kidney and Urinary tract, **TSAT:** Transferrin saturation, **VCUG:** Vesico-cystourography, **VUR:** Vesicouretralreflux

The rest see UTI section

References

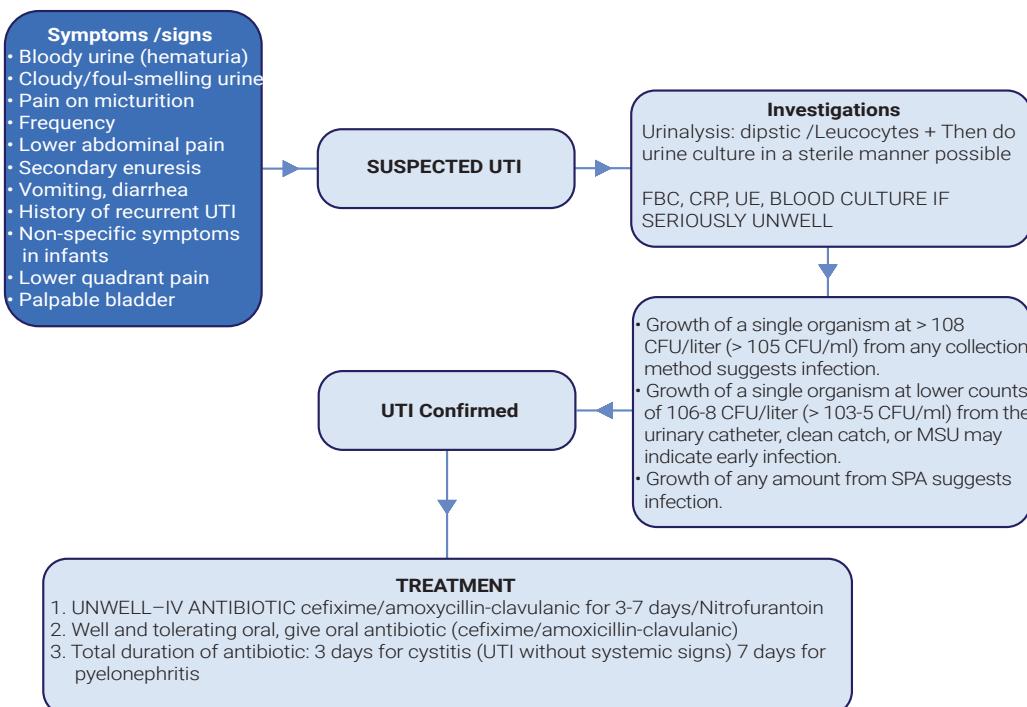
1. KDIGO CKD Work Group. Official Journal of the International Society of Nephrology, 2013. KDIGO 2012 Clinical Practice Guidelines for the Evaluation and Management of Chronic Kidney Disease.
2. Harambat J, van Stralen KJ, Kim JJ, Tizard EJ. Epidemiology of chronic kidney disease in children. Pediatric Nephrology. 2012.
3. Schwartz GJ, Munoz A, Schneider MF, Mak RH, Kaskel F, Warady BA, et al. New equations to estimate GFR in children with CKD. J Am Soc Nephrol. 2009.
4. Rees L, Brogan P, Bockenhauer D, Webb N. Chronic Kidney Disease. Paediatric Nephrology. 2nd Edition. Oxford: Oxford University Press 2012.
5. Wühl E, Trivelli A, Picca S, Litwin M, Peco-Antic A, Zurowska A, et al. Strict blood pressure control and renal failure progression in children. The ESCAPE Trial Group. N Engl J Med. 2009.
6. Flynn JT, Mitsnefes M, Pierce C, Cole SR, Parekh RS, Furth SL, et al. Blood pressure in children with chronic kidney disease: a report from the chronic kidney disease in Children Study. Hypertension. 2008.
7. KDOQI clinical practice guidelines for bone metabolism and disease in chronic kidney disease. Am J Kidney Dis. 2003 Oct.
8. KDIGO 2017 Clinical Practice Guideline Update for the Diagnosis, Evaluation, Prevention, and Treatment of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD). Kidney Int Suppl (2011). 2017 Jul.
9. Denburg MR, Kumar J, Jemielita T, Brooks ER, Skversky A, Portale AA, et al. Fracture Burden and Risk Factors in Childhood CKD: Results from the CKD Cohort Study. J Am Soc Nephrol. 2016 Feb.
10. Milliner DS, Zinsmeister AR, Lieberman E, Landing B. Soft tissue calcification in pediatric patients with end-stage renal disease. Kidney Int. 1990 Nov.
11. Prasad C, Cummings E. Rickets presenting as gross motor delay in twin girls. CMAJ. 2018.
12. Hruska KA, Choi ET, Memon I, Davis TK, Mathew S. Cardiovascular risk in chronic kidney disease (CKD): the CKD-mineral bone disorder (CKD-MBD). Pediatr Nephrol. 2010 Apr.

IV.B.2 Urinary tract infection (UTI) and urinary tract abnormalities

1. Introduction

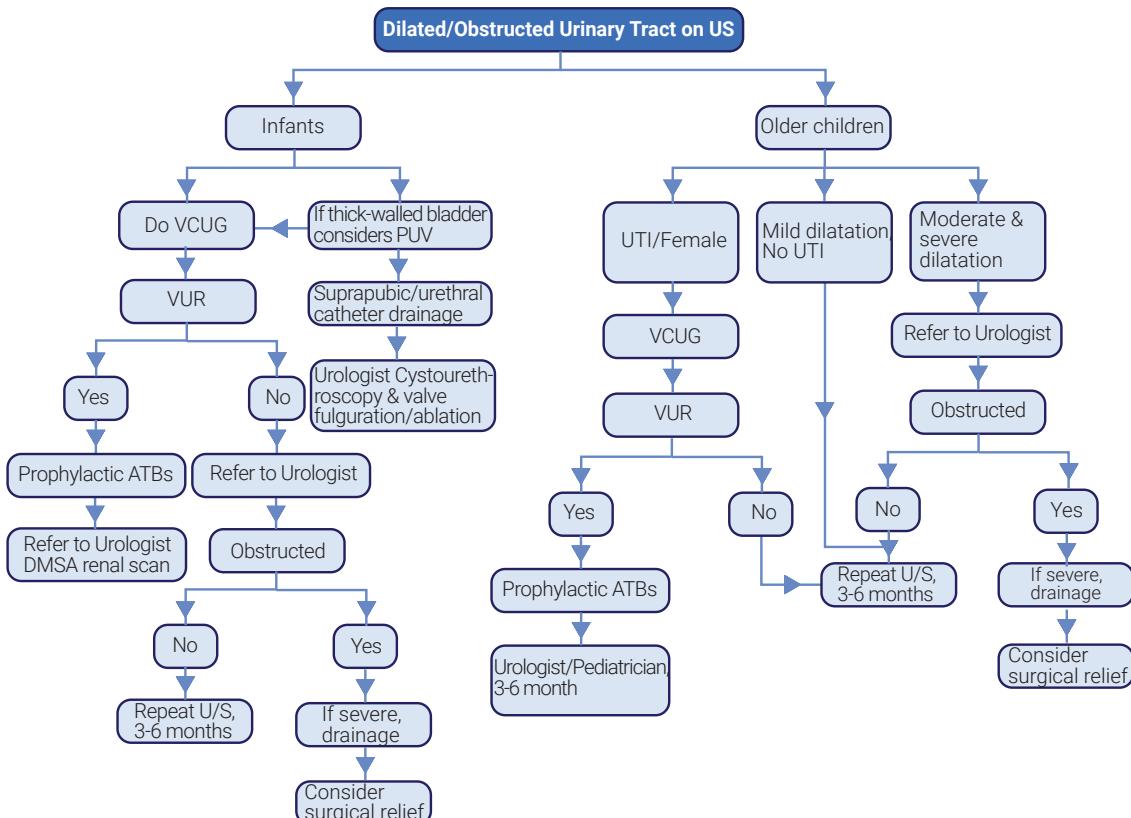
The majority of children and adolescents with chronic kidney disease have underlying kidney and urinary tract abnormalities. Most of these children present first with signs of UTI. Hence, timely investigations and proper management of children with UTI are paramount to prevent or delay CKD in children.

Figure 38: Algorithm for Urinary tract infection clinical presentation and management



2. Management of recurrent UTI and atypical UTI

In our clinical context, it is recommended to do an abdominal ultrasound to exclude congenital abnormalities and renal scarring in case of every documented UTI.





3. Conclusion

Congenital abnormalities are among major causes of kidney disease in children and adolescent.

ultrasound screening for congenital abnormalities screening is important for every child with UTI.

Denotations

CFU: Colony Forming Unit, **Cystitis:** UTI without systemic signs, **PUV:** Posterior Urethral Valve, **Pyelonephritis:** UTI with systemic signs, **VCUG:** Vesico-Cysto-Ureterography, **VUR:** Vesicourethral Reflux

References

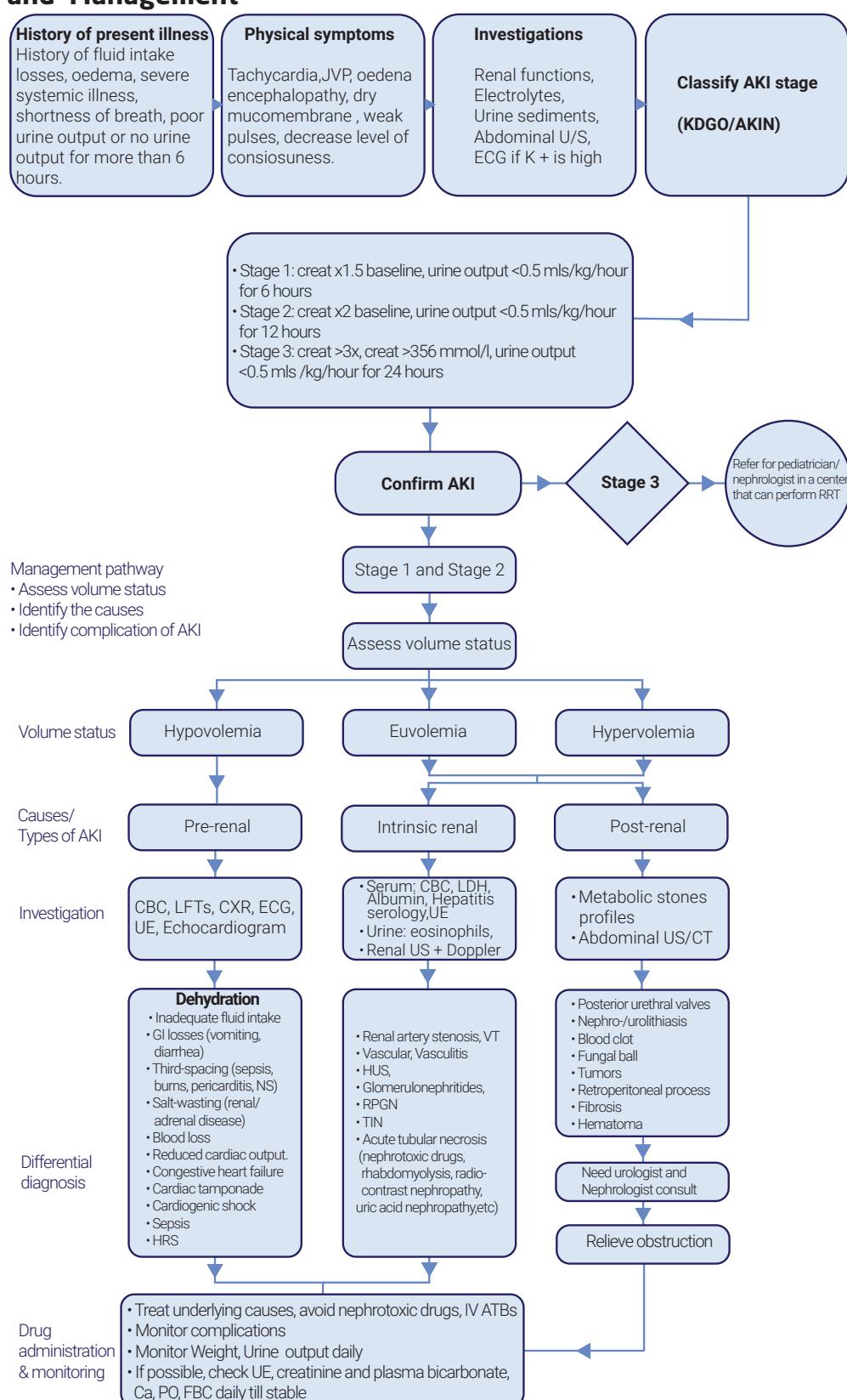
1. Hoberman A, Chao HP, Keller DM, Hickey R, Davis HW, Ellis D. Prevalence of urinary tract infection in febrile infants. *J Pediatr* 1993;123:17-23. [https://doi.org/10.1016/S0022-3476\(05\)81531-8](https://doi.org/10.1016/S0022-3476(05)81531-8).
2. Keren R, Shaikh N, Pohl H, Gravens-Mueller L, Ivanova A, Zaoutis L, et al. Risk factors for recurrent urinary tract infection and renal scarring. *Pediatrics* 2015;136:e13-21. <https://doi.org/10.1542/peds.2015-0409>
3. Hoberman A, Charron M, Hickey RW, Baskin M, Kearney DH, Wald ER. Imaging Studies after a First Febrile Urinary Tract Infection in Young Children. *N Engl J Med* 2003;348:195-202. <https://doi.org/10.1056/nejmoa021698>.
4. Joan L Robinson, Jane C Finlay, Mia Eileen Lang, Robert Bortolussi, Canadian Paediatric Society, Community Paediatrics Committee, et al. Urinary tract infection in infants and children: Diagnosis and management. *Can Paediatr Soc* 2020. <https://www.cps.ca/en/documents/position/urinary-tract-infections-in-children> (accessed November 2, 2020).
5. Hoberman A, Wald ER, Hickey RW, Baskin M, Charron M, Majd M, et al. Oral versus initial intravenous therapy for urinary tract infections in young febrile children. *Pediatrics* 1999;104:79-86. <https://doi.org/10.1542/peds.104.1.79>.
6. Mattoo TK. Vesicoureteral Reflux and Reflux Nephropathy. *Adv Chronic Kidney Dis* 2011;18:348-54. <https://doi.org/10.1053/j.ackd.2011.07.006>.
7. Hiraoka M, Hori C, Tsukahara H, Kasuga K, Ishihara Y, Kotsuji F, et al. Vesicoureteral reflux in male and female neonates as detected by voiding ultrasonography. *Kidney Int* 1999;55:1486-90. <https://doi.org/10.1046/j.1523-1755.1999.00380.x>.
8. Willemsen J, Nijman RJM. Vesicoureteral reflux and videourodynamic studies: Results of a prospective study. *Urology* 2000;55:939-43. [https://doi.org/10.1016/S0090-4295\(00\)00549-5](https://doi.org/10.1016/S0090-4295(00)00549-5).
9. Darge K, Troeger J. Vesicoureteral reflux grading in contrast-enhanced voiding urosonography. *Eur J Radiol* 2002;43:122-8. [https://doi.org/10.1016/S0720-048X\(02\)00114-6](https://doi.org/10.1016/S0720-048X(02)00114-6).
10. Montini G, Rigon L, Zucchetta P, Fregonese F, Toffolo A, Gobber D, et al. Prophylaxis after first febrile urinary tract infection in children? A multicenter, randomized, controlled, noninferiority trial. *Pediatrics* 2008;122:1064-71. <https://doi.org/10.1542/peds.2007-3770>.
11. Robson WLM, Leung AKC. Secondary nocturnal enuresis. *Clin Pediatr (Phila)* 2000;39:379-85. <https://doi.org/10.1177/000992280003900701>.
12. Miller K. Concomitant nonpharmacologic therapy in the treatment of primary nocturnal enuresis. *Clin Pediatr (Phila)* 1993;32:32-7. <https://doi.org/10.1177/0009922893032001s08>.
13. Hjalmas K, Arnold T, Bower W, Caione P, Chiozza LM, Von Gontard A, et al. Nocturnal enuresis: An international evidence based management strategy. *J. Urol.*, vol. 171, Lippincott Williams and Wilkins; 2004, p. 2545-61. <https://doi.org/10.1097/01.ju.0000111504.85822.b2>.

IV.B.3 Acute Kidney Injury in Children

1. Introduction

- AKI is defined as a sudden (<48 hours) increase in serum creatinine resulting from an insult that causes a functional or structural change in the kidney, with or without oliguria.
- AKI occurs in 10%–80% of all critically sick children.
- Timely and accurate intervention to treat AKI is essential to prevent mortality and morbidity including progression to CKD.

2. Diagnosis and Management



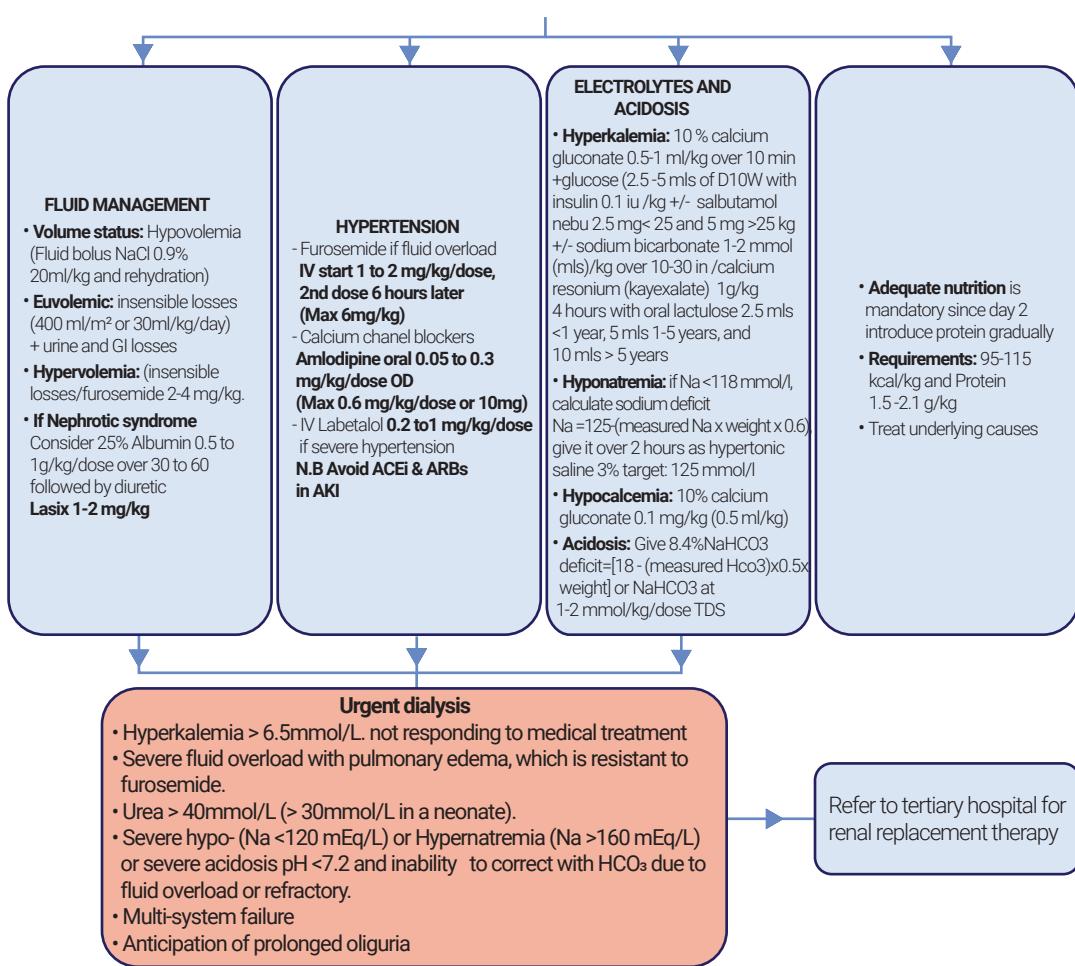


Figure 40: Algorithm for Acute kidney injury presentation and management

3. Conclusion

Early and adequate treatment of AKI can prevent high morbidity and mortality associated with AKI. Children in stage 3 AKI should be referred to a center with the capability to perform renal replacement therapy

Denotations

AKI: Acute Kidney Injury, **AKIN:** Acute Kidney Injury Network, **CDK:** Chronic Kidney Injury, **HUS:** Hemolytic Uremic Syndrome, **HRS:** Hepatorenal Syndrome, **KDIGO:** Kidney Disease Improving Global Outcomes, **NS:** Nephrotic Syndrome, **RPGN:** Rapid Progressive Glomerulonephritis, **TIN:** Tubulointerstitial Nephritis

References

- Chanchlani R, Nash DM, McArthur E, et al. Secular trends in incidence, modality, and mortality with dialysis receiving AKI in children in Ontario a population-based cohort study.
- Clin J Am Soc Nephrol. 2019;14(9):1288-1296. doi:10.2215/CJN.08250718. Kaddourah A, Basu RK, Bagshaw SM, Goldstein SL; AWAKE Investigators: Epidemiology of acute kidney injury in critically ill children and young adults. N Engl J Med 376: 11-20, 2017

IV.B.4 Nephrotic Syndrome in Children

1. Definition

- Nephrotic syndrome is a clinical syndrome defined by:

> Nephrotic range proteinuria – Nephrotic range proteinuria is usually defined as >50 mg/kg/day or 40 mg/hr/m² in a 24-hour urine collection or proteinuria of 3 to 4+ by dipstick or Urine protein to Creatinine ratio (UPC) >2 g/l creatinine (>0.2 g/mmol)

> Hypoalbuminemia – The plasma albumin level is typically less than 2.5 g/dL (25 g/L)).

- Most children with nephrotic syndrome respond well to adequate dosage of glucocorticosteroid therapy If poorly treated, nephrotic syndrome carries high morbidity and may progress to CKD.

2. Clinical sign and symptoms

Clinical symptoms	Clinical signs
<ul style="list-style-type: none">• Swelling, particularly in the face and extremities.• Foamy urine.• Fatigue and weakness.• Elevated cholesterol levels.• Risk of blood clots and related complications.• Abdominal pain or discomfort.• Decreased urine output.• Edema symptoms (ie. significant ascites, pleural effusions)	<p>Signs of fluid overload</p> <ul style="list-style-type: none">• Documentation of weight gain• Nephrotic range proteinuria• Hypoalbuminemia• Edema• ± Hyperlipidemia (not always required for diagnosis)• Foamy or frothy urine due to proteinuria. <p>Intravascular volume depletion</p> <ul style="list-style-type: none">• Tachycardia• Elevated creatinine,• Edema• Risk of blood clots (thrombosis).• Decreased urine output (oliguria) <p>Other signs</p> <ul style="list-style-type: none">• Increased susceptibility to infections.• Hypertension• Hematuria

3. Investigation and Diagnosis

The diagnosis of nephrotic syndrome is confirmed by the presence of **both** nephrotic range proteinuria and hypoalbuminemia:

Investigations	Differential diagnosis
<ul style="list-style-type: none">• Urine dipsticks• Urinalysis with microscopy• 24-hour urine protein• Blood urea nitrogen (BUN) and creatinine• Full blood count• Complement studies (C3, C4)• Serum lipids• Serum electrolytes• Suspected systemic lupus erythematosus: antinuclear antibody (ANA) level and anti-ds DNA antibody.• Kidney Biopsy if fulfilling criteria.	<ol style="list-style-type: none">Primary Nephrotic Syndromes<ul style="list-style-type: none">• Minimal Change Disease (MCD)• Focal Segmental Glomerulosclerosis (FSGS)• Membranous Nephropathy• Membranoproliferative Glomerulonephritis (MPGN)Secondary Causes<ul style="list-style-type: none">• Systemic Lupus Erythematosus (SLE)• Diabetes Mellitus (Diabetic nephropathy)• Amyloidosis• Infections: such as HIV and hepatitis B, hepatitis C, and Syphilis.• Drug-Induced NephropathyGenetic and Congenital Disorders:<ul style="list-style-type: none">• Alport Syndrome.• Congenital Nephrotic SyndromeSystemic Diseases<ul style="list-style-type: none">• Multiple Myeloma.• Systemic Vasculitis.• Sarcoidosis.Inflammatory and Infectious Causes<ul style="list-style-type: none">• IgA Nephropathy (Berger's Disease)• Post-Infectious GlomerulonephritisOthers<ul style="list-style-type: none">• Hematologic disorders: thrombotic Microangiopathies like hemolytic-uremic syndrome (HUS) and thrombotic thrombocytopenic purpura (TTP).• Malignancies: Some cancers can cause paraneoplastic glomerulopathies



Table 13. Summary of urinary protein interpretation

	NORMAL	ABNORMAL	NEPROTIC RANGE
URINE DIPSTICK	NEGATIVE TRACE	1+ or 2+	3+ or 4+
URINALYSIS	< 0.3g/l	0.3-3g/l	>3g/l
URINE PROTEIN CREATININE RATIO (UPC)	<25mg/mmol	25-200mg/mmol	>200mg/mmol
24 HOUR URINE PROTEIN RANGE	<4mg/m ² /hr,	4-40mg/m ² /hr	40mg/m ² /hr or 50mg/kg /day



Note

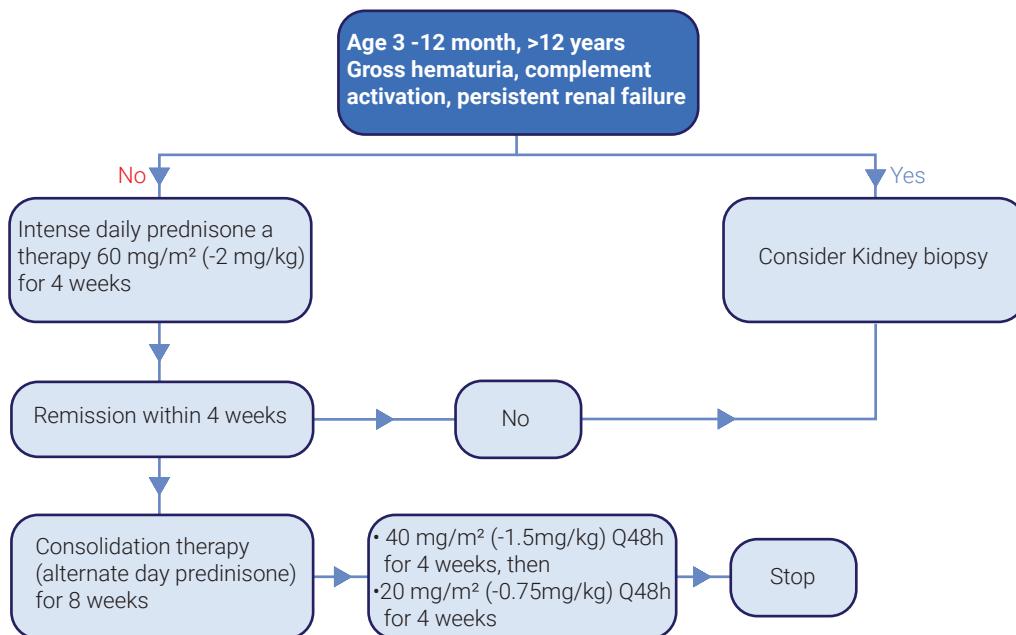
If the laboratory uses g/mmol as their screening units, normal urine UPC, = <0.02 g/mmol, abnormal: 0.02 – 0.2 g/mmol, and nephrotic range >0.2 g/mmol

4. Approach to management

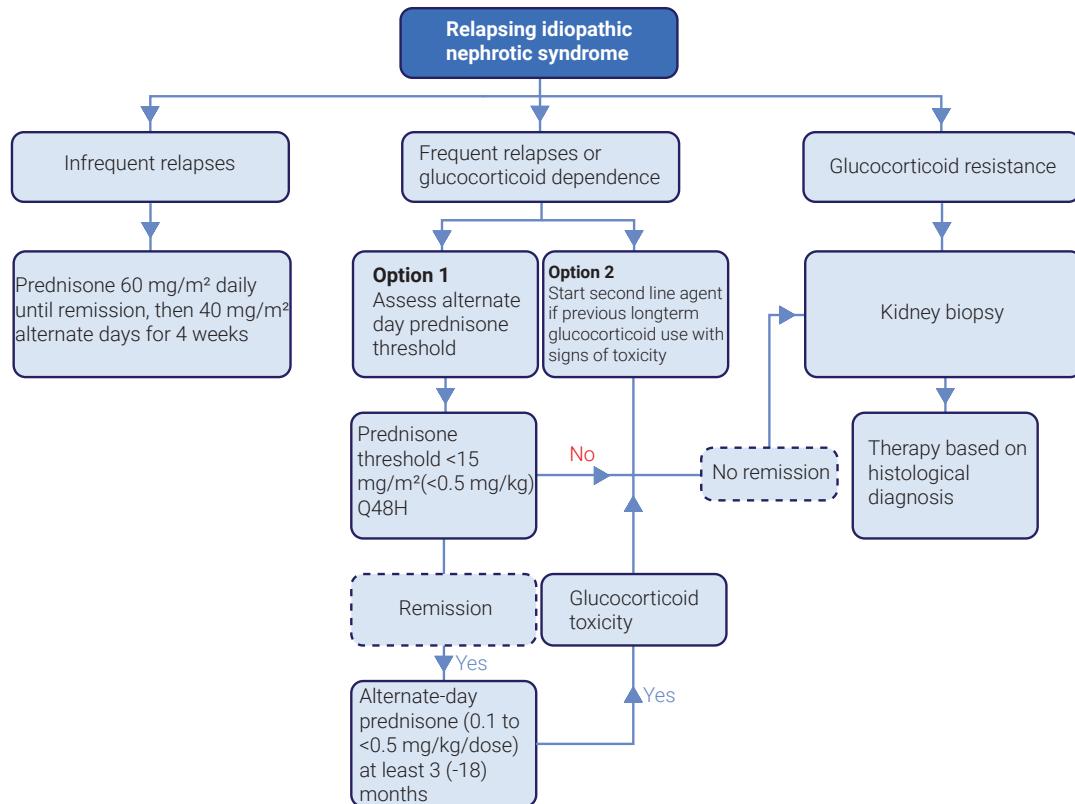
Definition of Key Terms

- **Remission:** Urine albumin nil or trace (or proteinuria <4 mg/m²/h) for three consecutive days
- **Relapse:** Urine albumin 3+ or 4+ (or proteinuria >40 mg/m²/h) for three consecutive days, having been in remission previously
- **Frequent relapse:** Two or more relapses during 6 months, or more than three relapses during any 12-month period
- **Glucocorticoid Steroid Dependence (SDNS):** Persistent proteinuria (>2 g/g creatinine) despite high-dose prednisone therapy with 60 mg/m² (2 mg/kg) daily for 4 weeks, in the absence of infection or nonadherence to medication

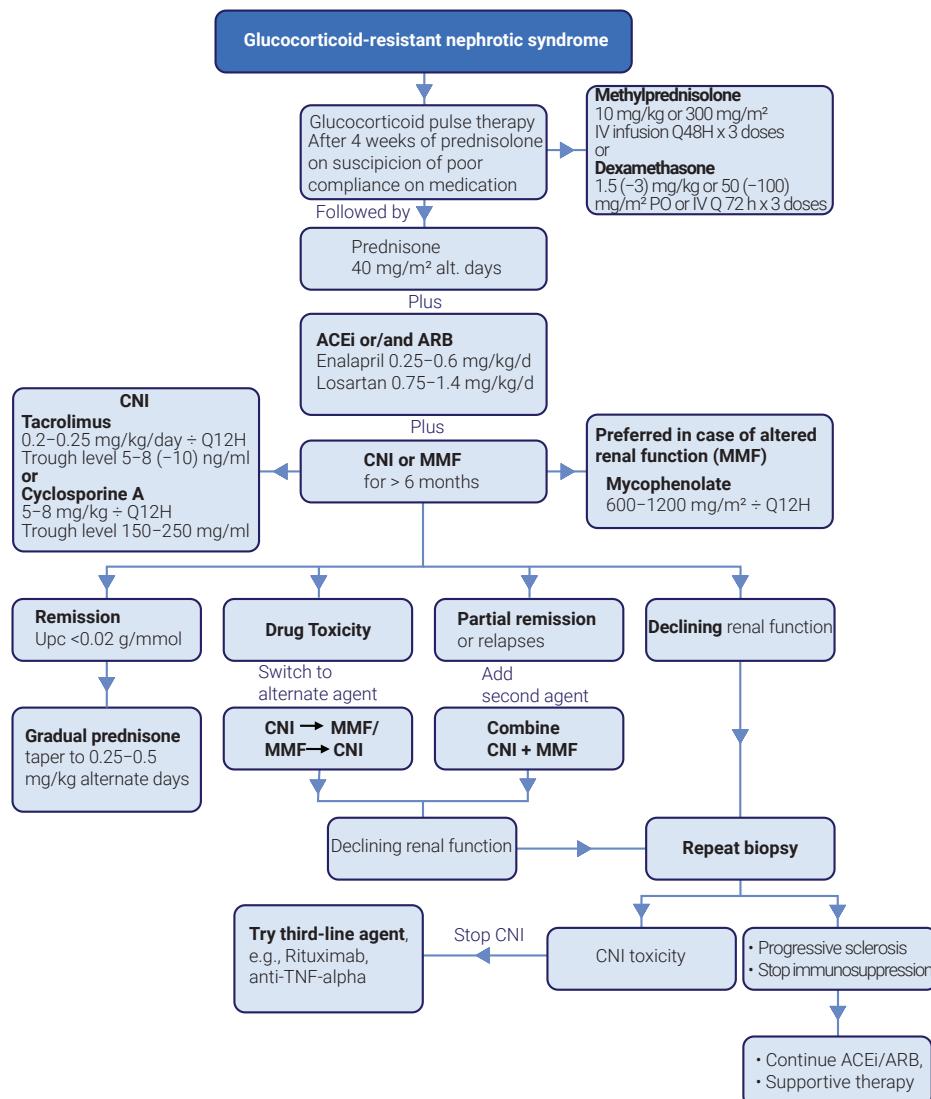
4.1. Management algorithm for first time nephrotic syndrome



4.2. Management of relapse nephrotic syndrome



4.3. Management of Glucocorticoid-resistant nephrotic syndrome



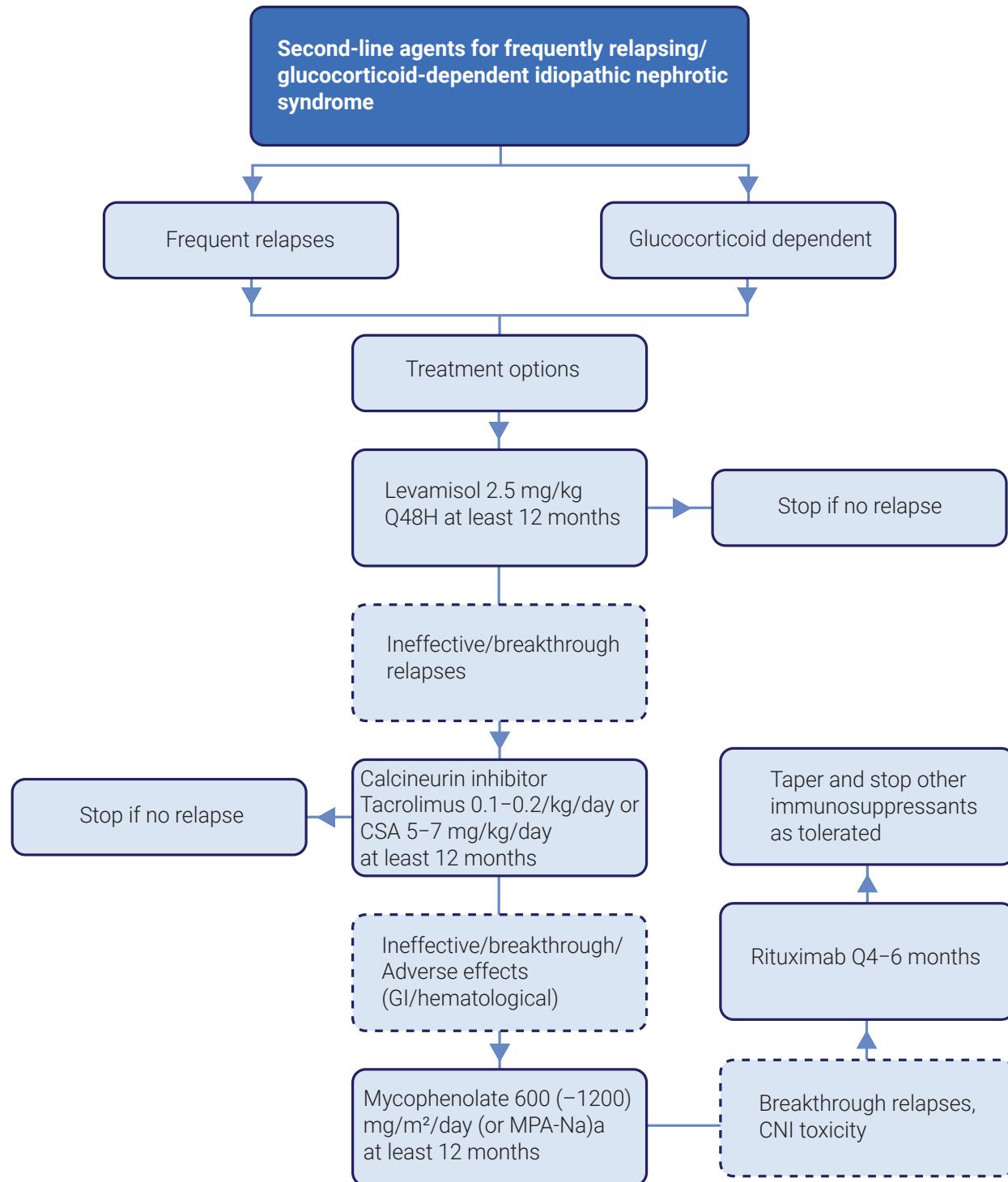


Acute Complications of nephrotic syndrome

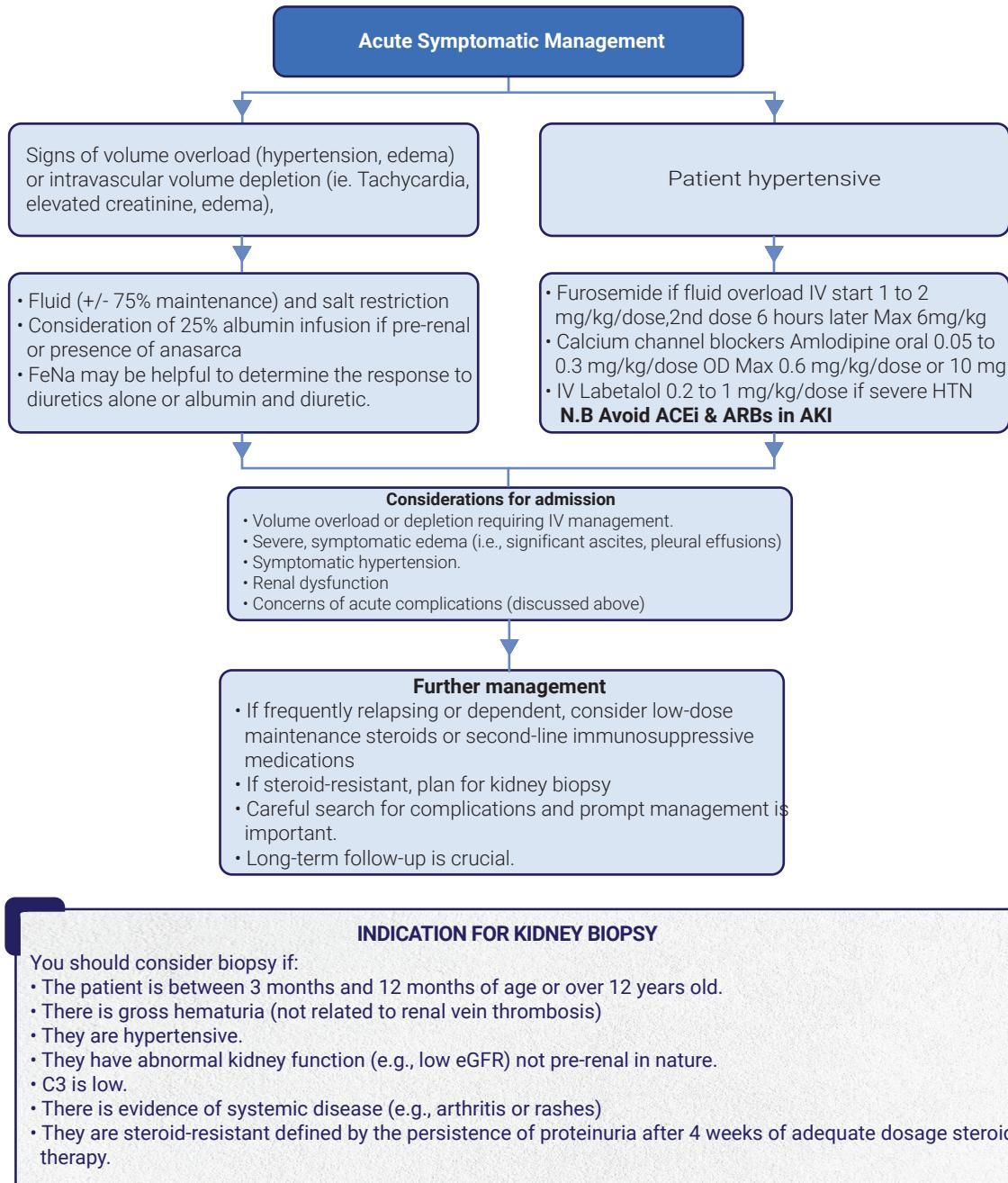
Consider the most serious complications of nephrotic syndrome.

- **Thromboembolism:** suspect if severe headache, limb swelling
- **Spontaneous bacterial peritonitis:** suspect if severe abdominal pain and fever
- **Infection:** If there are concerns (i.e., Fever) culture and start empiric antibiotics covering for pneumococcus (Streptococcus pneumonia) and gram-negative bacteria (Predominantly Escherichia coli)

4.4. Second-line agents for frequently relapsing /glucocorticoid-dependent idiopathic nephrotic syndrome



4.5. Summary Symptomatic approach



5. Conclusion

- Nephrotic syndrome carries poor prognosis if not treated timely and adequately.
- Quantification of proteinuria should be done whenever possible.
- Children who do not respond to initial 6 weeks of appropriate dose of steroid or who present with atypical features, should be referred for Kidney biopsy.



References

1. Bergstein JM. A practical approach to proteinuria. *Pediatr Nephrol*. 1999;13(8):697-700. doi:10.1007/s004670050684
2. Kerlin BA, Ayoob R, Smoyer WE. Epidemiology and pathophysiology of nephrotic syndrome-associated thromboembolic disease. *Clin J Am Soc Nephrol*. 2012;7(3):513-520.doi:10.2215/CJN.10131011
3. Noone DG, Iijima K, Parekh R. Idiopathic nephrotic syndrome in children. *Lancet*. 2018 Jul 7;392(10141):61-74. doi: 10.1016/S0140-6736(18)30536-1. Epub 2018 Jun 14. Erratum in:Lancet. 2018 Jul 28;392(10144):282. PMID: 29910038.
4. Pediatric Nephrology Program BC Children's Hospital. Childhood nephrotic syndrome: A physician's handbook 2nd Edition <http://www.bcchildrens.ca/health-professionals/clinicalresources/renal-program>
5. Manual of Pediatric Nephrology by Kishore Phadke, Paul Goodyer, Martin Bitzan

SECTION V: CHRONIC RESPIRATORY DISEASES

V.A Chronic Adult Respiratory Diseases

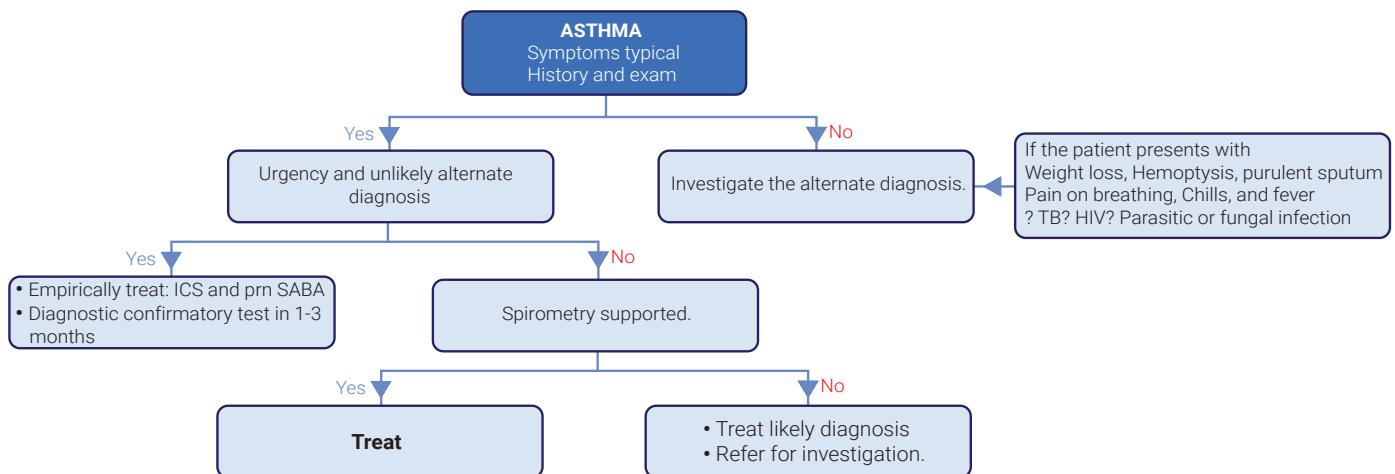
V.A.1 Asthma

Asthma is chronic inflammatory disease characterized with:

- * Airway wall thickened.
- * Airway mucus hypersecretion
- * Hyperresponsiveness bronchoconstriction

DIAGNOSIS	Asthma Phenotypes
<p>• Typical Symptoms: Cough, Wheeze, Chest tightness > Vary over time and in intensity. > Worse most at waking, night > Cold air, laughter, allergy, and exercise triggered. > Worse with viral infection</p> <p>AND (1 or more)</p> <ul style="list-style-type: none">• Baseline FEV1 increase > 200 ml and 12%. > 10-15 min post 200-400 mcg albuterol inhaled. > [Stop [SABA]>4 H, [twice ICS-LABA]>12H, [once ICS-LABA]>24H before the test]• PEF increase by >20% and baseline FEV1 >12% and 200ml. > After 4 weeks of anti-inflammation treatment outside respiratory infection• Average daily diurnal PEF variability >10% (2 weeks)• Positive bronchial challenge test• Positive exercise challenge test• If normal lung function: Repeat test when symptomatic or Stop [SABA]>4 H, [twice ICS-LABA]>12H, [once ICS-LABA]>24H• If frequent symptoms, step up in the controller and repeat the test in 3 months. The greater the variability, the more confidence is the diagnosis. Bronchodilator reversibility may be absent with ongoing respiratory infection, exacerbation, or drugs.	<p>Asthma Phenotypes</p> <ul style="list-style-type: none">• Allergic > Start in childhood and most easily recognized, > Associated with a family history of allergic disease. (eczema, allergic rhinitis, food, or drug allergy) > Eosinophilic airway inflammation (sputum),• Non-allergic: Not associated with allergy, responds less to ICS• Late-onset > The first symptoms in adult life, > Tend to be non-allergic, > Often requires a higher dose of ICS or refractory to CS.• With fixed airflow limitation > Airway wall remodeling due to long-standing asthma.• With obesity > Little eosinophilic airway inflammation by sputum analysis
<p>ASTHMA POOR OUTCOME RISK FACTORS</p> <ul style="list-style-type: none">• Potentially Modifiable independent risk for exacerbation<ul style="list-style-type: none">> Uncontrolled asthma symptoms> High SABA use (with increased mortality if >1x200 dose canister/month)> Inadequate ICS> Low FEV1 (more if <60% PREDICTED)> Major psycho-socio-economic problem> Exposures: smoking, sensitized allergen> Comorbidities: obesity, rhinitis, confirmed food allergy> Sputum/blood eosinophilia; elevated FENO> Pregnancy• Other major independent risk factors<ul style="list-style-type: none">> Ever ICU/intubation for asthma> 1 or more severe exacerbations in the last 12 months• Risk factors to develop fixed airflow limitation.<ul style="list-style-type: none">> Lack of ICS treatment> Exposures: tobacco smoke, noxious chemicals, occupational exposures> Low initial FEV1, chronic mucus secretion, sputum, or blood eosinophilia• Risk factors for medication side effects<ul style="list-style-type: none">> Systemic: frequent OCS, long-term high dose or potent ICS> Local: high doses or potent ICS, poor inhaler technique	<p>Comorbidities or Differentials</p> <ul style="list-style-type: none">• Heart diseases, Deconditioning, Obesity,• Restrictive lung diseases, Cough variant asthma, COPD,• Chronic sinusitis, Eosinophilic bronchitis, Rhinitis, GERD,• COPD-Asthma overlap (ACO),• Chronic upper airway cough syndrome (postnasal drip syndrome),• Inducible laryngeal obstruction (Vocal cord dysfunction),• Obstructive sleep apnea (OSA), Depression, Anxiety. <p>Treatment goals</p> <ul style="list-style-type: none">• Risk reduction<ul style="list-style-type: none">> Burden to patient> Asthma related death> Exacerbation> Airway damage> Medication side effects> Symptom control

Figure 41: Initial presentation diagnostic flowchart



Evaluation on patients with asthma on each visit.

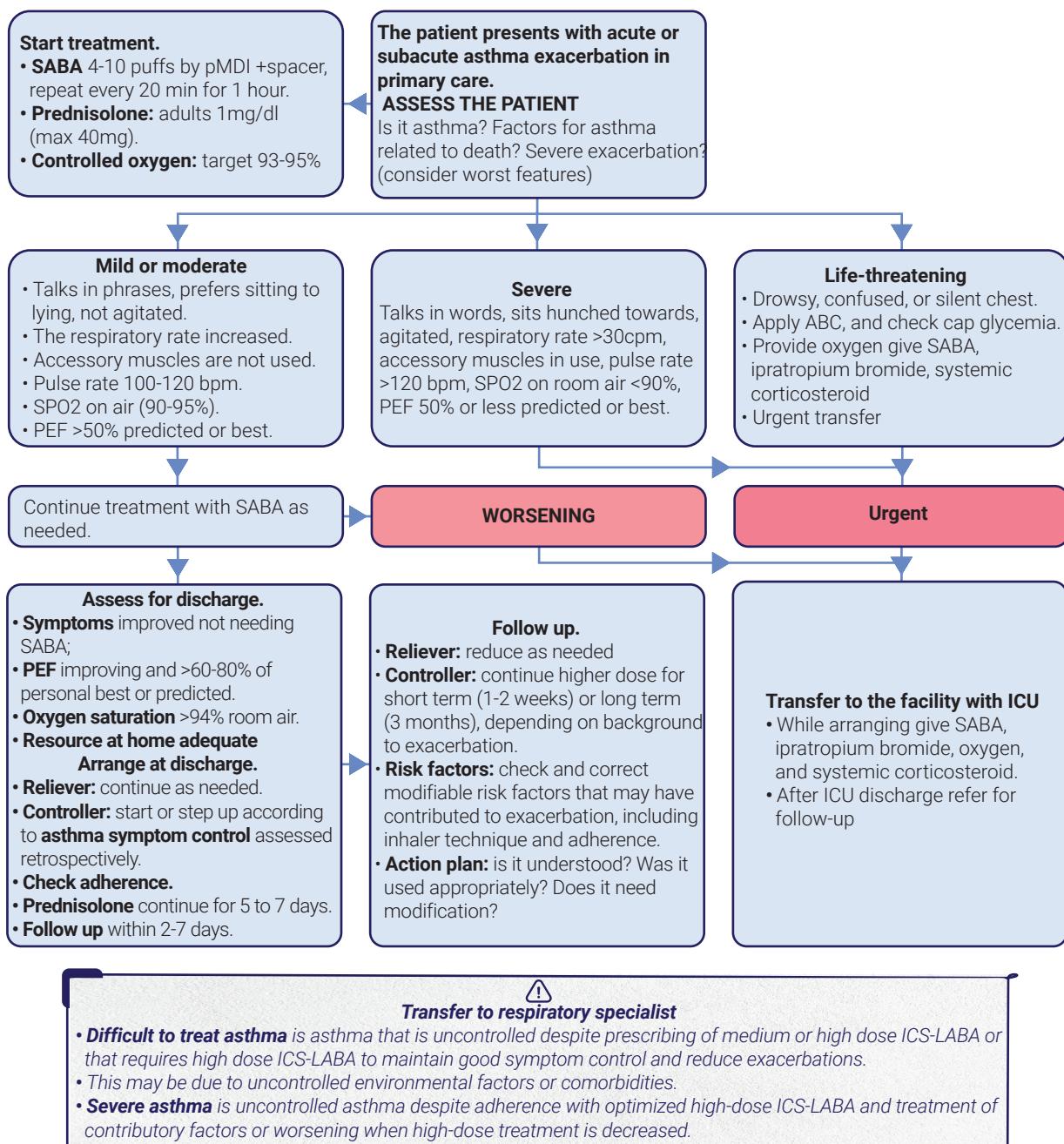
A. Asthma Symptom control		Level of asthma symptom control		
In the past 4 wks, has the patient had		Well controlled= Mild	Partly con- trolled= Moderate	Uncontrolled= Severe
Daytime asthma symptoms >2x/wk.	Y/N			
Any night wakening due to asthma?	Y/N			
Reliever needed for symptoms > 2x/wk?	Y/N	None	1 - 2	3 - 4
Any activity limitation due to asthma?	Y/N			

B. Evaluate the following criteria.

- * Modifiable poor outcome risk factors?
- * Adherence (drug and technique),
- * Any drug side effect
- * Grade severity

Management of Asthma

Figure 42: Algorithm for the management of Asthma (Adapted from Box 11. GINA 2022)



Asthma Treatment plan

Asthma severity and treatment plan

- * Mild: controlled well with steps 1 or 2
- * Moderate: controlled well with step 3
- * Severe: Require step 4 or 5

Table 14: Asthma treatment options

Asthma medication options: Adjust treatment up and down for individual patient needs

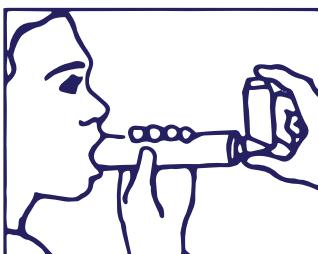
Step	Preferred controller	Alternative controller options	Preferred reliever
1	As needed low dose ICS-formoterol	low dose ICS or low dose ICS as SABA is taken	
2	Daily low dose ICS or as needed low dose ICS-formoterol	Leukotriene receptor antagonist (LTRA) or low dose ICS whenever SABA taken	
3	Low dose ICS-LABA	medium dose ICS or low dose ICS+LTRA	
4	Medium dose ICS-LABA	high dose ICS, add on tiotropium or add on LTRA	
5	High dose ICS-LABA and Refer for phenotypic assessment and ± add-on therapy, e.g.tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R	Add low dose OCS, but consider side-effects	In each step Low dose ICS-formoterol as needed

Inhalation technique and spacer use

1. Remove the cap and hold inhaler upright.
2. Shake the inhaler.
3. Tilt your head back slightly and breathe out slowly.
4. Position the inhaler in one of the following ways (A or B is optimal, but C is acceptable for those who have difficulty with A or B. C is required for breath-activated inhalers):



A. Open mouth with inhaler 1 to 2 inches away.



B. Use spacer/holding chamber (that is recommended especially for young children and for people using corticosteroids).



C. In the mouth.
Do not use for corticosteroids.



D. NOTE: Inhaled dry powder capsules require a different inhalation technique. To use a dry powder inhaler, it is important to close the mouth tightly around the mouthpiece of the inhaler and to inhale rapidly.

5. Press down on the inhaler to release medication as you start to breathe in slowly.
6. Breathe in slowly (3 to 5 seconds).
7. Hold your breath for 10 seconds to allow the medicine to reach deeply into your lungs.
8. Repeat puff as directed. Waiting 1 minute between puffs may permit second puff to penetrate your lungs better.
9. Spacers/holding chambers are useful for all patients. They are particularly recommended for young children and older adults and for use with inhaled corticosteroids.

Avoid common inhaler mistakes. Follow these inhaler tips:

- Breathe out before pressing your inhaler.
- Inhale slowly.
- Breathe in through your mouth, not your nose.
- Press down on your inhaler at the *start* of inhalation (or within the first second of inhalation).
- Keep inhaling as you press down on inhaler.
- Press your inhaler only *once* while you are inhaling (one breath for each puff).
- Make sure you breathe in evenly and deeply.

Table 15: Inhaled Corticosteroids Dosage

Daily inhaled corticosteroid doses			
Adults and adolescents ICS	Total daily ICS dose (mcg)		
	Low	Medium	High
BDP (pMDI,HFA)	200-500	>500-1000	>1000
BDP (pMDI, extrafine particle, HFA)	100-200	>200-400	>400
Budesonide (DPI)	200-400	>400-800	>800
Ciclesonide (pMDI, extrafine particle, HFA)	80-160	>160-320	>320
Fluticasone furoate (DPI)	100		200
Fluticasone propionate (DPI)	100-250	>250-500	>500
Fluticasone propionate (pMDI,HFA)	100-250	>250-500	>500
Mometasone furoate (DPI)	200		400
Mometasone furoate (pMDI,HFA)	200-400		400

Most patients get clinical benefits with low-dose ICS. Very few patients need high-dose ICS (associated with local and systemic side effects).
 BDP (beclomethasone dipropionate); DPI (dry powder inhaler); HFA (hydrofluoroalkane propellant); pMDI (pressurized metered dose inhaler)

Denotations

CS: Corticosteroids, **FEV1:** Forced Expiratory Volume in 1 second, **ICS:** Inhaled Corticosteroids, **IL-4R:** interleukin 4 receptors, **IL-5R:** interleukin 5 receptors, **LABA:** Long-acting Beta-agonist, **LTRA:** leukotriene receptor antagonists, **OCS:** Oral Corticosteroids, **PEF:** Peak Expiratory Flow, **SABA:** Short-acting Beta-agonist

References

1. The 2023 update of the Global Strategy for Asthma Management and Prevention

V.A.2 Chronic Obstructive Pulmonary Disease (COPD)

COPD is defined as an irreversible obstructive lung disease. If after the postbronchodilator spirometry FEV1/FVC is below 70% COPD is confirmed. Clinically COPD has 4 phenotypes (A, B, C and D) based on previous exacerbations, and dyspnea severity (see table below).

Table 16: COPD assessment

COPD refined ABCD assessment tool					
Spirometry confirmed diagnosis	Assessment of airflow limitation				Assessment of symptoms/risk of exacerbations
Post bronchodilator FEV1/FVC <0.7	GRADE	FEV1(predicted)	Moderate or severe exacerbation history		
	GOLD 1	Mild: 80% or more	≥ 2 or ≥ 1 leading to admission	C	D
	GOLD 2	Moderate: 50-79%	0 or 1 (not leading to admission)	A	B
	GOLD 3	Severe: 30-49%		mMRC 0-1	mMRC ≥ 2
	GOLD 4	Very Severe: <30%		Symptoms	

Table 17: Treatment options

COPD Class and appropriate therapy			
2 or more moderate or 1 or more leading to hospitalization	Group C LAMA	Group D LAMA or LAMA+LABA or ICS+LABA	
0 or 1 moderate exacerbation (not leading to admission)	Group A bronchodilator	Group B LABA or LAMA	
Exacerbation/Dyspnea	mMRC 0-1	mMRC 2 or more	

Table 18: Modified MRC Scale

Modified MRC (mMRC) dyspnea scale Grade 0 to 4	
mMRC grade 0	I only get breathless with strenuous exercise
mMRC grade 1	I get short of breath when hurrying on the level or walking up a slight hill
mMRC grade 2	I walk slower than people of the same age on the level because of breathlessness, or I must stop for breath when walking on my own pace on the level
mMRC grade 3	I stop for breathing after walking about 100 meters or after few minutes on the level
mMRC grade 4	I am too breathless to leave the house, or I am breathless when dressing or undressing

Table 19: Composite score

BODE index for COPD survival prediction in adults.	
B: BMI	>21 (0 point) 21 or < (1 point)
O: Post bronchodilator FEV1 %predicted	65% or > (0 point) 50 to 64% (1 point) 35 to 49% (2 points) 35% or < (3 points)
D: mMRC dyspnea scale	mMRC 0 or 1 (0 point) mMRC 2 (1 point) mMRC 3 (2 points) mMRC 4 (3 points)
E (Exercise capacity): 6 minutes walk distance	350 m or more (0 point) 250 to 349 m (1 point) 150 to 249 m (2 points) 149 m or < (3 points)
Approximate 4 year mortality	0 to 2 points: 80% 3 to 4 points: 67% 5 to 6 points: 57% 7 to 10 points: 18%

COPD drug class:

- * Bronchodilators: LABA; LAMA; LABA+LAMA.
- * Corticosteroid containing regimens: LABA+ICS; LAMA+LABA+ICS.
- * Anti-inflammatory (non-steroid): Roflumilast
- * Anti-infectives: vaccines and long-term macrolides
- * Mucoregulators: N-acetylcysteine and Carbocystein.
- * Various others: smoke cessation; rehabilitation; lung volume reduction; vitamin D

COPD drugs

Short-Acting Muscarinic Antagonist (SAMA) or Short Acting Anticholinergic

R/Ipratropium bromide Atrovent® pMDI: 20 mcg/puff 200 doses S/40 mcg (2 actuations) TID to QID

Combination product: SABA and SAMA

R/Ipratropium bromide salbutamol sulfate Combivent® Respimat® Inhalation solution via Respimat: 20 mcg/100 mcg salbutamol 120 doses S/ 1 inhalation QID Maximum: 6 inhalations/ 24 hours

Long-Acting Beta₂ Agonists (LABA)

R/ Formoterol Oxeze® Turbuhaler® Turbuhaler: 6 mcg, 12 mcg 60 doses; S/ 6 or 12 mcg Q12 hour Maximum: 48 mcg/day

Long-Acting Muscarinic Antagonists (LAMA) or Long-Acting Anticholinergics

R/ Tiotropium bromide Spiriva® Respimat® Inhalation solution via Respimat: 2.5 mcg per actuation 60 actuation; S/ 5 mcg (2 actuation) once daily by oral inhalation

Combination: Inhaled Corticosteroid (ICS) and LABA

R/ Budesonide/ formoterol fumarate Symbicort® Turbuhaler® DPI: 100 mcg/6 mcg, 200 mcg/6 mcg 120 doses; S/ 400 mcg / 12 mcg BID

Phosphodiesterase 4 (PDE4) inhibitor

R/ Roflumilast Daxas® Tablet: 500 mcg S/ 500 mcg daily

Macrolide - maintenance therapy to reduce AECOPD

R/ Azithromycin Zithromax®, generics Tablets: 250 mg Oral suspension: 300 mg/15 mL, 600 mg/15 mL, 900 mg/22.5 mL; S/ To reduce risk of AECOPD: 250 mg daily or 250 mg three times per week

Mucolytics

R/N-acetylcysteine (NAC) Generics Solution: 200 mg/mL; S/ 600 mg PO bid

Denotations

AECOPD: acute exacerbations of COPD, **BODE:** body mass index, airflow, obstruction, dyspnea, and exercise capacity, **mMRC:** Modified Medical Research Council

References

1. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease, 2023

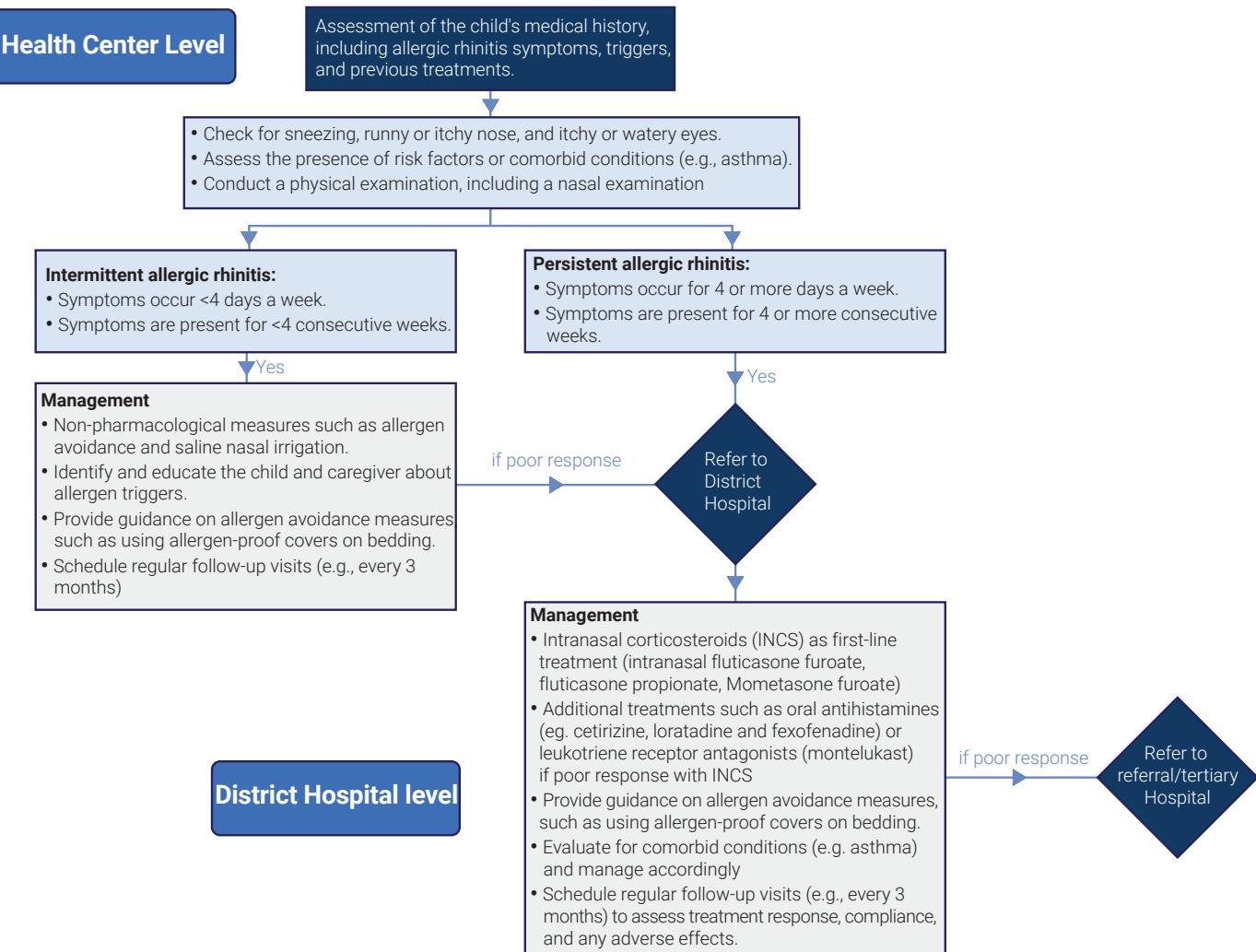
V.B Chronic Pediatric Respiratory Diseases

Pediatric chronic respiratory disorders refer to a group of long-term respiratory conditions that affect children. These disorders can significantly impact a child's breathing and overall health. Some common pediatric chronic respiratory disorders include:

V.B.1 Chronic allergic rhinitis in children

Chronic allergic rhinitis in children is a persistent inflammatory condition of the nasal passages that results from an allergic response to various airborne allergens, such as pollen, dust mites, pet dander, or mold. Unlike acute allergic rhinitis (commonly known as hay fever), which typically occurs seasonally or in response to specific allergens, chronic allergic rhinitis persists throughout the year, causing ongoing symptoms and discomfort for affected children. This condition is characterized by a range of symptoms, including nasal congestion, sneezing, runny nose, and itching, and it can have a significant impact on a child's overall quality of life, sleep, and daily activities. Management and treatment options for chronic allergic rhinitis in children often involve a combination of allergen avoidance strategies and medications to alleviate symptoms and improve the child's well-being. Early recognition and proper management are essential in providing relief and preventing long-term complications associated with this condition.

Figure 43: Algorithm for the management of chronic allergic rhinitis in children

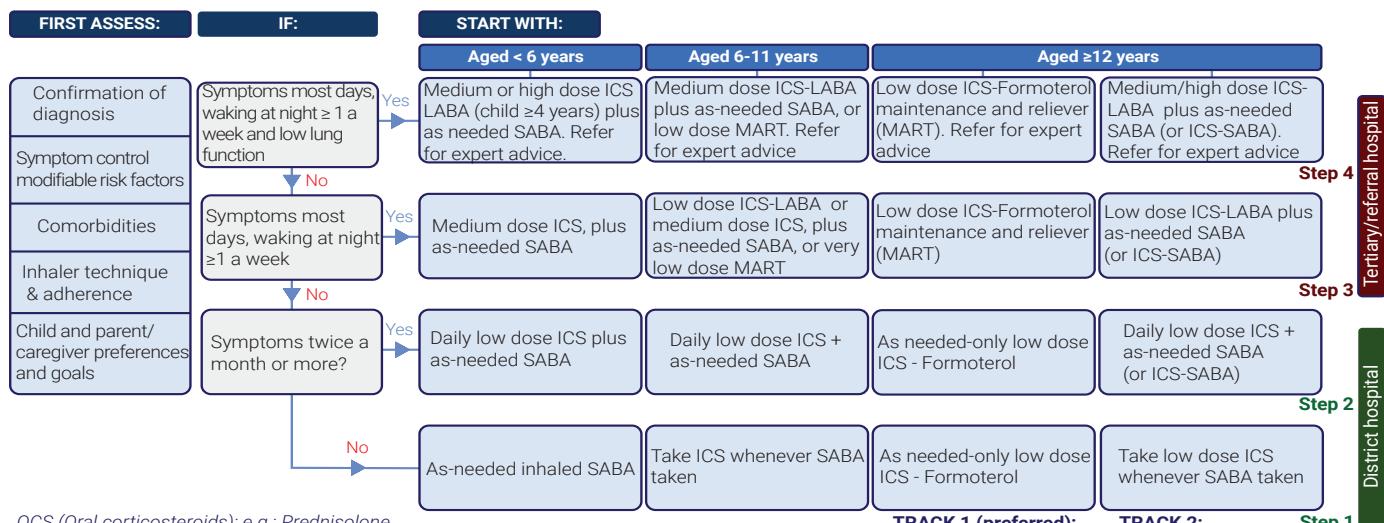


References

1. Baena-Cagnani C. E. (2004). Safety and tolerability of treatments for allergic rhinitis in children. *Drug safety*, 27(12), 883–898. <https://doi.org/10.2165/00002018-200427120-00005>
2. Daley-Yates, P. T., Larenas-Linnemann, D., Bhargave, C., & Verma, M. (2021). Intranasal Corticosteroids: Topical Potency, Systemic Activity and Therapeutic Index. *Journal of asthma and allergy*, 14, 1093–1104. <https://doi.org/10.2147/JAA.S321332>
3. Roberts, G., Xatzipsalti, M., Borrego, L. M., Custovic, A., Halken, S., Hellings, P. W., Papadopoulos, N. G., Rotiroti, G., Scadding, G., Timmermans, F., & Valovirta, E. (2013). Paediatric rhinitis: position paper of the European Academy of Allergy and Clinical Immunology. *Allergy*, 68(9), 1102–1116. <https://doi.org/10.1111/all.12235>
4. Wise, S. K., Damask, C., Roland, L. T., Ebert, C., Levy, J. M., Lin, S., Luong, A., Rodriguez, K., Sedaghat, A. R., Toskala, E., Villwock, J., Abdullah, B., Akdis, C., Alt, J. A., Ansotegui, I. J., Azar, A., Baroody, F., Benninger, M. S., Bernstein, J., Brook, C., ... Zhang, L. (2023). International consensus statement on allergy and rhinology: Allergic rhinitis - 2023. *International forum of allergy & rhinology*, 13(4), 293–859. <https://doi.org/10.1002/alr.2309>

V.B.2 Chronic asthma in children

Chronic asthma in children is a long-term respiratory condition marked by recurring airway inflammation and narrowing. It leads to symptoms like wheezing, coughing, and shortness of breath. Proper management and a personalized action plan are essential to control symptoms and improve a child's quality of life.



Low, medium, and high daily metered doses of inhaled corticosteroids (alone or with LABA)

This is not a table of equivalence, but instead, suggested total daily doses for 'low', 'medium', and 'high' dose ICS options for adolescents ≥ 12 years and children 6–11 years, based on product information. Few data are available for comparative potency, and this table does NOT imply potency equivalence. Doses may differ depending on local products, regulatory labeling, and clinical guidelines or, for one product, with the addition of a LAMA to an ICS-LABA. For children aged 5 years and younger, data on comparative potency are not readily available, particularly for children, and this table does NOT imply potency equivalence. The doses listed here are the lowest approved doses for which safety and effectiveness have been adequately studied in this age group.

Low-dose ICS provides most of the clinical benefits of ICS for most patients with asthma. However, ICS responsiveness varies between patients, so some patients may need **medium-dose ICS** if their asthma is uncontrolled, or they have ongoing exacerbations, despite good adherence and correct technique with low-dose ICS (with or without LABA).

High-dose ICS (in combination with LABA or separately) is needed by very few patients, and its long-term use is associated with an increased risk of local and systemic side effects, which must be balanced against the potential benefits. Daily doses in this table are shown as metered doses.

Table 20: Corticosteroids dosage

Adults and adolescents (12 years and older)

Inhaled corticosteroid (alone or in combination with LABA)	Total daily ICS dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (pMDI, standard particle, HFA)	200-500	>500-1000	>1000
Beclometasone dipropionate (DPI or pMDI, extrafine particle, HFA)	100-200	>200-400	>400
Budesonide (DPI, or pMDI, standard particle, HFA)	200-400	>400-800	>800
Ciclesonide (pMDI, extrafine particle, HFA)	80-160	>160-320	>320
Fluticasone furoate (DPI)	100		200

Fluticasone propionate (DPI)	100-250	>250-500	>500
Fluticasone propionate (pMDI, standard particle, HFA)	100-250	>250-500	>500
Mometasone furoate (DPI)	Depends on DPI device – see product information		Mometasone furoate (DPI)
Mometasone furoate (pMDI, standard particle, HFA)	200-400	>400	Mometasone furoate (pMDI, standard particle, HFA)
Mometasone furoate (pMDI, standard particle, HFA)	200-400		>400

Children 6-11 years old

Beclometasone dipropionate (pMDI, standard particle, HFA)	100-200	>200-400	>400
Beclometasone dipropionate (pMDI, extrafine particle, HFA)	50-100	>100-200	>200
Budesonide (DPI, or pMDI, standard particle, HFA)	100-200	>200-400	>400
Budesonide (nebulizer)	250-500	>500-1000	>1000
Ciclesonide (pMDI, extrafine particle*, HFA)	80	>80-160	>160
Fluticasone furoate (DPI)	50	n.a.	Fluticasone furoate (DPI)
Fluticasone propionate (DPI)	50-100	>100-200	>200
Fluticasone propionate (pMDI, standard particle, HFA)	50-100	>100-200	>200
Mometasone furoate (pMDI, standard particle, HFA)	100	200	Mometasone furoate (pMDI, standard particle, HFA)

Children < 6 years old

Inhaled corticosteroid	Low total daily dose (mcg)
BDP (pMDI, standard particle, HFA)	100 (ages 5 years and older)
BDP (pMDI, extrafine particle, HFA)	50 (ages 5 years and older)
Budesonide nebulized	500 (ages 1 year and older)
Fluticasone propionate (pMDI, standard particle, HFA)	50 (ages 4 years and older)
Fluticasone furoate (DPI)	Not sufficiently studied in children 5 years and younger)
Mometasone furoate (pMDI, standard particle, HFA)	100 (ages 5 years and older)
Ciclesonide (pMDI, extrafine particle, HFA)	Not sufficiently studied in children 5 years and younger

ICS by pMDI should preferably be used with a spacer.

BDP: Beclometasone dipropionate.

Denotations

BDP: Beclometasone dipropionate., **DPI:** Dry-powder inhaler, **HFA:** Hydrofluoroalkane propellant, **ICS:** Inhaled Corticosteroid, **LABA:** Long-Acting Beta-2 Agonists (eg: Formoterol, Salmeterol, Indacaterol), **MART:** Maintenance and Reliever Therapy (eg: Beclomethasone-Formoterol / Budesonide-Formoterol), **MDI:** Metered-dose inhaler, **OCS:** Oral Corticosteroids (eg: Prednisolone), **pMDI:** Pressurized metered-dose inhaler, **SABA:** Short-Acting Beta-2 Agonists (eg: Salbutamol)

References

1. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2022 (GINA, 2022).
2. Levy ML, Bacharier LB, Bateman E, Boulet LP, Brightling C, Buhl R, Brusselle G, Cruz AA, Drazen JM, Duijts L, Fleming L, Inoue H, Ko FWS, Krishnan JA, Mortimer K, Pitrez PM, Sheikh A, Yorgancioğlu A, Reddel HK. Key recommendations for primary care from the 2022 Global Initiative for Asthma (GINA) update. NPJ Prim Care Respir Med. 2023 Feb 8;33(1):7. doi: 10.1038/s41533-023-00330-1. PMID: 36754956; PMCID: PMC9907191.

SECTION VI: PAIN MANAGEMENT AND PALLIATIVE CARE

VI.A Pain Management

Definition

Pain is defined as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.” (IASP)

Type of pain and characteristics

Table 21: Type and characteristics of pain

	Type of pain	Characteristics	Mechanisms	Examples of pharmacologic treatments
Nociceptive	Somatic (Tissue injury)	Superficial (skin) or deep pain (muscle, fascia, tendon)	Mechanical, thermal or chemical stimuli	Acetaminophen, Na+ blockers, NSAID, Steroids, Opioids
	Visceral (Irritable Bowel, Cystitis)	Constant or cramping. Poor localization. Autonomic responses	Visceral distension	NSAIDs, Antispasmodics, Opioids
	Inflammatory (musculo-skeletal)	Localized or diffuse pain hyperalgesia, allodynia.	Associated with localized inflammation	NSAID, Steroids
Neurogenic	(Neuralgia, radiculopathy, Causalgia, CNS lesions)	Spontaneous, paroxysmal pain, allodynia, hyperalgesia.	Peripheral or CNS lesions	Anticonvulsants, opioids, antidepressants
	Functional (FM, thalamic syndromes, irritable bowel syndrome)	Diffuse deep pain, hyperalgesia, allodynia	Dysregulation of excitatory or inhibitory mechanisms in CNS	Antidepressants, anticonvulsants, opioids, cannabinoids.

Other types of pain (Situational Pain)

Incident pain Occurs only in certain circumstances (E.g. After a particular movement)

Procedural pain Related to procedures or interventions (E.g. Endoscopies, IV Lines insertion)

Breakthrough pain Sudden, temporary flare of severe pain that occurs on a background of otherwise controlled

Pain Assessment

Adult Pain score: Numeric Pain Rating Scale

- Pain levels from 0-10 can be explained verbally to the patient using a scale in which 0 is no pain and 10 is the worst possible pain imaginable.
- Patients are asked to rate their pain from 0 to 10.

Record the pain level to make treatment decisions, follow-up, and compare between examinations.

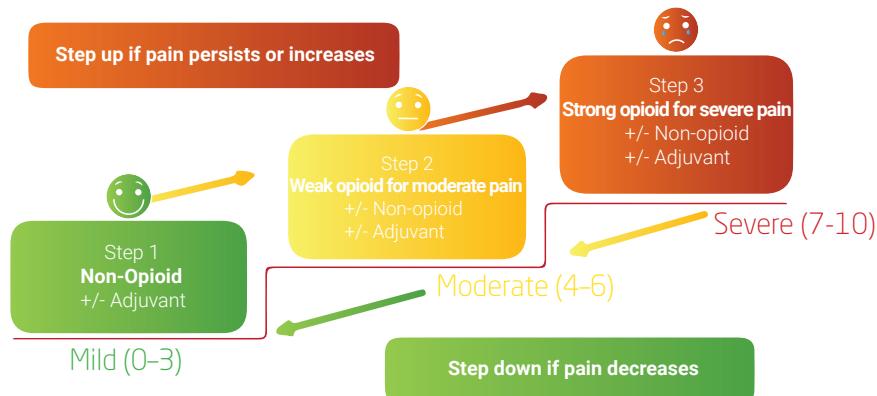
Figure 44: Physical pain assessment



Management of Pain

The management of pain in adults is referred from WHO analgesic ladder.

Figure 45: Stepwise management of pain



Category of Drugs

Non-opioids	Ibuprofen or other NSAID, paracetamol (acetaminophen), or aspirin
Weak opioids	Codeine, tramadol, or low-dose morphine
Strong opioids	Morphine, Fentanyl, Oxycodone, Hydromorphone, Buprenorphine
Adjuvants	Antidepressant, Anticonvulsant, Antispasmodic, Muscle relaxant, Bisphosphonate, or Corticosteroid.

* Combining an opioid and non-opioid is effective, but do not combine drugs of the same class.

* Time doses based on drug half-life ("dose by the clock"); do not wait for pain to recur.

Category	Drug and dosage	Caution and contraindications
Non-opioid	Paracetamol: Give 500-1g 6-8 hourly Ibuprofene: Give 400mg 6-8 hourly Diclofenac: Give 50mg 8-12 hourly	<ul style="list-style-type: none"> • Hepatotoxicity • Maximum dose of 4g per day <ul style="list-style-type: none"> • Give with food. • Maximum dose 1.2g • Avoid asthma and peptic ulcer. • Lower dose if liver impairment. <ul style="list-style-type: none"> • Give with food and avoid in asthma patients and peptic ulcer. • Maximum dose 150mg
Weak Opioid	Tramadol: Give 50-100mg 4-6 hourly Codeine: Give 30-60mg 4 hourly	Caution with epileptic patients <ul style="list-style-type: none"> • Maximum dosage 240mg daily • Give laxatives to avoid constipation unless the patient has diarrhea. • Low-dose morphine is given if the maximum dose cannot work.
Strong Opioid	<ul style="list-style-type: none"> • Morphine: Start with 2.5-20mg q4h for immediate release > Give 8-24 hourly for slow release. > 5% - 20% daily dose is used to calculate the starting dose to treat breakthrough pain 	<ul style="list-style-type: none"> • No ceiling dose of morphine (give gradually until pain is controlled) • Pethidine can be used for acute pain (NOT for chronic pain)

Less commonly used strong opioids in our settings: Fentanyl, Oxycodone, Hydromorphone, Methadone

Table 22: Opioids Equi-analgesic dose ratios

Opioid	Approximate Oral	Equivalent Dose Subcut (IV)
Codeine	100mg	
Tramadol	50mg	
Morphine	10mg	5 mg (3mg)
Hydromorphone	2 mg	1 mg (0.5mg)
Oxycodone	5mg-7.5mg	
Fentanyl		50mcg
Methadone	About 1mg	

Table 23: Opioids to use or to avoid with chronic kidney disease.

	Mild to moderate CKD Stages 1,2, (3) (eGFR >60 mL/min)	Advanced CKD Stages (3),4,5 (eGFR<30 mL/min)
Codeine	YES, reduced dose	AVOID
Tramadol	YES, reduced dose	Maybe ⁴ , reduced dose
Buprenorphine ³	YES	YES, reduced dose
Morphine	YES, reduced dose	AVOID
Hydromorphone	YES, reduced dose	Use with caution, reduced dose
Oxycodone	YES, reduced dose	AVOID ⁴
Fentanyl ^{1,2}	YES ¹	YES, reduced dose
Methadone's ^{1,2}	YES ^{1,2}	YES, with caution ^{1,2}

¹ 2nd line ² Only to be used under palliative care or pain specialist supervision.

³ Not used much in palliative care setting ⁴ only very select cases.

References

1. Rwanda Ministry of Health Pain Management Guidelines, Edition of September 2012
2. Nicolson B. Differential Diagnosis: Nociceptive and Neuropathic Pain [Internet]. [cited 2020 Mar 11]. Available from: <https://www.ajmc.com/journals/supplement/2006/2006-06-vol12-n9suppl/jun06-2326ps256-s262>
3. Morrise W, Gouke R. Essential Pain Management -participant manual [Internet]. 2016 [cited 2020 Mar 11]. Available from: <http://fpm.anzca.edu.au/documents/epm-participant-manual-082016.pdf>
4. African Palliative Care Association. Beating Pain: a pocket guide for pain management in Africa, 2nd Ed. [Internet]. 2012. Available from: http://www.africanpalliativecare.org/images/stories/pdf/beating_pain.pdf

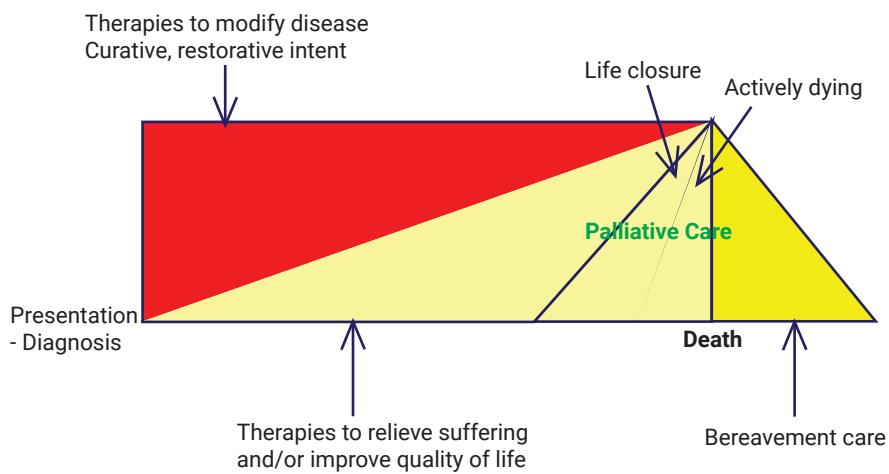
VI.B Adult Palliative Care

Introduction

Palliative care is the prevention and relief of suffering of any kind including physical, psychological, social, or spiritual experienced by adults and children living with serious health problems.

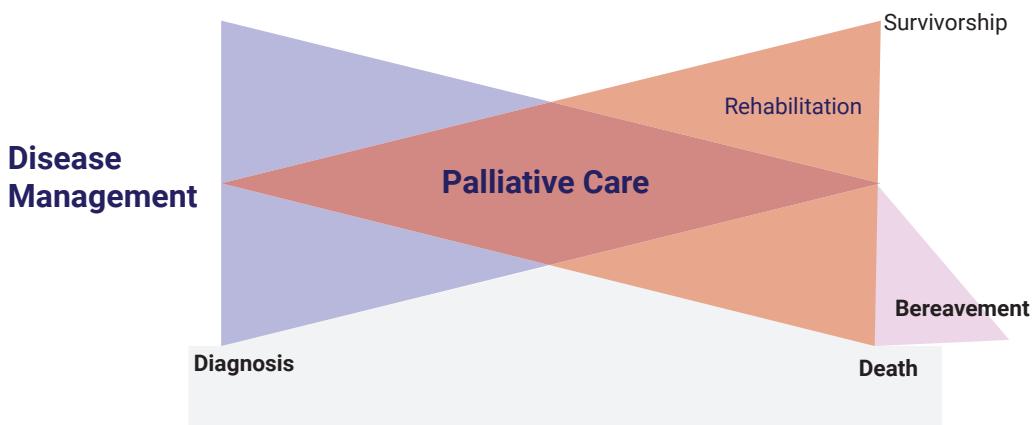
It is a people-centered accompanying of patients and their families throughout the illness course, including during treatment and at the end of life, that optimizes quality of life and maximizes dignity. Palliative care needs to be holistic and initiated at the time of diagnosis and continue after death (Bereavement care)

Figure 46: Palliative care in the trajectory of the patient's illness



Some cases of palliative care improve towards the survivorship stage.

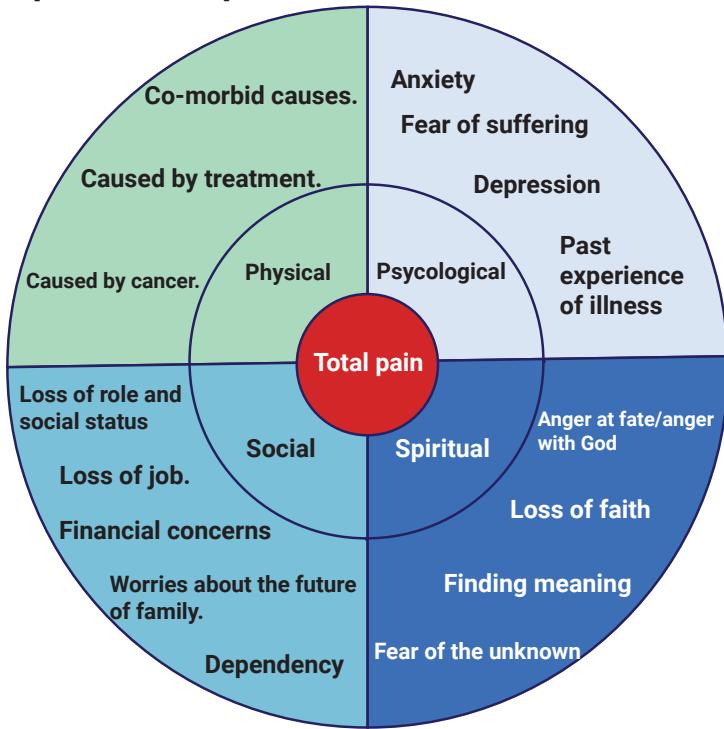
Figure 47: Stages in palliative adapted from Hawley P.J pain symptom management 2014



Holistic approach in palliative care

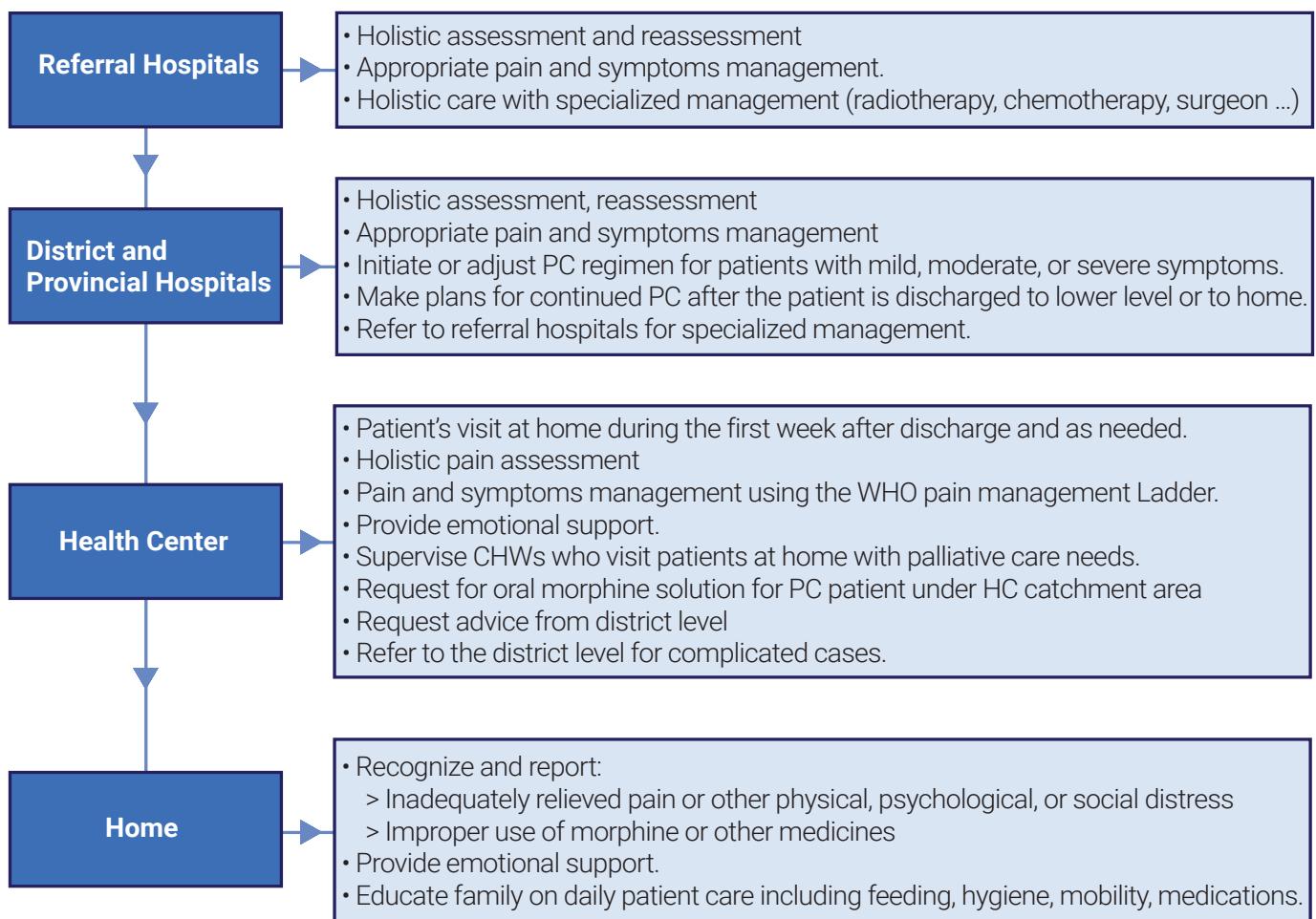
The holistic approach is one that regards the patients as a whole person recognizing them as comprising psychological, social, spiritual and physical aspect.

All components make up the whole person



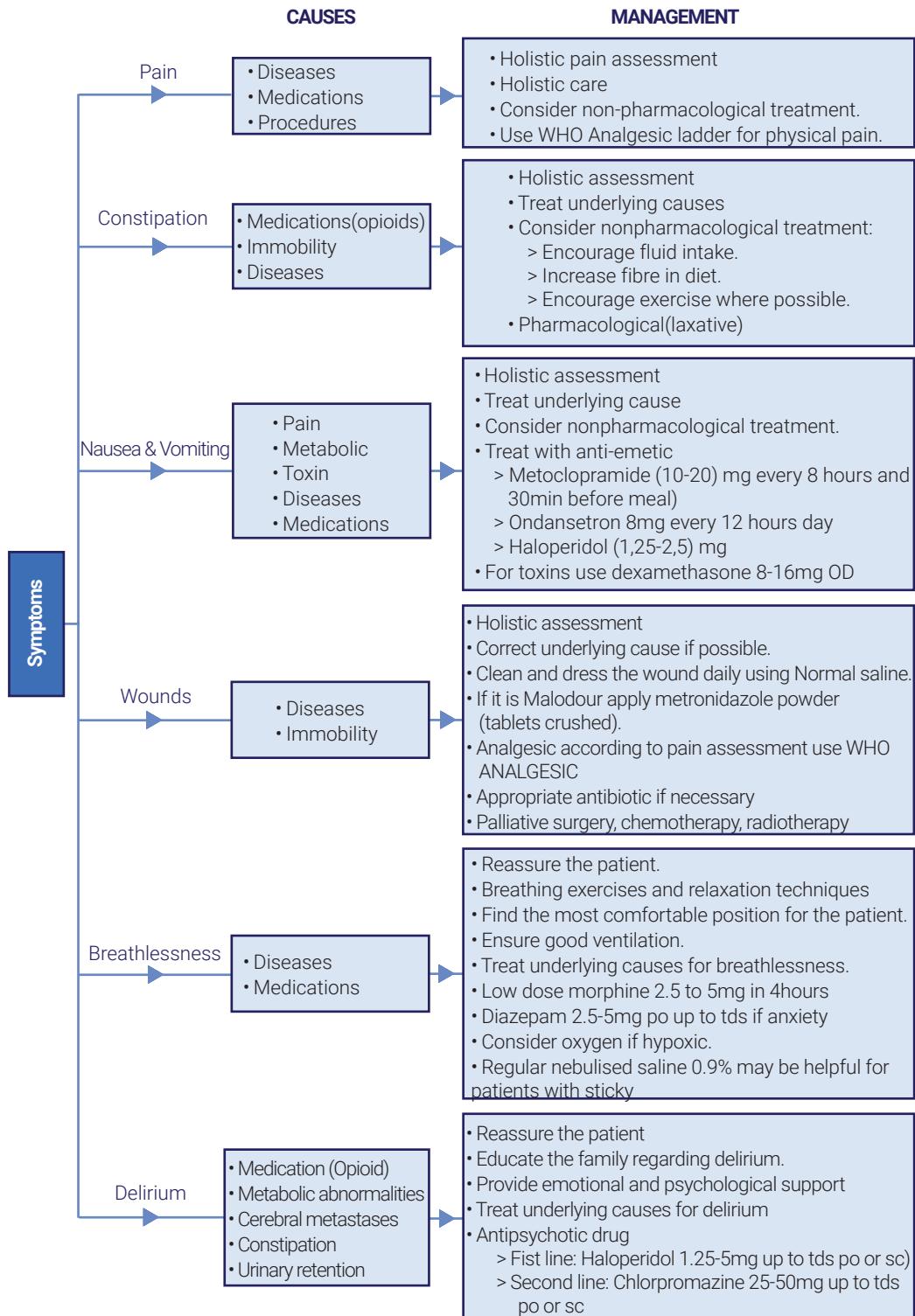
Suggestion: Caused by serious disease instead of cancer (under physical pain)

Palliative care package at each level of the healthcare system



Common symptoms in palliative care and management

Figure 48: Algorithm for common symptoms causes and management in Palliative Care



End of life care

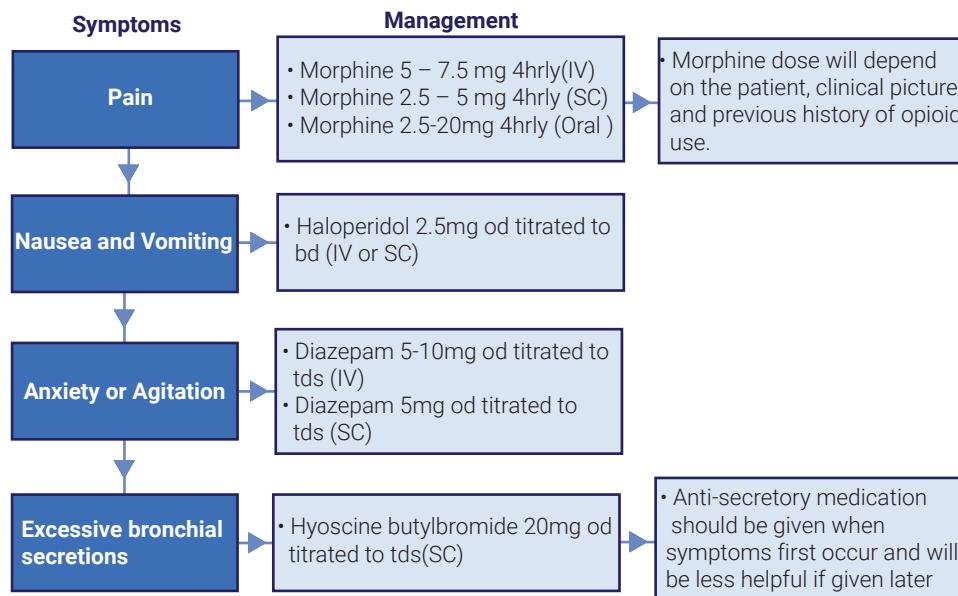
Care rendered to individuals who are near death or for whom death is expected in a relatively finite period of time. It includes supportive care, palliative care, hospice care.

Principle:

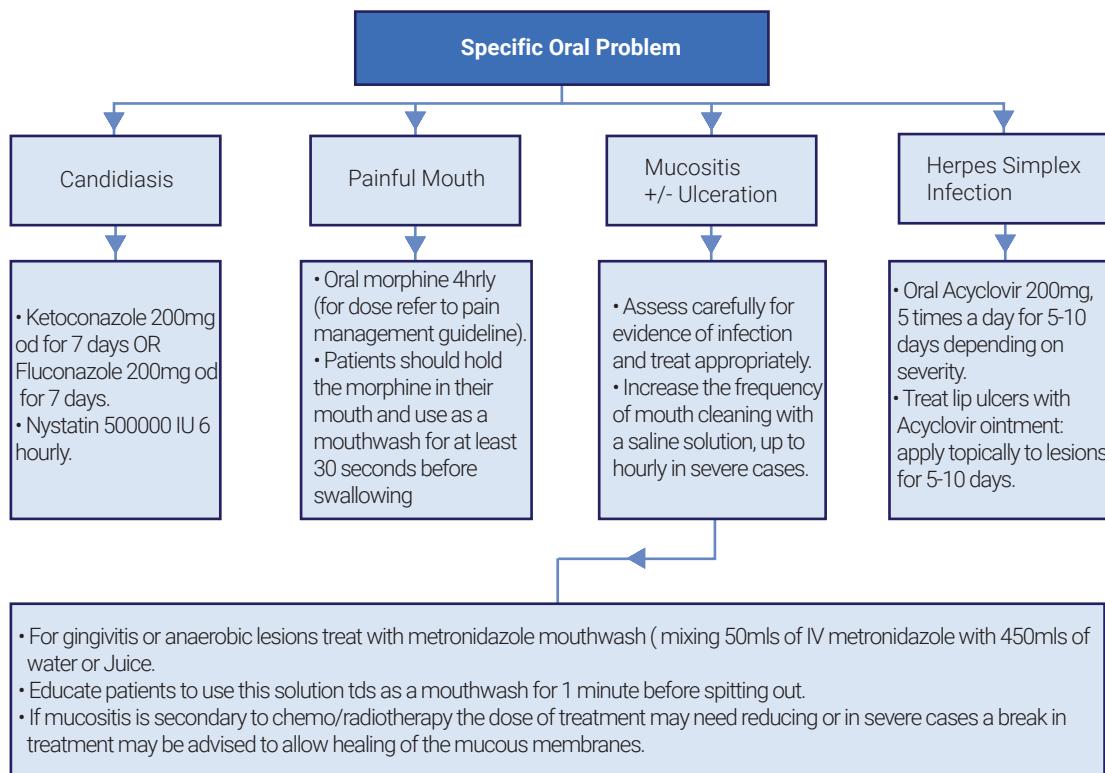
- Most patients find taking medication a burden especially towards the end of life.
- Focus on giving medication that will improve the patient's quality of life and discontinue any unnecessary medications.

Common symptoms and management in the end of life care

Figure 49: Algorithm for symptoms and its management in end of life care



Common and Specific Oral Problems at the end of life care



Nutrition and mouth care at the end of life care

Hydration and Nutrition	Mouth care
<ul style="list-style-type: none"> Patients should eat and drink as they wish. Educate Family that it is normal for patients to lose their appetite, sense of thirst and stop feeding towards the end of life. Intravenous fluids at this stage will not prolong life and will not prevent thirst. Patients should not be fed if there is reduced level of consciousness to prevent risk of aspiration. 	<ul style="list-style-type: none"> Consider Holistic care. Good regular mouth care is the best way to keep the patient comfortable. Maintain a moist mouth by sipping fluids regularly throughout the day. Brush teeth and clean tongue at least twice daily Application of lip balm or Vaseline to dry cracked lips.



Common conditions that need palliative care

	Adults		Children
<ul style="list-style-type: none"> • Cancers • HIV Infection • Complicated and Progressive Neurological Illness • Severe Renal Failure • Heart Failure • Chronic and End stage lung disease • Other life limiting illness. 		<ul style="list-style-type: none"> • Cancers • Severe Congenital Abnormalities • HIV Infection • Debilitating Genetic conditions • Other life limiting illness. 	

NOTE: For reporting purpose, physician will determine patient who has to be enrolled in palliative care register and Health Monitoring and Information System (HMIS) basing on disease prognosis.

References

1. Rwanda National Palliative Care Policy, January 2011
2. WHO (2002) Definition of palliative care, World Health Organization, Geneva. Available:<http://www.who.int/cancer/palliative/definition/en/>
3. World Health Organization. palliative care. cancer control knowledge into Action. WHO Guide for Effective Programmes.Geneva,2007

VI.C Pediatric Palliative Care

Definition

Pediatric palliative care is an interdisciplinary collaboration that seeks to improve the quality of life for children with life-threatening conditions, as well as their families.

Focuses

1. Prevention and relief of suffering, regardless of the stage of disease
2. Addressing comprehensively the physical, psychosocial, or spiritual needs of the child and family/caregivers

Six general principles to consider when delivering children's palliative care

Figure 50: Principles in pediatric palliative care



Pediatric pain assessment

Table 24: Neonatal/Infant Pain Scale (NIPS)

Behavior	0	1	2
Face	Relaxed	Contracted	
Cry	None	Moaning	Vigorous
Breathing	Relaxed	Change in Breathing	
Arms	Relaxed	Tense	
Legs	Relaxed	Tense	
Arousal	Calm	Uncomfortable	

If ≥ 4 , need pain intervention and in this case for palliative care, prescribe Morphine 0.05 mg/kg as needed.
Score range: 0-7

Neonatal pain management

Table 25: Pain management in Neonates

PROCEDURE	PAIN MANAGEMENT
Blood draw, IV catheter placement, injections (IM or subcutaneous), or umbilical catheters	Breastfeeding, comfort measures (such as holding and swaddling) Sugar Water (1 teaspoon in 20 ml of clean water) or D10% (20ml) two minutes prior to procedure on a gauze or via small syringe
Surgical procedures (draining abscess, extensive dressing or wound care)	Sugar Water (1 teaspoon in 20 ml of clean water) or D10% (20ml) two minutes prior to procedure on a gauze or via small syringe 20 minutes prior to the procedure, use syrup morphine 0.02-0.05 mg/kg or IV morphine 0.01-0.1 mg/kg

NG Tube Insertion	Use holding, swaddling or containment by flexing and holding the infant. Sugar Water (1 teaspoon in 20 ml of clean water) or D10% (20ml) two minutes prior to procedure on a gauze or via small syringe Lubrication (e.g., Normal Saline, KY Gel)
CPAP	Every 3 hours, use normal saline drops on the nose. Proper nasal prong sizing to avoid pain and trauma
Lumbar Puncture	Sugar Water (1 teaspoon in 20 ml of clean water) or D10% (20ml) two minutes prior to procedure on a gauze or via small syringe Paracetamol 10-15mg/kg/dose PO 1 hour prior to procedure Use topical lidocaine
Urinary catheters/Suprapubic bladder tap	Sugar Water (1 teaspoon in 20 ml of clean water) or D10% (20ml) two minutes prior to procedure on a gauze or via small syringe
Intubation	Morphine 0.05mg/kg 20 minutes before intubation or Fentanyl 1mcg/kg 5 minutes prior to intubation (the administration must be slow to avoid related respiratory depression or chest rigidity).

Pain management in infants and children younger than four years of age (Preverbal children): Revised FLACC

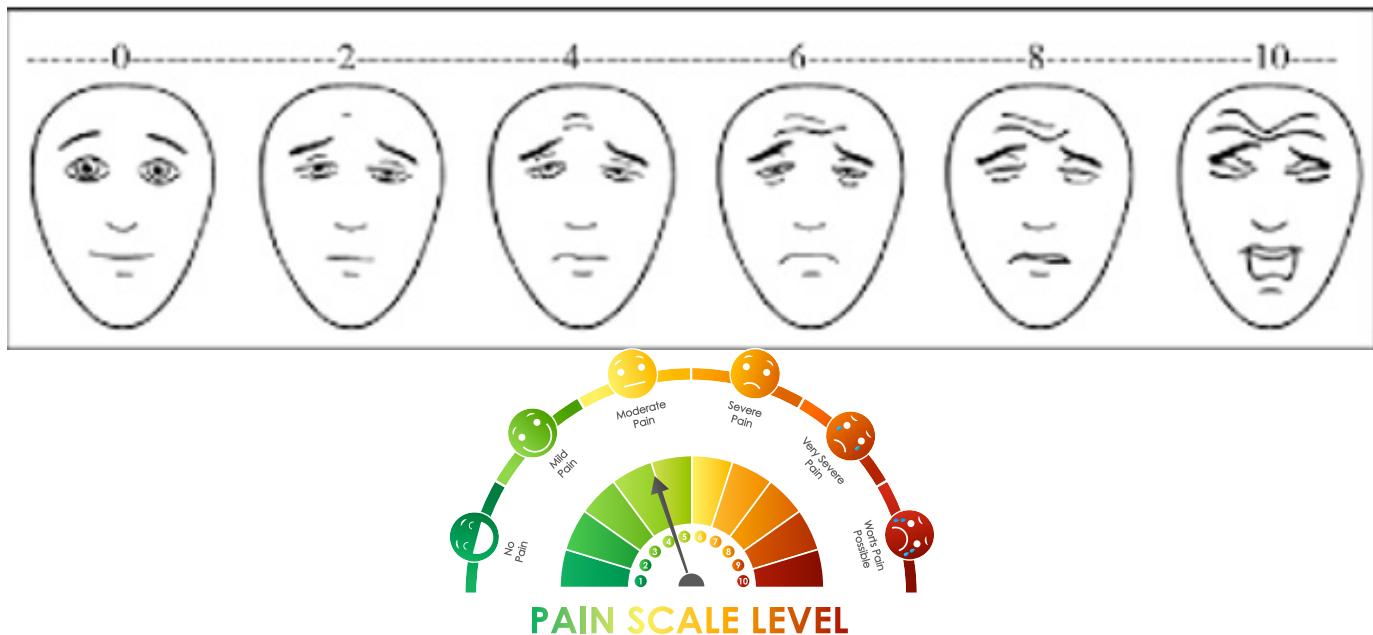
Table 26: Pain management in infant and older children

CATEGORIES	SCORING	0	1	2
F Face	No particular expression or smile		Occasional grimace or frown Disinterested; appears or sad worried.	Frequent to constant frown, clenched jaw, quivering chin; distressed-looking face: expression of fright or panic
L Legs	Normal position or relaxed		Uneasy, restless, tense; occasional tremors	Kicking or legs drawn up; marked increase in spasticity, constant tremors or jerking
A Activity	Lying quietly, normal position, moves easily		Squirming, shifting back and forth, tense; mildly agitated (eg, head back and forth, aggression); shallow and splinting respirations, intermittent sighs	Arched, rigid, or jerking; severe agitation, head banging; shivering (not rigors); breath-holding, gasping or sharp intake of breath; severe splinting
C Cry	No cry (awake or asleep)		Moans or whimpers, occasional complaint; occasional verbal outburst or grunt	Crying steadily, screams or sobs, frequent complaints; repeated outbursts, constant grunting
C Consolability	Content, relaxed		Reassured by occasional touching, hugging, or being talked to, distractable	Difficult to console or comfort; pushing away caregiver, resisting care or comfort measures

Pain assessment in older children

Faces pain scale-revised. These scales share a common metric (generally 0–10). Pain scores fall into three ranges:

- * Mild (0–3)
- * Moderate (4–6)
- * Severe (7 or more)



Pain management

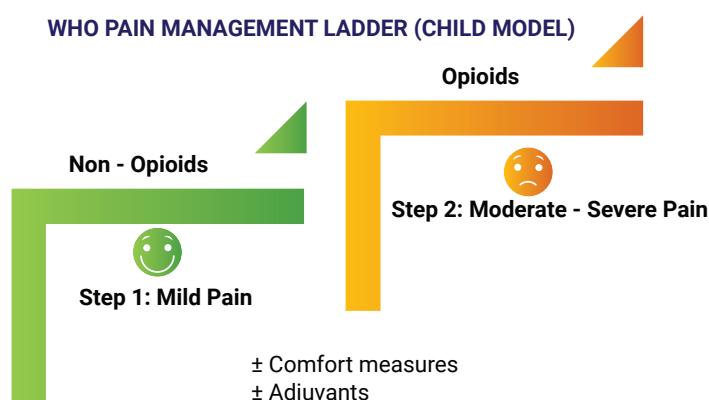
Non-Opioids

Age <6 months: Paracetamol

Age >6 months: Ibuprofen or Paracetamol (Acetaminophen).

Strong Opioids

Morphine (medicine of choice) or Fentanyl, Oxycodone, Hydromorphone, Buprenorphine.



N.B:

- Combining an opioid and non-opioid is effective, but do not combine drugs of the same class.
- Time doses based on drug half-life ("dose by the clock"); do not wait for pain to recur.

References

- Twycross, R. Introducing Palliative care, Radcliffe Medical Press, (4th Edition)
- WHO Guidelines for the pharmacological and radiotherapeutic management of cancer pain in adults and adolescents (2018)
- Amery J, editor. Children's Palliative Care in Africa [Internet]. 2009.

SECTION VII: HAEMOPHILIA

VII.A Introduction

Haemophilia A and B are congenital disorders caused by deficiency or absence of either two coagulation proteins, factor VIII (FVIII) for Haemophilia A (encoded by F8) and factor IX (FIX) for haemophilia B (encoded by F9). There is also more rare type of haemophilia called haemophilia C caused by deficiency of factor XI (FXI), also known as Rosenthal disease was first described in the 1950s in a multigenerational family experiencing bleeding related to surgery and dental procedures.

Types of Haemophilia

- **Haemophilia A:** this is the most common and is due to deficiency or absence of clotting factor VIII
- **Haemophilia B:** this is the most common and is due to deficiency all absence of clotting factor IX
- **Haemophilia C:** This is the less common and its prevalence is not yet established. It is due to deficiency or absence of factor XI.

Deficiency or absence of other clotting factors have not yet named "haemophilia" but rather as other bleeding disorders.

Severity

Severity of haemophilia A and B is determined by coagulation factor activity.

Table 27: Correlation of coagulation factor activity and disease severity in Haemophilia A or B

FVIII/FIX, % of activity (units/dl)	Bleeding tendency	Relative incidence (%)
< 1% (<1)	Severe: frequent spontaneous bleeding into joints, muscles and internal organs	50
1-5% (1-5)	Moderate: some "spontaneous" bleeds, bleeding after minor trauma	30
>5-45% (4-45)	Mild: bleeding only after significant trauma, surgery. Some times spontaneous bleeding can occur	20

VII.B Diagnosis

Around 70% of patients have a positive family history of haemophilia. Therefore, proper family history should be taken to all patients presented with bleeding tendencies. Laboratory tests are needed to confirm the diagnosis.

Clinical Manifestation

The clinical pictures of patients with haemophilia A and B are largely similar, and conflicting data are reported in the literature. Some articles reported that haemophilia B have a kind of lower bleeding frequency and good outcomes than Haemophilia A but others reported similar severity and variation in bleeding phenotype.

 Major Bleeding Episodes	 Minor Bleeding Episodes
<ul style="list-style-type: none"> • Central nervous system • Gastrointestinal • Neck/throat • Severe injury • Hip or iliopsoas • Advanced joint/muscle/Forearm compartment <p>"These may cause death or deformity. Therefore, hematologist should be consulted on proper management. Hospitalization will usually be required to maintain adequate factor levels"</p>	<ul style="list-style-type: none"> • Joint • Muscle/soft tissue • Mouth/gums • Epistaxis • Painless haematuria <p>"Even if considered minor bleeds, complications may occur. They should be treated early to avoid long term complications"</p>

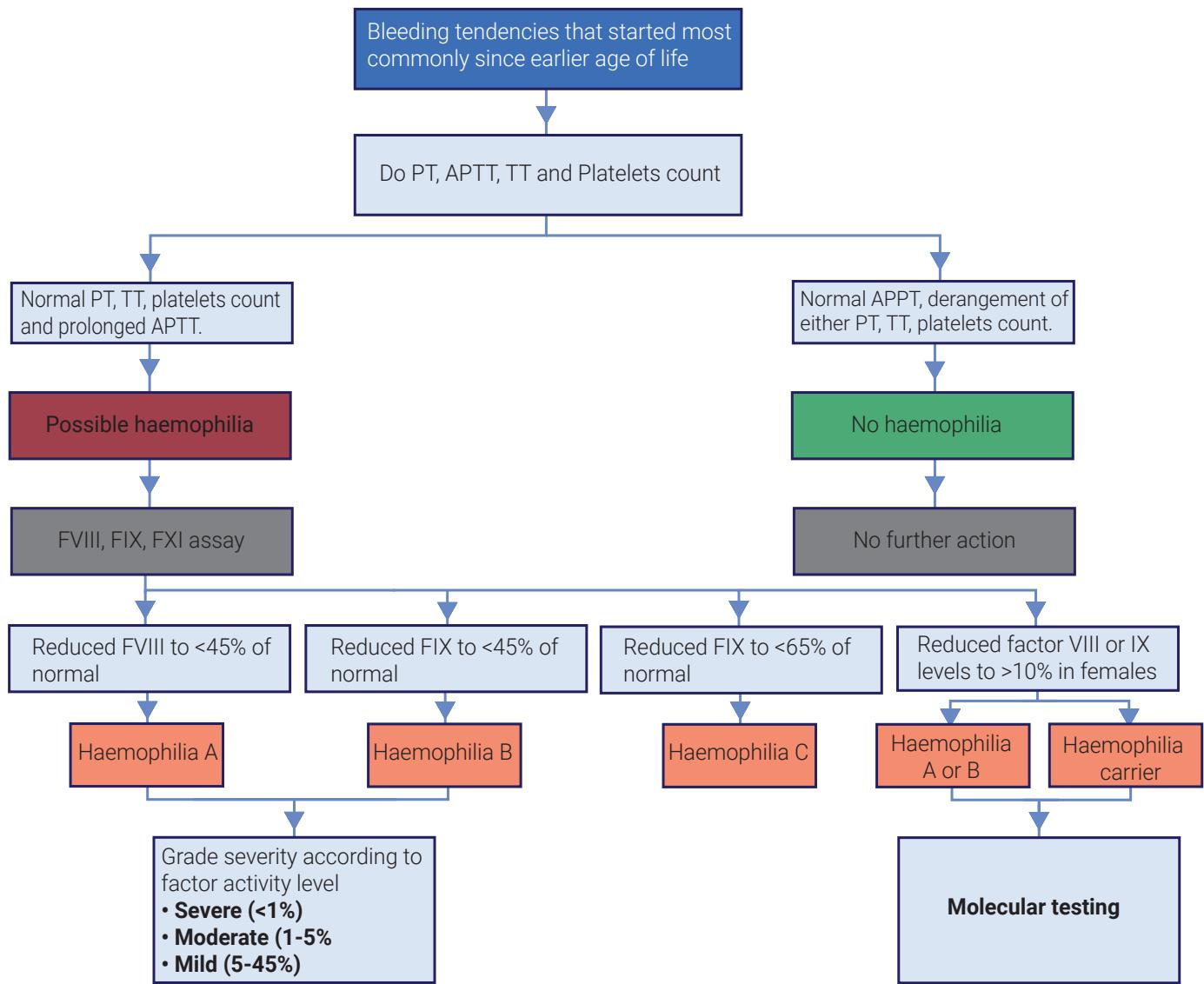
Laboratory Diagnosis

Initial tests

- Investigation of a suspected inherited bleeding disorder usually begins with screening tests of coagulation. The principal routine tests in common use are prothrombin time (PT), the activated partial thromboplastin time (APTT) and thromboplastin time (TT). PT and TT are normal in haemophilia whereas APTT is prolonged in haemophilia.
- However, APTT can be prolonged because of deficiency of other clotting factors than FVIII, FIX and FXI.
- Mixing studies using normal plasma will help to define whether prolonged coagulation times are due to factor deficiency or circulating anticoagulants or inhibitors

Possible condition	PT	APTT	TT	Platelet count
Normal	Normal	Normal	Normal	Normal
Haemophilia A or B	Normal	Prolonged	Normal	Normal
vWD	Normal	Normal/prolonged	Normal	Normal/reduced
Platelet defect	Normal	Normal	Normal	Normal/reduced

Figure 51: Pathway to haemophilia diagnosis



VII.C General care of Haemophilia

Principles of care

The general principles of care for hemophilia management include the following:

- Prevention of bleeding should be the goal.
- Acute bleeds should be treated early (within two hours, if possible).
- Home therapy should be used to manage only uncomplicated mild/moderate bleeding episodes.
- All severe bleeds should be managed in the clinic or hospital setting.
- Clotting factor concentrate replacement or Desmopressin (DDAVP) should be given to achieve appropriate factor levels prior to any invasive procedures.
- As much as possible, patients should avoid trauma by adjusting their lifestyle.
- Patients should be advised to avoid use of drugs that affect platelet function, particularly acetylsalicylic acid (ASA) and non-steroidal anti-inflammatory drugs (NSAIDs), except certain COX-2 inhibitors. The use of paracetamol/acetaminophen is a safe alternative for analgesia.
- Intramuscular injections, difficult phlebotomy, and arterial punctures must be avoided.
- Regular exercise should be encouraged to promote strong muscles, protect joints, and improve fitness.
- Contact sports should be avoided, but swimming and cycling with appropriate gear should be encouraged.

Management of bleeding

- During an episode of acute bleeding an assessment should be performed to identify the site of bleeding and treatment should be given early.
- Patients usually recognize early signs of bleeding even before manifestation of physical signs – they often experience a tingling sensation or “aura”. Treatment at this stage will stop bleeding early, resulting in less tissue damage and the use of less clotting factor concentrates.
- All patients should carry easily accessible identification indicating the diagnosis, severity, inhibitor status, type of product used, and contact information of the treating physician/clinic. This will facilitate management in an emergency and prevent unnecessary investigations before treatment.
- In severe bleeding episodes, especially in the head, neck, chest, and gastrointestinal and abdominal regions that are potentially life-threatening, treatment should be initiated immediately, even before assessment is completed.
- If bleeding does not resolve, despite adequate treatment, clotting factor level should be monitored and inhibitors should be checked if the level is unexpectedly low.
- Administration of desmopressin (DDAVP) can raise FVIII level sufficiently high (2-8 times baseline levels) in patients with mild to moderate hemophilia A.

Adjunctive management

- The following treatment strategies are important, particularly where clotting factor concentrates are limited or not available and may lessen the amount of treatment products required.
- **RICE** (rest, ice, compression, and elevation) is an important adjunctive management for bleeding in muscles and joints in addition to increasing factor level with clotting factor concentrates or desmopressin in mild hemophilia A.

Bleeding muscles and joints can be kept at rest by splinting, casting, or using crutches or a wheelchair. Application of cold/ice packs is useful to decrease inflammation, but ice should be wrapped in a towel and not be applied directly to the skin. It is recommended that ice be applied for 20 minutes, every four to six hours, until swelling and pain decrease.

- Antifibrinolytic drugs (e.g., tranexamic acid, epsilon amino caproic acid) for 5-10 days is effective as adjunctive treatment for mucosal bleeds (e.g., epistaxis, mouth bleed) and is used to decrease the use of coagulation products in dental extractions.

VII.D Treatment of Haemophilia

Treatment of Hemophilia A (FVIII Deficiency)

Factor VIII concentrate

Commercially prepared, lyophilized FVIII is available under a variety of brand names.

Dosage

- Vials of factor concentrates are available in dosages ranging from approximately 250 to 2000 units each.
- Each FVIII unit per kilogram of body weight infused intravenously will raise the plasma FVIII level approximately 2%. The half-life is approximately 8–12 hours. Verify the calculated dose by measuring the patient's factor level.
- Calculate the dosage by multiplying the patient's weight in kilograms by the factor level desired multiplied by 0.5. This will indicate the number of factor units required.

Table 28: Type of Bleed vs Factor Deficient

Types of bleed/Factor Deficient	FVIII
Major 80 – 100%	40 – 50 IU/Kg
Minor 40 – 60%	20 – 30IU/Kg

Example: (50 kg x 40 (% level desired) x 0.5 = 1,000 units of FVIII).

Refer to Table 29 for suggested factor level and duration of replacement required based on type of hemorrhage.

- Infuse FVIII by slow IV push at a rate not to exceed 3 ml per minute in adults and 100 units per minute in young children.

- It is best to use the entire vial of FVIII once reconstituted, though many products have been shown to have extended stability after reconstitution.
- Continuous infusion will help avoid peaks and troughs and is considered by many to be safer and more cost-effective. This will significantly reduce the total amount of factor concentrates used to treat bleeding or during prophylaxis after surgery. Dosage is adjusted based on frequent factor assays and calculation of clearance. Since FVIII concentrates of very high purity are stable in IV solutions for at least 24-48 hours at room temperature with less than 10% loss of potency, continuous infusion for a similar number of hours is possible.

Cryoprecipitate/fresh frozen plasma

- Only use cryoprecipitate if factor concentrates are not available. Cryoprecipitate is best prepared from repeatedly tested and virus-negative donors.
- FVIII content per bag of cryoprecipitate is 60-100 units (average - 80 units) in a volume of 30-40 ml.
- Fresh frozen plasma may also be used if factor concentrates are not available. It is recommended that FFP be subjected to viral reduction procedures.
- One ml of fresh frozen plasma contains 1 unit of factor activity.

Table 29: Type of blood product vs FVII or FIX contained per bag

Type of blood product	FVIII or FIX contained per bag
FFP	200 IU of either FVIII or FIX per unit/bag
Cryoprecipitate	100 IU of FVIII per unit/bag

Desmopressin (DDAVP)

- DDAVP is useful in the treatment of persons with mild hemophilia who have a 5% or greater FVIII level and who have been shown to be responsive in pre-tests.

Dosage

Table 30: DDAVP dosage

Desmopressin (DDAVP) (<2 years old*)	Subcutaneous injection IV	0.3 microgram/kg or (use 15 microgram/ml concentration preparation) 0.3 microgram/kg in 30-50mls of 0.9% sodium chloride over 20-30 minutes
---	------------------------------	--

* DDAVP is relatively contraindicated in children under 2 years old. DDAVP should only be administered to this age group with consultant approval as young children are at greater risk of hyponatraemia and fluid restriction is more difficult to enforce.

Fluid restriction is advised in the 24hrs following a dose of DDAVP to minimise the risk of hyponatraemia and fits. The following is suggested as a guide to fluid restriction which must include oral and intravenous fluids. If more than one dose of DDAVP is planned U&Es must be checked prior to each subsequent dose to check for hyponatraemia. If hyponatraemia occurs further doses of DDAVP must **NOT** be given.

Table 31: Fluid restriction in a patient receiving DDAVP

Age	Maximal fluid/24hrs
2-4 yrs	<750mls
5-10 yrs	<1litre
>10 yrs	<1.5litres

For those in whom DDAVP does not provide an adequate rise in FVIII or where a sustained rise is required (e.g major surgery), clotting factor concentrates may be required. Factor concentrates should only be used in patients with mild/moderate haemophilia with authorization of a consultant haematologist

Treatment of Hemophilia B (FIX Deficiency)

Factor IX concentrate

- Commercially prepared, lyophilized FIX concentrates are available under a variety of brand names. FIX concentrates fall into two classes:

- * Pure coagulation FIX products, and
- * Prothrombin complex concentrates (PCCs).

- Whenever possible, the use of pure FIX concentrates is preferable, and it is particularly advisable in the following instances:

- * Surgery;
- * Liver disease;
- * Prolonged therapy at high doses;
- * Previous thrombosis or known thrombotic tendency;
- * Disseminated intravascular coagulation (DIC);
- * Concomitant use of drugs known to have thrombogenic potential, including antifibrinolytic agents.

Dosage

- Vials of FIX concentrates are available in doses ranging from approximately 300 to 1200 units each.
- Each FIX unit per kilogram of body weight infused intravenously will raise the plasma FIX level approximately 1%. The half-life is about 18-24 hours. Verify calculated doses by measuring the patient's factor level.
- Recombinant FIX (rFIX; BeneFIX Wyeth) has a lower recovery, and each FIX unit per kg body weight infused will raise the FIX activity by approximately 0.8% in adults and 0.7% in children < 15 years of age. The reason for lower recovery of rFIX is not entirely clear.
- To calculate dosage, multiply the patient's weight in kilograms by the factor level desired. This will indicate the number of factor units required.

Table 32: Type of Bleed vs Factor Deficient

Types of bleed/Factor Deficient	FIX
Major 80 – 100%	80 – 100 IU/kg
Minor 40 – 60%	40 – 60 IU/kg

Example: $50 \text{ kg} \times 40 \text{ (% level desired)} = 2000 \text{ units}$ of plasma-derived FIX. For rFIX, the dosage will be $2000 \div 0.8$ (or 2000×1.25) = 2500 units for adults, and $2000 \div 0.7$ (or 2000×1.43) = 2860 units for children.

Refer to Table 28 at the end of this section, for suggested factor level and duration of replacement therapy based on type of hemorrhage.

- Infuse FIX by slow IV push at a rate not to exceed a volume of 3 ml per minute in adults and 100 units per minute in young children. PCCs and APCCs should be infused at half this rate.

- Continuous infusion will help avoid peaks and troughs and is considered by many to be safer and more cost-effective. This will reduce significantly the total amount of factor concentrates used to treat bleeding or during prophylaxis after surgery. Dosage is adjusted based on frequent factor assays and calculation of clearance. Since FIX concentrates of very high purity are stable in IV solutions for at least 24-48 hours at room temperature with less than 10% loss of potency, continuous infusion for a similar number of hours is possible.

Fresh frozen plasma (FFP)

- For patients with hemophilia B, fresh frozen plasma should only be used if FIX concentrates are unavailable.
- FIX levels above 25% are difficult to achieve. An acceptable starting dose is 15-20 ml/kg.

Immunizations

It is advised that children with disorders that significantly increase the risk of bleeding avoid intramuscular injections as there is a risk of hematoma formation which can lead to compartment syndrome.

In these cases, vaccinations should be given subcutaneously.

Plasma Factor Level and Duration of Administration

Table 34 presents commonly recommended plasma factor levels and duration of replacement therapy.

Table 33: Recommended Plasma Factor Level and Duration of Administration

Type of hemorrhage	Hemophilia A		Hemophilia B	
	Desired level	Duration (days)	Desired level	Duration (days)
Joint	40%-60%	1-2, may be longer if response is inadequate	40%-60%	1-2, may be longer if response is inadequate
Muscle (Except iliopsoas)	40%-60%	2-3, sometimes longer if response is inadequate	40%-60%	2-3, sometimes longer if response is inadequate
Iliopsoas • Initial maintenance	80%-100% 30%-60%	1-2 3-5, sometimes longer as secondary prophylaxis during physiotherapy	60%-80% 30%-60%	1-2 3-5, sometimes longer as secondary prophylaxis during physiotherapy
CNS/head • Initial maintenance	80%-100% 50%	1-7 8-21	60%-80% 30%	1-7 8-21
Throat and neck • Initial maintenance	80%-100% 50%	1-7 8-14	60%-80% 30%	1-7 8-14
Gastrointestinal • Initial maintenance	80%-100% 50%	1-6 7-14	60%-80% 30%	1-6 7-14
Renal	50%	3-5	40%	3-5
Deep laceration	50%	5-7	40%	5-7
Surgery (major) • Pre-op • Post-op	80%-100% 60%-80% 40%-60% 30%-50%	1-3 4-6 7-14	60%-80% 40%-60% 30%-50% 20%-40%	1-3 4-6 7-14

VII.E Management of common complications

Several complications may develop in people living with haemophilia the most concerning being development of inhibitors and chronic synovitis.

Inhibitors in haemophilia

Inhibitors" in haemophilia are IgG alloantibody to eXogenous clotting factor VIII (FVIII) or factor IX (FIX) that neutralize the function of infused clotting factor concentrates (CFCs). The presence of a new inhibitor should be suspected in any patient with haemophilia who fails to respond clinically to CFC replacement therapy, particularly in previously responsive patients. Inhibitors may develop in up to 25% of persons with haemophilia A, but are much less common in haemophilia B (1 -3%).

Treatment of inhibitors

Management of patients with inhibitors is complex and should be done in a hemophilia center in a presence of hematologist with experience in hemophilia management.

The management involves treatment of acute bleeds and measures to eradicate the inhibitors:

- Management of Acute bleeding episodes
- Low responding inhibitor titers (<5 BU):
- Give factor concentrate at 200-300% correction
- Monitor response clinically.
- Frequent monitoring of factor recovery levels

High responding (> 5 BU):

- Both Activated Prothrombin Complex Concentrates (APCC) [example Factor Eight Inhibitor Bypass Activity (FEIBA)] and recombinant activated factor seven (rFVIIa) [e.g. NOVOSEVEN] are effective for treatment of acute bleeding episodes in patients with Factor VIII and IX inhibitors
- Activated Prothrombin Complex Concentrate – APCC (FEIBA):
- FEIBA contains already activated factors II, IX, and X.
- Dose 50 – 100 U/kg every 12 -24hr until clinical improvement.
- *DO NOT exceed a single daily dose of 200 U/kg.*
- *DO NOT infuse antifibrinolytic drugs (e.g. Tranexamic acid) concurrently because of the risk of thromboembolism*

Recombinant Factor VIIa /rFVIIa (NOVOSEVEN):

- Factor VIIa activates Factor X and leads to the formation of a hemostatic plug.
- 90 µg/kg every 2 – 3 hourly or by adjusted-dose continuous infusion (at 2µg/kg/hr.).
- Single dose of 270µg/kg may be used until clinical improvement.
- Tranexamic acid 10mg/kg/dose PO /IV 6hrly may be used concurrently with recombinant factor VIIa.

Emicizumab

Emicizumab has been licensed for bleed in patients with hemophilia A with and without inhibitors. Prophylaxis dosing with emicizumab consists of an induction period of 3.0 mg/kg/week for 4 weeks by subcutaneous injection. This is followed thereafter by 1.5 mg/ kg/week or alternative dosing schedules including 3 mg/kg every 2 weeks or 6 mg/kg every 4 weeks

Denotations

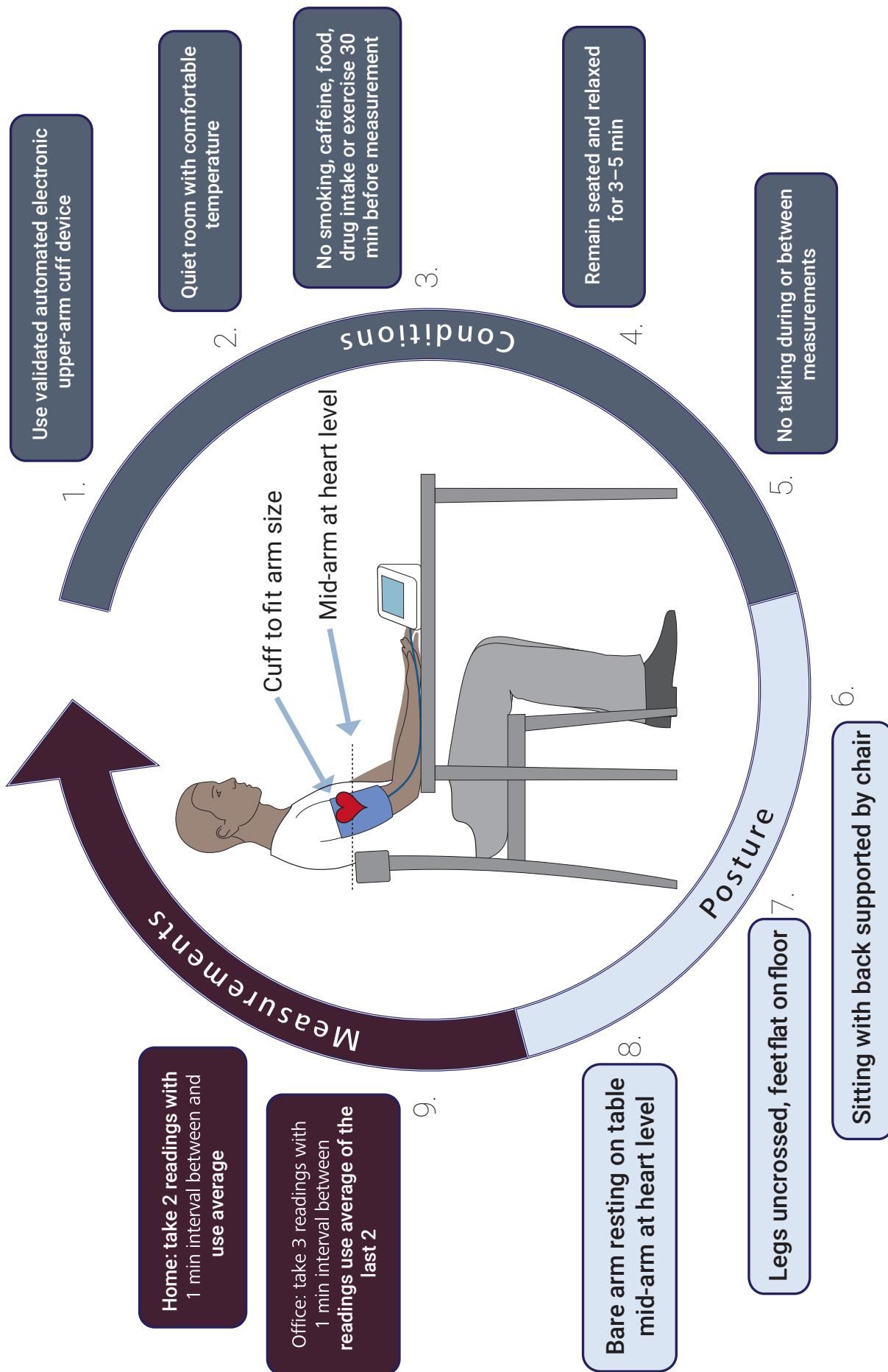
APTT: Activated Partial Thromboplastin Time, **ASA:** acetylsalicyclic acid, **BU:** Bethesda Unit, **CFC:** clotting factor concentrates, **DDAVP:** Desmopressin, **IgG:** Gamma Immunoglobulin, **DNA:** Deoxyribonucleic acid, **FEI-BA:** Factor Eight Inhibitor Bypass Activity, **FVIII:** clotting factor 8, **FIX:** clotting factor 9, **FXI:** clotting factor 11, **NCD:** Non-Communicable Disease, **NNHF:** Novo Nordisk Foundation, **NSAIDs:** non-steroidal anti-inflammatory drugs, **PPP:** Platelets Poor Plasma **PT:** Prothrombin time, **rFIX:** Recombinant FIX, **RFH:** Fraternity against Haemophilia, **rFVIIa:** recombinant activated factor seven, **RICE:** rest, ice, compression, and elevation, **RDHS:** Rwanda Demographic Health Survey, **TENS:** Transcutaneous electrical nerve, **TT:** Thromboplastin Time stimulation, **WFH:** World Federation of Haemophilia.

References

1. Lewandowska MD, Connors JM. Factor XI Deficiency. *Hematol Oncol Clin North Am.* 2021 Dec;35(6):1157-1169. doi: 10.1016/j.hoc.2021.07.012. Epub 2021 Sep 15. PMID: 34535287.
2. Peyvandi F, Garagiola I, Young G. The past and future of haemophilia: diagnosis, treatments, and its complications. *Lancet.* 2016 Jul 9;388(10040):187-97. doi: 10.1016/S0140-6736(15)01123-X. Epub 2016 Feb 18. PMID: 26897598
3. Páramo JA. Treatment of haemophilia: From replacement to gene therapy. *Med Clin (Barc).* 2021 Dec 24;157(12):583-587. English, Spanish. doi: 10.1016/j.medcli.2021.04.031. Epub 2021 Sep 9. PMID: 34509300.
4. Loomans JI, Lock J, Peters M, Leebeek FW, Cnossen MH, Fijnvandraat K. Hemofilie [Haemophilia]. *Ned Tijdschr Geneeskd.* 2014;158:A7357. Dutch. PMID: 25351381.
5. Samuelson Bannow B, Recht M, Négrier C, Hermans C, Berntorp E, Eichler H, Mancuso ME, Klamroth R, O'Hara J, Santagostino E, Matsushita T, Kessler C. Factor VIII: Long-established role in haemophilia A and emerging evidence beyond haemostasis. *Blood Rev.* 2019 May;35:43-50. doi: 10.1016/j.blre.2019.03.002. Epub 2019 Mar 3. PMID: 30922616.
6. Schramm W. The history of haemophilia - a short review. *Thromb Res.* 2014 Nov;134 Suppl 1:S4-9. doi: 10.1016/j.thromres.2013.10.020. Epub 2014 Feb 7. PMID: 24513149.
7. Mingot-Castellano ME, Núñez R, Rodríguez-Martorell FJ. Acquired haemophilia: Epidemiology, clinical presentation, diagnosis and treatment. *Med Clin (Barc).* 2017 Apr 7;148(7):314-322. English, Spanish. doi: 10.1016/j.medcli.2016.11.030. Epub 2017 Jan 22. PMID: 28118963.
8. Dolan G, Benson G, Duffy A, Hermans C, Jiménez-Yuste V, Lambert T, Ljung R, Morfini M, Zupančić Šalek S. Haemophilia B: Where are we now and what does the future hold? *Blood Rev.* 2018 Jan;32(1):52-60. doi: 10.1016/j.blre.2017.08.007. Epub 2017 Aug 16. PMID: 28826659.
9. Dou X, Poon MC, Yang R. Haemophilia care in China: Achievements in the past decade. *Haemophilia.* 2020 Sep;26(5):759-767. doi: 10.1111/hae.14101. Epub 2020 Jul 14. PMID: 32666580.
10. Chen YC, Chang CY, Cheng SN, Pan RY, Shih YL, Li TY, Wang SH. Evolution of congenital haemophilia care in Taiwan. *J Formos Med Assoc.* 2022 Mar;121(3):582-591. doi: 10.1016/j.jfma.2021.07.017. Epub 2021 Aug 3. PMID: 34362614.
11. Farrugia, A. Guide for the assessment of clotting factor concentrates for the treatment of hemophilia. World Federation of Hemophilia. 2003.
12. Hemophilia of Georgia. Protocols for the treatment of hemophilia and von Willebrand disease. 2004.
13. Kitchen, S. and Angus McCraw. Diagnosis of hemophilia and other bleeding disorders: A laboratory manual. World Federation of Hemophilia. 2000.
14. Karabus, C., ed. Treatment guidelines for hemophilia in South Africa. South African Hemophilia Foundation.
15. Kasper, C.K., and Meirione Costa e Silva. Registry of clotting factor concentrates. Fifth edition. World Federation of Hemophilia. 2004.
16. National Hemophilia Foundation. Standards and criteria for the care of persons with congenital bleeding disorders. 2002.
17. Santagostino, E., P.M. Mannucci, and A. Bianchi Bonomi. Guidelines for replacement therapy for hemophilia and inherited coagulation disorders in Italy. *Hemophilia.* 2000. 6:1-1

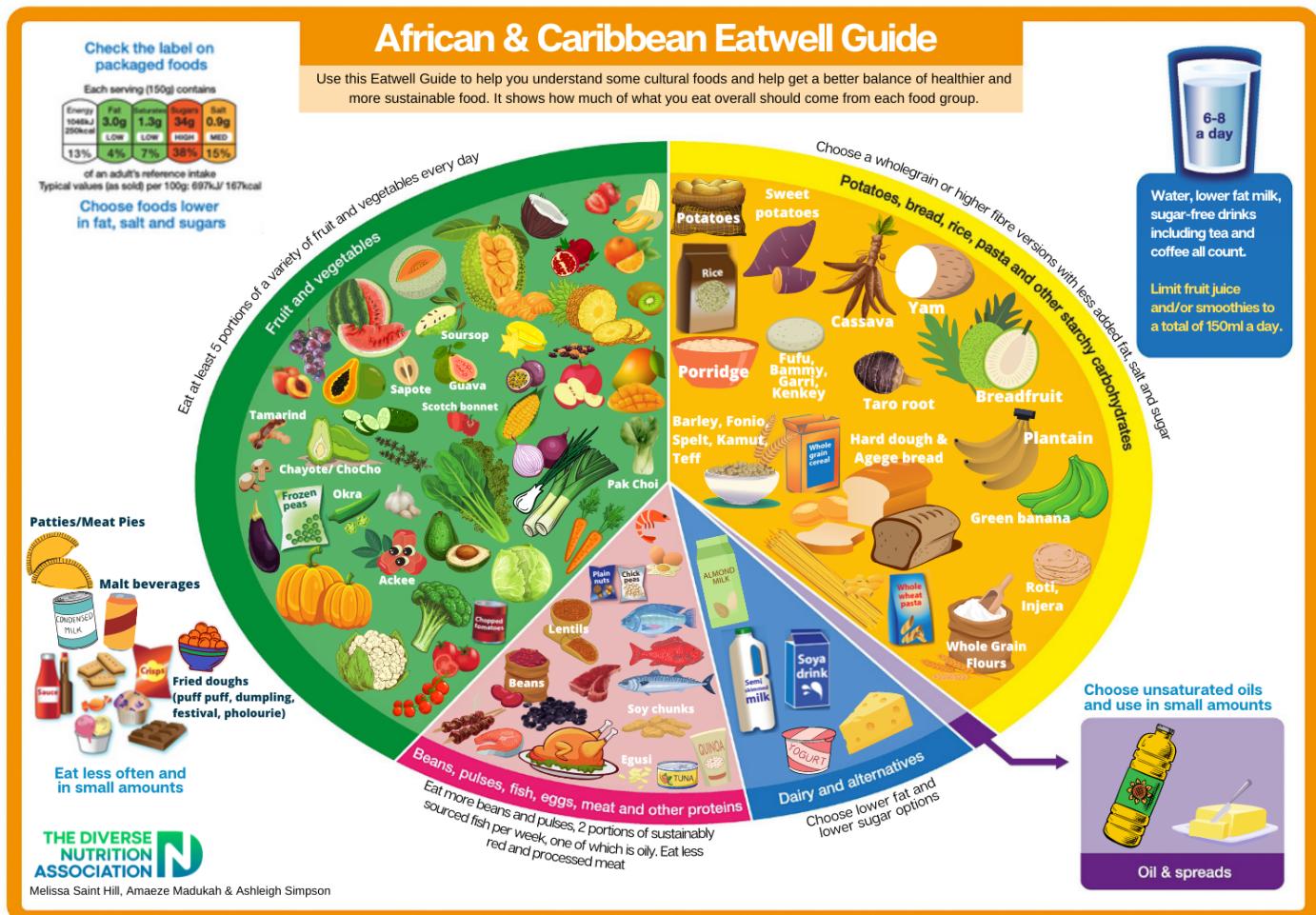
ANNEX

Annex 1: Recommendations for BP measurements in the office and at home



Adopted from ESH guidelines, 2023

Annex 2: Diet Education



Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

© Crown copyright 2016

NATIONAL
NON-COMMUNICABLE DISEASES
MANAGEMENT GUIDELINES

www.moh.gov.rw | www.rbc.gov.rw



REPUBLIC OF RWANDA



MINISTRY OF HEALTH

**RWANDA STANDARD TREATMENT
GUIDELINES**

MENTAL HEALTH

Volume 9

March 2022

FOREWORD

I have the pleasure to preface the 2022 Rwanda Standards Treatment Guidelines and the Essential Medicines List (STGs/EML). This is the second edition after the 2013 STGs and 2015 EML.

The development of the STGs/EML is an essential part of the improvement of the quality of health care delivery especially at the primary healthcare level. Rwanda is committed to the attainment of the 2030 SDGs and especially goal 3 i.e. "good health and well-being" with one its target to "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"

To attain the above-mentioned goals, special packaging of policies and strategies aligned to the Global Strategy for Women's, Children's and Adolescent's Health were developed through the MNCH strategic plan 2018- 2024 ensuring coordinated action to address cross-cutting health needs of our future. These guidelines have therefore integrated this plan accordingly

Equally important, this 2022 STGs/EML integrates Rwanda global commitment to the implementation of the One Health Policy that set-up policies, implementation strategies to prevent and control zoonotic diseases, plant diseases, food safety and specifically antimicrobial resistance. Rwanda has therefore set up a One Health Multi-sectoral Coordination Mechanism (OH-MCM) that will allow antimicrobial resistance surveillance, guide and monitor the use of antibiotics in Rwanda. This policy is in line with our commitment to the WHO Global Action Plan on Antimicrobial Resistance (2018). We have therefore for the first time customized the WHO AWARE classification of antibiotics as well as the antibiotics prescription guidance. This will help not only reduce the current trend of antimicrobial resistance but importantly ensure better quality of healthcare of our population by reducing the negative impact of multi-drug resistance in Rwanda.

While the above global commitments inform our strategic choices, the STGs/EML are grounded first and foremost in our national diseases burden and specifically at the primary health care level. It is our hope that these guidelines will bring more evidence-based practice, more transparency in the care provision as well as access to efficient, affordable, and available medications in the country.

I would finally wish to acknowledge the strategic technical and financial contribution of the WHO that made this work possible despite the challenging environment due to Covid-19 pandemic.

This work would not have been possible without the active involvement of the professional medical/pharmacy societies/associations, that reviewed the literature, held numerous online discussions, peer-reviewed several drafts and came up with the most suitable guidelines.

Several other partners provided support to this project in one way or another and I wish to thank all of them for their usual support

Dr. NGAMIJE M. Daniel
Minister of Health



Acknowledgement

The Ministry of Health wishes to acknowledge the support of various stakeholders in the making of the 2022 Standards Treatment Guidelines (STGs) and Essential Medicines List (EML). Without their contributions, it wouldn't have been possible to complete this work despite the restrictions made necessary by the Covid-19 Pandemics.

The World Health Organization availed the required financial and technical support throughout the project and was flexible to adjust to the challenges brought about by the stringent environment.

World AIDS Campaign International (WACI) Health made a significant financial input to allowing a smooth running of the project.

The Medicines, Technologies, and Pharmaceutical services program (USAID MTaPS) financial intervention especially in the shaping of the rational use of antibiotic guidelines has been a great input in the current work.

Clinton health access initiative (CHAI) have been instrumental and played a major role especially in developing the Clinical guidelines for hypoxemia screening and oxygen therapy administration in Neonates, children and adults.

The Ministry wishes to thank specifically all Rwanda Health professionals and Pharmacy Societies and Associations for their self-less spirit and gave their time to patiently review and update the previous 2013 STGs and 2015 EML spending very long hours online very often late in the night.

The Ministry of Health wishes to acknowledge and thank the consultants, Prof Emile Rwamasirabo, Dr. Raymond Muganga and Dr. Richard Butare who coordinated this 2022 STG/EML updates.

The Ministry also recognizes the important contribution of tertiary Hospitals including CHUK, CHUB and KFH that availed their microbiology data over 5 to 7 years that helped to profiling the antimicrobial resistance in Rwanda.

Special recognition goes also to the Experts Taskforce appointed by the MOH upon recommendation by the Medical and Pharmacy Societies and Associations. The team is composed as follows:

	Societies and Associations	Coordinators
1	The Rwanda Pediatric Association (RPA)	Prof. Musiime S.
2.	The Rwanda College of Physicians (RCP)	Dr. Muvunyi B.
2	The Rwanda Society of Obstetrics and Gynecology (RSOG)	Dr. Ruzigana G.
3	The Rwanda Surgical Society	Dr. Byiringiro F.
4	The Rwanda Psychiatric Society	Dr. Mudenge C.
5	The Rwanda Dental Surgeon Association (RDSA)	Dr. Bizimana A.
6	The Rwanda Ophthalmology Society (ROS)	Dr. Mutangana F.
7	The Rwanda Oncology Society (in formation)	Dr. Rubagumya F.
8	The Rwanda Otolaryngology and Neck Surgery Society (ROHNSS)	Dr. Mukara Kaitesi
9	The Rwanda Dermatology Society (RDS)	Dr. Amani A.
10	The Rwanda Society of Anesthesiologists (RSA)	Dr. Rudakemwa A.
11	The National Pharmacy Council	Dr. Hitayezu F.

Table of Content

FOREWORD.....	iii
Acknowledgement.....	v
List of Abbreviations and acronyms	xi
● Psychotic Disorder.....	1
-- Brief Psychotic Disorder	1
-- Schizophrenia.....	4
● Mood Disorders.....	8
-- Bipolar Disorder	8
-- Major Depressive Disorder.....	9
● Anxiety Disorders	13
-- Generalized Anxiety Disorder (Gad).....	13
-- Phobia.....	14
-- Panic Disorder	15
● Obsessive-Compulsive Disorder.....	16
● Trauma- And Stressor-Related Disorders	16
-- Adjustment Disorders	17
-- Posttraumatic Stress Disorder	18
● Somatic Symptom And Related Disorders	20
● Substance-Related And Addictive Disorders..	21
-- Alcohol Use Disorders	21
-- Cannabis Use Disorders	23
-- Opioid Use Disorder.....	25
● Neurocognitive Disorders	28
-- Delirium.....	28
● Psychiatric Emergencies.....	29
-- Agitation/Aggression	30
● EPILEPSY	31
● The Neurodevelopmental Disorders	33
-- Intellectual Disability (Intellectual Developmental Disorders)..	34
-- Attention Deficit Hyperactivity Disorder (Adhd).....	35
-- Autism Spectrum Disorders	36

● Disruptive, Impulse-Control, and Conduct Disorders	37
● Elimination Disorders	38
-- Enuresis	38
-- Encopresis.....	39
REFERENCES	41

List of Tables

Table 1. Treatment of 1st and 2 nd generation	32
---	----

List of Abbreviations and acronyms

ADHD	: Attention-Deficit Hyperactivity Disorder
AUDIT	: Alcohol Use Disorder Identification Test
CBT	: Cognitive Behaviour Therapy
CIWA-R	: Clinical Institute Withdrawal Assessment for Alcohol-Revised
CNS	: Central nervous System
CT	: Computer Tomography
DSM 5	: Diagnostic and Statistical Manual-5
DSM IV-TR	: Diagnostic and Statistical Manual –IV text Revised
DSM-IV	: Diagnostic and Statistical Manual
E.g	: Example
ECG	: Electrocardiogram
EEG	: Electroencephalogram
EFNS	: European Federation of Neurological Societies
FBC	: Full Blood Count
I.M	: Intramuscular
ID	: Intellectual disability
Mg	: Milligram
MRI	: Magnetic Resonance Imaging
OCD	: Obsessive compulsive disorder
OD	: Once a day
PO	: Per os
PTSD	: Post Traumatic Stress Disorder
PTSD	: Posttraumatic stress disorder
SSRI	: Selective serotonin re-uptake inhibitor
Tab	: Tablets
TID	: Three times a day

● Psychotic Disorder

Psychosis is a condition of the mind broadly defined as a loss of contact with reality. It is estimated that 13 to 23 percent of people experience psychotic symptoms at some point in their lifetime and 1 to 4 percent will meet criteria for a psychotic disorder.

-- | Brief Psychotic Disorder

Brief psychotic disorder is defined in DSM-5 as the presence of one or more psychotic symptoms with a sudden onset and full remission within one month.

Diagnosis

A. Presence of one or more of the following symptoms:

- 1. Delusions
- 2. Hallucinations
- 3. Disorganized speech
- 4. Grossly disorganized or catatonic behavior

B. Duration of an episode of the disturbance is at least a day but less than a month, with eventual full return to premorbid level of functioning.

C. Absence of symptoms comprising a bipolar or depressive disorder, or psychosis resulting from substance use/withdrawal or a general medical condition.

specify if there is a marked stressor – Symptoms are preceded by and apparently in response to a markedly stressful experience or a post-partum onset,

Treatment

The approach to individuals with brief psychotic disorder is the same as the general initial management of psychosis, regardless of the cause. This includes antipsychotic medications and adjunctive supportive therapy. Management of psychosis is briefly discussed here.

Essential information for patient and Family

Explanation to the family should include: that these signs and strange behaviour are symptoms of a mental illness. Acute episodes often have a good prognosis, but long-term course of the illness is difficult to predict from an acute episode. Continued treatment may be needed for several months after symptoms resolve. Educate the family further on medication including its side effects.

Adjunctive supportive therapy

Ensuring safety/determining site of care – The initial treatment decisions should be guided by the patient's ability to maintain safety.

This should be assessed by direct questioning about homicidal or suicidal ideation

Ensure the safety of the patient and those caring for him/her:

- Ensure that the patient's basic needs are met
- Take care not to harm the patient.
- Minimize stress and stimulation.
- Do not argue with psychotic thinking (you may disagree with the patient's beliefs, but do not try to argue that they are wrong).
- Avoid confrontation or criticism unless it is necessary to prevent harmful or disruptive behavior.
- Agitation which is dangerous to the patient, the family or the community requires hospitalization or close observation in a secure place. If patients refuse treatment, legal measures may be needed
- Encourage resumption of normal activities after symptoms improve.

Medication

Pharmacological Treatment:

Acute phase:

In case of violent patients the first choice is:

Typical Antipsychotic

- Chlorpromazine, IM, 100–300 mg/day in 3 or 4 divided doses
- Levomepromazine, IM, 100–200 mg/day in 3 or 4 divided doses
- Haloperidol, IM, 10 – 30 mg/day in 3 or 4 divided doses

In case of non-violent patients the first choice is

Atypical Antipsychotic:

- Tabs Risperidone, tablets, 2 – 8 mg daily in divided doses.
- Quetiapine 50-750mg in divided doses.
- Olanzapine 5-20mg once a day.
- Aripiprazol 10-30mg once a day

Or

Typical antipsychotic:

- Tabs Haloperidol, tablets, 5 – 30 mg daily in divided doses
- Tabs Flupentixol, tablets, 1 – 6 mg daily in divided doses

- Tabs Chlorpromazine(Largactil), tablets, 25 – 1200 mg daily in divided doses
- Tabs Levomepromazine (Nozinan), tablets, 25 – 300 mg daily in divided doses
NB: the doctor should consider the minimum effective dose.

The maintenance phase

Atypical Antipsychotic:

- Tabs Risperidone, tablets, 2 – 8 mg daily in divided doses.
- Quetiapine 50-750mg in divided doses.
- Olanzapine 5-20mg once a day.
- Aripiprazol 10-30mg once a day

Or

Typical antipsychotic:

- Tabs Haloperidol, tablets, 5 – 30 mg daily in divided doses
- Tabs Flupentixol, tablets, 1 – 6 mg daily in divided doses
- Tabs Chlorpromazine (Largactil), tablets, 25 – 1200 mg daily in divided doses
- Tabs Levomepromazine (Nozinan), tablets, 25 – 300 mg daily in divided doses

If no adherence and/or compliance, the patient should be put on the following medication:

- Flupentixol decanoate, 20 – 40 mg IM / 2 weeks
- Haloperidol decanoate, 50 – 200 mg/Month
- Tabs Pimozide, tablet, 4 – 8 mg / week orally

Non Pharmacological Treatment

- Individual psychotherapy
- Psycho-education
- Group psychotherapy
- Family therapy

Monitor for side effects of medication:

- Acute dystonia or spasms may be managed with injectable
 - *In* Diazepam 10mg or antiparkinsonian drugs
- Akathisia (severe motor restlessness) may be managed with dosage

- reduction or beta-blockers
 - Tabs Propranolol 40-120mg per day in divided dose. OD.
- Parkinsonian symptoms (tremor, akinesia) may be managed with oral antiparkinsonian.
 - Tablets Biperiden 2 mg up to three times a day.

In cases of severe side effects or the appearance of fever, rigidity, hypertension, stop antipsychotic medication and consider consultation by a specialist.

-- | Schizophrenia

Schizophrenia is a psychiatric disorder involving chronic or recurrent psychosis. It is commonly associated with impairments in social and occupational functioning. It is among the most disabling and economically catastrophic medical disorders, ranked by the World Health Organization as one of the top ten illnesses contributing to the global burden of disease

Diagnosis

DSM-5 diagnostic criteria for schizophrenia are described in more detail below

a. Two or more of the characteristic symptoms below are present for a significant portion of time during a one-month period (or less if successfully treated):

- Delusions
- Hallucinations
- Disorganized speech (eg, frequent derailment or incoherence)
- Grossly disorganized or catatonic behavior
- Negative symptoms, ie, affective flattening, alogia, or avolition

b. For a significant portion of the time since the onset of the disturbance, one or more major areas of functioning such as work, interpersonal relations, or self-care are markedly below the level achieved prior to the onset. When the onset is in childhood or adolescence: failure to achieve expected level of interpersonal, academic, or occupational achievement.

c. Continuous signs of the disturbance persist for at least six months. The six-month period must include at least one month of symptoms (or less if successfully treated) that meet criterion.

Treatment

Psychoeducation for patient and families:

Explanation to the family and patients should include that:

These signs or strange behaviors are symptoms of a mental illness.

- Symptoms may come and go over time.
- Anticipate and prepare for relapses.
- Medication is a central component of treatment; it will both reduce current difficulties and prevent relapse.
- Family support is essential for compliance with treatment and effective rehabilitation.
- Community organizations can provide valuable support to patient and family.
- Discuss treatment plan with family members and obtain their support for it.
- Explain that drugs will prevent relapse and inform patient of side-effects.
- Encourage patient to function at the highest reasonable level in work and other daily activities.
- Encourage patient to respect community standards and expectations (dress, appearance, behavior).
- Minimize stress and stimulation:
- do not argue with psychotic thinking
- Avoid confrontation or criticism
- During periods when symptoms are more severe, rest and withdrawal from stress may be helpful.

Antipsychotic medication will reduce psychotic symptoms

Pharmacological Treatment

When Acute phase,

in case of violent patients the first choice is:

Typical Antipsychotic: one of the following medication

- Chlorpromazine, IM, 100–300 mg/day in 3 or 4 divided doses
- Levomepromazine, IM, 100–200 mg/day in 3 or 4 divided doses

Haloperidol, IM, 10 – 30 mg/day in 3 or 4 divided doses

In case of non-violent patients the first choice is

Atypical Antipsychotic:one of the following medication

- Tabs Risperidone, tablets, 2 – 8 mg daily in divided doses.
- Quetiapine 50-750mg in divided doses.
- Olanzapine 5-20mg once a day.
- Aripiprazol 10-30mg once a day

Or

Typical antipsychotic: one of the following medication

- Tabs Haloperidol, tablets, 5 – 30 mg daily in divided doses
 - Tabs Flupentixol, tablets, 1 – 6 mg daily in divided doses
 - Tabs Chlorpromazine(Largactil), tablets, 25 – 1200 mg daily in divided doses
 - Tabs Levomepromazine (Nozinan), tablets, 25 – 300 mg daily in divided doses
- NB: the doctor should consider the minimum effective dose.
- Tabs Pipamperon, tablets, 20 - 120 in divided doses
 - Pipamperon Oral drop 40mg/ml, 20-120mg in divided doses
 - Tabs Pimozide , tablets, 4 – 12 mg daily in divided doses

The maintenance phase

Atypical Antipsychotics: one of the following medications

- Tabs Risperidone, tablets, 2 – 8 mg daily in divided doses.
- Quetiapine 50-750mg in divided doses.
- Olanzapine 5-20mg once a day.
- Aripiprazol 10-30mg once a day

Or

Typical antipsychotic: one of the following medication

- Tabs Haloperidol, tablets, 5 – 30 mg daily in divided doses
- Tabs Flupentixol, tablets, 1 – 6 mg daily in divided doses
- Tabs Chlorpromazine(Largactil), tablets, 25 – 1200 mg daily in divided doses
- Tabs Levomepromazine (Nozinan), tablets, 25 – 300 mg daily in divided doses

If no adherence and/or compliance, the patient should be put on the following medication:

- Flupentixol decanoate, 20 – 40 mg IM / 2 weeks
- Haloperidol decanoate, 50 – 200 mg/Month
- Tabs Pimozide, tablet, 4 – 8 mg / week orally
-

Non Pharmacological Treatment

- Psycho-education
- Group psychotherapy
- Family therapy
- Individual psychotherapy

Monitor for side effects of medication

- Acute dystonias or spasms may be managed with injectable IM Diazepam 10mg
Or
antiparkinsonian drugs Akathisia (severe motor restlessness) may be managed with dosage reduction or beta-blockers
 - 1. Tabs Propranolol 40mg-120 mg- Parkinsonian symptoms (tremor, akinesia) may be managed with oral antiparkinsonian
 - 2. Tablets Biperiden 2 mg up to three times a day.
- In cases of severe side effects or the appearance of fever, rigidity, hypertension, stop antipsychotic medication and consider consultation.

● Mood Disorders

-- | Bipolar Disorder

Bipolar disorder frequently disrupts mood, energy, activity, sleep, cognition, and behavior and patients thus struggle to maintain employment and interpersonal relationships

Manic episode

Diagnosis

- A. A distinct period of abnormally and persistently elevated, expansive, or irritable mood and increased goal-directed activity or energy, lasting at least 1 week and present most of the day.
- B. During the above period in A., three (or more) of the following symptoms are present to a significant degree and represent a noticeable change from usual behavior:
1. Inflated self-esteem or grandiosity.
 2. Decreased need for sleep.
 3. More talkative than usual or pressure to keep talking.
 4. Flight of ideas or subjective experience that thoughts are racing.
 5. Distractibility as reported or observed.
 6. Increase in goal-directed activity or psychomotor agitation.
 7. Excessive involvement in activities that have a high potential for painful

Consequences

C. The mood disturbance is sufficiently severe to cause marked impairment in social or occupational functioning or to necessitate hospitalization to prevent harm to self or others, or there are psychotic features.

D. The episode is not attributable to the physiological effects of a substance or to another medical condition.

Note: A full manic episode that emerges during antidepressant treatment (e.g., medication) but persists at a fully syndromal level beyond the physiological effect of that treatment is sufficient evidence for a manic episode and, therefore, a bipolar I diagnosis.

Treatment

Psycho-education for patient and family

- Unexplained changes in mood and behaviors are symptoms of an illness.

- Effective treatments are available. Long-term treatment can prevent future episodes.
- Avoid confrontation unless necessary to prevent harmful or dangerous acts
- Advise caution about impulsive or dangerous behavior
- Close observation by family members is often needed
- If agitation or disruptive behavior is severe, consider hospitalization.

If patient displays agitation, extreme or disruptive behavior, antipsychotic medication may be needed initially. In case the patient is left untreated, manic episodes may become disruptive or dangerous. Manic episodes often lead to loss of job, legal problems, financial problems or high-risk sexual behavior.

Pharmacological Treatment

Severe manic episode:

Mood stabilizers: one of the following medication:

1. Valproic Acid (depakine): 500-2000mg/day in two divided doses
2. Carbamazepine (Tegretol): 400-1600mg/day in two divided doses.

In addition to one of the following antipsychotic medication:

1. Chlorpromazine, IM or PO, 50-300 mg/day in divided doses
1. Levomepromazine, IM or PO 50 – 300mg/day in divided dose

Adjunctive Non Pharmacological Treatment

- Psychoeducation
- Psychotherapy
- Family therapy
- Individual psychotherapy

-- | Major Depressive Disorder

Diagnosis

Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

1. Depressed mood most of the day, nearly every day, as indicated by either subjective report or observation made by others (Note: In children and adolescents, can be irritable mood.)
 2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day
 3. Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. (Note: In children, consider failure to make expected weight gain.)
 4. Insomnia or hypersomnia nearly every day.
 5. Psychomotor agitation or retardation nearly every day
 6. Fatigue or loss of energy nearly every day.
 7. Feelings of worthlessness or excessive or inappropriate guilt nearly every day
 8. Diminished ability to think or concentrate, or indecisiveness, nearly every day
 9. Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.
- B. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- C. The episode is not attributable to the physiological effects of a substance or to another medical condition.
- D. The occurrence of the major depressive episode is not better explained by schizoaffective disorder, schizophrenia, schizopreniform disorder, delusional disorder, or other specified and unspecified schizophrenia spectrum and other psychotic disorders.
- E. There has never been a manic episode or a hypomanic episode

Treatment

Psycho-education for patient and family

- Depression is a common illness and effective treatments are available.
- Depression is not weakness or laziness, patients are trying hard to cope.
- Close supervision by family or friends, or hospitalization, may be needed. Ask about risk of harm to others.
- Plan short-term activities that give the patient enjoyment or build confidence.
- Encourage the patient to resist pessimism and self-criticism, not to act on pessimistic ideas (e. g., ending marriage, leaving job), and not to concentrate on negative or guilty thoughts.

- Identify current life problems or social stresses. Focus on small, specific steps patients might take towards reducing or better managing these problems.
- Avoid major decisions or life changes.
- If physical symptoms are present, discuss the link between physical symptoms and mood
- After improvement, plan with patient the action to be taken if signs of relapse occur.
- Consider antidepressant drugs if sad mood or loss of interest are prominent for at least two weeks and four or more of these symptoms are present:
- Fatigue or loss of interest, disturbed sleep, guilt or self-reproach, poor concentration, thoughts of death or suicide, disturbed appetite, agitation or slowing of movement and speech.
- In severe cases, consider medication at the first visit. In moderate cases, consider medication at a follow-up visit if counseling is not sufficiently helpful.

Ask about risk of suicide: Has the patient often thought of death or dying? Does the patient have a specific suicide plan? Has he/she made serious suicide attempts in the past. Can the patient be sure not to act on suicidal ideas?

Non-Pharmacological Treatment

Psychotherapy such as cognitive behavioural therapy, Problem Management Plus (PM+)

Medications

Adults:

- Initially Clomipramine, Amitriptyline or Imipramine 25–50 mg, oral taken early evening – once a day. Increase by 25 mg every 3–5 days up to a maximum dose of 150 mg respectively for clomipramine and amitriptyline and up to a maximum of 300mg for imipramine orally at night. The patient's tolerance will determine the rate of increase of the dose.
- If the patient refuses oral antidepressants, use Clomipramine, injection. Start by 25mg in IV fluids. Increase gradually up to 150 mg daily
- Note: the patient should get the minimum effective dose.

Children: 6–12 years; 5–15 mg, oral, 12 hourly

Alternative treatment:

Adults and Children above 8 years

1. Tabs Fluoxetine, oral, 20–60 mg daily as a single dose in the morning
2. Tabs Citalopram 20-40mg per day
3. Tabs Setraline ,oral 50-200mg daily as single dose (especially for pregnant women)

Note :

-If anxiety symptoms and insomnia are coexisting with depression, one of the following anxiolytics treatment may be required for a short period (not more than 10 to 15 days):

Diazepam 10 mg nocte or Zolpidem nocte 10 mg orally or Lorazepam oral 2.5 mg, as needed, maximum 10 mg daily divided into two to three doses

-For the first single episode of depression, antidepressants should be continued for at least 6 months after remission of symptoms, as there is a high risk of relapse.

-Stop antidepressants immediately if manic swing occurs.

-Admit patients with suicidal tendencies and keep under close observation.

● Anxiety Disorders

Anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioral disturbances. Fear is the emotional response to real or perceived imminent threat, whereas anxiety is anticipation of future threat. Many of the anxiety disorders develop in childhood and tend to persist if not treated.

-- | Generalized Anxiety Disorder (Gad)

Diagnosis

GAD is characterized by excessive worry and or fear that is difficult to control, cause significant distress and impairment, and occur on more days than not for at least six months.

GAD is a relatively common disorder, most often with onset during adulthood and a chronic course. GAD can lead to significant impairments in role functioning, diminished quality of life, and high healthcare costs.

Treatment

Psycho-education for patient and family

- Fear and worry have both physical and mental effects.
- Learning skills to reduce the effects of stress (not sedative medication) is the most effective relief.
- Encourage the patient to practice daily relaxation methods to reduce physical symptoms of tension.
- Encourage the patient to engage in pleasurable activities and exercise, and to resume activities that have been helpful in the past.
- Identifying and challenging exaggerated worries can reduce anxiety symptoms.
- Identify exaggerated worries or pessimistic thoughts (e. g., when daughter is five minutes late from school, patient worries that she may have had an accident).

Non Pharmacological Treatment

- Cognitive behavioral therapy
- Reassurance
- Teach relaxation methods

- Regular exercise

Encourage healthy social activities

Medications:

One of the following medications can be used. The antidepressant stays the treatment of choice

1. Tabs Fluoxetine, 20 mg-60mg, oral, as a single morning dose
2. Tabs Imipramine or Amitriptyline can be used in doses of 25–300 mg as an oral single and evening dose.
3. Tabs Diazepam, oral, 5-10 mg; 2 to 3 times daily for 2 weeks. Do NOT give for more than 15 days continuously.

-- | Phobia

Diagnosis

Phobia is a type of anxiety disorder that causes an individual to experience extreme, irrational fear about a situation, living creature, place or object.

Treatment

Psycho-education for patient and family

- Phobias can be treated.
- Avoiding feared situations allows the fear to grow stronger.
- The patient should avoid using alcohol or benzodiazepine drugs to cope with feared situations.

Non Pharmacological Treatment

- Cognitive behavioural therapy

Medications:

One of the following medication can be used. The antidepressant stays the treatment of choice

1. Tabs Fluoxetine, 20 mg-60mg, oral, as a single morning dose
2. Tabs Imipramine or Amitriptyline can be used in doses of 25–300 mg as an oral single dose.
3. Tabs Diazepam, oral, 5-10 mg 2 to 3 times daily. Do NOT give for more than 15 days continuously

-- | Panic Disorder

Panic disorder is a chronic illness characterized by recurrent panic attacks, at least some of which are unexpected, accompanied either by anxiety about having future attacks or about the implications of attacks, or by a change in behavior due to attacks.

Diagnosis

Panic attacks classically present with spontaneous, discrete episodes of intense fear that begin abruptly and last for several minutes to an hour. In panic disorder, patients experience recurrent panic attacks, at least some of which are not triggered or expected, and one month or more of either worry about future attacks/consequences, or a significant maladaptive change in behavior related to the attacks, such as avoidance of the precipitating circumstances.

Treatment

Psycho-education for patient and family

- Panic is common and can be treated.
- Anxiety often produces frightening physical sensations. Chest pain, dizziness or shortness of breath is not necessarily signs of a physical illness: they will pass when anxiety is controlled.
- Panic anxiety also causes frightening thoughts (fear of dying, a feeling that one is going mad or will lose control). These also pass when anxiety is controlled.
- Mental and physical anxiety reinforces each other. Concentrating on physical symptoms will increase fear.
- A person who withdraws from or avoids situations where attacks have occurred will only strengthen his/her anxiety.

Non Pharmacological Treatment

- Cognitive behavioral therapy

Medications:

One of the following medication can be used. The antidepressant stays the treatment of choice

1. Tabs Fluoxetine, 20 mg-60mg, oral, as a single morning dose
2. Tabs Imipramine or Amitriptyline can be used in doses of 25–300 mg

- as a single, oral dose.
3. Tabs Diazepam, oral, 5 -10mg 2 to 3 times daily. Do NOT give for more than 15 days continuously.

● Obsessive-Compulsive Disorder

Diagnosis

Obsessive-compulsive disorder (OCD) is characterized by recurrent, intrusive, and distressing thoughts, images, or impulses (ie, obsessions), and repetitive mental or behavioral acts that the individual feels driven to perform (ie, compulsions) to prevent or reduce distress.

Treatment

Medications

1. Tabs Fluoxetine, 20 mg-60mg, oral, as a single morning dose
2. Among tricyclics, Tabs clomipramine is effective and can be used in doses of 25–250 mg as a single, oral morning dose.

Note: For complicated cases, an augmentation to the antidepressant of a small dose of antipsychotic like Olanzapine 2.5 to 5 mg or Risperidone 1 to 2 mg can be effective.

Non Pharmacological Treatment

- Cognitive behavioral therapy

● Trauma- And Stressor-Related Disorders

Trauma- and stressor-related disorders include disorders in which exposure to a traumatic or stressful event is listed explicitly as a diagnostic criterion. These include reactive attachment disorder, disinhibited social engagement disorder, posttraumatic stress disorder (PTSD), acute stress disorder, and adjustment disorders.

-- | Adjustment Disorders

Diagnosis

- The development of emotional or behavioral symptoms in response to an identifiable stressor(s) occurring within 3 months of the onset of the stressor(s).
- These symptoms or behaviors are clinically significant, as evidenced by one or both of the following:
 - Marked distress that is out of proportion to the severity or intensity of the stressor,
 - Significant impairment in social, occupational, or other important areas of functioning.
- The stress-related disturbance does not meet the criteria for another mental disorder and is not merely an exacerbation of a preexisting mental disorder
- The symptoms do not represent normal bereavement.
- Once the stressor or its consequences have terminated, the symptoms do not persist for more than an additional 6 months.

Treatment

Psycho-education for patient and family

- Stressful events often have mental and physical effects.
- Stress-related symptoms usually last few days or weeks

Non pharmacological approach:

Cognitivo-behavioral Therapy (CBT) like psychotherapy:

- Encourage the patient to acknowledge the personal significance of the stressful event.
- Review and reinforce positive steps the patient has taken to deal with the stress.
- Identify steps the patient can take to modify the situation that produced the stress. If the situation cannot be changed, discuss problem-solving strategies.
- Identify relatives, friends and community resources able to offer support.
- Short-term rest and relief from stress may help the patient.

Encourage a return to usual activities within a few weeks.

Medication:

Most acute stress reactions will resolve without use of medication. However, if severe anxiety symptoms occur, use anti anxiety drugs for up to three days (e.g., benzodiazepines such as;

1.Tabs lorazepam 0.5-1.0 mg up to three times a day.

If the patient has severe insomnia, use hypnotic drugs for up to three days (e.g. trazodone 50-100mg per night or zolpidem 10mg per night,).

-- | Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) has been described as **the complex somatic, cognitive, affective, and behavioral effects of psychological trauma.**

Diagnosis

- A. Exposure to actual or threatened death, serious injury, or sexual violence.
- B. Presence of one (or more) of the following intrusion symptoms associated with the traumatic event(s), beginning after the traumatic event(s) occurred:
 1. Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s)..
 2. Recurrent distressing dreams in which the content and/or affect of the dream are related to the traumatic event(s).
 3. Dissociative reactions (e.g., flashbacks)
 4. Intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).
 5. Marked physiological reactions to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).
- C. Persistent avoidance of stimuli associated with the traumatic event(s), beginning after the traumatic event(s) occurred.
- D. Negative alterations in cognitions and mood associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:
 1. Inability to remember an important aspect of the traumatic event(s)
 2. Persistent and exaggerated negative beliefs or expectations about oneself, others, or the world.
 3. Persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others.

4. Persistent negative emotional state (e.g., fear, horror, anger, guilt, or shame).
 5. Markedly diminished interest or participation in significant activities.
 6. Feelings of detachment or estrangement from others.
 7. Persistent inability to experience positive emotions (e.g., inability to experience happiness, satisfaction, or loving feelings).
- E. Marked alterations in arousal and reactivity associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:
1. Irritable behavior and angry outbursts (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects.
 2. Reckless or self-destructive behavior.
 3. Hypervigilance.
 4. Exaggerated startle response.
 5. Problems with concentration.
 6. Sleep disturbance
- F. Duration of the disturbance is more than 1 month.
- G. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- H. The disturbance is not attributable to the physiological effects of a substance or another medical condition.

Treatment

Pharmacological Treatment: one of the following can be used:

1. SSRI and SNRIs such as Tabs fluoxetine 20-60mg , oral, daily f
2. Tabs Imipramine or Amitriptyline can be used in doses of 25–250 mg as a single, oral dose.
3. Tabs Fluoxetine, 20 mg, oral, as a single morning dose

Note: In complicated cases with psychotic features, antipsychotics such as risperidone 0,5 to 4mg daily or quetiapine 25-400mg. In case of nightmares and other sleep disturbances, Prazosin 3-15mg at bed time will be more indicated.

Non Pharmacological Treatment

- Cognitive behavioral therapy especially the trauma focused psychotherapy is the treatment of choice.

● **Somatic Symptom And Related Disorders**

These disorders includes the diagnoses of somatic symptom disorder, illness anxiety disorder (hypochondriasis), conversion disorder (functional neurological symptom disorder), psychological factors affecting other medical conditions, factitious disorder, other specified somatic symptom and related disorder, and unspecified somatic symptom and related disorder.

Diagnosis

All of the disorders in this chapter share a common feature: the prominence of somatic symptoms associated with significant distress and impairment. Individuals with disorders with prominent somatic symptoms are commonly encountered in primary care and other medical settings but are less commonly encountered in psychiatric and other mental health settings. Their history and physical examination do not indicate the presence of a medical condition. Medical test results are either normal or do not explain the person's symptoms. Patients are convinced that their symptoms result from some type of undetected and untreated bodily derangement. These complaints are real given that the patients do actually experience these symptoms. They result from mind – body interactions in which the brain sends various signals that impinge on the patient's awareness, indicating a severe problem in the body.

Treatment

Specific non pharmacological treatments:

Cognitive-behavioral therapy and other therapy that includes general advice, lifestyle change, relaxation.

Medications:

- 1.Tabs Amitriptyline or Imipramine 25–250 mg, oral taken early evening
- 2.Tabs Fluoxetine 20-60mg in the morning
- 3.Tab Diazepam 10 mg at night for 10 day

● Substance-Related And Addictive Disorders

These disorders encompass 10 separate classes of drugs: alcohol; caffeine; cannabis; hallucinogens; inhalants; opioids; sedatives, hypnotics, and anxiolytics; stimulants : tobacco; and other (or unknown) substances. These 10 classes are not fully distinct. The substance-related disorders are divided into two groups: substance use disorders and substance-induced disorders. The following conditions may be classified as substance- induced: intoxication, withdrawal, and other substance/medication-induced mental disorders (psychotic disorders, bipolar and related disorders, depressive disorders, anxiety disorders, obsessive-compulsive and related disorders, sleep disorders, sexual dysfunctions, delirium, and neurocognitive disorders).

-- | Alcohol Use Disorders

The World Health Organization estimated that more than 283 million people (5 percent of adults) had a current (past 12-month) alcohol use disorder worldwide.

Diagnosis

Harmful alcohol use

- Heavy alcohol use (quantity defined by local standards, e. g., over 21 Units of alcohol per week for men, over 14 units of alcohol per week in women)
- Overuse of alcohol has caused physical harm (e. g., liver disease, gastrointestinal bleeding), psychological harm (e. g., depression or anxiety due to alcohol) or has led to harmful social consequences (e. g., loss of job).

Standard questionnaires (e.g., AUDIT) may help identify harmful use.

Alcohol dependence

- Continued alcohol use despite harm
- Difficulty controlling alcohol use
- Strong desire to use alcohol
- Tolerance (drinks large amounts of alcohol without appearing intoxicated)
- Withdrawal (anxiety, tremors, sweating after stopping drinking).

Treatment

Psycho-education for patient and family

- Alcohol dependence is an illness with serious consequences.
- Stopping or reducing alcohol use will bring mental and physical benefits.
- Drinking during pregnancy can harm the baby.

In some cases of harmful alcohol use without dependence, controlled or reduced drinking' is a reasonable goal.

For patients with alcohol dependence, abstinence from alcohol is the goal.

Because abrupt abstinence can cause withdrawal symptoms, medical supervision is necessary. Relapse is common. Controlling or stopping drinking often requires several attempts.

Motivation interview

For patients willing to stop now

- Set a definite day to quit.
- Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).
- Make specific plans to avoid drinking (e. g., ways to face stressful events without alcohol, ways to respond to friends who still drink).
- Help patients to identify family members or friends who will support stopping alcohol use.
- Discuss symptoms and management of alcohol withdrawal.

If reducing drinking is a reasonable goal (or if patient is unwilling to quit)

-Negotiate for a clear goal for decreased use

-Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).

-Self-help organizations (e. g., Alcoholics Anonymous) are often helpful.

Non Pharmacological Treatment

-Group therapy

-Adequate nutrition

Pharmacological Treatment

Uncomplicated alcohol dependence (First week)

Admit for one week. Stop all alcohol use.

Then Give Thiamine inj 100 mg (IV/IM) 2 to 3 time a day for 3 to 7 days

AND

Give Diazepam, oral, as follows:

- Day 1 Diazepam 10 – 20 mg twice daily
- Day 2 Diazepam 10 – 20 mg twice daily
- Day 3 Diazepam 5 – 10 mg twice daily
- Day 4 Diazepam 5 – 10 mg twice daily
- Day 5 Diazepam 10 mg at night
- Day 6 Diazepam 10 mg at night
- Day 7 Diazepam 5 mg at night

Uncomplicated alcohol dependence (second week)

- Tab Diazepam 5 mg once daily for 2–7 days then STOP.
- Give thiamine oral 50-100 mg daily and indefinitely as long as the patient still taking alcohol.
- Give folic acid oral 5 mg daily
- Give multivitamin and mineral preparations daily for about one month

Note: If there is a history of concomitant diazepam abuse, this may not be effective therefore consult a specialist.

Maintenance treatment

1. Antabuse, tab 100-500mg once a day for at least 3 to 6 months.
2. Tabs-Acamprosate oral 666 mg Three times a day least for 6 months
3. Naltrexone oral 50-100mg daily for 3 to 6 months (Patient must be opioid free for at least 7 to 10 days).

-- | Cannabis Use Disorders

Diagnosis

- A. A problematic pattern of cannabis use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:
 1. Cannabis is often taken in larger amounts or over a longer period than was intended.
 2. There is a persistent desire or unsuccessful efforts to cut down or control cannabis use.
 3. A great deal of time is spent in activities necessary to obtain cannabis, use cannabis, or recover from its effects.
 4. Craving, or a strong desire or urge to use cannabis.

5. Recurrent cannabis use resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued cannabis use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of cannabis.
7. Important social, occupational, or recreational activities are given up or reduced because of cannabis use.
8. Recurrent cannabis use in situations in which it is physically hazardous.
9. Cannabis use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by cannabis.
10. Tolerance,
11. Withdrawal

Treatment

Psycho-education for patient and family

- Abstinence is the goal; the patient and family should concentrate on this.
- Stopping or reducing drug use will bring mental and physical benefits.
- Using drugs during pregnancy will harm the baby.
- Relapse is common. Controlling or stopping drug use often requires several attempts.

Motivational Interview:

For patients willing to stop now

- Set a definite day to quit.
- Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).
- Make specific plans to avoid drug use (e.g., how to respond to friends who still use drugs).
- Identify family or friends who will support stopping drug use.

If reducing drug use is a reasonable goal (or if patient is unwilling to quit)

- Negotiate a clear goal for decreased use (e.g., no more than one marijuana cigarette per day with two drug-free days per week).
- Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).
- Introduce self-monitoring procedures and safer drug-use behaviors (e.g., time restrictions, slowing down rate of use).

- For patients not willing to stop or reduce use now
- Do not reject or blame.
- Clearly point out medical, psychological and social problems caused by drugs.
- Make a future appointment to reassess health and discuss drug use.
- For patients who do not succeed or relapse
- Identify and give credit for any success.
- Discuss situations that led to relapse.
- Return to earlier steps above.
- Self-help organizations (e. g., Cannabis Anonymous) are often helpful.

Non-pharmacological

- Psychotherapy
- Supportive Group

Medication:

For Craving: Bupropion: 150-300mg OD.

Note: Cannabis users may develop psychosis, anxiety, mood disorders, and a withdrawal state. Therefore we treat the presenting symptoms accordingly.

-- | Opioid Use Disorder

Diagnostic Criteria

- A. A problematic pattern of opioid use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:
 1. Opioids are often taken in larger amounts or over a longer period than was intended.
 2. There is a persistent desire or unsuccessful efforts to cut down or control opioid use.
 3. A great deal of time is spent in activities necessary to obtain the opioid, use the opioid, or recover from its effects.
 4. Craving, or a strong desire or urge to use opioids.
 5. Recurrent opioid use resulting in a failure to fulfill major role obligations at work, school, or home.
 6. Continued opioid use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of opioids.

7. Important social, occupational, or recreational activities are given up or reduced because of opioid use.
8. Recurrent opioid use in situations in which it is physically hazardous.
9. Continued opioid use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.
10. Tolerance,
11. Withdrawal symptoms such as Dysphoric mood, Nausea or vomiting., Muscle aches, Lacrimation or rhinorrhea, Pupillary dilation, piloerection, or sweating, Diarrhea, Yawning, Fever, Insomnia.

Treatment

Psycho-education for patient and family

- Abstinence is the goal; the patient and family should concentrate on this.
- Stopping or reducing drug use will bring mental and physical benefits.
- Using drugs during pregnancy will harm the baby.
- For intravenous drug users, there is a risk of getting or giving HIV infection, hepatitis or other blood borne infections. Discuss appropriate precautions (use condoms, do not re-use needles).
- Relapse is common. Controlling or stopping drug use often requires several attempts.

Motivational Interview:

For patients willing to stop now

- Set a definite day to quit.
- Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).
- Make specific plans to avoid drug use (e.g., how to respond to friends who still use drugs).
- Identify family or friends who will support stopping drug use.

If reducing drug use is a reasonable goal (or if patient is unwilling to quit)

- Negotiate a clear goal for decreased use (e.g., no more than one marijuana cigarette per day with two drug-free days per week).
- Discuss strategies to avoid or cope with high-risk situations (e. g., social situations, stressful events).
- Introduce self-monitoring procedures and safer drug-use behaviors (e. g., time restrictions, slowing down rate of use).

- For patients not willing to stop or reduce use now
- Do not reject or blame.
- Clearly point out medical, psychological and social problems caused by drugs.
- Make a future appointment to reassess health and discuss drug use.
- For patients who do not succeed or relapse
- Identify and give credit for any success.
- Discuss situations that led to relapse.
- Return to earlier steps above.
- Self-help organizations (e. g., Narcotics Anonymous) are often helpful.

Non-pharmacological

- Psychotherapy
- Supportive Group

Medication:

One of the following medications can be used:

1. Methadone syrup, 20mg-120mg/day in divided dose and prescribed in a specialized mental health facility.
2. Clonidine tabs 0.1 mg -1.2mg/day in 3 or 4 divided doses.
3. Buprenorphine sublingual tabs, 4mg to 24mg/day once a day

Note: the prescriber should use the minimum effective dose.

● Neurocognitive Disorders

These disorders includes “Dementia, Delirium, Amnestic, and Other Cognitive Disorders”. They encompass the group of disorders in which the primary clinical deficit is in cognitive function, and that are acquired rather than developmental. Although cognitive deficits are present in many if not all mental disorders (e.g., schizophrenia, bipolar disorders), only disorders whose core features are cognitive are included in the NCD category.

-- | Delirium

- Families may request help because patient is confused or agitated.
- Delirium may occur in hospitalized patients for physical conditions.
- Patients may appear uncooperative or fearful.

Diagnosis

Acute onset of:

- Confusion (patient appears confused, struggles to understand surroundings)
- Clouded thinking **or** awareness.
- Often accompanied by:
 - Poor memory
 - Emotional upset
 - Wandering attention
 - Withdrawal from others
 - Suspiciousness
 - Agitation
 - Loss of orientation
 - Hearing voices
 - Visions or illusions
 - Disturbed sleep (reversal of sleep pattern)

Symptoms often develop rapidly and may change from hour to hour.

May occur in patients with previously normal mental function or in those with dementia.

Milder stresses (medication, mild infections) may cause delirium in older patients or in those with dementia.

Treatment

Psycho-education for patient and family

- Strange behavior or speech is symptoms of an illness.
- Take measures to prevent the patient from harming him/herself or others (e. g., remove unsafe objects, restrain if necessary).
- Supportive contact with familiar people can reduce confusion.
- Provide frequent reminders of time and place to reduce confusion.
- Hospitalization may be required because of agitation or because of physical illness which is causing delirium.

Medication

- Avoid use of sedative or hypnotic medications (e. g., benzodiazepines) except for the treatment of alcohol or sedative withdrawal.
- Antipsychotic medication in low doses (*Tablets Haloperidol 2-10 mg once or twice a day*, may be needed to control agitation, psychotic symptoms or aggression).

Be aware of drug side-effects (Parkinsonian symptoms, anticholinergic effects) and drug interactions.

● Psychiatric Emergencies

Suicide

The word suicide means “self-murder.” If successful, it is a fatal act that fulfils the person’s wish to die. Various terms used to describe para-suicidal thoughts or behaviours that is, suicidality, ideation should be used with clear meaning and purpose. Nearly 45,000 people in the United States and more than 800,000 worldwide die by suicide each year. In Rwanda from 2019 to 2020, 576 peoples died by suicide as reported by the Rwanda Investigation Bureau in September 2021.

Primary care providers may be in a unique position to prevent suicide due to their frequent interactions with suicidal patients.

Risk factors

- Gender. Men commit suicide three times more often than women. Women attempt suicide four times more often than men.

- Method. Men's higher rate of successful suicide is related to the methods they use (e.g., firearms, hanging), while women more commonly take an overdose of psychoactive substances or a poison.
- Age. Rates increase with age
- Marital status. Rate is twice as high in single persons
- Mental illness, Depression, schizophrenia, alcohol and drug abuse
- Chronic physical condition

Treatment

- Do not leave a suicidal patient alone; remove any potentially dangerous objects from the room.
- Assess whether the attempt was planned or impulsive. Determine the lethality of the method, the chances of discovery (whether the patient was alone or notified someone), and the reaction to being saved (whether the patient is disappointed or relieved). Also, determine whether the factors that led to the attempt have changed.
- Patients with severe depression may be treated on an outpatient basis if their families can supervise them closely and if treatment can be initiated rapidly. Otherwise, hospitalization is necessary. The suicidal ideation of alcoholic patients generally remits with abstinence in a few days. If depression persists after the physiologic signs of alcohol withdrawal have resolved, a high suspicion of major depression is warranted. All suicidal patients who are intoxicated by alcohol or drugs must be reassessed when they are sober.

-- | Agitation/Aggression

Diagnosis

Agitation is an acute state of anxiety, heightened emotional arousal, and increased motor activity. Although not specific to psychosis, untreated psychosis is associated with an increased risk for agitation and aggressive behaviors. These can sometimes lead to intentional or unintentional bodily harm to self or others. Clinicians should observe the patient's behaviors, including body language and voice intonation, and use appropriate safety measures for the evaluation.

Treatment

Non- Pharmacological

- Maintain safety
- Verbal de-escalation/distraction
- Physical restraint (manual and/or mechanical)
- Calling for security or police assistance

Medications:

Intramuscular

1. 1.Diazepam 10mg IM
or
2. Lorazepam 2 – 4 mg Im (Max 6mg/24hrs) Sedation in 30 – 45 minutes; peaks in 1 – 3 hours, lasts 4 – 6 hours
+ / -
3. Haldol 5mg IM (Max 18mg / 24hrs) Sedation in 10 minutes; peaks in 20 minutes or Chlorpromazine 100- 400mg/day IM, in divided doses
Note: Chlorpromazine IV is contra indicated.

● EPILEPSY

Epilepsy is a disorder of the brain characterized by recurrent seizures, which are brief episodes of involuntary movement that involve a part of the body or entire body and are sometimes accompanied by loss of consciousness and control of bowel or bladder function. Seizures are a result of excessive electrical discharges in a group of brain cells.

Treatment

Non Pharmacological Treatment

Psycho-education of the patient and family

Ensure safety of the patient including to remove false teeth if present
Immediate emergency measures:

If patient is seen convulsing:

Ensure that the patient does not harm himself and that the airway is clear
Clothing about the neck should be loosened

After convulsions cease, turn the patient into semi-prone position, ensure the airway is clear

Medications

Anti-convulsing medicine therapy:

Type of Seizure Drug Dose

Table 1. Treatment of 1st and 2nd generation

Product	Daily dose	Mg/day (adult)	Mg/ day (child)	Indication	Side effects	Teratogenicity
Phenobarbital	1	1,5-3mg/kg	3-4mg/kg	Generalized-tonic-clonic and partial seizure	Irritability and cognitive hints	Yes
Phenytoin	2	2-6mg/kg	4-8mg/kg	Generalized-tonic-clonic and partial seizure	Hypertrophic Gingivitis, Hirsutism, Hypofolique /vitD	Yes
Carbamazepine	2	10-15mg/kg	5-20mg/kg	Generalized-tonic-clonic and partial seizure	Nausea, Digestive, Drunkenness, Diplopia	Yes
Valproic acid	2	15-20mg/kg	2030mg/kg	Generalized-tonic-clonic and partial seizure	Weight gain, Hair loss, Hematologic, Hepatotoxicity, Pancreas	Yes
Diazepam (valium)	2-3	0,1-0,2mg/kg	0,1-0,2mg/kg	Status Epilepticus	Dependence Paradoxical Effect, Sedation	Unknown
Clonazepam	1-3	0.05-0.1mg/kg		Status Epilepticus	Sedative, Dependence	Unknown

Management of Status Epilepticus

Non pharmacological Treatment

Remove false teeth if present

Insert a Brook's airway (oropharyngeal tube) to maintain airway

Give oxygen

Give Diazepam IV , 10–20 mg, not faster than 2 mg/minute

Or

Clonazepam, IV, 1 mg , May be repeated after 5 minutes. Maximum dose: 4 mg. Or

Lorazepam, IV/IM, 4 mg

If there is no venous access:

Diazepam, rectal, 10 mg using the contents of an ampoule

Or

Clonazepam, IM, 1 mg

If seizures continue:

Set up IV infusion of Diazepam in Sodium Chloride 0.9% 40–80 mg per litre to be infused over six hours. Give at 5 mg/min until seizures stop

If seizures still uncontrolled 60 minutes after it began:

Deepen sedation and ventilate for safe Transfer to a facility where the patient can be appropriately manage.

Recommendations

Take adequate history to define the type of epilepsy.

Treatment can be stopped only after 2-5years free of seizures, a normal EEG and full discussion with patient.

If hypoglycaemia is suspected, treat as appropriate for adult or child.

● The Neurodevelopmental Disorders

These disorders are a group of conditions with onset in the developmental period.

They typically manifest early in development, often before the child enters grade school, and are characterized by developmental deficits that produce impairments of personal, social, academic, or occupational functioning.

The range of developmental deficits varies from very specific limitations of learning or control of executive functions to global impairments of social skills or intelligence. These include disorders such as the intellectual development disorders, autism spectrum disorders or attention-deficit/hyperactivity disorder (ADHD).

-- | Intellectual Disability (Intellectual Developmental Disorders)

Intellectual disability (ID) is a neurodevelopmental disorder with multiple etiologies. It is characterized by deficits in intellectual and adaptive functioning of varying severity, presenting before 18 years of age.

Diagnosis:

The following three criteria must be met:

- Deficits in intellectual functions, such as reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience.
- Deficits in adaptive functioning that result in failure to meet developmental and sociocultural standards for personal independence and social responsibility.
- Onset of intellectual and adaptive deficits during the developmental period.

Treatment

Psychoeducation for patient and family

- Early training can help a mentally retarded person towards independence and self-care.
- Retarded children are capable of loving relationships.
- Reward effort. Allow retarded children and adults to function at the highest level of their ability in school, work and family.
- Families may feel great loss or feel overwhelmed by the burden of caring for a retarded child.
- Offer empathy and reassurance.
- Advise families that training will be helpful but that miracle cures do not exist.

Medication

Except in the case of certain physical or psychiatric disorders, medical treatment cannot improve mental function.

Retardation may occur with other disorders that require medical treatment (e.g., Epilepsy, spasticity psychiatric illness such as depression).

-- | Attention Deficit Hyperactivity Disorder (Adhd)

This is a disorder that manifests in childhood with symptoms of hyperactivity, impulsivity, and/or inattention. The symptoms affect cognitive, academic, behavioral, emotional, and social functioning

Diagnostic criteria for ADHD include symptoms of hyperactivity, impulsivity, and/or inattention that occur in more than one setting and affect function (eg, academic, social, emotional, etc.).

Diagnosis

Usually there is:

- Severe difficulty in maintaining attention (short attention span, frequent changes of activity)
- Abnormal physical restlessness (most evident in classroom or at mealtimes)
- Impulsiveness (the patient cannot wait his or her turn, or acts without thinking).
- Sometimes there may be discipline problems, underachievement in school, proneness to accidents.
- This pattern occurs in all situations (home, school, play).

Treatment

Psycho-education for patient and family

- Hyperkinetic behavior is not the child's fault
- The outcome is better if parents can be calm and accepting.
- Hyperactive children need extra help to remain calm and attentive at home and school
- Some hyperactive children continue to have difficulties into adulthood, but most make a satisfactory adjustment.
- Encourage parents to give positive feedback or recognition when the child is able to pay attention.

- Avoid punishment.
- Advise parents to discuss the problem with the child's school teacher (to explain that learning will be in short bursts, immediate rewards will encourage attention, and periods of individual attention in class may be beneficial).
- Stress the need to minimize distractions (e.g., have child sit at front of class).
- Sport or other physical activity may help release excess energy.
- Encourage parents to meet with the school psychologist or counsellor (if available).

Medication

For more severe cases, stimulant medication may improve attention and reduce overactivity (e.g., Tabs methylphenidate 10-60 mg a day)

-- | Autism Spectrum Disorders

DIAGNOSIS

- Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history:
 - Deficits in social-emotional reciprocity,
 - Deficits in nonverbal communicative behaviors
 - Deficits in developing, maintaining, and understanding relationships
- Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history :
 - Stereotyped or repetitive motor movements, use of objects, or speech
 - Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior
 - Highly restricted, fixated interests that are abnormal in intensity or focus
 - Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment
- Symptoms must be present in the early developmental period
- Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning

Psycho-education to the family:

Explain:

- what ASD is
- When to take the child to the doctor.

Treatment

- The right treatment for autism spectrum disorder depends on the age of the child, How severe the disorders is and whether the child has any other medical problem. ASD can not be cured.
- The treatment of ASD focuses on Behavioral and educational interventions that target the core symptoms of ASD.
- The psychopharmacologic interventions such as Risperidone, Citalopram, aripiprazol, methylphenidates or other stimulants, do not treat the underlying ASD but they improve the child's functioning and ability to participate in the behavioral interventions.

● Disruptive, Impulse-Control, and Conduct Disorders

Disruptive, impulse-control, and conduct disorders include conditions involving problems in the self-control of emotions and behaviors.

Diagnosis

A consistent pattern of abnormally aggressive or defiant behavior such as:

- Fighting, bullying, truancy, cruelty, stealing, lying, vandalism.
- Conduct must be judged by what is normal for age and culture.
- Conduct disorder may be associated with stress at home or school

Treatment

Psycho-education for patient and family

- Effective discipline should be clear and consistent, but not harsh.
- Avoid punishment. It is more helpful to reward positive behavior.
- Ask about the reasons for disruptive behavior, Alter the child's circumstances accordingly, as far as is possible.
- Encourage parents to give positive feedback or recognition for good behavior.
- Parents should make discipline consistent.

- Advise parents to discuss this approach to discipline with teachers.
- Relatives, friends or community resources can support parents in providing consistent discipline. No appropriate treatment has been established

● **Elimination Disorders**

Elimination disorders all involve the inappropriate elimination of urine or feces and are usually first diagnosed in childhood or adolescence.

-- | **Enuresis**

Diagnosis

- Repeated voiding of urine into bed or clothes, whether involuntary or intentional.
- The behavior is clinically significant as manifested by either a frequency of at least twice a week for at least 3 consecutive months or the presence of clinically significant distress or impairment in social, academic (occupational), or other important areas of functioning.
- Chronological age is at least 5 years.
- The behavior is not attributable to the physiological effects of a substance

Treatment

Psycho-education for patient and family

- Enuresis is usually part of a specific delay in development. It is often hereditary.
- The outlook is good. Treatment is usually effective.
- Enuresis is not within a child's voluntary control.
- Punishment and scolding are unlikely to help and may increase emotional distress.
- Make the child a part of his/her own treatment.
- Have the child keep a record of dry nights on a calendar.
- Give praise and encouragement for success.
- Offer reassurance if the child is anxious about using toilets (e. g., at night, away from home).
- If available, simple alarm systems will warn the child of night-time wetting and can improve bladder control. Ensure that the child wakes and urinates in the toilet when the alarm sounds. Up to 12 weeks of use may be needed.

- Exercises to increase bladder control while awake may be helpful (resisting urge to urinate for longer and longer periods! stopping urination in mid-stream).

Medication

Regular use of medication is usually not though it can help when children have a special need to be dry. Effective medications include:

1. Tabs imipramine (25-50mg two hours before bedtime),
2. Desmopressin 0.1-0.2 mg at bed time.
3. Oxybutynin 5mg at bedtime.

-- | Encopresis

Diagnosis

- Repeated passage of feces into inappropriate places (e.g., clothing, floor), whether involuntary or intentional.
- At least one such event occurs each month for at least 3 months.
- Chronological age is at least 4 years (or equivalent developmental level).
- The behavior is not attributable to the physiological effects of a substance (e.g., laxatives) or another medical condition except through a mechanism involving constipation.

Treatment

- The earlier that treatment begins for encopresis, the better.
- The first step involves clearing the colon of retained, impacted stool.
- The treatment focuses on encouraging healthy bowel movements.
- Psychotherapy may be a helpful addition to treatment.

REFERENCES

1. Daughton JM, Kratochvil CJ. Review of ADHD pharmacotherapies: Advantages, disadvantages, and clinical pearls. *J Am Acad Child Adolesc Psychiatry* 2009; 48:240.
2. van Os J, Hanssen M, Bijl RV, Vollebergh W. Prevalence of psychotic disorder and community level of psychotic symptoms: an urban-rural comparison. *Arch Gen Psychiatry* 2001; 58:663.
3. Perälä J, Suvisaari J, Saarni SI, et al. Lifetime prevalence of psychotic and bipolar I disorders in a general population. *Arch Gen Psychiatry* 2007; 64:19.
4. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), American Psychiatric Association, Arlington 2013.
5. World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines, World Health Organization, Geneva 192. Vol xii, p.362.
6. Lieberman JA, Stroup TS, McEvoy JP, et al. Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *N Engl J Med* 2005; 353:1209.
7. Goldberg JF, Harrow M, Grossman LS. Course and outcome in bipolar affective disorder: a longitudinal follow-up study. *Am J Psychiatry* 1995; 152:379.
8. Lieb R, Becker E, Altamura C. The epidemiology of generalized anxiety disorder in Europe. *Eur Neuropsychopharmacol* 2005; 15:445.
9. Kessler RC, Berglund P, Demler O, et al. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005; 62:593.
10. Bakker A, van Balkom AJ, Spinhoven P. SSRIs vs. TCAs in the treatment of panic disorder: a meta-analysis. *Acta Psychiatr Scand* 2002; 106:163.
11. Issari Y, Jakubovski E, Bartley CA, et al. Early onset of response with selective serotonin reuptake inhibitors in obsessive-compulsive disorder: a meta-analysis. *J Clin Psychiatry* 2016; 77:e605.
12. Institutes of Medicine. Treatment of Posttraumatic Stress Disorder: An Assessment of the Evidence, National Academies Press, Washington, DC 2008.

10. World Health Organization (WHO). WHO global status report on alcohol 2004. Geneva: WHO; 2004.
13. Nevéus T, Fonseca E, Franco I, et al. Management and treatment of nocturnal enuresis-an updated standardization document from the International Children's Continence Society. *J Pediatr Urol* 2020; 16:10.
14. Mental Health and Drug and Alcohol Office, Mental Health for Emergency Departments – A Reference Guide. NSW Department of Health, Sydney, 2009.
15. Bennett, Howard. "Waking Up Dry: Helping Your Child Overcome Bedwetting." *Healthy Children*. Winter 2007, 12-13. <http://www.aap.org/healthychildren/07winter/wakingupdry.pdf>
16. Prof. David Musyimi Ndetei. *The African textbook of Clinical Psychiatry and Mental Health*, AMREF, 2006
17. Hani Raoul Khouzam and col. *Handbook of Emergency Psychiatry*, Elsevier, 2007
18. James H.Scully, *Psychiatry 4th edition*, Lippincott Williams & Wilkins, 2001
20. CUMMING J. L., "Subcortical dementia" *Neuropsychology, Neuropsychiatry, and pathophysiology*, Br.J. Psychiatry, 1986, 149: 682-687.
21. World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*, World Health Organization, Geneva 192. Vol xii, p.362.
22. Kaplan & Sadock's *Pocket Handbook of Clinical Psychiatry Sixth Edition*
23. Hirschfeld RM, Lewis L, Vornik LA. Perceptions and impact of bipolar disorder: how far have we really come? Results of the national depressive and manic-depressive association 2000 survey of individuals with bipolar disorder. *J Clin Psychiatry* 2003; 64:161.
24. Hyams JS, Di Lorenzo C, Saps M, et al. Functional Disorders: Children and Adolescents. *Gastroenterology* 2016.

The list of contributors

Ministry of Health and Stakeholders

	Names	Institution
1	Dr Corneille NTIHABOSE	MOH
2	Dr Parfait UWALIRAYE	MOH
3	Dr Nathalie UMUTONI	MOH
4	Dr MUVUNYI Zuberi	MOH
5	Theobald HABIYAREMYE	MOH
6	Eliezer NSENGIYUMVA	MOH
7	Dr Felix SAYINZOGA	RBC
8	Dr Francois UWINKINDI	RBC
9	Dr Evariste NTAGANDA	RBC
10	Dr Jean Louis MANGARA	RBC
11	Marc HAGENIMANA	RBC
12	Frederic MUHOZA	RFDA
13	Dr Lysette UMUTESI	RSSB
14	Alexis RULISA	RSSB
15	Esperance MUKARUSINE	RSSB
16	Dr Emmanuel SABAYESU	MMI
17	Diane MUTONI	RMS
18	Jean Bernard MUNYANGANZO	RMS
19	Julie KIMONYO	NCNM
20	Prof. Annette UWINEZA	RMDC
21	Jean Damascene GASHEREBUKA	RAHP
22	Prof. Emile RWAMASIRABO	Consultant
22	Dr Raymond MUGANGA	Consultant
23	Dr Richard BUTARE	Consultant
24	Prof. Charlotte M. BAVUMA	RCP
25	Stella Matutina TUYISENGE	WHO

26	Dr William NIRINGIYIMANA	RHIA
27	Patrick RUGAMBYA	MPC
28	Eugene R. Abinene	USAID
29	Theogene NDAYAMBAJE	RFDA
30	Jean D'Amour URAMUTSE	NUDOR
31	Ines MUSABYEMARIYA	FHI
32	Dr Georges RUZIGANA	RSOG

Mental Health

No	Names	Specialty
1	Dr. Musoni Emmanuel	Psychiatry
2	Dr. Yubahwe Janvier	Psychiatry
3	Dr. Mudenge Charles	Psychiatry
4	Dr. Rutakayire Bizoza	Psychiatry
5	Dr. Butare Richard	Consultant
6	Dr. Muganga Raymond	Consultant
7	Prof. Bizoza Rutakayire	Psychiatry
8	Prof. Emile Rwamasirabo	Consultant

REPUBLIC OF RWANDA



MINISTRY OF HEALTH

**RWANDA STANDARD TREATMENT
GUIDELINES**

PEDIATRICS
Volume 2

March 2022

FOREWORD

I have the pleasure to preface the 2022 Rwanda Standards Treatment Guidelines and the Essential Medicines List (STGs/EML). This is the second edition after the 2013 STGs and 2015 EML.

The development of the STGs/EML is an essential part of the improvement of the quality of health care delivery especially at the primary healthcare level. Rwanda is committed to the attainment of the 2030 SDGs and especially goal 3 i.e. "good health and well-being" with one its target to "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"

To attain the above-mentioned goals, special packaging of policies and strategies aligned to the Global Strategy for Women's, Children's and Adolescent's Health were developed through the MNCH strategic plan 2018- 2024 ensuring coordinated action to address cross-cutting health needs of our future. These guidelines have therefore integrated this plan accordingly

Equally important, this 2022 STGs/EML integrates Rwanda global commitment to the implementation of the One Health Policy that set-up policies, implementation strategies to prevent and control zoonotic diseases, plant diseases, food safety and specifically antimicrobial resistance. Rwanda has therefore set up a One Health Multi-sectoral Coordination Mechanism (OH-MCM) that will allow antimicrobial resistance surveillance, guide and monitor the use of antibiotics in Rwanda. This policy is in line with our commitment to the WHO Global Action Plan on Antimicrobial Resistance (2018). We have therefore for the first time customized the WHO AWARE classification of antibiotics as well as the antibiotics prescription guidance. This will help not only reduce the current trend of antimicrobial resistance but importantly ensure better quality of healthcare of our population by reducing the negative impact of multi-drug resistance in Rwanda.

While the above global commitments inform our strategic choices, the STGs/EML are grounded first and foremost in our national diseases burden and specifically at the primary health care level. It is our hope that these guidelines will bring more evidence-based practice, more transparency in the care provision as well as access to efficient, affordable, and available medications in the country.

I would finally wish to acknowledge the strategic technical and financial contribution of the WHO that made this work possible despite the challenging environment due to Covid-19 pandemic.

This work would not have been possible without the active involvement of the professional medical/pharmacy societies/associations, that reviewed the literature, held numerous online discussions, peer-reviewed several drafts and came up with the most suitable guidelines.

Several other partners provided support to this project in one way or another and I wish to thank all of them for their usual support

Dr. NGAMIJE M. Daniel
Minister of Health



Acknowledgement

The Ministry of Health wishes to acknowledge the support of various stakeholders in the making of the 2022 Standards Treatment Guidelines (STGs) and Essential Medicines List (EML). Without their contributions, it wouldn't have been possible to complete this work despite the restrictions made necessary by the Covid-19 Pandemics.

The World Health Organization availed the required financial and technical support throughout the project and was flexible to adjust to the challenges brought about by the stringent environment.

World AIDS Campaign International (WACI) Health made a significant financial input to allowing a smooth running of the project.

The Medicines, Technologies, and Pharmaceutical services program (USAID MTaPS) financial intervention especially in the shaping of the rational use of antibiotic guidelines has been a great input in the current work.

Clinton health access initiative (CHAI) have been instrumental and played a major role especially in developing the Clinical guidelines for hypoxemia screening and oxygen therapy administration in Neonates, children and adults.

The Ministry wishes to thank specifically all Rwanda Health professionals and Pharmacy Societies and Associations for their self-less spirit and gave their time to patiently review and update the previous 2013 STGs and 2015 EML spending very long hours online very often late in the night.

The Ministry of Health wishes to acknowledge and thank the consultants, Prof Emile Rwamasirabo, Dr. Raymond Muganga and Dr. Richard Butare who coordinated this 2022 STG/EML updates.

The Ministry also recognizes the important contribution of tertiary Hospitals including CHUK, CHUB and KFH that availed their microbiology data over 5 to 7 years that helped to profiling the antimicrobial resistance in Rwanda.

Special recognition goes also to the Experts Taskforce appointed by the MOH upon recommendation by the Medical and Pharmacy Societies and Associations. The team is composed as follows:

	Societies and Associations	Coordinators
1	The Rwanda Pediatric Association (RPA)	Prof. Musiime S.
2.	The Rwanda College of Physicians (RCP)	Dr. Muvunyi B.
2	The Rwanda Society of Obstetrics and Gynecology (RSOG)	Dr. Ruzigana G.
3	The Rwanda Surgical Society	Dr. Byiringiro F.
4	The Rwanda Psychiatric Society	Dr. Mudenge C.
5	The Rwanda Dental Surgeon Association (RDSA)	Dr. Bizimana A.
6	The Rwanda Ophthalmology Society (ROS)	Dr. Mutangana F.
7	The Rwanda Oncology Society (in formation)	Dr. Rubagumya F.
8	The Rwanda Otolaryngology and Neck Surgery Society (ROHNSS)	Dr. Mukara Kaitesi
9	The Rwanda Dermatology Society (RDS)	Dr. Amani A.
10	The Rwanda Society of Anesthesiologists (RSA)	Dr. Rudakemwa A.
11	The National Pharmacy Council	Dr. Hitayezu F.

TABLE OF CONTENTS

FOREWORD	iii
TABLE OF CONTENTS	v
List of tables	ix
List of figures.....	xi
Acknowledgement.....	xiii
● RESPIRATORY DISEASES	1
-- Rhinitis and rhinopharyngitis	1
-- Pneumonia.....	2
-- Wheezing child: bronchiolitis.....	6
-- Asthma	8
● EAR NOSE AND THROAT CONDITIONS	12
-- Otitis externa	12
-- Otitis media	12
-- Chronic Suppurative Otitis Media	14
-- Tonsillitis	15
-- Acute mastoiditis	16
-- Epistaxis.....	17
-- Laryngotracheobronchitis	19
-- Epiglottitis	20
-- Sinusitis.....	21
-- Pertussis (whooping cough)	22
-- Allergic Rhinitis	23
● GASTROINTESTINAL DISORDERS	25
-- Acute gastroenteritis	25
-- Persistent diarrhoea	28
-- Bloody diarrhoea (dysentery).....	29
-- Amoebiasis	30
-- Constipation.....	30
-- Constipation-associated faecal incontinence:	32
-- Upper git bleeding	33
-- Peptic Ulcer Disease.....	35
-- Gastroesophageal reflux	37
-- Tropical splenomegaly (hyperreactive malarious splenomegaly).....	39
-- Herpes gingivostomatitis	40

CARDIOVASCULAR DISEASES	41
-- Heart failure (congestive cardiac failure)	41
-- Cardiogenic shock.....	42
-- Pulmonary oedema	43
-- Congenital heart diseases.....	44
► Acyanotic Heart Diseases	44
► Cyanotic heart diseases	45
► Tetralogy of Fallot:.....	45
-- Acquired heart diseases	47
► Acute Rheumatic Fever	47
► Rheumatic heart Diseases.....	50
► Infective endocarditis	50
-- Cardiomyopathies.....	52
► Dilated cardiomyopathy	53
► Hypertrophic cardiomyopathy	53
► Restrictive cardiomyopathy	54
► Pericarditis/Pericardial Effusion:	55
-- Hypertension in children.....	56
-- Cardiac arrhythmias in children	60
-- Bradyarrhythmias	63
GENITOURINARY SYSTEMS	64
-- Urinary tract infection (UTI)	64
► Acute cystitis	64
► Acute pyelonephritis	65
-- Acute kidney injury (acute renal failure)	66
DERMATOLOGY	69
-- Eczema.....	69
-- Bacterial infections (Impetigo)	71
-- Cellulitis	72
-- Staphylococcal scalded skin syndrome	73
-- Steven-johnson syndrome (sjs)/toxic epidermal necrosis (ten)	73
-- Acne.....	74
-- Fungal infections	77
► Dermatophytes.....	77
-- Viral infections.....	78
► Varicella Zoster Virus (Chicken pox, VZV).....	78
-- Parasitic infections	80
► Scabies	80

● INFECTIOUS DISEASES	82
-- Malaria	82
-- Meningitis	87
-- Tetanus.....	89
-- Hepatitis	91
► Hepatitis B.....	92
► Chronic hepatitis	92
-- Acute liver failure	94
-- Septicaemia	96
-- Septic arthritis	98
-- Acute Osteitis/Osteomyelitis.....	99
-- Salmonella infections (typhoid fever):.....	101
-- Varicella (chicken pox)	103
-- Mumps	104
● ENDOCRINE SYSTEM CONDITIONS	105
-- Diabetes mellitus	105
-- Diabetic ketoacidosis	107
-- Hypoglycaemia	111
-- Guidelines for management of diabetics on sick days.....	113
-- Hypocalcaemia in Children.....	114
● MUSCULOSKELETAL CONDITIONS.....	116
-- Juvenile rheumatoid arthritis.....	116
-- Rickets.....	117
● HAEMATOLOGICAL CONDITIONS.....	118
-- Anaemia	118
-- Sickle cell anaemia	122
-- Idiopathic thrombocytopenic purpura	124
● CENTRAL NERVOUS SYSTEM	127
-- Convulsions	127
-- Febrile seizures	129
-- Epilepsy	130
-- Convulsive status epilepticus	133
-- Cerebral palsy.....	137

● MANAGEMENT OF THE SICK	
NEONATES 0-7 DAYS	139
● MANAGEMENT OF THE SICK YOUNG	
INFANT AGED 1 WEEK TO 2 MONTHS	146
● CLASSIFICATION OF DIARRHEA IN	
A SICK YOUNG INFANT	152
● CLASSIFICATION OF FEEDING PROBLEMS	
OR LOW WEIGHT	153
● ASSES ALL YOUNG INFANTS FOR RISK	
FACTORS	154
● MANAGEMENT OF THE SICK CHILD	
AGED 2 MONTHS UP TO 5 YEARS	155

List of tables

Table 1. Clinical staging of pneumonia.....	3
Table 2. Management summary of pneumonia	4
Table 3. Treatment failure definition and the appropriate action to take	5
Table 4. Normal rates of breathing in awake children.....	8
Table 5. Guide to limits of normal pulse rate in children	8
Table 8. Presentation	20
Table 9. Clinical evaluation of dehydration	25
Table 10. severe dehydration without shock.....	26
Table 11. How to administer ORS.....	26
Table 12. Different forms of dehydration	27
Table 13. Causes of persistent diarrhoea	28
Table 14. Common causes of heart failure in Neonates.....	46
Table 15. Revised Jones Criteria.....	47
Table 16. Recommended Secondary Prophylaxis Regimens.....	49
Table 17. Major and minor clinical criteria used in the modified Duke criteria for diagnosis of infective endocarditis (IE).....	51
Table 18. Interpretation of IE.....	51
Table 21. Recommended medications and doses for patients with chronic Hypertension.....	59
Table 22. Recommended Hypertension medications for patients with Renal Failure.....	59
Table 23. Normal heart rate/minute for age:.....	61
Table 24. Diagnosis is based on these clinical signs and symptoms	61
Table 25. Schematic diagram of COARTEM dosing according to the body weight of the patient.....	83
Table 26. Summary of oral quinine dosing scheme	86
Table 27. Immediate clinical management of severe manifestations and complications of P. falciparum malaria.....	86
Table 28. Serologic responses to HBV infection	92
Table 29. Causes of septic arthritis.....	98
Table 30. Alternative Rehydration plan.....	109
Table 31. Doses	110
Table 32. Management of ITP according to risk category	125
Table 33. Management of transfusion reactions	127
Table 34. Maintenance medicine treatment choices for different types of epileptic seizures.....	132
Table 35. Phasic management of status epilepticus	135
Table 36. Management of the sick neonates 0-7 days.....	139
Table 37. Assess for severe disease or severe bacterial infection, moderate hypothermia and local bacterial infection.....	141
Table 38. Check for feeding problem.....	142
Table 39. Asses for low birth weight	143
Table 40. Assess for eye infection.....	143
Table 41. Classification of jaundice in newborn 0-7 days.....	144
Table 42. Check for HIV infection	144
Table 43. Assess for congenital problems.....	144
Table 44. Assses all young infants for risk factors	145
Table 45. Management of the sick young infant aged 1 week to 2 months ...	146
Table 46. Classification of signs of serious illness in a sick young infant.....	148

TREATMENT GUIDELINES

Table 47. Classification of jaundice in a sick young infant	149
Table 48. Classification of feeding problems or low weight	150
Table 49. Asses the neonate for hiv infection	150
Table 50. Assess for congenital problems.....	151
Table 51. classification of diarrhoea in a sick young infant	152
Table 52. Classification of feeding problems or low weight.....	153
Table 53. Assses all young infants for risk factors	154
Table 54. Management of the sick child aged 2 months up to 5 years.....	155
Table 55. Classification table for cough and/or difficult breathing.....	157
Table 56. Classification table for dehydration.....	157
Table 57. Classification table for persistent diarrhoea	158
Table 58. If blood in the stool.....	158
Table 59. Classification table for high malaria risk.....	158
Table 60. Classification table for low malaria risk and no travel to a high risk area.....	159
Table 61. Classification table for measles (if measles now or within the last 3 months	159
Table 62. Classification table for ear problem	160
Table 63. Check for anaemia	160
Table 64. Check for acute malnutrition	161

List of figures

Figure 1. Sinus tachycardia	61
Figure 2. Supraventricular Tachycardia.....	62
Figure 3. Ventricular Tachycardia.....	62
Figure 4. Sinus Bradycardia	63
Figure 5. Heart Block (Complete)	63
Figure 6. How to position an unconscious child	128
Figure 7. A flowchart showing medical management of Status Epilepticus	136

● RESPIRATORY DISEASES

-- | Rhinitis and rhinopharyngitis

Definition

Rhinitis and rhinopharyngitis are very common viral infections of the nasal or pharyngeal mucosa, which occur with seasonal variations under 5 year olds (more frequent in cold and rainy seasons).

Causes

- **Commonest virus:** Rhinoviruses
- **Other viruses:** Coronaviruses, respiratory syncytial viruses, human metapneumovirus, influenza viruses, para influenza viruses, adenoviruses, enteroviruses rarely
- **Other causes include** allergy (in case of recurrence), Iron deficiency, Passive tobacco smoke

Signs and symptoms:

- Nasal congestion
- Sore throat
- Sneezing
- Productive Cough
- Fever sometimes
- Watery red eyes
- Headache

Note: Suspect allergic rhinitis in case of recurrent signs of rhinitis with itching of nose, eyes, ears and palate.

Complications

- Otitis media
- Sinusitis (over 6 year old age)
- Tonsillitis
- Exacerbation of asthma

Management

At health centre

Investigations

- Malaria test and FBC/ Hb if fever is present

Treatment

- No specific treatment
- Nasal irrigation with 0.9% sodium chloride, 4 to 6 times/ day to clear the airway.
- Patients with fever give paracetamol as follow 10 to 15 mg/kg/dose 4-6 hourly (maximum dose 60mg/kg/day),
- Air humidification using nebulization with 0.9% sodium chloride may help open the airways, thin secretions, and loosen mucus in the lungs, making it easier to cough up or clear
- For allergic rhinitis only, give an antihistamine: Desloratadine for 3 to 5 days as follow:
 - From 2 to 5 years: 1.25mg once a day
 - Children from 6 to 12 years: 2.5 mg Once a day
 - Children >12 years: 5 mg Once a day
 - Avoiding the allergen

At district hospital level (Same as above)

Recommendation:

- Antibiotics are not indicated in viral rhinitis and rhinopharyngitis except in case of evident super-infection

— | Pneumonia

Definition

Pneumonia is infection of the lung parenchyma characterized by inflammation and consolidation of lung tissue.

Causes

- Bacterial:
 - Streptococcus pneumonia (most common at all ages)
 - Chlamydia pneumonia
 - Mycoplasma pneumonia (over 5 year old age)
 - Chlamydia trachomatis (infant)
 - Staphylococcus aureus
 - Haemophilus influenza (in case of no vaccination)
 - Pseudomonas aeruginosa (in immunocompromised patients)
 - Klebsiella pneumonia ...
- Viral:
 - Respiratory syncytial Virus
 - Adenovirus
 - Influenzae A and B
 - Parainfluenzae types 1 and 3
 - Metapneumovirus
- Fungal Cryptococcus neoformans, Aspergillus spp,...
- Mycobacterial: Mycobacterium tuberculosis, Mycobacterium avium, Mycobacterium intracellulare
- Parasites: Pneumocystis Jirovecii (in HIV infected children)

Signs and symptoms

- Fever
- Tachypnea
- Respiratory distress (inter-costal, sub-costal recession)
- Nasal flaring
- Use of accessory muscles
- Cyanosis and respiratory fatigue (in severe case especially for infant)
- Crackles and wheezing on auscultation
- Bronchial breathing

Table 1. Clinical staging of pneumonia

Type	Signs	Symptoms
Very severe pneumonia	Cyanosis Inability to drink/breastfeed AVPU = V, P or U Grunting Head bobbing	
Severe pneumonia	Lower chest indrawing Nasal flaring Grunting	History of cough or difficulty of breathing Fever Abdominal/chest pain (sometimes)
Non severe Pneumonia	Fast breathing Presence or absence of crackles	

Investigations

- FBC
- Chest x-ray
- Blood culture
- HIV test

Complications of pneumonia:

- Pneumothorax
- Pleural effusion/pleuritis
- Sepsis/ Meningitis / Arthritis
- Empyema
- Respiratory failure
- Bronchiectasis

Management:

At health centre (Follow IMCI guideline)

- For very severe and severe pneumonia
 - Give first dose of an appropriate antibiotic. (Ampicillin 25mg/kg stat dose and Gentamycin 5mg/kg stat)
 - Treat to prevent hypoglycaemia
 - Refer URGENTLY to hospital
- For Non-severe pneumonia
 - Give an appropriate oral antibiotic for 5 days. (Amoxycillin 40mg/kg/day in 3 divided doses)
 - Soothe the throat and relieve the cough with a safe remedy.
 - Advice mother when to return immediately.
 - Follow-up in 2 days

Factors for admission of children with pneumonia:

- Age < 6 months
- Sickle cell anaemia with acute chest syndrome

TREATMENT GUIDELINES

- Multiple lobe involvement
- Immunocompromised state
- Toxic appearance
- Very severe or severe pneumonia (clinical staging)
- Severe respiratory distress:
 - Supplemental oxygen
 - Dehydration
 - Vomiting
 - No response to appropriate oral antibiotic therapy

At district hospital level (Follow ETAT+ guideline)

Table 2. Management summary of pneumonia

Type	Management	Comments
Very severe pneumonia	Hospitalization, Oxygen, Correct shock, hypoglycaemia and dehydration, Fluid maintenance Ampicillin 200mg/kg Q6hr or Benzyl penicillin 50,000 units/kg IM/IV Q6hr Plus Gentamycin IV 7.5mg/kg IV over 3-5 minutes Q24hr OR Cefotaxime 50mg/kg/dose Q8hr (second line)	Duration 10 days Switch to oral treatment with amoxicillin 45mg/kg/dose Q12hr if improvement in clinical symptoms
Severe pneumonia	Hospitalization Oxygen Correct hypoglycaemia and dehydration Fluid maintenance Ampicillin 200mg /kg/day (50mg/kg/ dose Q6h)	Duration 7 days Switch to oral treatment with amoxicillin 45mg/kg/dose Q12hr if improvement in clinical symptoms
Non severe Pneumonia	Amoxycillin 25mg/kg/dose Q12hr	Duration 5 days

Note: If pneumonia due to *staphylococcus* is suspected give Cloxacillin 100mg/kg/day for in 3doses and Gentamycin 7.5mg/kg. Use vancomycin as second line therapy if no response

Complications:

Recurrent/persistent pneumonia:

In case of persistent pneumonia (abnormal X-ray more than 30 days after treatment) the patient should be referred for investigations (CT scan, bronchoscopy) to exclude:

- Foreign body
- Tuberculosis
- Congenital malformation (adenomatosis)
- Immotile cilia syndrome

Likewise, in case of recurrent pneumonia, an underlying cause should be suspected and the child referred for further investigations.

Pleural effusion:

In case of pleural effusion, think of *Staphylococcus aureus*, *streptococcus pneumonia*, *mycoplasma pneumonia*, *tuberculosis*

Exclude Tuberculosis

Ultrasound to measure the volume of liquid and aspiration for culture, GeneXpert
Drainage of fluid is urgent to relieve the respiratory distress

Table 3. Treatment failure definition and the appropriate action to take

Treatment failure definition	Action
Any time. Progression of pneumonia to severe (development of cyanosis or inability to drink in a child with pneumonia without these signs on first contact.)	Admit child <ul style="list-style-type: none"> Change treatment from amoxicillin to Ampicillin and gentamicin to cover for Gram negative pneumonia
Obvious cavitation on CXR	<ul style="list-style-type: none"> ❖ Treat with Cloxacillin and gentamicin iv for Staph. Aureus and Gram-negative pneumonia. ❖ Investigate for TB
48 hours	
Severe pneumonia child getting worse, reassess thoroughly, get chest X ray if not already done (looking for empyema /effusion, Cavitation, Pneumothorax etc).	<ul style="list-style-type: none"> ❖ Switch to Ceftriaxone / Cefotaxime unless suspect Staphylococcal pneumonia then use Cloxacillin and Gentamycin ❖ Suspect PCP especially if <12 months, an HIV test must be done - treat for Pneumocystis if HIV positive.
Severe pneumonia without improvement in at least one of: <ul style="list-style-type: none"> • Respiratory rate, • Severity of indrawing, • Fever, • Eating / drinking 	<ul style="list-style-type: none"> ❖ Admit child ❖ Change treatment from amoxicillin to Ampicillin and gentamicin
5 Days (or earlier if continued signs of worsening)	
At least three of: <ul style="list-style-type: none"> ❖ Fever, temp >38 0C ❖ Respiratory rate >60 bpm ❖ Still cyanosed or saturation <90% and no better than admission. ❖ Chest indrawing persistent ❖ Worsening CXR 	Consider transfer to higher level hospital Re-evaluate and consider; <ul style="list-style-type: none"> ❖ If still on amoxicillin, admit the child and change to Ampicillin and Gentamycin ❖ If on Ampicillin and gentamicin change to ceftriaxone or Cefotaxime. ❖ Suspect PCP, an HIV test must be done - treat for Pneumocystis if HIV positive.
After 1 week	
Persistent fever and respiratory distress.	<ul style="list-style-type: none"> ❖ Consider TB, perform mantoux and follow TB treatment guidelines

— | Wheezing child: bronchiolitis

Definition

A wheeze is a musical and continuous sound that originates from oscillations in narrowed airways. Wheezing is heard mostly in expiration as a result of critical airway obstruction.

Causes/ differential diagnosis:

- Bronchiolitis
- Asthma
- Oesophageal foreign bodies
- Aspiration syndrome (gastro-oesophageal reflux diseases)

Definition: Bronchiolitis is an inflammation of the small airways due to acute viral infection affecting children below 2 years of age. It occurs with seasonal variations and may lead to fatal respiratory distress. Recurrent episodes of wheeze associated with bronchiolitis may occur, and some of these children may develop asthma.

Causes

- Respiratory Syncytial Virus is the most common (>50% cases)
- Other agents: parainfluenza, adenovirus, Mycoplasma, and, occasionally, other viruses especially Human metapneumovirus

Clinical signs

- Mild Bronchiolitis
 - Cough and fast breathing (tachypnoea).
- Moderate Bronchiolitis: As above plus one of the following:
 - Lower chest wall in-drawing;
 - Nasal flaring;
 - Grunting
- Severe Bronchiolitis: As above plus at least one of the following:
 - Central cyanosis, oxygen saturation < 90% in room air;
 - Inability to feed;
 - Convulsions, lethargy or decreased level of consciousness;
 - Severe respiratory distress (e.g. very severe chest wall in-drawing).
 - Silent chest on auscultation (corresponding to an intense bronchospasm)

Risk factors for severe bronchiolitis:

- Age less than 3 months
- Ex-preterm infants
- Chronic lung disease
- Congenital heart disease

Diagnosis:

Is on clinical basis

- Prodrome of viral infection: irritability and rhinorrhoea.
- A wheeze that is slowly responsive or non-responsive to bronchodilators.
- Crepitations and signs of hyperinflation of the chest.
- Chest X-ray should be reserved for clinically severe or complicated cases
- Tachypnoea: age dependent:

Investigations

- FBC
- CRP (Less contributory as viral infection)
- Chest X-ray: (Not mandatory) show hyperinflated lungs with patchy atelectasis

Complications:

- Bacterial secondary infection
- Atelectasis
- Apnoea especially in neonatal and infant period
- ARDS

Management: In Bronchiolitis treatment is symptomatic

At health centre level:

Outpatient management

- Nasal irrigation with 0.9% NaCl before each feed
- Small, frequent feedings to reduce vomiting triggered by bouts of coughing.
- Increased fluids if fever and/or significant secretions are present.
- Treat fever with paracetamol 10-15mg/kg/dose 6 hourly
- Counsel the care giver and advise to come back if the child deteriorates or does not improve.
- Transfer all children with one of the following criteria to hospital:
 - Presence of any sign of severity
 - Pre-existing pathology (cardiac, Respiratory, malnutrition, HIV, etc.)
 - Associated acute pathology (viral gastro-enteritis, bacterial infection, etc.)
 - Age less than 3 months

At district hospital level

Hospitalize children if signs of serious illness

- Administer high humidified oxygen at 8L/min in 30 to 40 % oxygen
- Maintenance IV fluid
- Tube feeding when the respiratory distress improves
- In case of respiratory failure, use non-invasive naso CPAP or mechanical ventilation

Recommendation

- Antibiotic treatment only indicated for children with secondary infection according to severity of clinical signs, high fever $> 39^{\circ}\text{C}$, purulent sputum, aggravation of respiratory symptoms.
- Give oral or parenteral antibiotics for 5 days based on severity and/or condition of the patient as follow:
 - Amoxicillin 25mg per dose/kg/day Q12hr PO OR
 - Ampicillin IVI: 100 mg/kg/day in 3 divided doses

Alternative treatment:

- Erythromycin 30-50 mg per dose/kg/day x3/day/7-10days

Note: Treatment of bronchospasm:

Data does not support routine use of bronchodilators, steroids or antibiotics. If bronchodilators are to be used, closely monitor effect as it might worsen the respiratory distress.

— | Asthma

Definition

Asthma is a chronic inflammatory condition of the lung airways resulting in episodic airflow obstruction.

Causes: unknown but the following factors have been identified:

- Allergens (e.g., house dust, perfumes, food, animal airs, mites),
- Medicines (e.g., propranolol and aspirin),
- Environmental (e.g., change of weather, pollutants), Infections (viral or bacterial),
- Emotions,
- Family history (genetic factors),
- Gastro-esophageal reflux

Clinical signs and symptoms

- Breathlessness
- Wheezing/ prolonged expiratory
- Cough (chronic nocturnal cough)
- Exercise induced cough
- Chest tightness
- Sputum production

Table 4. Normal rates of breathing in awake children

< 2 months	< 60/min
2-12 months	< 50/min
1-5 years	< 40/min
6-8 years	< 30/min

Table 5. Guide to limits of normal pulse rate in children

Infants	2-12 months	< 160/min
Preschool	1-2 years	< 120/min
School age	2-8 years	< 110/min

<u>Severity of Asthma Exacerbations</u>				
Parameter	Mild	Moderate	Severe	Respiratory arrest imminent
Breathless	Walking Can lie down	Talking Infant - softer, shorter cry; difficulty feeding Prefers sitting	At rest Infant stops feeding Hunched forward	
Talks in	Sentences	Phrases	Words	
Alertness	May be agitated	Usually agitated	Usually agitated	Drowsy or confused
Respiratory rate	Increased	Increased	Very Increased	
Accessory muscles and suprasternal retractions	Usually not	Usually	Usually	Paradoxical thoraco-abdominal movement
Wheeze	Moderate, often only expiratory	Loud	Usually loud	Absence of wheeze
Pulse/min.	<100	100 - 120	>120	Bradycardia
Pulsus paradoxus	Absent < 10 mm Hg	May be present 10 - 25 mm Hg (adult) 20 - 40 mm Hg (children)	Often present > 25 mm Hg (adult) 20 - 40 mm Hg (children)	Absence suggests respiratory muscle fatigue
PEF after initial bronchodilator % predicted or % personal best	Over 80%	Approx. 60-80%	< 60% predicted or personal best or response lasts < 2 hrs	
SaO ₂ % (on air)	>95%	91 - 95%	<90%	

Diagnosis:

Asthma is diagnosed on the basis of a patient's symptoms and medical history.

Presence of any of these signs and symptoms should increase the suspicion of asthma:

- Wheezing: high-pitched whistling sounds when breathing out-especially in children. (A normal chest examination does not exclude asthma.)
- History of any of the following:
 - Cough, worse particularly at night
 - Recurrent wheeze
 - Recurrent difficulty in breathing
 - Recurrent chest tightness
- Symptoms occur or worsen at night, awakening the patient.
- Symptoms occur or worsen in a seasonal pattern.
- The patient also has eczema, hay fever, or a family history of asthma or atopic diseases.
- Symptoms occur or worsen in the presence of:
 - Strong emotional expression Animals with fur
 - Aerosol chemicals
 - Changes in temperature

TREATMENT GUIDELINES

- Domestic dust mites
- Drugs (aspirin, beta blockers)
- Exercise
- Pollen
- Respiratory (viral) infections
- Smoke
- Symptoms respond to anti-asthma therapy
- Patients colds “go to the chest” or take more than 10 days to clear up

Investigations:

- FBC for exclusion of super-infection
- Chest X-ray (where available for differential diagnosis and i
- Additional diagnostic tests:
- Lung function to confirm diagnosis and assess severity (where available)
- Peak expiratory flow rate can help diagnosis and follow up

Complication:

- Uncontrolled/poorly controlled asthma can lead to severe lung damage
- Severe asthma exacerbation can cause respiratory failure and death

Management:

- Asthma** exacerbation (asthma attacks) are episodes of a progressive increase in shortness of breath, cough, wheezing or chest tightness or a combination of these symptoms.
- Asthma attacks require prompt treatment
 - Categorize severity of attack and treat as per ETAT+ guidelines below

Very Severe Asthma

Any one with;

- Oxygen saturation <90%
- Central cyanosis
- Silent chest
- Inability to drink / breast feed
- AVPU= “V”, “P” or “U” or
- Inability to talk/complete sentences
- Pulse rate >200 bpm (0-3 years) and >180 bpm (4-5yrs)

Immediate Management**ADMIT**

- Oxygen
- Nebulize 2.5 mg salbutamol or 6 puffs of Inhaler with spacer and mask give every 20 minutes up to 3 doses if needed
- Prednisolone 2mg/kg OR
- IVI Hydrocortisone 4mg/kg if unable to take orally

Alternative treatment:

- Ipratropium bromide (if available): nebulization increases effect of salbutamol or Combivent (Ipratropium bromide and albuterol sulfate)
- Adrenaline in case of anaphylaxis but not indicated for asthma attack ($10\mu\text{g}/\text{kg}$ IM then infusion $0.1\mu\text{g}/\text{kg}/\text{min}$)

Moderate to Severe asthmatic attack:

- Wheeze
- Lower chest wall indrawing

Immediate Management

- Oxygen if obvious use of accessory muscles, measure oxygen saturation.
- Salbutamol by nebulizer or
- Inhaler + spacer + mask repeated up to 10 puffs in 30min min (shake inhaler every 2 puffs)
- Start oral prednisolone at 2mg/kg for 3-5 days. Max dose of 20mg/day for < 2 years and 30mg/day for 2-5 years.

Reassess after 30-60 min and reclassify severity – if now:

- Very severe
 - Continue oxygen, 1-4 hourly salbutamol, early review, antibiotics as for very severe pneumonia
- Severe
 - 4 hourly salbutamol, antibiotics as for severe pneumonia
- Mild:
 - 4 hourly salbutamol, oral antibiotics aim for discharge in 24 hr

Mild asthmatic attack:

- Wheeze PLUS
- Fast breathing (RR 50 aged 2-11 months RR 40 aged 12-59 months)

Management of mild asthmatic attack

- Salbutamol by inhaler, spacer + mask
- Reassess respiratory rate after 20-30 minutes, if persistently elevated consider oral antibiotic
- Counsel caregiver on signs of deterioration and schedule review within 48 hours
- Give education on use of inhaler, spacer + mask
- Discharge on salbutamol inhaler 4-6 hourly for no more than 5 days

NOTE:

- In recurrence of asthma symptoms consider inhaled corticosteroid (ICS) therapy or adjust the doses if already on ICS and look out for other comorbidities
- Demonstrate MDI and spacer use to the caregiver before discharge
- Preferably use spacer with face masks for <3 years for 4-5 years use facemask or mouthpiece.
- Advise on regular follow up

Maintenance treatment: see tables below

Clinical initial check- up

- Check risk factors
- Patient education: Discuss the management plan, importance of adherence to treatment
- Medication: inhaled corticosteroids. Example: start with Beclomethasone inhaled 250 μ g, once to twice a day with inhalation chamber then step up or step down according to the evolution (close follow up after discharge)
- Treatment of co-morbid conditions (Rhinitis, sinusitis, gastroesophageal reflux)

● EAR NOSE AND THROAT CONDITIONS

— | Otitis externa

Definition

Inflammation of the external ear. Common precipitants of otitis externa are maceration, trauma of the ear canal or presence of a foreign body or dermatologic diseases (such as eczema, psoriasis).

Clinical features

May be one of the following:

- Diffuse: An infection of the ear canal, often due to Gram negative bacilli especially *P Aeruginosa*
 - Pain on chewing and movement of the tragus or pinna
 - Lining of the canal is inflamed or swollen with dry or moist debris with or without discharge.
 - If visible, the tympanic membrane is normal
- Furuncular: Usually caused by *Staphylococcus aureus*.
 - A painful localized swelling seen at the entrance to the ear canal

General measures

- Rule out chronic otitis media before treatment.
- Most cases recover after thorough cleansing and drying of the ear.
- Keep the ear clean and dry.
- Do not leave pieces of cotton wool, etc. in the ear.

Medical treatment

Diffuse

- Does not usually require an antibiotic.
- Clean and dry the ear using a dry cotton bud or a small piece of dry cotton wool.
- Consider ear irrigation only if the tympanic membrane is intact
 - Acetic acid 2% in alcohol, 3–4 drops into the ear every 6 hours for 5 days.
OR
 - Apply **ciprofloxacin** ear drops: 3 drops 12 hourly in the affected ear(s) for 7 days

Furuncular-

- Cefadroxil, oral, 15 mg/kg/dose 12 hourly for 5 days.
- OR
- Flucloxacillin, oral, 12–25 mg/kg/dose 6 hourly for 5 days.

— | Otitis media

Definition

It is the inflammation of the middle ear cavities

Causes:

- Bacterial (*Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis* etc)
- Viral

Predisposing factors include poor living conditions, adenoids, sinusitis, allergic rhinitis, tonsillitis, asthma etc

Signs/symptoms

- Fever
- Retroauricular pain
- Crying with ear scrubbing
- Gastro intestinal signs
- Otalgia
- Cervical lymphadenopathy
- Otorrhea (if tympanic membrane perforated)
- Impaired hearing
- Redness of eardrum
- Sometimes bulging of the eardrum

Diagnosis:

- Clinical including otoscopy
- FBC and CRP if signs of sepsis

Complications:

- Secretory otitis media (ear glue)
- Chronic otitis media with perforation
- Acute mastoiditis sometimes with periosteal abscess
- Intracranial (meningitis, brain abscess, subdural abscess, etc)
- Facial paralysis
- Labyrinthitis

Management:

- General measures: Elimination of risk factors
- Medical
- Surgical: Myringotomy if necessary

Treatment of first choice

- Amoxicillin, Po 30mg/kg/dose P.O. Q8h for 7-10 days
- When associated with rhinitis add Xylometazoline (Otrivine) 0.05% nose drops or simple argyrol drops 1%, 0.05%
- Paracetamol 10-15mg/kg/dose Q6hr if high fever or pain

Alternative treatment:

- Amoxyclav: 50mg/kg/day P.O , Q8h for 7 -10 days;

OR

- Cefadroxil: 25mg/kg/dose Q12h for 7 days
- Cefuroxime: 15mg/kg /dose Q12h for 7 days
- Azithromycine 5mg/kg/dose Q24h for 3 days
- Erythromycine 20 mg/kg/dose Q8h for 10 days

Recommendations:

- Avoid getting in the inside of the wet ear

— | Chronic Suppurative Otitis Media

Definition

It is a chronic inflammation of the middle ear with recurrent ear discharges or otorrhoea through a tympanic perforation for more than 2 weeks.

Predisposing risk factors:

- Inadequate management of otitis media
- Frequent upper respiratory tract infections
- Anatomic factor: Short Eustachian tube
- Poor living conditions, poor housing, hygiene and poor nutrition
- Immunosuppression (ex: HIV infection)

Causes

- H. Influenza
- P. aeruginosa
- S.pneumoniae
- Staphylococcus aureus
- Tuberculosis

Signs and symptoms:

- Recurrent pus ear discharge
- Large perforation of the eardrum on examination
- Progressive hypoacusia with Impaired hearing
- Buzzing (acouphene)
- History of recurrent otitis media
- Loss of transparency of tympanic membrane

Diagnosis:

- Clinical including Otoscopy
- Investigations :
 - Bacterial Cultures
 - Search for predisposing factors
 - Audiogram
 - CT-scan

Complications:

- Subperiosteal abscesses
- Facial nerve paralysis
- Lateral sinus thrombophlebitis
- Suppurative labyrinthitis
- Brain abscess
- Meningitis
- Mastoiditis
- Extradural and subdural Empyema
- Otitic hydrocephalus
- Hearing impairment
- Deafness

Management

Non pharmacological management

- Dry mopping
- Aural toilet by medicines' droppers (with Hydrogen peroxide or polyvidone iodine saline solutions)
- Avoid getting the inside of the ear wet. E.g.: bathing and swimming

Pharmacological management

- Topical quinolones (Ciprofloxacin ear drops Q12h for 7 days)
- Systemic treatment: Ceftazidime IV or IM 50mg/kg/dose Q8h (max:6gr/day) for 7 days
- In case of mastoiditis: Refer to ENT surgeon for possible mastoidectomy

Recommendations:

- Proper management of acute otitis media
- Avoid getting the inside of the ear wet. E.g: bathing and swimming
- Refer to the tertiary health facility for further management

— | Tonsillitis

Definition

It is an inflammation of the tonsils

Causes:

- Bacterial infection (*Group A β-hemolytic streptococcal, staphylococcal...*)
- Viral infection (Rhinoviruses, influenza...)
- Fungal infection

Signs/symptoms

- Difficult and painful swallowing (Dysphagia)
- Refusal of breastfeeding
- Fever, chills
- Headache
- Vomiting
- Sore throat - lasts longer than 48 hours and may be severe
- Enlarged and tender submandibular lymph nodes
- Swollen red tonsils with white spots

Diagnosis os clinical

- It is not possible to distinguish clinically between viral and bacterial tonsillitis
- Investigations:
 - Swab for laboratory analysis where possible
 - Complete blood count
 - Streptococcal screen ASOT/ASLO

Complications:

- Rheumatic heart disease
- Acute glomerulonephritis
- middle ear infections
- Peritonsillar abscess (quinsy)
- Abscess of the pharynx
- Sinusitis

TREATMENT GUIDELINES

- Septicaemia
- Bronchitis or pneumonia
- Airway obstruction

Management:

- Ensure enough fluids to avoid dehydration
- Medical treatment: antibiotics, analgesics, anti-inflammatory
- Surgery

Treatment of first choice:

- Amoxicillin 15-30 mg/kg/dose Q8h for 10 days

OR

- Penicillin V tabs: 15mg/kg/dose Q12h for 10days
 - In case of allergy to penicillins use:
- Erythromycin 15-20mg/kg/dose Q8h for 10 days
- OR Azithromycin 5mg/kg/dose Q24h for 3 days
- If fever or pain, give Ibuprofen: 2-3mg/kg/dose Q8h or Paracetamol 10-15mg/kg Q6h, max 60mg/kg/day

If no response with the first choice,

- Amoxi-clav (Augmentin) 15-20mg/kg/dose P.O , Q8h 7 -10 days;

OR

- Cefuroxime (Zinat): 15mg/kg /dose Q8h for 7 days

Surgical treatment:

- Tonsillectomy indicated in:
 - Chronic repetitive tonsillitis
 - Obstructive tonsils
 - Peritonsilar abscess

Recommendations:

- Systematically give Antibiotherapy for children > 3 years in order to prevent rheumatic heart disease
- For chronic and obstructive tonsillitis refer to the ENT specialist

— | Acute mastoiditis**Definition**

Acute mastoiditis is sudden onset bacterial infections of the mastoid bone

Causes:

Spread of pathogens causing acute otitis media to the mastoid bone

Signs/symptoms

- Fever
- Pain,tenderness, discomfort and swelling behind the ear
- In some instances, the ear on the affected side seems pushed out and quite prominent. This is caused by a high concentration of pus in the mastoid
- Sometimes associated suppurative otitis media
- Tympanic membrane is usually perforated with otorrhoea
- Occasionally, pus breaks through the mastoid tip and forms an abscess in the neck (Bezold's abscess)

- Headache
- Hearing loss

Diagnosis: Clinical basis

- X-Ray of the mastoid bone
In selected cases,
- CT-scan of the middle ear
- Culture of the pus from the mastoid bone
- Blood culture
- LP if signs of meningitis

Complications:

- Facial paralysis
- Brain abscess
- Meningitis
- Neck abscess
- Extradural abscess
- Septicaemia
- Subdural abscess

Management: Should be managed in collaboration with ENT surgeon

- Pharmacological

Treatment of first choice:

- Ceftriaxone iv 100mg/kg/dose Q24h for 14 days+ Vancomycin are the recommended treatment until culture and sensitivity results are available

If 3rd generation cephalosporin not available,

- Amoxiclav, for 14 days and Gentamycin iv 5mg/kg/dose Q24h 5 days
- If fever or pain, give Ibuprofen: 2-3mg/kg/dose Q8h or Paracetamol 10-15mg/kg Q6h, max 60mg/kg/day

Surgical

- Mastoidectomy
- Incision of abscess
- When anaerobic infection is suspected : Add metronidazole IV 15-20 mg/kg/dose Q8h and culture sensitivity where possible

-- | Epistaxis

Definition

Epistaxis is nose bleeding.

Causes:

- Local (trauma, inflammation, foreign bodies, tumours of the nose and rhinopharynx, chronic use of nasal steroids, intra nasal growth like polyps,..)
- Systemic (cardiovascular diseases, blood diseases, liver diseases, kidney diseases, febrile diseases)
- Upper respiratory disease (sinusitis, allergic rhinitis)
- Juvenile nasopharyngeal angiofibroma if profuse unilateral epistaxis associated with a nasal mass in adolescent boy
- Idiopathic (causes not known)

Signs/symptoms:

- Blood coming from the nose or the rhinopharynx
- History of recurrent nasal bleeding

Diagnosis:

- Clinical: exploratory clinical examination, ENT and general examination
- Investigations in complicated or recurrent cases
 - *Full blood count, clotting time, bleeding time, prothrombin time*
 - *CT scan and MRI if Juvenile nasopharyngeal angiofibroma*
 - *Other investigations should be requested based on general examination findings*

Complications

- Hypovolemic shock
- Anaemia

Management:**Non pharmaceutical treatment:**

- Sit the patient up to avoid aspiration
- Cleaning of blood clots from the nose
- Direct pressure applied by pinching the soft fleshy part of the nose applied for at least five minutes and up to 20 minutes
- Application of cold compresses on the nose
- Room humidifier
- Pack with ribbon gauze impregnated with topical ointments (Vaseline...) and remove it after 12-24 hours.

Pharmaceutical treatment:

- Application of a topical antibiotics ointment to the nasal mucosa has been shown to be an effective treatment for recurrent epistaxis
- Topical vasoconstrictor: xylometazoline spray (otrivine) 0.5mg/ml
- Cauterization of the bleeding site with silver nitrate or 20% of solution trichloracetic acid under topical anesthesia
- Electro coagulation
- If severe bleeding with shock/or anemia, immediate blood transfusion is recommended

Recommendations:

- Investigate for underlying causes
- Refer cases of severe and recurrent epistaxis
- Refer to ENT specialist for otolaryngologic evaluation if bilateral bleeding or hemorrhage that not arise from Kiesselback plexus

-- | Laryngotracheobronchitis

Definition

Inflammation of the vocal cords and structures inferior to the cords. It is the common cause of stridor in children aged between 6 months and 2 years leading to potentially life-threatening airway obstruction.

Causes:

- Viral respiratory tract infection: Parainfluenza Virus Type 1 and 2, Rhinoviruses, Syncytial Viruses, adenoviruses, measles and herpes simplex....)

Signs and Symptoms:

- Progressive shortness of breath following upper respiratory tract infection in a previously well child, followed by a barking cough and stridor
- Stridor becomes softer as airway obstruction becomes more severe
- There may be a sore throat
- Mild fever may be present
- Erythema and oedema of larynx

The following features suggest a different diagnosis:

- Acute onset of obstruction without prodromal features (foreign body or angioneurotic oedema)
- incomplete immunisation and a membrane in the upper airway (diphtheria),
- High fever, dysphagia, drooling or sitting position (epiglottitis, retropharyngeal abscess, bacterial tracheitis)
- Recurrent upper airways obstruction (laryngeal papilloma).

Assessment of severity of airway obstruction in LTB

- Grade 1: Inspiratory stridor
- Grade 2 : Inspiratory and Expiratory stridor and passive expiration
- Grade 3 : Inspiratory and Expiratory stridor + pulsus paradoxus and active expiration
- Grade 4 : cyanosis, apathy, marked retractions, impending cardiorespiratory arrest

Diagnosis:

- Clinical signs as above
- Investigations:
 - FBC + CRP
 - Lateral Neck X-ray (not mandatory)

Management:

**Leave child in carer's arms as much as possible
(except if near respiratory arrest) as you manage the child**

Supportive measures

- Humidified O₂ therapy
- Monitor oxygen saturation, heart rate and respiratory rate
- Maintenance fluids and nutrition
- Avoid unnecessary stimulation
- Depending on severity, admit child to high care or intensive care ward.

Medical treatment:**Grade 1 obstruction**

- Prednisone, oral, 2 mg/kg as a single dose. OR
- Dexamethasone, IV/IM, 0.5 mg/kg as a single dose.

Note: Avoid steroids in patients with measles or herpes infection.

Grade 2 obstruction

- As above PLUS
- Adrenaline (epinephrine), 1:1000, nebulise with oxygen, every 15–30 minutes until respiratory obstruction is abolished.
 - 1 mL adrenaline (epinephrine) 1:1 000 diluted in 1 mL sodium chloride 0.9%.

Grade 3 obstruction

- As above:
- If improvement, treat as in grade 2 but reduce frequency of adrenaline (epinephrine) nebulization with time,
- If no improvement within 1 hour, intubate, preferably under general anaesthesia
- If unable to intubate, bag and mask ventilate and refer urgently.

Grade 4 obstruction

As above and:

- Continue steroids
- Continue with adrenaline (epinephrine) nebulization with 100% warm humidified oxygen
- Intubate, preferably under general anaesthesia
- If unable to intubate, bag and mask ventilate and refer urgently

For suspected herpes:

- Acyclovir IV, 10–15 mg/kg/dose 8 hourly for 5–7 days.

For suspected bacterial infection in children < 20 kg:

- Ampicillin, IV, 12.5–25 mg/kg/dose 6 hourly for 5–10 days.

For suspected bacterial infection in children > 20 kg:

- Ampicillin, IV, 250–500 mg, 6 hourly for 7 days.

If bacterial tracheitis is suspected:

- Cloxacillin, IV, 50 mg/kg/dose 6 hourly for 7 days.

— | Epiglottitis

Definition

Acute epiglottitis is a life-threatening emergency due to respiratory obstruction. It is due to intense swelling of epiglottis and surrounding tissues with septic signs.

Cause

It is caused by *Haemophilus influenza type b*. Since systematic vaccination, this condition has become very rare.

Table 8. Presentation

Signs/symptoms:	Croup (laryngitis)	Epiglottitis
Onset	Over days	Over hours

Preceding coryza	Yes	No
Cough	Severe, barking	Absent or slight
Able to drink	Yes	No
Drooling saliva	No	Yes
Appearance	Unwell	Toxic, very ill
Fever	<38,5°C	>38,5°C
Stridor	Harsh, rasping	Soft, whispering
Voice, cry	Hoarse	Muffled, reluctant to speak

Management:

Urgent hospital admission and treatment

Move the child only when ready for intubation under anaesthesia

Intubation by senior anaesthetist, paediatrician and ENT in theatre room

Urgent tracheostomy if intubation impossible

Antibiotic treatment: Cefotaxime iv 30-50 mg/kg/dose Q8h for 7-10 days

or

Ceftriaxone iv 100mg/kg/dose Q24h for 7-10 days

-- | Sinusitis

Definition

Sinusitis is the inflammation of one or more sinus cavities.

Causes:

- Rhinitis (most common cause)
- Trauma with open sinuses
- Bacterial infections (Bacteria: S.pneumoniae, H. Influenza, Moraxella catarrhalis, staphylococcus Aureus, anaerobes)
- Viral
- Common predisposing factors include: abscess and tooth extraction, chemical irritants, nasal polyp, deviation of nasal septum, perfumes or paint fumes, and changes in the weather

Signs/symptoms:

- Non specific complaints
- Purulent nasal discharge (unilateral or bilateral)
- Fever and cough
- Nasal obstruction and congestion
- Frontal headache and heaviness of the head exaggerated on bending the head
- Persistent symptoms of upper respiratory tract infection
- On clinical examination, pressure on frontal and maxillary sinuses causes pain
- Decreased sense of smell
- Periorbital oedema
- Anterior rhinoscopy shows pus coming through the middle meatus

Diagnosis:

- Clinical
- Investigations:

TREATMENT GUIDELINES

- Paranasal X-ray (shows opacification with air-fluid level)
- CT scan

Complications:

- Local: Osteomyelitis, orbital cellulitis, orbital abscess
- Descending infections: pharyngitis, tonsillitis, bronchitis, pneumonia
- Systemic: septicemia, meningitis, brain abscess, thrombophlebitis of cavernous sinus, subdural empyema

Management:

- Medical treatment consists of nasal decongestants and antibiotics

Treatment of first choice:

- Amoxicillin, Po 15-20mg/kg/dose Q8h 7-10 days
- Paracetamol 10-15mg/kg/dose Q6hr

Alternative treatment:

- Amoxicillin-clavulanate (amoxi-clav, augmentin®) 15-20 mg/kg/dose PO, Q8h 7 -10 days
- Add Xylometazoline (Otrivine) 0.05% nose drops or simple argyrol drops 0.1% , 0.05%
- OR
- Cefadroxyl (Oracefal): 25mg/kg/dose Q12h for 7 days
- Cefuroxime (Zinat): tabs 15mg/kg/dose Q12h for 7 days
- Azithromycin 5mg/kg/dose Q24h for 3 days
- Erythromycin 15-20 mg/kg/dose Q8h for 10 days
- Rovamycine 3MI units: 50000-100000 UI/kg/dose Q8h for 10 days
- Argyrol-ephedrin nasal drops 2% 3 drop x3/day/7 days

Recommendations:

- Do not use nasal decongestants taking a monoamine oxidase inhibitor in hypertensive patient

— | Pertussis (whooping cough)

Definition

This is a highly infectious form of bronchitis caused by bordetella pertussis. It has become rare since vaccination but it is endemic with epidemics every 3-4 years. Particular attention to young infants (before complete vaccination), adults (weaning effect of vaccine) and unvaccinated.

Cause: *Bordetella pertussis***Signs/symptoms:**

After one week of coryza (catarrhal phase), the child develops a characteristic paroxysmal cough followed by characteristic inspiratory whoop (paroxysmal phase, 3-6 weeks). Worse at night and occasional vomiting. During paroxysm, the face goes red or blue and mucus flows from nose and mouth. May cause apnoea in young infants. The symptoms gradually decrease and may persist for months (convalescent phase)

Diagnosis:

Clinical symptoms and signs

Culture if available

FBC: marked lymphocytosis ($>15 \text{ } 10^9/\text{l}$)

Management:

- Admit to hospital if infant (risk of apnoea)
 - Symptomatic treatment: O₂, gavage
 - Erythromycine 15-20 mg/kg/dose Q8h for 14 days
- Or
- Azithromycin
 - Infants aged <6 months: 10 mg/kg/dose Q24h for 5 days.
 - Infants and children aged ≥6 months: 10 mg/kg (maximum: 500 mg) on day 1, followed by 5 mg/kg/dose Q24h (maximum: 250 mg) on days 2-5.
 - Prophylaxis for close contact (same)

-- | Allergic Rhinitis

Definition

Recurrent inflammation of the mucous membranes of the nose and paranasal sinuses in response to an inhaled allergen e.g. pollen, house dust, grasses and animal hair. Overuse of nasal decongestants and viral infections may precipitate the symptoms

Signs/symptoms allergic rhinitis:

- Blocked stuffy nose/ Sensation of nasal obstruction
- Watery nasal discharge
- Frequent sneezing, often accompanied by nasopharyngeal itching and irritation
- Conjunctival itching and watering
- Oedematous pale nasal mucosa
- Mouth breathing
- Snoring at night
- Dry cough
- Headache
- Asthenia
- Thick, sticky mucus (after 3-days)

Diagnosis: Based on clinical signs

Investigations: Not indicated in our setting

Complications:

- Acute or chronic sinusitis.
- Otitis media.
- Sleep disturbance or apnoea.
- Dental problems (overbite): Caused by excessive breathing through the mouth.
- Palatal abnormalities.
- Eustachian tube dysfunction
- Sinusitis
- Pharyngitis
- Laryngo-bronchitis

Management:

- Avoid allergens
- There is no cure for allergic rhinitis; treatment is given for symptom relief
- Supportive care includes bed rest and drinking plenty of fluid

Treatment of first choice:

- 2-5 years : Desloratadine syrup: 1.25mg once a day for 5 days;
- 6-11 years: /Desloratadine syrup: 2.5mg once a day for 5 days
- 12 years: Desloratadine tab 5 mg once a day for 5 days
- Nasal steroids, 1-2 spray/nostril/dose Q12-24h
- Avoid local nasal decongestants as they have long term side effects

Alternative treatment:

During periods of exacerbation of symptoms, a short course of antihistamine can help:

- Cetirizine, oral, as a single dose at night if the predominant symptoms are sneezing, nasal itching and rhinorrhoea:
 - Children 3–12 years: 5 mg
 - Children older than 12 years: 10 mg.mg.

If poorly controlled/severe:

- Corticosteroid aqueous nasal solution, e.g. Budesonide, 100 mcg, 1 spray into each nostril 12 hourly. OR Fluticasone nasal spray (Avamys) 27.5mcg 1 puff daily

GASTROINTESTINAL DISORDERS

— | Acute gastroenteritis

Definition

Gastroenteritis is an inflammation of the stomach and intestines that causes diarrhoea, vomiting, nausea and other symptoms of digestive upset.

Diarrhoea is the passage of three or more loose or watery stools per day. It can be watery, bloody or containing mucus.

Causes:

- **Viral gastroenteritis:** Rotavirus and enterovirus), are the most likely cause of infectious diarrhoea in children under age 5
- **Bacterial gastroenteritis:** Campylobacter, Salmonella or E. coli
- **Intestinal parasites:** Giardia lamblia,
- **Others** causes include life threatening conditions including intussusception; appendicitis...may be initiated by diarrhoea.

Signs/Symptoms:

Table 9. Clinical evaluation of dehydration

Mild dehydration : 3 - 5% <i>(Plan A)</i>	No signs of dehydration
Moderate dehydration : 6-9% <i>(Plan B)</i>	<ul style="list-style-type: none"> • Able to drink (drinks eagerly) plus 2 or more of: • Sunken Eyes • Skin pinch 1 - 2 secs • Restless / Irritable/Agitated
Severe dehydration : 10-15% <i>(Plan C)</i>	<ul style="list-style-type: none"> • Pulse weak or rapid and unable to drink plus: • Sunken Eyes • Skin pinch \geq 2 secs? • Lethargic or decreased level of consciousness unconscious • Kussmaul (acidotic) breathing

Complications:

- **Hypovolemic shock** (Tachycardia, cold hands, weak or absent pulse, capillary refill > 2 sec, not alert)
- **Electrolytes imbalance:** severe hyponatraemia ($<130\text{mmol/L}$), severe hypernatraemia ($>150\text{mmol/L}$), severe hypokalaemia ($<3\text{mmol/L}$), severe hyperkalemia (>5.5).
- **Cerebral oedema** (headache, convulsions, vomiting, nausea, weakness) due to rapid rehydration with hypotonic solutions. Common in hypernatraemia
- **Intracerebral haemorrhage** (due to severe dehydration in infants and young children)

Investigations:

- Stool exam: direct/culture (if blood or pus in stool)
- FBC, CRP, blood culture if suspicion of bacterial blood stream.
- Electrolytes (Sodium and Potassium)
- Random blood sugar , Urea/creatinine if shock

Note: Qualitative evaluation of dehydration (according to sodium level)

- **Isotonic dehydration:** Na 130 to 150 mmol/L
- **Hypertonic dehydration:** Na $> 150\text{ mmol/L}$
- **Hypotonic dehydration :** Na $< 130\text{ mmol/L}$

Management:**At health centre level (Follow IMCI guidelines)****At district hospital level follow ETAT + guidelines**

Admit the child: Absolute criteria of admission:

- Profuse diarrhoea (> 8 stools/24h) with vomiting
- Vomiting every feed
- Severe dehydration
- Failure of home oral rehydration

If dehydration and shock without signs of malnutrition, give appropriate treatment as follow:

- Consider ABCD
- 20ml/kg of normal saline (NS) or Ringers Lactate (RL) as quickly as possible IV or IO in 15 minutes (see table below for estimation of required volume for 20ml/kg):
- Repeat the bolus of NS or RL 3-4 times if persistence of signs of shock
- Treat as severe dehydration after correction of shock

If dehydration and shock with signs of malnutrition

AVPU<A, absent or weak pulses, prolonged capillary refilling (>3 s) and cold periphery with temperature gradient

- 20 ml/kg over 2 hours of Ringer's Lactate (RL)/5% dextrose. – add 50mls 50% dextrose to 450mls Ringers (or 10% Dextrose/HSD if no Ringers).
- If severe anaemia start urgent blood transfusion not Ringers.

If severe dehydration without shock (Plan C);

Table 10. severe dehydration without shock

Normal Saline (If unavailable) Full Strength Ringer Lactate	Age < 12 months	Age \geq 12 months to 5 years
Step 1	30 mls / kg over 1 hour	30 mls / kg over 30 mins
Step 2	70 mls / kg over 5 hours	70 mls / kg over 2.5 hours
Then re-assess child – if still signs of severe dehydration repeat step. If signs improving treat for moderate dehydration		

If moderate dehydration (Plan B);

- Best treated with ORS 75ml/kg 4 hours
- Give RL 75ml/kg during 4 hours in case of uncontrolled /severe diarrhoea and/or vomiting

After 4 hours

- Reassess the child and classify the child for dehydration.

Table 11. How to administer ORS

By bottle	Give 1/3 during 1 st h, then 2/3 during 3 following hours. Example: 10 kg; dehydrated 7%. Should receive 75 ml/kg = 750 ml ORS in 4h Give 60 ml every 15 min during 1 st hour Then 170 ml every h during 3 following hours
Spoon or syringe	Maybe effective if has severe vomiting Allows adequate volumes Ex: 5 ml every 1 to 2 min → 300 to 150 ml in 1 h!
Nasogastric tube	vomiting +++ fatigue +++

- Select the appropriate plan to continue treatment.
- Begin feeding the child in clinic.

NB ORS is

- Contra-indicated if ileus or decreased level of consciousness
- Able to correct the electrolyte imbalance (hypo and hypernatraemia)

If the mother must leave before completing treatment:

- Show her how to prepare ORS solution at home.
- Show her how much ORS to give to finish 4-hour treatment at home.
- Give her enough ORS packets to complete rehydration

Explain the 4 rules of home treatment

- Give extra fluid: Give to the child more to drink as he wants
- Give zinc supplements for 10–14 days:
 - Up to 6 months: 1/2 tablet (10 mg) per day, 6 months and more 1 tablet (20 mg) per day
- Continue feeding: initial 4-hour rehydration period, breastfed children should continue to breastfeed frequently throughout
- When the child has to be returned to the health facility:
 - Drinking poorly or unable to drink or breastfeed
 - Becomes more sick
 - Develops fever
 - Has blood in the stool

If no dehydration (Plan A)

- Treat the child as an outpatient; give ORS 10ml/kg after each watery stool
- Counsel the mother on the 4 rules of home treatment:
 - Give extra fluid,
 - Give zinc supplements
 - Continue feeding
 - Give advice on when to return for review

Table 12. Different forms of dehydration

Type	Intervention	Comment
Hyponatremia (Na < 130mmol/L)	Na Deficit = $0.6 \times W \text{ in kg} \times (Na+d - Na+m)$ during 4 hours W= weight d = desired sodium m = measured sodium	Do not correct too quickly to avoid CNS complications
Hypernatremia (Na > 150mmol/L)	Slowly correct dehydration over 48 hours	Risk of convulsions/cerebral oedema in case of rapid correction
Hypokalemia	If Potassium < 2.5 mmol/L give KCl 30-40 mmol/L/24hours	Give KCl if urine output is adequate

— | Persistent diarrhoea

Definition

Persistent diarrhoea is a diarrhoea, with no signs of dehydration and severe malnutrition, with or without blood, which begins acutely and lasts ≥ 14 days.

Table 13. Causes of persistent diarrhoea

Age	Aetiologies
Infancy	<ul style="list-style-type: none"> Post gastroenteritis mal-absorption syndrome Cow's milk/soy protein intolerance Secondary disaccharidase deficiencies Cystic fibrosis
Childhood	<ul style="list-style-type: none"> Secondary disaccharidase deficiencies Giardiasis Post gastroenteritis malabsorption syndrome Celiac disease Cystic fibrosis HIV Malnutrition
Adolescence	<ul style="list-style-type: none"> Irritable bowel syndrome HIV Inflammatory bowel disease

Complications:

- Dehydration
- Failure to thrive, malnutrition
- Immunosuppression

Investigations:

will vary according to the suspected etiology

- Stool examination: PH, White blood count, Fat, Ova, osmolality, Culture
- FBC, CRP, electrolytes, urea and creatinine
- Urine culture
- Sweat chloride if suspicion of cystic fibrosis
- Barium study
- Small bowel biopsy
- Endoscopy: Sigmoidoscopy or colonoscopy with biopsy

Management:

- Oral rehydration
- Treat the cause

Step-wise empiric protocol for management of diarrhoea

Day 1–2

- Continue full-strength feeds with additional ORS as required.

Day 3–7

- Change to lactose-free feeds if not breastfed.
- Continue additional oral rehydration as required.
- If diarrhoea resolves, discharge, but continue with lactose-free feeds for 2 weeks.

Day 8–13

- Semi-elemental formula: sucrose- and lactose-free, protein hydrolysate, medium chain triglyceride.
- Continue additional ORS as required.

-- | Bloody diarrhoea (dysentery)

Definition

Frequent (>3/day) passage of blood and/or mucus in the stools

Cause:

- Bacterial infections (e.g. Shigella, salmonella...)
- Parasitic infestations (e.g. amoebic dysentery)
- Milk allergy
- Chronic inflammatory bowel disease

Signs and symptoms:

- Sudden onset
- Abdominal cramps
- Peritonism urgency, fever and diarrhoea with blood and mucus in the stools
- Meningism and convulsions may occur
- Exclude intussusceptions which present as:
 - pain or abdominal tenderness
 - bile-stained vomitus
 - red currant jelly-like mucus

Investigations

- Stool culture to confirm diagnosis of Shigellosis
- Stool microscopy reveals many polymorphs and blood
- Immediate microscopy of warm stool to diagnose amoebic dysentery

Treatment:

Non-pharmacological treatment:

- Ensure adequate nutrition and hydration

Pharmacological treatment

- Fluid and electrolyte replacement (see Acute Diarrhoea)
- Ciprofloxacin, oral, 15 mg/kg/dose 12 hourly for 3 days

OR

- Ceftriaxone, IV, 50 mg/kg as a single daily dose for 5 days (if hospitalised or if unable to take oral antibiotics)

Complications include:

- Dehydration
- Convulsions
- Shock
- Toxic megacolon
- Acidosis
- Rectal prolapse
- Renal failure
- Haemolytic uraemic syndrome

Recommendation:

- Refer patient to a paediatrician, if dysentery with complications, e.g. persistent shock, haemolytic uraemic syndrome and toxic megacolon

— | Amoebiasis

Definition

Amoebiasis is a parasitic infection due to the intestinal protozoa *Entamoeba histolyticum*. Transmission is faecal-oral, by ingestion of amoebic cysts from food or water contaminated with faeces. Usually, ingested cysts release non-pathogenic amoebae and 90% of carriers are asymptomatic. In 10% of infected patients, pathogenic amoebae penetrate the mucous of the colon: this is the intestinal amoebiasis (amoebic dysentery). The clinical picture is similar to that of shigellosis, which is the principal cause of dysentery. Occasionally, the pathogenic amoebae migrate via the blood stream and form peripheral abscesses. Amoebic liver abscess is the most common form of extra-intestinal amoebiasis.

Clinical features

- Amoebic dysentery
 - Diarrhoea containing red blood and mucus
 - Abdominal pain, tenesmus
 - No fever or mild fever
 - Possibly signs of dehydration
- Amoebic liver abscess
 - Painful hepatomegaly; mild jaundice may be present
 - Anorexia, weight loss, nausea, vomiting
 - Intermittent fever, sweating, chills; change in overall condition

Laboratory

- Amoebic dysentery: identification of mobile trophozoites (*E. histolytica*) in fresh stool samples
- Amoebic liver abscess: indirect haemoagglutination and ELISA

Treatment for Amoebic dysentery

Tinidazole PO

- Children: 50 mg/kg once daily for 3 days (max. 2 g daily)
- Adolescents: 2 g once daily for 3 days OR

Metronidazole PO

- Children: 15 mg/kg 3 times daily for 5 days
- Adolescents: 500 mg 3 times daily for 5 days

Note:

- If there is no laboratory, first line treatment for dysentery is for shigellosis
- Treat for amoebiasis if correct treatment for shigellosis has been ineffective
- The presence of cysts alone should not lead to the treatment of amoebiasis.
- Amoebiasis is confirmed with a parasitological stool examination: mobile trophozoites in fresh stool

— | Constipation

Definition

Constipation is an acute or chronic condition in which bowel movements occur less often than usual or consist of hard, dry stools that are painful or difficult to pass.

Causes:

- Lack of exercise
- Certain medicines

- Metabolic, endocrine, neurogenic and lower bowel abnormalities
- Psychogenic disorders
- Chronic use of enemas
- Not drinking enough water
- Diet that does not include an adequate amount of fiber-rich foods
- Anal fissure (a tear or crack in the lining of the anus)
- Chronic kidney failure
- Hirschsprung disease
- Colon or rectal cancer
- Depression
- Hypercalcemia (abnormally high levels of calcium in the blood)
- Hypothyroidism (underactive thyroid gland)
- Illness requiring complete bed rest
- Irritable bowel syndrome
- Stress

Signs and Symptoms:

- A symptomatic bowel impaction
- Blood on the stools
- Changes in bowel patterns
- Abdominal pain, distension

Diagnosis: clinical based

- Non-tender deformable faecal masses palpable on rectal examination

Investigations: Not always indicated

- Abdominal X-ray
- Barium enema - reveals blockage inside the intestine in particular cases
- Laboratory analysis of blood and stool samples for internal bleeding
- Sigmoidoscopy (examination of the sigmoid area of the colon with a flexible tube equipped with a magnifying lens), rarely indicated.

Complications:

- Bowel obstruction
- Chronic constipation
- Haemorrhoids
- Hernia
- Spastic colitis
- Laxative dependency

Treatment:

- Treatment involves 3 steps:
 - Initial clearance of stools
 - Prevent re-accumulation of hardened retained stool (Diet change with additional natural fibre from fruit, vegetables and bran).
 - Retraining of the gut to achieve regular toilet habits
- Management is long-term, and requires the active involvement of the parents

Pharmacological treatment:

- Enema twice daily for 3 days for faecal clearance if faecal loading
- Lactulose (Duphalac) for 1 week but if passes 3 stools/day stop it
- Bowel re-training

- In refractory cases:
 - Lactulose, oral, twice daily
 - < 1 year 2.5 mL
 - 1–6 years 5 mL
 - > 6 years 10 mL
 - Forlax (Macrogol 4000) 4g & 10g for children above 8 years
 - Determine and treat the underlying cause

Recommendation:

- Refer patient to the specialist, if an organic cause e.g. constipation from birth in a breast-fed baby is suspected
- If faecal loading continues, maintenance therapy should be continued for months to years

— | Constipation-associated faecal incontinence: encopresis

Definition

Encopresis also known as faecal soiling is the involuntary leakage of small amounts of soft or watery stool in a child with chronic constipation

Causes

- Psycho social precipitants
- Functional (Incorrect Diet, lack of exercise, poor fluid intake)
- Metabolic or Neurological Abnormalities
- Endocrine abnormalities (Hypothyroidism)
- Chronic use of Laxatives
- Obstructive lesions (Acquired and congenital defects)

Signs and symptoms:

- Abdominal pain
- Most of the times associated with encopresis
- Infrequent defecation
- Pain or strain on defecation
- Hard stool
- Feeling of incomplete evacuation (Tenesmus)

Investigations

- Barium Enema
- Abdominal x-ray in suspected obstructive lesions
- Thyroid function tests when indicated
- Stool analysis
- Investigate other functional lesions

Complications

- Anal Fissure, ulcers and prolapse
- Over flow incontinence (Encopresis)
- Stasis syndrome with bacterial overgrowth

Management

Non-pharmacological management

- Rehydrate to increase fecal bulk and soften stool
- Education of patients/parents on Diet, exercise, etc.....
- Diet change with additional natural fibre from fruit and vegetables.
- Treatment involves 3 steps:
- Initial clearance of stools
- Prevent re-accumulation of hardened retained stool
- Retraining of the gut to achieve regular toilet habits

Pharmacological management:

- Glycerin Suppositories 1 suppository /dose according to occurrence of symptoms OR
- Lactulose syrup <1 yr: 5-10ml/24 hr PO OD; 1-6 Yrs 10-20 ml/24 hrs PO OD; 7-14 yrs 20-50ml/24 hrs PO OD OR
- Bisacodyl (Dulcolax) 0.3mg/kg/day PO OD maximum dose 30mg/24 hrs

Recommendation:

- Refer to tertiary health facility in cases of inadequate response to therapy for further investigations
- If continued constipation therapy should be continued for months to years

-- | Upper git bleeding

Definition

Bleeding arising proximal to the ligament of Treitz in the distal duodenum commonly manifested by haematemesis and/or melena.

Causes

Neonates:

- False bleeding (maternal swallowed blood Vit K1 deficiency (Haemorrhagic disease of the newborn)
- Stress or gastric ulcer
- Coagulopathy (infection, liver failure, coagulation disorder).
- Haemangioma

Infants and toddlers:

- Malory Weiss syndrome
- Non steroid anti-inflammatory drugs
- Oesophagitis
- Caustic ingestions, iron poisoning
- Oesophageal varices bleeding

Old children and adolescent:

- Malory Weiss
- Peptic ulcer/gastritis
- Rendu Osler syndrome
- Gastric polyps
- Oesophageal varices

Clinical manifestations:

- Hematemesis
- Melena
- Other signs according to the causative agent

Assessment:

History: The clinical history should include information concerning:

- The **time course** of the bleeding episode
- Estimated blood loss, and any associated symptoms.
- Gastrointestinal symptoms including dyspepsia, heartburn, abdominal pain, dysphagia, and weight loss. In infants, these features may be reflected in poor feeding and irritability.
- The history should also include information about the following symptoms or signs which may provide clues to an underlying disorder:
 - Recent onset of jaundice, easy bruising or change in stool color, which may suggest underlying liver disease
 - Recent or recurrent epistaxis, to investigate the possibility of a nasopharyngeal source of bleeding
 - History of easy bruising or bleeding, which suggests a disorder of coagulation, platelet dysfunction, or thrombocytopenia
 - Personal or family history or liver, kidney or heart disease, or coagulation disorders
 - A drug history is important to assess potential contributions from medications that may induce ulceration (such as NSAIDs and corticosteroids); Tetracyclines, may cause a pill esophagitis
 - If the patient has been taking drugs or has a cardiac condition that affects homeostatic responses (such as beta-adrenergic antagonists), because these may mask tachycardia associated with life-threatening hypovolemia and shock.

Physical examination: The physical examination should include the following elements:

- The skin for cutaneous signs of generalized vascular malformations/disorders (cutaneous hemangiomas, mucocutaneous telangiectasia)
- Evidence of portal hypertension, (splenomegaly, prominent abdominal and haemorrhoid vessels)
- Inspection of the nasopharynx
- Check for hemodynamic failure (signs of shock?)

Nasogastric tube:

- Sometimes used to confirm the diagnosis and determine if the bleeding is ongoing.
- The lavage will also remove particulate matter, fresh blood, and clots to facilitate endoscopy and decrease the risk of aspiration.
- Ice water lavage (an older practice) does not slow bleeding and may induce iatrogenic hypothermia, particularly in infants and small children, and is **not recommended**

Differentials:

- Swallowed maternal blood during delivery or while nursing
- Ingested epistaxis – nasopharynx bleeding

Investigations:

Depending on suspected cause and magnitude of the blood loss, laboratory assessment should include:

- FBC, cross-match blood in case transfusion is required, LFTs, blood urea nitrogen, serum creatinine, Coagulation tests
- Upper digestive endoscopy (diagnosis and interventional).

Management:

Main objectives:

- Relieve or treat haemorrhagic shock if present
- Stop bleeding
- Treat the causative agent

Emergency treatment

- ABC (include Blood transfusion if necessary)
- Insert a nasogastric tube for aspiration and an IV line (big enough for age).
- If the haemodynamic state is stable (pulse and blood pressure are normal):
 - Hydrate (Ringer lactate), monitor vitals, keep NPO for 12 hours.
 - If there is no active haemorrhage, restart oral feeding after 12 hours
- Assess for possible causative agent and treat accordingly.
- If need of endoscopy, then refer to centre where it's available.

Most common causes according to age and treatment

- Neonates (Stress ulcers secondary to severe illness):
 - Cimetidine IV 5-20mg/kg divided in 2 doses OR Ranitidine IV 2mg/kg/24 divided in 2-3 doses
 - Omeprazole, PO 0.5–1 mg/kg, 12– 24 hourly
- Infants and toddlers (common cause is gastric ulcers and other causes can be evaluated after endoscopy)
 - Octreotide, IV bolus, 1–2 mcg then 1–5 mcg/kg/hour by infusion, initiated by the specialist in case of cases of variceal bleeding (difficult to control, to help control bleeding before endoscopy, or when endoscopy is unsuccessful, contraindicated, or unavailable)
 - Omeprazole, PO
 - 1 month–2 years 2.5mg, 12 hourly
 - 2–6 years 5 mg, 12 hourly initiated by the Specialist for post bleed prophylactic management
- Old children and adolescent (common cause is gastric ulcers and other causes can be evaluated after endoscopy)
 - Omeprazole, PO < 20 kg: 10 mg QD >20 kg : 20 mg QD

Note: Endoscopy is recommended to be performed within 24 to 48 hours for infants and children presenting with upper GIT bleeding that is acute and severe, it can be performed for diagnosis and treatment (sclerotherapy in oesophageal variceal)

Alternative treatment:

- Propranolol oral, 2–8 mg/kg/24 hours in 3 divided doses (to reduce the pulse rate by 25%)
- Surgical oversewing if endoscopy and sclerotherapy or banding have failed

Recommendations:

- Refer all cases to the specialist for appropriate diagnosis and treatment
- Refer all bleeding varices - after commencement of resuscitation and octreotide, if available

-- | Peptic Ulcer Disease

Definition

This refers to ulceration of gastric or duodenal mucosa that tends to be chronic and/or recurrent. Peptic ulcers may be primary (e.g. Helicobacter pylori related) or secondary, (e.g. stress related or associated with NSAID use).

Signs and Symptoms:

- Peptic ulcers may present with dyspeptic or other gastrointestinal symptoms or may be completely asymptomatic, sometimes until complications such as haemorrhage or perforation occur. The symptoms associated with peptic ulcers are not sensitive or specific and the differential diagnosis is broad.
- Most common: Ulcer-like or acid dyspepsia (burning pain; epigastric hunger-like pain; relief with food, antacids, and/or anti-secretory agents)
- Food-provoked dyspepsia or indigestion (postprandial epigastric discomfort and fullness, belching, early satiety, nausea, and occasional vomiting) : food-stimulated acid secretion persists for three to five hours; thus, classic DU symptoms occur two to five hours after meals
- Reflux-like dyspepsia

Cause:

- Helicobacter pylori (*H. pylori*) -In developing nations, the majority of children are infected with *H. pylori* before the age of 10

Diagnosis:**Clinical symptoms:**

- Epigastric pain. Pain is often poorly localised in children, described as dull and aching and frequently does not respond to antacids
- Haematemesis or melena is a relatively common presentation in children (up to 50%).

Investigations

- Stool analysis for occult blood
- FBC
- For Helicobacter Pylori:
 - It is recommended that the initial diagnosis of *H. pylori* infection be based on positive histopathology plus positive rapid urease test, or positive culture.
 - A validated ELISA for detection of *H. pylori* antigen in stool is a reliable non-invasive test to determine whether *H. pylorus* has been eradicated.
 - **Tests based on the detection of antibodies (IgG, IgA) against *H. pylori* in serum, whole blood, urine and saliva are less reliable for use in the clinical setting.**

NB: specialists recommend: In children with refractory iron deficiency anaemia, where other causes have been ruled out, testing for *H. pylori* infection may be considered (Grade of evidence: low)

Complications:

The natural history of peptic ulcer ranges from resolution without intervention to development of complications : acute or Chronic blood loss or perforation

- Iron deficiency anaemia

Management:

- Avoid any foods that cause pain to the patient's (e.g. acid foods, cola drinks)
- Avoid gastric irritating drugs (NSAIDs)
- Give magnesium-based antacids or combined magnesium-aluminium

First line *H pylori* eradication regimens are:

- Triple therapy with a PPI + Amoxicillin + Imidazole;
- or PPI + Amoxicillin + Clarithromycin;
- or Bismuth salts + Amoxicillin + Imidazole;
- or Sequential Therapy Triple therapy for eradication of *H. pylori* by;
 - Omeprazole PO

- 15-30 kg: 10 mg twice daily
- >30 kg: 20 mg twice daily

Or

- cimetidine 20–40mg/kg/day
+
○ Clarithromycin : 500mg BID (15mg/Kg/24 BID)
+
○ Amoxicillin 1g twice daily
Or
○ metronidazole 500 mg (15–20mg/kg/day) BD

Duration: 10 – 14 days,

A reliable non-invasive test for eradication is recommended at least 4 to 8 weeks following completion of therapy

Recommendations:

- Refer to a specialist, if there is severe haemorrhage
- Stabilize the patient before transfer
- Infuse IV fluids/blood to maintain normal volume/pulse
- Ensure continuous assessment of further blood loss (Persistent tachycardia, postural hypotension, continuing haematemesis)
- Definitive treatment/Eradication of H. pylori

-- | Gastroesophageal reflux

Definition

GER is the passage of gastric contents into the esophagus with or without regurgitation and vomiting. GER is a normal physiologic process occurring several times per day in healthy infants, children, and adults. Most episodes of GER in healthy individuals last <3 minutes, occur in the postprandial period, and cause few or no symptoms. In contrast, Gastroesophageal reflux disease GERD is present when the reflux of gastric contents causes troublesome symptoms and/or complications.

Causes and risk factors:

- The cause is still unclear
- Anatomical abnormalities such as a hiatal hernia
- Long term use of nasal gastric tube
- Diet that stimulates gastric acid production
- Neurologic impairment (NI), obesity, certain genetic syndromes, esophageal atresia (EA), chronic lung diseases, and those with a history of premature birth

Diagnosis: Based on Signs and Symptoms:

In infants and toddlers, there is no symptom or symptom complex that is diagnostic of GERD or predicts response to therapy. In older children and adolescents, as in adult patients, history and physical examination may be sufficient to diagnose GERD if the symptoms are typical. The following suggestive:

- **In newborn:**
 - Recurrent vomiting, stridor, apnoea
- **In infant:**
 - Recurrent vomiting
 - Respiratory manifestations, (dry cough, recurrent wheeze or cough, chronic obstructive airway disease, recurrent aspiration pneumonia, stridor, apnoea

- **In children /adolescent:**
 - Heartburn, Epigastric or chest pain.
 - Respiratory manifestations: dry cough, recurrent wheeze or cough, chronic obstructive airway disease,

Complications:

- Dysphagia (difficulty in swallowing)
- Odynophagia (pain on swallowing)
- Weight loss
- Anaemia
- Esophagitis
- Aspiration pneumonia
- Barrett's esophagus
- Abnormal posturing or opisthotonus (Sandifer syndrome)

Investigations: when GER is persisting despite basic management

- 24 hours esophageal PH monitoring
- Endoscopy with biopsy to rule out esophagitis
- Barium X-rays for severity of oesophageal stenosis
- FBC look for anaemia

Management:

Non-pharmacological management

- Postural treatment: prone and lateral positions are associated with an increased incidence of sudden infant death syndrome (SIDS). The risk of SIDS outweighs the benefit of prone or lateral sleep position on GER; therefore, in most infants from birth to 12 months of age, supine positioning during sleep is recommended.
- Dietary measures such as thickened food – if not breastfeeding, frequent small volume of solid foods

Pharmacological management

Less Severe or Non-Erosive;

- Anti-acids
 - Sodium alginate (Gaviscon Enfant)/antacid combination
 - 1-2 months 1.5 mls after each meal
 - 2-4 months 2mls after each meal
- Aluminium and Magnesium hydroxide (Maalox) Syrup 0.5 ml/kg/dose PO QID
- H2 Antagonists: Cimetidine IV/syrup/tab
 - Neonates 5-20mg/kg/24 hr divided in 2 doses
 - Infants 10-20 mg/kg/24hrs divided in 2 doses
 - Children 20-40mg/kg/24hr divided in 2 doses

Severe or Erosive

- Omeprazole, oral;
 - Neonate 0.5–1 mg/kg, 12– 24 hourly
 - Children 1- 16 years :
 - 5 kg to <10 kg: 5 mg once daily
 - 10 kg to ≤20 kg: 10 mg once daily
 - >20 kg: 20 mg once daily

Alternate dosing: 1 mg/kg/dose once or twice daily; Higher doses may be necessary in children between 1-6 years

ADD

- Pro-Kinetics: Domperidone (Motilium) 0.3 – 0.6 mg/kg/24hrs PO Divided in 3 doses (TDS). Maximum 30mg/24hrs
AND
- Metoclopramide IV/IM/PO 0.1-0.2mg/kg/dose TDS. Maximum dose 0.5mg/kg/24hr

Recommendation

- Refer to tertiary level gastro-oesophageal reflux not responding to treatment
- Education Parents/guardians on patient diet
- Eat small, frequent meals

-- | Tropical splenomegaly (hyperreactive malarious splenomegaly)

Definition

It is a massive enlargement of the spleen resulting from abnormal immune response to repeated attacks of malaria

Signs and symptoms:

- Chronic abdominal distension and pain.
- Weight loss
- Intermittent fever

Some patients present with Anaemia, generalized weakness, cough, dyspnea, epistaxis, headache, increased skin and respiratory infection

Diagnosis: is based on clinical signs

- Splenomegaly of at least 10cms
- Regression of the spleen by at least 40% by 6 months on antimalarial therapy.

Investigations:

- Blood smear
- Complete blood count (for Hb, Platelets)
- Serum levels of IgM (at least 2SD above normal limit)

Complications:

- Hypersplenism leading to anaemia, leukopenia and thrombocytopenia, bleeding
- Splenic lymphoma
- Death

Management:**Pharmacological treatment:**

- Doxycycline tabs /day for 6 months
 - Children >8 years (<45 kg): 5 mg/kg/day OD
 - Children >8 years (>45 kg): treat as adults

OR

- Mefloquine 5mg/kg weekly without exceeding 250mg/week of adult dose for 6 months

NB: Generally, splenectomy in the management of HMS is not recommended as mortality is high from sepsis and thrombocytosis **UNLESS** there is a splenic rupture.

— | Herpes gingivostomatitis

Definition

Inflammation of the mouth structures with ulcers (which may be of various numbers and sizes), caused by Herpes simplex virus infection. The normal course of the disease is 7–10 days.

Diagnosis Based on clinical symptoms and signs

- General inflammation of the mouth with multiple small ulcers on the buccal mucosa, palate, anterior tonsillar pillars, tongue, inner lips and gingival margins.
- Fever, malaise and dysphagia.
- Tender, enlarged cervical lymph nodes.

Management

General and supportive measures

- Maintain adequate nutrition and hydration by encouraging fluid and food intake – use foods and fluids that cause less pain ripe bananas, porridge, yoghurt, Milk.
- If oral nutrition cannot be maintained use oral/nasogastric and/or IV fluids, if necessary.

Medical treatment

- Chlorhexidine 0.2%, 10 mL as a mouthwash or gargle, 12 hourly. Do not swallow.
- For pain: Paracetamol, oral, 15 mg/kg/dose 6 hourly.

OR

- Ibuprofen, oral, 5–10 mg/kg/dose 6 hourly after meals.

If more than minor fever blisters:

- Acyclovir, oral
 - If > 1 month to 1 year old: 12.5 mg/kg/dose.
 - If > 1 year to 6 years old: 10 mg/kg/dose.
 - If > 6 years to 12 years old: 6 mg/kg/dose.

If very severe infection, consider:

- Acyclovir, IV, same dosage

For very painful oral herpes in children > 2 years:

- Lidocaine (lignocaine) 2% gel applied every 3 to 4 hours. Apply a thin layer on the affected areas only. Do not exceed 3 mg/kg dose, i.e. maximum 0.15 mL/kg of 2% gel.

Referral

- Herpes gingivostomatitis not responding to therapy.
- Disseminating disease, especially if associated with encephalopathy or increasing liver span.

CARDIOVASCULAR DISEASES

Definition

Cardiovascular diseases (CVD) are the disorders of heart and blood vessels. Most cardiac diseases in young children are congenital, while those in older children may be acquired or congenital.

-- | Heart failure (congestive cardiac failure)

Definition

It is a clinical syndrome reflecting the inability of the myocardium to meet the oxygen and nutritional/ metabolic requirements of the body.

Causes:

In normal heart anatomy;

- Severe anaemia
- Infection/sepsis
- Volume overload
- Arrhythmia
- Cardiomyopathies/Myocarditis
- Hypertension
- Renal failure
- Acquired valvulopathies
- Hypothyroidism
- Kawasaki disease

In Congenital heart disease:

- Left to Right shunt (Ventricular Septal Defect, Patent Ductus Arteriosus...)
- Aortic coarctation
- Aortic valvular stenosis
- Supra valvular aortic stenosis
- Mitral stenosis, mitral regurgitation
- Pulmonary veins stenosis
- Single ventricle

Signs and Symptoms:

- Cough
- Sweating
- Excessive weight gain/oedema
- Poor feeding/ failure to thrive
- Pallor
- Weak pulses
- Cold extremities
- Prolonged capillary refill > 2seconds
- Hypotension
- Tachycardia
- Gallop rhythm with or without heart murmur
- Tachypnea/dyspnoea

- Crepitations (in old children) / wheezing
- Hepatomegaly with or without increased jugular vein pressure
- Oliguria

Diagnosis: Based on the above clinical symptoms and signs

Investigations

- FBC, Electrolytes, Urea and Creatinine, Blood Gas if available.
- Chest X-ray
- ECG
- Echocardiogram

Management: Monitoring of vital signs: RR, HR, BP, O₂ saturation, urine output is critical

Non pharmacological treatment

- Oxygen therapy
- Semi- Sitting position (cardiac bed)
- Restrict fluids to 2/3 of maintenance (aim at urine output of 2ml/kg/h)
- Strict bed rest
- Low sodium diet
- Ensure adequate nutrition
- Recognize and treat the underlying conditions e.g. fluid overload, hypertension, infection

Pharmacological treatment

- Frusemide IV 1-4mg/kg divided in 2 doses (to be increased progressively)
- Digoxin per os 0.01mg/kg/day (no loading dose!!)
- Captopril 1-4mg/kg/day divided in 3 doses if normal creatinine (to be increased progressively, beware hypotension)
- Carvedilol for stable older children > 30 kg: initiate with 3.125mg BID, increase every 15 days if good tolerance. Maximum dose: 12.5mg BID

Recommendation:

- If isolated Right sided heart failure: use furosemide (see dosage above) and aldactone 2mg/kg/day divided in 2 doses.
- Administration of carvedilol and aldactone should be discussed with the cardiologist.
- **Any patient with heart failure due to heart disease must be referred to the cardiologist**

— | Cardiogenic shock

Definition

It is a dramatic syndrome characterized by inadequate circulatory provision of oxygen due to cardiac pump failure secondary to poor myocardial function, so that the metabolic demands of vital organs and tissues are not met. The patient is often a known case of heart disease with signs of heart failure but may be a new case with heart failure.

Signs and symptoms:

- Hypotension
- Tachycardia
- Gallop rhythm
- Hepatomegaly
- Crackles/wheezes
- Weak and fast pulses (or absent)

- Cold extremities/ pallor
- Capillary refill > 2 seconds
- Oliguria/anuria

Management:

Non pharmacological management:

- Avoid excessive IV fluids, the patient is fluid overloaded in this case, give 2/3 of maintenance (aim at urine output of 2ml/kg/h)
- Oxygen therapy: 10-15l/min with mask and reservoir bag
- Semi- Sitting position (cardiac bed)
- Low sodium diet
- Strict bed rest
- Ensure adequate nutrition
- Correct hypoglycemia with 3-5ml/kg IV of Dextrose 10%

Pharmaceutical treatment

- Dopamine IV 5-10 microgram/kg/min, may increase to 20 microgram/kg/min OR
- Dobutamine IV 2 to 20 microgram/kg/min
- If tissue perfusion and blood pressure do not improve satisfactorily on adequate fluid volume replacement and inotropic support, consider: Epinephrine (adrenaline), IV infusion, 0.01–1 mcg/kg/minute.
- Furosemide IV 2mg/kg/dose if adequate peripheral perfusion. Repeat the dose according to estimated fluid overload up to 8mg/kg/day. This is done after discussion with a cardiologist or paediatrician
- Correct arrhythmia if present with digoxin 0.04mg/kg/day in 3 divided doses(maintenance: 0.01mg/kg/day)
- Monitor: Heart rate, Respiratory rate, BP, Urine output, Pulse Oximetry for oxygen saturation

-- | Pulmonary oedema

Definition

Pulmonary oedema is accumulation of fluid in the alveoli due to an increase in pulmonary capillary venous pressure resulting from acute left ventricular failure.

Causes:

- Heart not removing fluid from lung circulation properly (cardiogenic pulmonary oedema)
- A direct injury to the lung parenchyma

Signs and symptoms:

- Breathlessness/ Respiratory distress
- Sweating
- Cyanosis (decreased oxygen saturation)
- Frothy blood-tinged sputum
- Ronchi, and crepitations/wheezes

Diagnosis: Mainly clinical: history, symptoms and signs

Investigations:

- Chest x-ray shows loss of distinct vascular margins, Kerley B lines, diffuse haziness of lung fields, pleural effusion.
- ECG
- Echocardiography
- Blood Gas if possible

Management:

- Maintain patient in a semi sitting position
- Oxygen by facial mask with reservoir bag if available
- IV furosemide 2mg/kg/dose, maximum 8mg/kg/day.
- Inotropic support with dopamine or dobutamine if signs of shock
- Transfer to paediatrician/cardiologist for further management.

— | Congenital heart diseases

Definition

Structural abnormalities of the heart or great vessels present at birth. They fall into 2 major groups: Acyanotic and cyanotic

► Acyanotic Heart Diseases

Common lesions:

- Ventricular Septal Defect (VSD) most common congenital heart disease
- Patent ductus arteriosus (PDA)
- Atrio-ventricular septal defect (AVSD) or endocardial cushion defect (common in trisomy 21)
- Atrial septal defect (rarely causes heart failure)
- Coarctation of aorta

Signs and symptoms:

Each condition has specific clinical, radiological and ECG findings. Large left to right shunts present clinically with:

- Feeding difficulties (breast feeds and stops then starts again}
- Sweating during feeds.
- Failure to thrive
- Recurrent chest symptoms
- Tachypnoea and indrawing.
- Chest deformity: respiratory sulcus, precordial bulge.
- Tachycardia
- Heart murmur
- Gallop rhythm
- Hepatomegaly
- Increased jugular venous pressure.
- Chest X-ray: usually cardiomegaly with plethoric lung fields.

Diagnosis: Based on clinical signs and symptoms

Investigations:

- Chest X-Ray
- ECG
- Echocardiogram
- Cardiac catheterization/angioscan in special cases.

Complications

- Failure to thrive
- Heart failure
- Recurrent chest infections
- Infective endocarditis
- Pulmonary vascular obstructive disease (pulmonary hypertension) which can lead to Eismenger syndrome

Management: Treatment depends on the specific condition. Some congenital heart diseases can be treated with medication alone, while others require one or more surgeries.

- Furosemide, oral, 1mg/kg/dose 8-12 hourly. Supplement with potassium chloride, oral, 25-50 mg/kg/dose 8-12 hourly
- Captopril 1-3mg/kg/day (start with 1mg/kg)
- Pay special attention to nutrition/Increase calories in feeding
- Iron if Hb less than 10g/dl (preferably reach 15g/dl)
- Surgical repair generally before 1 year if possible

► Cyanotic heart diseases

Definition

Cyanotic heart disease is a heart defect, present at birth (congenital), that results in low blood oxygen levels (< 90 % even with oxygen).

Common lesions:

Decreased flow to the lungs (do not cause heart failure):

- Tetralogy of Fallot
- Pulmonary stenosis
- Pulmonary atresia

Increased flow to the lungs (cause heart failure and failure to thrive):

- Transposition of great vessels (TGA)
- Truncus arteriosus
- Single ventricle
- Tricuspid atresia

► Tetralogy of Fallot:

Definition: Tetralogy of Fallot refers to a type of congenital heart defect comprising of:

- Large ventricular septal defect
- Pulmonary stenosis
- Overriding aorta
- Right ventricular hypertrophy

Signs and symptoms:

- Progressive cyanosis with pulmonary systolic murmur
- Digital clubbing occurs after long time
- Hallmark: Paroxysmal hyper cyanotic attacks (blue spells) with the following manifestations:

- Hyperpnea and restlessness
- Increased cyanosis
- Gaspings respiration
- Syncope or convulsions
- Spontaneous squatting position is frequent (in older children)
- Heart murmur disappears

Diagnosis: Clinical plus Echocardiography findings

Investigations:

- Chest x-ray
- Complete blood count (CBC)
- Echocardiogram
- Electrocardiogram (EKG)

Complications

- Delayed development/growth
- Polycythaemia
- Hypercyanotic attack, sometimes associated with seizures and death
- Infective endocarditis
- Brain abscess

Management:

- Avoid dehydration and stress (treat early infections, quite environment)
- Propanolol 0.5-1mg/kg every 6 hours to prevent hypercyanotic attacks
- Iron 5mg/kg /day to prevent microcytosis
- Surgical repair, urgent as soon as spells begin.
- In case of Hypercyanotic attacks:
 - Squatting position (hold the infant with the legs flexed on the abdomen)
 - Oxygen 6l/min with mask
 - Diazepam 0.3mg/kg IV or 0.5mg PR if convulsing,
 - Normal saline 10-20ml/kg bolus over 30 minutes
 - Sodium bicarbonate 8.5% 1ml/kg to correct acidosis
 - Morphine 0.1mg/kg IV if persistent attacks (but risk of respiratory depression),
 - Propranolol IV 0.1 – 0.2 mg/kg slowly then continue oral maintenance to relax the infundibular spasms.

Table 14. Common causes of heart failure in Neonates

Clinical manifestations	Likely lesions
Very poor pulses	<ul style="list-style-type: none"> ● Hypoplastic Left Ventricle Syndrome ● Critical aortic stenosis
Poor femoral pulses	<ul style="list-style-type: none"> ● Coarctation of aorta
Bounding pulses	<ul style="list-style-type: none"> ● Patent ductus arteriosus (PDA) ● Truncus arteriosus ● Severe anaemia

Recommendations:

- All children with cyanotic heart diseases who come with diarrhea and vomiting should be admitted for closer observation. Furosemide is contra-indicated
- All new born babies with suspected cyanotic heart disease should be referred to a cardiologist/ tertiary hospital immediately.

— | Acquired heart diseases

► Acute Rheumatic Fever

Definition

This is an acute, systemic connective tissue disease in children related to an immune reaction to untreated group A Beta haemolytic streptococcus infection of the upper respiratory tract .The initial attack of acute rheumatic fever occurs in most cases between the ages of 3 and 15 years. It is the autoimmune reaction that damages the heart valves leading to Rheumatic heart diseases

Cause: Auto-immune disease

Table 15. Revised Jones Criteria

Major manifestations:	Minor manifestations:	Group A Strep(GAS) Infection:
Carditis	Fever	GAS on throat swab (culture)
Arthritis	Arthralgia	Raised Anti-streptolysin O titre (ASOT)
Sydenham's Chorea	Prolonged P-R interval on ECG	Raised Anti-deoxyribonuclease B (Anti-DNase B)
Erythema marginatum	Raised ESR or CRP	
Subcutaneous nodules		

Criteria for ARF diagnosis according to WHO

- The first episode of ARF can be confirmed if:
 - 2 MAJOR, **or** 1 MAJOR and 2 MINOR manifestations are present **plus** evidence of preceding Group A streptococcal infection.
- Recurrent ARF (with no RHD) can be confirmed if
 - 2 MAJOR, **or** 1 MAJOR and 2 MINOR manifestations are present **plus** evidence of preceding Group A streptococcal infection.
- Recurrent ARF (with existing RHD) can be confirmed if
 - 2 MINOR manifestations are present **plus** evidence of preceding Group A streptococcal infection.

Note:

- Chorea for which other causes have been excluded, provides adequate evidence of rheumatic fever without the other criteria for diagnosis being required.
- In children with rheumatic heart disease with fever, it is critical to differentiate recurrence of acute rheumatic fever from infective endocarditis (IE).
- For children with rheumatic heart disease, recurrence of some of the above criteria would suggest a recurrence of rheumatic fever but other causes such as IE should be excluded.

Diagnosis is made on clinical basis

Investigations

- Throat swab for culture (positive throat culture of group A Streptococcal infection)
- Raised ASOT/ASLO antibodies titre (Anti-streptolysin-O-titre – ASOT of 1:300)
- Anti DNase B
- FBC/ ESR/CRP
- Chest x-ray – Features of cardiomegaly
- ECG
- Echocardiogram

Complications: Rheumatic heart disease

Management:

- The primary goal of treating an ARF attack is to eradicate streptococcal organisms and bacterial antigens from the pharyngeal region
- Persons with symptoms of ARF should be hospitalized to ensure accurate diagnosis, and to receive clinical care and education about preventing further episodes of ARF.
- The diagnosis should include an initial echocardiogram used to help identify and measure heart valvular damage.
- Long-term preventative management should be organized before discharge.
- All cases of ARF should receive:
 - A single injection of Benzathine penicillin G (Extencilline): 25,000–50,000 units/kg/ dose stat; maximum 1.2 mega units dose OR
 - Oral Penicillin (Pen V) 25–50mg/kg/day in divided 3 doses for 10 days (Erythromycin 30-50mg/kg/day divided in 3 doses if penicillin allergy)

Relief of symptoms

Arthritis and fever

- Aspirin 75–100mg/kg/day in 4–6 divided doses. Treatment continued until fever and joint inflammation are controlled and then gradually reduced over a 2-week period
- Add an antacid to reduce risk of gastric irritation e.g Omeprazole 1mg/kg Or
- Prednisolone 1-2mg/kg OD for 2 weeks then taper for 2 weeks with good response begin Aspirin in the 3rd week and continue until 8th week tapering in the final 2 weeks

Chorea

- Most mild-moderate cases do not need medication
- Provide calm and supportive environment (prevent accidental self-harm)

For severe cases:

- Carbamazepine per os:
 - <6 years: 10-20mg/kg/day divided in 3 doses,
 - 7-ears: 400-800mg/day divided in 3 doses,
 - >12 years: 200mg x 2/day
- Valproic acid 20-30mg/kg/day divided in 2 doses
- Duration: 2 weeks

Carditis

- Bed rest if in cardiac failure
- Anti-failure medication as above
- Anti-coagulation medication if atrial fibrillation is present

Management plan when the acute episode is controlled

- Administer the first dose of secondary prophylaxis
- Register the individual with the local health authority or RHD Programme;
- Provide disease education for the person with ARF and the family
 - Understanding of ARF and RHD and risks of ARF recurrence
 - Importance of regular secondary prophylaxis and medical review
 - Recognising own signs and symptoms of ARF and RHD
 - Risks associated with future RHD (e.g. pregnancy, surgery and high level of aftercare)
 - Importance of dental health

- Include an ARF diagnosis alert on computer systems and/or medical files (if applicable);
- Refer to local health facility for ongoing management;
- Arrange dental review (and provide advice about endocarditis prevention);

Long-term Management

- Regular secondary prophylaxis (refer to 5.5 Table 6 Recommended Secondary Prophylaxis Regimen)
- Regular medical review
- Regular dental review
- Echocardiogram (if available) following each episode of ARF, and routine echocardiogram: every 2 years for children (sooner if there is evidence of cardiac symptoms)

Secondary prophylaxis

Aim:

- Prevents the occurrence of GAS infections which can lead to recurrent ARF
- Reduces the severity of RHD
- Helps prevent death from severe RHD.

Indications for Use

Secondary prophylaxis is indicated for people who have

- ARF confirmed by the Jones Criteria
- RHD confirmed on echocardiogram
- ARF or RHD not confirmed, but highly suspected.

Doses:

Benzathine Penicillin G IM every 4 weeks:

- 1,200,000 units for ALL people \geq 30kg
- 600,000 units for children $<$ 30kg

Penicillin V if Benzathine Penicillin G IM injections not tolerated or contraindicated:

Dose: 250mg oral, twice-daily for ALL children.

Erythromycin if proven allergy to Penicillin: 250mg oral, twice-daily for ALL people.

Table 16. Recommended Secondary Prophylaxis Regimens

Disease Classification	Duration of Secondary Prophylaxis
ARF (No proven Carditis)	<ul style="list-style-type: none"> • Minimum of 5 years after last ARF, or • Until age 18 years (whichever is longer)
Mild-moderate RHD (or healed carditis)	<ul style="list-style-type: none"> • Minimum 10 years after last ARF, or • Until age 25 years (whichever is longer)
Severe RHD and following Cardiac Surgery for RHD	<ul style="list-style-type: none"> • Continue medication for life

► Rheumatic heart Diseases

Definition

It is an inflammatory damage of the heart valves, as a complication of acute rheumatic fever. The mitral valve is the most commonly involved valve, although any valve may be affected.

Types of valvular lesions;

- Mitral regurgitation/stenosis
- Aortic regurgitation/stenosis
- Tricuspid regurgitation
- Mixed regurgitation and stenosis
- Multivalvular heart diseases

Signs and symptoms:

- May be asymptomatic when minor lesions
- Heart murmurs over affected valve

Complications:

- Congestive cardiac failure with pulmonary oedema
- Bacterial endocarditis.

Diagnosis: on clinical basis

Investigations:

- Chest x-ray
- ECG
- Echocardiography

Management:

- Treat underlying complication, e.g., heart failure, pulmonary oedema
- Continue prophylaxis against recurrent rheumatic fever
- Ensure oral hygiene
- Endocarditis prophylaxis if dental procedures, urinary tract instrumentation, and GIT manipulations;
 - Above the diaphragm;
 - Amoxicillin 50mg/kg (Max 2gr) 1 hour before the procedure OR
 - Erythromycin 50mg/kg (max 1.5gr) – if allergic to penicillins
 - Below the diaphragm:
 - Ampicillin 50mg/kg IV or IM (max 2gr) with Gentamycin, 2mg/kg (max 120mg) 30minutes before the procedure then,
 - Amoxycillin per os 25mg/kg (max 1gr) 6 hours after the procedure
- Ensure good follow up by cardiologist

► Infective endocarditis

Definition

Infection of the endothelial surface of the heart. Suspect infective endocarditis in all children with persistent fever and underlying heart disease.

Cause/predisposing factors:

- Rheumatic valvular disease
- Congenital heart disease

Signs and symptom:

- Persistent low grade fever without an obvious underlying cause
- Fatigue, joint pain, new murmurs, clubbing, splenomegaly and haematuria

Table 17. Major and minor clinical criteria used in the modified Duke criteria for diagnosis of infective endocarditis (IE)

Major criteria	Minor criteria
<ul style="list-style-type: none"> • Positive blood culture: <ul style="list-style-type: none"> ○ typical micro-organisms from two separate blood cultures: <i>S. viridans</i>, including nutritional variant strains, <i>S. bovis</i>, *HACEK group, <i>S. aureus</i>, or ○ Enterococci, in the absence of a primary focus, or ○ persistently positive blood culture with a micro-organism consistent with IE ○ from blood cultures drawn > 12 hours apart, or ○ all 3 or a majority of 4 or more separate blood cultures, with the first and last drawn at least one hour apart, or ○ positive serology for Q fever, ○ Single positive blood culture for <i>Coxiella burnetti</i> or anti-phase 1 IgG antibody titre > 1:800. • Evidence of endocardial involvement: <ul style="list-style-type: none"> ○ positive echocardiogram for IE (transoesophageal echocardiography is recommended for patients with prosthetic valves): oscillating intracardiac mass, on valve or supporting structures, or in the path of regurgitant jets, or on implanted materials, in the absence of an alternative anatomic explanation, or ○ abscess, or ○ new partial dehiscence of prosthetic valve, or ○ New valvular regurgitation. 	<ul style="list-style-type: none"> • Predisposing heart condition or • IV drug use • Fever $\geq 38^{\circ}\text{C}$. • Vascular phenomena: <ul style="list-style-type: none"> ○ major arterial emboli, ○ septic pulmonary infarcts, ○ mycotic aneurysm, ○ intracranial haemorrhage, ○ conjunctival haemorrhages, ○ Janeway lesions. • Immunologic phenomena: <ul style="list-style-type: none"> ○ Osler's nodes, ○ Roth spots, ○ glomerulonephritis, ○ Rheumatoid factor. • Microbiologic evidence: <ul style="list-style-type: none"> ○ positive blood culture but not meeting major criterion, or ○ Serologic evidence of active infection with organism consistent with IE.

Table 18. Interpretation of IE

Definite IE	Possible IE	Rejected
<p>Pathological criteria</p> <ul style="list-style-type: none"> • Micro-organisms <ul style="list-style-type: none"> ○ by culture or histology in a vegetation, or in a vegetation that has embolised, or ○ in an intracardiac abscess, or lesions • Vegetation or intracardiac abscess present – confirmed by histology showing active IE. <p>Clinical criteria – see Table above</p> <ul style="list-style-type: none"> • 2 major criteria, • 1 major and 3 minor, or • 5 minor. 	<ul style="list-style-type: none"> • At least one major and one minor criterion, or • 3 minor 	<ul style="list-style-type: none"> • Alternative diagnosis for manifestation of endocarditis, or • resolution of manifestations, with antibiotic therapy ≤ 4 days, or • No pathologic evidence of IE at surgery or autopsy, after antibiotic therapy for ≤ 4 days.

Limitations of the Duke Criteria in children

The clinical criteria rely heavily on relatively rare clinical features.

In contrast, common clinical features like splenomegaly, clubbing and haematuria have not been included.

Investigations:

- Blood cultures (at least 3 cultures) before antibiotics
- FBC /CRP/ESR
- Urine test strips – haematuria
- Echocardiography

Management:

Non-pharmacological management

- Bed rest/limit physical activity
- Ensure adequate nutrition
- Maintain haemoglobin > 10 g/dL
- Measures to reduce fever

Pharmacological management

- Paracetamol, oral, 20 mg/kg at once, then 10–15 mg/kg/dose, 6 hourly as required
- Antibiotics regimen: IV antibiotics are always given, based on culture and sensitivity results
 - Native valve endocarditis (NVE) due to Streptococci:
 - Benzylpenicillin (Penicillin G), IV, 300 000 units/kg/day divided in 4 doses for 4 weeks OR
 - Ceftriaxone 100mg/kg/day as single dose (maximum 2g) for 4 weeks PLUS
 - Gentamicin, IV, 3mg/kg/day divided in 3 doses (maximum 240mg/day) for 2wks
 - Patients allergic to penicillin and cephalosporins: Vancomycin 40mg/kg/day divided in 3 doses (max 2g/day) for 4 weeks.
 - NVE due to staphylococci
 - Cloxacillin 200mg/kg/day divided in 4 doses 6 for 4 weeks PLUS
 - Gentamicin 3mg/kg/day divided in 3 doses (maximum 240mg/day) for first 5 days .OR
 - Cloxacillin-resistant strains or allergy to penicillin: Vancomycin 40mg/kg/day divided in 3 doses (max 2g/day) for 6 weeks.

Note: All highly suspected cases of infective endocarditis must be referred to the cardiologist where bloodcultures and proper management will be done.

— | Cardiomyopathies**Definition**

Cardiomyopathies are diseases characterized by structural and functional abnormalities of the myocardium.

Classification: Classification based on the predominant structural and functional abnormalities:

- Dilated cardiomyopathy: primarily systolic dysfunction,
- Hypertrophic cardiomyopathy: primarily diastolic dysfunction,
- Restrictive cardiomyopathy: primarily diastolic but often combined with systolic dysfunction

► Dilated cardiomyopathy

Dilated cardiomyopathy refers to a group of conditions of diverse etiology in which both ventricles are dilated with reduced contractility

Causes:

- Infections (e.g. Viral++, Rickettsia, Chagas disease...)
- Neuromuscular disorders (e.g. Duchenne dystrophy, Becker dystrophy, ...)
- Endocrine, metabolic and nutritional (e.g. hyperthyroidism, beriberi, kwashiorkor...)
- Diseases of coronary arteries (e.g. Kawasaki, Aberrant Left Coronary Artery)
- Autoimmune diseases (e.g. Rheumatic carditis, juvenile rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis, systemic lupus erythematosus...)
- Drugs toxicity (e.g. doxorubicin, cyclophosphamide, IPECA...)
- Hematologic diseases (e.g. anaemia, Sickle cell anaemia, hypereosinophilic syndrome: Löffler syndrome)

Signs and symptoms: see signs of congestive heart failure

Diagnosis:

- ECG: prominent P wave, LV or RV hypertrophy, nonspecific T-wave abnormalities.
- Chest X-ray: cardiomegaly, pulmonary oedema
- Echocardiogram: confirm diagnosis and shows LA and LV dilation, poor contractility
- FBC, Urea and creatinine, Electrolytes (Na, K),
- Myocardial biopsy, PCR, genetic... according to the etiology

Management:

- Treatment: Refer to principles and medications of congestive heart failure

► Hypertrophic cardiomyopathy

Definition

Hypertrophic cardiomyopathy is a genetic disorder that is characterized by left ventricular hypertrophy unexplained by secondary causes and a non-dilated left ventricle with preserved or increased ejection fraction

Causes:

- Left ventricle obstruction (Coarctation of aorta, hypertension, aortic stenosis)
- Secondary (infants of diabetic mothers, corticosteroids in premature infants)
- Metabolic (Glycogen storage disease type II (Pompe disease))
- Familiar hypertrophic cardiomyopathy
- Syndromes (Beckwith - Wiedemann syndrome, Friedreich, ataxia...)

Signs and Symptoms:

- Weakness
- Fatigue
- Dyspnea on effort
- Palpitations
- Angina pectoris
- Dizziness and syncope
- Increased risk of sudden death

Diagnosis:

- ECG: LV hypertrophy
- Chest X-ray: Mild cardiomegaly
- Echocardiogram: LV hypertrophy, ventricular outflow tract gradient
- Doppler flow studies may demonstrate diastolic dysfunction before the development of hypertrophy.

Management:

- Prohibit competitive sports and strenuous physical activities
- Propranolol 0.5 -1mg/kg/day devised in 3 doses or atenolol
- Implantable cardioverter-defibrillator if documented arrhythmias or a history of unexplained syncope
- Open heart surgery for septal myotomy: rarely indicated

► Restrictive cardiomyopathy**Definition**

Restrictive cardiomyopathy (RCM) is a myocardial disease, characterized by impaired filling of the ventricles in the presence of normal wall thickness and systolic function.

Cause/Etiologies:

- Idiopathic, Systemic disease (scleroderma, amyloidosis, or sarcoidosis)
- Mucopolysaccharidosis
- Hypereosinophilic syndrome; malignancies
- Radiation therapy
- Isolated noncompaction of the left ventricular myocardium

Signs and symptoms:

- Dyspnea
- Edema and ascites
- Hepatomegaly with increased venous pressure
- Pulmonary congestion

Diagnosis: clinical basis**Investigations**

- ECG: Prominent P waves, ST segment depression, T-wave inversion
- Chest X-ray: mild to moderate cardiomegaly
- Echocardiogram: markedly enlarged atria and small to normal-sized ventricles with often preserved systolic function but highly abnormal diastolic function

Complications

- Arrhythmias
- Mitral regurgitation
- Progressive heart failure
- Tricuspid regurgitation

Management:

- Lasix 2mg/kg divided in 2 doses
- Aldactone 1-2mg/kg devised in 2 doses

- Antiarrhythmic agents / biventricular pacing are used as required
- Aspirin or warfarin in case of noncompaction LV with an increased risk of mural thrombosis and stroke
- Cardiac transplantation where possible and indicated

► Pericarditis/Pericardial Effusion:

Definition

Accumulation of fluid in the pericardial space, usually secondary to pericarditis..

Causes:

- Infection such as viral, bacterial (tuberculosis...)
- Inflammatory disorders, such as lupus
- Cancer that has spread (metastasized) to the pericardium
- Kidney failure with excessive blood levels of nitrogen
- Heart surgery (postpericardectomy syndrome).

Signs and symptoms:

- Pericardial tamponade:
- Chest pressure or pain and signs of congestive heart failure with sometimes shock.

Note: Many patients with pericardial effusion have no symptoms. The condition is often discovered on a chest x-ray or echocardiogram that was performed for another reason.

Diagnosis:

- Most patients present with a prolonged history of:
 - Low cardiac output,
 - Distended neck veins,
 - Muffled or diminished heart sounds.
- Patients with HIV may be asymptomatic and incidentally diagnosed on chest Xray.
- Often associated with TB.
- Acute septic pericarditis may occur in patients with septicaemia

Investigations

- ECG
 - Small complexes tachycardia
 - Diffuse T wave changes
- Chest X-ray: “water bottle” heart, or triangular heart with smoothed out borders
- Echocardiogram
- Tuberculin skin test
- Diagnostic pericardiocentesis
 - in all patients with suspected bacterial or neoplastic pericarditis and patients whom diagnosis is not readily obtained
- Cell count and differential, culture, gram stain, PCR

Management

Non-pharmacological treatment

- Semi-sitting position if tamponade suspected
- Pericardiocentesis
 - preferably under ultrasound guidance
 - Performed by an experienced person
 - indicated in children with symptomatic pericardial effusion

Pharmacological treatment:

- If hypotensive, rapidly administer intravenous fluids 20ml/kg of Normal saline over 30min to 1 hour,
- If suspected TB pericarditis: standard anti TB treatment + steroids
- In case of purulent pericarditis: cloxacillin, IV 50 mg/kg/dose 6 hourly for 3 – 4 weeks + ceftriaxone, IV, 100 mg/kg as a single daily dose, to adapt according to culture results.
- Treat heart Failure (See Section on heart failure)

Recommendation: All patients with pericardial effusion should be referred to a cardiologist

— | Hypertension in children

Definition

Hypertension is defined as systolic and/or diastolic blood pressure \geq the 95th percentile for gender, age and height percentile on at least three consecutive occasions.

A sustained blood pressure of $> 115/80$ is abnormal in children between 6 weeks and 6 years of age.

Hypertensive emergency/crisis exists when CNS signs of hypertension appear such as encephalopathy, convulsions, retinal haemorrhages or blindness. Great care is required to reduce the blood pressure in a controlled manner to avoid potentially serious consequences of impaired auto-regulation of cerebral blood flow.

Hypertensive urgency is defined as a significant elevation of blood pressure without accompanying end organ damage. Patients are generally symptomatic with complaints of headache, blurred vision and nausea, despite the lack of end organ involvement

Accurate measurement of BP:

- Use the widest cuff that can be applied to the upper arm
- The cuff bladder must encircle at least 80% of the upper arm and should cover at least 75% of the distance between the elbow and the shoulder joints
- It is better to use a cuff that is slightly too large than one that is too small

Causes:

- Severe hypertension suggests renal disease
- Coarctation of aorta
- Rarely pheochromocytoma
- Long term steroid therapy

Most common causes of secondary hypertension by age:**New born:**

- Renal abnormalities
- Coarctation of the aorta
- Renal artery stenosis
- Renal artery or veinal thrombosis

First year:

- Coarctation of the aorta
- Renal vascular disease
- Tumor
- Medications (steroids...)

1-6 years:

- Renal vascular diseases
- Renal parenchymal diseases (glomerulonephritis, hemolytic-uremic syndrome...)
- Coarctation of the aorta
- Medications
- Essential hypertension

6-15 years:

- Renal vascular diseases
- Renal parenchymal diseases (glomerulonephritis, hemolytic-uremic syndrome...)
- Essential hypertension
- Coarctation of the aorta
- Endocrine causes
- Nutritional causes (obesity)

Signs and symptoms:

- Headache
- Convulsions, coma and visual symptoms
- Oedema, haematuria, proteinuria
- Acute heart failure and pulmonary oedema
- Some children may be asymptomatic

Table 19. Blood pressure in children correlates with body size and age.

Age of child	95th Percentile of Systolic and Diastolic Blood Pressure	
	First 12 hours	First week
newborn prem	65/45 mmHg	80/50 mmHg
newborn fullterm	80/50 mmHg	100/70 mmHg
	Systolic mmHg	Diastolic mmHg
6 weeks–6 years	115	80
8 years	120	82
9 years	125	84
10 years	130	86
12 years	135	88
14 years	140	90

Table 20. 95th Percentile of systolic and diastolic BP correlated with Height

Height cm	Systolic mmHg	Diastolic mmHg
100	114	70
110	116	72
120	118	74
130	120	74
140	125	75
150	130	75
160	135 (131)	77
170	140 (133)	80
180	145 (135)	83

Diagnosis: Mainly Clinical

Symptoms and signs of any of the following systems:

- Central nervous
- Cardiovascular
- Respiratory
- Urogenital

Investigations:

- Urea, creatinine, electrolytes (Na^+ , K^+),
- Fundoscopy
- ECG
- Echocardiogram
- Abdominal ultrasound (focused on kidneys).
- Others according to the suspected etiology

Management of acute hypertension (hypertension of sudden onset)**Non-pharmacological treatment**

- Admit patient to paediatric high dependence care unit
- Monitor BP every 10 minutes until stable – thereafter every 30 minutes for 24 hours
- Insert two peripheral intravenous drips
- Rest on cardiac bed
- Control fluid intake and output (restriction)
- Restrict dietary sodium

Pharmacological treatment: Do not combine drugs of the same class

- Frusemide, IV, 1–2 mg/kg as a bolus slowly over 5 minutes increase up to 8 mg/kg/day. If oliguric; Max 5mg/kg/day
- Nifedipine 0.25-0.5mg/kg (max: 10mg) sublingual OR
- Amlodipine, oral, 0.2 mg/kg/dose. May be repeated 6 hours later, thereafter every 12 hours.
- Refer the patient to a specialist when the patient is stable

Recommendations:

- For acute or chronic hypertension blood pressure needs to be lowered cautiously
- Aim to reduce the SBP slowly over the next 24 - 48 hours
- Do not decrease BP to < 95th percentile in first 24 hours
- Advise a change in lifestyle
- Institute and monitor a weight reduction programme for obese individuals
- Regular aerobic exercise is recommended in essential hypertension
- Dietary advice
- Limit salt and saturated fat intake
- Increase dietary fiber intake

Management of Chronic Hypertension**Non-pharmacological management:**

- Introduce physical activity, diet management and weight reduction, if obese.
- Advise against smoking in teenager
- Follow up to monitor blood pressure and educate patient on hypertension
- If blood pressure decreases, continue with non-drug management and follow up
- If BP is increasing progressively, reinvestigate to exclude secondary causes or refer to the specialist

- If BP is stable but persistently $> 95^{\text{th}}$ percentile and secondary causes have been excluded, start drug treatment after failed non-drug management for 6 months
- Consider earlier initiation of drug treatment if positive family history for cardiovascular disease, essential hypertension or diabetes mellitus

Pharmacological management:

Table 21. Recommended medications and doses for patients with chronic Hypertension.

Drug	Dosage	Side effect/comment
First line: Hydrochlorothiazide	1-2mg/kg/day once daily (maximum 25mg/day).	Hypokalemia
Second line: Nifedipine OR Amlodipine	0.3-1mg/kg/day divided in 3 doses 0.1mg/kg/day (maximum dose 10mg/day) once daily	Not well studied in children less than 6 years of age
Third line: Captopril OR Lisinopril	0.5 – 4mg/kg/day divided in 2 doses 0.07- 0.6mg/kg daily	<ul style="list-style-type: none"> • Hyperkalaemia • Check renal function and Serum-K periodically, • Not used in bilateral renal artery stenosis, contraindicated in renal failure • Can cause cough
Forth line: Atenolol	0.5-1mg/kg/day once daily (max up to 2mg/kg/day, do not exceed /100mg/day).	<ul style="list-style-type: none"> • Bradycardia
Furosemide (Lasix) if associated oedema or stage 4 chronic kidney disease. Note: Do not associate Furosemide with Hydrochlorothiazide	1-4mg/kg/day in 2 to 4 divided doses	<ul style="list-style-type: none"> • Hyponatremia • Hypokalemia

Table 22. Recommended Hypertension medications for patients with Renal Failure

For CKD 1-3 (GFR ≥ 30, creatinine $< 2 \times$ normal value for age)	
First- line drug	Lisinopril
Second -line drug	Hydrochlorothiazide
Third- line drug	Amlodipine
Forth- line drug	Atenolol (use half of normal recommended dose)
For CKD 4 or 5 (GFR < 30, creatinine $\geq 2 \times$ normal value for age)	
First-line drug	Furosemide
Second-line drug	Amlodipine
Third-line drug	Atenolol (use half of normal recommended dose).

Recommendations:

- All patients with hypertension and persistent proteinuria should be treated with an ACE inhibitor
- Always exclude bilateral renal artery stenosis before treating with an ACE inhibitor
- Renal function must be monitored when an ACE inhibitor is prescribed because it may cause a decline in GFR resulting in deterioration of renal function and hyperkalaemia
- Patients with hypertension due to a neuro-secretory tumour (phaeochromocytoma or neuroblastoma), should receive an α -blocker either as single drug or in combination with β -adrenergic blocker
- For patients with persistent hypertension despite the use of first line drugs, a second/third drug should be added
- Specific classes of antihypertensive drugs should be used according to the underlying pathogenesis or illness
- For patients with predominantly fluid overload: use diuretics with/without β -blocker

— | Cardiac arrhythmias in children**Definition**

Heart rate that is abnormally slow or fast for age or irregular.

There are three types of arrhythmias in children;

- Heart block
- Ventricular arrhythmias
- Paroxysmal atrial tachycardia

Type of Arrhythmia	cause	Signs and symptom
Heart block: A delay or complete block of the electrical impulse as it travels from the sinus node to the ventricles	<ul style="list-style-type: none"> • Idiopathic and familial • Electrolyte disturbances (hyperkalaemia), • Digoxin toxicity • Congenital heart disease, particularly transposition of the great arteries, and especially after surgery • Myocarditis • Post infective, for example in endocardial fibroelastosis or rheumatic fever 	<ul style="list-style-type: none"> • Chest pressure or pain • Fainting, also known as syncopy, or near-syncope • Fatigue • Light headedness or dizziness • Palpitations, which can be skipping, fluttering or pounding in the chest • Shortness of breath
Ventricular arrhythmias: A rapid heart rate, usually with a regular rhythm, originating from above the ventricles	<ul style="list-style-type: none"> • Heart attack • Cardiomyopathy • Heart failure • Heart surgery • Myocarditis • Valvular heart disease 	<ul style="list-style-type: none"> • May be asymptomatic • Chest discomfort (angina) • Fainting (syncope) • Light-headedness or dizziness • Sensation of feeling the heart beat (palpitations) • Shortness of breath • Absent pulse • Loss of consciousness • Normal or low blood pressure • Rapid pulse
Paroxysmal atrial tachycardia: A rapid heart rate, usually with a regular rhythm, originating from above the ventricles.		<ul style="list-style-type: none"> • Palpitation • lightheadedness • Weakness • Shortness of breath • Chest pressure

Table 23. Normal heart rate/minute for age:

Age	Heart rate
Newborn	100–160
< 1 year	110–160
1–2 years	100–150
2–5 years	95–140
5–12 years	80–120
> 12 years	60–100

Table 24. Diagnosis is based on these clinical signs and symptoms

Infants:	
Color changes (pale, mottled)	Irregular pulse
Irritability	Tachycardia
Feeding difficulties	Bradycardia
Sweating	Signs of cardiac failure
Tachypnoea/apnoeic spells	
Children:	
Dizziness	Tachycardia
Palpitations	Bradycardia
Fatigue	Syncope
Chest Pain	Signs Of Cardiac Failure

Note: All patients with arrhythmias should be referred to a cardiologist

Investigations

- ECG is essential for diagnosis, preferably a 12 lead ECG
- Echocardiogram
- Other according to the suspected etiology

Tachyarrhythmias:

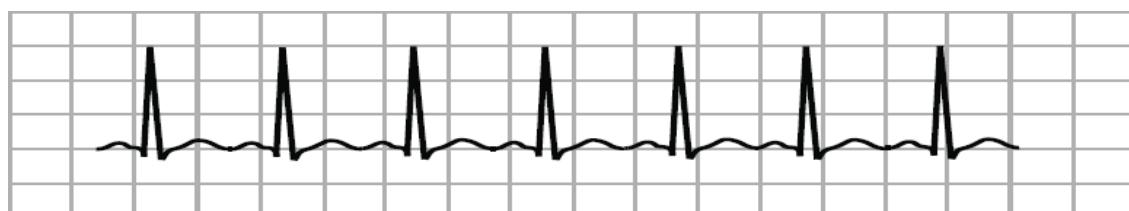


Figure 1. Sinus tachycardia

ECG Criteria

Rate: > upper limit for age

Rhythm: regular

P wave: present and normal

QRS: normal

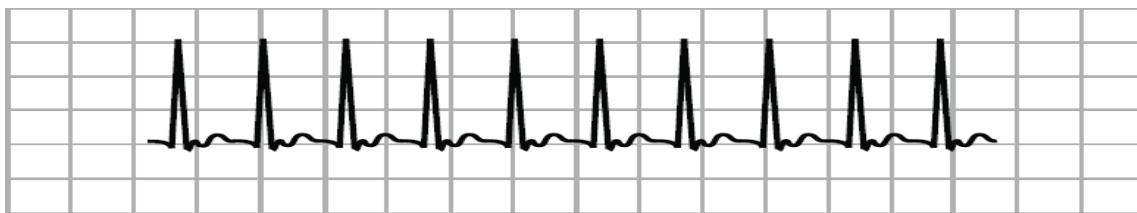


Figure 2. Supraventricular Tachycardia

ECG Criteria

Rate: usually > 200 beats per minute

Rhythm: regular

P wave: abnormal

QRS: narrowed

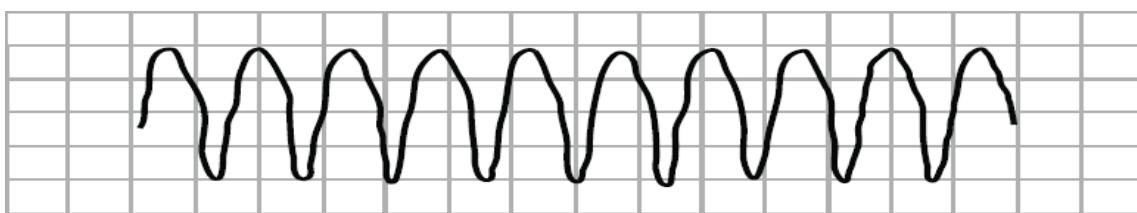


Figure 3. Ventricular Tachycardia

ECG Criteria

Rate: generally 100–220 beats per minute

Rhythm: generally regular

P wave: mostly not seen

QRS: abnormal, large with QRS > 120 millisecond

Management

Non-pharmacological treatment

- Sinus tachycardia usually requires management of the underlying condition
- ABC of resuscitation
- Admit to high care or intensive care unit
- Monitor ECG, Oxygen saturation, Blood pressure, Haemoglobin, Heart rate, Acid–base status and blood gases, Respiratory rate, Maintain adequate nutrition and hydration, Treat pyrexia

Pharmacological management:

Emergency treatment

Narrow Complex Tachycardia (supraventricular tachycardia):

Stable patient: Attempt vagal stimulation

- Place icebag on face, or
- Infants: immerse face in ice-cold water for a few seconds
- Older children: try a Valsalva manoeuvre, e.g. asks the patient to blow through a straw.
- Place NGT if other means are not available
- Note: Eye-ball pressure and carotid massage is contraindicated in children.
- In consultation with a paediatrician or Cardiologist: Adenosine, IV, 0.1 mg/kg initially, increasing in increments of 0.05 mg/kg to 0.25 mg/kg. Follow with a rapid flush of at least 5 ml Normal saline.

Unstable patient: Heart failure / shocked

- DC synchronised cardioversion in increments of 0.5–1–2 J/kg
- Empty the stomach before cardioversion is attempted
- Amiodarone, IV, 5 mg/kg slowly over 20 minutes (NEVER as a rapid infusion)

-- | Bradyarrhythmias

Causes:

- Hypoxia
- Hypothermia
- Head injuries and increased intracranial pressure
- Toxins and drug overdose
- Post operative
- Congenital excessive vagal stimulation
- Electrolyte disturbances (Hypo- or hyperkalaemia, Hypocalcaemia)



Figure 4. Sinus Bradycardia

ECG Criteria

Rate: < lower limit for age

Rhythm: regular

P wave: present, all look the same

QRS: normal, 80–120 millisecond



Figure 5. Heart Block (Complete)

ECG Criteria

Rate: low, usually < 60 beats per minute

QRS's: with no relationship between the two (AV dissociation)

P wave: independent P waves

Management

- If syncope and Heart rate - below 50/min:
- Start i.v. Isuprel (Isoprenaline) 0.05 – 0.4 microgram/kg/min.

OR

- Dobutamine (Dobutrex) 2 - 20 microgram/kg/min
- Insert pacemaker if ineffective

References

1. Larry M. Baddour et al. Infective Endocarditis. Diagnosis, Antimicrobial Therapy, and Management of Complications. A Statement for Healthcare Professionals From the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, and the Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia, American Heart Association. *Circulation*. 2005;111:e394-e434
2. Guidelines on Prevention, Diagnosis and Treatment of Infective Endocarditis Executive Summary. The Task Force on Infective Endocarditis of the European Society of Cardiology. *European Heart Journal* (2004) 25, 267–276.
3. Gene Buhkman. The PIH guide to Chronic Care Integration for Endemic Communicable Diseases. Rwanda Edition, 2011

4. <http://www.uptodate.com>
5. GREGORY B. LUMA et al. Hypertension in Children and Adolescents. *American Family Physician*. May 1, 2006 .Volume 73, Number 9
6. Brian W. McCrindle. Assessment and Management of Hypertension in Children and Adolescent. *Nature Reviews cardiology* 2010.

● GENITOURINARY SYSTEMS

— | Urinary tract infection (UTI)

Definition

UTI is significant bacteriuria of a clinically relevant uropathogen in a symptomatic patient.

It is classified as:

- Uncomplicated UTI (Cystitis), which is the inflammation and infection of the bladder to the bladder and urethra OR
- Complicated urinary tract infection (Pyelonephritis), an infection of the urinary tract involving the renal parenchyma

► Acute cystitis

- Affects mainly girls from 2 years of age and there are no associated urological anomalies
- Escherichia coli is the causative pathogen in at least 70% of cases. Other pathogens include Proteus mirabilis, Enterococcus sp, and Klebsiella sp

Clinical features

Signs and symptoms are related to the age of the child and often non-specific.

- Burning sensation/pain on urination, urinary urgency and frequency; in children: crying when passing urine; involuntary loss of urine, cloudy urine and lower abdominal discomfort. PLUS
- No fever (or mild fever), no flank pain; no systemic signs and symptoms in children.

It is essential to rule out pyelonephritis

The symptom ‘burning pain on urination’ alone is insufficient to make the diagnosis.

Laboratory

Urine dipstick test:

- Perform dipstick analysis for nitrites (which indicate the presence of enterobacteria) and leukocytes (which indicate an inflammation) in the urine.
- If dipstick analysis is negative for both nitrites and leukocytes, a urinary infection is unlikely.
- If dipstick analysis is positive for nitrites and/or leukocytes, a urinary infection is likely.
- Microscopy/culture: when a dipstick analysis is positive, it is recommended to carry out urine microscopy/culture in order to confirm the infection and identify the causative pathogen, particularly in children and pregnant women.
- When urine microscopy is not feasible, an empirical antibioticotherapy should be administered to patients with typical signs of cystitis and positive dipstick urinalysis (leucocytes and/or nitrites).

Treatment

Cystitis in girls 2 years and above:

- Cefixime PO: 8 mg/kg once daily for 3 days Or
- Amoxicillin/clavulanic acid PO 25 mg/kg 2 times daily for 3 days

► Acute pyelonephritis

- Pyelonephritis is more common in females.
- May be associated with underlying congenital anomalies of the kidneys and urinary tract.
- It may result in significant short-term morbidity, including septicaemic shock and acute renal failure, especially in infants.
- Permanent renal damage may occur in children who have recurring episodes of pyelonephritis.
- The pathogens causing pyelonephritis are the same as those causing cystitis above
- Pyelonephritis is potentially severe, especially in neonates and infants.
- Management depends on the presence of signs of severity or complications or risk of complications.

Clinical features

Neonates and infant

- Symptoms are not specific: fever, lethargy, irritability, poor oral intake, vomiting, loose stools and jaundice. Palpation of the lower abdomen may show abdominal tenderness.
- The absence of fever does not rule out the diagnosis. On the other hand, fever with no obvious cause— may be the only manifestation.
- Neonates may present with fever or hypothermia, altered general condition, altered conscious state, pale/grey colour, shock etc.
- In practice, a urinary tract infection should be suspected in children with unexplained fever or septic syndrome with no obvious focus of infection.

Older children

- Signs of cystitis (burning pain on urination and urinary urgency and frequency, etc.
- Fever > 38 °C
- Flank pain or abdominal tenderness
- Nausea and/or vomiting are common.

Laboratory: As for cystitis above Plus

- Full Blood count, where possible Urine culture, blood urea and creatinine levels
- Renal and bladder ultrasound where possible in:
 - Children < 2 years of age with a first febrile UTI
 - Children of any age with recurrent febrile UTIs
 - Children of any age with a UTI who have a family history of renal or urologic disease, poor growth, or hypertension
 - Children who do not respond as expected to appropriate antimicrobial therapy

Treatment

Criteria for hospital admission:

- Patients at risk of complications: Neonates, infants and children with immunodeficiency
- Patients with complicated pyelonephritis: urinary tract obstruction, renal abscess,
- Patients with signs of severe infection: sepsis and septic shock, dehydration or vomiting

Neonates

Ampicillin slow IV (3 minutes) for 7 to 10 days

- Neonates 0 to 7 days (< 2 kg): 50 mg/kg every 12 hours
- Neonates 0 to 7 days (≥ 2 kg): 50 mg/kg every 8 hours
- Neonates 8 days to < 1 month: 50 mg/kg every 8 hours

PLUS Gentamicin slow IV for 5 days

TREATMENT GUIDELINES

- Neonates 0 to 7 days (< 2 kg): 3 mg/kg once daily
- Neonates 0 to 7 days (≥ 2 kg): 5 mg/kg once daily
- Neonates 8 days to < 1 month: 5 mg/kg once daily

Or

Cefotaxime slow IV for 7 to 10 days

- Neonates 0 to 7 days (< 2 kg): 50 mg/kg every 12 hours
- Neonates 0 to 7 days (≥ 2 kg): 50 mg/kg every 8 hours
- Neonates 8 days to < 1 month: 50 mg/kg every 8 hours

Children one month and over

- Ceftriaxone IM or slow ivi 50 mg/kg once daily until the child's condition improves then change to oral route to complete 10 days of treatment with:
- Amoxicillin/clavulanic acid PO
 - Children < 40 kg: 25 mg/kg 2 times daily
 - Children ≥ 40 kg: 2 tablets of 500/62.5 mg 2 times daily

Uncomplicated pyelonephritis

- Ceftriaxone IM: 1 g single dose or Gentamicin IM: 5 mg/kg single dose

PLUS Ciprofloxacin PO: 500 mg 2 times daily for 7 days

Or

- Cefixime PO: 200 mg 2 times daily or 400 mg once daily for 10 to 14 days

Pyelonephritis with criteria for hospital admission

- Ampicillin slow IV 50mg/kg (Max 2g) every 6 hours for at least 3 days PLUS
- Gentamicin IM: 5 mg/kg once daily for 3 days then change to Amoxicillin/clavulanic acid PO (or another antibiotic depending on the antibiotic susceptibility test) to complete 10 to 14 days of treatment

Or

- Ceftriaxone IV 1 g once daily for at least 3 days PLUS Gentamicin IM: 5 mg/kg once daily for 3 days in the event of sepsis then change to amoxicillin/clavulanic acid PO (or another antibiotic depending on the antibiotic susceptibility test) to complete 10 to 14 days of treatment

— | Acute kidney injury (acute renal failure)

Definition

Acute kidney injury (AKI) is a syndrome characterised by a rapid decline in glomerular filtration rate and retention of fluid and nitrogenous waste products.

AKI is classified as prerenal, renal and postrenal failure. In neonates exclude congenital abnormality of the urinary tract

Clinical presentation

- Oliguria is the most common manifestation, i.e.:
 - Neonates: output < 1 mL/kg/hour.
 - Older children: output ≤ 0.3 mL/kg/hour.
- Prerenal: shock and dehydration.
- Postrenal: exclude obstruction, e.g. palpable bladder.
- Intrinsic kidney disease: oedema, volume overload, hypertension.
- Signs of underlying infection/septicaemia, e.g. fever, skin rash, etc.

Investigations

- Full blood count
- Serum urea, creatinine, electrolytes, calcium and phosphate (Look for typical biochemistry complications: hyperkalaemic metabolic acidosis, hyponatraemia, hypocalcaemia, hyperphosphataemia)
- Urine macroscopic appearance: brownish with acute tubular necrosis.
- Urine microscopy: red blood cell casts, leukocyte, hyaline and granular casts.
- Urine culture to exclude pyelonephritis.
- Ultrasound of kidneys and bladder.

Management

Non pharmacological

- Treat the underlying cause.
- Monitor fluid intake and output, blood pressure.
- Weigh daily.
- Nutritional support: High-energy diet. Give supplementary nasogastric feeds, if required.
- Restrict salt, potassium and phosphate intake.
- Avoid nephrotoxic or renally excreted medicines, e.g. NSAIDs, aminoglycosides, vancomycin, cough and cold mixtures, radiocontrast drugs.
- Fluid management:
 - Depends on volume status, urine output and extra-renal losses.
 - Never use a potassium-containing solution in an anuric patient.
 - Only use parenteral fluids if oral intake is not possible
 - Fluid balance is critical. Assess at least every 12 hours to make appropriate changes to fluid prescription.
 - Fluid management is done according to fluid status
- Insensible water loss is calculated as:
 - Neonates and young babies: 30 - 40 mL/kg/day
 - Older children: 25 mL/kg/day (400 mL/m²/day)
- Pulmonary oedema plus oliguria/anuria: Do not give fluid.
- Hydrated anuric patient without extra-renal fluid losses: Oral fluid to replace insensible water losses only.
- Normally hydrated plus oliguria: Oral fluid intake to replace insensible water loss plus urine output of previous 24 hours.
- Dehydrated, oliguric and ongoing extra-renal fluid losses:
- Replace fluid losses with an appropriate solution which mirrors losses e.g.:
 - For diarrhoea: ½ Darrow's/dextrose 5%, IV or oral rehydration solution;
 - For vomiting/gastric fluid losses: sodium chloride 0.9%/dextrose 5%.
- Normally hydrated plus normal urine output: Give normal fluid intake.
- Polyuria, (urine output > 4 mL/kg/hour): which usually occurs during the recovery (diuretic) phase of acute tubular necrosis: Replace fluid and electrolyte losses with ½ Darrow's/dextrose 5%, IV. Volume to replace is equal to urine output of preceding 12 hours.

Management of Hyperkalaemia

- Monitor ECG for signs of hyperkalaemia.
- Discontinue all sources of intake of potassium.
- Treat when serum potassium \geq 6.5 mmol/L.
- Monitor response to treatment and adjust accordingly.
 - Calcium gluconate 10 %, IV, 0.5mL/kg/dose slowly over 3–5 minutes.
 - Salbutamol, solution, 2.5–5 mg/dose, nebulise over 20 minutes. OR
- Sodium bicarbonate 4.2%, IV, 4 mL/kg administered over 4 hours.
 - Do not mix calcium and sodium bicarbonate-containing solutions.

- Check Potassium level, if still no improvement
- Dextrose 10%, IV, 5 mL/kg over 20 minutes with/without insulin, soluble, 0.1 units/kg depending on the blood glucose level.
 - If insulin is used -monitor for hypoglycaemia hourly.
- Sodium polystyrene sulphonate (Kayexelate), oral/rectal, 1 g/kg in dextrose water.
- If hyperkalaemia persists despite above treatment refer the patient urgently for dialysis.

Other complications

Metabolic acidosis: serum pH ≤ 7.1

- Sodium bicarbonate 4.2 %, IV, 4 mL/kg administered over 2–4 hours.

Infection

- Avoid nephrotoxic antibiotics.

Pulmonary oedema, volume overload and hypertension

- Do not give fluid to anuric patients with pulmonary oedema.
- Intubate and initiate positive pressure ventilation as necessary.
- Furosemide, IV, 2–5 mg/kg administered over 5 minutes. Maximum daily dose: 8 mg/kg/24 hours.
- Morphine, IV, 0.1 mg/kg. Repeat after 4 hours, if required.
- Oxygen, 100%, 2–3 L/minute by nasal cannula.

Note: Pulmonary oedema is an indication for dialysis in non-responsive cases.

Referral

- All children with AKI should be referred to a tertiary hospital

● DERMATOLOGY

-- | Eczema

Definition

Eczema, also known as dermatitis, is a syndrome characterized by superficial inflammation of the epidermis and itching.

It is an inflammatory itchy skin condition characterised by:

- Vesicles, weeping and crusting during the acute stage.
- Scaling and lichenification during the chronic stage.

Types:

Atopic Dermatitis: Chronic disease that affects the skin and often occurs together with asthma, dermatitis, rhinitis and Conjunctivitis.

- Contact Dermatitis: Acute or chronic inflammation caused by allergens or irritants
- Napkin (Or Diaper area) dermatitis

Diagnostic criteria: Based on clinical history and signs

- Family history of allergies.
- Reaction after exposure to allergens.
- Typical distribution: face, flexures of knees and elbows, and creases of neck

Signs and Symptoms:

- Pruritus (constant symptom)
- And any of the following:
 - Blisters
 - Exudates and Erosions
 - Crusting/Excoriations
 - Xerosis
 - Erythroderma

Complications

- Secondary infection (bacterial, viral, fungal, etc)
- Post inflammatory Hypo or Hyper pigmentation
- Lichenification

Investigations

- Full blood count (Increase of Eosinophils is common)
- Identification of allergens (Prick Skin Test or Patch test not practical in our setting)

Management

General and supportive measures

- Avoidance measures: use neutral soaps and rinse clothes properly after wash.
- Keep fingernails short to prevent scratching.
- Wrap with dressings soaked in sodium chloride 0.9%.
- Avoid sunlight and recommend use of sunscreen

For atopic dermatitis:**Non-pharmacological management**

- Patient education
- Recommend Emollient to restore cutaneous barrier
- Aqueous cream: Apply > 2 times/day
- Emulsifying Ointment: apply > 2 times/day

Pharmacological management**• Local Treatment:**

- Antiseptic – Exudative lesions, Potassium permanganate diluted at 1/10,000 (500mg Tablet in 5 liters)
- Antibiotics – Impetiginized lesions, Fucidine 2% 1 application/day/5 days.
- Topical steroids: According to topography and thickness of the lesion
- No long-term topical steroid treatment (local side effects and gradual loss of efficiency). Prefer short courses

First choice:

- Betamethasone dipropionate (Diprosone, Diprolene) Cream/Ointment 2 applications/day for 3-4 days, then 1 application/day for 3 days then 1 application every 2 days/week for 2 weeks

Alternatives: According to the severity of the lesions and location:

- Betamethasone valerate (Betneval) Cream/Ointment 2 applications/day for 3-4 days, then 1 application/day for 3 days then 1 application every 2 days/week for 2 weeks **OR**
- Methylprednisolone (Advantan) Cream/Ointment 1 application/day/3-4days then every 2 days/week for 1 week **OR**
- Hydrocortisone Cream/Ointment 2 applications/day for 3-4 days, then 1 application/day for 3 days then 1 application every 2 days/week for 2 weeks

Side effects of topical steroids;

- Skin atrophy
- Skin Bleaching
- Systemic treatment:
 - Antihistamine for relief of the itching
 - Desloratadine
 - Children 6 months - 6 years: 1.25 mg once a day
 - Children 6-12 years: 2.5 mg once a day
 - Above 12 years: 5 mg once a day
 - OR**
 - Cetirizine/ Ebastine oral, as a single dose..
 - Combined Phototherapy UVAB in erythrodermic atopic dermatitis

Recommendation

- Short duration of topical steroids whenever possible (Stop topical steroids as soon as skin lesions disappear)
- Encourage use of emollient
- Avoid medicated soap
- Other eczema, consider topical steroids as indicated in atopic dermatitis above

-- | Bacterial infections (Impetigo)

Definition

A contagious intra-epidermal infection caused by streptococcus or staphylococcus and presenting as bullous lesions which rupture and crust. It comprises two types:

Non Bullous Impetigo:

- More common form and is a superficial infection of the skin that appears first as a discrete papulovesicular lesion surrounded by a localized area of redness.
- The vesicle become rapidly purulent and covered with crust.
- The lesions may occur anywhere but is more common on the face and extremities.
- There is usually no fever nor systemic signs.
- Also occurs in traumatized skin that forms vesicles or pustules initially and rapidly develops crust.

Bullous Impetigo:

- Less common and occur most often in neonates and young infants on a previously healthy skin.
- It is characterized by transparent bullae usually < 3cm diameter. The distribution involves the face buttocks trunk and perineum. *Staphylococcus aureus* usually responsible.

Signs and symptoms:

Non Bullous Impetigo

- Honey coloured crusters
- Lymphadenopathy
- Bullous Impetigo
- Flaccid and purulent bullous

Complications:

- Ulcerations
- Septicaemia
- Staphylococcal scaled skin syndrome (SSSS)

Investigations:

- Diagnosis is Clinical based on history and physical examination
- Swab for bacterial culture and sensitivity test

Management:

General measures

- Good personal and household hygiene to avoid spread of the infection and to reduce carriage of organisms.
- Trim finger nails.
- Wash and soak sores in soapy water to soften and remove crusts.
- Continue with general measures until the sores are completely healed.

Local Treatment:

- Antibiotics: Fucidic acid ointment (Fucidine 2%) 2 applications/day for 7 days
- Disinfectant with antiseptic solution;
- Potassium Permanganate diluted at 1/10,000 (500mg in 5 litres) OR
- Chlorhexidine solution (dermobacter) 2 applications/ Day for 7-10 da

Systemic treatment: Diffuse lesions

- Cefadroxil, oral, 15 mg/kg/dose 12 hourly for 5 days.
- Cloxacillin : <40 kg: 12.5-25 mg/kg/day PO divided q6hr (Severe infection: 50-100 mg/kg/day PO divided q6hr)
 - : ≥40 kg: 125-500 mg PO q6hr

Penicillin allergy:

Children ≤ 18 kg

Erythromycin, oral, 10–15 mg/kg/dose 6 hourly for 5 days.

Children > 18–35 kg (able to take tablets)

- Azithromycin, oral, 250 mg daily for 3 days.

Children > 35 kg and adults

- Azithromycin, oral, 500 mg daily for 3 days. If impetigo has improved, but has not completely cured, give a 2nd 5-day course of antibiotics.

Referral

- No improvement after second course of antibiotics.
- Presence of blood in urine test or clinical features of glomerulonephritis.

Recommendation:

- Follow-up is important to ensure complete clearing of lesions

— | Cellulitis

Definition

A diffuse, spreading, acute infection within skin and soft tissues, commonly caused by streptococci and staphylococci.

- It is characterised by: oedema, redness, increased local temperature and no suppuration
- Frequently associated with lymphangitis and regional lymph node involvement.
- Commonly occurs on the lower legs, but may occur elsewhere.
- May follow minor trauma.
- There may be significant systemic manifestations of infection:
- Fever, tachycardia, hypotension, chills and delirium/ altered mental state

Management**General measures**

- Elevate the affected limb to reduce swelling and discomfort.

Medication

- Children ≤ 7 years of age
 - Cefadroxil, oral, 15mg/kg/dose 12 hourly for 5 days. OR
- Cloxacillin <40 kg: 12.5-25 mg/kg/day PO divided q6hr Severe infection: 50-100 mg/kg/day PO divided q6hr: ≥40 kg: 125-500 mg PO q6hr

Penicillin allergy:

Children ≤ 18 kg

- Erythromycin, oral, 10–15 mg/kg/dose 6 hourly for 5 days.

Children > 18–35 kg (able to take tablets)

- Azithromycin, oral, 250 mg daily for 3 days.

Children > 35 kg and adults

Azithromycin, oral, 500 mg daily for 3 days.

Severe cases: Refer for parenteral antibiotics.

Referral**Urgent**

- Children who have significant pain, swelling or loss of function (to exclude osteomyelitis).
- Necrosis.
- Extensive cellulitis.
- Recurrent cellulitis associated with underlying conditions, e.g. lymphoedema.
- Cellulitis with systemic manifestations, e.g. confusion, hypotension.
- Poorly controlled diabetic patients.
- Involvement of the hand, face and scalp.

Non-urgent

- Inadequate response to initial antibiotic treatment

-- | Staphylococcal scalded skin syndrome**Definition**

Blistering skin condition that presents like scalded skin.

General and supportive measures

- Appropriate wound care.

Medication

- Cloxacillin, IV, 50 mg/kg/dose 6 hourly for 5 days.
- Neonates
 - Week 1–2 of age: administer 12 hourly.
 - Week 2–4 of age: administer 8 hourly.

-- | Steven-johnson syndrome (sjs)/toxic epidermal necrosis (ten)**Definition**

Life-threatening, acute hypersensitivity reaction with systemic upset, epidermal necrosis, and mucous membrane involvement.

TEN and SJS are different ends of the same spectrum: in TEN epidermal necrosis involves >30% of body surface area, while in SJS the involvement is <10%.

This condition is usually due to medication, e.g. sulphonamides, Nonnucleoside reverse transcriptase inhibitors (especially Nevirapine), Mebendazole, antiepileptics (phenytoin, Phenobarbitone, carbamazepine, lamotrigine), Allopurinol, laxatives (phenolphthalein).

Complications include:

- Dehydration, electrolyte disturbances and shock,
- Hypoalbuminaemia,
- Hypo and more commonly hyperthermia,
- High output cardiac failure,(resting cardiac output greater than 8 L/min)
- Secondary infection and sepsis; and
- Adhesions and scarring.

Diagnostic criteria

- Cutaneous lesions may start as a dusky red macular rash, progressing to confluence with epidermal necrosis and large flaccid blisters which rupture, leaving large areas of denuded skin. Mucous membrane erosions are common and multi- organ involvement may be present

General and supportive measure

- May require care in high or intensive care unit.
- Examine daily for systemic involvement, infection and ocular lesions.
- If infection is suspected, send blood and skin lesion specimens for culture and sensitivity before initiating antibiotic therapy.
- Do not puncture bullae or vesicles.
- Cool compresses and wet dressings.
- Regular supervised oral, genital and eye care to prevent adhesions and scarring.
- Encourage oral fluids, to prevent adhesions.
- Maintain fluid balance. Beware of shock.
- Nasogastric feeds if unable to eat, IV alimentation if enteral feeds are not possible.
- Stop all potentially causative medicines.

Medications

- These patients require effective pain control especially during change of dressing
- Skin hygiene, daily cleansing and bland, non-adherent dressings as needed.
- Do not use silver sulfadiazine if Stevens - Johnson syndrome is thought to be due to Cotrimoxazole or other sulphonamide.
- Empiric antibiotic therapy

For secondary infections

- Cefadroxil , oral: 15mg/kg/dose 12 hourly Or
- Cloxacillin oral: 25-50 mg/kg/day divided 6 hourly
- Use IV antibiotics if the oral route cannot be used.
 - Cloxacillin, IV, 50 mg/kg/dose 6 hourly. OR
 - Cefazolin IV 100-150 mg/kg/day divided 8 hourly
- Reconsider choice of antibiotic when the results of cultures become available or the child does not improve.

For oral lesions:

- Chlorhexidine 0.2%, 15 mL as a mouthwash.
 - Use as needed.
 - Do not swallow.

Note: The use of systemic corticosteroids is not recommended.

Referral

- All cases with signs of respiratory distress
- Discuss with a specialist, if considering re-initiation of medicine treatment

— | Acne

Definition

Acne is a skin disease characterized by pimples on the face, chest, and back. It occurs when the pores of the skin become clogged with oil, dead skin cells and bacteria, caused by changes in skin structures consisting of a hair follicle and its associated sebaceous gland. It can present in inflammatory or non-inflammatory forms.

Acne is most common during adolescence but may continue into adulthood. For most people, acne improves over time and tends to disappear in the early twenties. The most common sites for acne vulgaris are the forehead, cheeks, nose, and chin; the chest and back may sometimes be involved.

Causes and aggravating factors

- Sebum overproduction during puberty
- Altered hormonal status in adolescence with increased androgens in males
- Increased androgenic properties of progesterone in premenstrual females or those taking progesterone-containing contraceptives
- Some medicines (e.g., steroids) and cosmetics
- Family history
- Infection by *Propionibacterium*, mainly *P. acnes*

Signs and symptoms

Acne can be categorised as mild, moderate, and severe.

Mild

- Open and closed comedones (i.e. whiteheads and blackheads)
- Some papules and pustules (pimples), commonly on face, chest, back and shoulders

Moderate

- More frequent papules and pustules
- Mild scarring

Severe

- All of the above plus nodular abscesses
- Leads to more extensive scarring that may be keloidal in some cases

Management objectives

- Alleviate symptoms by reducing the number and severity of lesion
- Limit duration and recurrence
- Decrease sebaceous gland activity
- Decrease bacterial infection and inflammation
- Minimise cosmetic disfigurement and psychological suffering

Nonpharmacological management

Advise patients to:

- Avoid squeezing pimples because doing so may increase the risk of scarring
- Avoid excessive use of cosmetics and use only water-based products
- Wash face with mild soap and water 3 times/day; minimise scrubbing
- Get some sun (sunshine is helpful), but avoid sunburn
- Shave as lightly and as infrequently as possible.

Pharmacological management**For mild acne:**

- Start with topical benzoyl peroxide cream or lotion 5%, once daily (use overnight).
- Treatment should be assessed after 4 weeks and, if beneficial, should be continued for at least 4–6 months.
- If no satisfactory response with benzoyl peroxide, use topical antibiotics or a combined preparation:
 - Erythromycin lotion or solution 1.5% or 2% applied twice daily to the affected area OR
 - Benzoyl peroxide 5%/erythromycin 3% gel applied twice daily to the affected area.

For moderate acne:

- Use topical treatment as for mild acne.
- If poor response to topical treatment, give oral antibiotics for at least 3 months:
 - Erythromycin 250 mg twice a day for 4 weeks OR
 - Doxycycline 100 mg once daily; can be taken with food or milk

Severe acne

- Use the topical treatment as for mild acne.
- Give also
 - Tetracycline 250–1,000 mg/day
 - Erythromycin 250–1,000 mg/day
- Duration of treatment depends on response. It may require 6 months to a year.
- Topical retinoid, e.g. Tretinoin cream/gel 0.05%, topical, applied sparingly once daily at bedtime until substantial improvement. Avoid contact with eyes and mucous membranes.

Referral

- All mild and moderate acne with poor response after 3 months of treatment
- All severe cases of acne
- Psychologically disturbed or depressed patient.
- Young females with premenstrual flare or with clinical signs of hyperandrogenism for consideration of oral contraceptives.

— | Fungal infections

► Dermatophytes

Definition

Fungal infection often seen as Tinea or Ringworm with clinical entities/forms depending on the anatomic site and etiologic agents involved. It is of two types;

- Tinea Capitis: Fungal Infections of the Scalp or head and often found in children.
- Tinea Corporis: Fungal infection of the glabrous skin (Hairless part of the body)

Signs and symptoms:

Type	Clinical forms (Causative Agent)	Signs and symptoms
Tinea Capitis	Microsporic Tinea (<i>Microsporum spp</i>)	<ul style="list-style-type: none"> • Large patches/ plaques • Hair Fracture at few millimetres above surface of scalp (No alopecia)
	Trichophytic Tinea (<i>Trichophyton Spp</i>)	<ul style="list-style-type: none"> • Multiple small patches • Hair Fracture at the scalp giving black dots aspect
	Inflammatory Tinea/ kerion (<i>Microsporum spp and Trichophyton Spp</i>)	<ul style="list-style-type: none"> • Severe Inflammatory reaction with deep abscess causing hair loss with permanent alopecia after healing.
		<ul style="list-style-type: none"> • Yellow cup shaped crusts known as scotula • Hair is eliminated leading to permanent alopecia.
	Favus (<i>Trichophyton schoenleinii</i>)	Raised borders with Central normal skin, ring itself is red with dryness and scaling (Circinate lesions)
Tinea Corporis	All spp	<ul style="list-style-type: none"> • Itching • Skin rash • Small area of red, raised spots and pimples • Rash which slowly becomes ring-shaped, with a red-colored, raised border and a clearer center • The border of rash may look scaly • Rash may occur on the arms, legs, face, or other exposed body areas

Diagnosis:

- Clinical based on history and physical examination

Investigations:

- Looking at a skin scraping of the rash under the microscope using a potassium hydroxide (KOH) test
- Skin biopsy for histological exams

Management:

Types	Therapeutic options
Tinea capitis	<p>Topical treatment (always combined to systemic treatment).</p> <ul style="list-style-type: none"> • Ketoconazole (Nizoral) shampooing, 3times/week apply to moist hair after shower, and then wash off after 15 minutes OR • Whitefield ointment , apply BID <p>Systemic treatment: First choice:</p> <ul style="list-style-type: none"> • Griseofulvin (tabs 125mg,250mg, 500mg): 20 mg/kg/ day , 6 to 8 weeks taken once daily with fatty meal <p>Alternatives:</p> <ul style="list-style-type: none"> • Fluconazole (Flucazol syrup 50mg/ml) 6 mg/kg/day, 6 to 8weeks once a day. • If inflammatory Tinea: add systemic antibiotics to antifungal above mentioned
Tinea Corporis	<p>Local treatment:</p> <ul style="list-style-type: none"> • Miconazole nitrate 2% cream, 2 applications/day for 15 days OR • Clotrimazole cream, 2 applications/ day for 10 days. OR • Ketoconazole cream, 2 applications/ day for 10 days. <p>Systemic treatment(≥ 3 lesions):</p> <p><i>First choice:</i></p> <ul style="list-style-type: none"> • Griseofulvin 20 mg/kg/ day, 3-4 weeks taken with fatty meals. <p><i>Alternative:</i></p> <ul style="list-style-type: none"> • Fluconazole (Flucazol suspension, 50mg/ml) 6 mg/kg/day, 6 to 8weeks once a day.

Recommendation:

- Avoid sharing combs and towels to prevent Tinea capitis

— | Viral infections**► Varicella Zoster Virus (Chicken pox, VZV)****Definition**

An acute, highly contagious, viral disease caused by herpes varicella-zoster.

It spreads by infective droplets or fluid from vesicles. One attack confers permanent immunity. Varicella is contagious from about 2 days before the onset of the rash until all lesions crusted. Re-activation of the virus may appear later as herpes zoster or shingles (in children, consider immunosuppression if this occurs). Incubation period is 2–3 weeks.

Complications are more common in immunocompromised patients and include:

- Secondary skin infection,
- Pneumonia,
- Necrotizing fasciitis,
- Encephalitis,
- Haemorrhagic varicella lesions with evidence of disseminated, intravascular coagulation.
- Two important bacteria causing complications are *Staphylococcus aureus* and *Streptococcus pyogenes*

Diagnostic criteria

Clinical

- Mild headache, fever and malaise.
- Characteristic rash.
- The lesions progress from macules to vesicles in 24–48 hours.
- Successive crops appear every few days.
- The vesicles, each on an erythematous base, are superficial, tense ‘teardrops’ filled with clear fluid that dries to form fine crusts.
- The rash is more profuse on the trunk and sparse at the periphery of extremities.
- At the height of eruption, all stages (macules, papules, vesicles and crusts) are present at the same time.
- The rash lasts 8–10 days and heals without scarring, unless secondarily infected.
- Mucous membranes may be involved.
- Pruritus may be severe.
- Patients are contagious from 1–2 days before onset of the rash until crusting of lesions

Management

- Isolate the patient.
- Maintain adequate hydration.

Medications

- Antiviral therapy
- Indicated for immunocompetent patients with complicated varicella and for all immunocompromised patients.
- Initiate as early as possible, preferably within 24 hours of the appearance of the rash.
- Neonates, immunocompromised patients and all cases with severe chickenpox (not encephalitis)
- Acyclovir, oral, 20 mg/kg/dose 6 hourly for 7 days. Maximum dose: 800 mg/dose.
- In severe cases or in cases where oral medicine cannot be given: Acyclovir, IV, 8 hourly administered over 1 hour for 7 days
 - If 0 – 12 years: 20 mg/kg/dose 8 hourly.
 - If > 12 years: 10 mg/kg/dose 8 hourly

For mild pruritus:

- Calamine lotion, topical, applied 8 hourly.

For severe pruritus:

- Less than 2 years: Chlorphenamine, oral, 0.1 mg/kg 6–8 hourly for 24–48 hours.
- Over 2 years: Cetirizine, oral, 2.5-5 mg 12-24 hourly.

Secondary skin infection

- Cefadroxil, oral, 15 mg/kg/dose, 12 hourly for 5 days.

- Prophylaxis: Post exposure prophylaxis must be given to:
 - Neonates whose mothers develop varicella from 5 days before delivery to 2 days after delivery:
 - Varicella-zoster immunoglobulin, IM, 1 mL (100 units) given within 96 hours of exposure.
 - If varicella-zoster immunoglobulin is not available: Acyclovir, oral, 20 mg/kg/dose 6 hourly for 10 days.
 - Note: In neonates, prophylaxis may not prevent disease.

Infants and children > 28 days

- Immunocompromised children exposed to varicella:
 - Acyclovir, oral, 20 mg/kg/dose 8 hourly for 10 days given in the second week after exposure.
- Hospitalised immunocompetent children exposed to varicella (to limit spread).
 - Acyclovir, oral, 20 mg/kg/dose 8 hourly for 10 days given in the second week after exposure.

Referral: All patients with complications.

— | Parasitic infections

► Scabies

Definition

Scabies is a contagious skin condition caused by a tiny mite (*Sarcoptes scabiei*). It burrows into the outer layer of the skin and deposits its eggs there. It spreads easily through person-to-person contact. It is particularly problematic in areas of poor sanitation and overcrowding.

Signs and symptoms

- Nocturnal intense pruritus
- Lesion distribution:
 - Interdigital web spaces.
 - Around the nipples.
 - Genital region.
- Lesion characteristics:
 - Papules, pustules or excoriations.
 - The pathognomonic sign: intradermal tunnel called scabetic “burrow”

Diagnosis

- Based on clinical history and physical examination.
 - The history particularly itching of recent onset, and careful scrutiny of hands and wrists will usually establish the diagnosis.

Investigation:

- Microscopic identification of skin scrapings

Complications:

- Secondary skin infection
- Sepsis

Management objectives

- Prevent re-infection or further spread of the disease
- Relieve the itching

Non pharmacological management

- All close family and skin-to-skin contacts must be treated at the same time to prevent re-infection, even if symptoms are not evident.
- The patient should be advised to wash, boil, dry in the sun, and iron all clothing, bedding, and bed linens after each use.
- The mattress, pillows, and chair cushions must be placed in the sun for at least 3 consecutive days.
- Advise the patient to keep his or her nails short and clean.
- Instruct the patient to dry his or her skin thoroughly after bathing and to put on clean clothes.
- The whole house should be cleaned and disinfected with a disinfectant spray.

Pharmacological management

- Use benzyl benzoate lotion 25%.
 - Adults and children >6 years: full strength 25% solution
 - Children <6 years: 12% solution (dilute 25% solution 1 part solution: 1 part water)
 - Infants: 1:3 dilution
 - Apply benzyl benzoate lotion to the entire body, excluding the face and nipple area of breastfeeding women, for 3 consecutive evenings.
 - Leave on overnight and wash off the next day.
 - Attention should be paid to the toes, fingers, genital area and areas where the rash is seen.
 - A scrub bath must be taken before and after the 3 days of application.
 - Repeat the treatment after 10 days.
- Itching may persist for some weeks after completing the treatment. This can be relieved by taking Chlorpheniramine
 - Give Chlorpheniramine (4 mg tablets; 2 mg/5 ml syrup) PO every 4–6 hours daily.
 - Adults: One 4 mg tablet 4–6 times/day, not to exceed 24 mg/day
 - Children
 - 2–5 years: 1 mg (. teaspoon) syrup 4–6 times/day, not to exceed 6 mg/day
 - 6–12 years: 2 mg (. tablet or 5 mL—1 teaspoon—syrup) 4–6 times/day, not to exceed 12 mg/day
- Note: Itching usually starts to abate after 1 week and the rash after 3 weeks.

Referral

- If there are signs of treatment resistance, refer the patient to the specialist.

● INFECTIOUS DISEASES

— | Malaria

Definition

Malaria is a febrile haematozoid parasitic illness due to *Plasmodium* parasites. It may be simple or severe form. In Rwanda, the main species is Falciparum (98% and the cause of severe malaria cases. In Rwanda, there 3 forms of malaria:

Simple Malaria

- Axillary temperature 37.5°C or history of fever in the last 24 hours with or without the following signs: headache, weakness, chills, loss of appetite, stiffness, and muscular pains
- Laboratory confirmation using either a blood smear or a rapid test is compulsory in all cases without exception.

Simple malaria with minor digestive symptoms

- Characterized by signs of simple malaria with vomiting that prevents oral medication with or without associated moderate diarrhoea.
- The confirmation of *Plasmodium* by either blood smear or rapid test is compulsory without any exception.

Severe malaria

- **All severe malaria cases must be admitted to hospital.**
- It is characterized by positive parasitaemia due to *Plasmodium falciparum*, accompanied by one or more of the following signs of severity or danger in the absence of an identified alternative cause:
 - Inability to drink or suckle;
 - Prostration; Generalized weakness with inability to sit, stand or walk without support
 - Vomiting every feed
 - Convulsions (≥ 2 convulsions in 24 hours);
 - Lethargy and unconsciousness.
 - Respiratory distress syndrome/Pulmonary oedema
 - Metabolic acidosis
 - Hypoglycaemia $<2.2\text{Mmol/L}$ or $< 40\text{mg/dl}$
 - Renal impairment
 - Significant bleeding from any site
 - Signs of shock
 - Hyperparasitaemia of Falciparum $> 10\%$
- Severe malaria is a medical emergency. Delay in diagnosis and inappropriate treatment, leads to rapid worsening of the situation.
- The keys to effective management are early **recognition, assessment and appropriate antimalarial and supportive therapy**.

Management of different forms of malaria

Management of simple malaria; First line treatment:

- Artemisinin combination therapy (ACT): Artemether 20 mg and Lumefantrine 120 mg (COARTEM®), taken preferably during meals twice a day for 3 days

Table 25.Schematic diagram of COARTEM dosing according to the body weight of the patient

Category of body weight of the patient in kg	Type of blister administered	Number of tablets of COARTEM per dose					
		Day 1		Day 2		Day 3	
		First dose	8 hours after first dose	24 hours after first dose	36 hours after first dose	48 hours after first dose	60 hours after first dose
5 kg ≤ weight < 14 kg	6*1 (5-15 kg)	1	1	1	1	1	1
15 kg ≤ weight < 24 kg	6*2 (15-25kg)	2	2	2	2	2	2
25 kg ≤ weight < 34 kg	6*3 (25-35 kg)	3	3	3	3	3	3
≥ 35 kg	6*4 (> 35 kg)	4	4	4	4	4	4

Important instructions to follow:

- Respect the dose prescribed by the health provider;
- Artemether-lumefantrine is contraindicated in:
 - Children weighing less than 5 kg
 - During first trimester pregnancy
 - In cases of allergy to one of the two drugs in the combination
 - In severe liver or renal disease
- In such cases, oral quinine sulphate is indicated, 10 mg per kg body 3 times for 7 days;
- If there is no improvement after 48 hours of treatment Artemether-Lumefantrine, verify if the patient swallowed the drugs correctly, re-examine the patient carefully and do another peripheral blood smear, and if the test is positive, change the treatment to oral quinine sulphate at 10 mg per kg body weight per dose, taken three times a day over seven consecutive days.
- If the peripheral blood smear is negative, exclude and treat other causes of illness and/or refer the patient to the specialist
- If there is no improvement after 48 hours of treatment with quinine probably due to associated pathologies other than malaria, refer the patient to the specialist

Recommendation:

Monotherapy using artemisinine derivatives is not allowed for the management of simple malaria in Rwanda.

Management of simple malaria with minor digestive symptom:

Artesunate IV: 2.4 mg/kg body weight as a single dose on admission (time= 0) then at 12 hour, then daily thereafter.

- If the patient's condition improves, change to oral Artemether-lumefantrine twice a day for three consecutive days.
- If the patient's condition does not improve within 24 hours of treatment, refer the patient to the specialist

Note: Preparation: Artesunate will be diluted in 1 ml 5% sodium bicarbonate (provided in the package), and then further diluted with 5% dextrose or 0.9% normal saline to a total volume of 6 ml, giving a final concentration of 10 mg/ml.

In case of contra indications of Arthemether derivatives give;

- Quinine dihydrochloride (Salt) intra-rectal: 15mg/kg body weight diluted in 4 ml of distilled water or physiological saline and administered rectally with a 5 ml syringe every eight hours. The drug is administered slowly through the anus, and the buttocks are held together

for 5 minutes to prevent a premature reflex ejection of the drug.

- If the patient's condition improves, change to oral COARTEMR, 2 times a day for 3 consecutive days, or in the case of contraindications to COARTEMR, administer oral quinine
- If no improvement after 24 hours of treatment, refer to the hospital

Recommendation:

- If the drug is ejected during the first 10 minutes following its administration, administer another half dose;
- Diarrhoea and anal lesions contraindicates utilisation of intra-rectal route, then give Quinine dihydrochloride (salt) intravenous: 10 mg /kg body weight per dose, diluted in 5 to 10 ml of 5% or 10% glucose, every 8 hours.
- Rapid administration of Quinine is unsafe.
- If the patient's condition does not improve within 24 hours of treatment, refer the patient to hospital
- Quinine IM is contraindicated

Supportive treatment:

In case of diarrhoea and/or vomiting;

- Evaluate and monitor the hydration status of the patient
- Rehydrate the child with ORS or other available liquids, encourage breast feeding and other modes of feeding and if necessary use a nasogastric tube
- Anti-emetics should be avoided as necessary
- In case of fever, give oral Paracetamol 15 mg/ kg per dose

Management of severe malaria;

Recommendations:

- Treatment must be initiated based on malaria positive blood smear or rapid diagnostic test results
- Meanwhile, other investigations to determine severity and prognosis should be undertaken
- The management of severe malaria must be done in either district hospital or referral hospital (private or public).

Pre-transfer treatment at the health centre:

- It is indicated to administer antimalarial treatment only after obtaining a positive blood smear or positive rapid diagnostic test
- While preparing for the transfer of the patient, urgently administer IV Artusinate or quinine intrarectally IR or IV (IV infusion) if there is a contraindication to artemesinine derivates and depending on the general condition of the patient (weak pulse or not, dehydration or none), the health centre staff will administer, either:
 - Artesunate 3.2 mg /kg IV as a single dose before transferring the patient **OR**
 - Quinine by intrarectal route in children, 20mg per kg body weight diluted in 4ml of distilled water of physiological saline, administered with a 5 ml syringe without a needle **OR**
 - Give quinine IV, preferably by intravenous infusion as a loading dose of 20 mg /kg body weight to run in 4 hours (not exceeding a total dose of 1200 mg for the loading dose);

Recommendation:

- Give parenteral antimalarial in the treatment of severe malaria for a minimum of 24h, once started (irrespective of the patient's ability to tolerate oral medication earlier), and, thereafter, complete treatment by giving a complete course of artemether plus lumefantrine orally.

- For cerebral malaria, administer the first dose of antibiotics; Ampicillin 50 mg/kg body weight per dose, four times a day accompanied by - chloramphenicol 25 mg/ kg body weight per dose, four times a day.
- In case of hypovolaemia (severe anaemia, rapid breathing, coma or systolic BP < 80 mm Hg), start with normal saline or Ringer's lactate infusion in a dose of 20 ml/kg to run for 15 minutes to move the patient out of shock.
- For malnourished children (kwashiorkor or marasmus), give the loading dose of quinine in IV perfusion without fluid replenishment (to avoid the risk of circulatory overload).
- The administration of quinine intravenous infusion is preferable in severe cases (repeated convulsions, coma, respiratory distress, shock)
- If an intravenous line is not possible, use intramuscular artemether or intrarectal quinine.

Note: The intramuscular use of Quinine is prohibited in all health facilities in Rwanda.

Supportive treatment:

- If the temperature is $\geq 38^{\circ}\text{C}$;
 - Do tepid sponging
 - Give Paracetamol 15 mg /kg body weight by oral route or suppository and injectable forms
- To prevent hypoglycemia (characterized by lack of consciousness, severe weakness);
 - Give 3-5ml/kg body weight of 10% glucose bolus or if not available 1 ml/kg of 50% glucose diluted in 4ml of water for injection Or
 - Administer water with 10% sugar per mouth or with nasogastric tube, at a rate of 5 ml/kg (Preparation of 10% sugar/water: take 100 ml of boiled clean water and add 10 g of sugar or 2 coffee spoons

Treatment of the severe malaria in the hospital;

- Artesunate 2.4 mg/kg IV or IM given on admission (time = 0), then at 12h and 24h, then once a day; Quinine is an acceptable alternative if parenteral Artusinate is not available

If Quinine is indicated:

- Loading dose of 20 mg/kg body weight of quinine dihydrochloride (do not exceed 1200 mg) diluted in an isotonic solution or 5 or 10% glucose on the basis of 5 to 10 ml/kg body weight to run for 4 hours in IV perfusion.
- Then run IV glucose 5 or 10% for 4 hours as maintenance drip. Thereafter, a maintenance dose of 10 mg/kg body weight of quinine dihydrochloride, to run for 4 hours repeated every 8 hours until the patient can swallow, within 48 hours
- After 48 hours, if the patient's state does not permit the patient to take quinine orally, continue the drip of quinine by reducing the doses to 7 mg/kg every 8 hours to run for 4 hours.
- Give parenteral antimalarials in the treatment of severe malaria for a minimum of 24h, once started (irrespective of the patient's ability to tolerate oral medication earlier), and, thereafter, complete treatment by giving a complete course of oral Artemether 20 mg and Lumefantrine 120 mg, as recommended for the treatment of simple malaria
- Change to oral quinine 10 mg/kg of quinine sulphate every 8 hours as soon as the patient can swallow; to complete the 7 days of treatment in case of contraindication in artemesinin derivates

Recommendation:

- For the patient with weight $\geq 60\text{kg}$ give the loading dose, and decrease the dose from 1200mg to 800mg not to exceed 2000mg per day,

- The loading dose of quinine is not administered if the patient received quinine the past 12 hours or Mefloquine in the 7 past days
- Never exceed 2 g of daily dose of quinine
- For cerebral malaria, concurrent IV antibiotics is recommended; (Cefotaxime 50 mg/kg/dose IV 6 hourly or Ceftriaxone 50mg/kg 12 hourly until meningitis and sepsis have been excluded)
- For the anaemic form of severe malaria antibiotics are not indicated.
- Syrup Quinine is not recommended

Table 26. Summary of oral quinine dosing scheme

Body weight of patient in kg	Number of tablets of quinine 300 mg per dose
Weight ≤10 kg	1/4 tablet
10 kg < weight ≤ 15 kg	1/2 tablet
15 kg < weight ≤ 21 kg	3/4 tablet
21 kg < weight ≤ 31 kg	1 tablet
31 kg < weight ≤ 36 kg	1+ 1/4 tablet
36 kg < weight ≤ 47 kg	1+ 1/2 tablet
Weight > 48 kg	2 tablets

Management of complications (World Health Organization 2015). Guidelines for the Treatment of Malaria. 3rd edition.

Severe malaria is associated with a variety of manifestations and complications, which must be recognized promptly and treated as shown below.

Table 27. Immediate clinical management of severe manifestations and complications of *P. falciparum* malaria

Manifestation or complication	Immediate management
Coma (Cerebral malaria)	Maintain airway, place patient on his or her side, exclude other treatable causes of coma (e.g. hypoglycaemia, bacterial meningitis); avoid harmful ancillary treatments, intubate if necessary.
Hyperpyrexia	Administer tepid sponging, fanning, a cooling blanket and Paracetamol.
Convulsions	Maintain airways; treat promptly with intravenous or rectal diazepam 0.5 mg/kg body weight Intra-rectal; If convulsions persist, give Phenobarbital 10-15 mg/kg IVI/IM; Check blood glucose.
Hypoglycaemia	Check blood glucose, correct hypoglycaemia and maintain with glucose-containing infusion. Although hypoglycaemia is defined as glucose < 2.2 mmol/L, the threshold for intervention is < 3 mmol/L for children < 5 years and < 2.2 mmol/L for older children and adults.
Severe anaemia	Transfuse with packed cells 10ml/kg or screened fresh whole blood 20ml/kg

Manifestation or complication	Immediate management
Acute pulmonary oedema	Prop patient up at an angle of 45°, give oxygen, give a diuretic, stop intravenous fluids, intubate and add positive end-expiratory pressure or continuous positive airway pressure in life-threatening hypoxaemia.
Acute kidney injury	Exclude pre-renal causes, check fluid balance and urinary sodium; if in established renal failure, refer for haemodialysis/peritoneal dialysis.
Spontaneous bleeding and coagulopathy	Transfuse with screened fresh whole blood (cryoprecipitate, fresh frozen plasma and platelets, if available); give vitamin K injection.
Metabolic acidosis	Exclude or treat hypoglycaemia, hypovolaemia and septicaemia. If severe do haemodialysis.
Shock	Suspect septicaemia, take blood for cultures; give parenteral broad-spectrum antibiotics, correct haemodynamic disturbances.

Reference

1. (World Health Organization 2015). Guidelines for the Treatment of Malaria. 3rd edition.
2. Rectal versus Intravenous Quinine for the Treatment of Childhood Cerebral Malaria in Kampala, Uganda: A Randomized, Double-Blind Clinical Trial [Jane Achan, Justus Byarugaba, Hubert Barennes, James K. Tumwine](#) Clinical Infectious Diseases, Volume 45, Issue 11, 1 December 2007, Pages 1446–1452, <https://doi.org/10.1086/522972>

-- | Meningitis

Definition

Meningitis is the inflammation of the meninges usually due to infection

Causes

- Bacteria (H.influenzae, streptococcus pneumoniae, meningococcus...)
- Viruses (Herpes group...)
- Fungi (Cryptococcus Neoformans)
- Protozoa (toxoplasma gondii...)

Note:

- Hemophilus Influenza and Streptococci are common causes in infants while Neisseria meningitidis is responsible for epidemics in older children ...)
- Mycobacterium tuberculosis, Fungal and protozoa infections are more common in immunocompromised children like in HIV/AIDS and malnutrition

Signs and symptoms

In younger infants

- Nonspecific features e.g. vomiting, restlessness, irritability and poor feeding
- Convulsions and bulging fontanel are more reliable signs in this age group

In older children

- Headaches
- Fever
- Convulsions
- Stiffness of the neck

Diagnosis

- Based on symptoms and signs

Investigations

- Lumber puncture and laboratory analysis of cerebral spinal fluid
- FBC, serum glucose, electrolytes (Na and K)
- Blood culture

Interpretation of the CSF results:

Either Bedside examination:

- Looks cloudy in bottle (turbid) and not a blood stained tap, and /or laboratory examination with one or more of:
 - White cell count more than $10 \times 10^6/l$
 - Gram positive diplococci or gram negative coco bacilli
 - If one is positive: definitive meningitis
 - If all lab negative but one of the following (coma, stiff neck, bulging fontanel and LP looks clear : probable meningitis
 - If all of the clinical signs mentioned above, and CSF not done: possible meningitis

Complications:

- Convulsions
- Brain oedema
- Coma
- Syndrome of inappropriate ADH secretion
- Brain abscess
- Cranial nerve palsies
- Psycho-motor retardation
- Hydrocephalus
- Epilepsy

Management:**General supporting measures:**

- Admit in high dependence unit
- Follow ABC guidelines for unconscious patient
- Correct hypoglycemia if present
- Give maintenance fluids IV
- Stop convulsions with diazepam 0.5mg/kg intra rectal or Phenobarbital 10-15mg/kg IV
Feeding by NGT with milk, soup and porridge, if stabilized (then, stop IV fluids)

Antibiotics:

- **Definitive meningitis:** Cefotaxime 50 mg/kg/dose IV 6 hourly for 10 to 14 days) or Ceftriaxone 50mg/kg 12 hourly for 10 to 14 days
- If not available Ampicillin 50 mg/kg IV 6 hourly + Chloramphenicol 25mg/Kg IV 6 hourly for 10 to 14 days
- **Probable meningitis:** Same as definitive meningitis
- **Possible meningitis:** Same as definitive meningitis

Dexamethasone

- Reduces the risk of hearing loss in patients with H. influenzae or S. pneumoniae.
 - Given with or before the first dose of antibiotics except in neonates
 - Children > 1 month: 0.15 mg/kg (max. 10 mg) every 6 hours for 2 to 4 days
 - Monitor;

- Vital signs (temperature, RR, HR, level of consciousness, diuresis)
- Fluid input and output
- If suspected viral meningoencephalitis; Add Acyclovir IV 20mg/kg 8 hourly for 3 weeks
- If tuberculous meningitis, fungal and protozoal meningitis treatment refer to the respective treatment services
- Raised intracranial pressure or cerebral oedema (Must be managed in HDU/ICU)
 - Elevate head of bed \pm 30°.
 - Maintain PaCO₂ at 30–35 mmHg; intubate and ventilate if necessary.
 - Avoid fluid overload.
 - Mannitol, IV, 250 mg/kg administered over 30–60 minutes.
 - Dexamethasone, IV, 0.5 mg/kg 12 hourly.

Contraindications to performing LP:

- Focal neurological signs (strabismus, focal convulsions, unequal pupils...)
- Papilledema
- Glasgow coma scale less than 8/15 or Blantyre scale <3

-- | Tetanus

Definition

Tetanus is an acute spastic paralytic illness caused by tetanospasmin, the neurotoxin produced by Clostridium tetani. The toxin prevents neurotransmitter release from spinal inhibitory neurons. It occurs in several clinical forms including generalized, localized and neonatal disease.

Cause

- Clostridia tetani

Signs and symptoms:

- Trismus (lock jaw)
- Opisthotonus (Rigid arching of back muscles)
- Dysphagia
- Laryngospasm
- Autonomic nervous system instability with hypertension, tachycardia and dysrhythmias

Diagnosis:

The diagnosis is made on clinical grounds.

- Unimmunised/incompletely immunised child.
- History of wound/trauma or unhygienic care of umbilical cord/stump.
- Trismus/False smile
- Stiffness of the neck, back and abdominal muscles.
- Pharyngospasm, laryngospasm, dysphagia, inability to suck, chew and swallow which severely compromises feeding and eating activities.
- Spontaneous muscle contractions/spasms or muscle contractions/ spasms triggered by minimal stimuli such as touch, sound, light or movement.
- No involvement of sensorium, i.e. consciousness is not disturbed.
- Autonomic nervous system instability with hypertension, tachycardia and dysrhythmias

Complications

- Asphyxia and Brain damage due to hypoxia spasms
- Inability to suck, chew and swallow leading to dehydration.
- Heart failure from arrhythmias
- Pneumonia, Laryngospasms, Respiratory failure
- Fractures

Investigations:

- No specific lab test is available to determine the diagnosis of tetanus
- Other tests done to rule out meningitis, rabies, strychnine poisoning e.t.

Management:**Non-Drug Treatment**

- Admit to high or intensive care unit/High Dependency unit, in a tertiary hospital
- Oxygen to prevent hypoxia and ventilatory support if needed
- Monitor:
 - Temperature
 - Respiration
 - Heart rate
 - Blood gases
 - SaO₂
 - blood pressure
 - blood glucose
 - electrolytes
 - acid-base status
- Protect the patient from all unnecessary sensory and other stimuli
- Ensure adequate hydration and nutrition
- Wound care and debridement/umbilical cord care
- Educate parents/caregivers regarding prevention of tetanus by vaccination

Pharmacological

- Tetanus immunoglobulin, IM, 500–2 000 IU as a single dose
- Eliminate toxin production
 - Benzylpenicillin (Penicillin G), IV, 50000IU/kg/day (Neonate 12hourly and in older children 6hourly)
 - Metronidazole 40mg/kg/day IV in three divided doses for 7-10 days

Neonates less than 7 days old:

Weight	Dosage
<1.2 kg	7.5mg/kg/ i.v 48 hours
1.2-2 kg	7.5kg/kg ivi 0.d
>2kg	15kg/kg/day 12 hourly

Neonates 7 days and older

Weight	Dosage
<1.2kg	7.5kg/kg 48 hourly
1.2-2 kg	15mg/kg/day 12 hourly
>2kg	30mg/kg/day 12 hourly

Infants and children Metronidazole 30mg/kg/24 hr ivi 6 hourly

- Diazepam, IV, 0.1–0.2 mg/kg/dose 4–6 hourly, titrated according to response. Do not exceed dose of 10 mg/dose. Alternating with chlorpromazine 0.5 mg/kg 6 hourly PO (NGT)

After recovery from tetanus, patients should be actively immunized as the disease does not confer immunity

NB: Don't remove the NGT from the child until at least one-week seizure free.

Prevention of tetanus**Minor Wounds:**

- Children with clean minor wounds do not require tetanus immunoglobulin or antibiotics
- Tetanus vaccine should be given, except in fully immunized patients who have received a booster within the past 5 years

For more severe wounds

- If child with penetrating wound is fully not immunized give tetanus immunoglobulin
 - < 5 years 75 IU
 - 5–10 years 125 IU
 - > 10 years 250 IU
 - Tetanus toxoid vaccine (TT), IM, 0.5 mL

- phenoxycephalothin, oral, 12.5 mg/kg/dose 6 hourly for 7 days
- OR
- Erythromycin, oral, 6.25–12.5 mg/kg/dose, 6 hourly for 7 days (if allergic to penicillins)

Recommendation

- Refer all cases of tetanus to intensive care /High dependency unit

-- | Hepatitis

Definition

It is an acute inflammation of the liver with varying degrees of hepatocellular necrosis. The most commonly known are hepatitis A, B and less commonly C, D and E viruses. **Hepatitis A**

Cause:

- Hepatitis A RNA (virus)
- Vaccination does exist but provided in developed countries
- HAV is spread via the faecal-oral route

Symptoms and signs:

- Abrupt onset with nonspecific symptoms, such as fever, malaise, anorexia, vomiting, nausea, abdominal pain or discomfort, and diarrhoea.
- Jaundice occurs one week after onset of symptoms, along with cholangitis (bilirubin in the urine) and mild hepatomegaly.
- Young children are asymptomatic; Symptomatic 30 percent of infected children younger than six years, jaundice usually lasts for less than two weeks. Conjugated bilirubin and aminotransferases return to normal within two to three months
- In contrast, older children and adults with HAV infection are usually symptomatic for several weeks. Approximately 70 percent are jaundiced, and 80 percent have hepatomegaly. Symptoms last for a longer time
- The most common extrahepatic manifestations include an evanescent rash (11 percent) and arthralgias (14 percent). Less common extrahepatic manifestations include vasculitis, arthritis, optic neuritis, transverse myelitis, encephalitis, and bone marrow suppression

Complications:

- Acute liver failure is rare in developed countries , but account for 60% of liver failure in Latin America
- Death

Diagnosis: Made based on clinical symptoms and signs

Investigations

- Liver Function tests
- Anti-HAV IgM in a patient with the typical clinical presentation
- Serological tests for Hepatitis A

Management:

- improved sanitary conditions, adherence to sanitary practices, hand washing +++ (virus may survive for up to four hours on the fingertips)
- No specific treatment for Hepatitis A
- Bed rest may be recommended but does not alter the course of the illness
- Human immunoglobulin prophylaxis for those who had contact
- Isolate patient of Hepatitis A for 7–10 after the onset of jaundice

Patients rarely require hospitalization except for those who develop fulminant hepatic failure.

► Hepatitis B

Cause:

- Hepatitis B DNA virus (HBV)
- Perinatal transmission is the most common cause of chronic infection
- Infants born to women with HBV infection (HBeAg positive or negative) should be tested for hepatitis B at 9-18 months even if vaccinated (at least 5% develop chronic HBV)
- All pregnant women should be screened for HBV infection

Symptoms and signs:

Infection with HBV is associated with characteristic changes in the serum levels of hepatitis B antigens and antibodies. These markers are used to define different clinical states

Acute hepatitis

- Acute HBV infection in children ranges from asymptomatic infection to fulminant hepatitis.
- Constitutional symptoms, anorexia, nausea, jaundice and right-upper-quadrant discomfort.
- The symptoms and jaundice generally disappear after one to three months, but some patients have prolonged fatigue even after normalization of serum aminotransferase concentrations. Older children and adolescents have mild constitutional symptoms during acute HBV infection.

► Chronic hepatitis

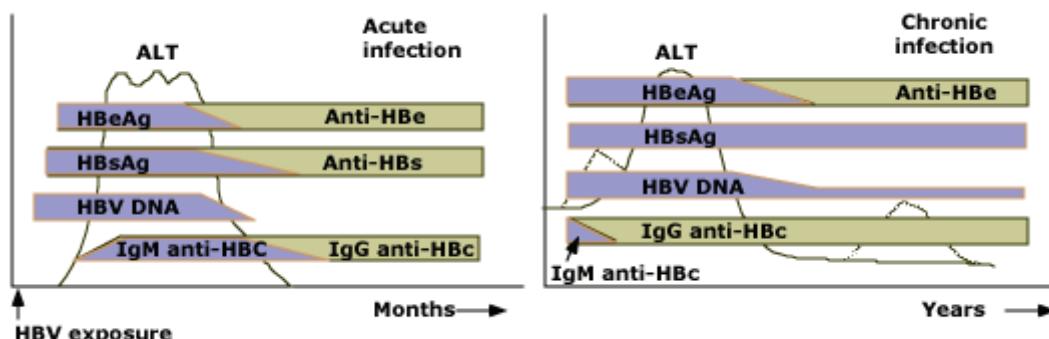
- Commonly asymptomatic and grow and develop normally.
- Vague right upper quadrant discomfort and fatigue, loss of appetite, jaundice.
- Extrahepatic manifestations including polyarteritis nodosa and glomerulonephropathy.

Diagnosis:

- Based on persistence of HBsAg for more than six months; IgG anti-HBc is positive, while IgM anti-HBc is negative
- Some carriers have large numbers of HBV in their serum and liver without symptoms or signs and without antibodies in their serum.

Investigations

Table 28. Serologic responses to HBV infection



- **Left panel: Acute infection:**
 - HBeAg (hepatitis B e antigen), HBsAg (hepatitis B surface antigen), and HBV DNA beginning in the preclinical phase.

- IgM anti-HBc (hepatitis B core antigen) appears early in the clinical phase; the combination of this antibody and HBs Ag makes the diagnosis of acute infection.
- Recovery: normalization of the serum ALT, the disappearance of HBV DNA, HBeAg to anti-HBe seroconversion, and subsequently HBsAg to anti-HBs seroconversion and switch from IgM to IgG anti-HBc. Then previous HBV infection is characterized by anti-HBs and IgG anti-HBc.
- **Right panel: Chronic infection:**
 - Persistence of HBsAg for more than six months after acute infection
 - Persistence of HBeAg (for a variable period), HBsAg, and HBV DNA in the circulation
 - Anti-HBs is not seen.
- Other tests
 - Liver Function tests (Prothrombin time, Bleeding time)
 - Glycemia if severe
 - HBV tests (refer to figure)
 - Blood ammonia
 - Urea and electrolytes in cases of liver failure
 - CBC to determine severity of anaemia

Complications:

- Chronic Liver Disease: In children born from infected mother 76 percent of them are HBeAg positive at 10 years of age. The frequency of spontaneous seroconversion increases during puberty (Cirrhosis)
- Liver failure (hepatic encephalopathy)
- Portal hypertension (GIT bleeding, hematemesis and melena stools)
- Hepatorenal syndrome /reduced glomerular filtration rate.
- Liver cancer

Management:

General measures:

- Counseling of the patient about alcohol use in adolescents and family, surveillance for disease progression and development of complications,
- Regular monitoring of liver function tests every 3 months
- Patients who are in the inactive carrier phase of hepatitis B infection (ie, HBsAg positive, HBeAg negative, anti HBe positive, persistently normal ALT/AST levels, serum HBV DNA <10⁵ copies/mL) should undergo monitoring of liver biochemical tests every 6 to 12 months.

Selection of patients for treatment:

- Treatment is generally considered in patients with HBV DNA positive chronic hepatitis who are in the immune active phase (usually defined as ALT >2 x ULN and HBV DNA >20,000 IU/mL or 10⁵ copies/mL, for at least six months)
- Children with ALT values greater than 10 times the upper limit of normal but with concomitant low HBV DNA levels may be in the process of spontaneous seroconversion, and may not require treatment. These patients should be observed for several months with serial serologic testing.
- If there is evidence of hepatic decompensating, such as jaundice or coagulopathy, treatment should be initiated earlier
- Several other considerations may be relevant to treatment decisions (co-infected with HCV, HIV or HDV)

Choice of treatment:

- Lamivudine, TDF and interferon (IFN), are licensed for use in children Adefovir approved for use in those over 12 years of age.
- IFN alfa as the first-line treatment for the patients with serum ALT more than twice the upper limit of normal, have positive HBeAg, who are committed to adhering to the treatment, and have no comorbid diseases that might be exacerbated by an immunostimulatory agent
- If the patient does not respond to IFN alfa (defined by detectable HBV DNA and elevated serum ALT six months after completion of the course of IFN alfa), a nucleoside/nucleotide analog such as lamivudine or adefovir can be used – this shall be considered as primary treatment if IFN alpha not available

— | Acute liver failure

Definition

Acute liver failure is the rapid deterioration of liver function due to massive necrosis of liver cells resulting into coagulopathy and alteration in the mental status of a previously healthy individual.

Causes:

- Hepatotoxicity due to drugs like acetaminophen
- Viral (hepatitis, cymegalovirus, hemorrhagic fever viruses, herpes simplex virus)
- Autoimmune hepatitis
- Miscellaneous causes
- Poisons e.g. Mushrooms

Signs and symptoms:

- Malaise
- Vomiting
- Anorexia
- Stupor/Encephalopathy
- Foetor hepaticus
- Bleeding tendency
- Ascites
- Jaundice often present but not always
- Ascites

Diagnosis: Based on the above clinical signs and symptoms

Investigations:

- Raised or low liver enzymes, low serum albumin, raised bilirubin, raised blood ammonia
- Hypoglycaemia
- Prolonged prothrombin time
- Low fibrinogen
- FBC
- Urea-creatinine and electrolytes

Management

Non-pharmacological treatment:

- Admit to high care or intensive care unit
- Monitor blood pressure, urine output, heart rate, neurological state, respiration, gastrointestinal bleeding, haematocrit, blood glucose (3 hourly if comatose), acid-base status, liver and renal functions, coagulation, competence (INR), electrolytes: sodium, potassium, calcium and phosphate
- Maintain hydration
- Aim to reduce ammonia production by the gut and optimise renal excretion for patients with encephalopathy
- Withdraw protein completely initially followed by restricted intake if level of consciousness improves, i.e. 0.5–1 g/kg/24 hours
- Stop medium chain triglyceride supplements but maintain an adequate energy intake
- Stop sedatives, diuretics and hepatotoxic drugs, if possible

Pharmacological treatment:

- Lactulose, oral, 1 g/kg/dose 4–8 hourly via nasogastric tube, then adjust dose to produce frequent soft stools daily (to reduce intestinal protein absorption)

OR

- Polyethylene glycol solution with sodium sulphate and electrolytes, oral/via nasogastric tube, 10–25 mL/kg/hour over 6 hours. Follow with lactulose.
- Neomycin, oral, 12.5 mg/kg/dose 6 hourly for 5 days
- Mannitol, IV, 250 mg/kg administered over 30–60 minutes (if cerebral Oedema with serum osmolality < 320)
- Fresh frozen plasma, IV, 20 mL/kg over 2 hours (pre-operative)
- Vitamin K1, IV/oral, 2.5–10 mg daily never gives IM
 - Monitor response to vitamin K1 with INR and PTT
- Platelet transfusion (if platelet count < 10 x 10⁹/L or if < 50 and with active bleeding)
- Ranitidine, IV/oral 3–4 mg/kg/day 8 hourly

OR
- Omeprazole, oral initiated by the specialist;
 - Neonate 1–2 mg/kg, 12–24 hourly
 - 1 month–2 years 5 mg, 12 hourly
 - 2–6 years 10 mg, 12 hourly
 - 7–12 years 20 mg, 12 hourly

AND/OR

- Sucralfate, oral, 250–500 mg 6 hourly
- Dextrose 10%, IV bolus 2 mL/kg (for patient with hypoglycaemia)
- Ringers lactate with dextrose 5%, IV, 60–80mL/kg/day, ensure a minimum of 3–6 mmol/kg/day of potassium

- Avoid diuretics
- Packed red cells, 10 mL/kg over 3 hours if haemoglobin < 7 g/dL For anaemia
- For sedation, if essential;
 - Midazolam, IV, 0.1 mg/kg Amelioration of liver injury, especially in idiopathic/toxin cases
 - Ampicillin, IV, 25 mg/kg/dose, 6 hourly + Cefotaxime, IV, 25–50 mg/kg/dose, 6–8 hourly + Nystatin 100 000 units/mL, oral, 0.5 mL after each feed. Keep nystatin in contact with affected area for as long as possible

Recommendation

- All cases of liver failure should be managed in a referral /Tertiary hospital

— | Septicaemia

Definition

Septicemia is a suspected or proven infection plus an uncontrolled systemic inflammatory response syndrome, SIRS (e.g., fever, tachycardia, tachypnea, and leukocytosis).

Causes:

- Bacterial: (*Streptococcus pneumoniae*, *Haemophilus influenzae* type b, *Neisseria meningitidis*, group A streptococcus, *S. aureus*, *Salmonella*)
- Viral infection: (influenza, enteroviruses, hemorrhagic fever group, HSV, RSV)
- Encephalitis: (arboviruses, enteroviruses, HSV)
- Vaccine reaction (pertussis, influenza, measles)
- Toxin-mediated reaction (toxic shock, staphylococcal scalded skin syndrome)

Clinical evaluation:

- Assess Air way, Breathing (RR, signs of respiratory distress and pulse oximetry),
- Circulation (HR, BP, Skin for signs of dehydration, JVP)
- SIRS is systemic inflammatory response with at least two of the following four criteria, one of which must be abnormal temperature or leucocyte count:
 - Core temperature of < 36°C or > 38.5°C,
 - Tachycardia,
 - Tachypnoea,
 - Increased WBC (>12,000/mm³) or decreased (<4000/mm³) PLUS, one of the following:
 - Cardiovascular dysfunction,
 - Acute respiratory distress syndrome, or
 - ≥ 2 other organ dysfunctions
- Identify source of infection e.g pneumonia, abdominal abscess, meningitis etc
- Assess organ function e.g. CNS (LOC, focal signs) , Renal function for urinary output

Diagnosis: Based on signs and symptoms complemented by laboratory investigations

Clinical

On examination, look for the following:

- Fever with no obvious focus of infection
- Blood film for malaria is negative
- No stiff neck or other specific signs of meningitis (or a lumbar puncture for meningitis is negative)
- Signs of systemic upset (e.g. inability to drink or breastfeed, convulsions, lethargy or vomiting everything)

- Purpura may be present.
- Always fully undress the child and examine carefully for signs of local infection before deciding that no cause can be found.

Laboratory evaluation

- Identify SIRS; CBC and White-cell differential
- Identify source of infection; Blood and urine culture and sensitivity, sputum, CSF analysis, Chest radiography and Ultrasonography when indicated
- Assess organ function;
 - Renal function: Electrolytes, BUN, creatinine
 - Hepatic function: Bilirubin, AST, alkaline phosphatase
 - Coagulation: INR, PTT, platelets

Complications:

- Convulsions
- Confusion or coma
- Dehydration
- Multiorgan failure
- Disseminated intravascular coagulation (with bleeding episodes)
- Pneumonia
- Septic shock; which is the main cause of death

Management:

- Assess for Air way, Breathing, Circulation, and Dehydration followed by appropriate management.
- Treat the source of sepsis e.g abscess, peritonitis
- First choice treatment
 - Neonates: Cefotaxime, IV, 75 mg/kg/dose, 8 hourly
 - Children > 1 month: Ceftriaxone, IV, 50 mg/kg/dose, 12 hourly.

Alternative:

- Give IV ampicillin at 50 mg/kg every 6 h plus IV gentamicin 7.5 mg/kg once a day for 7–10 days
- If staphylococcal infection is suspected use Cloxacillin, IV, 50 mg/kg/dose 6 hourly for at least 14 days, (longer courses often required).

Monitoring

- The child should be checked by nurses at least every 3 hours and by a doctor at least twice a day.
- Check for the presence of complications such as shock, reduced urine output, signs of bleeding (petechiae, purpura, bleeding from venepuncture sites), or skin ulceration.

Recommendation:

- Immunization with the conjugate H. influenzae type b and S. pneumoniae vaccines is for all infants

N.B Use of Corticosteroids in patients with sepsis has adverse effects like hyperglycemia and immunosuppression thus leading to nosocomial infection and impaired wound healing. Studies reveal that early use of short-course, high-dose corticosteroids does not improve survival in severe sepsis.

— | Septic arthritis

Definition

Septic arthritis is defined as an acute articular suppurative infection caused by pyogenic microorganisms. It may occur as a result of haematogenous seeding of the synovium during transient periods of bacteraemia and often part of a generalised septicaemia which may involve more than one joint

Table 29. Causes of septic arthritis

Neonates	S.aureus, Group B. Streptococci, E. coli, fungi
Infants/children	S.aureus, H. influenzae, Group A Streptococci, S. pneumonia
Children - Sexually active	N. gonorrhoea
Chronic septic arthritis	Brucella, tuberculosis, atypical mycobacteria, fungi and other uncommon organisms

Risk factors:

- Trauma
- Rheumatoid arthritis or osteoarthritis
- Sickle cell disease
- Skin infections
- Sexual activity
- Immune deficiency (HIV, etc.)

Symptoms and signs:

- Fever, local pain, loss of function and toxic/septic looking child.
- In neonates and infants signs and symptoms may be nonspecific and subtle (not well remarked)
- Malaise, irritability, feeding problems and pseudoparalysis
- Local tenderness, warmth, swelling at a joint with restriction of passive and active movement.
- Poor weight gain

Old infants and children:

- Acute onset of pain, warm, and swollen joint
- Usually monarticular and affecting large weight-bearing joints (knee, shoulder or hip)

Complications:

- Sepsis
- Osteomyelitis
- Destruction of articular cartilage, permanently damaging the joint
- Secondary infectious site (bacterial endocarditis, brain abscess, etc.)

Investigations:

- Joint ultrasonography
- Aspiration of pus under sonar guidance for microscopy, Gram stain, culture and sensitivity.(Done by a specialist/orthopedic surgeon)
- FBC and CRP
- X-ray
- Blood culture and sensitivity before starting antibiotic treatment
- Scintigraphy
- MRI

Management:**Non- pharmacological management:**

- Emergency surgical drainage of pus from infected joints

Pharmacological management:

Antibiotics: Minimum duration of therapy is 4–6 weeks.

Neonates:

- Cloxacillin IV:
 - 1st -2nd week of life: 50 mg/kg/dose 12 hourly,
 - 3rd – 4th week of life: 50mg/kg/dose 8 hourly
 - > 4 weeks of life 50mg/kg/dose 6 hourly + Cefotaxime, IV, 50 mg/kg/dose (preterm 12 hourly, 1st week of life 8 hourly and > 2 weeks 6 hourly)

Infants and children:

- Cloxacillin IV 50mg/kg/dose, 6 hourly PLUS Cefotaxime IV 25–50mg/kg/dose, 6 hourly
- Do arthrocentesis and culture to treat appropriately to sensitivities

Antipyretics and anti-inflammatories:

- Ibuprofen, oral, 5–10 mg/kg/dose, 6 hourly

Recommendations:

- Penicillin antibiotic given for up to 6 weeks, with the first 2 weeks administered intravenously followed by a switch to oral treatment if an oral option exists and clinical signs, symptoms, and inflammatory markers are settling
- IV antibiotics regimen is adjusted based on the results of culture and sensitivity testing

Alternative:

- Vancomycin 50mg/kg/day divided in 3 doses. Maximum dose is 1g/dose

-- | Acute Osteitis/Osteomyelitis

Definition

Osteitis is inflammation of the bone while osteomyelitis is an infection of the bone

Most cases result from haematogenous deposition of organisms in the bone marrow after a transient bacteraemia episode. Osteomyelitis most commonly begins in the metaphyses of long bones which are highly vascular. The spread of infection through the epiphysis can result in septic arthritis.

Causes:

- Neonates: *S. aureus*, Group B Streptococci, Gram negative (*E. coli*).
- Infants/children: *S. aureus*, *H. influenzae*, Group A Streptococci, *S. pneumoniae*.
- Traumatic direct infection: *P. aeruginosa* (penetrating foot wounds).
- Co-existing medical conditions e.g. diabetes, HIV, leucopenia: *M. tuberculosis*, fungi.
- Sickle cell disease: *Salmonella*, pneumococcus.

Diagnostic criteria**Clinical**

- Local pain and tenderness, loss of function, general toxicity and fever.
- If lower extremities are involved (development of a limp or refusal to bear weight).
- In neonates, early signs may be subtle or non-specific, e.g. irritability, feeding problems and pseudoparalysis.
- Investigate for multi-organ disease, e.g. endocarditis, pericarditis and pneumonia.

Investigations

- Full blood count (raised white cell count)
- CRP raised
- Aspiration of pus for microscopy, Gram stain, culture and sensitivity.
- Blood culture
- X-ray after 2 weeks.
- Bone scan ($Tc99$).
- MRI.

General Management

- Immobilize affected limb in position of function.
- Supportive and symptomatic care.

Medications

- Minimum duration of therapy: 4–6 weeks.
- Initiate IV antibiotic treatment immediately as diagnosis is made and blood and pus specimens have been collected.
- Adjust antibiotic therapy based on culture results or if response to antibiotic treatment is unsatisfactory.
- Where a single agent has been found to be sensitive, continue treatment on that single agent.
- Continue with IV antibiotics until there is evidence of good clinical response and laboratory markers of infection improve. Once clinical improvement and inflammatory markers have normalized, patients can be switched to oral antibiotic therapy.
- Ongoing fever suggests an undrained focus of pus.

Neonates:

- Cloxacillin, IV, 50 mg/kg/dose
 - If 1st week of life: 12 hourly.
 - If 2nd–4th week of life: 8 hourly.
 - If > 4 weeks old: 6 hourly.
- PLUS
- Cefotaxime, IV, 50 mg/kg/dose.
 - Preterm: 12 hourly.
 - If 1st week of life: 8 hourly.
 - If > 2 weeks old: 6 hourly.

Infants and children:

- Cloxacillin, IV, 50 mg/kg/dose 6 hourly.
- PLUS
- Ceftriaxone, IV, 50 mg/kg/dose 12 hourly.

Special Circumstances

- If MRSA, replace Cloxacillin with vancomycin.
 - Vancomycin IV, 15 mg/kg/dose administered over 1 hour given 8 hourly (Monitor renal function)
- Penetrating foot bone injuries: replace cefotaxime with ceftazidime plus an aminoglycoside:
 - Ceftazidime, IV, 50 mg/kg/dose 6 hourly.
 - PLUS
 - Gentamicin, IV, 6 mg/kg once daily.

Oral antibiotics

- Can transition to oral therapy once there is sustained clinical improvement, resolution of fever, normal white cell count and CRP 4-6 weeks of treatment.
- Flucloxacillin, oral, 25 mg/kg/dose, 6 hourly.

Referral: Refer or discuss all cases with an orthopaedic surgeon

References

1. James A. Russell. Management of Sepsis: N Engl J Med 2006; 355:1699-1713
2. WHO: POCKET BOOK OF Hospital care for children
3. Dellinger RP, Carlet JM, Masur H, et al. Surviving Sepsis Campaign guidelines for management of severe sepsis and septic shock. Crit Care Med 2004;32:858-73.
4. Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. N Engl J Med 2001;345:1368-77.
5. Meduri GU, Headley AS, Golden E, et al. Effect of prolonged methylprednisolone therapy in unresolving acute respiratory distress syndrome: a randomized controlled trial. JAMA 1998;280:159-65.
6. Steinberg KP, Hudson LD, Goodman RB, et al. Efficacy and safety of cortico-steroids for persistent acute respiratory distress syndrome. N Engl J Med 2006;354:1671-84.

-- | Salmonella infections (typhoid fever):

Definition: is a systemic infection with the bacterium *Salmonella enterica* serotype *typhi*.

Causes and risk factors

- *Salmonella typhi* causes typhoid. The bacteria survives only in humans.
- More than 95% of all transmission occurs through food, especially eggs.
- Water contaminated by faeces from an infected person carries the disease.
- Symptoms are most severe in infants and those with other comorbidities
- Immune compromised patients are frequently affected and have recurrences.

Signs and symptoms

Initial signs and symptoms:

- Prolonged or high fever (≥ 38.8), with profuse sweating, in a previously healthy individual, lasting >1 week; the person may become delirious and possibly convulsions
- A slower pulse rate than expected with the level of fever
- Dull frontal headache
- Poorly localized abdominal pain, constipation, anorexia, nausea and diarrhoea later in the illness; may be accompanied by frank bleeding
- A coated tongue, abdomen tenderness and hepatosplenomegaly are common findings
- Jaundice may occur

Signs of complications

- Intestinal perforation—abdominal tenderness, with sudden increase in pulse rate and hypotension
- Altered mental status

NB: there is no typhoid fever without fever or hypothermia in infants !!!

Diagnosis:

On examination, key diagnostic features of typhoid are:

- Fever with no obvious focus of infection
- No stiff neck or other specific signs of meningitis, or a lumbar puncture for meningitis is

negative (note: children with typhoid can occasionally have a stiff neck)

- Signs of systemic upset, e.g. inability to drink or breastfeed, convulsions, lethargy, disorientation/confusion, or vomiting everything
- Rose spots on the abdominal wall in light-skinned children
- Hepatosplenomegaly, tense and distended abdomen.

Note:

- Typhoid fever can present atypically in young infants as an acute febrile illness with shock and hypothermia.
- The differential diagnosis is broad and includes malaria, amoebiasis, dengue fever, leishmaniasis, and other causes of bacterial gastroenteritis

Laboratory evaluation

- FBC (may show leukocytosis or leucopenia, thrombocytopenia, severe anaemia follows intestinal bleeding)
- Blood culture(Gold standard) will isolate the bacteria during the first 2 weeks of illness
- Stool culture will isolate the bacteria during the later period of illness.
- Plain X-rays of abdomen in erect position will show gas under the diaphragm if there is gut perforation

Note:

- Serologic tests such as the Widal test are of limited clinical utility in endemic areas because positive results may represent previous infection. Positive serology alone shall never be a base for treatment of typhoid fever

Complications:

- **GIT:** gastrointestinal bleeding, intestinal perforation, abdominal mass due to abscess formation
- **CVS:** Asymptomatic electrocardiographic changes, Myocarditis, Shock
- **CNS:** Encephalopathy, Delirium, Psychotic behaviour, Meningitis, Impairment of coordination
- **Haematologic:** Anaemia, Disseminated intravascular coagulation
- **Respiratory:** Bronchitis, Pneumonia (*Salmonella enterica* serotype *typhi*, *Streptococcus pneumoniae*)
- **Others:** Focal abscess, Pharyngitis, Relapse and Chronic carriage
- Chronic carriers frequently have high serum antibody titers against the Vi antigen, which is a clinically useful test for rapid identification of such patients

Management:

Management objectives:

- Reduce the fever
- Prevent dehydration
- Prevent the spread of the disease in the community

Nonpharmacological management

- Encourage adequate oral fluids or initiate IV infusion.
- Ensure appropriate nutrition.
- Tepid sponging with lukewarm water (32-35°C) to reduce the fever.
- Isolate the patient
- Identify and treat all carriers

Pharmacological

- Paracetamol to reduce fever
- Rectal Diazepam if there are convulsions

- blood transfusion in case of severe bleeding
- Ciprofloxacin ivi 10mg/kg/dose (max400mg) 12 hourly or 15mg/kg (max500mg) orally 12 hourly for 7-10 days
- Ceftriaxone 50 mg/kg 12 hourly IV for 7-14 days OR
- Cefotaxime 50 mg/kg IV 6 hourly for 7-14days

Follow up review: check for the following:

- Efficacy of treatment: fever
- Perforation (abdominal pain, tenderness,)
- Myocarditis (heart rate, gallop rhythm)

-- | Varicella (chicken pox)

#? Transfer to Dermatology

Definition

An acute, highly contagious, viral disease caused by herpes varicella-zoster. It spreads by infective droplets or fluid from vesicles. One attack confers permanent immunity. Varicella is contagious from about 2 days before the onset of the rash until all lesions crusted. Re-activation of the virus may appear later as herpes zoster or shingles (in children, consider immunosuppression if this occurs). Incubation period is 2–3 weeks.

Complications are more common in immunocompromised patients and include:

- Secondary skin infection,
- Pneumonia,
- Necrotizing fasciitis,
- Encephalitis,
- Haemorrhagic varicella lesions with evidence of disseminated, intravascular coagulation.
- Two important bacteria causing complications are *Staphylococcus aureus* and *Streptococcus pyogenes*

Diagnostic criteria

Clinical

- Mild headache, fever and malaise.
- Characteristic rash.
- The lesions progress from macules to vesicles in 24–48 hours.
- Successive crops appear every few days.
- The vesicles, each on an erythematous base, are superficial, tense ‘teardrops’ filled with clear fluid that dries to form fine crusts.
- The rash is more profuse on the trunk and sparse at the periphery of extremities.
- At the height of eruption, all stages (macules, papules, vesicles and crusts) are present at the same time.
- The rash lasts 8–10 days and heals without scarring, unless secondarily infected.
- Mucous membranes may be involved.
- Pruritus may be severe.
- Patients are contagious from 1–2 days before onset of the rash until crusting of lesions

Management

- Isolate the patient.
- Maintain adequate hydration.

Medications

- Antiviral therapy
- Indicated for immunocompetent patients with complicated varicella and for all immunocompromised patients.
- Initiate as early as possible, preferably within 24 hours of the appearance of the rash.
- Neonates, immunocompromised patients and all cases with severe chickenpox (not encephalitis)
- Acyclovir, oral, 20 mg/kg/dose 8 hourly for 7 days. Maximum dose: 800 mg/dose.
- In severe cases or in cases where oral medicine cannot be given: Acyclovir, IV, 8 hourly administered over 1 hour for 7 days
 - If 0 – 12 years: 20 mg/kg/dose 8 hourly.
 - If > 12 years: 10 mg/kg/dose 8 hourly

For mild pruritus:

- Calamine lotion, topical, applied 8 hourly.

For severe pruritus:

- Less than 2 years: Chlorphenamine, oral, 0.1 mg/kg 6–8 hourly for 24–48 hours.
- Over 2 years: Cetirizine, oral, 2.5-5 mg 12-24 hourly.

Secondary skin infection

- Cefadroxil, oral, 15 mg/kg/dose, 12 hourly for 5 days.
- Prophylaxis: Post exposure prophylaxis must be given to:
 - Neonates whose mothers develop varicella from 5 days before delivery to 2 days after delivery:
 - Varicella-zoster immunoglobulin, IM, 1 mL (100 units) given within 96 hours of exposure.
 - If varicella-zoster immunoglobulin is not available: Acyclovir, oral, 20 mg/kg/dose 6 hourly for 10 days.
 - Note: In neonates, prophylaxis may not prevent disease.

Infants and children > 28 days

- Immunocompromised children exposed to varicella:
 - Acyclovir, oral, 20 mg/kg/dose 8 hourly for 10 days given in the second week after exposure.
- Hospitalised immunocompetent children exposed to varicella (to limit spread).
 - Acyclovir, oral, 20 mg/kg/dose 8 hourly for 10 days given in the second week after exposure.

Referral: All patients with complications.

— | Mumps

Definition: A viral infection primarily involving the salivary glands.

Incubation period: 14–21 days.

Signs and symptoms:

- Fever.
- Pain on opening the mouth or eating.
- About two days later a tender swelling appears below the ears at the angle of the jaw. Often first on one side and later on the other.
- The swelling disappears in about 10 days.

General measures

- Bed rest during febrile period.
- Advise on oral hygiene.
- Recommend plenty of fluids and soft food during acute stage.
- Patient is infectious from 3 days before parotid swelling to 7 days after it started.
- Isolate until swelling subsides.
- Children may return to school 1 week after initial swelling.

Medication

Children

- Paracetamol, oral, 10–15 mg/kg/dose 6 hourly when required.

Referral

- Abdominal pain (to exclude pancreatitis).
- Painful swollen testes (orchitis).
- Suspected meningoencephalitis.

● ENDOCRINE SYSTEM CONDITIONS

-- | Diabetes mellitus

Definition

Diabetes mellitus is disorder of absolute or relative insulin deficiency that results in increased blood glucose and disruption of energy storage and metabolism. Diabetes Mellitus is generally divided into two classifications: Diabetes Mellitus I and Diabetes Mellitus Type II.

Diabetes Mellitus Type I: This results from the destruction of the pancreatic beta cells that leads to absolute insulin deficiency. Type IA is secondary to the autoimmune destruction of the beta cells. Type IB is secondary to non-autoimmune destruction of the beta cells. Type I diabetes accounts for approximately 2/3 of the new diagnosis of diabetes in patients ≤ 19 years old. There is a component of genetic susceptibility and close relatives of patients with type I DM are at higher risk of developing the disease.

Diabetes Mellitus Type II: This is secondary to varying degrees of insulin resistance and insulin deficiency and is related to both genetic and environmental influences including predisposing medications such as steroids and some ARVs. It is the most common type of diabetes mellitus in adults.

Neonatal diabetes: This is defined as persistent hyperglycaemia occurring in the first months of life that lasts more than 2 weeks and requires insulin therapy for management. The majority of affected infants are small for gestational age and present with weight loss, volume depletions, hyperglycaemia and glycosuria with or without ketonuria and ketoacidosis.

Signs and Symptoms

History of:

- Polyuria: This occurs when the serum glucose concentration rises above 180 mg/dl exceeding the renal threshold for glucose and leads to increased urinary glucose excretion and a subsequent osmotic diuresis. This may present as nocturia, bedwetting, or daytime incontinence in a previously toilet trained child, or heavy diapers.

- **Polydipsia:** This is secondary to increased thirst from increased serum osmolality and dehydration.
- **Polyphagia:** This is due to an increased appetite that occurs initially secondary to loss of calories from glycosuria. This symptom is not always present.
- **Weight loss:** This is due to hypovolemia and increased catabolism.
- **Weakness/Lethargy with ultimate progression to coma:** This is secondary to hypovolemia and electrolyte disturbances including progressive acidosis.
- **Visual disturbances:** This is secondary to osmotic changes in the lens.
- Further history to exclude other co-existing autoimmune disease such as hypothyroidism, vitiligo, rheumatoid arthritis, etc., and to further ask about family history of endocrinopathies or autoimmune diseases

Physical examination:

- Full general and systemic examination
- Fundoscopy: to rule out diabetic retinopathy.
- Foot examination: for features of diabetic neuropathy and diabetic wounds

Diagnosis:

Clinical: The diagnosis should be suspected based on the signs and symptoms described above. Any of the above signs or symptoms should prompt further investigations.

Investigations:

- **Blood sugar:** Diagnostic criteria for diabetes mellitus:
 - Symptoms of DM plus random plasma glucose ≥ 200 mg/dl (11.1 mmol/L) OR
 - Fasting plasma glucose ≥ 126 mg/dl (7.0 mmol/L). Fasting is defined as no oral intake for at least 8 hours.
OR
 - Two-hour plasma glucose ≥ 200 mg/dl during an oral glucose tolerance test (OGTT) as described by the WHO.
OR
 - HbA1C > 6.5 percent. This laboratory should be performed in a certified laboratory with an assay standardized to the diabetes control and complications trial (DCCT).
- Additional studies to evaluate severity and complications of the disease:
 - Blood gas if concern for diabetic ketoacidosis (where) available.
 - Electrolytes
 - Renal function tests (urea and creatinine) to evaluate for diabetic nephropathy and dehydration.
 - Urine analysis to check for glycosuria, ketones, and protein
 - HbA1c: This can be used for diagnosis (see below) or to assess severity of disease and to assess response to therapy.
 - Lipid profile
 - Thyroid-stimulating hormone (TSH): This should be performed in type 1 diabetics as autoimmune diseases may occur together.

Complications:

Short-term complications:

- **Diabetic ketoacidosis (DKA):** Occurs more frequently in type I diabetes mellitus, but may occur in some forms of type I diabetes mellitus.
- **Hyperosmolar hyperglycaemic state (HHS):** Occurs in type II diabetes mellitus.
- **Insulin resistance secondary to hyperglycaemia:** This occurs in both type I and type II diabetes mellitus.
- **Infections due to immunosuppression** and commonly include oral candidiasis and urinary tract infections.

- Death: Patients presenting with DKA or HHS have a high mortality rate.

Long Term complications:

- Vascular complications including both microangiopathy and macroangiopathy:
 - Nephropathy
 - Retinopathy
 - Neuropathy
 - Cardiovascular disease
 - Hypertension
- Dyslipidaemia
- Growth retardation or obesity depending on the insulin therapy. Patients may also have delayed puberty secondary to poor growth.
- Psychiatric disorders including depression related to their chronic disease.

Management:

General objectives:

- Maintain normal glycaemia with insulin therapy or oral medications (in type II diabetes mellitus) to prevent both the signs and symptoms of uncontrolled hyperglycaemia and the complications mentioned above.

Non pharmaceutical management

- Assess A-B-C-D (Airway, Breathing, Circulation, Disability)
- If patient has signs or symptoms of diabetic ketoacidosis (DKA) or hyperosmolar hyperglycaemic state, this is an emergency and treatment must be initiated immediately.
- The patient and the family should be counselled on the cause and the treatment of diabetes and its management. The patient and the family should be taught how to monitor blood glucose, record the test results, administer and adjust insulin doses based on blood glucose values and food intake.
- The family should be counselled on the complications of diabetes mellitus and how to manage them. In particular, they should know the signs and symptoms of acute hypoglycaemia and its management. They should also understand the importance of maintaining normoglycemia to avoid long-term complications. They should be instructed on how to manage acute illnesses in the context of diabetes mellitus, for example how to manage their insulin dose if they are unable to tolerate oral intake.
- Diet modification is important in both type I and type II diabetes mellitus. A nutritionist should be involved in providing individualized recommendations.

Pharmaceutical management

- The majority of children with diabetes mellitus have type I diabetes and may present with diabetic ketoacidosis (DKA). The management of DKA is detailed below.
- Diabetes Mellitus Type I: Children with Diabetes Mellitus Type I require insulin therapy. The patient is insulin dependent and while the insulin therapy may be adjusted based on the clinical condition and blood glucose results, the insulin therapy should NEVER be stopped completely as this could result in the development of DKA and death.

-- | Diabetic ketoacidosis

Definition

DKA is the increase in the serum concentration of ketones greater than 5 mEq/L, a blood glucose level greater than 250 mg/dL and a blood pH less than 7.3.

Other features include: Ketonaemia, ketonuria and low serum bicarbonate level <18 mEq/L.

Causes:

- Previously undiagnosed diabetes
- Interruption of insulin therapy
- Underlying infection and intercurrent illness
- Poor management of DM type 1
- Stress
- Medication like corticosteroids

Signs and Symptoms:

The signs and symptoms of DKA can develop suddenly and include:

- Polydipsia
- Polyuria
- Nausea and vomiting
- Abdominal pain
- Weakness or fatigue
- Rapid deep breathing
- Fruity-scented breath
- Confusion or drowsiness
- Hot, dry skin
- Blurred vision

Suspect DKA even if the blood glucose is normal in a child with known diabetes and any of the following:

- Nausea or vomiting
- Abdominal pain
- Hyperventilation
- Dehydration
- Reduced level of consciousness

Investigations:

- Blood glucose
- Urine dipsticks for glucose and ketones
- Blood urea and electrolytes
- Malaria
- Full blood count
- Blood and urine cultures

Management:*DKA treatment goals*

- Management of A,B, C
- Admission to HDU/ICU if possible for close monitoring
- Correct dehydration with intravenous fluids
- Correct hyperglycaemia with insulin and iv fluids
- Correct acidosis and reverse ketosis
- Monitor for complications of DKA (cerebral oedema).
- Correct electrolyte imbalances, especially potassium loss
- Restore blood glucose to near normal.
- Identify and treat any precipitating event.

Fluid requirements

- Fluids for resuscitation in shock:
 - Sodium chloride 0.9%, IV, 10–20 mL/kg over 10–30 minutes.
 - Repeat if shock persists.

- Fluid requirements after resuscitation
 - Fluid requirement = deficit + maintenance
 - Calculate deficit = estimated % dehydration x body weight (e.g. 10kg with 5% dehydration $10 \times 50 = 500\text{mL}$)
 - Calculate maintenance (mL): use the Holliday–Segar formula (max wt.75kg :
 - ≤1 year: $120 \text{ mL/kg}/24 \text{ hours}$
 - All children older than 1 year; it is the sum of the following:
 - First 10 kg body weight: $100 \text{ mL/kg}/24 \text{ hours}$
 - Second 10 kg body weight: $50 \text{ mL/kg}/24 \text{ hours}$
 - Additional weight > 20 kg body weight: $20 \text{ mL/kg}/24 \text{ hour}$
- Add the deficit to 48 hour maintenance and replace this volume evenly over 48 hours, initially with sodium chloride 0.9%.

Example 6 year old with 24kg

Deficit after resuscitation is $50 \times 24 = 1200\text{ml}$

Maintenance (100×10) + ($10 \times 50 + (4 \times 20)$) = $1580\text{ml}/24\text{hour}$

Maintenance in 48 hours = $1580 \times 2 = 3160\text{ml}$

Deficit + maintenance = $3160 + 1200 = 4360$

Rehydration will be $4360/48 = 91\text{ml}/\text{hour}$

- When blood glucose falls to < 15 mmol/L change the infusion to a dextrose containing maintenance fluid, e.g. dextrose 5% in sodium chloride 0.45%.
- Assess hydration status at least every 3 hours

Table 30. Alternative Rehydration plan

AGE	1 st hour	Next 7 hours	Next 16hours
< 1 yr	20 ml/kg	15 ml/kg	7 ml/kg
1 - 7 yrs	20 ml/kg	10 ml/kg	5 ml/kg
8 – 14 yrs	20 ml/kg	9 ml/kg	5 ml/kg
> 15 yrs	20 ml/kg	8 ml/kg	4 ml/kg

Emergency Insulin Therapy:

- Delay insulin until serum K+ is > 3,5 mmol/l
- Insulin should only be started after 30-60 minutes of fluid therapy, provided shock has been treated.
- Use regular Insulin short-acting (Actrapid or Humulin R), IV, 0.1 unit/kg, hourly
- If the rate of blood glucose fall exceeds 5 mmol/ L/hour or the blood glucose falls to 14 mmol/L:
 - Add a dextrose-containing fluid.
 - Do not stop the insulin while dextrose is being infused.
- If the blood glucose falls below 4 mmol/L:
 - Give a bolus of 2 mL/kg of dextrose 10% and increase the concentration of dextrose in the infusion.
- If glucose fall is inadequate, ie. a fall of < 4 mmol/l/hr - double the dose of insulin
- If glucose fall is excessive, ie a fall of > 5,5 mmol/l/hr - halve the dose of insulin
- Continue with IV insulin until:
 - Base deficit is < 5 or bicarbonate is ≥15 mmol/L,
 - There is no ketonuria,
 - Blood glucose is ≤10 mmol/L.

- If blood glucose stable and urine ketones negative, then start standard insulin regimen

Potassium (K+):

- If hyperkalaemia (serum K+ or ECG) withhold potassium supplementation
- If serum K+ is normal or low and patient is passing urine: Start K+ supplementation immediately
- K+ replacement will be necessary in all cases (even with initial hyperkalaemia)

Table 31. Doses

Serum Potassium	Required potassium supplement as KCL added to each litre of iv fluids
<3,0 mmol/l	40 mmol
3,0 - 4,0 mmol/l	30 mmol
4,1 - 5,0 mmol/l	20 mmol
5,1 - 6,0 mmol/l	10 mmol
6,0 mmol/l	None

Changing from intravenous to subcutaneous insulin

- When oral fluids are tolerated, reduce intravenous fluids.
- Subcutaneous insulin can be started once the child is well hydrated and able to tolerate a normal diet

Transitional insulin therapy (Sliding Scale):

Monitor Blood Glucose 4-hourly and give the corresponding amount of Soluble/Regular insulin subcutaneously

Blood Glucose Result	Amount of Soluble/Regular Insulin to be given
Less than 6 mmol/L	No Insulin
6.1 – 9.0 mmol/L	0.06 units/kg body weight
9.1 – 12.0 mmol/L	0.09 units/kg body weight
12.1–15.0 mmol/L	0.12 units/kg body weight
15.1–18.0 mmol/L	0.15 units/kg body weight

Sliding scale is considered when the patient is;

- Out of coma and no acidosis
- Continue the sliding scale, making appropriate adjustments to the doses of insulin, until the patient is eating normally and the urine is free of ketones. This may take on average between 12 – 24 hours.

Maintenance insulin therapy:

- Determine dose on normal requirement: 1 units/kg/day
- 2 Injections regimen:
 - Administer subcutaneously in the form of 50% intermediate acting insulin (NPH or Lente) and 50% rapid insulin. Total dose divided in 2 doses:
 - 2/3 before breakfast (1/2 rapid insulin and 1/2 intermediate acting insulin)
 - Remaining 1/3 before the evening meal (1/2 Rapid insulin and 1/2 intermediate acting insulin)

OR

- 4 Injections regimen (Prandial regimen): Total dose divided in 4 doses:
 - 50% of intermediate acting insulin at bed time
 - 50% of rapid acting insulin divided in 3 doses – 20% before breakfast, 10% before lunch and 20% before dinner

Treatment of intercurrent infection:

- Start empiric antibiotics on suspicion of infection until culture results are available: Cefotaxime 100mg/kg/day/7days

Recommendation:

- Regular follow-up of all diabetics is important to assess their blood sugar control
- Dietary education
- Physical activity
- Diabetes education
- Keep urine free of ketones

-- | Hypoglycaemia

Definition

Blood glucose levels below the lower limit of the normal range (blood glucose < 2.2 mmol/L, for malnourished children <3 mmol/L).

Causes/Risk factors:

Individuals with diabetes

- Excessive dose of medication anti-diabetic medication
- Omitted or inadequate amount of food
- Unaccustomed physical over activity
- Alcohol intake

Signs and symptoms:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Dizziness • Blurred vision • Headaches • Palpitation • Irritability and abnormal behaviour | <ul style="list-style-type: none"> • Sweating • Tremors • Tachycardia • Confusion • Unconsciousness • Convulsions |
|--|---|

Note: Patients with frequent hypoglycaemic episodes develop hypoglycaemia unawareness, where the symptoms above do not occur despite a dangerously low blood sugar level.

Nocturnal hypoglycaemia

Nightmares and headaches may be suggestive of nocturnal hypoglycaemia.

Blood glucose concentrations fall to their lowest levels between 02h00 and 04h00.

Grading of severity:

Mild (Grade 1)

- Child or adolescent is aware of, responds to and self-treats the hypoglycaemia.
- Children < 6 years of age can rarely be classified as grade 1 because they are unable to help themselves.

Moderate (Grade 2)

- Child or adolescent cannot respond to hypoglycaemia and requires help from someone else, but oral treatment is successful.

Severe (Grade 3)

- Child or adolescent is semiconscious or unconscious with or without convulsions and may require parenteral therapy with glucagon or intravenous glucose.

Diagnosis: is made on clinical signs and investigations

Investigations:

- Blood glucose

Management:

Outside the hospital

Mild or moderate hypoglycaemia:

- Glucose, oral, 5–15 g or 1–3 level teaspoons of sugar (depending on child's age) in a small amount of water.
- Wait 10–15 minutes.
- If blood glucose has not risen to 6–8 mmol/L, repeat above.
- As symptoms improve, the next meal or oral complex carbohydrate should be taken, e.g. fruit, bread, cereal, milk, etc.

Severe hypoglycaemia

- Glucagon, IM/SC, 0.1–0.2 mg/10 kg body weight.
 - If < 12 years of age: 0.5 mg.
 - If > 12 years of age: 1.0 mg.
- If glucagon is not available:
 - A teaspoon of sugar moistened with water placed under the tongue, every 20 minutes until patient awakes

In hospital

- 10% Glucose, IV, 2–4 ml/kg 1 to 3 minutes followed by 5–10% Glucose, IV, according to total daily fluid requirement until the patient is able to eat normally (Dextrose 50% 1 mL + water for injection 4 mL = 5 mL 10% dextrose solution).
- If IV dextrose cannot be given; give glucagon, IM/SC, 0.1–0.2 mg/10 kg body wt
 - If < 12 years of age: 0.5 mg.
 - If > 12 years of age: 1.0 mg.

Recommendation

- Monitor blood glucose every 15–30 minutes until stable, then repeat 1–2 hourly.
- Keep blood glucose between 6 and 8 mmol/L

Referral

- Recurrent episodes of hypoglycaemia.

-- | Guidelines for management of diabetics on sick days

Definition

Illness associated with fever tends to raise blood glucose because of higher levels of stress hormones, gluconeogenesis and insulin resistance.

Illness associated with vomiting and/or diarrhoea may lower blood glucose, with the possibility of hypoglycaemia and the development of starvation ketones.

Diagnostic criteria

- Unstable blood glucose measurements as a result of illness, stress or starvation.
- Increased insulin requirements are induced by a catabolic state and stress.
- Ketonuria may also indicate the following:
 - In the presence of hyperglycaemia, it is indicative of severe insulin deficiency and calls for urgent therapy to prevent progression into ketoacidosis;
 - In the presence of low blood glucose levels, it is indicative of a starvation state or is the result of a counter-regulatory response to hypoglycaemia.

General and supportive measures

- Monitor glucose more frequently.
- Test urine for ketones.
- Ensure adequate intake of calories and fluids on sick days to prevent ketogenesis. If insufficient calories are consumed, ketones will appear in the urine without hyperglycaemia. In this circumstance encourage the patient to eat whatever he/she feels like.
- Treat underlying intercurrent illness.

Special circumstances:

Gastroenteritis:

- If hypoglycaemia occurs especially with gastroenteritis, and there is mild ketonuria, ensure that the child takes regular frequent amounts of carbohydrate, using oral rehydration solution or intravenous fluids.

Loss of appetite:

- Replace meals with easily digestible food and sugar-containing fluids.

Vomiting:

- If the patient has difficulty eating or keeping food down and the blood glucose is < 10 mmol/L, encourage the patient to take sugar containing liquids. Give small volumes. Some glucose will be absorbed. If there is no vomiting, increase the amount of liquid.

Medications

Insulin therapy

- Insulin must be given every day. Insulin injections should not be omitted because of sickness and/or vomiting. If vomiting occurs, IV fluids may be needed to avoid hypoglycaemia
- During an infection, the daily requirement of insulin may rise by up to 25%.

Moderate urine ketones

- The extra dose of insulin is usually 10–20% of the total daily dose given as short acting insulin every three hours.
- If the blood glucose drops < 8.3 mmol/L, it may be necessary to sip regular juice or other sugar-containing drinks. This is done to raise the blood glucose before giving the next insulin injection.

Large amount of urine ketones

- Give 20% of the total daily insulin dose.
- Repeat as above if necessary.

Extra fluids

In addition to taking extra insulin, extra fluids, e.g. water and fruit juices are important to prevent acidosis. These fluids replace the fluids lost in the urine and prevent dehydration.

Referral

In a child with inter-current illness **urgent** specialist advice must be obtained when:

- Patient is unable to carry out the advice regarding sick days;
- The diagnosis is unclear
- Vomiting is persistent, particularly in young children;
- Blood glucose continues to rise despite increased insulin;
- Hypoglycaemia is severe;
- Ketonuria is heavy or persistent;
- The child is becoming exhausted, confused, hyperventilating, dehydrated or has severe abdominal pain.

— | Hypocalcaemia in Children

Definition

The adjusted serum calcium levels below the normal ranges (calcium is 2.2 - 2.6mmol/L). Symptoms of hypocalcaemia, such as muscle cramps, paraesthesia, tetany and carpopedal spasm, typically develop when serum adjusted calcium falls below 1.9mmol/L. However, this threshold varies and symptoms also depend on the rate of fall.

The main causes of hypocalcaemia in children are:

- Vitamin D deficiency
- Calcium deficiency
- Magnesium deficiency
- Reduced parathyroid hormone production or resistance,
- Impaired renal function.

Diagnosis: Based on clinical signs and symptoms

Signs and symptoms of tetany include:

- Paraesthesia
- Weakness
- Lethargy
- Cramps
- Laryngospasm
- Seizures
- Positive Trousseau's sign
- Carpopedal spasm
- positive Chvostek's sign
- Prolonged QT interval on the ECG.

Investigations

- Calcium
- Albumin

- Phosphate
- Kidney function
- Magnesium
- 25 Hydroxyvitamin D.

Medication

Acute hypocalcaemia

- Calcium gluconate 10%, IV, 1–2 mL/kg administered over 5–10 minutes, 6–8 hourly.
Maximum dose: 10 mL.
- ECG monitoring is advised.

If hypomagnesaemic:

- Magnesium sulphate 50%, IV/IM, 0.2 mL/kg every 12–24 hours.

Chronic therapy

- Long-c therapy depends on the cause.
- Manage hypophosphataemia or hyperphosphatemia, depending on the cause of hypocalcaemia, before long-term calcium is initiated.
- Elemental calcium oral, 50 mg/kg/day until normal calcium level is achieved (given with meals).
- Maintenance dose: 30 mg/kg/day
- If vitamin D deficient:
 - Vitamin D, oral:
 - Under 6 months 2500 IU/day
 - 6 months -12 years 5 000 IU/day
 - 12 - 18 years 10 000 IU/day
- For hypoparathyroidism and pseudohypoparathyroidism:
 - Calcitriol, oral, 0.01–0.04 mcg/kg/day. **OR**
 - Alfacalcidol, oral, 0.05 mcg/kg/day.
 - If < 20 kg: 0.05 mcg/kg/day.
 - If > 20kg: 1 mcg/day.

Referral

- Chronic hypocalcaemia.

MUSCULOSKELETAL CONDITIONS

— | Juvenile rheumatoid arthritis

Definition

Juvenile rheumatoid arthritis is a chronic non-suppurative inflammatory condition of the synovium.

Occurs in different forms

- **Systemic onset arthritis** (still's disease), occur at any age (mostly at 2–4 years old)
- **Polyarticular onset arthritis**, typically involves five or more joints, usually small joints
- **Pauciarticular onset arthritis**, commonest type of juvenile rheumatoid arthritis (50 %), less than five joints affected

Systemic onset arthritis:

Symptoms & signs:

- Arthritis in one or more joints.
- Plus 2 weeks of daily fever.
- With one of the following:
 - Erythematous macular rash, or
 - Serositis, i.e. pericarditis and pleuritis, or
 - Hepatosplenomegaly, or
 - Generalized lymphadenopathy

Polyarticular onset arthritis:

Signs and symptoms:

- Affects ≥ 5 joints in the first 6 months
- Involves large and small joints
- Rheumatoid factor either positive or negative
- Aggressive form of diseases with chronic course persisting into adulthood

Pauciarticular onset arthritis:

Signs and symptoms:

- Involves the large joints.(wrists, knees, ankles or elbows)
- Often asymmetrical distribution
- ≤ 4 joints are involved
- Associated with an increased risk of iridocyclitis/uveitis

Diagnosis

- Based on clinical signs

Investigations

- FBC, differential, ESR
- Rheumatoid factor
- X-ray of affected joints
- Anti-nuclear antibodies (ANA)

Complications

- Leg length discrepancy
- Scoliosis
- Contractures
- Iridocyclitis/uveitis

Management:

Non-pharmaceutical management

- Occupational and physiotherapy are essential
- Education of the patient and their families

Pharmaceutical management

- First choice: Brufen 5-10 mg/kg/dose x 3/day
- Alternative: Prednisone p.o. 2 mg/kg as a single daily dose for 1–2 weeks, continue with 0.3–0.5 mg/kg/day as single dose for 3 months
- If arthritis not controlled;
- Give methotrexate p.o. 0.3 mg/kg/week as a single dose on an empty stomach, increase at monthly intervals up to 1 mg/kg/week until there is satisfactory response, maximum dose is 25 mg/week + folic acid 5mg daily for methotrexate treatment

Recommendation

- Refer patient for rheumatology specialist consultation and adequate management (methotrexate treatment)

-- | Rickets

Definition

Failure to calcify osteoid tissue in a growing child, usually due to deficiency of vitamin D, its active metabolites, calcium, phosphorus or other rare causes. This leads to bone deformity. Occurs in ex-premature babies during infancy and in children with developmental disability, on anticonvulsants or not exposed to sunlight. In older children it is caused by renal tubulopathy and other rare conditions.

Diagnosis

Clinical signs

- Bowing of long bones, widening of metaphyses and cranial bossing.
- Rachitic rosary
- Occasionally convulsions or tetany due to hypocalcaemia.

Investigations:

- FBC
- Urea & Electrolytes, Creatinine
- Bone profile (Ca, Mg, Phosphate, Alkaline phosphatase)
- 25-OH Vitamin D levels (combined vitamin D2 and D3 (where possible))
- X-ray of wrists

General and supportive measures

- Prevent vitamin D deficiency.
- Exposure to sunlight, at least 3 hours a week.

Note: Breast milk does not contain adequate vitamin D to prevent deficiency.

- Ensure adequate sunlight exposure of infant or provide vitamin D until weaning.
- Normal vitamin D-containing diet for lactating mothers.

Medications**Prophylaxis**

- For premature babies:
 - Vitamin D, oral, 800 IU, once daily.
- Infants who are exclusively breastfed or not on adequate volume of commercial milk formula:
 - Vitamin D, oral, 400 IU once daily.

Treatment of active rickets

- Treat only after confirmation of active rickets on x-ray.
- Vitamin D, oral, 5 000 IU once daily, in addition to milk in the diet.
- Repeat X-ray after 6–8 weeks.
 - If no radiological improvement, further investigation is required.
 - If healing occurs, continue for 3 months. Confirm complete healing and adequate diet for the future.

Note: Children with low levels of calcium should have both calcium and Vit D. This intervention shows a complete recovery within 3 months of supplementation.

● HAEMATOLOGICAL CONDITIONS

— | Anaemia

Definition

Anaemia is defined as a haemoglobin (Hb) level below reference values, which vary depending on sex, age and pregnancy status

Haemoglobin level reference ranges

- 0-2 weeks: 12-20 g/dL
- 2-6 months: 10-17 g/dL
- months-1 year: 9.5-14 g/dL
- 1-6 years: 9.5-14 g/dL
- 6-18 years: 10-15.5 g/dL

Causes of anaemia

- Decreased production of red blood cells:
 - Iron deficiency, nutritional deficiencies (folic acid, vitamin B12, vitamin A)
 - Depressed bone marrow function, certain infections (HIV, EBV), renal failure;
- Loss of red blood cells
 - Acute or chronic haemorrhage
- Increased destruction of red blood cells (haemolysis)
 - Parasitic (malaria), bacterial and viral (HIV) infections
 - Haemoglobinopathies (sickle cell disease, thalassaemia)
 - Reaction to certain drugs (co-trimoxazole, etc.)

In tropical settings, the causes of anaemia are often interlinked.

Clinical symptoms and signs

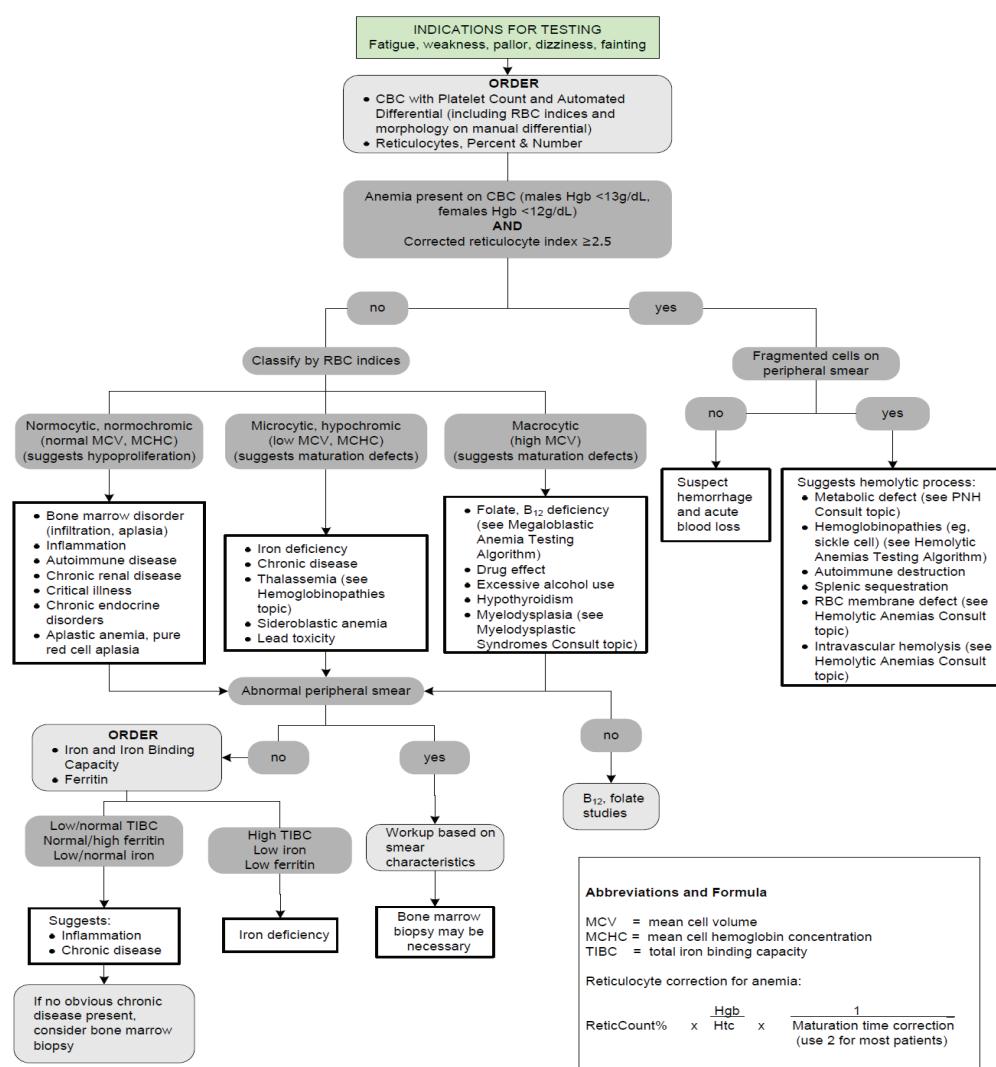
- Dizziness, fainting
- Headache
- Shortness of breath on exertion (exercise intolerance)

- Visual disturbances
- Poor growth
- Confusion, decreased mental activity
- Mood or sleep disturbances
- Pale mucous membranes, palms and nail beds
- Rapid heartbeat or palpitations
- Dyspnoea, tachypnea
- Signs of heart failure if severe anaemia
- Other signs of severe anaemia include: Heart murmur, sweating, thirst, cold extremities, oedema in the lower limbs and shock
- Some signs may indicate the likely cause of the anaemia:
 - Cheilosis (cracking of the corners of the mouth) and glossitis (nutritional deficiency)
 - Jaundice, hepatosplenomegaly, dark coloured urine (haemolysis)
 - Melena, haematuria, etc. (bleeding.)

Classification of anaemia

- Anaemia is classified according to physiologic process (decreased production, increased destruction or blood loss).
- In practice, classifying anaemia according MCV is a useful approach to assessing the common causes of anaemia in children

Algorithm for classification of anaemia



Investigations

Investigate according to clinical situation

- FBC, reticulocyte count and peripheral blood smear examination
- Blood film for malaria parasites/RDT
- Blood urea and serum creatinine
- Stool examination for eggs of hookworm, ova, parasites and occult blood,

Other tests that can be done at a tertiary level depending on the clinical presentation

- Sickling test/ Hemoglobin electrophoresis
- Analysis for nutritional deficiencies
- Bone marrow aspiration to assess the decreased production of red cells
- Coombs direct and indirect (in cases of haemolytic anaemia)
- Iron studies (Fe, Ferritin, TIBC, transferrin % saturation)

Reticulocytes

- Reticulocytes are circulating immature RBC. Reticulocyte count helps to categorize the anaemia into hypo-or hyper-proliferative type. Normal 0.5-1.5%

Hypoproliferative:

- Decreased reticulocytes
- Bone marrow unable to produce the required number of RBC's
- Lack of essential substance (iron, B12, folate) or Bone marrow infiltration such as in leukemia , Aplastic anaemia

Hyperproliferative:

- Increased reticulocytes
- Cause of anaemia outside marrow
 - Hemolytic anemia
 - Hemorrhage
 - Post anaemia treatment
- Decreased survival of RBCs
- Marrow normal and responds adequately by increasing the output

Corrected reticulocyte count (CRC) calculations:

- CRC = Reticulocyte % x (Patients' Hematocrit/Normal hematocrit per age). A CRC >1.5 suggests increased red blood cells production as a result of haemolysis and blood loss.

Management

At health centre: Follow IMCI guidelines

Refer the child urgently if:

- There is severe anaemia (Hb <5), oedema or the child is very unwell
- Has recurrent or persistent anaemia
- Has severe acute malnutrition

Management at district hospital level:

- Obtain a detailed history from the patient or care givers
- Examine the anaemic patient carefully and perform the appropriate investigations with a goal of;
 - Confirming that the patient is anaemic
 - Establishing the type of anaemia
 - Determining the cause of the anaemia
 - Determining whether or not there are complications arising from the anaemia, the cause of the anaemia or both

- Treat or correct the underlying cause
- Always investigate cause of anaemia before initiating treatment
- In an emergency, take all blood samples before treatment

Therapeutic objectives:

- Treat underlying cause of anaemia
- In sickle cell disease patients restore haemoglobin to steady state level
- In iron deficiency replenish iron stores after correction of anaemia (continue to treat for 2-3 months)

Non-Pharmaceutical management:

- Advise on a balanced diet especially iron-rich foods such as liver; beef kidneys; molasses; meat; sardines; eggs, fish; fresh green leafy vegetables..
- Malaria prevention
- Encourage exclusive breastfeeding until 6 months, then supplementation with iron rich food.
- Discourage use of cow's milk before 12 months and excessive intake of cow's milk.

Pharmaceutical management:

- For iron deficiency anaemia:
 - Elemental Iron 4-6 mg/kg/day divided in 3 doses daily until the Hb has reached the normal range.
 - Ferrous Sulphate has 20% elemental iron
 - Ferrous Fumarate has 33% elemental iron
 - Ferrous gluconate has 12% elemental iron.
 - Continue for 2-3 months after normalization of Hb to build up iron stores.
 - Side effects of iron therapy: Diarrhea, abdominal discomfort, constipation, or black stools
- Sickle cell disease patients should receive iron tablets only if there is evidence of iron deficiency. They should however, receive folic acid. Similarly, patients whose anaemia is possibly due to malaria should receive folic acid
 - Folic acid, oral: 5 mg every 2 days for 30 days or for as long as required.
- If anaemia is due to hookworms
 - Albendazole:
 - Children 1-2 years of age 200 mg as a single dose
 - Children over 2 years of age 400 mg as a single dose
 - Or Mebendazole 100 mg orally 12h x 3 days).
- Vitamin B12 deficiency:
 - Hydroxycobalamin injection IM: Initially 100mcg/day for 10-15 days. Maintenance dose 30-50 mcg/month. Lifelong treatment may be required.
- Severe anaemia with signs of cardiac failure will need treatment of the heart failure in addition to blood.
 - Transfusion with packed cells. Look for signs of decompensation before deciding to transfuse and look for these signs during transfusion.
 - Transfuse the patient if Hb < 5 g/dl and decompensation signs are present:
 - Packed cells: 10-20 ml/kg body weight slowly over 4 hours
 - To calculate the volume needed to increase Hb: Volume of packed red cells = (desired Hb – actual Hb) x weight x 0.4
 - Furosemide 1mg/kg IV should be given at the beginning of transfusion:
 - If signs of heart failure or
 - If there is normal circulating volume, such as in chronic severe anaemia
 - Make sure the CORRECT bag of blood is given and never transfuse blood that has been out of the refrigerator for more than 2 hours.
 - Make baseline recordings of temperature, respiratory rate and pulse rate, then observe patient closely every 15 minutes for transfusion reactions

Referral:

- Refer all patients with anaemia related to poor diet to a nutritionist or a health center for nutritional follow-up
- Refer all patients with recurrent anaemia or with anaemia of unknown cause to a referral hospital

— | Sickle cell anaemia

Definition

Chronic haemolytic anaemia characterized by sickle shaped red blood cells as a result of mutation in the β chain of Hemoglobin

Cause:

- Homozygous inheritance of mutated HbS (amino acid valine is substituted for glutamic acid in the position 6 of the β -chain)

Signs and symptoms:

- Impaired growth and development
- Anaemia and mild jaundice
- Hepatosplenomegaly (in younger children)
- Bone pain (especially long bones in children)
- Pain and swelling of the hands and feet (hand - foot syndrome) in children between 6 months and 3 years old.
- Arthralgia with fever
- Severe abdominal pain with vomiting
- Acute chest syndromes (sudden onset of fever, cough, chest pain, tachypnea leukocytosis and pulmonary infiltrates on x-ray): Must be aggressively treated may be fatal
- Tower shaped ("frontal and parietal bossing") skull

Investigations:

- Full blood count
- Peripheral blood smear
- Sickling test (Test d'Emmel)
- Hb electrophoresis

Complications:

- Infections (especially from encapsulated organism such as Streptococcus pneumoniae):
 - Osteomyelitis (Streptococcus pneumoniae and Salmonella)
 - Meningitis
- Aplastic crisis (commonly due to Parvovirus B19 infection)
- Stroke (infarctive) with hemiparesis and convulsions
- Gangrene (vaso-occlusive)
- Pulmonary hypertension
- Acute chest syndrome (sudden onset of fever, cough, chest pain, tachypnea leukocytosis and pulmonary infiltrates on X-ray): Must be aggressively treated as may be fatal
- Gall bladder stones +/- cholecystitis
- Splenic sequestration (in 5 first years of life): onset of life threatening anaemia with rapidly enlarging spleen and high reticulocyte counts
- Avascular necrosis of the femoral head is common
- Occlusion of major intracranial vessels may lead to hemiplegia

- Cranial nerve palsies and other neurological deficits
- Priapism

Management:

- **At health centre:** Refer all suspected sickle cell cases to a district hospital

Management aims at 4 types of crisis

- Thrombotic (vaso-occlusive, painful or infarctive),
- Aplastic
- Hyperhaemolytic due to Hypersplenism
- Acute splenic sequestration

Non-pharmacological treatment:

- IV or oral fluids 2L/m²/day
- Oxygen if in respiratory distress

Pharmaceutical treatment:

- Analgesics (WHO Step wise pain management)
 - Paracetamol 10-15mg/kg/dose orally every 4-6 hours associated with Brufen 5-10mg/kg/dose every 6-8 hours
 - Codeine 0.5-1mg/kg/dose every 6 hours
 - Pethidine 0.5-2mg/kg 4hrly)
 - Morphine (titrate to effect) PO: 0.2-0.5 mg/kg/dose every 4-6 hours, IV, IM, SC: 0.1-0.2 mg/kg/dose every 2-4 hours
- If patient has an infection treat according to the bacteria, the site and the severity of the infection
- Aggressively search for cause of infection (blood and urine cultures, chest X ray) and start empiric antibiotic treatment if child has fever
- Blood Transfusion: Transfusion should be reserved for the following circumstances:
 - Urgently for sudden, severe anaemia due to acute splenic sequestration, parvovirus B19 infection, or hyperhaemolytic crises.
 - Transfusion is indicated in the following situations:
 - Acute infarctive stroke
 - Severe acute chest syndrome
 - Multiorgan failure syndromes
 - Perioperative.
 - Priapism that does not resolve after adequate hydration and analgesia

Additional treatment:

- Give supplementary folic acid (5 mg oral daily) but AVOID iron (risk of hemochromatosis).
- Hydroxyurea should be given to patients with more than 3 crises per year. Start at a dose of 10 mg/kg PO daily and titrate by 5mg/kg every 8 to 12 weeks to a maximum dose of 25mg/kg/day.
- Homozygous should be vaccinated for *salmonella*, *Pneumococcal* and *Haemophilus influenza*

Recommendation:

- Education of patient on sickle cell disease and crisis to avoid complications
 - Should drink much water daily
 - Avoid getting cold (dress with warm clothes in cold weather)
- Sickle cell screening before marriage for suspected carriers and genetic counseling if possible
- Heterozygote carriers should have family members screened for sickle cell disease

— | Idiopathic thrombocytopenic purpura

Definition

Immune thrombocytopenia purpura (ITP) is an immunologically mediated bleeding disorder in which autoantibodies against platelet antigens cause premature platelet destruction that leads to thrombocytopenia.

Children often develop ITP after a viral infection and usually recover fully without treatment.

History:

- A previously healthy child who has sudden onset of generalized petechiae and purpura
- A history of a preceding viral infection 1–4 weeks before the onset of thrombocytopenia
- Acute bleeding from the gums and mucous membranes

Clinical manifestations:

- Findings on physical examination are normal, other than the finding of petechiae and purpura.
- Splenomegaly is rare, as is lymphadenopathy or pallor.
- Fewer than 1% of patients have intracranial hemorrhage
- The severity of bleeding in ITP is based on symptoms and signs, but not on platelet count
- Symptoms can be categorized as:
 - No symptoms (identified on routine blood tests showing severe thrombocytopenia)
 - Mild symptoms: bruising and petechiae, occasional minor epistaxis, very little interference with daily living
 - Moderate: more severe skin and mucosal lesions, more troublesome epistaxis and menorrhagia
 - Severe: bleeding episodes—menorrhagia, epistaxis, melena—requiring transfusion or hospitalization, symptoms interfering seriously with the quality of life

Diagnosis:

- Diagnosis is based on the history, physical examination, full blood count with leukocyte differential, and examination of the peripheral smear

Laboratory:

- FBC with differential (should not show any anaemia (unless significant bleeding) or anomaly of WBC count) - Profound thrombocytopenia (platelet count $<10 \times 10^9/L$).
- Peripheral blood film examination (will show large or giant platelets)
- HIV test
- Additional investigations are done as clinically indicated
- Bone marrow biopsy is only indicated if the patient has other cytopenias, suspicious findings on the peripheral smear, or other clinical features associated with bone marrow failure syndrome

Differential diagnosis:

ITP is a diagnosis of exclusion

- HIV infection
- Bacterial or viral infections
- Leukemia
- Aplastic anaemia
- Systemic lupus erythematosus (SLE)
- Wiskott-Aldrich syndrome (WAS)) must be considered in young males found to have low platelet counts, particularly if there is a history of eczema and recurrent infection.

Management

The goal of therapy is to reduce the risk for bleeding so that patients can live a normal life. The decision to treat a child should be based on the clinical symptoms and not the platelet count.

Table 32. Management of ITP according to risk category

Risk category	Symptoms	Management
Low	<ul style="list-style-type: none"> Many petechiae or large bruises Painless oral/palatal petechiae or purpura. Dry blood clots in the nostril/nares 	<ul style="list-style-type: none"> Outpatient without medical treatment (unless significant psychosocial or safety concerns) Repeat FBC and review in 1 week Provide family education
Moderate	<ul style="list-style-type: none"> Epistaxis >5 minutes Haematuria Haematochezia Painful oral purpura Significant menorrhagia 	<ul style="list-style-type: none"> Admission to hospital Discuss with Paediatrician/Paed Haematologist Transfuse with Platelets to stop bleeding Prednisolone 2 mg/kg (max 60 mg) for 4–7 days If poor response or rapid platelet rise is required e.g. before surgery: IVIG 0.8–1.0 g/kg/day for 1–2 days IV Rh (D) immune globulin can be used in Rh positive patients at a dose of 50–75 microgram/kg. Additional treatments: <ul style="list-style-type: none"> Epistaxis: oral tranexamic acid 25 mg/kg (max 1.5 g), ENT consult where possible Heavy menstrual bleeding: tranexamic acid (must not be used if haematuria is present)
Severe Life-threatening	<ul style="list-style-type: none"> Suspected internal haemorrhage (brain, lung, muscle, joint, etc.) OR Mucosal bleeding that requires immediate intervention 	<ul style="list-style-type: none"> Urgent transfer to a tertiary hospital after stabilisation Combination IVIG 0.8–1 g/kg and pulse IV Methylprednisolone 15–30 mg/kg (max 1 g) daily for 3 days Platelet transfusion 20 mL/kg, continuous if required IV tranexamic acid 15 mg/kg Urgent surgical intervention or referral depending on site of bleeding

Splenectomy in ITP

- Splenectomy removes the primary site of platelet clearance and autoantibody production and offers the highest rate of durable response (50% to 70%) compared with other ITP therapies
- It should be reserved for 1 of 2 circumstances:
 - The older child (> 4 yrs.) with severe ITP that has lasted >1 yr. (chronic ITP) and whose symptoms are not easily controlled with steroids and IVIGs is a candidate for splenectomy.

- Splenectomy must also be considered when life-threatening hemorrhage (intracranial hemorrhage) complicates acute ITP, if the platelet count cannot be corrected rapidly with transfusion of platelets and administration of IVIG and corticosteroids.

Family education

- On the illness/diagnosis
- Restrict activities to minimise the risk of head injury
 - Avoid contact sports (e.g. Rugby, Soccer)
 - Limit activities that have a risk for traumatic injury (e.g. Bicycle riding)
- Avoid anti-platelet, non-steroidal and anticoagulant medications.
- Avoid intramuscular injections
- Monitor for significant bleeding symptoms and go immediately to the emergency department if they occur
- Monitor for signs of ICH and go immediately to the emergency department if head injury or severe headache
- Consider discharge when family understands the condition, management, activity restrictions, follow-up plan and when to go to the emergency department

Splenectomy in ITP

- Splenectomy removes the primary site of platelet clearance and autoantibody production and offers the highest rate of durable response (50% to 70%) compared with other ITP therapies
- It should be reserved for 1 of 2 circumstances:
 - The older child (> 4 yrs.) with severe ITP that has lasted >1 yr. (chronic ITP) and whose symptoms are not easily controlled with steroids and IVIGs is a candidate for splenectomy.
 - Splenectomy must also be considered when life-threatening hemorrhage (intracranial hemorrhage) complicates acute ITP, if the platelet count cannot be corrected rapidly with transfusion of platelets and administration of IVIG and corticosteroids.

General transfusion policy management:

Red blood cells:

In children and adolescent:

- Low Hb and symptomatic
- Asymptomatic but Hb <5 g/dl
- Fever and Hb <8.0 g/dl
- Hb <8.0 g/dL in the perioperative period
- Serious infection and Hb <10.0 g/dl
 - Volume packed cells necessary = 3 x weight in Kg x requested rise in Hb.
 - Keep volume within limits e.g. do not transfuse 3 litre blood for chronic anaemia
- Postpone blood transfusion at diagnosis if WBC >100x10⁹/l (Leukaemia is likely and high risk of increased viscosity).
- In infants within the first 4 months of life:
 - Hb <10 g/dL and major surgery
 - Hb < 10 g/dL and pulmonary disease

Platelets:

- Asymptomatic but platelets <10.0x10⁹/l
- Symptomatic (petechiae, fever from serious mucositis) and platelet <20.0x10⁹/l
- Before LP if platelets <30.0x10⁹/l or DIC or high WCC.
- Before surgical procedure if platelets <50.0x10⁹/l

Reference

Hume: Clinical Practice of Transfusion Medicine Petz LD et al (eds) 3rd edition. New York, Churchill Livingstone 1996: 705 – 732.

Table 33. Management of transfusion reactions

Severity	Signs	Transfusion	Treatment
Mild	Itchy rash	Slow rate	<ul style="list-style-type: none"> Promethazine 0.125mg/Kg (Max 25mg) Continue if stable after 30minutes
Moderate	Severe rash Fever Rigor Tachycardia	Stop	<ul style="list-style-type: none"> Promethazine 0.125mg/Kg (Max 25mg) Hydrocortisone 4mg/kg IV (max 100mg) Nebulize with salbutamol if wheezing If stable restart with new blood
Severe	Shock Haemolysis Bleeding Collapse	Stop	<ul style="list-style-type: none"> Maintain airway and give oxygen Normal saline bolus 20ml/kg Adrenaline 1:1000 at 0.01 mg/kg (Max 0.3mg) every 2-5 minutes IM. In refractory cases, drip (0.1 mcg/kg/min) Promethazine 0.125mg/Kg (Max 25mg) Hydrocortisone 4mg/kg IV (max 100mg) Nebulize with salbutamol if wheezing Consider and treat for sepsis Preferably observe in high dependency unit

CENTRAL NERVOUS SYSTEM

Convulsions

(For neonatal convulsions refer to neonatal protocol)

Definition:

A convulsion is an involuntary change in movement, attention or level of awareness that is sustained or repetitive and occurs as a result of abnormal and excessive neuronal discharges within the brain. Convulsions may be focal (Partial) or generalised

Generalised seizures may be:

- Tonic-clonic,
- Absence (typical or atypical),
- Clonic,
- Tonic or atonic,
- Myoclonic

Focal seizures:

- Affect one part of the body but may progress to generalised tonic-clonic seizures and this is known as secondary generalisation.

Signs & symptoms of convulsions

- Shaking of body; can be generalised or focal
- Unresponsive, eyes rolling back, biting tongue or frothing of mouth
- Followed by post-ictal period (sleepiness after)

Causes

- Febrile convulsions
- Malaria
- Meningitis/Encephalitis
- Hypoglycaemia
- Hyponatraemia/ Hypernatraemia/Hypocalcaemia
- Epilepsy
- Poisoning
- Head injury, hypoxic injury

Investigation

- Bedside blood sugar level
- Malaria slide or Rapid Diagnostic Test (RDT)
- Full Blood count
- Urea, Creatinine, sodium, potassium and calcium (where possible)
- Consider lumbar puncture:
 - If signs of meningitis (fever, neck stiffness, bulging fontanelle or irritability)
 - DON'T do a lumbar puncture if the child is very sick or there are signs of raised intracranial pressure (unequal or unresponsive pupils, papilloedema, abnormal breathing)

Management**During seizure management**

- Airway and Breathing: Clear airway; place child on side, protect from trauma, loosen clothing and suction secretions if possible
- Make sure child is breathing; if not, give breaths using bag and mask
- Give oxygen
- Check blood sugar & treat as per the hypoglycaemia guideline
- Most seizures are quickly self-limited. Immediate administration of an anticonvulsant is not systematic.
- If generalized seizure lasts more than 5 minutes, use diazepam to stop it:
 - Diazepam
 - Infants and Children 6 months to 5 years: Rectal: 0.5 mg/kg rectally without exceeding 10 mg
 - Children 6 to 11 years: Rectal: 0.3 mg/kg.
 - Children \geq 12 years and Adolescents: Rectal: 0.2 mg/kg.
 - In all cases if seizure continues, repeat dose once after 10 minutes.
 - Monitor respiratory rate.
- If still fitting after 20 minutes
 - IV Phenobarbitone (loading 20mg/kg over 15 mins, max 1g) OR
 - IV phenytoin (loading dose 20mg/kg in Normal saline over 60 mins)
 - If seizure continues after Phenobarbitone/Phenytoin, treat as status epilepticus.

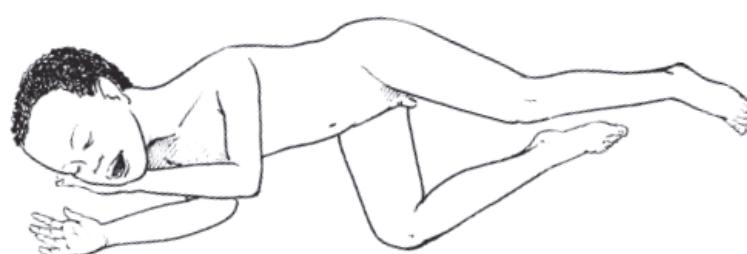


Figure 6. How to position an unconscious child

-- | Febrile seizures

Definition

Seizures occurring in children between the ages of 6 months and 6 years associated with a fever but without evidence of intracranial infection or defined cause for the seizure. Febrile seizures can be simple or complex febrile seizures.

Simple febrile seizures:

- Are generalised tonic-clonic seizures
- Are self-limiting, usually less than 5 minutes and always less than 15 minutes
- Cause no neurological deficit after the convulsion
- Have a good prognosis and very rarely develop into epilepsy
- Consist of only one seizure during the febrile illness which needs no specific treatment
- There is often a family history of febrile seizures.

Complex febrile seizures:

Febrile seizures with one or more of the following:

- Last longer than 15 minutes
- Are recurrent within the same febrile illness or occur within 24 hours
- Have a focal (partial) onset
- Have post-ictal, focal neurological abnormalities.

Risk factors for recurrent febrile seizures include:

- Seizure disorder in a first degree relative,
- Onset before 12 months of age

Diagnostic criteria

Clinical

- Exclude intracranial, extracranial and biochemical causes of fever or seizure.
- Signs of meningism are unreliable in children < 2 years of age.
- Treat children empirically for meningitis if suspected.

Investigations

- Bedside blood sugar level
- Malaria slide or Rapid Diagnostic Test (RDT)
- Full Blood count
- Urea, Creatinine, sodium, potassium and calcium (where possible)
- Lumbar puncture is indicated in:
 - All children with clinical features of possible meningitis,
 - Children where meningitis cannot be excluded, e.g. < 1 year of age or those who have received a course of antibiotics prior to the event.

In children > 1 year of age, where a focus of extracranial infection is present and intracranial infection such as meningitis has been excluded clinically, no further investigation is required.

Neuroimaging

- All children with complex febrile seizures and persistent lethargy require Brain CT scan before doing a lumbar puncture to exclude raised intracranial pressure
- Based on clinical findings, investigate complex febrile seizures for possible underlying conditions such as meningitis, focal brain lesions, cerebral malaria and epilepsy.

Note: An EEG is of no value in simple febrile seizures, but consider in recurrent complex febrile seizures.

General and supportive measures

- Reassure parents and caregivers.
- Educate parents and caregivers regarding the first aid management of seizures.

Medicines

- Treat fever with Paracetamol, oral, 15 mg/kg/dose 6 hourly.
- If convulsing: Infants and children 6 months to 5 years: Rectal Diazepam 0.5 mg/kg without exceeding 10 mg

Note: For children with recurrent complex febrile seizures, discuss the treatment options with a Paediatrician.

— | Epilepsy

Definition:

Epilepsy is a condition characterized by recurrent seizures associated with abnormal paroxysmal neuronal discharges. When seizures are recurrent, persistent or associated with a syndrome, then the child may be diagnosed with epilepsy.

Causes:

- Idiopathic (70-80%)
- Secondary causes:
 - Cerebral dysgenesis or malformation
 - Cerebral vascular occlusion
 - Cerebral damage like hypoxic ischaemic encephalopathy (HIE), intraventricular haemorrhage or ischemia, head injury, infections
 - Cerebral tumors
 - Neurodegenerative disorders

Types of epilepsy and their clinical presentation

Infantile spasms (West's Syndrome) Clinical Signs/Symptoms:

- Onset is during the first year of age
- Epileptic spasms (flexion and extension) associated with hypersarrhythmia on the EEG
- Developmental regression
- Child appears to stare, with a sudden flexion of the trunk and head, limbs either flung in or out but held in a tonic spasm for a few seconds
- Red appearance in the face and may cry out

Generalized epilepsy with febrile seizures

Clinical Signs/Symptoms:

- Febrile convulsions which persist beyond 6 years
- Often family history of febrile convulsions
- Occasionally associated with afebrile convulsions

Primary generalized absence seizure of childhood (Petit mal)

Clinical Signs/Symptoms:

- Onset 4 - 6 years of age
- Short spells of motor arrest of maximum 15 seconds duration with little or no associated movements and no post-ictal effect

Benign Rolandic epilepsy with centrotemporal spikes

Clinical Signs/Symptoms

- Onset usually between 6–10 years but can occur before 6 years of age
- Sleep related events of hemi-facial clonic spasm
- Inability to speak with retained awareness
- Usually resolves by late adolescence

Severe Myoclonic Epilepsy of Infancy

Clinical Signs/Symptoms:

- Occur in children under 1 year of age
- Recurrent clusters of febrile convulsions, severe neuro-regression and other non-febrile seizures by 2-3 years of age

Lennox-Gastaut syndrome

Clinical Signs/Symptoms:

- Onset between 2 - 3 years of age
- Combination of generalized tonic clonic seizures, atypical absences, myoclonic seizures, atonic drop attacks and occasionally complex partial seizures
- Behavioral problems and neuro-regression

Note: Infantile spasms, Severe Myoclonic Epilepsy of Infancy and Lennox-Gastaut syndrome are regarded as malignant forms of epilepsy and are associated with neuro-regression and behavioral problems.

Complications:

- Status Epilepticus
- Trauma secondary to loss of consciousness during seizures
- Mental retardation

Diagnosis:

- Detailed clinical history and physical examination

Investigations:

- Blood work up : Full Blood count, blood sugar, malaria test, Urea, Creatinine, sodium, potassium and calcium depending on the type of epilepsy
- Electroencephalogram (EEG)
- CT scan of the brain /MRI of the brain

Management:

Non Pharmaceutical

Acute management:

- Manage Airway-Breathing-Circulation-Disability and continue to monitor throughout the seizures
- Place patient on side at 20 – 30° head up to prevent aspiration
- Monitor heart rate, respiratory rate, blood pressure, oxygen saturation (SaO_2), neurological status, fluid balance
- Monitor laboratory values including blood glucose, electrolytes, if available blood gases toxicology screen and if indicated anticonvulsant blood levels
- Control fever with Paracetamol with or without tepid sponging
- Administer oxygen to maintain SaO_2 of $\geq 95\%$
- If unable to protect airway or poor ventilation, consider use of an oral airway, bag-mask ventilation and/or intubation
- Admit to pediatric ward or to intensive care unit if indicated

Long-term management:

- Minimize the impact of the epilepsy by obtaining complete seizure control to maximize child's full potential
- Educate/counsel the patient and caregiver about epilepsy and associated complications (i.e. learning difficulties)

Pharmacological treatment in children >1 month of age:

*Please refer to neonatology protocols 3rd Edition June 2019 for management of convulsions in children <1 month of age.

Monotherapy is preferred but combination therapy may be necessary. Combination therapy should be initiated by or in close consultation with a pediatric specialist or neurologist. Drug levels are rarely indicated unless there is concern about toxicity or compliance.

For acute generalized tonic clonic seizures in children > 1 month of age:

- Diazepam rectal 0.5 mg/kg once OR IV 0.2-0.3mg/kg once
- Repeat after 10 minutes same dose only once
- Monitor airway and breathing closely

Alternative Medications (in the absence of diazepam):

- Lorazepam IV 0.05- 0.1 mg/kg once, may repeat in 5 minutes for a total of 3 doses
- Clonazepam IV 0.1 -0.15 mg/kg loading dose by slow IV injection
- For refractory status epilepticus: Midazolam IV 0.1-0.3 mg/kg bolus followed by a continuous infusion starting at 1 ug/kg/minute. The infusion can be titrated upwards every 5 minutes as needed.

If persistent seizure activity after benzodiazepines, start:

- Phenobarbital 15-20 mg/kg IV or by NG tube loading dose over 15minutes, may use a dextrose containing solution. If no response after 30 minutes, may repeat a 10 mg/kg IV loading dose.
- Phenytoin 15-20 mg/kg IV infused over 30 minutes in Normal saline
- If seizures persist after loading of dose of either Phenobarbital or Phenytoin, manage as status epilepticus below and arrange to transfer to a centre with high dependency unit/intensive care unit
- Monitor for bradycardia, arrhythmias, and hypotension and pause the infusion if they occur and restart at 2/3 of the initial loading dose.

Ongoing seizure control: Children with epilepsy require maintenance anticonvulsants

Table 34. Maintenance medicine treatment choices for different types of epileptic seizures.

Type of epilepsy	First line treatment	Second line treatment
Generalised tonic and/or clonic	<ul style="list-style-type: none"> • Valproate OR • Phenobarbitone (< 6 months old) 	<ul style="list-style-type: none"> • Lamotrigine
Focal seizures	<ul style="list-style-type: none"> • Carbamazepine 	<ul style="list-style-type: none"> • Lamotrigine • Topiramate
Infantile epileptic spasms	<ul style="list-style-type: none"> • Stabilize then consult paediatric neurologist 	
Myoclonic	<ul style="list-style-type: none"> • Stabilize then consult paediatric neurologist 	
Lennox-Gastaut syndrome	<ul style="list-style-type: none"> • Stabilize then consult paediatric neurologist 	

Maintenance medicine treatment dosage

- Valproate, oral, 5 mg/kg/dose (starting dose), 8–12 hourly.
 - Increase by 5 mg/kg weekly to 15–20 mg/kg/day given 8–12 hourly over 4 weeks.
 - Maximum total daily dose: 40 mg/kg/day.
 - Exclude liver dysfunction prior to initiating therapy (at least ALT).
 - Monitor at least clinically for hepatotoxicity.
- Carbamazepine, oral, 5 mg/kg/dose (starting dose), 8-12 hourly.
 - Increase slowly by 0.2 mg/kg at 2 weekly intervals to 5–10 mg/kg/dose 8–12 hourly.
 - Usual maintenance total daily dose: 10–20 mg/kg/day.
 - Maximum total daily dose: 20 mg/kg/day.
 - Dosage intervals: syrup 8 hourly, tablets 12 hourly.
 - Exacerbates myoclonic seizures and absence seizures..
- Phenobarbitone, oral, 2.5–5 mg/kg/dose as single dose at night.
 - May be used in children under six months of age.
 - Is not recommended as maintenance therapy for children older than 2 years due to undesirable side effects such as sedation, behaviour disturbances, hyperkinesia and dependence, except in situations where there is poor adherence to other drugs.
 - Exacerbates absence seizures

Note:

- Patients not responding to these medications should be referred to a referral hospital for possible use of second line drugs like Lamotrigine and Topiramate
- Avoid prescribing carbamazepine, phenobarbital, and phenytoin for patients receiving NNRTIs or PIs, as there are serious interactions involved

Referral

- All cases of suspected infantile spasms or myoclonic seizures.
- If there is concern for a secondary cause of epilepsy requiring further evaluation (examples include brain tumors, tuberous sclerosis, brain abscess, cysticercosis, etc.). This is particularly true in partial seizures where there may be a focal neurological problem.
- Seizures that are not controlled on first-line medications within 1 month.
- Seizures associated with neuro-regression.
- Mixed seizure types within one patient.

-- | Convulsive status epilepticus

Definition

Status epilepticus is a generalized epileptic seizure lasting 5 or more minutes, or the presence of two or more seizures without recovering consciousness within 30 min, or a focal seizure that persists for >10 min, or with altered consciousness lasting for 60 min or more

Causes:

Epilepsy syndromes may present first as status epilepticus or status epilepticus may occur with inadequate anti-epileptic drug levels

- CNS infection
- Hypoxic ischemic insult
- Traumatic brain injury
- Cerebrovascular accidents
- Metabolic disease including severe hypoglycemia and inborn errors of metabolism
- Electrolyte imbalance

- Intoxication
- Cancer including primary brain tumors and metastatic disease

Signs and Symptoms

- Seizure lasting > 30 minutes or repetitive seizure activity without return to baseline consciousness.

Diagnosis

- Clinical evaluation

Investigations

- Blood work up : Full Blood count, blood sugar, malaria test, Urea, Creatinine, sodium, potassium and calcium depending on the type of epilepsy
- Lumbar puncture if infectious cause is suspected.
- Electroencephalogram (EEG)
- CT scan of the brain /MRI of the brain

Complications:

- Hypoxic ischaemic damage to brain, myocardium and muscles
- Cerebral oedema
- Long term neurologic morbidity including persistent seizures or encephalopathy
- Respiratory depression or failure due to neurologic status or aspiration
- Blood pressure disturbances including severe hypotension or severe hypertension
- Hyperthermia
- Metabolic derangement including hypoglycemia, alterations in sodium, and acidosis
- Inappropriate antidiuretic hormone (ADH) secretion
- Renal failure
- Death

Non-pharmaceutical

Acute Management:

- Carefully evaluate vital signs as convulsions may cause alterations in blood pressure or interfere with breathing resulting in a decrease in oxygen saturation levels
- Manage Airway-Breathing-Circulation-Disability and continue to monitor throughout seizures
- Place patient on side at 20–30° head up to prevent aspiration
- Monitor heart rate, respiratory rate, blood pressure, oxygen saturation (SaO_2), neurological status, fluid balance every 15 minutes or as frequently as possible
- Monitor laboratory values including blood glucose, electrolytes, blood gases, toxicology screen and if indicated anticonvulsant blood levels
- Control fever with Paracetamol
- Administer oxygen to maintain SaO_2 of $\geq 95\%$
- If unable to protect airway or poor ventilation, consider use of an oral airway, bag-mask ventilation and/or intubation
- Admission to intensive care if possible

Pharmacological treatment of status epilepticus

- Diazepam
 - Infants and Children 6 months to 5 years: Rectal: 0.5 mg/kg rectally without exceeding 10 mg
 - Children 6 to 11 years: Rectal: 0.3 mg/kg.
 - Children ≥ 12 years and Adolescents: Rectal: 0.2 mg/kg.
 - In all cases if seizure continues, repeat dose once after 10 minutes.
 - Monitor respiratory rate.
- If still fitting after 20 minutes

- IV Phenobarbitone (loading 20mg/kg over 15 mins, max 1g) OR
- IV phenytoin (loading dose 20mg/kg in Normal saline over 60 mins)
- If seizure continues after Phenobarbitone, load with Phenytoin or if it persists after Phenytoin loading dose, load with Phenobarbitone if seizures continue despite the above, transfer to ICU for Endotracheal intubation and thiopental infusion

It is important to continue to address and manage the following:

- ABCs
- Hypoxia: Administer oxygen, oral airway, bag-mask ventilation or intubation.
- Haemodynamic: Assess for shock or hypertension and manage accordingly.
- Hyperthermia: Treat with paracetamol 10-15 mg/kg orally or rectally every 4-6 hours as required.
- Hypoglycemia: Treat with IV dextrose solution.
- Electrolyte imbalance: Assess aetiology and manage accordingly.
- If cerebral oedema and normal renal function, consider mannitol IV 0.5-1 gram/kg administered over 30–60 minutes.
- If there is a known space-occupying lesion, consider dexamethasone IV 1-2 mg/kg IV as a single dose then 1-1.5 mg/kg/day divided into 4 doses after discussion with a neurosurgeon

Recommendations

- Once status epilepticus is resolved, consider maintenance therapy with an appropriate anti-epileptic drug depending on the aetiology of seizure.
- Referral to a specialist is always appropriate in the case of status epilepticus. If possible, control seizures and stabilize the patient before referral. If status epilepticus has resolved, further work-up by a neurologist may be indicated.

Table 35. Phasic management of status epilepticus

Phase	Management	Goals
<i>Early status 0-5 minutes</i>	Early stabilisation phase <ul style="list-style-type: none"> ● Immediate ABC ● Diagnose hypoglycaemia ● Establish IV access ● Lorazepam, IV, 0.1 mg/kg ● Diazepam 0.3 mg/kg over 3 minutes (rectal is preferred) If no IV access: <ul style="list-style-type: none"> ● Diazepam, rectal, 0.5 mg/kg ● OR ● Lorazepam, IM, 0.1 mg/kg 	<ul style="list-style-type: none"> ● Maintain oxygen saturation ● Maintain cerebral perfusion pressure ● Support haemodynamic status
<i>Emergent initial antiepileptic drug (AED) 5 minutes</i>	If still convulsing after 5-10 minutes <ul style="list-style-type: none"> ● Repeat Lorazepam, IV, 0.1 mg/kg OR ● Diazepam, rectal, 0.5 mg/kg ● And load with Phenytoin, IV, 20mg/kg (infused in normal saline over 30 minutes OR ● Phenobarbitone, IV, 20mg/kg If still convulsing after 15-20 minutes (use alternative option to what was used above) <ul style="list-style-type: none"> ● Refer ICU 	<ul style="list-style-type: none"> ● Stop seizure ● Control status epilepticus
<i>Established Status 5-30 minutes</i>		
<i>Urgent Status Control Therapy</i>		
<i>Refractory Status 30-60 minutes</i>	ICU <ul style="list-style-type: none"> ● Consideration for Midazolam infusion ● Endotracheal intubation and thiopental infusion 	<ul style="list-style-type: none"> ● Stop seizure ● Support haemodynamic status

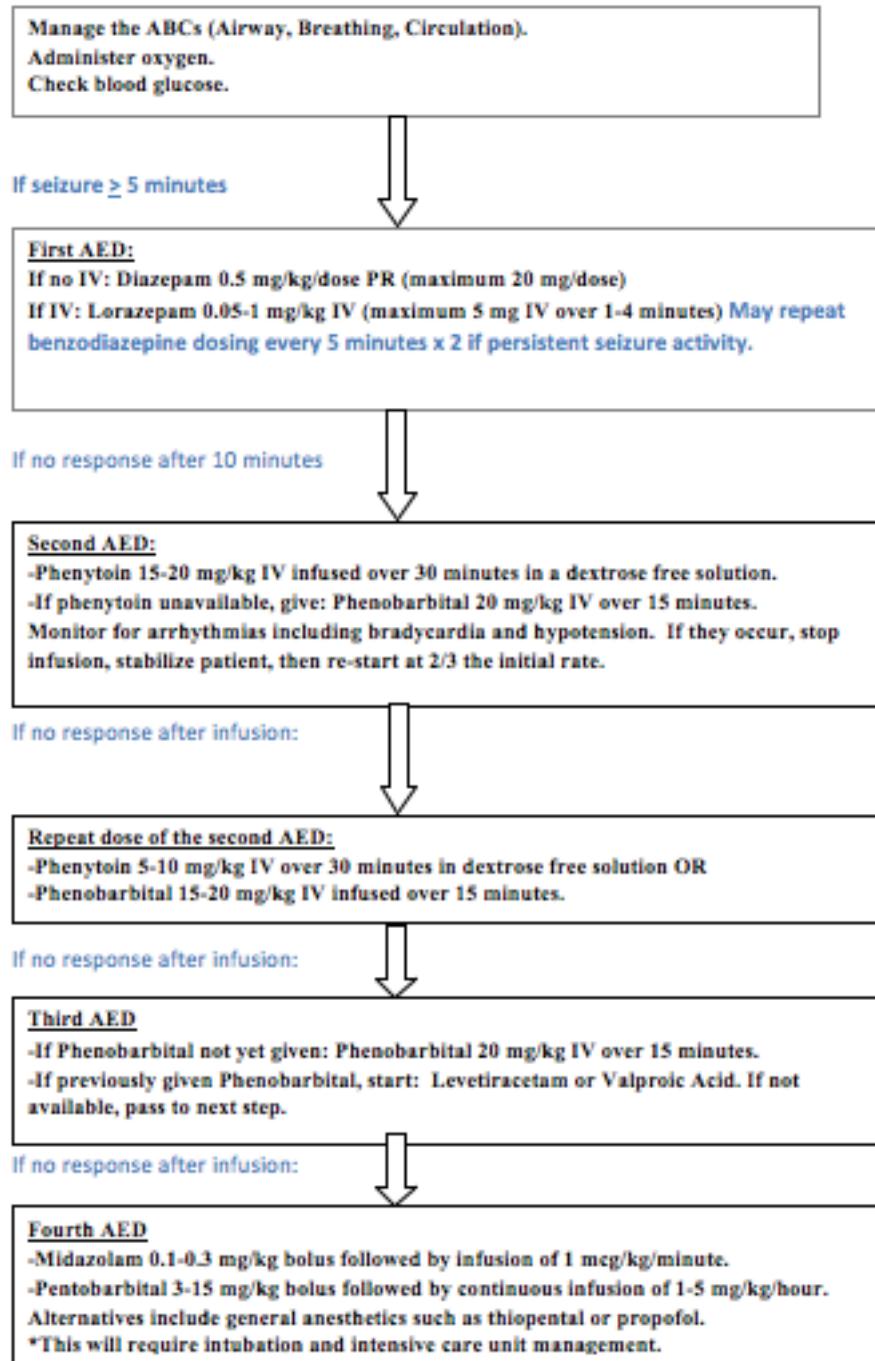


Figure 7. A flowchart showing medical management of Status Epilepticus

-- | Cerebral palsy

Definition

Cerebral palsy is a group of non-progressive clinical syndromes due to brain abnormalities from a variety of causes that is characterized by motor and postural dysfunction of varying severity. Though it is not progressive, the appearance of the brain lesions and the clinical manifestations may change over time as the brain matures.

Causes:

- The etiology of the disorder is unknown in 70% of the cases
- Congenital infections (TORCH)
- Obstetric complications leading to perinatal hypoxia (toxemia, placenta previa, abruptio placentae, etc.)
- Teratogenic substances
- Congenital abnormalities including brain malformations and hereditary disorders
- Prematurity with Intracranial hemorrhage
- Cerebral trauma
- Infections (Bacterial sepsis, meningitis, herpes)
- Metabolic disturbances (kernicterus, severe prolonged hypoglycemia, Reye's syndrome)
- Intoxication

Clinical Signs/Symptoms:

Findings are consistent with a specific CNS lesion and commonly include:

- Spastic syndromes : diplegia, hemiplegia, or quadriplegia
- Dyskinetic syndromes : athetosis, chorea or dystonia
- Ataxic syndromes
- Atonic syndromes
- Abnormal persistence or absence of infantile reflexes

Associated Disorders & Complications may include:

- Cognitive impairments. Intellectual disability, learning problems and perceptual difficulties are common. There is a wide range of intellectual ability and children with severe physical disabilities may have normal intelligence
- Psychiatric disorders : Behavioral, emotional or psychiatric disorders
- Epilepsy: This occurs in 45% of patients with CP and the onset is generally in the first 2 years of life.
- Gastro-oesophageal reflux can result in oesophagitis or gastritis, causing pain, poor appetite and aspiration.
- Speech, swallowing, vision and hearing problems
- Constipation
- Drooling (poor saliva control).
- Incontinence. Children may be late in achieving bowel and bladder control because of cognitive deficits or lack of opportunity to access toileting facilities because of physical disability or inability to communicate. Some children have detrusor over activity causing urgency, frequency and incontinence.
- Growth failure: This is generally due to poor nutrition.
- Pulmonary disease: This is usually due to chronic aspiration and chronic pulmonary disease is a leading cause of death in patients with CP.
- Orthopedic disease: This includes hip and foot deformities and spinal curvatures. Patients may have chronic back, neck, and joint pain.

- Osteopenia: This is multifactorial related to poor nutrition, lack of motility and chronic medication use.
- Visual problems e.g. strabismus, refractive errors, visual field defects and cortical visual impairment
- Hearing deficits

Diagnosis:

- Based on history and clinical examination of the patient.

Investigations:

- Neuro-imaging including brain ultrasound, CT or MRI
- Lumbar puncture if indicated
- Basic lab-work to exclude other abnormalities (liver and renal function tests)
- Genetic screening depending on the clinical and family history
- Metabolic screening depending on the clinical and family history and basic lab work
- EEG
- Audiogram and visual evaluation to exclude correctable hearing or vision loss
- X-rays if indicated

Common reasons to come to hospital

- Respiratory problems particularly pneumonia
- Uncontrolled seizures / status epilepticus
- Unexplained irritability - consider acute infections, oesophagitis, dental disease, hip subluxation, pathological fracture.

Management:

Management involves a team approach with health professionals and teachers. Input from the family is paramount

- Perinatal asphyxia may be managed by passive or active hypothermia as per the neonatology protocols.
- Pharmacologic management of seizures (see above)
- Multidisciplinary services to address and promote social and emotional development, communication, education, nutrition, mobility and maximal independence and normal appearance.
 - Physical, occupational, and speech language therapy as necessary
 - Social services provided in a variety of context to aid in the coordination of care.
 - Nutritional assessment and support for those with dysphagia and/or poor growth
 - Mobility aids including crutches, walkers, or wheelchairs as needed
 - Surgical procedures to correct spasticity, contractures, scoliosis, or hip disorders
- Pharmacologic management of spasticity:
 - Botulinum toxin injections: Must be done by trained provider.
 - Dantrolene oral 0.5 mg/kg/dose once daily for 7 days, then increase to 1.5 mg/kg divided 3 times/day for 7 days, then increase to 3 mg/kg/day divided 3 times/day for 7 days, then increase to 6 mg/kg/day divided 3 times/day. Do not exceed 400 mg/day.
 - Benzodiazepines: Dose varies based on medication. Diazepam may be used: If 5 years: <8.5 kg: 0.5-1 mg at bedtime; 8.5-15 kg: 1-2 mg at bedtime; >5 years: 1.25 mg given 3 times per day up to 5 mg given 4 times per day.
 - Baclofen oral: <2 years: 10-20 mg divided every 3 times per day, titrate dose every 3 days in increments of 5-15 mg/day to a maximum of 40 mg daily; 2-7 years: 20-30 mg/day divided 3 times per day, titrate dose every 3 days in increments of 5-15

mg/day to a maximum of 60 mg/day, >8 years: 30-40 mg/day divided every 8 hours, titrate dose every 3 days in increments of 5-15 mg/day to a maximum of 120 mg/day.

- Intrathecal baclofen: Requires neurosurgical intervention to place pump to deliver medication. The benefits and complications should be discussed in detail with the neurosurgeon.

● MANAGEMENT OF THE SICK NEONATES 0-7 DAYS

Name: Age: Weight (kg): Temperature (°C):

Ask: What are the infant's problems?: Initial Visit? Follow-up Visit

Table 36. Management of the sick neonates 0-7 days.

ASSESS (Circle all signs present)	CLASSIFY
<p>CHECK FOR SEVERE DISEASE, SEVERE BACTERIAL INFECTION , MODERATE HYPOTHERMIA AND LOCAL BACTERIAL INFECTION</p> <ul style="list-style-type: none"> ● Is the infant having difficulty in feeding? ● Has the infant had convulsions? ● Has the infant had any attacks where s/he stops breathing, or becomes stiff or blue (apnoea)? ● Count the breaths in one minute. ___ breaths per minute Repeat if elevated: ___ Fast breathing? ● Look for severe chest indrawing. ● Look and listen for grunting. ● Look for pus draining from the eyelids/Swollen eyes/ No eye swelling ● Movement only when stimulated or no movement even when stimulate ● Look and feel for bulging fontanelle ● Look at the umbilicus. Is it red or draining pus? Look for discharge from the eyes. Is there a purulent or sticky discharge? Is there abundant pus? Are the eyelids swollen ● Fever (temperature 37.5°C or above feels hot) or low body temperature (below 35.5°C or feels cool) ● Look for skin pustules. Are there many or severe pustules? 	
<p>CHECK FOR JAUNDICE</p> <ul style="list-style-type: none"> ● When did the jaundice appear first? 24h of life, > 24h of life ● Look for jaundice (yellow eyes or skin) ● Look at the young infant's palms and soles. Are they yellow? 	

DOES THE YOUNG INFANT HAVE CONGENITAL ABNORMALITIES?

- Ask the mother if she has any concerns
- Ask for any identified birth defects or other problems
- Was the mother's RPR tested in pregnancy? If yes, was it positive or negative? If positive, did she receive treatment? If yes, how many doses? How long before delivery did she receive the last dose?

LOOK FOR PRIORITY SIGNS

- Cleft lip or palate
- Imperforate anus
- Nose not patent
- Macrocephaly or Microcephaly or (birth head circumference more than 39 cm or <32cm)
- Ambiguous Genitalia
- Abdominal distention
- Look for other abnormal signs

Yes _ No _

THEN CHECK FOR FEEDING PROBLEM OR LOW WEIGHT If the infant has no indication to refer urgently to hospital

- Is there any difficulty feeding? Yes ___ No ___
- Is the infant breastfed? Yes ___ No ___ If yes, how many times in 24 hours? ___ times
- Is the infant suckling effectively (that is, slow deep sucks, sometimes pausing)? no suckling at all, not suckling effectively, suckling effectively
- Is the infant able to attach? no attachment at all, not well attached, good attachment
- Look for ulcers or white patches in the mouth (thrush).
- Does the infant usually receive any other foods or drinks? Yes ___ No ___ If yes, how often?
- What do you use to feed the child?
- Determine weight for age. Low ___ Not low ___

ASSESS FOR LOW BIRTH WEIGHT

- Look at the current weight of the newborn; is it <1500 grams?
- Is it between 1500g and 2500g
- Is it above 2.5kg

CHECK FOR HIV INFECTION Note mother's and/or child's HIV status:

- Mother's HIV test: NEGATIVE /POSITIVE/ NOT DONE/KNOWN
- Child's virological test: Child's serological test: NEGATIVE/ POSITIVE/ NOT DONE
- If mother is HIV positive and NO positive virological test in young infant: Is the infant breastfeeding now? Was the infant breastfeeding at the time of test or 6 weeks before it? If breastfeeding: Is the mother and infant on ARV prophylaxis?

ASSESS BREASTFEEDING	<ul style="list-style-type: none"> Has the infant breastfed in the previous hour? If the infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes. Is the infant able to attach? To check attachment, look for: Chin touching breast: Yes ___ No ___ Mouth wide open: Yes ___ No ___ Lower lip turned outward: Yes ___ No ___ More areola above than below the mouth: Yes ___ No ___ not well attached good attachment Is the infant sucking effectively (that is, slow deep sucks, sometimes pausing)? not sucking effectively sucking effectively 	
CHECK THE CHILD'S IMMUNIZATION STATUS (Circle immunizations needed today) BCG OPV-0 Hep B 0		Return for next immunization on: ___ (Date)

MANAGEMENT OF THE SICK NEONATE 0-7 DAYS OLD

Table 37. Assess for severe disease or severe bacterial infection, moderate hypothermia and local bacterial infection

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Presence of one of the following signs; <ul style="list-style-type: none"> Convulsions Unable to eat Fast breathing ($>= 60$ cycles per minute) OR Severe costal recessions OR Grunting OR No movements even if stimulation OR Movements if stimulation OR Fever ($\geq 37.5^{\circ}\text{C}$) OR Severe hypothermia ($< 35.5^{\circ}\text{C}$) Bulging fontanelle Apnoeic attacks Severe pustules 	SEVERE BACTERIAL INFECTION OR VERY SEVERE DISEASE	<p>Administer the first pre-transfer dose of antibiotics in IM (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat)</p> <p>Administer phenobarbital IM in case of ongoing seizures (15mg/kg)</p> <p>Start warming the newborn if hypothermia</p> <p>Prevent hypoglycaemia (G 10% 2ml/Kg stat)</p> <p>Explain to the mother how to keep baby warm during the transfer</p> <p>URGENTLY transfer the baby to the hospital</p>
<ul style="list-style-type: none"> Red umbilicus or pus discharge from the umbilicus. Skin pustules. 	LOCAL BACTERIAL INFECTION	<ul style="list-style-type: none"> Give an appropriate antibiotic by mouth (Amoxycillin 25mg/g/dose 12hourly) Teach the mother how to treat local infections at home Advise the mother on the care of the newborn at home Explain when to return immediately Review in 2 days

<ul style="list-style-type: none"> Moderate hypothermia (temperate 35.5-36.5) 	MODERATE HYPOTHERMIA	<ul style="list-style-type: none"> Warm the baby by skin-to-skin contact (follow guidelines on hypothermia) Reassess after 1 hour and follow guidelines on hypothermia Explain when to return immediately Review in 2 days
No sign of serious or local bacterial infection No hypothermia	Bacterial infection unlikely And No hypothermia	<ul style="list-style-type: none"> Treat the newborn for any other problem Advise the mother on home care of the newborn Explain when to return immediately

Table 38. Check for feeding problem

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
<ul style="list-style-type: none"> Not able to feed No attachment at all No suckling at all. 	SERIOUS ILLNESS OR SERIOUS BACTERIAL INFECTION	<ul style="list-style-type: none"> Give first dose of two intramuscular antibiotics. Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) Advise the mother how to keep the young infant warm on the way to hospital. Refer URGENTLY to hospital.
<ul style="list-style-type: none"> Attachment not well done or Ineffective sucking or Less than 8 feedings in 24 hours or Receives other foods or liquids or Ulcerations or white patches in the mouth or Malformation in the mouth 	FEEDING PROBLEM	<ul style="list-style-type: none"> If the attachment is not good or the sucking is not effective: <ul style="list-style-type: none"> - explain the good position and the good attachment. - help the mother to treat nipple abnormalities if they exist - Clean the nose if it is blocked If the mother is breastfeeding less than 8 times within 24 hours, advise her to breastfeed more often. If the newborn receives other foods or liquids in addition to breast milk: <ul style="list-style-type: none"> - advise the mother to breastfeed more, reduce other foods and fluids, and use a cup. - give appropriate advice if the mother is HIV positive If no breastfeeding: Refer for Breast feeding counselling <ul style="list-style-type: none"> - Advise and encourage mother on breastfeeding and possibly relactation if mother is HIV-negative. - Teach the mother to correctly prepare a breast-milk substitute and use a cup especially if the mother is HIV-positive In case of thrush, teach the mother to treat him at home. In case of malformation to the mouth, refer better management Teach the mother how to care for the newborn at home. Explain when to return immediately Review the newborn in 2 days

Normal weight for age and no any other sign of inadequate feeding.	NO FEEDING PROBLEMS	Congratulate the mother for the good nutrition of the newborn Encourage the mother to breastfeed more and reinforce hygiene. Explain when
--	---------------------	---

Table 39. Asses for low birth weight

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Less 1.5kg	VERY LOW BIRTH WEIGHT	<ul style="list-style-type: none"> Ensure enough warm (skin to skin) before and during transfer Test for low blood sugar, and treat or prevent it Teach the mother how to keep the infant warm on way to hospital Refer the new born to hospital in KMC position
Weight between 1500g and 2500g	LOW BIRTH WEIGHT	<ul style="list-style-type: none"> Teach the mother to keep the baby warm at home (Kangaroo) Encourage the mother to breastfeed every 2 or 3 hours Review the newborn every day until good breastfeeding, gaining weight and body temperature remains stable Then see the newborn 14 days after the last visit Explain when to return immediately
Weight \geq 2500 g	NO LOW WEIGHT	<ul style="list-style-type: none"> Treat the newborn for any other problem Advise the mother on the care of the newborn at home Explain when to return immediately

Table 40. Assess for eye infection

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Swollen and purulent eyes	PROBABLE GONOCOCCAL EYE INFECTION	<ul style="list-style-type: none"> Administer the appropriate antibiotic systemically (Ceftriaxone 50mg/kg IM x 1 dose Max 125mg OR cefotaxime single dose of 100 mg/kg) Teach the mother how to look after the eyes of the newborn at home Advise the mother to keep the newborn warm Explain when to return immediately Review the child 2 days later Treat parents for Gonococcal genital infection
Purulent eyes	CONJUNCTIVITIS	<ul style="list-style-type: none"> Apply the first dose of local antibiotic into the eyes(Gentamycin eye drops 1 drop 8h for 7 days Show the mother how to look after the child at home Explain when to return immediately Review the child 5 days later
No swollen or purulent eyes	NO EYE INFECTION	<ul style="list-style-type: none"> Treat the newborn for any other problem Advise the mother on the care of the newborn at home Explain when to return immediately

CLASSIFICATION OF JAUNDICE IN NEWBORN 0-7 DAYS

1. SEVERE JAUNDICE
2. JAUNDICE
3. NO JAUNDICE

Table 41. Classification of jaundice in newborn 0-7 days

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Jaundice appearing within 24 hours of life OR Jaundice on the palms and soles of the feet at any age.	Pink: SEVERE JAUNDICE	<ul style="list-style-type: none"> • treat to prevent hypoglycaemia • Refer URGENTLY to hospital • Teach the mother how to keep the infant warm on way to hospital
Jaundice appearing after 24 hours of age AND Palms and soles not yellow	Yellow: JAUNDICE	<ul style="list-style-type: none"> • Advise the caregiver to return immediately if palms and soles appear yellow • Follow-up in 2 days • Teach the mother home care
No jaundice	Green: NO JAUNDICE	Advise the mother to give home care for the young infant

Table 42. Check for HIV infection

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
HIV test of the mother and / or father of the child is positive	POSSIBLE HIV TRANSMISSION	<ul style="list-style-type: none"> • Treat the infant according to guidelines/ classification • Refer the infant to the HIV clinic
HIV status of parents is unknown OR HIV test of one of the parents is negative and it is positive for an other parent	HIV TRANSMISSION PROBABLE	<ul style="list-style-type: none"> • Start treatment for other classifications/ guidelines • Counsel parents on HIV prevention and voluntary testing
HIV test of the mother and father of the child is negative during pregnancy or breastfeeding	HIV TRANSMISSION NOT PROBABLE	<ul style="list-style-type: none"> • Give advice to the mother on newborn care. • No specific interventions for HIV • Counsel on HIV Prevention

Table 43. Assess for congenital problems

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any one of the PRIORITY SIGNS: Cleft palate or lip Imperforate anus Nose not patent Macrocephaly Ambiguous genitalia Abdominal distention Omphalocele / gastroschisis	Pink: MAJOR ABNORMALITY OR SERIOUS ILLNESS	<ul style="list-style-type: none"> • Keep warm, skin to skin or transport in incubator • Test for low blood sugar, and treat or prevent • Encourage mother to continue breastfeeding or give EBM 3ml/kg per hour • Refer URGENTLY

Other abnormal signs	Yellow: BIRTH ABNORMALITY	<ul style="list-style-type: none"> • Keep warm, skin to skin • Assess breastfeeding If not able to breastfeed, give EBM 3ml/kg per hour on the way • Address any feeding problems and support mother to breastfeed successfully • Refer for assessment
Mother's RPR positive and she is Untreated/Partially treated (fewer than three doses) / Treatment completed less than 1 month before delivery OR Mother's RPR is not known, and it is not possible to get the result now	Yellow: POSSIBLE CONGENITAL SYPHILIS	<ul style="list-style-type: none"> • Check for signs of congenital syphilis and if present refer to hospital • If no signs of congenital syphilis, give intramuscular penicillin • Ask about the caregiver's health, and treat as necessary. • Ensure that the mother receives full treatment for positive RPR.
No risks nor abnormal signs	Green: NO BIRTH ABNORMALITIES	Counsel the caregiver on home care for the young infant

Table 44. Asses all young infants for risk factors

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Mother or is on TB treatment Mother has TB and not on treatment	Yellow: TB EXPOSED	<ul style="list-style-type: none"> • If mother has received TB treatment for more than 2 months, is smear negative and baby is well, give baby BCG and follow the baby every month for 2 months • If mother has received TB treatment for less than 2 months before delivery or smear positive, refer to hospital to check the baby for signs of congenital TB; <ul style="list-style-type: none"> ○ Those that are symptomatic should be treated for TB ○ Those without active TB disease should be on IPT for 6 months. • Give BCG 2 weeks after completion of INH or TB treatment • Ask about the caregiver's health, and treat as necessary
Infant weighed less than 2 kg at birth OR Admitted to hospital for more than three days after delivery OR Known neurological or congenital problem	Yellow: AT RISK INFANT	<ul style="list-style-type: none"> • Monitor growth and health more frequently • Assess feeding and encourage breastfeeding • Conduct home visits to assess feeding and growth • Encourage mother to attend follow-up appointments and refer to other services if indicated (further medical assessment, ECD centre, support groups)

Mother has died or is ill OR Infant not breastfed OR Teenage caregiver OR Social deprivation	Yellow: POSSIBLE SOCIAL PROBLEM	<ul style="list-style-type: none"> Assess breastfeeding and support mother to breastfeed successfully If not breastfeeding, counsel and explain safe replacement feeding Monitor growth and health more frequently Conduct home visits to assess feeding and growth Refer to other available services if indicated (social worker, ECD centres or community based organisations)
No risk factors	Green: NO RISK FACTORS	Counsel the caregiver on home care for the young infant

● MANAGEMENT OF THE SICK YOUNG INFANT AGED 1 WEEK TO 2 MONTHS

Name: Age: Weight (kg): Temperature (°C):

Ask: What are the infant's problems?: Initial Visit? Follow-up Visit

Table 45. Management of the sick young infant aged 1 week to 2 months

ASSESS (Circle all signs present)	CLASSIFY
CHECK FOR SEVERE DISEASE AND BACTERIAL INFECTION <ul style="list-style-type: none"> Is the infant having difficulty in feeding? Has the infant had convulsions? Has the infant had any attacks where s/he stops breathing, or becomes stiff or blue (apnoea)? Count the breaths in one minute. ___ breaths per minute Repeat if elevated: _ Fast breathing? Look for severe chest indrawing. Look and listen for grunting. Look for pus draining from the ear. Movement only when stimulated or no movement even when stimulate Look and feel for bulging fontanelle Look at the umbilicus. Is it red or draining pus? Look for discharge from the eyes. Is there a purulent or sticky discharge? Is there abundant pus? Are the eyelids swollen Fever (temperature 38°C or above feels hot) or low body temperature (below 35.5°C or feels cool) Look for skin pustules. Are there many or severe pustules? 	
CHECK FOR JAUNDICE <ul style="list-style-type: none"> When did the jaundice appear first? Look for jaundice (yellow eyes or skin) Look at the young infant's palms and soles. Are they yellow? 	

DOES THE YOUNG INFANT HAVE DIARRHOEA?	
<ul style="list-style-type: none"> • For how long? • Is there blood in the stool? • Look at the young infant's general condition. • Does the infant move only when stimulated? • Does not move even when stimulated? • Lethargic or unconscious • Is the infant restless and irritable? • Offer the child fluid: Not able to drink or drinking poorly? Drinking eagerly, thirsty? • Look for sunken eyes. • Pinch the skin of the abdomen. Does it go back: Very slowly? Slowly? 	Yes _ No _
THEN CHECK FOR FEEDING PROBLEM OR LOW WEIGHT If the infant has no indication to refer urgently to hospital	
<ul style="list-style-type: none"> • Is there any difficulty feeding? Yes ___ No ___ • Is the infant breastfed? Yes _ No_ If yes, how many times in 24 hours? ___ times • Is the infant suckling effectively (that is, slow deep sucks, sometimes pausing)? no suckling at all, not suckling effectively, suckling effectively • Is the infant able to attach? no attachment at all, not well attached, good attachment • Look for ulcers or white patches in the mouth (thrush). • Does the infant usually receive any other foods or drinks? Yes ___ No ___ If yes, how often? • What do you use to feed the child? • Determine weight for age. Low ___ Not low ___ 	
CHECK FOR HIV INFECTION Note mother's and/or child's HIV status:	
<ul style="list-style-type: none"> • Mother's HIV test: NEGATIVE /POSITIVE/ NOT DONE/KNOWN • Child's virological test: Child's serological test: NEGATIVE/ POSITIVE/ NOT DONE • If mother is HIV positive and NO positive virological test in young infant: Is the infant breastfeeding now? Was the infant breastfeeding at the time of test or 6 weeks before it? If breastfeeding: Is the mother and infant on ARV prophylaxis? 	
ASSESS BREASTFEEDING	
<ul style="list-style-type: none"> • Has the infant breastfed in the previous hour? If the infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes. Is the infant able to attach? • To check attachment, look for: Chin touching breast: Yes ___ No ___ Mouth wide open: Yes ___ No ___ Lower lip turned outward: Yes ___ No ___ More areola above than below the mouth: Yes ___ No ___ not well attached good attachment • Is the infant sucking effectively (that is, slow deep sucks, sometimes pausing)? not sucking effectively sucking effectively 	

CHECK THE CHILD'S IMMUNIZATION STATUS (Circle immunizations needed today) BCG OPV-0 DPT+HIB-1 OPV-1 Rotavirus 1	Return for next immunization on: _ (Date)
RISK FACTORS IN ALL YOUNG INFANT <ul style="list-style-type: none"> • Has the mother been on TB treatment in the last 6 months? If so, for how long was she on treatment before the infant was born? • How much did the infant weigh at birth? • Was the infant admitted to hospital after birth? If so, for how many days? • Who is the child's caregiver? • How old is the mother/caregiver? • Is the infant exclusively breastfed? 	
ASSESS OTHER PROBLEMS: Ask about mother's own health	

MANAGEMENT OF THE SICK YOUNG INFANT AGED 1 WEEK TO 2 MONTHS**CLASSIFICATION OF SIGNS OF SERIOUS ILLNESS IN A SICK YOUNG INFANT**

1. VERY SEVERE DISEASE OR POSSIBLE BACTERIA INFECTION
2. LOCAL BACTERIAL INFECTION
3. NO SEVERE DISEASE OR LOCAL INFECTION UNLIKELY

VERY SEVERE DISEASE OR POSSIBLE BACTERIA INFECTION**Table 46. Classification of signs of serious illness in a sick young infant**

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any one of the following signs <ul style="list-style-type: none"> • Convulsions OR • Apnoea or breathing < 30 per minute OR • Fast breathing (> 60 per minute), chest indrawing, nasal flaring or grunting. OR • Bulging fontanelle. OR • Fever (37.5° or above or feels hot) or low body temperature (less than 35.5° or feels cold). OR • Only moves when stimulated or unconsciousness, OR • Abundant pus/purulent discharge from eyes, or swollen eyelids OR • Pus draining from ear OR • Umbilical redness extending to the skin and/or draining pus OR • Many or severe skin pustules OR • Unable to feed 	Pink: POSSIBLE VERY SEVERE DISEASE	<ul style="list-style-type: none"> • Give first dose of antibiotic IMI (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) • Give an anti convulsant (Phenobarbital IM 15mg/kg) • Treat to prevent hypoglycaemia • Breastfeed if possible • Keep the infant warm on the way • Refer URGENTLY

<ul style="list-style-type: none"> Red umbilicus or purulent OR Skin pustules. 	Yellow: LOCAL BACTERIAL INFECTION	<ul style="list-style-type: none"> Treat skin pustules and a red umbilicus with oral Cloxacillin 50mg/kg 8h for 5 days Teach the caregiver to treat local infections at home and counsel on home care for the young infant Follow-up in 2 days
None of the signs of very severe disease or local bacterial infection	Green: SEVERE DISEASE OR LOCAL INFECTION UNLIKELY	Advise mother to give home care and when to come back

CLASSIFICATION OF JAUNDICE IN A SICK YOUNG INFANT

2. SEVERE JAUNDICE 2. JAUNDICE 3. NO JAUNDICE

Table 47. Classification of jaundice in a sick young infant

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any jaundice if age less than 24 hours or Yellow palms and soles at any age	Pink: SEVERE JAUNDICE	<ul style="list-style-type: none"> Test for low blood sugar, and treat or prevent it (G10% 2ml/kg) Keep the infant warm Refer URGENTLY
Jaundice appearing after 24 hours of age and Palms and soles not yellow	Yellow: JAUNDICE	<ul style="list-style-type: none"> Advise the caregiver to return immediately if palms and soles appear yellow Follow-up in 1 day If the young infant is older than 14 days, refer for assessment
No jaundice	Green: NO JAUNDICE	Advise the mother to give home care for the young infant

Table 48. Classification of feeding problems or low weight

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Not able to feed or No attachment at all or Not suckling at all.	SERIOUS ILLNESS OR SERIOUS BACTERIAL INFECTION	<ul style="list-style-type: none"> Give first dose of intramuscular antibiotics IMI (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) Treat to prevent low blood sugar. Advise the mother how to keep the young infant warm on the way to hospital. Refer URGENTLY to hospital.
Not well attached to breast or Not suckling effectively or Less than 8 breastfeeds in 24hours or Receives other foods or drinks or Low weight for age or Thrush	FEEDING PROBLEM OR LOW WEIGHT	<ul style="list-style-type: none"> Advise the mother to breastfeed as often and for as long as the infant wants, day and night <ul style="list-style-type: none"> If not well attached or not suckling effectively, teach correct positioning and attachment. If breastfeeding less than 8 times in 24 hours, advise to increase frequency of feeding If receiving other foods or drinks, counsel mother about breastfeeding more, reducing other foods or drinks, and using a cup. If not breastfeeding at all: <ul style="list-style-type: none"> Refer for breastfeeding counselling and possible relactation. Advise about correctly prepared breast milk substitutes and using a cup. If thrush, teach the mother to treat thrush at home. Advise mother to give home care for the young infant. Follow-up any feeding problem or thrush in 2 days. Follow-up low weight for age in 14 days.
Not low weight for age and no other signs of inadequate feeding	NO FEEDING PROBLEM	<ul style="list-style-type: none"> Advise mother to give home care for the young infant Praise the mother for feeding the infant well.

Table 49. Asses the neonate for hiv infection

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Child has Positive PCR	CONFIRMED HIV INFECTION	<ul style="list-style-type: none"> Give Cotrimoxazole prophylaxis from age 4–6 weeks Assess the child's feeding and counsel as necessary Refer to HIV clinic for staging, assessment and initiation of ART Advise the mother on home care Follow-up in 14 days

<ul style="list-style-type: none"> HIV test of Mother and/or father is positive OR Child has positive HIV antibody test (seropositive) 	POSSIBLE HIV INFECTION/HIV EXPOSED	<ul style="list-style-type: none"> Give co-trimoxazole prophylaxis from age 4–6 weeks Assess the child's feeding and give appropriate feeding advice Refer to HIV clinic to confirm infant's HIV status Follow-up in one month
HIV status for both parents not known	Probable HIV infection	<p>Start treatment according to the current classification</p> <p>Advise parents to do HIV testing and encourage HIV prevention</p>
Negative HIV test for mother and father during pregnancy or breastfeeding period	HIV INFECTION UNLIKELY	<p>Treat, counsel and follow-up existing infections</p> <p>Advise the mother about feeding and about her own health</p> <p>No specific intervention for HIV</p>

Table 50. Assess for congenital problems

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any one of the PRIORITY SIGNS: Cleft palate or lip Imperforate anus Nose not patent Macrocephaly Ambiguous genitalia Abdominal distention Very low birth weight (\leq 2kg)	Pink: MAJOR ABNORMALITY OR SERIOUS ILLNESS	<ul style="list-style-type: none"> Keep warm, skin to skin or transport in incubator Test for low blood sugar, and treat or prevent Encourage mother to continue breastfeeding or give EBM 3ml/kg per hour Refer URGENTLY
One or more abnormal signs	Yellow: BIRTH ABNORMALITY	<ul style="list-style-type: none"> Keep warm, skin to skin Assess breastfeeding If not able to breastfeed, give EBM 3ml/kg per hour on the way Address any feeding problems and support mother to breastfeed successfully Refer for assessment
Mother's RPR positive and she is Untreated/Partially treated (fewer than three doses) / Treatment completed less than 1 month before delivery OR Mother's RPR is not known, and it is not possible to get the result now	Yellow: POSSIBLE CONGENITAL SYPHILIS	<ul style="list-style-type: none"> Check for signs of congenital syphilis and if present refer to hospital If no signs of congenital syphilis, give intramuscular penicillin Ask about the caregiver's health, and treat as necessary. Ensure that the mother receives full treatment for positive RPR.

No risks nor abnormal signs	Green: NO BIRTH ABNORMALITIES	Counsel the caregiver on home care for the young infant
-----------------------------	-------------------------------------	---

● CLASSIFICATION OF DIARRHEA IN A SICK YOUNG INFANT

Table 51. classification of diarrhoea in a sick young infant

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Two of the following signs: <ul style="list-style-type: none">• Lethargic or unconscious.• Sunken eyes.• Skin pinch goes back very slowly.• Young infant less than one month of age.	Pink: SEVERE DEHYDRATION	<ul style="list-style-type: none"> • If the infant is classified as NO POSSIBLE SEVERE BACTERIAL INFECTION:<ul style="list-style-type: none">- Give liquids and treat as severe dehydration (Plan C) OR • If the infant is classified as POSSIBLE SEVERE BACTERIAL INFECTION: Give first dose of intramuscular antibiotics IMI (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) • Refer urgently to the Hospital • Breastfeed or give frequent sips of ORS on the way if possible • Keep the infant warm on the way to hospital
Two of the following signs: <ul style="list-style-type: none">• Restless, irritable.• Sunken eyes.• Skin pinch goes back slowly.	Yellow: Signs of DEHYDRATION	<ul style="list-style-type: none"> • Give fluid for some dehydration (Plan B) • If the infant is classified as POSSIBLE SEVERE BACTERIAL INFECTION: Give first dose of intramuscular antibiotics IMI (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) • Refer urgently to the Hospital and advise the mother to give frequent sips of ORS on the way if possible and to continue breastfeeding Explain how to come back immediately
Not enough signs to classify as some or severe dehydration.	Green: NO DEHYDRATION	<ul style="list-style-type: none"> • Give fluids to treat for diarrhoea at home • If exclusively breastfed, do not give other fluids • Give zinc for 14 days • Counsel the caregiver on home care for the young infant • Follow-up in 2 days
Diarrhoea lasting 14 days or more	Pink: SEVERE PERSISTENT DIARRHOEA	<ul style="list-style-type: none"> • Refer after treating for dehydration if present • Keep the infant warm on the way to hospital
Blood in the stool.	Pink: Bloody diarrhoea	<ul style="list-style-type: none"> • Treat hypoglycaemia • Keep the infant warm on the way to hospital • Refer URGENTLY.

● CLASSIFICATION OF FEEDING PROBLEMS OR LOW WEIGHT

Table 52. Classification of feeding problems or low weight

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Not able to feed or No attachment at all or Not sucking at all.	NOT ABLE TO FEED—POSSIBLE SERIOUS BACTERIAL INFECTION	<ul style="list-style-type: none"> Give first dose of IM (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) Treat to prevent low blood sugar. Advise the mother how to keep the young infant warm on the way to hospital. Refer URGENTLY to hospital.
Not well attached to breast or Not sucking effectively or Less than 8 breastfeeds in 24 hours or Receives other foods or drinks or Low weight for age or Thrush	FEEDING PROBLEM OR LOW WEIGHT	<ul style="list-style-type: none"> Advise the mother to breastfeed as often and for as long as the infant wants, day and night <ul style="list-style-type: none"> If not well attached or not sucking effectively, teach correct positioning and attachment. If breastfeeding less than 8 times in 24 hours, advise to increase frequency of feeding If receiving other foods or drinks, counsel mother about breastfeeding more, reducing other foods or drinks, and using a cup. If not breastfeeding at all: <ul style="list-style-type: none"> Refer for breastfeeding counselling and possible relactation. Advise about correctly prepared breast milk substitutes and using a cup. If thrush, teach the mother to treat thrush at home. Advise mother to give home care for the young infant. Follow-up any feeding problem or thrush in 2 days. Follow-up low weight for age in 14 days.
Not low weight for age and no other signs of inadequate feeding	NO FEEDING PROBLEM	<ul style="list-style-type: none"> Advise mother to give home care for the young infant Praise the mother for feeding the infant well.

● ASSES ALL YOUNG INFANTS FOR RISK FACTORS

Table 53. Asses all young infants for risk factors

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Mother is on TB treatment	Yellow: TB EXPOSED	<ul style="list-style-type: none"> If mother has received TB treatment for more than 2 months, is smear negative and baby is well, give baby BCG and follow the baby every month for 2 months If mother has received TB treatment for less than 2 months before delivery or smear positive, check the baby for signs of congenital TB; <ul style="list-style-type: none"> Those that are symptomatic should be treated for TB Those without active TB disease should be on IPT for 6 months. Do an HIV PCR test at 6 weeks, or earlier if the child is sick Give BCG on completion of INH or TB treatment Ask about the caregiver's health, and treat as necessary
Infant weighed less than 2 kg at birth OR Admitted to hospital for more than three days after delivery OR Known neurological or congenital problem	Yellow: AT RISK INFANT	<ul style="list-style-type: none"> Monitor growth and health more frequently Assess feeding and encourage breastfeeding Conduct home visits to assess feeding and growth Encourage mother to attend follow-up appointments and refer to other services if indicated (further medical assessment, ECD centre, support groups)
Mother has died or is ill OR Infant not breastfed OR Teenage caregiver OR Social deprivation	Yellow: POSSIBLE SOCIAL PROBLEM	<p>Assess breastfeeding and support mother to breastfeed successfully If not breastfeeding, counsel and explain safe replacement feeding Monitor growth and health more frequently Conduct home visits to assess feeding and growth Refer to other available services if indicated (social worker, ECD centres or community based organisations)</p>
No risk factors	Green: NO RISK FACTORS	Counsel the caregiver on home care for the young infant

● MANAGEMENT OF THE SICK CHILD AGED 2 MONTHS UP TO 5 YEARS

Names:

Age: Weight (kg): Height/Length (cm): Temperature (°C):

Ask: What are the child's problems? Initial Visit? Follow-up Visit

Table 54. Management of the sick child aged 2 months up to 5 years

ASSESS (Circle all signs present)	CLASSIFY
<p>CHECK FOR GENERAL DANGER SIGN</p> <ul style="list-style-type: none"> • Not able to drink or breastfeed • Vomits everything • Convulsions lethargic or unconscious • Convulsing now. 	General danger sign present Yes <input type="text"/> No <input type="text"/>
<p>DOES THE CHILD HAVE COUGH OR DIFFICULT BREATHING? For how long? <input type="text"/> Days Count the breaths in one minute: <input type="text"/> breaths per minute. Fast breathing? Look for chest indrawing Look and listen for stridor Look and listen for wheezing</p>	Yes <input type="text"/> No <input type="text"/>
<p>DOES THE CHILD HAVE DIARRHOEA? For how long? <input type="text"/> Days Is there blood in the stool? Look at the child's general condition. Is the child: Lethargic or unconscious? Restless and irritable? Look for sunken eyes. Offer the child fluid; Not able to drink or drinking poorly? Drinking eagerly, thirsty? Pinch the skin of the abdomen. Does it go back: Very slowly (longer than 2 seconds)? Slowly?</p>	Yes <input type="text"/> No <input type="text"/>
<p>DOES THE CHILD HAVE FEVER? (by history/feels hot/temperature 37.5°C or above) Decide malaria risk: High <input type="text"/> Low <input type="text"/> No <input type="text"/> For how long? <input type="text"/> Days If more than 7 days, has fever been present every day? Has child had measles within the last 3 months? Do a malaria test, if NO general danger sign in all cases in high malaria risk or NO obvious cause of fever in low malaria risk: Test POSITIVE? P. falciparum P. vivax NEGATIVE? Look or feel for stiff neck Look for runny nose Look for signs of MEASLES: Generalized rash and One of these: cough, runny nose, or red eyes Look for any other cause of fever.</p>	

If the child has measles now or within the last 3 months:: • Look for mouth ulcers. If yes, are they deep and extensive? Look for pus draining from the eye. Look for clouding of the cornea.	
DOES THE CHILD HAVE AN EAR PROBLEM? Yes ____ No ____ Is there ear pain? Is there ear discharge? If Yes, for how long? ____ Days Look for pus draining from the ear Feel for tender swelling behind the ear	
CHECK FOR ACUTE MALNUTRITION Look for oedema of both feet. Determine WFH/L z-score: ____ Less than -3? Between -3 and -2? -2 or more? For children 6 months or older measure MUAC ____ mm.	
If child has MUAC less than 115 mm or WFH/L less than -3 Z scores or oedema of both feet: Is there any medical complication: General danger sign? Any severe classification? Pneumonia with chest indrawing? Child 6 months or older: Offer RUTF to eat. Is the child: Not able to finish? Able to finish? Child less than 6 months: Is there a breastfeeding problem?	
Signs of severity - Prostration, - Unconsciousness, - Convulsion, - Signs of pneumonia (rapid breathing, stridor, chest pain), - Diarrhoea, - Hypothermia, - Sign of dehydration, - Shock sign (cold end, uncollected pulse), - fever, - pallor, - Difficulty to eat. OTP *** Outpatient Therapeutic Program, SFP *** Supplementation Feeding Program	
CHECK FOR HIV INFECTION Note mother's and/or child's HIV status Mother's HIV test: NEGATIVE/POSITIVE /NOT DONE/KNOWN Child's virological test: NEGATIVE/POSITIV/ NOT DONE Child's serological test: NEGATIVE/POSITIVE/NOT DONE If mother is HIV-positive and NO positive virological test in child: Is the child breastfeeding now? Was the child breastfeeding at the time of test or 6 weeks before	
CHECK THE CHILD'S IMMUNIZATION STATUS (Circle immunizations needed today) BCG OPV-0 Hep B0 ; DPT+HIB-1 OPV-1 Hep B1 RTV-1 Pneumo-1; DPT+HIB-2 OPV-2 Hep B2 RTV-2 Pneumo-2; DPT+HIB-3 OPV-3 Hep B3 Pneumo-3; Measles1 Measles 2 Vitamin A Mebendazole	

Check for anaemia • Look for palmar pallor. Is she: Severe? Mild? No pallor)	
ASSESS FEEDING if the child is less than 2 years old, has MODERATE ACUTE MALNUTRITION, ANAEMIA, or is HIV exposed or infected Do you breastfeed your child? Yes ____ No ____ If yes, how many times in 24 hours? ____ times. Do you breastfeed during the night? Yes ____ No ____ Does the child take any other foods or fluids? Yes ____ No ____ If Yes, what food or fluids? How many times per day? ____ times. What do you use to feed the child? If MODERATE ACUTE MALNUTRITION: How large are servings? Does the child receive his own serving? ____ Who feeds the child and how? During this illness, has the child's feeding changed? Yes ____ No ____ If Yes, how?	FEEDING PROBLEMS
ASSESS OTHER PROBLEMS: Ask about mother's own health	

Table 55. Classification table for cough and/or difficult breathing

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
• Any danger signs or • Chest indrawing or • Stridor in calm child. • Grunting	SEVERE PNEUMONIA OR SEVERE DISEASE	<ul style="list-style-type: none"> Give first dose of an appropriate antibiotic (Ampicillin 50mg/kg stat and Gentamycin 5mg/kg stat) Treat to prevent hypoglycaemia Refer URGENTLY to hospital.
• Fast breathing	PNEUMONIA	<ul style="list-style-type: none"> Give an appropriate oral Amoxycillin 25mg/kg/dose 12hourly for 5 days. Soothe the throat and relieve the cough with a safe remedy. Advice mother when to return immediately. Follow-up in 2 days.
No signs of pneumonia or very severe disease.	NO PNEUMONIA: COUGH OR COLD	<ul style="list-style-type: none"> If coughing more than 14 days, refer for assessment. Soothe the throat and relieve the cough with a safe remedy. Advise mother when to return immediately Follow-up in 5 days if not improving.

Table 56. Classification table for dehydration

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Two of the following signs: • Lethargic or unconscious • Sunken eyes • Not able to drink or drinking poorly • Skin pinch goes back very slowly	SEVERE DEHYDRATION	<ol style="list-style-type: none"> If child has no other severe classification: • Give fluid for severe dehydration (Plan C). If child also has another severe classification: • Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way. Advise the mother to continue breastfeeding If child is 2 years or older and there is cholera in your area, give antibiotic for cholera

Two of the following signs: - Agitated, irritable - Sunken eyes - Drink strongly with thirst - Skin pinch goes back slowly	DEHYDRATION	<ul style="list-style-type: none"> Give fluids to treat dehydration (Plan B) Give Sulphate de Zinc If the child is classified as severe disease and need a transfer: Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way. Advise the mother to continue breastfeeding
No signs to classify as dehydration or severe dehydration	NO DEHYDRATION	<ul style="list-style-type: none"> Give fluids and treat diarrhoea (plan A) Give Zinc Sulphate Explain the mother when to return immediately Review in 3 days if no improvement

Table 57. Classification table for persistent diarrhoea

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Dehydration present	SEVERE DIARRHOEA PERSISTENT	<ul style="list-style-type: none"> Treat dehydration before referral unless the child has another severe classification. Give Zinc Sulphate Refer to hospital.
No dehydration	PERSISTENT DIARRHOEA	<ul style="list-style-type: none"> Advise the mother on feeding a child who has PERSISTENT DIARRHOEA. Give Zinc sulphate and multivitamins for 14 days Explain to the mother when to return immediately Follow-up in 5 days.

Table 58. If blood in the stool

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Blood in stool	Bloody diarrhoea	<ul style="list-style-type: none"> Treat for 5 days with Ciprofloxacin, oral, 15 mg/kg/dose 12 hourly Give Sulphate de Zinc Explain to the mother when to return immediately Review in 2 days

Table 59. Classification table for high malaria risk

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any general danger sign Stiff neck	VERY SEVERE FEBRILE DISEASE	<ul style="list-style-type: none"> Give quinine or Artesunate for severe malaria (first dose). Give first dose of Ampicillin 150mg/kg stat and Gentamycin 5mg/kg (Preferably Cefotaxime 100mg/kg stat) Treat the child to prevent low blood sugar Give one dose of paracetamol in clinic for high fever (38.5°C or above). Refer URGENTLY to hospital.

Fever (by history or feels hot or temperature 37.5°C or above)	MALARIA	<ul style="list-style-type: none"> If NO cough with fast breathing, treat with oral antimalarial (Coartem) If cough with fast breathing, treat with Amoxycillin (25mg/kg/dose 12hourly) for 5 days Give paracetamol for high fever (38.5°C or above). Advise mother when to return immediately. Follow-up in 2 days if fever persists. If fever is present every day for more than 7 days, REFER for assessment.
--	---------	---

Table 60. Classification table for low malaria risk and no travel to a high risk area

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any general danger sign Stiff neck	VERY SEVERE FEBRILE DISEASE	<ul style="list-style-type: none"> Give quinine or Artesunate for severe malaria (first dose). Give first dose of Ampicillin 150mg/kg stat and Gentamycin 5mg/kg (Preferably Cefotaxime 100mg/kg stat) Treat the child to prevent low blood sugar Give one dose of paracetamol in clinic for high fever (38.5°C or above). Refer URGENTLY to hospital.
NO runny nose and NO measles. NO other cause of fever	MALARIA	<ul style="list-style-type: none"> If NO cough with fast breathing, treat with oral antimalarial If cough with fast breathing, treat with Amoxycillin 25mg/kg/dose (or Cotrimoxazole) for 5 days Give paracetamol for high fever (38.5°C or above). Advise mother when to return immediately. Follow-up in 2 days if fever persists. If fever is present every day for more than 7 days, REFER for assessment.
Runny nose present or measles present or Other cause of fever present	FEVER—MALARIA UNLIKELY	<ul style="list-style-type: none"> Give one dose of paracetamol in clinic for high fever (38.5°C or above) Advise mother when to return immediately. Follow-up in 2 days if fever persists. If fever is present every day for more than 7 days, REFER for assessment

Table 61. Classification table for measles (if measles now or within the last 3 months)

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Any general danger sign or Clouding of cornea or Deep or extensive mouth ulcers.	SEVERE COMPLICATED MEASLES	<ul style="list-style-type: none"> Give vitamin A Give first dose of Ampicillin 150mg/kg stat and Gentamycin 5mg/kg If clouding of the cornea or pus draining from the eye, apply tetracycline eye ointment Refer URGENTLY to hospital

Pus draining from the eye or Mouth ulcers	MEASLES WITH EYE AND MOUTH COMPLICATIONS	<ul style="list-style-type: none"> Give vitamin A If clouding of the cornea or pus draining from the eye, apply tetracycline eye ointment If mouth ulcers, treat with gentian violet. Follow-up in 2 days.
Measles now or within the last 3 months.	MEASLES	<ul style="list-style-type: none"> Give vitamin A.

Table 62. Classification table for ear problem

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Tender swelling behind the ear.	MASTOIDITIS	<ul style="list-style-type: none"> Give first dose of Ampicillin 150mg/kg stat and Gentamycin 5mg/ Give first dose of paracetamol for pain. Refer URGENTLY to hospital.
Pus is seen draining. from the ear and discharge is reported for less than 14 days or Ear pain.	ACUTE EAR INFECTION	<ul style="list-style-type: none"> Give Amoxycillin 25mg/kg/dose 12h for 5 days Give paracetamol for pain. Dry the ear by wicking. Follow-up in 5 days
Pus is seen draining. from the ear and discharge is reported for 14 days or more	CHRONIC EAR INFECTION	<p>Dry the ear by wicking Follow-up in 5 days</p>
No ear pain and No pus seen draining from the ear.	NO EAR INFECTION	No additional treatment.

Table 63. Check for anaemia

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Severe palmar pallor	SEVERE ANEMIA	<p>Treat the child to avoid hypoglycaemia *Refer urgently to the hospital</p>
Palmar pale pallor	MILD ANEMIA	<ul style="list-style-type: none"> If the child is less than 2 years old, evaluate the child's diet and advise the mother to feed her child as per guidelines Give iron / folic acid Give Mebendazole if the child is 12 months old or older (if he has not received it in the previous 6 months). Explain to the mother when to return immediately Review the child in 14 days.

No palmar pallor	NO ANAEMIA	<ul style="list-style-type: none"> If the child is under 2 years of age, evaluate the child's diet and advise the mother to feed the child as per guideline If feeding problem, review the child in 5 days. Give Mebendazole if the child is 12 months old or older (if he has not received it in the previous 6 months). Explain to the mother when to return immediately
------------------	------------	--

Table 64. Check for acute malnutrition

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT
Oedema of both feet • Sign of severity WITH • Weight for age ≤ -3 DS and / or • MUAC <115 mm (11.5cm) [MUAC for HIV child, TBC <120 mm (12cm)]	SEVERE ACUTE MALNUTRITION WITH COMPLICATION	<ul style="list-style-type: none"> Treat the child to avoid hypoglycaemia Warm the child to avoid hypothermia Refer URGENTLY to the hospital
Sign of severity WITH • Weight for age between -2 and -3 DS AND / OR • MUAC between 115 and 125 mm [MUAC for HIV child, TBC between 120 and 130 mm]	MODERATE ACUTE MALNUTRITION WITH COMPLICATION	Treat the child to avoid hypoglycaemia Warm up the child to avoid hypothermia Refer URGENTLY to the hospital
Weight for age ≤ -3 DS and / or • MUAC <115 mm (11.5cm) [MUAC for HIV children, TBC <120 mm (12cm)]	SEVERE ACUTE MALNUTRITION WITHOUT COMPLICATIONS	<ul style="list-style-type: none"> Keep the child warm to avoid hypothermia Transfer to the nutritional service (OTP)
Weight for age between -2 and -3 DS AND / OR • MUAC between 115 and 125 mm [MUAC between 120 and 130 mm for children HIV and TB]	MODERATE ACUTE MALNUTRITION WITHOUT COMPLICATIONS	<ul style="list-style-type: none"> Transfer to the SFP service (Igikoni cy'umudugudu) Mother's Education on Child Feeding and Hygiene
Size over age ≤ -3 DS OR • Weight for age ≤ -3 DS	SEVERE CHRONIC MALNUTRITION	<ul style="list-style-type: none"> Transfer to the SFP service (Igikoni cy'umudugudu) Mother's Education on Child Feeding and Hygiene

<p>Weight-age between -2 and -3 DS (-2≤DS <-3)</p> <p>OR</p> <ul style="list-style-type: none"> • Weight for age between -2 and -3 DS (-2≤DS <-3) 	<p>MODERN CHRONIC MALNUTRITION</p>	<ul style="list-style-type: none"> • Mother's Education on Child Nutrition and Hygiene
<p>Weight for height and height-age and normal weight-age (Greater than - 2 DS), normal MUAC and without bilateral pitting oedema</p>	<p>NO MALNUTRITION</p>	<ul style="list-style-type: none"> • If the child is less than 2 years old, evaluate the child's diet and advise the mother to feed the child as per protocol • If feeding problem, review the child in 5 days • Explain to the mother when to return immediately.

REFERENCES

1. Hadjiloizou and Bourgeois. Antiepileptic drug treatment in Children. *Expert Rev Neurotherapeutics* 2007. Updated to 2011.
2. Loddenkemper, T., & Goodkin, H. (2011). Treatment of Pediatric Status Epilepticus. In H. S.
3. Singer (Ed.), *Pediatric Neurology*. In *Current Treatment Options in Neurology*. Springer Science + Business Media. DOI 10.1007/s11940-011-0148-3
4. Miller, G. Clinical Features of Cerebral Palsy. In: UpToDate., Patterson, MC (Ed), UpToDate, Waltham, MA.
5. Miller, G. Epidemiology and Etiology of Cerebral Palsy. In UpToDate., Patterson, MC (Ed), UpToDate, Waltham, MA.
6. Miller, G., Management and Prognosis of Cerebral Palsy. In UpToDate., Patterson, MC (Ed), UpToDate, Waltham, MA.
7. Miller, G., Diagnosis of Cerebral Palsy. In UpToDate., Patterson, MC (Ed), UpToDate, Waltham, MA.
8. Pocket Book of Hospital Care for Children. World Health Organization (2005). Geneva, Switzerland: WHO Press.
9. Wilfong, A., Management of status epilepticus in children. In UpToDate., Nordii, D (Ed), UpToDate, Waltham, MA.
10. Wilfong, A., Clinical features of status epilepticus in children. In UpToDate., Nordii, D (Ed), UpToDate, Waltham, MA.
11. Wilfong, A. Treatment of seizures and epileptic syndromes in children. In UpToDate., Nordii, D (Ed), UpToDate, Waltham, MA.

The list of contributors

Ministry of Health and Stakeholders

	Names	Institution
1	Dr Corneille NTIHABOSE	MOH
2	Dr Parfait UWALIRAYE	MOH
3	Dr Nathalie UMUTONI	MOH
4	Dr MUVUNYI Zuberi	MOH
5	Theobald HABIYAREMYE	MOH
6	Eliezer NSENGIYUMVA	MOH
7	Dr Felix SAYINZOGA	RBC
8	Dr Francois UWINKINDI	RBC
9	Dr Evariste NTAGANDA	RBC
10	Dr Jean Louis MANGARA	RBC
11	Marc HAGENIMANA	RBC
12	Frederic MUHOZA	RFDA
13	Dr Lysette UMUTESI	RSSB
14	Alexis RULISA	RSSB
15	Esperance MUKARUSINE	RSSB
16	Dr Emmanuel SABAYESU	MMI
17	Diane MUTONI	RMS
18	Jean Bernard MUNYANGANZO	RMS
19	Julie KIMONYO	NCNM
20	Prof. Annette UWINEZA	RMDC
21	Jean Damascene GASHEREBUKA	RAHP
22	Prof. Emile RWAMASIRABO	Consultant
22	Dr Raymond MUGANGA	Consultant
23	Dr Richard BUTARE	Consultant
24	Prof. Charlotte M. BAVUMA	RCP
25	Stella Matutina TUYISENGE	WHO
26	Dr William NIRINGIYIMANA	RHIA
27	Patrick RUGAMBYA	MPC
28	Eugene R. Abinene	USAID
29	Theogene NDAYAMBAJE	RFDA
30	Jean D'Amour URAMUTSE	NUDOR
31	Ines MUSABYEMARIYA	FHI
32	Dr Georges RUZIGANA	RSOG

Pediatrics

No	Names	Specialty
1	Prof.. Stephenson Musiime	Pediatrics
2	Phn Damaris Uwase	Pharmacy
3	Dr. Nkuranga John Baptist	Pediatrics
4	Dr Emmanuel Rusingiza	Pediatrics
5	Dr. Manzimpaka Albert	Pediatrics
6	Dr. Butare Richard	Expert
7	Phn. Hitayezu Felix	Pharmacy
8	Prof. Emile Rwamasirabo	Lead Expert
9	Dr. Raymond Muganga	Expert
10	Dr Florent Rutagarama	Pediatrics
11	Phn. Fredric Muhoza	Pharmacy
12	Dr. Christian Umuhoroza	Pediatrics
13	Phn Esperance Mukarusine	Pharmacist
14	Dr Anabel Kayirangwa	Pediatrics
15	Phn Noel Rutambika	Pediatrics
16	Dr Oscar Mwizerwa	Pediatrics
17	Phn.Denyse Niyoturamya	Pharmacy
18	Dr Febronie Mushimiyimana	Pediatrics
19	Dr. Hippolyte BWIZA MUHIRE	Pediatrics
20	Dr Aimable Kanyamuhunga	Pediatrics
21	Dr Nyalihama Alain	Pediatrics

REPUBLIC OF RWANDA



MINISTRY OF HEALTH

P O BOX 84 KIGALI

www.moh.gov.rw

**National guideline for management
of Non Communicable Diseases(NCDs)**

Edition 2016





PREFACE OF THE HON. MINISTER OF HEALTH

“... the world stands at a ... crossroads in the movement to confront the rapidly growing burden of non-communicable diseases such as heart disease, cancer, diabetes, and respiratory disease. We now face the challenge of equipping health systems with the means to adequately prevent, treat and monitor this group of complex chronic conditions... the complexity of this task is enormous and its urgency fierce, but there is no question of whether we possess the tool to meet it head on. History will judge us by our efforts to meet the challenge.”

Dr. Agnes Binagwaho, Rwanda Minister of Health, March 2012¹

Non-Communicable Diseases (NCDs) are a worldwide epidemic. Particularly, the most common diseases - Cardiovascular diseases, Chronic Obstructive Pulmonary Diseases (COPD), Chronic Kidney Diseases, Cancer, Diabetes, injuries and disabilities, EMT, oral, eye greatly contribute to the morbidity and mortality accounting for around 60% of all deaths worldwide. The disease pattern is also changing from infectious to chronic in Rwanda like other developing countries due to the epidemiological transition. The burden of infectious diseases is still preeminent; but in addition, the problem of NCDs is creating new challenges for our public health system.

Rwanda MOH plans to continue to prevalent infectious conditions, as well as to reach the next frontier through expansion of access to care for Non-Communicable Diseases (NCDs) which are a recognized and significant cause of morbidity and mortality around the world, including the developing countries. This represents a significant advancement in Rwanda health care services provision. It is in the wake of NCDs burden worldwide that all health care stakeholders,

¹ Agnes Binagwaho, “Meeting the Challenge of NCD: We Cannot Wait,” *Global Heart* 7, no. 1 (March 1, 2012): 1–2, doi:10.1016/j.ghert.2012.01.004

individuals and organizations are called upon to play an active role in improving the quality of life in Rwanda.

The National Guidelines 2015 for prevention and management of NCDs have been developed in accordance with the international standards by a recognized team of experts. The guidelines reported were developed and validated by a Technical Working Group composed by general practitioners and specialists with extensive experience in both urban and rural areas.

Dr Patrick NDIMUBANZI

Hon. Minister of State in Charge of Public Health and Primary Health Care

ACKNOWLEDGEMENTS

The Ministry of Health and the Rwanda Biomedical Center would like to express its gratitude to all organizations and individuals who contributed to the development of the National guidelines for Non-Communicable Diseases. Without the tireless support from all diverse stakeholders, these guidelines would not have been developed.

The Ministry of Health and the Rwanda Biomedical Center wishes to take this opportunity to thank the Non-Communicable Diseases Technical Working Group and all its partners for their worthwhile ideas namely: the Rwandan national teaching hospitals and professional associations, the World Health Organization, the United States Centers for Disease Control, Partners In Health, Family Health International, Handicap International, and civil society organizations.

We are heavily indebted to many other partners and actors in the health sector that made valuable contributions to the development of this policy. Please accept our sincere thanks

Dr Marie Aimee MUHIMPUNDU

Head of NCDs division RBC

Table of Contents

Preface of the Hon. Minister of Health.....	2
Acknowledgements.....	4
1 Heart Failure Guidelines	8
1.1 Guiding Principles.....	8
1.2 The Patient Visit	10
2 Hypertension Guidelines	33
2.1 Guiding principles.....	33
2.2 The Initial Visit.....	34
2.3 The Follow-up Patient Visit	49
2.4 Summary table	53
2.5 Children Hypertension Guidelines:	54
3 Acquired Heart Disease Guidelines	62
3.1 Acute Rheumatic Fever	62
3.2 Rheumatic Heart Disease	67
3.3 Cardiomyopathy.....	69
4 Cardiac surgery and post-op management Guidelines	73
4.1 Cardiac surgery indications, complications and follow up.	73
4.2 Types of cardiac Interventions and valve types	75
4.3 Post-operative follow-up guidelines	82
5 Chronic Respiratory Disease (CRD) guidelines.....	93
5.1 Guiding Principles.....	93
5.2 The Initial Visit.....	94

6	Diabetes guidelines	115
6.1	Guiding principles	115
6.2	The Initial Visit	117
6.3	The Follow-up Patient Visit.....	133
7	Chronic Kidney disease guidelines	157
7.1	Guiding Principle.....	157
7.2	The Initial Visit	158
8	Cancer Guidelines.....	173
8.1	Introduction.....	173
8.2	Signs and symptoms	177
8.3	Principles screening, diagnosis and treatment.....	177
8.4	Major emerging cancers in Rwanda	179
8.4.4	BREAST CANCER.....	186
9	Palliative care guidelines.....	219
9.1	Introduction.....	219
9.2	Guiding Principles	220
9.3	The Initial Visit	222
9.4	The Follow-up Patient Visit.....	242
10	Community Check-up guidelines	244



PART 1: Cardiology

1 HEART FAILURE GUIDELINES

1.1 Guiding Principles

This plan emphasizes a systematic approach, which will help you:

1. Establish that the patient has heart failure

- Heart failure (HF) is often confused with other volume overload syndromes. i.e. Just because a patient was given lasix at a prior hospitalization DOES NOT mean s/he has heart failure.
- You can only diagnose HF after collecting and considering the patient's history, vital signs, physical exam, labs, and imaging data.
- It can be 2-3 clinic visits before you can establish a firm diagnosis of HF.

2. Identify the type of heart failure

If there is clear evidence of HF then the patient's history, vital signs, PE, labs, CXR, and ECHO should be used to narrow the diagnosis to a distinct type of HF.

It's possible to know that the patient has HF but still be unsure of the exact type. i.e. *Cardiomyopathy, hypertensive, RHD, congenital*.

SYSTEMATIC APPROACH

This guide takes you through the following framework for each patient visit:

1. History
2. Vital Signs
3. Physical Exam
4. Lab Review
5. Chest Radiography*
6. Echocardiography*
7. Impression
8. Plan
9. Post-Surgical Care*
10. Anti-Coagulation Management*

* Additions that are unique to heart failure

It's possible to manage heart failure symptoms and optimize treatment while simultaneously searching for the most precise diagnosis.

Patients can have overlapping types of heart failure. i.e. Patients with RHD affecting the aortic valve may also have dilated cardiomyopathy.

3. Establish a Heart Failure Class 1-4

- a. Determine who needs to be emergently referred to the district hospital.
- b. Determine if current therapy is appropriate or if dose escalation is needed.

1.2 The Patient Visit

This guide helps you ask the same questions in the same order to understand: 1. Is this HF? 2. What type of HF? 3. How sick is the patient? (NYHA Class I-IV)

PATIENT BACKGROUND

Review the following information before the patient visit, if available:

- How was the patient referred to the heart failure clinic?
- Has a diagnosis been confirmed? If so, was the diagnosis made clinically or based on imaging information: CXR, echocardiography?
- Is the type of heart failure known?
- Is the patient's ejection fraction known?
- Establish up-front complications and co-morbidities that might affect management.

1.2.1 HISTORY

1.2.1.1 Clinical History

1.2.1.1.1 Exercise Tolerance

- Ask the patient the following questions:
- Do you feel more tired?
- How far can you walk before needing to rest?

1.2.1.1.2 Volume Overload

Ask the patient the following questions:

Pulmonary edema

- Are you short of breath when you're resting? If not, how far can you walk before you are short of breath?
- Is it worse when lying flat or sitting upright?
- Do you wake up in the middle of the night gasping for air?

Ascites

- Is your abdomen is getting bigger?
- Are you eating a smaller amount of food because you feel full or nauseous soon after you start eating?

Nocturia

- Do you need to urinate during the night?
- If so, how many times do you get up to urinate in one night?

Lower extremity edema

- Do you have leg swelling?
- Have you noticed that the swelling has moved closer to the knees or above the knees recently?
- Do you feel like the skin on your legs is tighter?

1.2.1.1.3 Heart Rate

Ask the patient the following question to know if they are experiencing palpitations:

Palpitations

- Do you feel like you have an animal or bird in your chest?

1.2.1.1.4 Cardiac Output

Ask the following questions:

- Do you feel more forgetful?
- Are you lightheaded or dizzy, especially when changing positions from sitting to standing?
- Are you peeing less?

1.2.1.1.5 Co-Morbidities

1. Find out if the patient has any of the following co-morbidities:

- HIV
- TB or a history of TB
- Pregnant or a history of pregnancy
- Diabetes
- Hypertension

HF MIMICKERS

- Renal failure
- Liver failure
- Low serum albumin due to malnutrition, cancer, TB, HIV, or other severe illness.

1.2.1.1.6 Medications

Listen for drugs that cause volume depletion or acute kidney injury, increase the serum potassium, or suppress the heart rate.

- Ask the patient what medications they are taking
- Ask if they are taking or have taken any of the following medicines now or in the past:

Lasix

- If the patient is symptomatic, this may suggest the need for intravenous therapy.
- Excessive diuresis may cause volume depletion and reduce blood flow to the kidneys.

B-Blockers

- May mask tachycardia if a patient is in a heart failure exacerbation.

Ace-Inhibitors

- May cause or worsen acute renal injury. If the patient is taking, you will need to check the urine output and creatinine.

1.2.1.2 Social History

1. Ask about the following:

Alcohol

- How many drinks do you have each day, week?
- How many years have you been drinking alcohol?

Tobacco

- Do you smoke or chew tobacco?
- How many cigarettes do you smoke every day?
- How many years have you smoked?

Pregnancy

If yes, test for pregnancy!

- Are you pregnant now? Do you think that there is a chance that you might be pregnant?
- Do you have any children? If yes, when did you last deliver?
- How many children do you have? How many times have you been pregnant?

Diet

- Do you like to add salt to your food?
- Has your diet changed for any reason?

Sexual History/HIV Risk Factors

- Are you sexually active now? Do you have sex with more than one partner?
- Do you use condoms?
- Have you ever been tested for HIV? When was the last time you were tested?

1.2.1.3 Family History

1. Ask about the family history:
 - Has anyone in your family been told they have a problem with their heart?
 - Does anyone have the same symptoms as you do (i.e. dyspnea, fatigue, edema)?

1.2.2 VITAL SIGNS

Always review vital signs before the physical exam. They will almost always help you understand if a patient is sick and if they should be referred to the district hospital.

VITAL SIGN	Notes
Heart Rate	<p>Tachycardia: May indicate that patient is trying to support cardiac output with a high heart rate.</p> <p>Bradycardia: Could indicate heart block or a high beta-blocker dose.</p>
Blood Pressure	<p>High blood pressure: May suggest a large, thick heart</p> <p>Low blood pressure: Suggests a thin, dilated heart.</p>
Respiratory Rate	Look at the patient. If she/he cannot sit comfortably and speaks in broken sentences this is very suggestive of Class IV symptoms and the patient should be hospitalized.
O2 Saturation	An O2 saturation below 92% suggests that the patient has fluid in the alveoli. Interpret in the context of the patient's other VS. O2 sat 85-90% may be normal in a patient with congenital heart disease who is comfortable with otherwise stable VS.
Weight	Very helpful! Comparing a patient's current weight to earlier values can help estimate the degree of a patient's volume overload.
Temperature	Very important! A patient with a fever or signs of an infection SHOULD NOT GET LASIX!

1.2.3 PHYSICAL EXAM

How to check for heart Failure

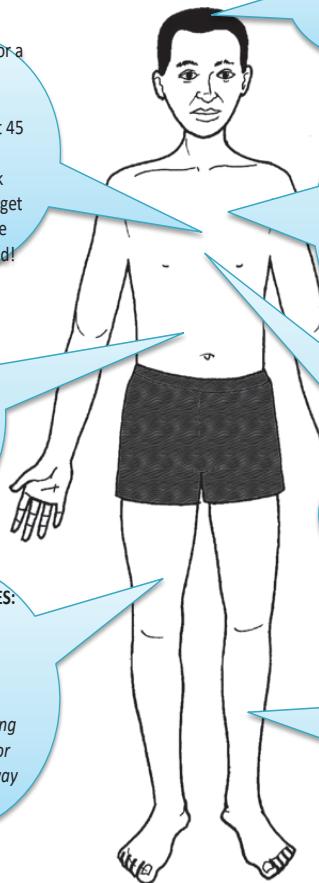
1. Observe the patient. If they are sitting upright, trying to stay still, and unable to hold a conversation because they are trying to catch their breath, these are signs of NYHA Class IV HF.
2. Conduct a head to toe evaluation of the left heart.
3. Conduct a head to toe evaluation of the right heart.

Right Heart

HEART: Listen for a murmur.
JVD: Have the patient laying at 45 degrees and inspect the neck veins. Don't forget to look along the ear and forehead!

ABDOMEN:
Enlarged liver?
How many centimeters below the costal margin?
Abdominal distention?
Ascites?

LOWER EXTREMITIES:
Pitting edema?
How far up the leg?
For example: Pitting edema between the ankle and knee, pitting edema to the knee, or pitting edema half way up the thigh?



Left Heart

BRAIN: Ask patient to give his/her name, location and date

LUNGS:
Cheyne-stokes breathing: alternating rapid breathing with periods of apnea.
Crackles, wheezing suggest pulmonary edema.
Patients with long-term heart failure may not have pulmonary edema because lymph tissue drains fluid from the lungs.

HEART:
Point of Maximal Impact – Can you feel the heart beat lateral to the mid-clavicular line.

EXTREMITIES:
Warm or cold arms & legs?
This will help decipher if the left heart is pumping enough blood to the extremities.

1.2.4 LAB REVIEW

LAB	Notes
NFS	<p>HB/Hct: Anemia can cause or worsen heart failure</p> <p>WBC: Very important to identify a patient who has an infection. HF patients with an infection SHOULD NOT BE DIURESED!</p> <p>Platelets: If very low could identify patients who are a bleeding risk.</p>
Urea	Elevated urea can suggest that there is decreased cardiac output to the kidneys (less blood reaches the kidneys so less urea gets excreted in the urine).
Creatinine	<p>Very, very important! Patients with underlying chronic renal failure may develop heart failure.</p> <p>Decreased cardiac output can cause less blood to flow to the kidneys and result in acute renal injury.</p> <p>Excessive furosemide use can cause volume depletion and decreased blood flow to the kidneys and result in acute renal injury.</p> <p>ACE-Inhibitors reduce the blood flow through the kidney and may result in acute renal injury.</p> <p>Co-morbidities like HTN, DM, and HIV can damage the kidneys and cause renal failure.</p>
Bilirubin, SGOT/SGPT	Mild elevations may suggest that pressure and fluid are building up in the liver.
Electrolytes	<p>Sodium: If it is <135 then could suggest volume overload.</p> <p>Potassium: Often low in patients on lasix. Heart failure patients with low potassium are much more vulnerable to fatal heart rhythms than patients without heart failure.</p> <p>Bicarbonate: Acidosis can mean that not enough blood and O₂ are being delivered to the tissues so they respond by making lactic acid.</p>

1.2.4.1.1 Chest Radiography

Radiographic Finding	Clinical Interpretation
Enlarged cardiac silhouette	Cardiomyopathy or pericardial effusion
Blunting of costovertebral angle	Pleural effusion
Bilateral interstitial infiltrates	Pulmonary edema

1.2.4.1.2 Echocardiography

Echocardiographic Finding	Clinical Interpretation
Enlarged left and/or right ventricles	Cardiomyopathy
Valvular vegetation (mitral / aortic)	RHD or endocarditis
Mitral Stenosis	RHD
Pericardial effusion	Tuberculous pericarditis

Please refer to the echocardiographic curriculum for greater detail

1.2.5 IMPRESSION

1.2.5.1 Diagnosis

Remember that other diseases cause volume overload. The DH nurse must confirm that the patient's clinical presentation is consistent with heart failure. Based on the information gathered decide if:

**Patient DOES NOT have
Heart Failure**

Stop

**Patient DOES have Heart
Failure**

Continue

Based on the information gathered, decide what type of heart failure the patient has:

Mitral Stenosis

*Must see a cardiologist
immediately*

Isolated Right HF

*Must see a cardiologist
immediately*

Valvular Disease

*Must see a cardiologist
immediately*

Congenital HF

*Must see a cardiologist
immediately*

Hypertensive HF

Pericardial Disease

Cardiomyopathy

1.2.5.1.1 NYHA Class

The NYHA Class helps you understand how sick the patient is. Specifically it tells you who is stable enough to continue outpatient management and who should be evaluated by a physician in the hospital.



CAUTION!! Take note of these situations where standard therapies are contraindicated, before proceeding!

1.2.6 PLAN

CONDITIONS THAT REQUIRE DIFFERENT MANAGEMENT	
Pregnancy	Never use ACE-Inhibitors, or Coumadin in pregnant women. Labetalol is the preferred beta-blocker for pregnant women. Avoid atenolol due to risk of low birth weight. All women of reproductive age should be referred for family planning.
Creatinine	Check creatinine. If it doubles or is $> 200 \mu\text{mol/L}$, then stop ACE-Inhibitors, spironolactone, digoxin. Consider reducing or holding furosemide.
Tachycardia	Sinus rhythm – NYHA 3-4 Do not start a beta-blocker. This will drop cardiac output

CONDITIONS THAT REQUIRE DIFFERENT MANAGEMENT	
	<p>abruptly.</p> <p>Consider if patient needs referral to District Hospital. If referral is not necessary, continue with outpatient management.</p>
	<p>Atrial fibrillation – NYHA 3-4</p> <p>Cautiously give 1 dose beta-blocker and transfer to district hospital.</p>
Bradycardia – Hr< 60	<p>Do not start a beta-blocker. This will induce heart block.</p> <p>Consider if patient needs referral to District Hospital. If referral is not necessary, continue with outpatient management.</p>
Hyperkalemia	<p>If potassium > 5.5 mEq/L, stop ACE-Inhibitors and spironolactone and treat hyperkalemia.</p> <p>Consider if patient needs referral to District Hospital. If referral is not necessary, continue with outpatient management.</p>

1.2.6.1 Emergencies

Inability to lie flat, dyspnea at rest, SBP < 80 or > 180, pulse < 40 or > 120, oxygen saturation < 90%, respiratory rate > 24

Decompensated(SBP > 80, warm extremities, not confused, good urine output)

- Volume Overload: Lasix 40 IV x 1. If no improvement in 30 minutes, give 80 IV x1
- Do not initiate beta-blockers unless patient has RHD
- Check urea/Cr, potassium, CBC, other electrolytes
- If SBP > 180, lower BP with ACE-Inhibitor, hydralazine, or calcium channel blocker
- TRANSFER TO DISTRICT HOSPITAL

Decompensated and Cardiogenic Shock (SBP > 80, warm extremities, not confused, good urine output)

- Use 1-3 above.
- Add digoxin 0.125 mcg to therapy above to improve contractility
- TRANSFER TO DISTRICT HOSPITAL

1.2.6.2 Volume Status Management

- Hypovolemia: Decrease or stop furosemide.
- Euvolemia: Maintain furosemide.
- Hypervolemia:

NYHA 1 or 2: Start or increase oral furosemide.

NYHA 3 or 4: This is an emergency! See above.

Initial Dose (Adult)	Dose Adjustment				Maximum Dose
	Hypovolemia	Euvolemia	Moderate Hypervolemia	Severe Hypervolemia	
20 - 40 mg 1x/day	Stop all diuretics, consider giving fluid.	May attempt to decrease dose unless starting or increasing B-blockers	Double current dose or add second agent	Admit and give IV diuresis	120 mg 2x/day

1.2.6.3 Blood Pressure Management

Low Ejection Fraction < 40%

1. Titrate the following in a step-wise fashion until the SBP is 90-100:
 1. ACE-Inhibitors and/or Beta-blockers: 1st Line
 2. Hydralazine & IsosorbideDinitrate: 2nd Line
 3. Spironolactone: 3rd Line

Normal Ejection Fraction > 40%

2. Use the following medications to reduce the SBP to <140:
 1. ACE-Inhibitors: 1st Line*
 2. If unable to use ACE-i, reduce blood pressure as you would with patients who do not have heart failure.

1.2.6.4 Atrial Fibrillation Management

1. If HR > 90 and SBP > 100, start beta-blocker
2. If HR > 90 and SBP < 100, start digoxin
3. Use aspirin to help prevent stroke

Most important in RHD & cardiomyopathy

1.2.6.5 Medications with Mortality Benefit

The patient should be on 2 of the following classes of drugs:

1. ACE-Inhibitors – 1st choice
2. Beta-blockers: 1st choice

Most important for cardiomyopathy

If patient has contraindications to ACE-Inhibitors and/or Beta-blockers try the following:

3. Hydralazine & IsosorbideDinitrate: 2nd choice
4. Spironolactone: 3rd choice

Beta-Blocker				
	Starting Dose	Dose Change	Target Dose	
Carvedilol	3.125-6.25 mg 2x/day	3.125-6.25 mg 2x/day	25 mg 2x/day	
Atenolol*	12.5 mg 1x/day	12.5 mg 1x/day	50 mg 1x/day	
ACE-inhibitor				

	Starting Dose	Dose Change	Target Dose
Lisinopril	5 mg 1x/day	5 mg 1x/day	20 mg 1x/day
Captopril	12.5 mg 3x/day	12.5 mg 3x/day	50 mg 3x/day
Enalapril	2.5 mg 2x/day	2.5 mg 2x/day	10–20 mg 2x/day
Hydralazine/isosorbidedinitrate (Contraind to B-Blocker or Ace-Inhibitor)			
	Starting Dose	Dose Change	Target Dose
Hydralazine	25 mg 3x/day	25 mg 3x/day	50 mg 3x/day
Isosorbide	10 mg 3x/day	10 mg 3x/day	30 mg 3x/day
Beta-Blocker			
	Starting Dose	Dose Change	Target Dose
Spironolactone	12.5-25 mg 1x/day	12.5 mg 1x/day	25 mg 1x/day

1.2.6.6 Anti-Platelet Management

Use Aspirin 100mg in any patient with cardiomyopathy, RHD, atrial fibrillation, any valvular or congenital heart disease.

1.2.6.7 Additional Targeted Therapy for specific types of HF

Patients with these conditions should be evaluated by a cardiologist within 6 months.

1.2.6.7.1 Mitral Stenosis

1st Line: Beta-blocker, Titrate to goal HR = 50 - 60 and SBP \geq 90.

It is ok to start a beta-blocker in a decompensated patient.

2nd Line: Digoxin can be used in patients with SBP < 90 who need heart rate lowered.

If patient has atrial fibrillation then manage per section 8.4 and section 10

Provide Secondary Penicillin Prophylaxis (see below). If patient has an allergic reaction -> give epinephrine 1 amp (0.3mg IM) and call the physician!

Female 15- 49: Refer for family planning

Close follow-up for surgical planning

Secondary Penicillin Prophylaxis			
Preparation	Route	Pediatric dosing (<15 yo or < 20kg)	Adult
Benzathine Penicillin G	IM	600,000 units every 4 wks	1.2 million units every 4 wks
Penicillin V	Oral	250mg 2x/day	500mg 2x/day

1.2.6.7.2 Valvular Heart Disease (not RHD)/Congenital/Right Heart Disease

- Unless there is an obvious cause of patient's valvular disease, treat as RHD.
- Evaluate for TB.
- Check a CXR to make sure that a patient does not have isolated right heart disease from pulmonary disease
- Provide Penicillin Prophylaxis
- Female 15 - 49: Refer for family planning
- Close follow-up for surgical planning

1.2.6.8 Routine Investigations

FIRST VISIT	EVERY VISIT	EVERY 3-6 MONTHS	ANNUALLY
<input type="checkbox"/> Echocardiography	<input type="checkbox"/> Creatinine & Potassium	<input type="checkbox"/> Creatinine	<input type="checkbox"/> Echocardiography
<input type="checkbox"/> Chest X-Ray	<input type="checkbox"/> ***	<input type="checkbox"/> ***	<input type="checkbox"/> ***
<input type="checkbox"/> Creatinine & potassium (if available)	<input type="checkbox"/> if diuretics or ACE-Inhibitors changed at the last visit.	<input type="checkbox"/> If taking diuretics, even if no changes made at the last visit.	<input type="checkbox"/> If there has been a significant clinical change.
<input type="checkbox"/> Random blood glucose & HbA1c (if available)	<input type="checkbox"/> ***	<input type="checkbox"/> ***	<input type="checkbox"/> ***
<input type="checkbox"/> Pregnancy Test			

1.2.6.9 Follow-Up

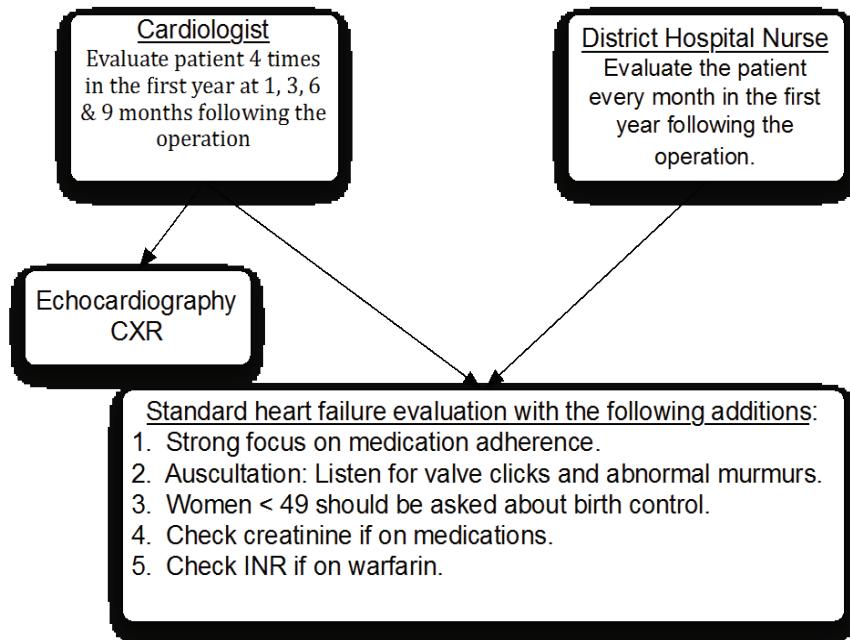
	CLASS I OR II HEART FAILURE, EUVOLEMIA	BORDERLINE SYMPTOMS (CLASS II-III), HYPERVOLEMIA, NEW RENAL FAILURE,
Medication Change	Return in 2-4 weeks	Return in 1-2 weeks
Ace-Inhibitor Change	Check creatinine & potassium in 2-4 weeks	Check creatinine & potassium in 1-2 weeks
No Medication Change	Return in 3-4 months	Return in 2-4 weeks

1.2.7 EDUCATION

SYMPTOM MONITORING	
Hypervolemia:	Teach patients to double furosemide dose and come to clinic.
Hypovolemia:	Teach patient how to recognize symptoms and instruct patient to stop furosemide and come to clinic.
Hypotension:	If patient lightheaded, instruct to stop BP meds and come to clinic.
DIET	
Salt:	Instruct patient not to add salt to food.

1.2.8 POST-SURGICAL CARE

1.2.8.1 Early Follow-Up



1. If any of the following are suspected, call the cardiologist and refer to the district hospital:
 - New Heart Failure
 - Sternal Wound Infection and Dehiscence
 - Pericardial Tamponade
 - Endocarditis
 - New Arrhythmia
2. All post-surgical RHD should be on penicillin prophylaxis.

1.2.8.2 Late Follow-up

Every 3-4 months in the District Hospital

1. Notify the cardiologist and transfer patients to the district hospital for the following problems:

- Fever ($>38^{\circ}\text{C}$) in a patient with a prosthetic heart valve: Concerning for endocarditis
- New murmur in a patient with a mechanical heart: Concerning for valve thrombosis or valve dehiscence

1.2.9 ANTI-COAGULATION MANAGEMENT

Warfarin

1. Refer patient to the district hospital to start warfarin for the following:

Indications	GOAL INR	DURATION OF THERAPY
PROSTHETIC VALVES		
Bioprosthetic Tricuspid Valve	2.5 – 3.0	3 months
Mechanical Aortic Valve	2.5 – 3.0	Lifelong
Mechanical Mitral Valve	3.0 – 3.5	Lifelong
Mechanical Tricuspid Valve	3.0 – 3.5	Lifelong
OTHER INDICATIONS		
Mitral stenosis and atrial fibrillation	2.0 – 2.5	Lifelong
Ventricular thrombosis	2.0 – 2.5	Lifelong
Deep vein thrombosis	2.0 – 2.5	3 months

INR	ACTION
Greater than 5	Hospitalize
Greater than goal, but less than 5	Decrease warfarin by 0.5 mg – 1.0 mg
At goal	Continue current dose
Less than goal, but greater than 1.5	Increase warfarin by 0.5mg – 1.0mg
Less than 1.5	Hospitalize

2 HYPERTENSION GUIDELINES

2.1 Guiding principles

THE INITIAL VISIT

The initial visit plan emphasizes a systematic approach, which will help you:

1. Establish that the patient has hypertension

Patients get mistakenly labeled with hypertension during periods of acute stress (i.e. infection) or when treated with certain medications.

Symptoms, risk factors, and physical exam findings raise suspicion for severe hypertension, but do not play a role in the diagnosis.

A diagnosis of hypertension is only made when:

- Systolic blood pressure ≥ 140 mmHg OR
- Diastolic blood pressure ≥ 90 mmHg

Blood pressure needs to be elevated on two separate visits.

2. Identify the cause of elevated blood pressure

Decide whether the patient has essential or secondary hypertension (especially in young persons and children assess secondary cause).

SYSTEMATIC APPROACH

This guide takes you through the following framework for each patient visit:

1. History
2. Vital Signs
3. Physical Exam
4. Lab Review
5. Impression
6. Plan

3. Assess the stage of hypertension

- a. Determine the patient's stage:
 - o I: 140/90 – 159/99
 - o II: 160/100 – 179/109
 - o III: > 180/110

Stage III

Assess target damage organ (brain, eye, heart, kidneys), if is a female patient exclude pregnancy.

THE FOLLOW-UP VISIT

The follow-up visit emphasizeson a systematic approach, which will help you:

1. Establish or confirm that the patient has hypertension
2. Identify or confirm the stage of hypertension
3. Assess medication compliance and hypertension control
4. Life style modification

2.2 The Initial Visit

This section emphasizes a systematic approach, which will help answer the following basic questions: 1. Is this hypertension? 2. What caused the hypertension? 3. How severe is the hypertension?

PATIENT BACKGROUND

Review the following information before the patient visit, if available:

- How was the patient referred to the hypertension clinic?
- Is the diagnosis suspected or confirmed?
- Has the patient been started on anti-hypertensive treatment already?
- Has the patient co-morbidities?

2.2.1 HISTORY

2.2.1.1 Clinical History

2.2.1.1.1 Hypertensive urgency and Emergency

Urgency means that the patient has raised BP of more than 180/110 mmHg without associated organ damage, also find out if the patient has experienced any of the following emergency signs:

- | | | |
|---|-------------------------------------|------------------------------------|
| <input type="checkbox"/> Acute dyspnea | <input type="checkbox"/> Chest pain | <input type="checkbox"/> Headaches |
| <input type="checkbox"/> Vision Changes | <input type="checkbox"/> Flank pain | <input type="checkbox"/> Hematuria |

2. If the patient has these symptoms, call the physician and initiate transfer. However you should complete the patient's workup(complete file, FBC, blood sugar, creatinine, potassium level, pregnant test if women child bearing age) and begin treatment before transferring.

2.2.1.2 Essential Hypertension

Generally asymptomatic

Determine if patient has symptoms that might suggest secondary hypertension.

2.2.1.3 Secondary Hypertension

Ask the patient the questions related to the following:

- Kidney Disease: Swelling, micturition frequency
- Anxiety: assess the causes of stress
- Pain: assess if the patient has pain
- Endocrinopathy: assess tremors, palpitations, weight loss?
- Cushing's: the face or abdomen larger while arms and legs are thinner?

2.2.1.1.4 Complications

Find out if the patient has experienced any of the following signs of end-organ damage:

Brain – Stroke

- Have you experienced any weakness on one side of the body?
- Have you ever had problems walking or speaking?

Eyes – Retinal Damage

- Is your vision blurred? or decrease sight

Heart – Left Ventricular Hypertrophy

- Do you become more tired than usual with daily activities?
- Are you short of breath laying flat or do you wake up in the night short of breath?

Kidney – Hypertensive Nephropathy

- Has a doctor or nurse ever told you that you have a problem with your kidneys?

2.2.1.1.5 Co-Morbidities

Find out if the patient has any of the following co-morbidities:

- | | |
|-----------------------------------|---|
| <input type="checkbox"/> HIV | <input type="checkbox"/> Kidney Disease |
| <input type="checkbox"/> Diabetes | <input type="checkbox"/> Pregnant or a history of pregnancy |

2.2.1.1.6 Medications

Ask the patient if they are taking or have taken any of the following medicines now or in the past:

Medications that cause hypertension

- Oestrogens (Family Planning)
- Steroids(prednisolone)
- Amitriptyline
- Ibuprofen, diclofenac

Medications that treat hypertension

- Ace-Inhibitors(for example captopril)
- ARBs(Angiotensine Receptor Blockers: lozartan)
- HCTZ
- Calcium Channel Blockers
- Beta-blockers
- Hydralazine
- Methyldopa

2.2.1.2 Social History

Ask about the following:

Tobacco/Alcohol

- Do you drink alcoholic beverages? If so, how many per day or week?
- Do you smoke cigarettes? If so, how many every day or week?

Diet

- Do you add salt to your food?
- What foods do you eat most (i.e. vegetables, carbohydrates, protein)?

Socio-economic Situation

- Would it be difficult for you to come to the clinic 4 times a year?
- Are there people at home who can help you with treatment?

2.2.1.3 Family history

Ask about the family history:

Hypertension:

- Has anyone in your family been told they have hypertension?
- Has anyone in your family been told they have a problem with their heart?

2.2.2 VITAL SIGNS

Always review vital signs before the physical exam. They will almost always help you understand if a patient is sick and will provide important information about whether the patient should be referred to the district hospital.

Vital Signs	Notes
TEMPERATURE	Infection can increase or lower blood pressure!
HEART RATE	Tachycardia: May indicate that the patient has a secondary cause or complication of hypertension.
BLOOD PRESSURE	Should be done at initial visit and all follow-up visits.
RESPIRATORY RATE	RR > 24 may signal complications of hypertension like pulmonary edema.
O2 SATURATION	O2 Sat < 90% may signal pulmonary edema
WEIGHT	Should be done at initial visit and all follow-up visits. Increasing weights may signal fluid retention.

Blood Pressure Techniques

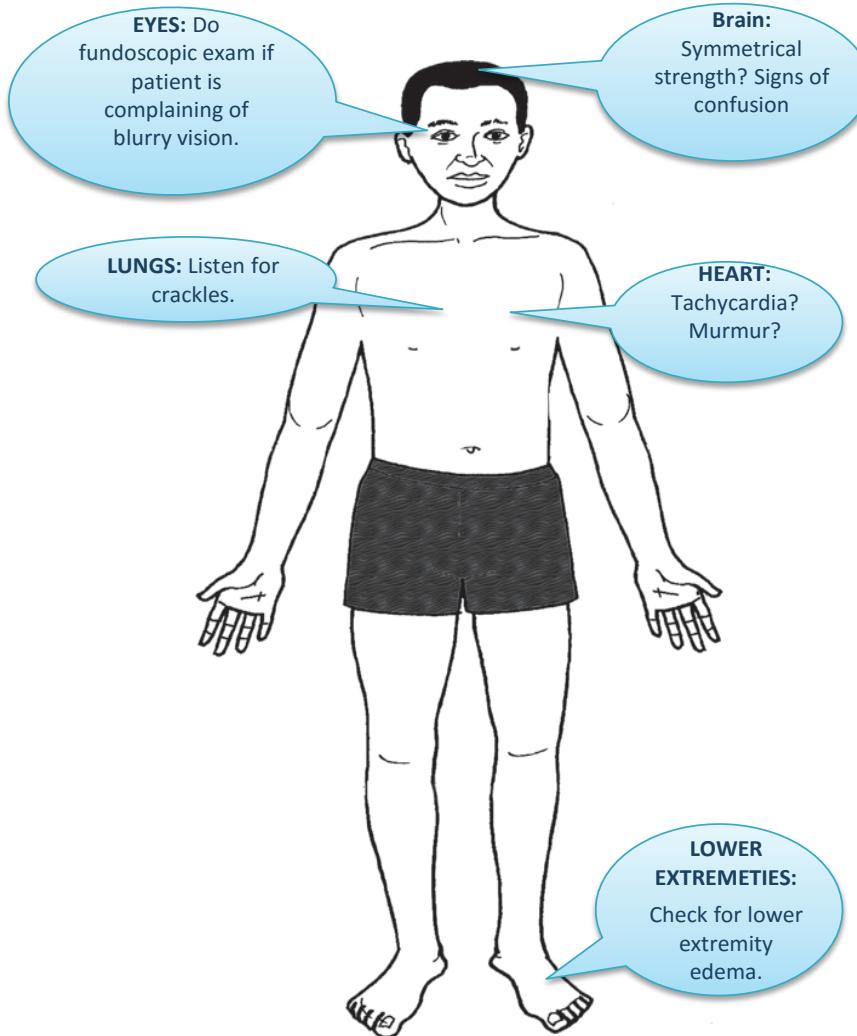
Stethoscope and cuffs



Patient: Seated for ten minutes
Arm: Same level of the heart
Cuff: lower edge 2-3 cm above brachial artery
Cuff: covers 40% of arm circumference

2.2.3 PHYSICAL EXAM

Observe the patient. Sometimes it is possible to determine severe side effects of hypertensive emergency simply by observation. Then check the following:



2.2.4 LAB REVIEW

LAB	WHEN	Notes
Fingerstick Blood Glucose (FBG)	Initial Visit	Diabetes and hypertension often exist together.
Creatinine	Initial Visit Every Year	Progressive renal failure is both a cause and consequence of hypertension. ACE-Inhibitors: Can cause acute renal failure. Cr > 150 umol/L is a risk factor for stage I HTN.
Urine Dipstick	Initial Visit	Protein in the urine is a risk factor in stage I HTN.
HIV	Initial Visit	HIV and ARVs can damage kidneys and cause hypertension.
Pregnancy Test	Initial Visit and as Indicated	The consequences of hypertension in pregnant women are grave.
NFS	Only as indicated	WBC: Infection may cause a high or low blood pressure!
Electrolytes	Only as indicated	Potassium: Low or high value could suggest a secondary cause of hypertension.

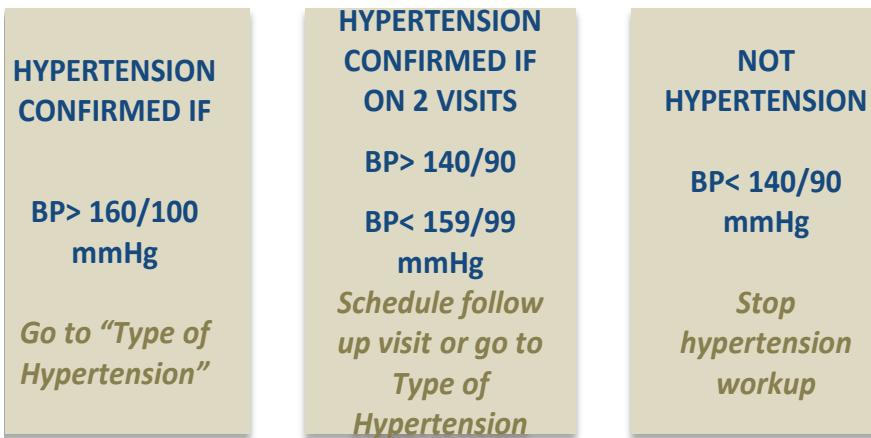
2.2.5 IMPRESSION

2.2.5.1 Diagnosis

If patient has already been diagnosed and treated for hypertension, skip to par 2.2.6

If the BP is between 140/80 – 160/89 mmHg (Stage1), you must ask the patient to return for afollow-up visit before you can diagnose hypertension.

Use the following boxes to guide your decision:



2.2.5.2 Type of Hypertension

Based on the information gathered in the exam, decide whether the patient has.

Essential or “Lone” Hypertension

Secondary Hypertension

2.2.5.3 Hypertension stage and danger sign

To know whether the patient should be transferred to the district hospital or started on treatment, choose the appropriate next step below by considering thehypertension stageand danger signs.

Hypertensive Emergency

BP > 180/110 mmHg & Danger Signs

Call physician and admit to district hospital

DANGER SIGNS:

- Sudden confusion, weakness, difficulty speaking
- Blurry vision
- Difficult breathing
- Chest pain

Stage III Hypertension

BP > 180/110 mmHg without Danger Signs

Manage as Outpatient

Stage II Hypertension

BP 160/100 - 179/109 mmHg

Manage as Outpatient

RISK FACTORS:

- Age >50
- Obesity (BMI>25)
- Smoking
- Diabetes
- Proteinuria
- Renal Failure ($\text{Cr}>150 \text{ umol/L}$)

Stage I Hypertension

WITH 2 OR MORE RISK FACTORS

BP 140/90 – 159/99 mmHg

Manage as Outpatient

Stage I Hypertension

WITH LESS THAN 2 RISK FACTORS

BP 140/90 – 159/99 mmHg

Manage as Outpatient

2.2.6 PLAN

CAUTION!! Take note of these situations where standard therapies are contraindicated, before proceeding!

CONDITIONS THAT REQUIRE DIFFERENT MANAGEMENT

Pregnancy	Ace-Inhibitors, Atenolol, and HCTZ should not be used in pregnant women. Refer all pregnant women to the pre-natal visit.
Renal Failure	Remember that acute kidney injury and chronic kidney disease are managed differently! ACE-Inhibitors (Ace-I) <ul style="list-style-type: none">○ If Cr > 200umol/L, then ACE-I are contraindicated○ If Cr increases by 50% hold ACE-I. Re-check Cr within 1 month.
Bradycardia – Hr< 60	Do not start a beta-blocker. This will induce heart block. Consider admission to District Hospital. If referral is not necessary, continue with outpatient management.
Hyperkalemia	If potassium > 5.5 mEq/L, stop ACE-Inhibitors and spironolactone and treat hyperkalemia. Consider admission to District Hospital. If referral is not necessary, continue with outpatient management.
Hypokalemia	Hold furosemide if KCl < 3.0. Consider admission to hospital for potassium repletion.
HIV Positive	Be sure to refer to ID clinic because patient may need ARVs changed.

2.2.6.1 Hypertensive Emergency

BP > 180/110 with evidence to damage to brain, eye, heart, kidneys or fetus

1. Give medication every 30 minutes
2. Call physician and admit to hospital
3. Check blood pressure every thirty minutes until transfer

*****DO NOT LOWER THE BLOOD PRESSURE MORE THAN 25%*****

Medication	Dosing	Notes
Captopril	25 mg orally	Contraindicated in pregnancy and renal failure ($\text{Cr} \geq \mu\text{mol/L}$)
Nifedipine (immediate release)	10 mg orally	
Hydralazine	25 mg orally or 20mg IV	
Eurosemide	40 mg orally or 20mg IV	If evidence of pulmonary congestion

2.2.6.2 Treat essential Hypertension

STAGE 1 (BP 140/90 – 159/99) WITHOUT RISK FACTORS

Encourage lifestyle modifications

If unable to achieve a blood pressure < 140/90 in 12 months, start one antihypertensive

Monitor every 3 months

STAGE 1 (BP 140/90 – 159/99) WITH RISK FACTORS:

- Encourage lifestyle modifications
- If unable to achieve a blood pressure <140/90 in 3 months, start one antihypertensive
- Monitor every 3 months

STAGE 2 (BP 160/100 – 179/109):

Start two hypertensive medications

Encourage lifestyle modifications

Follow-up in 1 month

Lifestyle Modifications:

- Salt Reduction
- Weight Loss (if BMII > 25)+Physical exercise
- Smoking Cessation
- Alcohol Cessation

STAGE 3 (BP > 180/110) without danger signs:

- Start two anti-hypertensive drugs immediately.
- Encourage lifestyle modifications.
- Follow-up in 2 weeks

	Medication	Starting Dose	Notes
1 st Line (Thiazide diuretics)	HCTZ	12.5mg oral 1x/day	Can cause dehydration and hypokalemia. Contraindicated in pregnancy!
2 nd Line (Calcium channel Blockers)	Amlodipine	5mg oral 1x/day	Can cause lower extremity edema and worsen volume overload.
	Nifedipine (Sustained Release)	20mg oral 2x/day	Can cause dizziness/lightheadedness. Safe in pregnancy.
3 rd Line (ACE-Inhibitors)	Lisinopril	10mg oral 1x/day	Can cause acute kidney injury, hyperkalemia, angioedema, cough
	Captopril	12.5mg oral 3x/day	Contraindicated in pregnancy!
4 th Line (Beta-blockers)	Atenolol	12.5mg oral 1x/day	Contraindicated if HR < 60 bpm Atenolol should not be used in pregnancy. Carvedilol is safe in

	Carvedilol	6.25mg oral 2x/day	pregnancy.
5 th Line	Hydralazine	25mg oral 3x/day	Headaches are common. Safe in pregnancy.

2.2.6.2.1 Hypertension with complications

Diabetes:

ACE-Inhibitors are first line.

Proteinuria:

ACE-Inhibitors are first line.

Cardiomyopathy:

Ace-Inhibitors, Beta-blockers, Spironolactone are preferred.

Chronic Renal Failure:

- 1st Line: Furosemide, Amlodipine or Nifedipine
- 2nd Line: Beta-blockers and hydralazine

ACE-INHIBITORS

In the short term, ACE-Inhibitors decrease blood flow to the kidneys. If you start an ACE-Inhibitor or increase the dose **you must check a creatinine within 30 days.**

2.2.6.2.2 Hypertension in pregnancy

Chronic Hypertension: Less than 20 weeks gestation

Treat according to 'essential hypertension' guidelines. Calcium-Channel Blockers, Hydralazine, Carvedilol, and Methyldopa are options.

- **Preeclampsia:** 140/90 to 150/99 mmHg & greater than 20 weeks gestation. Refer to ophthalmologist if worsening vision or abnormal fundoscopic exam.
- **Severe Preeclampsia:** > 160/100 mmHg & greater than 20 weeks gestation. Call physician immediately and admit to hospital. Give hydralazine 10 IV while waiting on transfer.
- **Eclampsia:** Patient having seizures. Call physician to help with immediate delivery of the baby. Give magnesium 2g IV if physician not available.

2.2.7 ROUTINE INVESTIGATIONS

FIRST VISIT	EVERY VISIT	EVERY 3-6 MONTHS	AT LEAST ONCE
<input type="checkbox"/> Creatinine & Potassium	<input type="checkbox"/> Creatinine & Potassium	<input type="checkbox"/> Creatinine	<input type="checkbox"/> Echocardiography
<input type="checkbox"/> Random blood glucose	<input type="checkbox"/> ***	<input type="checkbox"/>	<input type="checkbox"/> ***
<input type="checkbox"/> & HbA1c (if available)	<input type="checkbox"/> if diuretics or ACE-Inhibitors changed at the last visit.	<input type="checkbox"/> ***	<input type="checkbox"/> ONLY FOR PATIENTS WITH: <input type="checkbox"/> SBP > 180 or <input type="checkbox"/> DBP > 11 <input type="checkbox"/> ***
<input type="checkbox"/> Pregnancy Test	<input type="checkbox"/> ***	<input type="checkbox"/> ***	

2.2.8 FOLLOW-UP SCHEDULE

	Stage 1 HTN	Stage 2 or 3 HTN
Medication Change	Return in 4-6 weeks	Return in 2-4 weeks
Ace-Inhibitor Change	Check creatinine & potassium in 2-4 weeks	Check creatinine & potassium in 1-2 weeks
No Medication Change	Return in 3-4 months	Return in 2-4 weeks

2.2.9 EDUCATION

SYMPTOM MONITORING	
Asymptomatic:	Teach patients that hypertension usually does not cause symptoms.
Emergency Symptoms:	Instruct patient that if they experience blurry vision, chest pain, or shortness of breath related to hypertension this is an emergency.
MEDICATION	
Medication Effect:	Explain that lower blood pressure won't make the patient feel better. It will prevent complications like HF, CKD, and stroke.
Goal:	Do not stop medication once control is achieved. You must continue taking medication to keep BP low.
DIET	
Diet Counseling:	Advise patients not to add salt to food.

2.3 The Follow-up Patient Visit

This section emphasizes a systematic approach, which will help you: 1. Confirm that the patient has hypertension; 2. Assess medication adherence; and 3. Assess blood pressure control.

- 1. History (See 2.2.1)**
- 2. Vital Signs (See 2.2.2)**
- 3. Physical Exam (See 2.2.3)**
- 4. Lab Review (See 2.2.4)**

2.3.1 IMPRESSION

2.3.1.1 Medication Adherence

Evaluate the patient's ability to follow the treatment plan from last visit.

2.3.1.2 Blood Pressure Control

Review the patient's recorded blood pressure last visit.

Good Control

Blood Pressure < 140/80

NO TITRATION

Fair Control

Blood Pressure 140/90 – 159/99

ONE TITRATION

Poor Control

Blood Pressure >160/100 – 179/109

TWO TITRATIONS

Use the same information from the initial visit for HISTORY, VITAL SIGNS, PHYSICAL EXAM and LAB REVIEW in the follow up visit.

Very Poor Control

Blood Pressure >180/110 WITHOUT organ damage

TWO TITRATIONS

Emergency

Blood Pressure > 180/110 WITH organ damage

HOSPITAL ADMISSION

2.3.2 PLAN

*****IMPORTANT*****

**BEFORE CHANGES ARE MADE TO HYPERTENSION THERAPY
PLEASE CONSIDER THE FOLLOWING FROM THE INITIAL VISIT**

**CONDITIONS THAT REQUIRE DIFFERENT
MANAGEMENT**

See par 1.2.6 Above

EMERGENCIES

See Par 1.2..6.1 Above

2.3.2.1 Hypertensive therapy

Determine the patient's quality of control and the number of titrations required. Use the chart below to guide medication changes.

	Medication	Titration Dose	Maximum Dose	Notes
1 st Line (Thiazide diuretics)	HCTZ	12.5mg oral 1x/day	25mg oral 1x/day	Can cause dehydration and hypokalemia. Contraindicated in pregnancy!
2 nd Line (Calcium channel Blockers)	Amlodipine	5mg oral 1x/day	10mg oral 1x/day	Can cause lower extremity edema and worsen volume overload. Can cause dizziness/lightheadedness. Safe in pregnancy.
	Nifedipine (Sustained Release)	20mg oral 2x/day	60mg oral 2x/day	
3 rd Line (ACE-Inhibitors)	Lisinopril	10mg oral 1x/day	40mg oral 1x/day	Can cause acute kidney injury, hyperkalemia, angioedema, cough
	Captopril	12.5-25mg oral 3x/day	50mg oral 3x/day	Contraindicated in pregnancy!
4 th Line (Beta-blockers)	Atenolol	12.5-25mg oral 1x/day	100mg oral 1x/day	Contraindicated if HR < 60 bpm Atenolol should not be used in pregnancy.
	Carvedilol	6.2512.5mg oral 2x/day	25mg oral 2x/day	Carvedilol is safe in pregnancy.
5 th Line	Hydralazine	25mg oral 3x/day	100mg oral 3x/day	Headaches are common. Safe in pregnancy.

*****IMPORTANT*****

**AFTER CHANGES ARE MADE TO HYPERTENSION THERAPY
PLEASE CONSIDER THE FOLLOWING FROM THE INITIAL VISIT**

HYPERTENSION WITH COMPLICATIONS

See par 1.2.6.2.1 Above

HYPERTENSION IN PREGNANCY

See par 1.2.6.2.2. Above

ROUTINE INVESTIGATIONS

See par 1.2.7 Above

FOLLOW-UP

See par 1.2.8 Above

EDUCATION

See par 1.2.9 Above

2.4 Summary table

Type of patients	Diagnosis confirmation	Management of cases without risk factors/danger signs	Management of cases with risk factors/danger signs
Not Hypertension <140/90	Hypertension not diagnosed	Encourage lifestyle modifications	Encourage lifestyle modifications
Stage 1 Hypertension : 140/90 – 159/99	Schedule a 2 nd follow up visit to confirm Hypertension	Manage as outpatient - Encourage lifestyle modifications. If unable to achieve a blood pressure < 140/90 in 12 months, start one antihypertensive. Monitor every 3 months	Manage as outpatient - Encourage lifestyle modifications. If unable to achieve a blood pressure <140/90 in 3 months, start one antihypertensive. Monitor every 3 months
Stage 2 Hypertension : 160/100 – 179/109	Hypertension confirmed at first measurement	Manage as outpatient - Encourage lifestyle modifications, Start two antihypertensive immediately. Follow-up in 1 month	Manage as outpatient - Encourage lifestyle modifications, Start two antihypertensive immediately. Follow-up in 1 month
Stage 3 Hypertension Emergency: > 180/110	Hypertension confirmed at first measurement	Manage as outpatient – Encourage lifestyle modification, Start two hypertensive immediately. Follow up in 1 month	Call physician and admit to district hospital. Medications every 30 mn. Check blood pressure every thirty minutes until transfer. Encourage life style modifications. Follow up in 2 weeks. ***DO NOT LOWER THE BLOOD PRESSURE MORE THAN 25%***

2.5 Children Hypertension Guidelines:

Definition

Hypertension is defined as systolic and/or diastolic blood pressure \geq the 95th percentile for gender, age and height percentile on at least three consecutive occasions.

A sustained blood pressure of $> 115/80$ is abnormal in children between 6 weeks and 6 years of age.

Stage 1 hypertension:

SBP or DBP from 95th to 99th percentile + 5 mm Hg

In adolescents if BP>140/90 mmHg, even < 95th percentile

Stage 2 hypertension: *SBP or DBP greater than 99th percentile + 5 mm Hg*

Hypertensive urgency is defined as a significant elevation of blood pressure without accompanying end organ damage.

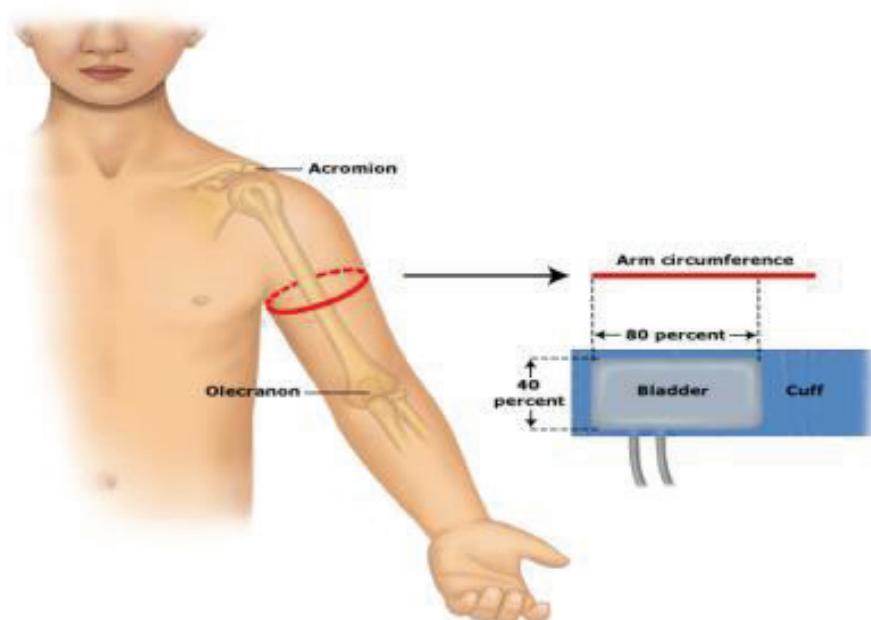
- *Signs of complications are: Encephalopathy, convulsions, retinal haemorrhages or blindness*

Causes

Generally, severe hypertension suggests renal disease

Accurate measurement of BP:

- Use the widest cuff that can be applied to the upper arm
- The cuff bladder must encircle at least 80% of the upper arm and should cover at least 75% of the distance between the elbow and the shoulder joints
- It is better to use a cuff that is slightly too large than one that is too small (see below)



Most common causes of secondary hypertension by age

New born:

- Renal abnormalities
- Coarctation of the aorta
- Renal artery stenosis
- Renal artery or vein thrombosis

First year:

- Coarctation of the aorta
- Renal vascular disease
- Tumor (Neuroblastoma...)
- Medications (steroids...)

1-6 years:

- Renal vascular diseases
- Renal parenchymal diseases (glomerulonephritis, hemolytic-uremic syndrome...)
- Coarctation of the aorta
- Medications (steroids)
- Essential hypertension
- Tumor

6-15 years:

- Renal vascular diseases
- Renal parenchymal diseases (glomerulonephritis, hemolytic-uremic syndrome...)
- Essential hypertension
- Coarctation of the aorta
- Endocrine causes
- Nutritional causes (obesity)
- Tumor (pheochromocytoma)

Signs and symptoms:

- Oedema, haematuria, proteinuria
- Headache, convulsions, coma and visual symptoms
- Acute heart failure and pulmonary oedema
- Acute respiratory distress,
- Some children may be asymptomatic

Blood pressure in children correlates with body size and increases with age:

Age of child	95th Percentile of Systolic and Diastolic Blood Pressure	
	First 12 hours	First week
newborn prem	65/45 mmHg	80/50 mmHg
newborn fullterm	80/50 mmHg	100/70 mmHg
	Systolic mmHg	Diastolic mmHg
6 weeks–6 years	115	80
8 years	120	82
9 years	125	84
10 years	130	86
12 years	135	88
14 years	140	90

95th percentile of systolic and diastolic BP in relation to the height of child:

Height cm	Systolic mmHg	Diastolic mmHg
100	114	70
110	116	72
120	118	74
130	120	74
140	125	75
150	130	75
160	135 (131)	77
170	140 (133)	80
180	145 (135)	83

Diagnosis:

- Clinical
- Investigations: FBC, urinalysis, urea, creatinin, Electrolytes (Na+, K+) proteinuria, renal ultrasound + doppler,
- ECG
- Echocardiogram, fundoscopy

Note: Investigations should be based on etiology.

Management:**Non-pharmacological management:**

- Lifestyle modification for patients with mild hypertension
- Treatment is specific to the type of hypertension

2.5.1 Acute hypertension:

Definition: Is hypertension of sudden onset

Causes:

- Diseases of the kidneys, arteries, heart or endocrine system
- Pregnancy

Signs and Symptoms:

- Oedema, haematuria, proteinuria, respiratory distress, cyanosis and apnoea **of acute onset**

Diagnosis:

- Clinical
- Investigation: see above

Management:

Non-pharmacological treatment

- Admit patient to pediatric high dependency unit
- Monitor BP every 60 minutes for 24 hours
- Insert peripheral line for drugs
- Bed rest
- Control fluid intake and output (restriction)
- Restrict dietary sodium
- Manage end organ effects

Pharmacological treatment:

- Do not combine drugs of the same class
- Furosemide, IV, 1–2 mg/kg as a bolus slowly over 5 minutes
- If oliguric, maximum dose: 5 mg/kg/dose
- Nifedipine 0.25–0.5mg/kg (max: 10mg) sublingual. May be repeated 6 hours later, thereafter every 12 hours OR amlodipine, oral, 0.2 mg/kg/dose daily. OR
- **Hydralazine** 0.2–0.6mg/kg/dose. The dose can be repeated every 4 hours.
- Refer the patient to a specialist

Recommendations:

- For acute or chronic hypertension blood pressure needs to be lowered cautiously
- Aim to reduce the SBP slowly over the next 24 - 48 hours
- Do not decrease BP to < 95th percentile in first 24 hours
- Advise a change in lifestyle
- Institute and monitor a weight reduction programme for obese individuals
- Regular aerobic exercise is recommended in essential hypertension
- Dietary advice
- Limit salt and saturated fat intake
- Increase dietary fiber intake

2.5.2 CHRONIC HYPERTENSION

Definition: Chronic hypertension is a condition where your blood pressure (BP) is usually higher than normal, over a long time. Two types, essential and secondary.

Stages:

- Prehypertension: This is a stage used to identify people who are at risk of getting hypertension, patient has SBP of 120 to 139 mmHg, or a DBP of 80 to 89 mmHg, or both
- Stage I: Patient has SBP of 140 to 159 mmHg, or a DBP of 90 to 99 mmHg, or both
- Stage II: Patient has SBP higher than or equal to 160 mmHg, or a DBP higher than or equal to 100 mmHg, or both

Causes:

- Diseases or problems with thyroid gland, adrenal glands, or kidneys
- Abusing drugs such as amphetamines, cocaine, and nicotine
- Being around certain chemicals, such as lead or mercury
- Drinking alcohol, using too much salt
- Medicines, such as steroids, birth control pills,

Signs and symptoms:

- Blurring of vision or loss of vision
- Chest pain
- Dizziness or fainting
- Mild to severe headache
- Sudden unexplained body weakness
- Breathing difficulties

Diagnosis:

- Clinical
- Investigations

- Urine tests strips for protein, blood.
- Blood urea, creatinine and electrolytes
- Chest X-ray, ECG and abdominal ultrasound focus on kidneys.

Management:

Similar to management of hypertension in adult

Pharmacological management:

- Diuretics:
 - Hydrochlorthiazide, oral, 0.5–1 mg/kg/dose once daily. *May cause hypokalaemia.*
- OR*
- Frusemide, oral, 0.5–1.5 mg/kg/dose 12–24 hourly
Max 6 mg/kg/day. *May cause hypokalaemia.*
- OR*
- Spironolactone, oral, 1–3 mg/kg/day 12–24 hourly. *May cause hyperkalaemia.*
- Vasodilators:
 - Hydralazine, oral, 1–6 mg/kg/daily dose 8-12 hourly
Max 200 mg/day (Causes tachycardia and fluid retention)
- **α -blocker:** indicated to patients with phaeochromocytoma-associated hypertension.
 - Prazosin, oral, 0.1–0.3 mg/kg/day 8–12 hourly
Maximum 0.4 mg/kg/day.

Recommendations

- *Urgently refer* severe hypertension in for specific diagnosis and treatment
- *Refer all* children with acute and chronic hypertension for specific diagnosis, planning of treatment and long-term follow-up
- *Treat* persistent cough with ACE inhibitor

3 ACQUIRED HEART DISEASE GUIDELINES

3.1 Acute Rheumatic Fever

Definition

This is an acute, systemic connective tissue disease in children related to an immune reaction to untreated group A Beta haemolytic streptococcus infection of the upper respiratory tract. The initial attack of acute rheumatic fever occurs in most cases between the ages of 3 and 15 years.

Cause

Auto-immune disease

Signs and symptoms (Revised Jones Criteria)

Major manifestations	Minor manifestations	Group A Strep(GAS) Infection
Carditis	Fever	GAS on throat swab (culture)
Arthritis	Arthralgia	Raised Antistreptolysin O titre (ASOT)
Sydenham's Chorea	Prolonged P-R interval on ECG	Raised Antideoxyribonuclease B (Anti-DNase B)
Erythema marginatum	Raised ESR or CRP	
Subcutaneous nodules		

Criteria for ARF diagnosis according to WHO

- The first episode of ARF can be confirmed if:
- 2 MAJOR, or 1 MAJOR and 2 MINOR manifestations are present plus there is evidence of preceding Group A streptococcal infection.
- Recurrent ARF (with no RHD) can be confirmed if
- 2 MAJOR, or 1 MAJOR and 2 MINOR manifestations are present plus there is evidence of preceding Group A streptococcal infection.
- Recurrent ARF (with existing RHD) can be confirmed if
- 2 MINOR manifestations are present plus there is evidence of preceding Group A streptococcal infection.

Complication

Rheumatic heart disease

Investigations

- Throat swab for culture (positive throat culture of group A Streptococcal infection)
- Raised ASOT/ASLO antibodies titre (Anti-streptolysin-O-titre – ASOT of 1:300)
- Anti DNase B
- FBC/ ESR/CRP
- Chest x-ray – features of cardiomegaly
- ECG
- Echocardiogram

Management

Persons with symptoms of ARF should be hospitalized to ensure accurate diagnosis, and to receive clinical care and education about preventing further episodes of ARF.

The diagnosis should include an initial echocardiogram used to help identify and measure heart valve damage.

Long-term preventative management should be organized before discharge.

All cases of ARF should receive:

- A single injection of Benzathine penicillin G
(Extencilline): 25,000–50,000 units/kg/dose, maximum 1.2 mega units dose

Or

- Oral Penicillin (Pen V) 25–50mg/kg/day in divided 3 doses for 10 days Or (Erythromycin 30-50mg/kg/day divided in 3 doses if penicillin allergy)

Symptomatic Treatment

Arthritis and fever

- Aspirin 75–100mg/kg/day in 4–6 divided doses. Continue treatment until fever and joint inflammation are controlled and then gradually reduced over a 2-week period. Add an antacid to reduce risk of gastric irritation
- Prednisolone 1–2mg OD for 2 weeks then taper for 2 weeks with good response begin
- Aspirin in the 3rd week and continue until 8th week tapering in the final 2 weeks

Chorea

- Most mild-moderate cases do not need medication
- Provide calm and supportive environment (prevent accidental self-harm)
- For severe cases: Carbamazepine per os

- <6 years: 10-20mg/kg/day divided in 3 doses
- 6-12 years: 400-800mg/day divided in 3 doses
- >12 years: 200mg x 2/day

OR

Valproic acid 20-30mg/kg/day divided in 2 doses; Duration:
2 weeks

Carditis

- Bed rest if in cardiac failure
- Anti-failure medication as above
- Anti-coagulation medication if atrial fibrillation is present
- Management plan when the acute episode is controlled
administer the first dose of secondary prophylaxis
- Register the individual with the local health authority or RHD Program
- Provide disease education for the person with ARF and the family
- Understanding of ARF and RHD and risks of ARF recurrence
- Importance of regular secondary prophylaxis and medical review
- Recognizing own signs and symptoms of ARF and RHD
- Risks associated with future RHD (e.g. pregnancy, surgery and high level of aftercare)
- Importance of dental health
- Include an ARF diagnosis alert on computer systems and/or medical files (if applicable)
- Refer to local health facility for ongoing management
- Arrange dental review (and provide advice about endocarditis prevention)

Long-term Management

- Regular secondary prophylaxis (Recommended Secondary Prophylaxis Regimen)
- Regular medical review
- Regular dental review
- Echocardiogram (if available) following each episode of ARF, and routine echocardiogram:
- Every 2 years for children (sooner if there is evidence of cardiac symptoms)

Secondary prophylaxis

- Prevents the occurrence of GAS infections which can lead to recurrent ARF
- Reduces the severity of RHD (and can result in cure of RHD after many years)
- Helps prevent death from severe RHD
- Secondary prophylaxis is indicated for people who have:
- ARF confirmed by the Jones Criteria
- RHD confirmed on echocardiogram
- ARF or RHD not confirmed, but highly suspected
- Dosage
- Benzathine Penicillin G IM every 4 weeks
- 1,200,000 units for ALL people $\geq 30\text{kg}$
- 600,000 units for children $< 30\text{kg}$
- Penicillin V if injections not tolerated or contraindicated
- 250mg oral, twice-daily for all children
- Erythromycin if proven allergy to Penicillin: 250mg oral, twice-daily for ALL people.

Table 1: Recommended duration of Secondary Prophylaxis

Disease Classification	Duration of Secondary Prophylaxis
ARF with No proven carditis	Minimum of 5 years after last ARF, or Until age 18 years (whichever is longer)
Mild-moderate RHD (or healed carditis)	Minimum 10 years after last ARF, or - Until age 25 years (whichever is longer)
Severe RHD and following Cardiac Surgery for RHD	Continue medication for life

3.2 Rheumatic Heart Disease

Definition

It is an inflammatory damage of the heart valves, as a complication of acute rheumatic fever. The mitral valve is the most commonly involved valve, although any valve may be affected.

Types of valvular lesions

- Mitral regurgitation/stenosis
- Aortic regurgitation/stenosis
- Tricuspid regurgitation
- Mixed regurgitation and stenosis
- Multivalvular heart diseases

Signs and symptoms

- May be asymptomatic when minor lesions
- Heart murmurs over affected valve

Complications

- Congestive cardiac failure with pulmonary oedema
- Bacterial endocarditis

Investigations

- Chest x-ray
- ECG
- Echocardiography

Management

- Treat underlying complication, e.g., heart failure, pulmonary oedema
- Continue prophylaxis against recurrent rheumatic fever
- Ensure oral hygiene
- Endocarditis prophylaxis if dental procedures, urinary tract instrumentation, and GIT manipulations

Procedure done above the diaphragm

- Amoxicillin 50mg/kg (Max 2gr) 1 hour before the procedure

Or

- Erythromycin 50mg/kg (max 1.5gr) - if allergic to Penicillins

Below the diaphragm

- Ampicillin 50mg/kg IV or IM (max 2gr) with Gentamycine, 2mg/kg (max 120mg) 30minutes before the procedure

Then

- Amoxycillin per os 25mg/kg (max 1gr) 6 hours after the procedure

Ensure good follow up by cardiologist

3.3 Cardiomyopathy

3.3.1 DILATED CARDIOMYOPATHY

Definition:

Dilated cardiomyopathy refers to a group of conditions of diverse etiology in which both ventricles are dilated with reduced contractility.

Classification

Classification based on the predominant structural and functional abnormalities

- Dilated Cardiomyopathy: primarily systolic dysfunction
- Hypertrophic Cardiomyopathy: primarily diastolic dysfunction
- Restrictive Cardiomyopathy: primarily diastolic but often combined with systolic dysfunction

Causes

- Infections (e.g. Viral++, Rickettsia, Chagas disease)
- Neuromuscular disorders (e.g. Duchenne dystrophy, Becker dystrophy)
- Endocrine, metabolic and nutritional (e.g. hyperthyroidism, Fatty acid oxidation disorders, beriberi, kwashiorkor)
- Diseases of coronary arteries (e.g. Kawasaki, Aberrant Left Coronary Artery - ALCAPA)
- Autoimmune diseases (e.g. Rheumatic carditis, juvenile rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis, systemic lupus erythematosus)
- Drugs toxicity (e.g. doxorubicin, cyclophosphamide, IPECA)
- Hematologic diseases (e.g. anemia, Sickle cell anemia, hypereosinophilic syndrome Löffler syndrome)

Signs and symptoms

See signs of congestive heart failure

Diagnosis

- ECG: proeminent P wave, LV or RV hypertrophy, nonspecific T-wave abnormalities
- Chest X-ray: cardiomegaly, pulmonary edema
- Echocardiogram: confirm diagnosis and shows LA and LV dilation, poor contractility
- FBC, Urea and creatinine, Electrolytes (Na, K)
- Myocardial biopsy, PCR

Management

- Treatment: (Refer to principles and medication of congestive heart failure)

3.3.2 HYPERTROPHIC CARDIOMYOPATHY

Causes

- Left ventricle obstruction (Coartation of aorta, hypertension, aortic stenosis)
- Secondary (infants of diabetic mothers, corticosteroids in premature infants)
- Metabolic (Glycogen storage disease type II (Pompe disease))
- Familiar hypertrophic cardiomyopathy
- Syndroms (Beckwith - Wiedmansyndrom, Friedreich, ataxia)

Signs and Symptoms

- Weakness
- Fatigue
- Dyspnea on effort
- Palpitations
- Angina pectoris
- Dizziness and syncope
- Increased risk of sudden death

Diagnosis

- ECG: LV hypertrophy
- Chest X-ray: Mild cardiomegaly
- Echocardiogram: LV hypertrophy, ventricular outflow tract gradient
- Doppler flow studies may demonstrate diastolic dysfunction before the development of hypertrophy

Management

- Prohibit competitive sports and strenuous physical activities
- Propranolol 0.5 -1mg/kg/day devised in 3 doses or Atenolol
- Implantable cardioverter-defibrillator if documented arrhythmias or a history of unexplained syncope
- Open heart surgery for septal myotomy: rarely indicated

3.3.3 RESTRICTIVE CARDIOMYOPATHY

Definition

Restrictive cardiomyopathy refers to a group of disorders in which the heart chambers are unable to properly fill with blood because of stiffness in the heart muscle. Its prognosis is poor, and clinical deterioration can be rapid.

Causes

- Idiopathic, Systemic disease (scleroderma, amyloidosis, or sarcoidosis)
- Mucopolysaccharidosis
- Hypereosinophilic syndrome; malignancies
- Radiation therapy
- Isolated non compaction of the left ventricular myocardium

Signs and symptoms

- Dyspnea
- Edema and ascites
- Hepatomegaly with increased venous pressure
- Pulmonary congestion

Complications

- Arrhythmias
- Mitral regurgitation
- Progressive heart failure
- Tricuspid regurgitation

Investigations

- ECG: Prominent P waves, ST segment depression, T-wave inversion
- Chest X-ray: mild to moderate cardiomegaly
- Echocardiogram: markedly enlarged atria and small to normal-sized ventricles with often preserved systolic function but highly abnormal diastolic function

Management

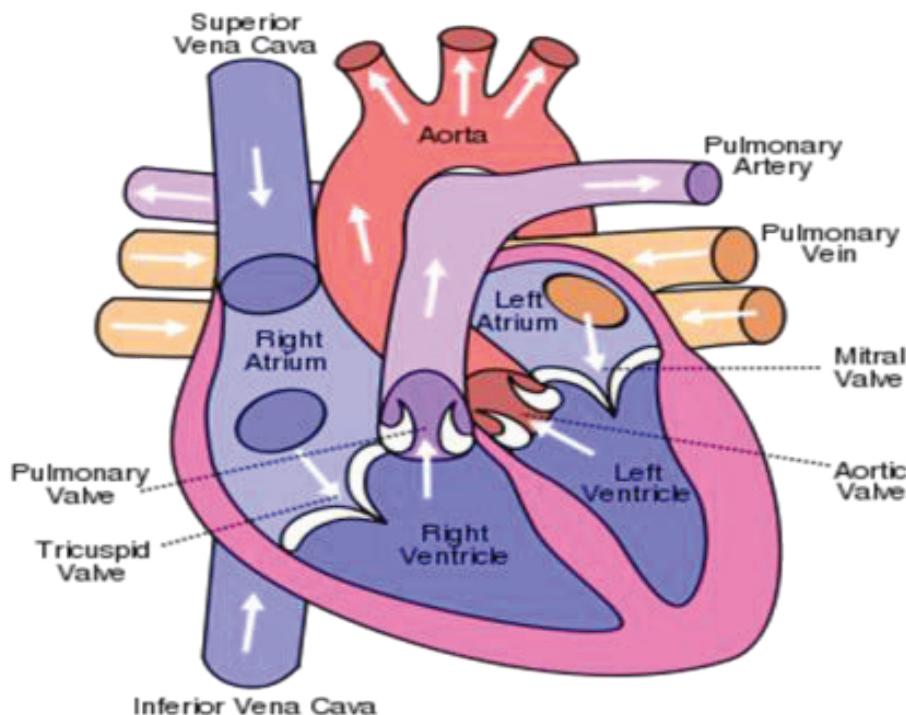
- Lasix 2mg/kg divided in 2 doses
- Aldactone 1-2mg/kg devised in 2 doses
- Antiarrhythmic agents / biventricular pacing are used as required
- Aspirin or Warfarin in case of non compaction LV with an increased risk of mural thrombosis and stroke
- Cardiac transplantation where possible and indicated

4 CARDIAC SURGERY AND POST-OP MANAGEMENT GUIDELINES

4.1 Cardiac surgery indications, complications and follow up

Common Congenital Heart Defects For Surgery

- Ventriculo-septal defect (VSD): a defect between the two ventricles
- Atrio-septal defect (ASD): a hole between the two atria
- Atrioventricular septal defect (AVSD)
- Patent ductus arteriosus (PDA): communication between the aorta and the pulmonary artery
- Tetralogy of Fallot: Several defects including a VSD, pulmonary hypoplasia and stenosis
- Coarctation of aorta
- Pulmonary valve stenosis
- Aortic valve stenosis



Acquired cardio-vasculaires diseases

- Rheumatic Heart Diseases
- MR, MS, AoR...
- Coronary diseases and other vascular diseases
- Atherosclerotic diseases, aneurysm, dissection...
- Degenerative heart diseases
- Arrhythmias(Heart Block, AF...)

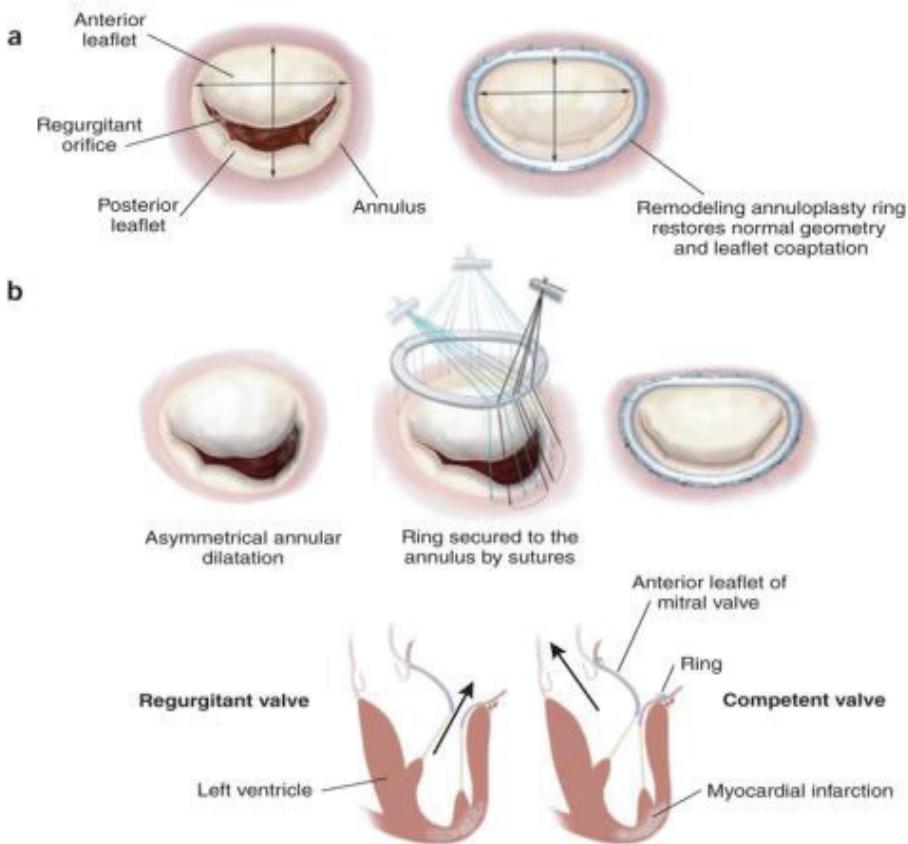
4.2 Types of cardiac Interventions and valve types

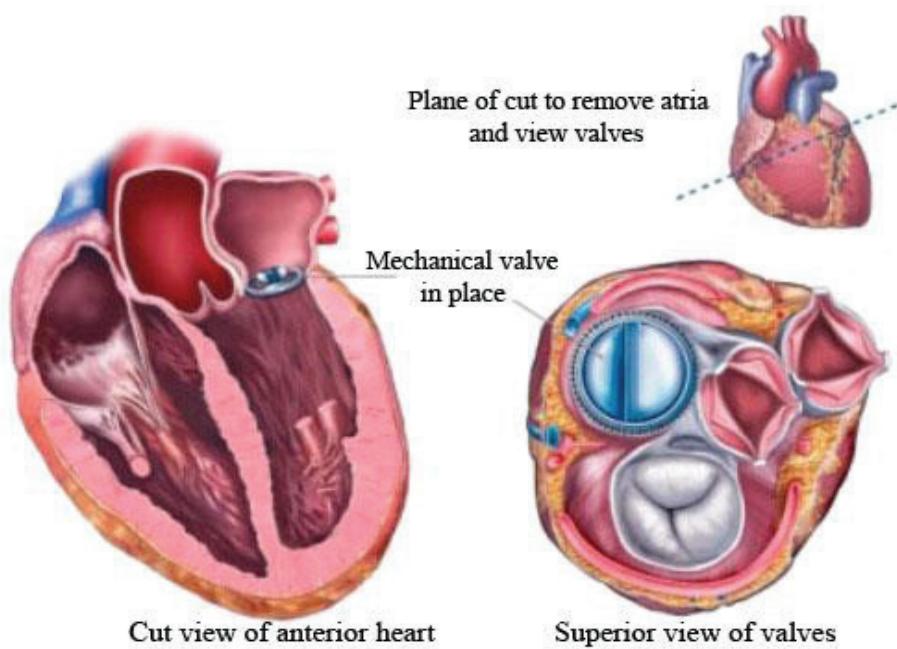
Types of cardiac interventions

- Open heart surgery with or without Cardio-pulmonary bypass (congenital and acquired heart diseases including valve surgery)
- Closed heart surgery (PDA ligation, coarctation repair...)
- Catheterization (balloon valvuloplasty, device and stent implantation...)

Types of Valve Surgery

- Valve Repair = Fixing the damaged heart valve (either making it open better or close better) without having to put any foreign material into the heart.
- Valve Replacement = Introducing a prosthetic valve to take the place of the damaged valve
- Mechanical
- Made of metal: Lasts a long time, Requires anticoagulation (warfarin) management for life to prevent clot formation and valve thrombosis(death)
- Bioprosthetic
- Made of tissue (pig or cow) Does not last very long (3-10 years) and most patients will require a second operation. No anticoagulation required





The following factors need to be considered:

- Age, sex
- Nature and severity of lesion
- Risks related to anticoagulation (warfarin) & pregnancy
- Follow-up: anticoagulation issues including availability and proximity of tests and medications, education level, compliance to follow up, social problems...
- Patient preference and informed consent?? Number of children? Contraception?

4.2.1 POSTOPERATIVE COMPLICATIONS

- Major bleeding: needing re-intervention
- Arrhythmias (A-V block...): needing temporary or permanent pacemaker !!
- Heart failure: needing heart failure management
- Inflammation:
- Pericardial effusion
- Pleural effusion
- Infections:
- wound infection, mediastinitis
- Infective endocarditis
- Others: depending of the type of surgery (pneumothorax, cheloid scar...)
- Wound infection, post op period

Figure 1: Wound infection, post op period



Figure 2: Pericardial Effusion (tamponade)



Figure-2: Echocardiograph, signs of tamponade (swinging heart and diastolic right ventricular collapse) and pericardial fluid 39 cm in size were found.

Figure 3: Pericardial effusion

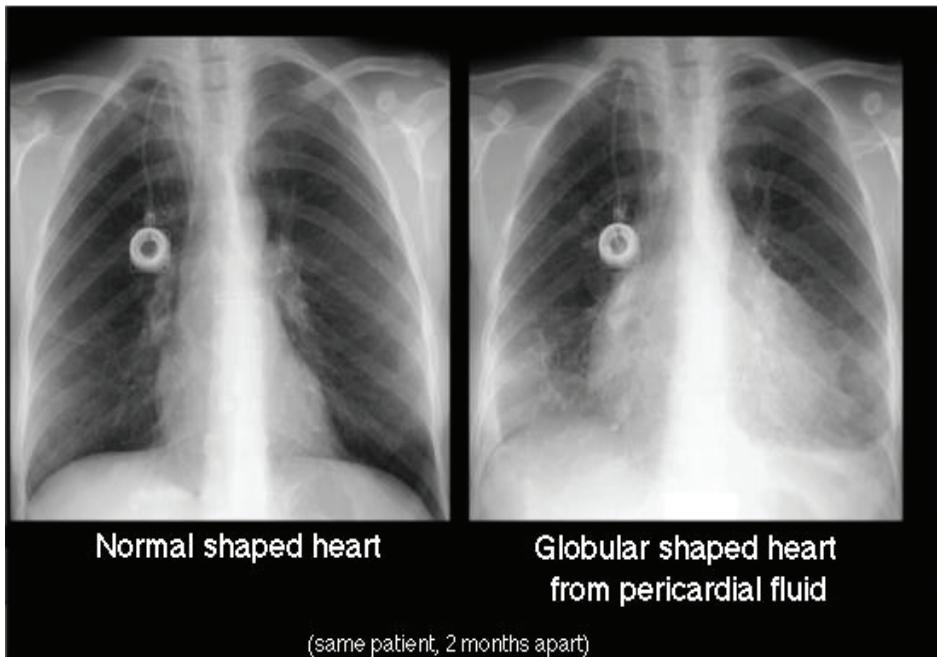
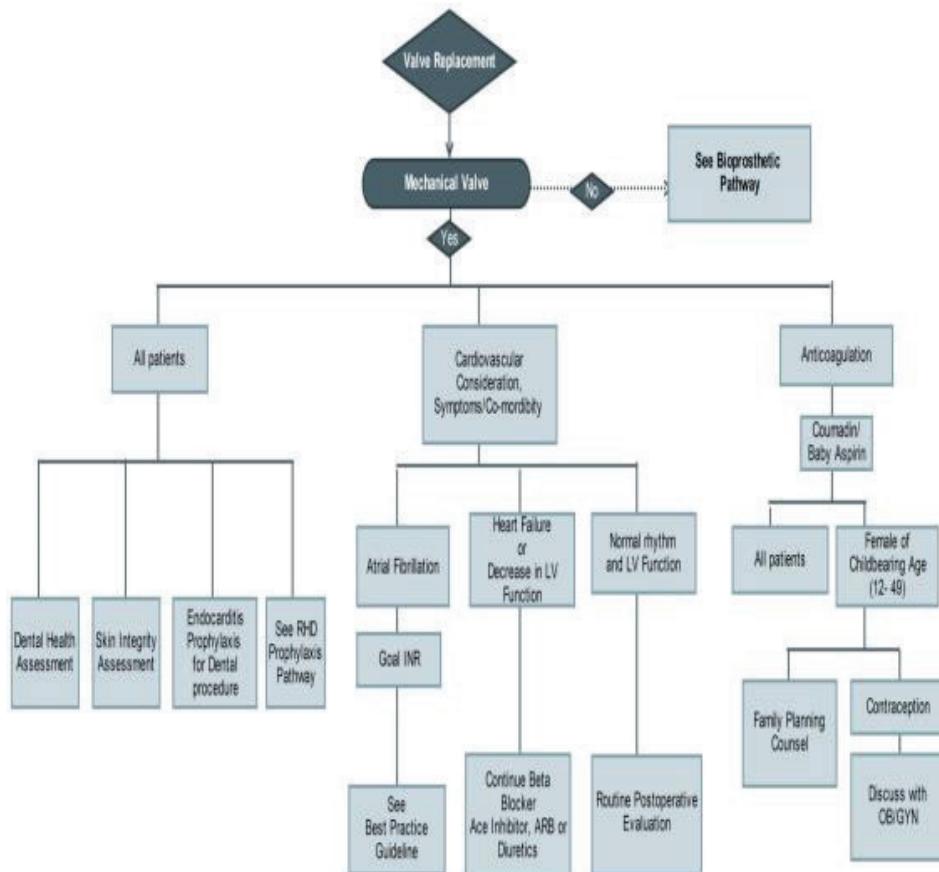


Figure 4: Mechanical Valve Replacement Postoperative Care Pathway in Rwanda



4.3 Post-operative follow-up guidelines

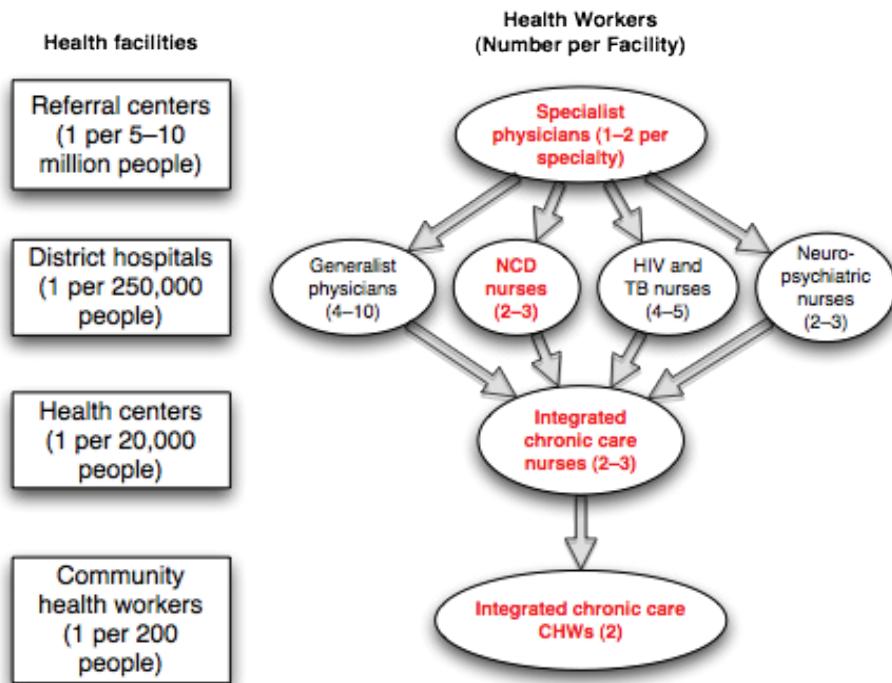
The cardiac surgery post-operative follow up

- Should be done by trained Medical Doctors and Nurses in Teaching and District Hospitals
- Regular supervision by Cardiologists, National Nurse Coordinator and NCD Division/CVD Unit via outreach program and communication (RHD registry, cell phones, emails....).
- A web based national database should be developed for pre and post-operative patients follow-up.
- Required basic equipment and drugs:
- Laboratory equipment for INR or Portable INR machines & strips
- Warfarin (Coumadin)
- Heart Failure medication
- Echocardiography and ECG machine

Follow-up pathway

- Referral hospitals: Absolute review by cardiologist the first three months, appointment are determined by cardiologist.
- District Hospital: By trained medical doctors and nurses and supervised by cardiologists.
- Health centers: By trained nurses for secondary prophylaxis and dispensation of essential medications

Figure 5: Integrated cardiac patients follow-up



4.3.1.1 WARFARIN (*Coumadin*) Management

4.3.1.1.1 Major Uses of Warfarin

Prevention of embolism associated with:

- Mechanical prosthetic heart valves
- Atrial fibrillation
- Thromboembolic disorders

Treatment of pulmonary embolism and deep vein thrombosis (DVT)

Table 2: Target INR Values

Mitral Mechanical Valve	2.5 - 3.5
Aortic Mechanical Valve	2.0 - 3.0
Tricuspid Mechanical Valve	2.5 - 3.0
Mitral Tissue Valve	2.0 - 3.0 for 6 weeks
Mitral Valve Repair	2.0 - 3.0 for 6 weeks
Tricuspid Tissue Valve	2.0 - 3.0 for 6 weeks
Tricuspid Repair	2.0 - 3.0 for 6 weeks
LV Thrombus	2.0 - 3.0
Aortic Tissue Valve	Aspirin (100 mg/day)
Atrial Fibrillation	2.0 – 3.0

4.3.1.1.2 Initiation of Coumadin

Impact of single dose is delayed 36 to 72 hours

- Result of clearance of normal clotting factors

Time to full Anticoagulant Effect: 5 - 7 days (may see partial response as early as 2 days)

- LONGER if vitamin K is present (healthy)
- SHORTER if vitamin K is inhibited (sick, antibiotics)

4.3.1.1.3 Initiation of Coumadin Therapy

Initial doses usually range between 2 - 5mg daily. Consider lower starting doses in elderly patients, patients with hepatic impairment and/or congestion secondary to heart failure, poor nutrition. Loading dose is not required

Dose adjustments should be made no sooner than every 4-5 days

No need for rapid dose titration when initiating therapy due to long half-life (36-42 hours). Bleeding risk with over-anticoagulation

4.3.1.1.4 Monitoring and Dosage Adjustment

- Prior to therapy initiation, obtain PT/INR
- Monitor every 1 – 3 days while targeting goal or after dosage adjustments
- Once stable, INR should be monitored every month

Note: If there are changes to diet, medications or disease status, more frequent monitoring is indicated

- For sub-therapeutic INR, dose increases should be based on previous response to therapy
- Adjustments should be made with every effort not to **over-anticoagulate**
- Based on prior doses and INR trends

Factors Impacting INR & Dose

- Inaccuracy in PT testing
- Changes in Vitamin K intake (diet)
- Changes in Vitamin K or Warfarin absorption (GI factors, diarrhea, drug effects)
- Changes in warfarin metabolism (liver disease, drug effects)
- Changes in Vitamin K-dependent coagulation factor synthesis or metabolism (liver disease, drug effects, other medical conditions)
- Drug interactions

Compliance Issues – VERY IMPORTANT TO ASSESS AT EACH VISIT!

Disease Interactions

<input type="checkbox"/> Disease State	<input type="checkbox"/> Effect
<input type="checkbox"/> Congestive Heart Failure <input type="checkbox"/> Leads to hepatic congestion and inhibits metabolism of warfarin	<input type="checkbox"/> Increased anticoagulant effect
<input type="checkbox"/> Hypothyroidism <input type="checkbox"/> Decreases vitamin K catabolism	<input type="checkbox"/> Decreased anticoagulant effect
<input type="checkbox"/> Hyperthyroidism <input type="checkbox"/> Increases vitamin K catabolism	<input type="checkbox"/> Increased anticoagulant effect
<input type="checkbox"/> Hepatic Failure <input type="checkbox"/> Decreases production of clotting factors.	<input type="checkbox"/> Increased anticoagulant effect

Drug Interactions

Drugs

Acetaminophen – amiodarone - azole antifungals,

barbiturates - cephalosporins - ethanol

Fluoroquinolones - statins – metronidazole

Non-steroidal anti-inflammatory agents (NSAIDS),

Penicillins - rifampin – sulfonamides- tetracyclines

Tramadol

Food Interactions

Intake of vitamin K rich foods should be consistent

Leafy green vegetables most common source of dietary Vitamin K!!! do not need to be eliminated from diet

Dosage Titration for High INR

- Risk of bleeding increases with INR > 5
- First, stop warfarin and check INR daily.
- Second, consider need for Vitamin K
- Decision based on intrinsic bleeding risk or active bleeding
- Third, do not give more Vitamin K than necessary: Risk reducing INR too far/too quickly and causing a clot + valve thrombosis.

Note: Prescription of Vit K to be discussed with Cardiologist or Physician

Management of High INR

INR Value	Action
Above goal but < 5 without clinically significant bleeding	Hold next dose, consider restarting at lower dose
INR > 5 but < 9 without bleeding or bleeding risk factors	Hold 1-2 doses, start at lower dose when INR in therapeutic range.
INR > 5 but < 9 with bleeding risk factors	Hold next dose and give Vitamin K 1-2mg PO or 0.5 – 1mg IV over 60min
INR > 9 without clinically significant bleeding	Hold warfarin, give Vitamin K 3-5mg PO or 1mg IV over 60min. INR should lower in 24-48 hours. May repeat Vitamin K as necessary.
Major INR elevation (> 20) or serious bleeding	Vitamin K 5-10mg IV over 60min. Also consider FFP 10–15 mL/kg or Prothrombin Complex Concentrate (PCC) 25–50 IU/kg

INR Value	Action
Life-threatening bleed	PCC and Vitamin K 10mg IV over 60min. Repeat according to INR.

Instructions for administration of IV Vitamin K

- Dilute in 50 ml of normal saline or dextrose solution and administer over 60 minutes.
- Monitor vital signs every 15 minutes until infusion is given, then every 30 minutes x 2.
- Note:
- IV Vitamin K is never given IV push.
- Vit. K administration should be guided by Cardiologist or Physician

4.3.1.2 Anticoagulation in Pregnancy

- Choice of therapeutic agent is based on full assessment of risk versus benefit
- What is level of mother's thromboembolic risk?
- Valve type
- Position
- Valve thrombosis history
- Patient preferences or capacity
- What is the risk of therapeutic agent to newborn?

[**>> Proven teratogenicity of Coumadin during the 1st trimester**](#)

Recommendations

Mechanical valves:

- Low molecular weight heparin (LMWH): Enoxaparin(Lovenox)
OR unfractionated heparin (UFH) until the 13th week – then warfarin until patient is close to delivery
- FBC(Plat) to be monitored

Note: to be done under supervision of adult Cardiologist and Obstetrician &Gynecologist

- Avoid unplanned pregnancy :
- Recommend systematic contraception (to discuss with Obs&Gyn - Norplan®)
- Concern in young girls
- If pregnancy diagnosed early and LWMH not available: recommendation to continue with warfarin up to term

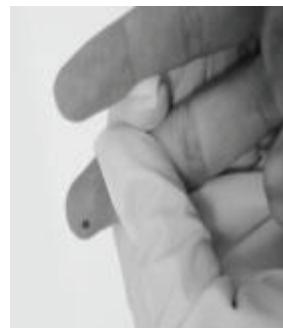
4.3.1.3 General Information on Alere INRatio®2 PT/INR Monitoring System

- 1) Keep the test strips and monitor at room temperature.
- 2) Verify the strip code each time a test is run.
- 3) Once the foil pouch is opened, use the test strip within 10 minutes and insert the test strip right side up so the word “INRATIO” on the strip is readable.
- 4) Warm the hand prior to finger stick to improve circulation and sample collection.



Stick the finger after the monitor says to apply the sample, not before.

5) Keep the monitor on a solid level surface and do not move it once blood has been added.



6) The test runs on 15ul of capillary whole blood. We use the term “hanging drop” to describe the amount of blood you should use.

Note: more than a typical glucose meter, which requires about 3-5ul.

7) To obtain a sufficient sample, apply gentle continuous pressure to the finger and avoid “milking”. Apply the one drop sample to the strip within 15 seconds, the quicker the better.



8) Do NOT wipe the first drop. Place the first drop of blood on the target area all at one time.

Never “double dip” by putting some blood on the target area, then adding more.

9) If you “miss the target area” or a bubble appears, do not try to scrape, shovel, or finger paint the blood into the target area. Repeat the test with a new strip, using a sample collected from another finger.

10) For callused hands and difficult sticks, use the non-dominant hand.

If you get an error code or “unexpected” result:

- (i.e.: An INR too high or too low for a patient that is usually “in range,”)
 - or an INR result that does not reflect the clinical assessment of the patient)
- a) Repeat the test with a new test strip, using a sample collected from another finger.
 - b) The patient should be thoroughly questioned regarding their dosing compliance, changes in other medications or diet.
 - c) If the result is very high (i.e. an INR \geq than 5.0, or whatever INR value the user protocol has set as a ‘take action’ value), or unexpectedly low, and it repeats that way on the second test, it would be advisable to draw a blue top tube for a lab test or refer for a second opinion.
 - d) If an error code repeats itself twice, call the Nurse Coordinator or the Cardiologist in charge.

PART 2: Chronic Respiratory Disease (CRD)

5 CHRONIC RESPIRATORY DISEASE (CRD) GUIDELINES

5.1 Guiding Principles

THE INITIAL VISIT

The initial visit plan emphasizes on a systematic approach, which will help you to assess asthma and Chronic Obstructive Pulmonary Diseases.

1. Establish that the patient has asthma or COPD

- Many conditions other than asthma and COPD that cause cough, dyspnea, & wheezing.
- A diagnosis of asthma or COPD is only made after other causes of cough, dyspnea, & wheezing have been ruled out.
- A diagnosis of asthma or COPD expose patients at greater risk for other causes of cough, dyspnea, & wheezing.

2. Classify asthma severity

- Intermittent
- Persistent-Mild
- Persistent-Moderate
- Persistent-Severe (Asthma Attack)

SYSTEMATIC APPROACH

This guide takes you through the following framework for each patient visit:

1. History
2. Vital Signs
3. Physical Exam
4. Lab Review
5. Plan

3. Use the “step system” to titrate therapy

- The “step system” will guide the initiation, the addition, titration or discontinuation of medications.
- It will clarify the difference between abortive and controller medications.

THE FOLLOW-UP VISIT

The follow-up visit emphasizes a systematic approach, which will help you:

- Identify or confirm the severity of asthma or COPD
- Use the “step system” for optimal respiratory control

5.2 The Initial Visit

This section emphasizes a systematic approach, which will help answer the following basic questions: 1. Is this asthma/COPD or another cause of chronic cough? 2. How severe is the asthma/COPD? 3. Is the patient at the correct treatment “step?”

PATIENT BACKGROUND

Review the following information at the patient's visit, if available:

- How was the patient referred to the CRD clinic?
- Is the diagnosis suspected or confirmed?
- Has the patient been started on any inhalers already?

5.2.1 HISTORY

5.2.1.1 Clinical History

5.2.1.1.1 Asthma or COPD emergency

1. Find out if the patient has any of the following emergency signs:

- | | | |
|---|---|---|
| <input type="checkbox"/> Acute dyspnea | <input type="checkbox"/> Unable to speak in full sentences | <input type="checkbox"/> Restless or confused |
| <input type="checkbox"/> Shortness of breath not relieved with salbutamol | <input type="checkbox"/> Tachypnea (rapid breathing) or bradypnea | <input type="checkbox"/> Tachycardia |
| | | <input type="checkbox"/> Bradycardia |
| | | <input type="checkbox"/> Hypoxia < 92% |

If the patient has these symptoms, call the physician and initiate transfer. However, you should complete the patient's workup and begin treatment before the transfer.

5.2.1.1.2 Asthma or COPD not yet diagnosed

Generalized Symptoms

- Fever -> Bronchitis/PNA, TB, Cancer
- Night Sweats & Weight Loss -> TB, Cancer

Determine if patient has symptoms that might suggest a cause other than asthma or COPD.

Cough

- Productive (yellow, green sputum) -> bronchitis, PNA
- Large volume purulence (thick, white pus) -> bronchiectasis
- Hemoptysis -> tuberculosis
- Persistent & dry -> COPD, allergic rhinitis, HF, ACE-I (lisinopril, captopril), TB
- Worse lying flat -> reflux

- Episodic & dry -> ASTHMA

Dyspnea

- Sudden onset -> bronchitis/PNA, pulmonary embolism
- Progressive -> COPD, TB, anemia, HF
- Episodic -> ASHTMA

Other Symptoms

- Itchy, watery, red eyes, post-nasal drip -> allergic rhinitis
- Edema, Ascites -> HF
- Heartburn -> reflux

5.2.1.1.3 Asthma or COPD has been diagnosed

Triggers

- Smoke exposure from indoor stoves?
- Symptoms occur during or after exercise?
- Is patient under chronic stress or depressed?
- Is there evidence of respiratory infections?
- Is there any climate change or environmental risk factors (dusts,pollen,insects, new weather ...)

Symptom Frequency (cough, dyspnea, wheezing)

- Once per week
- Several times per week
- Daily

Nighttime Awakening Frequency (from cough, dyspnea, wheezing)

- < 2 times per month
- Several times per month
- Several times per week

Salbutamol Use

- Less than 2 days per week
- More than 2 days per week
- Daily

Prior Exacerbations – Hospitalized in the past year?

- Yes
- No

5.2.1.1.4 Co-Morbidities

1. Find out if the patient has any of the following co-morbidities:

- HIV
- History of TB
- Heart Failure
- Reflux
- Allergies

5.2.1.1.5 Medications

Medications used to treat asthma

- Salbutamol
- How frequently does patient use a salbutamol inhaler?
- How correctly does the patient use salbutamol inhaler?
- Does it relieve symptoms?
- Beclamethasone
- Theophylline
- Prednisolone

Medications used to treat other causes of cough, dyspnea, & wheezing

- Antibiotics
- TB chemotherapy
- HF medications (beta-blockers, furosemide, spironolactone)

- Proton Pump Inhibitors (omeprazole, lansoprazole, esomeprazole....)
- Other drugs : anti histaminic, anti-helminthic drugs

Medications that cause cough

- ACE-Inhibitors (lisinopril or captopril)

5.2.1.2 Social History

5.2.1.2.1 Tobacco/Alcohol

- Do you drink alcoholic beverages? If so, how many per day or week?
- Do you smoke cigarettes? If so, how many packs every day or week?

5.2.1.2.2 In-door Pollutants

- Do you use an indoor stove?
- If so, how long have you cooked with an indoor stove?

5.2.1.2.3 Weather

- Are your symptoms worse according to the weather change?

5.2.1.2.4 Exercise

- Do symptoms worsen after you work in the field or walk up a mountain?

5.2.1.3 Family History

- Has anyone in your family had a problem with allergies, asthma or another problem with breathing?

5.2.2 VITAL SIGNS

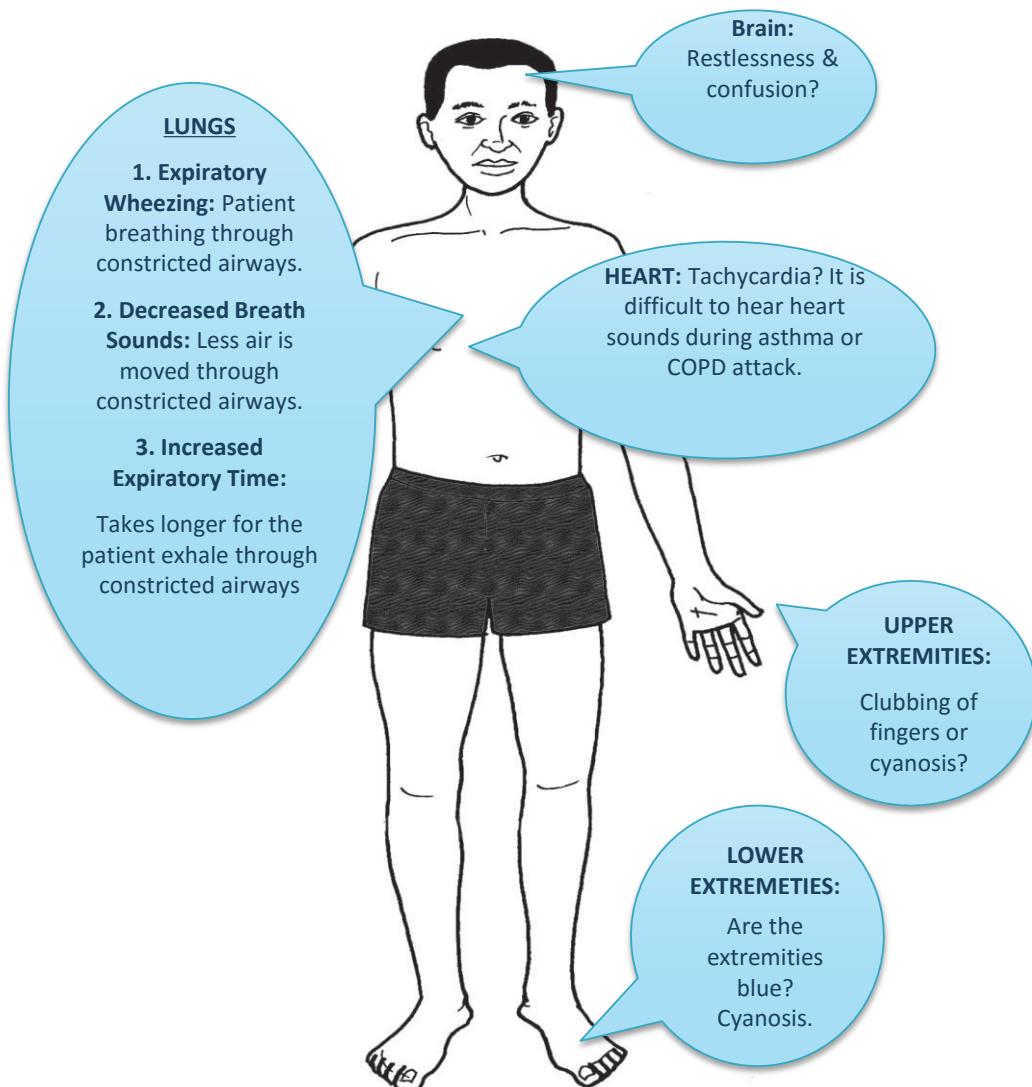
Always review vital signs before the physical exam. They will almost always help you understand if a patient is sick and will provide important information about whether the patient should be referred to the district hospital.

VITAL SIGN	Notes
Temperature	Infection can trigger an asthma or COPD attack!
Heart Rate	Tachycardia is a compensatory mechanism that indicates O ₂ exchange in the lungs is impaired & the heart is trying to deliver more oxygen to the body.
Blood Pressure	Should be taken at initial visit and all follow-up visits.
Respiratory Rate	RR > 24 may signal an asthma or COPD attack!
O ₂ Saturation	O ₂ Sat < 90% may signal an asthma or COPD attack!

Note: remember to weight the patient as some obese people may have difficulty in breathing (like sleep apnea)

5.2.3 PHYSICAL EXAM

Observe the patient. Sometimes it is possible to determine that a patient is in respiratory distress by observation. Danger signs include respiratory rate > 30, speaking in broken sentences, cyanosis, and sitting in the tripod position.



5.2.4 LABORATORY TESTS

LAB	WHEN	Notes
Creatinine	Initial visit and as indicated	Renal failure may cause volume overload, which can lead to dyspnea, cough, and wheezing.
HIV	Initial Visit	HIV puts patients at increased risk of TB and other respiratory infections.
Pregnancy Test	Women in child bearing age out contraception methods	Women may experience worsening of asthma symptoms during pregnancy.
NFS	Only as indicated	<p>WBC: Infection may trigger an asthma or COPD attack!</p> <p>HB/HCT: Anemia causes dyspnea and fatigue.</p> <p>Low Platelets: Helps identify patients at risk for bleeding.</p>
Gaz and electrolytes	Only as indicated	Bicarbonate: Acidosis means that CO ₂ is accumulating in the body. This is a danger sign! That may push to refer

5.2.5 CHEST RADIOGRAPHY

Chest X-Ray findings in case of asthma or COPD

- Often normal but one or more of the following findings may be observed:
 - ✓ Hyperinflated lungs
 - ✓ Flattening of hemidiaphragm
 - ✓ You may find lung infiltrates in case of infection as a triggering factor
 - ✓ Bronchial thickening
 - ✓ Atelectasis
 - ✓ Signs of pneumothorax

5.2.6 ECHOCARDIOGRAPHY

Echocardiography can help to differentiate respiratory from cardiac disease.

Echocardiographic Finding	Clinical Interpretation
Enlarged left and/or right ventricles	Cardiomyopathy
Valvular vegetations (mitral / aortic)	RHD or endocarditis
Mitral Stenosis	RHD
Pericardial effusion	Tuberculous pericarditis

Please refer to the echocardiographic curriculum for greater detail

5.2.7 IMPRESSION

5.2.7.1 Diagnosis

If patient has already been diagnosed and treated for asthma or COPD, go to par 5.2.8

Exclude and treat patients with other cause of cough, wheezing, and dyspnea before labeling a patient with a diagnosis of asthma or COPD.

Identify and treat conditions that mimic asthma	
HIV	Check HIV if patient has never been tested.
Pneumonia (HIV+, productive cough, fever, sweats, weight loss)	Treat for pneumonia. If patient has danger signs (speaking in broken sentences, confusion, RR>30): <ul style="list-style-type: none">○ Refer to district hospital for IV antibiotics.○ Do a sputum smear for TB x 3.○ Do a CXR If patient has risk factors for TB (without danger signs). <ul style="list-style-type: none">○ Do a sputum smear for TB x 3.
Anemia	Check HB/HCT and treat with iron and albendazole.
Heart Failure	Refer to heart failure clinic for further evaluation.
Chronic cough without other symptoms	Treat patient for: <ul style="list-style-type: none">○ Gastroesophageal reflux disease GERD: Omeprazole or cimetidine for 2-4 weeks. If no response, treat triple therapy for H. pylori.○ Allergies: Nasal steroids or anti-histamines (chlorpheniramine).○ Helminths (Strongyloides): Anti-helminthic (albendazole)



There is low suspicion for the above conditions:

ASTHMA

COPD

5.2.7.2 Classify Asthma

Intermittent

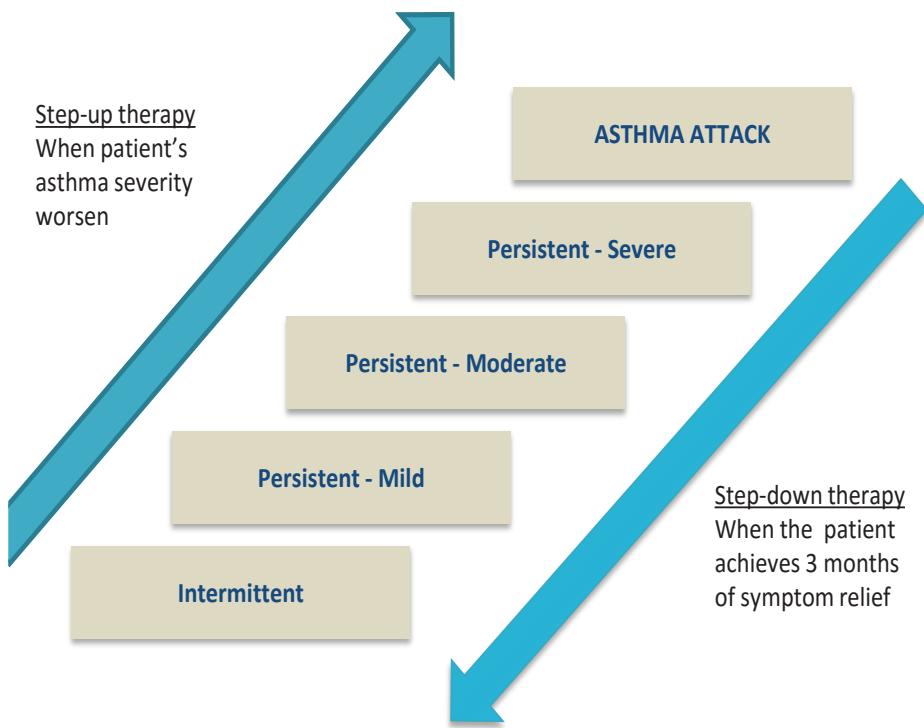
Other causes should be excluded because asthma is over-diagnosed at this stage

Persistent - Mild

Persistent - Moderate

Persistent - Severe

5.2.7.3 Use the step method



5.2.8 PLAN

5.2.8.1 Respiratory emergency

If patient is having an asthma attack then classify severity based on IUATLD guidelines below.

Symptoms	Minor Attack	Moderate Attack	Severe Attack	Imminent Respiratory Failure
Dyspnea	With effort	While talking	All the time	All the time
Ability to Speak	In complete sentences	In short sentences	Words	Unable to speak
State of Consciousness	Normal	Normal or restless	Restless	Drowsy or confused
Respiratory Rate	20-25/min	25-30/min	>30/min	>30/min
Heart Rate	<100	100-120	>120	Bradycardia

- Position upright, give continuous salbutamol nebulizer, administer I.V hydrocortisone 100 mg or prednisolone po 60mg if I.V not available.
- Oxygen by facial mask 6l/min if O2 saturation is <92% RA
- If symptoms uncontrolled after 30 minutes -> magnesium 2g IV x 1.
- Give amoxicillin 500mg PO x 1 if pneumonia suspected.
- Give furosemide 40mg IV x 1 if HF suspected.
- Call physician and admit to hospital.
- Intubation if decreased level of consciousness , exhaustion, silent chest, acidemia, cyanosis.
- Directed therapy if the triggering factor is evident: e.g antibiotics in case of infection,...

***COPD exacerbation managed the same way ***

5.2.8.2 Use the step method to treat asthma

When symptoms improve for at least 3 months: STEP DOWN the treatment ladder

STEP #5 ASTHMA ATTACK

1. Revert to Respiratory emergency

STEP #4 Persistent – Severe

1. Salbutamol Inh 2 puffs every 4 hr PRN
2. Beclamethasone 1500mcg 2 puff BD
3. Aminophylline 100mg PO 3x/day

STEP #3 Persistent – Moderate

1. Salbutamol Inh 2 puffs every 6 hrs
2. Beclamethasone 1000mcg 1puff BD

STEP #2 Persistent – Mild

1. Salbutamol Inh 2 puffs every 6 hrs PRN
2. Beclamethasone 500mcg 1puff BD

STEP #1 Intermittent

1. Salbutamol Inh 2 puffs every 6 hrs PRN

5.2.8.3 COPD Management

Treat like persistent, severe asthma without aminophylline

- Salbutamol 2 puffs every 4 hrs as needed
- Beclamethasone 1,500 mcg BD scheduled

If suspicion of infection:

- Doxycycline 100mg PO 2x/day for 7 days or
-
- Macrolides (erythromycin or clarithromycin 500 mg BID x 7 days

Provide counseling on smoking cessation

5.2.8.4 *Bronchiectasis*

Treat like persistent, severe asthma without aminophylline

- Salbutamol 2 puffs every 4 hr as needed
- Beclamethasone 1,500 mcg BD scheduled

If suspicion of infection:

- Doxycycline 100mg PO 2x/day for 7 days or
- Macrolides (erythromycin or clarithromycin 500 mg BID x 7 days
- Advise patient to stay well hydrated, which will help thin secretions.
- Refer for respiratory physiotherapy
- Prescribe PPIs (omeprazole 20mg BID) for gastro esophageal reflux disease (GERD)

5.2.9 FOLLOW-UP SCHEDULE

	ASTHMA Step 1 or 2	ASTHMA Step 3 or Above
Medication Change	Return in 4-6 weeks	Return in 1-2 weeks
No Medication Change	Return in 3-4 months	NA

5.2.10 EDUCATION

INHALER USE	
Symptoms:	Teach patients recognize signs of worsening asthma: cough, wheezing, difficulty breathing.
HOME INHALER TITRATION	
Beclamethasone:	Beclamethasone: Explain that it is ok to increase the dose (i.e. number of puffs), but the frequency should remain the same.
Salbutamol:	Salbutamol: Patients can use this more frequently for symptom relief.
Return to Clinic:	If the patient changes any medication then instruct him or her to return to clinic.
INHALER USE	
Instruct patients on proper inhaler use	SEE BELOW!

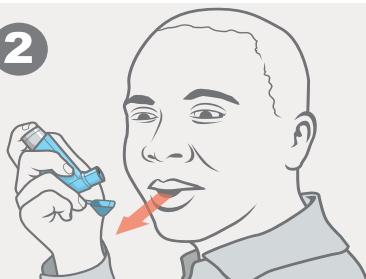
POMPE

1



Retirez le capuchon et agiter.

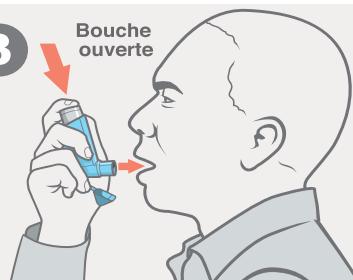
2



Expirez doucement.

3

Bouche ouverte



Commencez à inspirer tout en appuyant. Inspirez doucement et profondément, et retenez votre souffle.

3

Bouche fermée



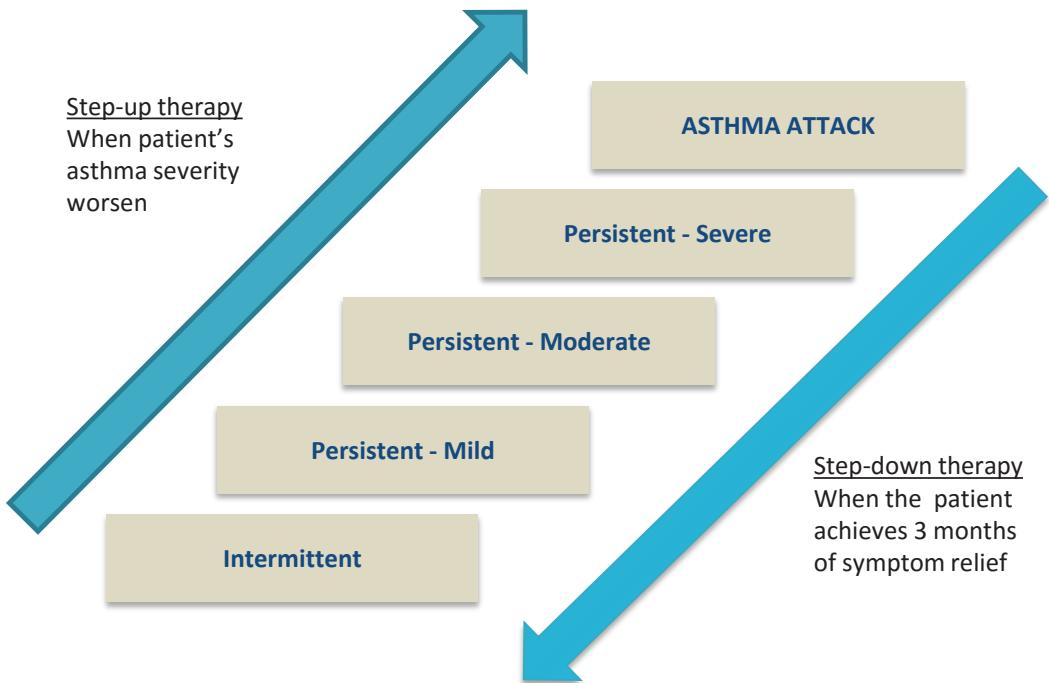
OU

Placez la pompe entre vos lèvres tout en appuyant. Inspirez doucement et profondément, et retenez votre souffle.

5.2.11 MEDICATION ADHERENCE

Evaluate the patient's ability to follow the treatment plan from last visit.

5.2.12 IDENTIFY THE TREATMENT STEP

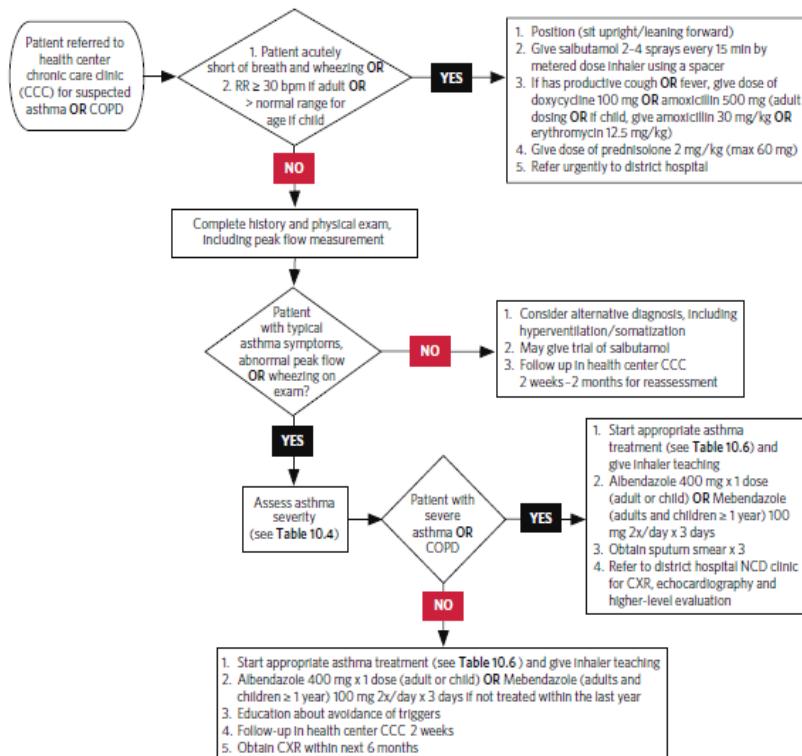


Once the correct treatment step is identified check section 5.2.8 and develop a treatment plan

Summary table: Annex 1

Asthma severity:	CHECK LIST SYMPTOMS					Protocol	Treatment
	Dyspnea	Ability to Speak	State of Consciousness	Respiratory Rate	Heart Rate		
Intermittent	With effort	In complete sentences	Normal	20-25/min	<100	Other causes should be excluded because asthma is over-diagnosed at this stage	Salbutamol inh 2 puffs every 6 hrs PRN
Persistent-Mild	While talking	In short sentences	Normal or restless	25-30/min	100-120	Call a physician and admit to the hospital!	Salbutamol inh 2 puffs every 6 hrs PRN, Beclamethasone 500mcg 1 puff BD
Persistent-Moderate	All the time	Words	Restless	>30/min	>120	Call a physician and admit to the hospital!	Salbutamol inh 2 puffs every 6 hrs, Beclamethasone 1000mcg 1 puff BD
Persistent-Severe	All the time	Unable to speak	Drowsy or confused	>30/min	Bradycardia	Call a physician and admit to the hospital!	Position upright, give continuous albuterol nebulizer, high dose and prednisolone 60mg PO x 1. If symptoms uncontrolled after 30 minutes -> magnesium 2g IV x 1. Give amoxicillin 500mg PO x 1 if pneumonia suspected. Give furosemide 40mg IV x 1 if HF suspected. Call physician and admit to the hospital
Asthma Attack	All the time	Unable to speak	Drowsy or confused	>30/min	Bradycardia	Call a physician and admit to the hospital!	

Initial Management of Asthma or COPD at Integrated Chronic Care Clinics



PART 3: Diabetes

6 DIABETES GUIDELINES

6.1 Guiding principles

THE INITIAL VISIT

The initial visit plan emphasizes a systematic approach, which will help you to:

1. Establish that the patient has diabetes

- Symptoms, risk factors, and physical exam findings raise suspicion for diabetes, but do not play a role in the diagnosis of diabetes.
- A diagnosis of diabetes is only made when:
- Fasting blood glucose: > 126mg/dL on two different visits
- Random blood glucose: > 200mg/dL on a single visit
- HbA1c > 6.5% on two different visits

2. Identify the type of diabetes

- The patient's history, complications, and response to treatment helps you make this judgment.
- Patients can have overlapping types of diabetes (i.e. malnutrition may cause a type of diabetes that has features of type 1 & 2 disease)

3. Assess the severity of hyperglycemia and complicating conditions

- If a patient has hyperglycemia without diabetic complications then oral agents should be started.

SYSTEMATIC APPROACH

This guide takes you through the following framework for each patient visit:

1. History
2. Vital Signs
3. Physical Exam
4. Lab Review
5. Impression
6. Plan

- If a patient has hyperglycemia with evidence of organ damage (advanced renal failure or diabetic foot ulcer) or patient is pregnant then immediate insulin therapy is required.
- If a patient's initial presentation for diabetes is DKA or HONKC then immediate insulin therapy may be required.

THE FOLLOW-UP VISIT

The follow-up visit emphasizes a systematic approach, which will help you to:

1. Establish or confirm that the patient has diabetes

2. Identify or confirm the type of diabetes

3. Assess glucose control

- This will clarify whether current therapy should be continued or if titration is needed.
- For patients with poor glycemic control titrate medications or insulin.
- If poor glycemic control despite maximum oral therapy, then transition the patient to insulin.

6.2 The Initial Visit

This section emphasizes a systematic approach, which will help answer the following basic questions: 1. Is this diabetes? 2. What type of diabetes? 3. What is the extent of hyperglycemia and complicating conditions?

PATIENT BACKGROUND

Review the following information before the patient visit, if available:

- How was the patient referred to the diabetes clinic?
- Is the diagnosis suspected or confirmed?
- Does the patient have type I or II diabetes?
- Has the patient been started on treatment (oral hypoglycemic or insulin)?

6.2.1 HISTORY

6.2.1.1 Clinical history

6.2.1.1.1 DKA or HONKC EMERGENCY

Find out if the patient has experienced any of the following emergency signs:

- | | | |
|--|---|--|
| <input type="checkbox"/> Seizure | <input type="checkbox"/> Confusion | <input type="checkbox"/> Coma |
| <input type="checkbox"/> Intolerance to food/water | <input type="checkbox"/> Nausea or vomiting | <input type="checkbox"/> Severe abdominal pain |

If the patient has these symptoms, call the physician and initiate transfer. However you should complete the patient's workup and begin treatment before the transfer.

6.2.1.1.2 Hyperglycemia

1. Ask the patient the following questions:
 - Weight loss: Have you lost weight? Try to determine if weight loss corresponds to changes in drinking or urination.
 - **Dehydration:** Are you dizzy when standing?
 - **Dehydration:** Are you urinating more than you are drinking?
 - **Polyuria:** Do you need to urinate during the night?
 - **Polydipsia:** Are you drinking more than usual?
2. Ask a family member the following questions:
 - **Confusion:** Has patient been confused or behaving differently?
 - **Fruity smelling breath:** Have you noticed a change in patient's breath?

6.2.1.1.3 Hypoglycemia

1. Find out if the patient has experienced any of the following signs:

- | | | |
|---|--|--|
| <input type="checkbox"/> Confusion | <input type="checkbox"/> Drowsiness | <input type="checkbox"/> Dizziness |
| <input type="checkbox"/> Nausea | <input type="checkbox"/> Sweats (cold) | <input type="checkbox"/> Tremors or Seizures |
| <input type="checkbox"/> Agitation | | <input type="checkbox"/> Coma |
| <input type="checkbox"/> Blurred vision | | |

6.2.1.1.4 Complications

Find out if the patient has experienced any of the following signs of **small vessel (microvascular)** complications:

Retinopathy

- Has your vision gotten worse?
- Do you have blurry or double vision?

Neuropathy

- Do you have numbness or tingling in your hands or feet?
- Have you ever felt like your hands or feet were being stuck with needles?
- Do you have wounds on your legs that won't heal?

Nephropathy

- Has a doctor or nurse ever told you that you have a problem with your kidneys?

2. Find out if the patient has experienced any of the following signs of **large vessel** complications:

Transient Ischemic Attack

- Have you felt sudden weakness on one side of your body that resolved immediately?
- Have you had an episode where you had difficulty finding words?

Coronary Artery Disease

- Do you have chest pain that gets worse with or without exertion?
- Have had a heart attack?

Peripheral Vascular or neuropathy Disease

- Do your legs ache after walking?
- Do you realize a non-healing wound in your feet?
- Do you experience an erectile problem(loss of libido)

6.2.1.1.5 Co-Morbidities

1. Find out if the patient has any of the following co-morbidities:

- HIV Kidney Disease Liver Disease
 Hypertension

6.2.1.1.6 Medications

1. Ask the patient if he/she is taking or have taken any of the following medicines now or in the past:

Metformin

Check for hypoglycemic symptoms.

Sulfonylurea

Insulin

- Are you taking or have you taken NPH, regular, or mixte?
- If yes, how many times a day?
- How is insulin stored?
- Do you inject insulin before or after meals?

Medications that may increase blood glucose

Are you taking or have you taken steroids or protease inhibitors etc?

Ace-Inhibitors

May cause or worsen acute renal injury!

If patient is taking, urine output and creatinine will need to be checked as part of the visit

6.2.1.2 Social History

1. Ask about the following:

Diet

- How many meals do you eat in a day?
- What foods do you eat most (i.e. vegetables, carbohydrates, protein)?
- Has your diet changed for any reason?

Social Situation

- Would it be difficult for you to come to the clinic 4 times a year?
- How would you get to the clinic 4 times per year?
- Do you people at home who can help you with treatment?

6.2.1.3 Family History

Pregnancy

Are you pregnant now? Is there a chance that you might be pregnant?



If yes, test for pregnancy!

- Do you have any children? If yes, when did you last deliver?
- How many children do you have? How many times have you been pregnant?
- Have delivered a baby of $\geq 4\text{kg}$ (fetal macrosomia)
- Have you been told or treated for gestational diabetes?

Ask about the family history:

Diabetes:

- Has anyone in your family has or had diabetes?

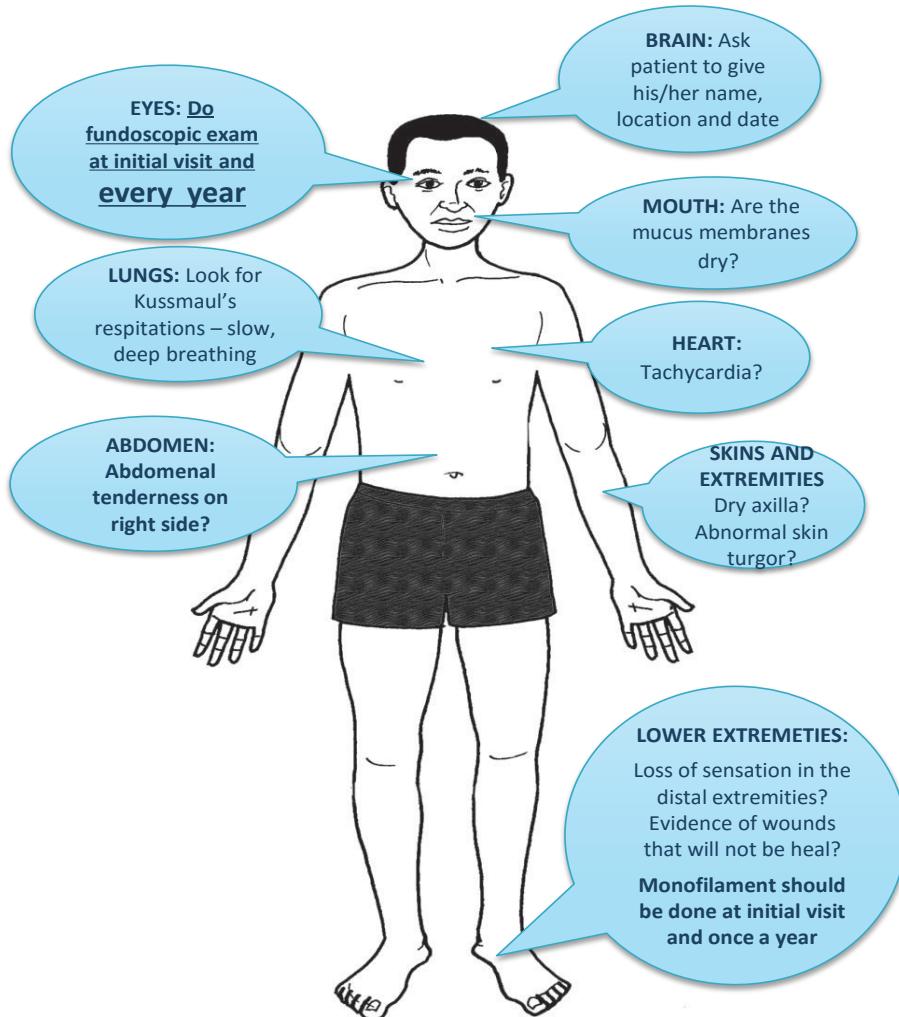
6.2.2 VITAL SIGNS

Always review vitals signs before the physical exam. They are essential and helps you to understand if a patient is sick and will provide important information about whether the patient should be referred to the district hospital.

VITAL SIGN	Notes
Temperature	Infection can worsen hyperglycemia!
Heart Rate	Tachycardia: May indicate that patient is dehydrated or in diabetic ketoacidosis.
Blood Pressure	Should be done at initial visit and all follow-up visits. Low blood pressure: Signals emergency in a patient with hypoglycemia or hyperglycemia. High blood pressure: There is a notable association between high blood pressure and diabetes.
Respiratory Rate	Slow deep, deep breathing (Kussmaul's respirations) is a sign of DKA (diabetic ketoacidosis).
O2 Saturation	Low oxygen saturations should be regarded as an emergency in patient's with hyperglycemia or hypoglycemia
Weight	Should be done at initial visit and all follow-up visits. It will serve as a baseline for future measurements.

6.2.3 PHYSICAL EXAM

Observe the patient. Sometimes it is possible to determine that a patient has severe hypoglycemia or DKA simply by observation. Then check the following:



6.2.4 LAB REVIEW

LAB	WHEN	Notes
Fingerstick Blood Glucose (FBG)	Every Visit	
HbA1c	Initial Visit Every 6 Months	Used to diagnose diabetes and give an assessment of glycemic control. Goal 7.5 – 8.0%
Creatinine	Initial Visit Every Year	Progressive renal failure is a direct consequence of diabetes. Ace-Inhibitors: May need to check creatinine if patient is on an ACE-Inhibitor. Co-morbidities like HTN and HIV can damage the kidneys and cause renal failure.
Urine Dipstick	Initial Visit Every 6 months	Assesses for protein in the urine.
NFS	Only as indicated	HB/Hct: Anemia can mimic dehydration. WBC: Very important to identify a patient who has an infection. Infection may worsen hyperglycemia! Platelets: If very low could identify patients who are a bleeding risk.
Urea	Only as indicated	Elevated urea can suggest dehydration (less blood reaches the kidneys so less urea gets excreted in the urine).

LAB	WHEN	Notes
Bilirubin, SGOT/SGPT	Only as indicated	Liver failure could make glycemic control more difficult and put the patient at risk for hypoglycemia.
Electrolytes	Only as indicated	Sodium: Difficult to interpret in diabetes. Potassium: Often low in patients with DKA. Bicarbonate: Acidosis is an ominous consequence of DKA.

6.2.5 IMPRESSION

6.2.5.1 Diagnosis – 1st visit

Consider the Fingerstick Blood Glucose (FBG) to know if you are able to diagnose diabetes during this visit, or if the patient must return. If the FBG is 126-200mg/dL, you must ask the patient to return for a follow-up visit before you can diagnose diabetes. Use the following boxes to guide your decision:

If patient has already been diagnosed and treated for diabetes, go to par 6.2.6

**DIABETES
CONFIRMED IF**

**FBG: >
200mg/dL**

*Skip to “Type of
Diabetes”*

**NOT DIABETES
IF**

**FBG: <
126mg/dL**

*Stop diabetes
workup*

DIABETES LIKELY IF

**FBG: 126-
200mg/dL**

OR

HbA1c: > 6.5%

*Schedule follow-up
visit*

6.2.5.2 Diagnosis – 2nd or return visit

Use the following boxes to determine if the patient has diabetes:

**DIABETES
CONFIRMED IF TWO
VISITS OF**

FBG: > 126mg/dL

OR

HbA1c: > 6.5%

Continue

NOT DIABETES IF

FBG: < 126mg/dL

Stop diabetes workup

6.2.5.3 Type of Diabetes

Based on the information gathered in the exam, decide whether the patient has:

Type 1 Diabetes

Type 2 Diabetes

Mixed Diabetes (Malnutrition)

6.2.5.4 Determining Next Steps

To know whether the patient should be transferred to the district hospital or started on treatment, choose the appropriate next step below by considering their glucose control and danger signs:

BG (Fingerstick Blood Glucose) > 400mg/dL

Transfer to District Hospital

F

BG 200-400 mg/dL with danger signs

Transfer to District Hospital

FBG 200-400 mg/dL without danger signs

Manage as Outpatient

DANGER SIGNS:

- Dehydration
- Abdominal pain with nausea/vomiting
- Hypotension
- Slow & deep breathing
- Confusion

CAUTION!! Take note of these situations where standard therapies are contraindicated, before proceeding!

6.2.6 PLAN

CONDITIONS THAT REQUIRE DIFFERENT MANAGEMENT

Pregnancy	Pregnant women should be started on insulin immediately. They should NOT be on oral agents (glibenclamide or metformin) or ace-Inhibitors. All women of reproductive age should be referred for family planning.
Renal Failure	Stop metformin and sulfonylurea if creatinine doubles or $> 150 \mu\text{mol/L}$ Decrease insulin by 25% if Creatinine doubles or $> 150 \mu\text{mol/L}$ and patient has evidence of hypoglycemia ACE-Inhibitors (Ace-i) If Cr $> 200 \mu\text{mol/L}$, then ACE-I are contraindicated If Cr increases by 50% hold ACE-I. Re-check Cr within 1 month.
Liver Failure	If patient has evidence of hypoglycemia, then decrease patient's insulin by 25%.
HIV Positive	Be sure to refer to ID clinic because patient may need ARVs changed.

6.2.6.1 Emergencies

DKA or Random Blood Glucose > 400

- Bolus 1 liter normal saline.
- Give regular insulin 10 units.
- Check FBG every hour.
- Repeat insulin 10 units for FBC >300mg/dL until transfer to the district hospital.

Hypoglycemia (Adults)

- Give by oral route of rapid sugar(juices, soda,banana...)
- Give IV glucose 50% solution(if a patient is unable to follow command)
- Check FBG every 1-2 hours.
- Repeat IV glucose 50% for FBG < 70 , transfer patient to the district hospital if hypoglycemia is persisting after 30 minutes of initial management

6.2.6.2 Insulin Therapy

Indications for insulin:

- Type 1 or malnutrition type diabetes
- DKA or glucose >400mg/dL
- Type 2 DM patients already on maximum oral therapy
- Pregnancy
- Renal (>150mmol/L)
- Children < 18 years old

If not indicated, go to
Oral Therapy.

If indicated:

- Stop glibenclamide.
- Continue metformin unless creatinine > 150umol/L.
- Transfer to district hospital to start insulin.

If no indication for insulin, use oral therapy.

Be sure to check creatinine before starting oral agents!

6.2.6.3 Oral Therapy

- BMI >25kg/m²: Metformin 500mg PO BD
- BMI <25kg/m²: Glibenclamide 5mg in the morning

6.2.6.4 Complications

Hypertension

- If BP >140/90 then an ACE-Inhibitor is the first choice.

Retinopathy

- Refer to ophthalmologist if worsening vision or abnormal fundoscopic exam.

Nephropathy

- If 2+ proteinuria detected on dipstick, an ACE-Inhibitor is the first choice.

Neuropathy & LE Wounds

- Give amitriptyline 25mg oral nightly.
- Provide wound care as needed.
- Monofilament test annually

ACE-INHIBITORS

In the short term, ACE-Inhibitors decrease blood flow to the kidneys. If you start an ACE-Inhibitor or increase the dose **you must check a creatinine within 30 days.**

6.2.7 ROUTINE INVESTIGATIONS

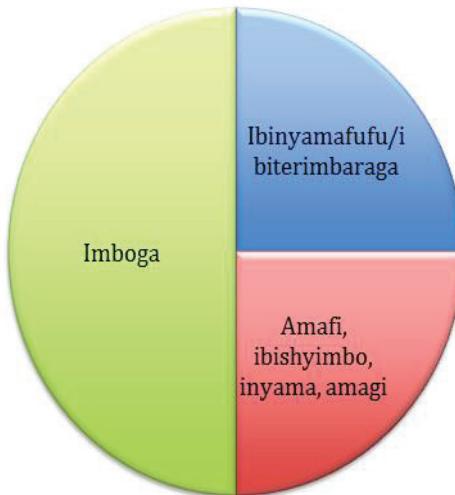
EVERY VISIT	EVERY 6 MONTHS	ANNUALLY	EVERY YEAR
<input type="checkbox"/> Random or Fasting Fingerstick <input type="checkbox"/> Weight and BP <input type="checkbox"/> Foot Exam	<input type="checkbox"/> HbA1c <input type="checkbox"/> Urine Protein with Dipstick	<input type="checkbox"/> Monofilament Test <input type="checkbox"/> Creatinine	<input type="checkbox"/> Refer for Ophthalmologic Exam

6.2.8 FOLLOW-UP SCHEDULE

	Good Glycemic Control	Poor Glycemic Control
Oral medication started or changed	NA	Return in 2-4 weeks
Insulin started or changed	NA	Return in 1-2 weeks
No Medication Change	Return in 3 months	NA

6.2.9 EDUCATION

SYMPTOM MONITORING	
Hypoglycemia:	Teach patients to recognize symptoms and routinely carry containing snacks or drinks with them.
Hyperglycemia:	Instruct patient to return to the hospital with worsening symptoms.
INSULIN	
Storage:	Make sure that patients have a way to safely store insulin.
Administration:	Review proper technique.
Timing:	1. Fingerstick, 2. Insulin, 3. Eat
Monitoring:	Two to three weeks after initiation or insulin adjustment Alternate pre-breakfast & pre-dinner FBG with pre-lunch and pre-bedtime FBG. Remind patient to bring glucose monitoring chart to clinic. Explain that good control is established when the patient is monitoring urine glucose twice a day. If 2 positive urine glucose measurements, then revert back to FBG.
DIET	
Diet Counseling:	Help patient obtain social services if needed. <u>REVIEW WHAT FOODS THE PATIENT SHOULD EAT TO MAINTAIN A HEALTHY DIET:</u>



6.3 The Follow-up Patient Visit

This section emphasizes a systematic approach, which will help you:
1. Assess medication adherence; and 2. Assess glucose control.

1. History (See 6.2.1)
2. Vital Signs (See 1.1.1)
3. Physical Exam (See 1.1.1)
4. Lab Review (See 6.2.4)

Use the same information from the initial visit for HISTORY, VITAL SIGNS, PHYSICAL EXAM and LAB REVIEW in the follow up visit.

6.3.1 MANAGEMENT OF DIABETES

6.3.1.1 Medication Adherence

Evaluate the patient's ability to follow the treatment plan from last visit.

6.3.1.2 Glycemic Control

Review the fingersticks recorded since last visit.

Good Control

- >50% pre-meal or pre-bedtime: FBG 150-180mg/dL or HbA1c 7.5-8.0%
- No medication/insulin changes required

Poor Control

- >50% pre-meal or pre-bedtime: FBG >185mg/dL or HbA1c > 8.0%
- Medication/Insulin titrations required

Emergency

- DKA or random blood glucose > 400mg/DL
- Requires emergency attention!

6.3.2 PLAN

*****IMPORTANT*****

**BEFORE CHANGES ARE MADE TO INSULIN OR ORAL THERAPY
PLEASE CONSIDER THE FOLLOWING FROM THE INITIAL VISIT**

CONDITIONS THAT REQUIRE DIFFERENT MANAGEMENT

See par 3.2.6

EMERGENCIES

See par 3.2.6.1

6.3.2.1 Insulin Therapy

If not indicated go to Oral
Therapy below

1. Transfer insulin naïve patients to the hospital to initiate insulin if any of the following conditions are present:

- Type 1 or malnutrition type diabetes
- DKA or glucose >400mg/dL
- Type 2 DM patients who fail max oral therapy
- Pregnancy
- Renal
- Children < 18 years old

2. Manage patients currently taking insulin as follows:

Good Control

- Maintain insulin dose
- Monitor blood glucose with twice daily urine dipsticks

Poor Control

- Increase total insulin by 15-20%
- Monitor with twice daily fingersticks for 2 weeks
- Patients should follow-up

Hypoglycemia

- Decrease total insulin by 15-20%
- Instruct patient to carry sugary drink

6.3.2.2 Management of type 2 Diabetes (Oral Therapy)

Lifestyle	• Healthy Diet	• physical	*Avoid/Decrease alcohol intake
measures:	• weight control	Activity	

First line:

In addition to lifestyle modification start:

STEP	METFORMIN		GLIBENCLAMIDE	
	7 AM	7 PM	7 AM	7 PM
1	500 mg	—	5 mg	—
2	500 mg	500 mg	5 mg	5 mg
3	1000 mg	500 mg	10 mg	5 mg
4	1000 mg	1000 mg	10 mg	10 mg
5	Add glibenclamide		Add metformin	

- * Glimepiride is alternative of Glibenclamide when there is frequent hypoglycemia with Glibenclamide

1 or 2 mg given orally once daily with breakfast or the first major meal of the day. The dose may be increased by 1-2 mg in 1-2 weeks' interval up to 4 mg maximum based on blood sugar response and is given once daily).

Good Control

- Continue current therapy, no monitoring required.

Poor Control

- Titrate to Metformin 1000mg BD & glibenclamide 10mg OD in the morning.
- If already on maximum therapy then switch to second line.

Second line:

1. when to switch:

If despite adequate titration doses of medication, blood glucose targets are not being attained after 6 months at the most (HbA1C should fall at least by 1% or persistent hyperglycemia of more than 180mg/dl in the past 3 months).

- Check the patient's adherence (understanding of medical and self-management, reinforcement of lifestyle factors influencing health and fitness targets).
- Exclude other conditions that can disturb glycemic control (e.g. steroids).

2. What to switch

In addition to lifestyle measures, adherence to medication and dose optimization add	
Preferred regimens	Vildagliptin (50mg) + Metformine (850 or 1000mg)
Dosage	Twice/day

Third line

In addition to lifestyle measures, adherence to medication and dose optimization.

Preferred	Metformine (if tolerated) + Basal (long acting) Insulin. Add Prandial (short acting) with time if required*
-----------	--

GUIDE TO START AND ADJUST BASAL (LONG ACTING)INSULIN

1. Start basal insulin 10 units morning OR bed time and Continue Metformine

- *Bedtime insulin dosing if FBG is high(Pre breakfast)
- *Morning insulin if Blood glucose level high(Pre dinner).

2.Titration:Adjust the basal insulin dose to achieve target(fix the Fasting first)

- * Increase by 2 units every 3 days until the glycemic control is achieved.
- * If FBG is > 6mmol/l but < 8mmol/l for 3 consecutive days;No change
- *If FBG is 4-6 mmol/l on any day decrease insulin dose by 2 units
- * If FBG is <4 mmol/l on any day decrease insulin dose by 4 units.

3. Intensification:Once daily to twice daily basal insulin

When:

- *If evening pre prandial BGL is high(180mg/dl)
- *After 3 months if HbA1c > target despite FBG and predinner BGL at target

How:

- *Halve the current once daily insulin dose and give the dose twice a day(pre breakfast and pre dinner)
- *Monitor pre dinner BGL and FBG versus target

6.5 Type 1 Diabetes.

Type 1 diabetes is the most common autoimmune disorder in childhood and adolescence. Both genetic and environmental factors are important in determining an individual's risk, however the mechanisms are not fully understood.

Onset can be at any age after the neonatal period, but it is most common in childhood and adolescence.

6.5.1 Presentation of type 1 Diabetes

Clinical presentation of diabetes can vary from non-emergency presentations (e.g. polydipsia, polyuria, weight loss, enuresis) to severe dehydration, shock and diabetic ketoacidosis

Symptoms and Signs

More Common	Less Common	Severe (Diabetic ketoacidosis)	
Weight loss	Excessive hunger	Frequent vomiting and acute abdominal pain	
Polyuria – in younger children bedwetting is common	Blurred vision	Flushed cheeks	Acetone smell on breath
Excessive thirst	Mood changes	Dehydration with continuing polyuria	
Tiredness - not wanting to work or play	Skin infections	Decreased level of consciousness	
	Oral or vaginal thrush	Kussmaul respiration (deep, rapid, sighing)	
	Abdominal pain	Coma	Shock

Treatment of diabetes consists of

- lifelong insulin dependency with multiple injections per day
- a healthy eating plan
- regular physical activity.

6.5.6 INSULIN TREATMENT

All children with type 1 diabetes and some children with other forms of diabetes require insulin. The aim is to replace insulin as physiologically as possible so that blood glucose levels are within the target range avoiding hypoglycaemia and sustained hyperglycaemia. Prolonged under-insulinisation results in chronic hyperglycaemia which increases the risk of stunted growth and diabetes complications, including diabetic ketoacidosis.

Comprehensive diabetes management includes insulin treatment, blood glucose monitoring, nutritional management, physical activity, education, rules for sick days, and psychosocial support (see subsequent sections).

Types of Insulin.

- Short-acting (regular/soluble) - e.g. Actrapid, Humulin R, Insuman Rapid
- Intermediate-acting - NPH insulin – e.g. Humulin NPH, Protaphane, Insulatard
- Pre-mixed short-acting (regular) and intermediate-acting (NPH) insulins – usually in the combination 30/70 or 25/7

Partial Remission or Honeymoon Phase in Type 1 Diabetes

- Insulin requirements can decrease transiently following initiation of insulin treatment.
- This has been defined as insulin requirements of less than 0.5 units per kg of body weight per day with an HbA1c < 7% (53 mmol/mol).
- Ketoacidosis at presentation and at a young age reduce the likelihood of a remission phase.
- It is important to advise the family of the transient nature of the honeymoon phase to avoid the false hope that the diabetes is spontaneously disappearing.

Insulin Action

INSULIN TYPE	PREPARATIONS	ONSET OF ACTION	PEAK OF ACTION	DURATION OF ACTION	WHEN TO GIVE
Rapid-acting	Aspart, Glulisine, Lispro	15-30 minutes	1-2 hours	3-5 hours	immediately prior to meal
Short-acting (regular)	Actrapid, Humulin R, Insuman Rapid	30-60 minutes	2-4 hours	5-8 hours	30 minutes prior to meal
Intermediate-acting	Humulin NPH, Protaphane, Insulatard,	2-4 hours	4-10 hours	12-24 hours	30 minutes prior to meal
Long-acting	Detemir	1-2 hours	6-12 hours	20-24 hours	once or twice daily
	Glargine	2-4 hours	relatively peakless	24 hours or less	once or twice daily
Mixed	Rapid/long-acting mix or Short/long-acting mix 30/70 or 25/75	30 minutes	4-12 hours	8-24 hours	30 minutes prior to meal

The two most common regimens used are:

- Twice-daily insulin using both short-acting and also intermediate-acting insulin. (If these insulins are not always available, pre-mixed insulin can be used as an alternative regimen).

Basal bolus regimen (the preferred option) - with short-acting insulin given with main meals (usually three times per day) and intermediate-acting insulin given once or twice daily (evening, or morning and evening)

6.5.6.1 Guideline on insulin dosage

Initiating therapy in a child not in DKA

Day 1

Give short-acting (regular) insulin (0.1 U/kg) every second hour until blood glucose is < 11 mmol/l, then every 4-6 hours. If hourly monitoring of blood glucose cannot be provided, begin with half the above dose.

Day 2 (from morning/breakfast):

Total daily dose 0.5-0.75U/kg/day.

a) TWO INJECTIONS PER DAY

- A starting point is to give two-thirds of the total daily insulin in the morning before breakfast and one-third before the evening meal
- On this regimen, at the start, approximately one-third of the insulin dose may be short-acting (regular) insulin and approximately two-thirds may be intermediate-acting insulin, although these ratios change with greater age and maturity of the young person.

For example: For a 36 kg child who is started on 0.5 U/kg/day, the total daily dose is 18 Units. Two-thirds of this is given in the morning (before breakfast) – (12 Units), and one-third before the evening meal – 6 Units. At each injection, 1/3 is short-acting and 2/3 is intermediate-acting.

Therefore the doses, for this 36 kg child, would be:

	<i>Short-acting</i>	<i>Intermediate-acting</i>
<i>Before breakfast</i>		<i>4 Units</i>
<i>Before evening meal</i>	<i>2 Units</i>	<i>4 Units</i>

For mixed insulin, always think of the components separately (i.e. 10 units of mix 70/30 equals 3 units of short-acting (regular) and 7 units of intermediate-acting (NPH)), and adjust doses as above.

b) BASAL-BOLUS REGIMEN – also called Multiple Daily Injections (MDI)

- This is the preferred option if doctors and nurses have experience with this method, and frequent blood glucose monitoring is available.
- A starting point is:
 - If short-acting (regular) and intermediate-acting insulin is used, give:
 - 70% of the total daily dose as short-acting (regular) insulin (divided up between 3-4 pre-meal boluses)
 - 30% of the total daily dose as a single evening injection of intermediate-acting insulin
 - If short-acting (regular) and long-acting analogue insulins are used, give:
 - 50% of the total daily dose as short-acting (regular) insulin (divided up between 3-4 pre-meal boluses)
 - 50% of the total daily dose as a single evening injection of long-acting analogue insulin. (Sometimes this dose does not last for 24 hours and then

can be split into two doses morning and evening).

Subsequently, doses can be adjusted daily according to blood glucose levels.

It is important to note that:

- The level of blood glucose can rise in the early morning (“dawn phenomenon”) and so care should be taken if increasing the evening intermediate/long-acting dose as hypoglycaemia can occur in the middle of the night and this can be dangerous.
- insulin requirements can decrease for a time during the “honeymoon period” before rising again.
- The total daily dose required will generally increase as the child grows, and once puberty ensues a higher dose per kg per day is often needed.

6.5.6.2 Insulin requirements

- During the partial remission phase, the total daily insulin dose is often < 0.5 IU/kg/day
- ▢ Prepubertal children (outside the partial remission phase) usually require 0.7-1.0 IU/kg/day.
- ▢ During puberty, requirements may rise substantially above 1 and even up to 2 U/kg/day.

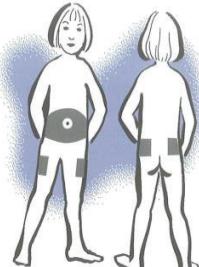
The “correct” dose of insulin is that which achieves the best attainable glycaemic control for an individual child or adolescent without causing obvious hypoglycaemia problems, and resulting in a harmonious growth according to children’s weight and height charts.

Mixing Insulins in the same syringe:

Short-acting insulin or rapid-acting analogues can be combined with intermediate-acting insulins (e.g. NPH) in the same syringe. Begin by injecting air into both bottles. The short-acting insulin is generally drawn into the syringe first. If the intermediate-acting insulin is a “cloudy” insulin, mix by tipping the vial/bottle up and down 10 – 20 times. Do not shake the insulin as this damages the insulin. The doses can be adapted every day according to food intake, physical activity, and blood glucose readings. Long-acting analogues (Lantus, Levemir) should not be mixed with any other insulin.

Injection sites:

Recommended sites for insulin injection



Recommended sites for insulin injection 1

Recommended sites for insulin injection 2

6.5.7 DIABETIC KETO ACIDOSIS

Children and adolescents with DKA should be managed in centres experienced in its treatment and where vital signs, neurological status and laboratory results can be monitored frequently.

6.5.7.1 Emergency assessment

- Perform a clinical evaluation to confirm the diagnosis and determine its cause.
- Look for evidence of infection.
- Weigh the patient and use this weight for calculations.
- Assess clinical severity of dehydration.
- Assess level of consciousness (Glasgow coma scale).
- Obtain a blood sample for laboratory measurement of serum or plasma glucose, electrolytes (including bicarbonate or total carbon dioxide [TCO₂]), blood urea nitrogen, creatinine, osmolality, venous (or arterial in critically ill patient) pH, pCO₂, haemoglobin and haematocrit or blood count, calcium, phosphorus, and magnesium concentrations. The cause of a high white blood cell count is more often stress than infection.
- Perform a urinalysis or blood test for ketones (or point-of-care measurement on a fingerprick blood sample using a bedside meter if available).
- Obtain appropriate specimens for culture (blood, urine, throat), if there is clinical evidence of infection. If laboratory measurement of serum potassium is delayed, perform an electrocardiogram for baseline assessment of potassium status

6.5.7.2 Supportive measures

- Secure the airway and empty the stomach by continuous nasogastric suction to prevent pulmonary aspiration in the unconscious or severely obtunded patient.
- A peripheral intravenous catheter should be placed for convenient and painless repetitive blood sampling.
- A cardiac monitor should be used for continuous electrocardiographic monitoring to assess T-waves for evidence of hyperkalemia or hypokalemia.
- Give oxygen to patients with severe circulatory impairment or shock.
- Give antibiotics to febrile patients after obtaining appropriate cultures of body fluids.
- Catheterize the bladder if the child is unconscious or unable to void on demand (e.g. infants and very ill young children).

6.5.7.3 Fluids and salt replacement

- For patients who are severely volume depleted but not in shock, volume expansion (resuscitation) should begin immediately with 0.9% saline to restore the peripheral circulation.
- The volume and rate of admin indicated, the volume administered typically is 10 ml/kg/h over 1-2 hours, and may be repeated if administration depends on circulatory status and, where it is clinically necessary, to assure a stable circulatory status.
- In the rare patient with DKA who presents in shock or severe circulatory collapse, rapidly restore circulatory volume with isotonic saline in 20 ml/kg bolus infused as quickly as possible through a large bore cannula. Repeat if necessary, with careful reassessment after each bolus

- Intraosseous access should be considered after multiple attempts to gain IV access have failed.
- Fluid management (deficit replacement) should be with 0.9% saline for at least 4-6 hours Thereafter, deficit replacement should be with a solution that has a tonicity equal to or greater than 0.45% saline with added potassium chloride, potassium phosphate or potassium acetate (see Potassium replacement).The rate of fluid (IV and oral) should be calculated to rehydrate evenly over 48 Hrs

»

»

Weight (kg)	Infusion rate (ml/kg/h)
4 - 9	6
10 - 19	5
20 - 39	4
40 - 59	3.5
60 - 80	3

)

6.5.7.4 Insulin therapy

- Start insulin infusion 1-2 hours after starting fluid replacement therapy; i.e. after the patient has received initial volume expansion.
- Correction of insulin deficiency
- Dose: 0.1 unit/kg/hour (e.g. dilute 50 units Regular [soluble] insulin in 50 ml normal saline, 1 unit = 1 ml).
- Route of administration IV.
- An IV bolus is unnecessary and should not be used at the start of therapy.
- The dose of insulin should usually remain at 0.1 unit/kg/h at least until resolution of DKA ($\text{pH} > 7.30$, bicarbonate $> 15 \text{ mmol/l}$ and/or closure of the anion gap), which invariably takes longer than normalisation of blood glucose concentrations.
- If the patient demonstrates marked sensitivity to insulin (e.g. some young children with DKA and patients with HHS (hyperglycaemic hyperosmolar state), the dose may be decreased to 0.05 unit/kg/h, or less, provided that metabolic acidosis continues to resolve.
- During initial volume expansion the plasma glucose concentration falls steeply. Thereafter, the plasma glucose concentration typically decreases at a rate of 2-5 mmol/l/h , depending on the timing and amount of glucose administration.
- To prevent an unduly rapid decrease in plasma glucose concentration and hypo-glycaemia, 5% glucose should be added to the IV fluid (e.g. 5% glucose in 0.45% saline) when the plasma glucose falls to approximately 14-17 mmol/l (250-300 mg/dl), or sooner if the rate of fall is precipitous.
- It may be necessary to use 10% or even 12.5% dextrose to prevent hypoglycaemia, while continuing to infuse insulin to correct the metabolic acidosis.

- If blood glucose falls very rapidly ($> 5 \text{ mmol/l/h}$, 90 mg/dl/h) after initial fluid expansion, consider adding glucose even before plasma glucose has decreased to 17 mmol/l (300 mg/dl).

6.5.7.5 Potassium replacement

- Replacement therapy is required regardless of the serum potassium concentration.
- If the patient is hypokalemic, start potassium replacement at the time of initial volume expansion and before starting insulin therapy. Otherwise, start replacing potassium after initial volume expansion and concurrent with starting insulin therapy. If the patient is hyperkalemic, defer potassium replacement therapy until urine output is documented.
- If immediate serum potassium measurements are unavailable, an ECG may help to determine whether the child has hyperkalemia or hypokalemia. Flattening of the T wave, widening of the QT interval, and the appearance of U waves indicate hypokalemia. Tall, peaked, symmetrical, T waves and shortening of the QT interval are signs of hyperkalemia.
- The starting potassium concentration in the infusate should be 40 mmol/l . Subsequent potassium replacement therapy should be based on serum potassium measurements.
- If potassium is given with the initial rapid volume expansion, a concentration of 20 mmol/l should be used.
- Potassium replacement should continue throughout IV fluid therapy. Potassium may be given either as potassium phosphate or potassium acetate in preference to all potassium given as potassium chloride (to reduce risk of hyperchlloremic acidosis).

- Potassium phosphate may be used together with potassium chloride or acetate; e.g. 20 mmol/l potassium chloride and 20 mmol/l potassium phosphate or 20 mmol/l potassium phosphate and 20 mmol/l potassium acetate.
- The maximum recommended rate of intravenous potassium replacement is usually 0.5 mmol/kg/h If hypokalemia persists despite a maximum rate of potassium replacement, then the rate of insulin infusion can be reduced.

6.5.7.6 Acidosis

- Bicarbonate administration should not be routinely administered, but in the rare case who presents in a critical condition with severe acidaemia and a state of shock, it may be appropriate to use bicarbonate.
- If bicarbonate is considered necessary, cautiously give 1-2 mmol/kg over 60 minutes.

6.5.7.7 Introduction of oral fluids and transition to subcutaneous insulin injections

- Oral fluids should be introduced only when substantial clinical improvement has occurred (mild acidosis/ketosis may still be present).
- When oral fluid is tolerated, IV fluid should be reduced.
- To prevent rebound hyperglycaemia the first SC injection should be given 15-30 minutes (with rapid-acting insulin) or 1-2 hours (with Regular insulin) before stopping the insulin infusion to allow sufficient time for the insulin to be absorbed. With intermediate- or long-acting insulin, the overlap should be longer and the rate of IV insulin gradually decreased. For example, for the patient on a basal-bolus insulin

regimen, the first dose of basal insulin may be administered in the evening and the insulin infusion is stopped the next morning

6.5.7.8. Cerebral oedema

1. Warning signs and symptoms of cerebral oedema include:

- Headache and slowing of heart rate.
- Change in neurological status (restlessness, irritability, increased drowsiness, incontinence).
- Specific neurological signs (e.g. unreactive pupils, cranial nerve palsies).
- Rising blood pressure.
- Decreased oxygen saturation.

2. Treatment of cerebral oedema

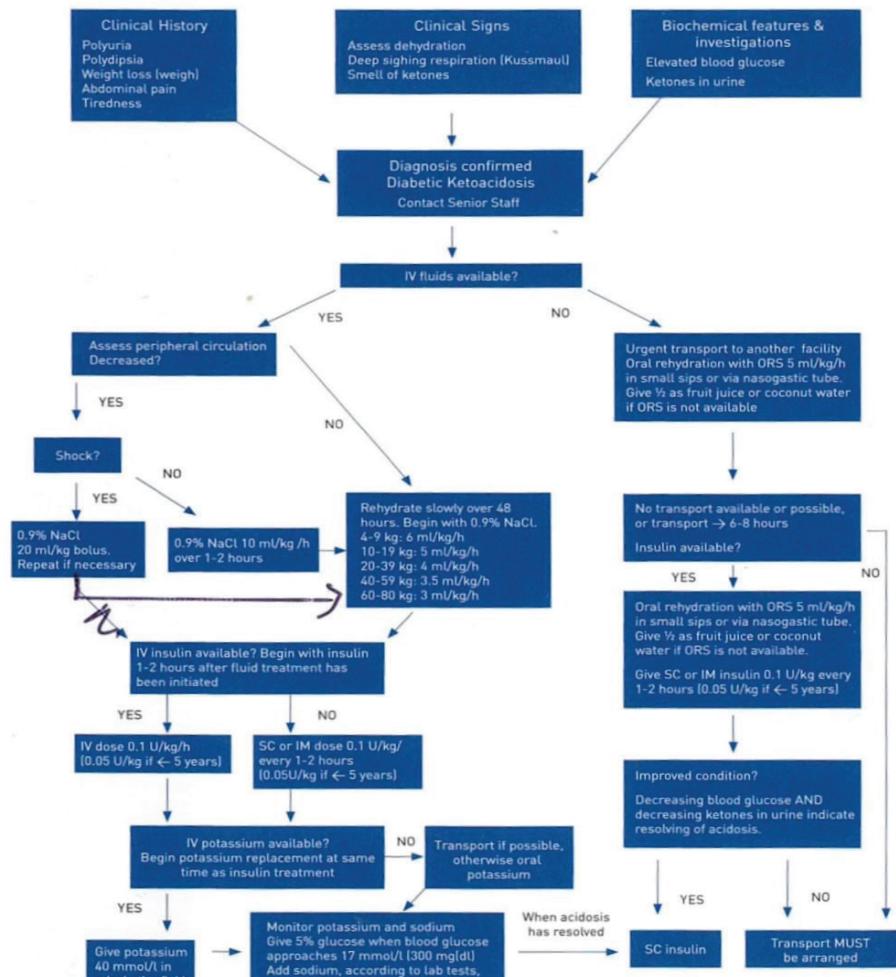
- Initiate treatment as soon as the condition is suspected.
- Reduce the rate of fluid administration by one-third.
- Give mannitol 0.5-1 g/kg IV over 20 minutes and repeat if there is no initial response in 30 minutes to 2 hours.
- Hypertonic saline (3%), 5 ml/kg over 30 minutes, may be an alternative to mannitol, especially if there is no initial response to mannitol.
- Mannitol or hypertonic saline should be available at the bedside.
- Elevate the head of the bed.
- Intubation may be necessary for the patient with impending respiratory failure, but aggressive hyperventilation (to a pCO₂ < 2.9 kPa [22 mm Hg]) has been associated with poor outcome and is not recommended.
- After treatment for cerebral oedema has been started, a cranial CT scan should be obtained to rule out other possible intracerebral causes of

neurologic deterioration (\sim 10% of cases), especially thrombosis or haemorrhage, which may benefit from specific therapy.

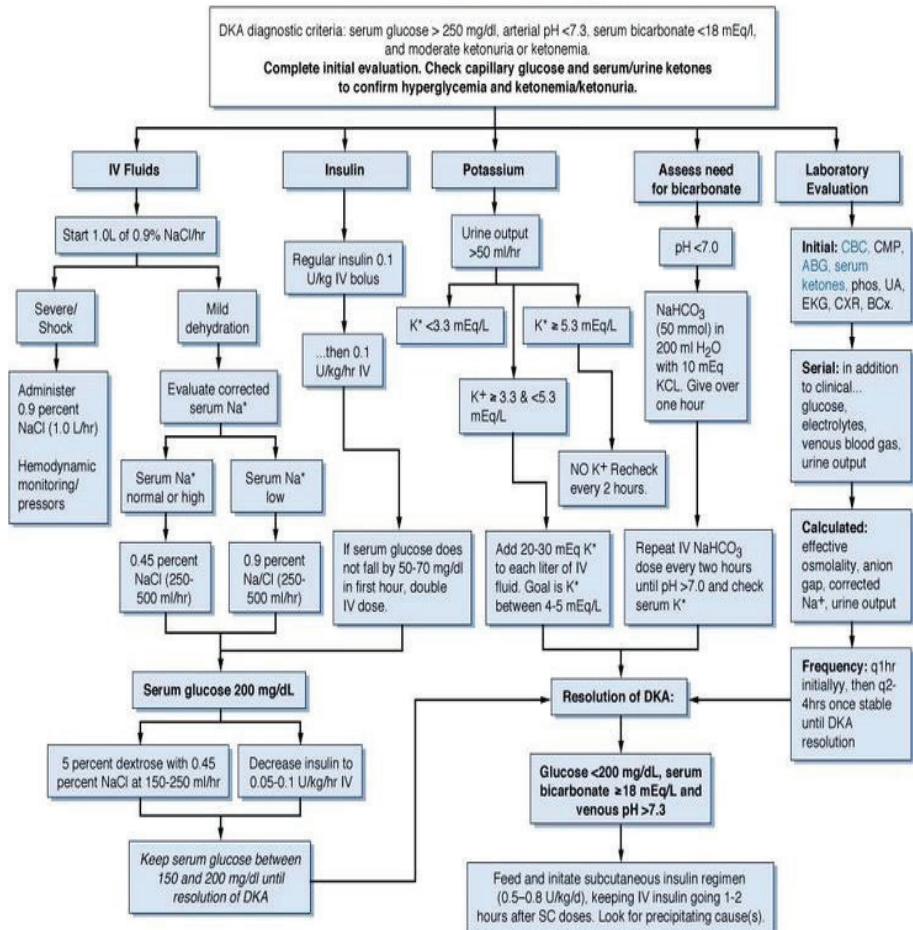
6.5.7.9 Clinical and biochemical monitoring should include:

- Hourly (or more frequently as indicated) vital signs (heart rate, respiratory rate, blood pressure).
- Hourly (or more frequently as indicated) neurological observations (Glasgow coma score) for warning signs and symptoms of cerebral oedema.
- Amount of administered insulin.
- Hourly (or more frequently as indicated) accurate fluid input (including all oral fluid) and output.
- Capillary blood glucose concentration should be measured hourly.
- Laboratory tests: serum electrolytes, glucose, blood urea nitrogen, calcium, magnesium, phosphorus, haematocrit, and blood gases should be repeated two to four hourly, or more frequently, as clinically indicated, in more severe cases.
- Urine ketones until cleared or blood β -hydroxybutyrate concentrations (either capillary or serum), if available, every 2 hours

Figure 2
DKA Management – Limited Care



DIABETIC KETOACIDOSIS (DKA), TREATMENT



Kitabchi AE, Wall BM. Management of diabetic ketoacidosis. Am Fam Physician. 1999 Aug 60(2):455-64.

Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN. Hyperglycemic crises in adult patients with diabetes. Diabetes Care. 2009 Jul;32(7): 1335-43.

Trachtenberg DE. Diabetic ketoacidosis. Am Fam Physician. 2005 May 171(9): 1705-14.

PART 5: Chronic Kidney diseases

7 CHRONIC KIDNEY DISEASE GUIDELINES

7.1 Guiding Principle

The Initial Visit

1 Establish that the patient has chronic kidney disease

- Progression to end stage chronic kidney disease can often be prevented or delayed through early detection and treatment.
- The diagnosis of chronic kidney disease should be established based on proper history taking, clinical signs and symptoms and paraclinical investigation.

2. Identify the risk factors

The patient's history can help Identifying risk factor for chronic renal disease.

- Patients with other chronic disease such as hypertension, Diabetes and HIV are vulnerable to chronic renal disease.
- Nephrotic syndrome, acute kidney injury and chronic nephrotoxic agents like NSAIDs,gentamycine can cause chronic kidney disease
- History of use of Herbes medications

3. Assess the stage of chronic kidney disease

- Among patients with chronic kidney disease, the stage of disease should be based on their level of creatinine which reflects the kidney function or based on the GFR calculated according to Gault Cockroft formula.

The Follow-up visit

The follow up visit emphasizes a systemic approach which will help you:

- Confirm that patient has chronic kidney disease
- Define progression of chronic kidney disease by using eGFR
- Review the referral criteria

Review of initial management and patient education

7.2 The Initial Visit

7.2.1 CLINICAL HISTORY

Find out if the patient has the following symptoms

- Swelling of the body (Oedema)
- Rapid weight gain
- Changes in urine output
- Changes in urine color
- Fatigue
- Inability to concentrate and confusion
- Anorexia, nausea, Vomiting
- Shortness of breath, cough

7.2.2 MEDICATIONS

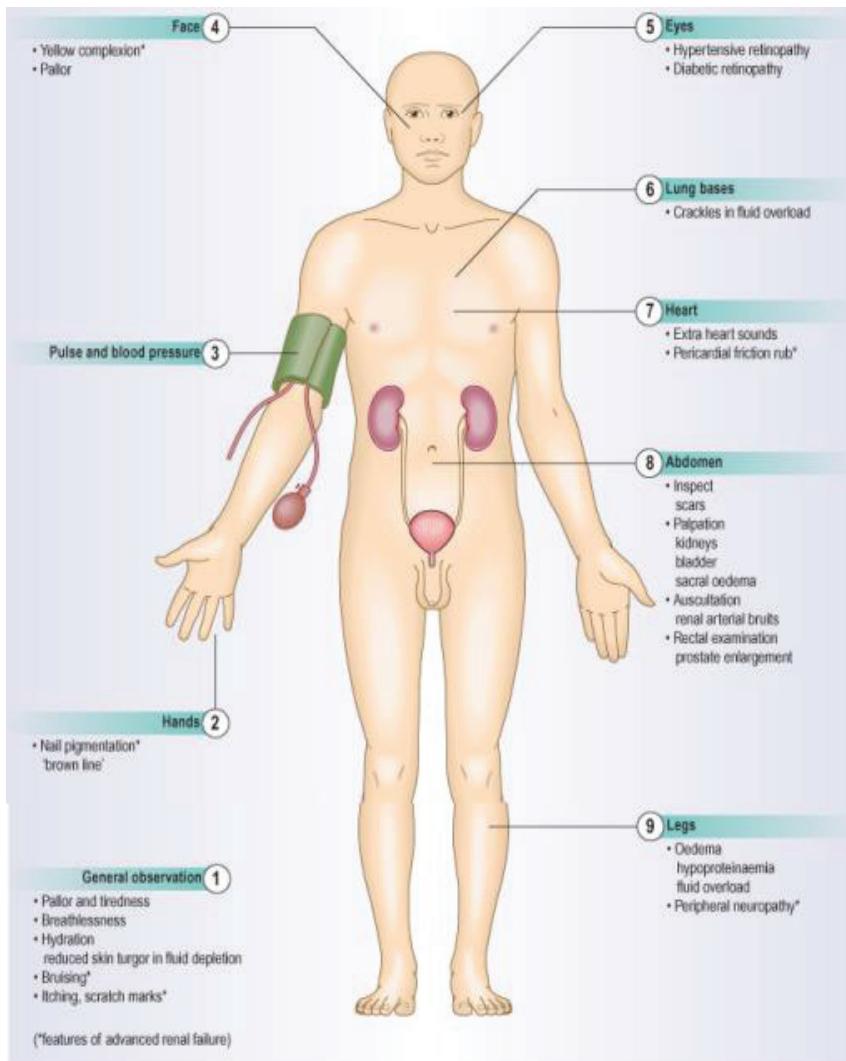
Nephrotoxic drugs such as NSAID, Tenofovir, Gentamycin and iodinated contrast agents should be avoided in patients with chronic kidney disease.

7.2.3 VITAL SIGNS

Vital Signs	Considerations
Blood Pressure	<ul style="list-style-type: none">○ High Blood pressure is very common in Chronic kidney Disease patients
Oxygen Saturation Respiratory rate Pulse	<ul style="list-style-type: none">○ These parameters can be impaired because of pulmonary edema, pleural effusion (as a result of hypervolemia) which may lead to hypoxia
Temperature	<ul style="list-style-type: none">○ CKD patients are prone to infections

7.2.4 PHYSICAL EXAMS

While performing a systemic physical examination, the following signs may attract your attention and orient you to the management of CKD.



SIGNS	CAUSE
Fatigue and confusion	<ul style="list-style-type: none"> ○ Anemia, insomnia, uremia, malnutrition ○ Fluid overload
Pruritus	<ul style="list-style-type: none"> ○ Dryness of the skin ○ Hyperphosphatemia ○ Anemia
Dyspnea	<ul style="list-style-type: none"> ○ Pulmonary oedema ○ Pleural effusion ○ Metabolic acidosis ○ Anemia ○ Aspiration ○ Other pulmonary diseases
Delirium(confusion)	<ul style="list-style-type: none"> ○ Metabolic imbalance ○ Hypoxia, Hypercapnia ○ Medications
Pain	<ul style="list-style-type: none"> ○ Bone pain due to secondary hyperparathyroidism ○ Diabetic Neuropathy ○ Calciphylaxis (Patients on hemodialysis)

SIGNS	CAUSE
Anorexia, Vomiting	<ul style="list-style-type: none"> ○ Nausea ○ Gastroparesis diabetic ○ Uremic gastritis
Swelling of the feet and ankle	<ul style="list-style-type: none"> ○ Fluid overload ○ Low oncotic pressure due to proteinuria and malnutrition ○ Heart failure comorbidity
Dry Mouth	<ul style="list-style-type: none"> ○ Intravascular volume depletion(Can exist with oedema)
Cough	<ul style="list-style-type: none"> ○ Pulmonary oedema ○ Aspiration ○ Pulmonary pathology comorbidity

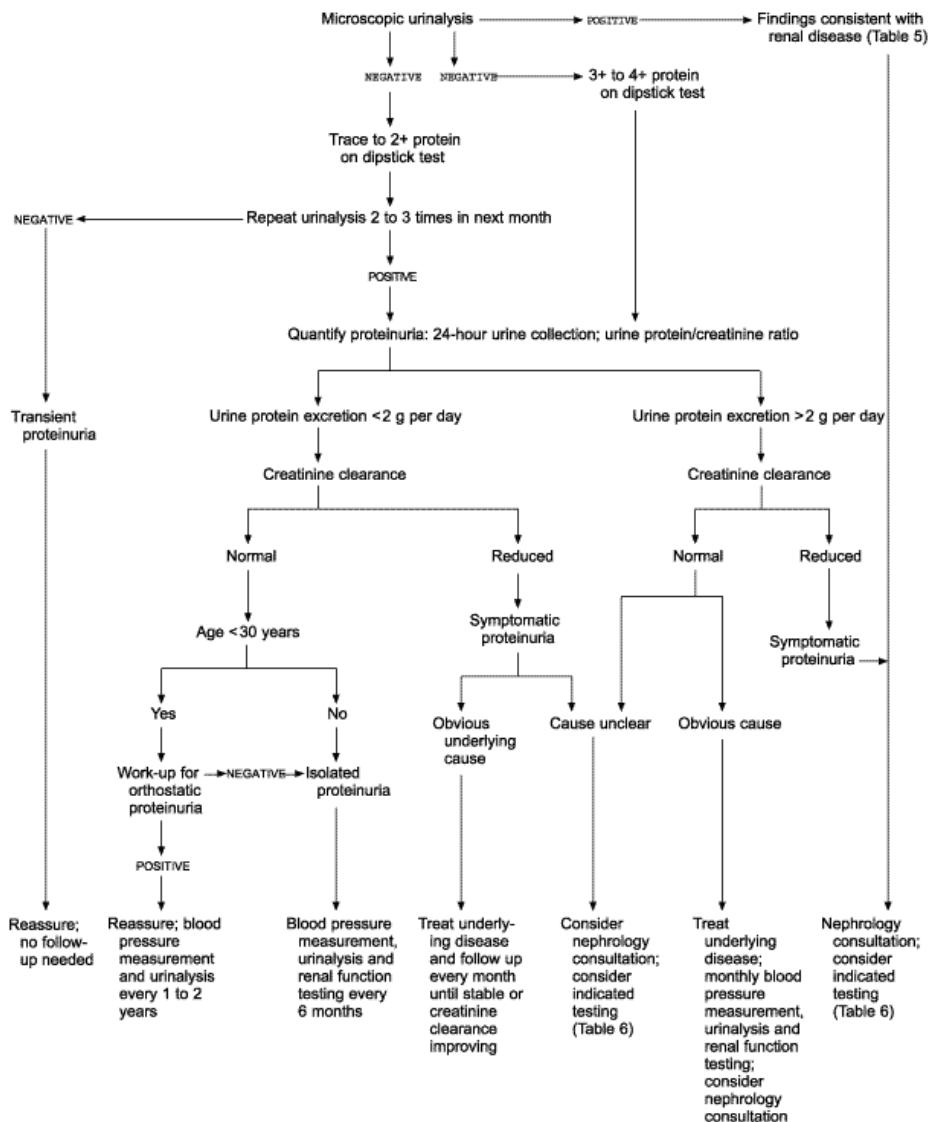
7.2.5 SCREENING OF CHRONIC KIDNEY DISEASES

- Urine test for proteinuria
- Blood test for creatinine

7.2.5.1

**7.2.5.2 Screening for chronic kidney disease with urine dipstick
(positive proteinuria is 2+)**

URINE DIPSTICK RESULT	24 HR URINE PROTEIN	DIPSTICK MAY BE SUGGESTIVE OF:(ideally urine of less than 4hours)
2+	0.5-2gm	Proteinuria
3+	2-5gm	Nephrotic range
4+	7gm	Nephrotic range



7.2.5.3 Measuring creatinine clearance estimate using by cockcroft-gault equation

- Creatinine depends on age, weight and sex.
- In a patient with stable creatinine, we can use the following formula to estimate the creatinine clearance.

**Calculation of Créatinine Clearance:
CrCl (mL/min)**

Cockcroft-Gault:

-If Creatinine reported in mg/dL (N = 0.5-1.4)
$$\text{CrCl (mL/min)} = \frac{[140 - \text{age (years)}] \times \text{weight (kg)}}{72 \times \text{serum creatinine (mg/dL)}} \times 0.85 \text{ if female}$$

- if creatinine reported in µmol/L (N = 60-120)
$$\text{CrCl (mL/min)} = \frac{(140-\text{age}) \times \text{weight (kg)}}{0.81 \times \text{Creatinine (\mu mol/L)}} \times 0.85 \text{ if female}$$

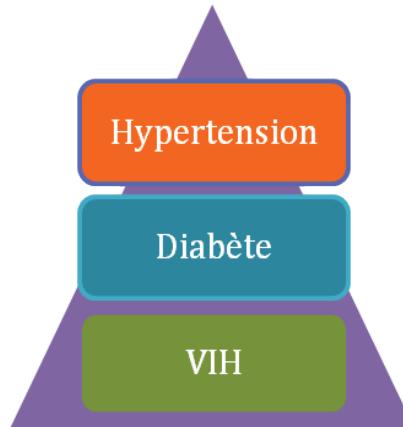
Interpretation

- $\geq 90 \text{ ml/min} = \text{Normal}$
- $60-89 \text{ ml/min} = \text{Mild Renal Failure}$
- $30-59 \text{ ml/min} = \text{Moderate Renal failure}$
- $15 - 29 \text{ ml/min} = \text{Severe Renal Failure}$
- $<15 \text{ ml/min} = \text{End stage renal failure}$

7.2.6 LABORATORY AND IMAGING REVIEW

LAB/Imaging REQUEST	WHEN
CREATININE	<ul style="list-style-type: none"> ○ Initial visit; ○ 6 months then yearly; ○ It can be checked at any visit if patients presents signs and symptoms
URINE DIPSTICK FOR PROTEIN	<ul style="list-style-type: none"> ○ Every visit
UREA	<ul style="list-style-type: none"> ○ Initial visit ○ 6months the yearly
HEMOGLOBIN	<ul style="list-style-type: none"> ○ Every 6 months ○ It can be checked at any visit if signs of anemia(palor,fatigue)
HIV	<ul style="list-style-type: none"> ○ Initial visit
GLYCEMIA	<ul style="list-style-type: none"> ○ Initial visit
POTASSIUM	<ul style="list-style-type: none"> ○ Every visit(expecially when on ACEI treatment , oliguria,anuria)
HEPATITIS B AND C SCREENING	<ul style="list-style-type: none"> ○ Initial visit
Renal ultrasound, renal structure (cortex and medullar)	<ul style="list-style-type: none"> ○ where available

7.2.7 COMMON CAUSES OF CHRONIC KIDNEY DISEASES



Hypertension:

Screening of proteinuria should be done to all patients with BP>160/100mmHg.

Creatinine is measured to patients with proteinuria>2+

Diabetes:

All patients diagnosed with Diabetes should do Urine dipstick for proteinuria 2 times per year and creatinine should be done annually.

HIV:

- HIV causes renal failure through damage to the glomerulus. This is defined as HIV- associated nephropathy (HIVAN)
- Higher rates are associated with advanced HIV disease with low CD4 Count and it often improves with ARVs treatment.
- Therefore ,Screen all HIV patients for proteinuria.
- Those with chronic renal failure should be started on ARVs regardless of the CD4 count.

7.2.7.1 Other causes of chronic renal failure are:

- Untreated or poorly treated acute renal failure (acute kidney injury) like renaldehydration (renal hypo perfusion)
- Chronic use of nephrotoxic agents
- Urinary truck infection or obstruction
- Viral Hepatitis B and C

A proper management of risk factors could prevent progression to chronic kidney diseases: in patients with diabetes Mellitus, hypertension, HIV, chronic use of NSAIDs, history of acute renal injury

7.2.8 STAGES OF RENAL DYSFUNCTION ACCORDING TO CREATININE LEVELS(USED IN MANAGEMENT)

STAGE	DEGREE OF DYSFUNCTION	CUTOFF CREATININE LEVEL(ADULTS)	CREATININE CUTOFF IN CHILDREN
CKD 1&2	MILD RENAL DISFUNCTION	<ul style="list-style-type: none">○ <100 Mmol/l○ <1.1mg/dl	Normal to <2x normal creatinine for age
CKD3	MODERATE RENAL DISFUNCTION	<ul style="list-style-type: none">○ 100-199mmol/l○ 1.1-2.3mg/dl	Normal to <2x normal creatinine for age.
CKD 4&5	SEVERE RENAL DISFUNCTION	<ul style="list-style-type: none">○ >200mmol/l○ >2.3mg/dl	>x2 Normal creatinine for age

7.2.9 PLAN

7.2.9.1 Initial management

The cause identification and early treatment conduct to success outcome are:

- Lower Blood Pressure;
- High BP is very common in CKD
- Keep blood pressure below 130/80 mmHg
- Treat proteinuria
- ACE-inhibitor should be used as agent of choice in patients with CKD stage 1, 2 and 3(creatinine<200mmol/l) and proteinuria.
- Monitor potassium levelin patients on ACE-inhibitors to avoid hyperkalemia.
- Diet restriction
- Sodium(Na) intake should be restricted if high pressure or retaining fluid
- Potassium intake should be restricted if oliguria or anuria(for example sweet banana).

CHRONIC KIDNEY DISEASE 3	CHRONIC KIDNEY DISEASE4 AND 5
<p>Start Iron supplements</p> <p>Start low dose of ACE-inhibitor if creatinine<200</p> <p>Monitor creatinine in 4 weeks and when indicated.</p>	<ul style="list-style-type: none">○ Palliative care○ Start Iron supplements○ Stop ACE-inhibitor○ Start Furosemide○ Monitor creatinine○ Monitor electrolytes include potassium,calcium level,phosphate.

Note: after initial assessment and management a renal patient has to consult a nephrologist for diagnosis, further management and establishing prognosis.

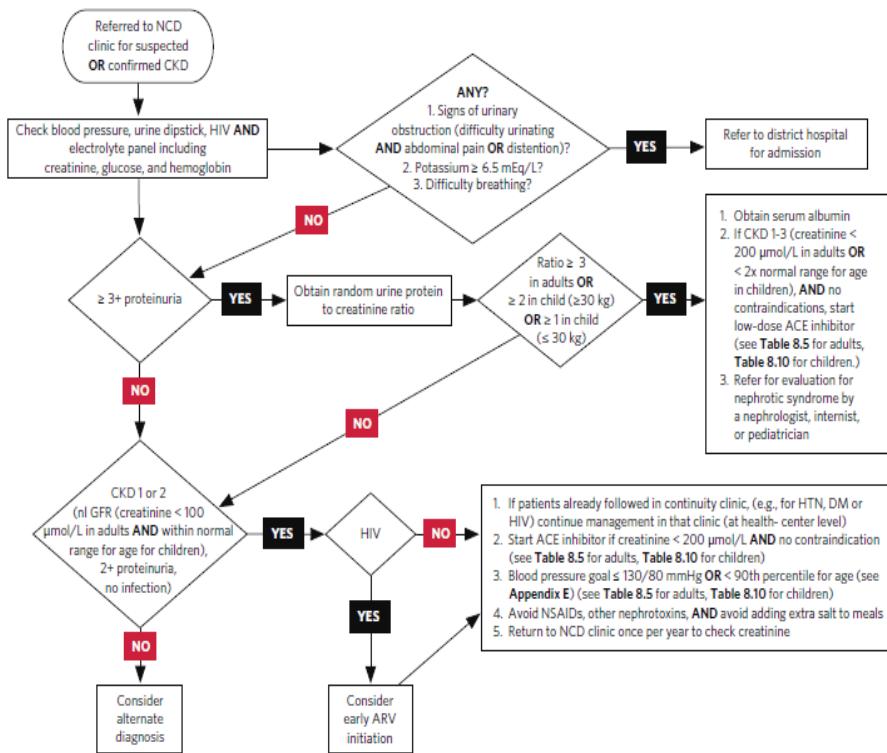
7.2.9.2 Follow-up care

- Define accelerated progression of CKD as:
- Sustained decrease in GFR of 25% or more and a change in GFR category within 12 months or a sustained decrease in GFR of 15 ml/min/1.73 m² per year.
- Take the following steps to identify the rate of progression of CKD:
- Obtain a minimum of 3 GFR estimations over a period of less than 90 days.
- In people with a new finding of reduced GFR, repeat within 2 weeks to exclude causes of acute deterioration of GFR.

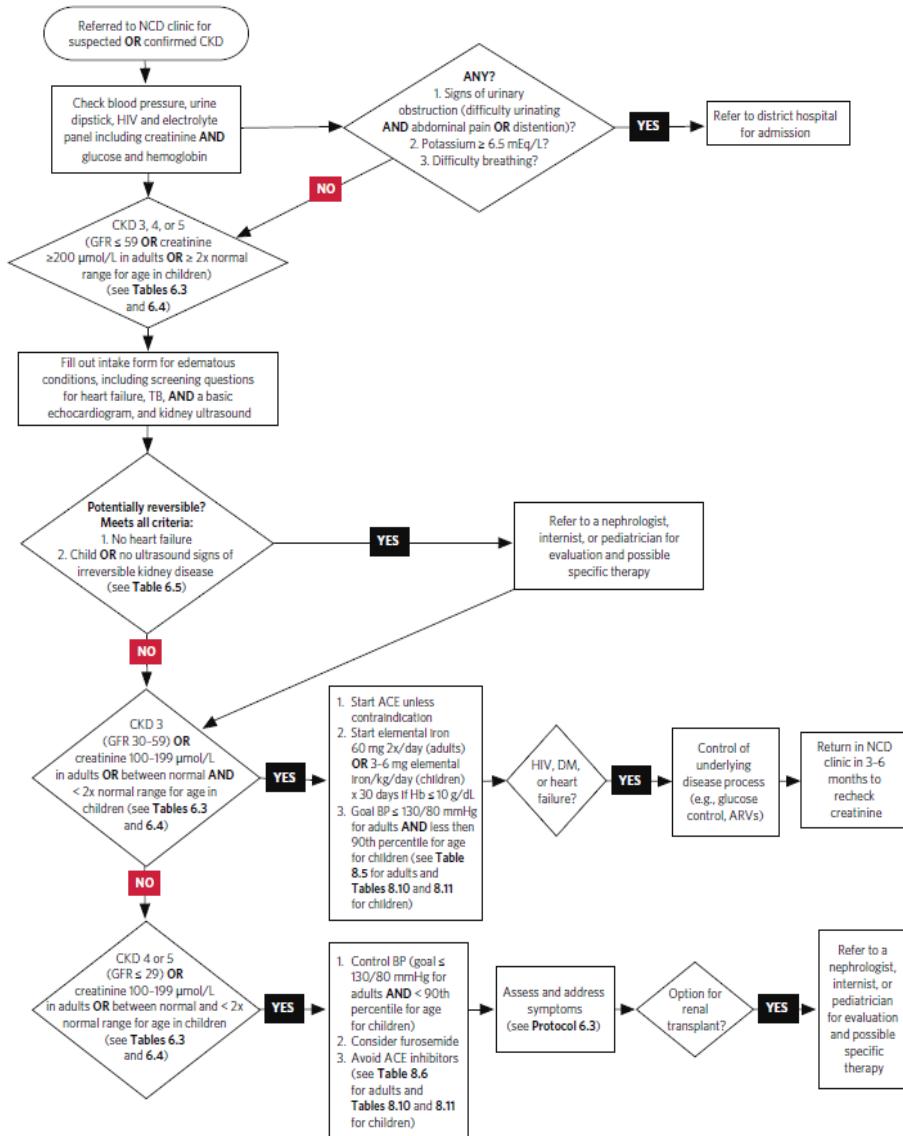
CHRONIC KIDNEY DISEASE3	CHRONIC KIDNEY DISEASE 4 and 5
<ul style="list-style-type: none">○ Ferrous sulfate 200mg x3/day 30 days (If HB<10mg/dl)○ ACE-I if creatinine<200 (Keep BP below 130/80mm/Hg)○ Furosemide 40mg/day or increase accordingly	<ul style="list-style-type: none">○ Avoid ACE-inhibitor○ Ferrous sulfate 200mgx3/day○ Furosemide(High dose)○ Palliative care

Initial evaluation of CKD stage 1 and stage 2

2



Initial evaluation of CKD stage 3,4 and 5



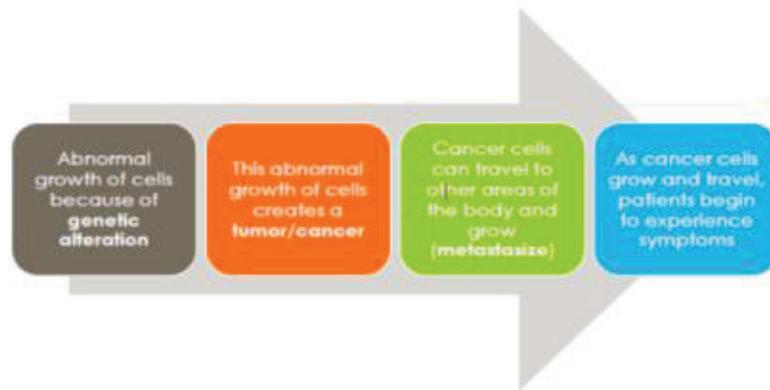
PART 6: Cancer

8 CANCER GUIDELINES

8.1 Introduction

8.1.1 WHAT IS CANCER?

Cancer refers to any one of a large number of diseases (more than 100) characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. The abnormal growth of cells can result in tumor ("solid" cancers) formation. Such cancers then have the potential to spread throughout the body, which is a process known as metastasis. However not all cancers present necessarily as tumors such as leukemias and some lymphomas ("liquid" cancers).



8.1.2 RISK FACTORS AND CAUSES

It is usually not possible to know exactly why one person develops cancer and another doesn't. The direct causes are not known for the majority of cancers. But research has shown that certain patient characteristics and behavior, called risk factors, may increase a person's chances to develop cancer.

The most common risk factors for cancer include aging, tobacco, alcohol, unhealthy diet, lack of physical activity, radiation exposure, chemicals and other substances, some viruses and bacteria, certain hormones, family history of cancer, or being overweight.

8.1.3 CANCER SERVICE PROVISION BY LEVEL OF HEALTH CARE.

HEALTH CARE LEVEL	PERSONNEL REQUIRED	SERVICES OFFERED
Community Service	-Community health worker	-Community awareness on cancer prevention and early detection. -IEC/BCC ,community mobilization -Home based palliative care -Referral and linkage
Health Center	-Nurse -Social Worker -Community Health Officer	-Community awareness on cancer prevention and early detection. -IEC/BCC, communityMobilization -clinical examination -screening services -Screening of cervical lesions using VIA - Cryotherapy

HEALTH CARE LEVEL	PERSONNEL REQUIRED	SERVICES OFFERED
		<ul style="list-style-type: none"> -Referral for screened positive clients for further management -Centre for outreach - Palliative care -Research
District Hospital	<ul style="list-style-type: none"> -Nurse - Medical Officer - Social Worker -Community Health Officer 	<ul style="list-style-type: none"> -IEC/BCC -Screening e.g. with VIA for cervical cancer. -Diagnosis using imaging modalities, -Staging and biopsy for suspected cancer -Referral for Cancer management -Palliative care -Coordination/M&E -Research - Cancer Registry
Provincial Hospital	<ul style="list-style-type: none"> - Nurse -Medical Officer -Family Physician 	<p>Same as DH Services plus</p> <ul style="list-style-type: none"> -Surgery -Chemotherapy

HEALTH CARE LEVEL	PERSONNEL REQUIRED	SERVICES OFFERED
	<ul style="list-style-type: none"> -Physician (Internist) -Pathologists- -Gynaecologist -Surgeon Pediatrician 	<ul style="list-style-type: none"> -Research
Referral Hospital	<ul style="list-style-type: none"> -Nurse -Medical Officer -Physician (Internist) - Pathologists - Gynecologist -Surgeons - Pediatrician -Radio-oncologist -Medical oncologist -Clinical Pharmacist 	<ul style="list-style-type: none"> Same as DH Services plus -Surgery -Chemotherapy -Research -Pathologic interpretation

8.2 Signs and symptoms

There are no common symptoms or signs for all cancers; at early stage most of cancers are asymptomatic. When they become symptomatic, each cancer can present with different symptoms according to the type and stage.

However, the following symptoms and signs should alert every clinician to suspect a possible cancer and make appropriate investigations and referral. Those symptoms are:

- Difficulty urinating (weak stream): **Prostate cancer**
- Persistent vomiting, nausea, early satiety: **Stomach or pancreatic cancer; CML**
- Difficulty defecating or blood in stool → **Colon or rectal cancer**
- Persistent headache, change in mental function, focal weakness: **Brain tumor**

The systemic signs include

- Unexplained loss of weight or loss of appetite.
- Persistent fatigue, nausea, or vomiting.
- Persistent low-grade fever, either constant or intermittent.
- Repeated infection
- Painless mass
- Unexplained abdominal or bone pain

8.3 Principles screening, diagnosis and treatment

8.3.1 PRINCIPLES OF CANCER SCREENING

In Rwanda the most feasible cancers to screen are cervical and breast cancers. Screening tests are performed on people who have no physical signs of the disease being tested. The goal of cancer screening is to detect tumors at an early enough stage so that they can be curable when treated.

8.3.2 PRINCIPLES OF DIAGNOSIS AND STAGING

Early diagnosis, during the first stages of cancer development, leads to high chances of recovery and success of treatment. The diagnosis of cancer is mostly confirmed by biopsy, and imaging techniques are used for cancer staging.

8.3.3 PRINCIPLES OF TREATMENT

Curing cancer requires eliminating all cancer cells. The major modalities include curative and palliative treatment depending on the stage of the diseases. They can be:

- Surgery (for local and local-regional disease)
- Radiation therapy (for local and local-regional disease)
- Chemotherapy (for systemic disease)

Other important methods include

- Hormonal therapy (for selected cancers, eg, prostate, breast, endometrium)
- Immunotherapy (, interferon's, and other biologic response modifiers and tumor vaccines
- Differentiating drugs such as retinoids
- Targeted drugs that exploit the growing knowledge of cellular and molecular biology(monoclonal antibodies)

Overall treatment should be coordinated among multidisciplinary team such us radiation oncologist, surgeon, and medical oncologist, where appropriate.

8.3.4 HOW TO USE THIS GUIDELINE AT HC AND DH LEVEL

This cancer diseases guideline is useful for any health care provider. It is aiming to provide basic information related to cancer diseases in general and focuses on some major cancers which are emerging in Rwanda such as Breast and cervical cancer etc. It aims also to raise awareness of health care providers particularly at health center and district hospital levels about cancer screening and early suspicion for early referral, diagnostic and management.

8.4 Major emerging cancers in Rwanda

PEDIATRIC CANCERS	OVERLAPPING	ADULT CANCERS
<ul style="list-style-type: none">-Wilm's tumor-Acute Lymphoblastic Leukemia-Burkitt's Lymphoma-Rhabdo-myosarcoma-Osteosarcoma-Neuroblastoma	<ul style="list-style-type: none">-Lymphomas-Chronic myeloid Leukemia	<ul style="list-style-type: none">-Breast-Cervical-Liver-Stomach-Acute Myeloid Leukemia

8.4.1 NEPHROBLASTOMA (WILMS' TUMOR)

Definition

Wilms tumor (also called Wilms' tumor or nephroblastoma) is a type of cancer that starts in the kidneys. It is the most common type of kidney cancer in children. It is named after Max Wilms, a German doctor who wrote one of the first medical articles about the disease in 1899.

Overview

- Wilms' tumor is the most common cancer in children that starts in the kidneys. About 9 of 10 kidney cancers in children are Wilms tumors.
- Fourth most common childhood cancer
- 2/3 of cases in children under age 5 years, 95% in patients under age 10 years
- Can have other associated abnormalities, particularly of the genitourinary tract
- Most Wilms tumors are unilateral, which means they affect only one kidney. About 5% of children with Wilms tumors have bilateral disease (tumors in both kidneys).

Signs and symptoms

Wilms tumors can be hard to find early because they can often grow quite large without causing any symptoms. Children may look healthy and play normally. The most common signs are:

- Swelling or a hard mass in the abdomen (belly): This is often the first sign of a Wilms tumor. It's usually not painful, but it might cause belly pain in some children.
- Less common: Blood in urine and/or hypertension, constipation

Diagnosis

Laboratory tests

- Renal function: urea, creatinine, urinalysis
- Screening NFS (check for anemia), SGOT/SGPT, HIV
- Coagulation studies (associated von Willebrand's disease in 8%)

Imaging tests

- Ultrasound is first tool – can show mass, associated hydronephrosis
- Abdominal CT useful to determine nature and extent of mass, lesions in opposite kidney (seen in 7%)
- Chest x-ray to rule out lung metastases

Pathology tests

- Diagnosis made by pathologic examination of tissue obtained during surgical resection
- Do NOT perform needle aspiration – risk of tumor rupture, peritoneal spillage
- Goal is complete surgical resection with pathology from operative specimen.

Staging of Wilms' tumor

Staging is based on the results of the physical exam and imaging tests (ultrasound, CT scans, etc.) as well as the results of surgery, if performed) to remove the tumor. The final staging is performed after surgery and can range from stage 1 to stage 5.

Treatment

Overall, about 9 of 10 children with Wilms tumor are cured. Most children will get more than one type of treatment with the main types of treatment for Wilms tumor being: **Surgery, Chemotherapy and Radiation therapy.**

Key recommendations:

- a) At Health center level
- If abdominal mass is clinically suspected refer immediately to the DH
- b) At District hospital level
- If abdominal mass is clinically confirmed refer to the referral hospital offering cancer services for diagnosis

8.4.2 LYMPHOMAS

Definition

Lymphomas are malignant tumours of the lymphoreticular system and are classified into **Hodgkin's lymphoma** (named after Dr. Thomas Hodgkin, who first recognized it) and **Non-Hodgkin's lymphoma (NHL)**. These types of lymphoma differ in how they behave, spread, and respond to treatment. Doctors can usually tell the difference between them by looking at the cancer cells under a microscope or by using sensitive lab tests.

They are 2 main types of NHL according to the cells of origin: B-cell Lymphoma and T-cell Lymphoma. **Burkitt's Lymphoma** is a B-cell lymphoma and rapidly growing tumor of childhood.

Risk factors

There are many risk factors for lymphomas, some are modifiable and others not (Age, Ethnicity, gender, etc.). Below are some modifiable risk factors

- Exposure to certain chemicals (benzene, insecticides, etc.)
- Radiation exposure (atomic bomb, nuclear reactor accidents, etc.)
- Auto-immune diseases
- **Certain infections:** Human T-cell lymphoma virus (HTLV-1), **Epstein-Barr virus (EBV)** for BurkittLymphoma, Human Herpes Virus 8 (HHV8), **Human Immunodeficiency Virus (HIV)**, Helicobacter pylori, Campylobacter jejuni, Hepatitis C virus (HCV) and Malaria

Signs and Symptoms

Lymphoma can cause many different signs and symptoms, depending on where it is in the body. In some cases it might not cause any symptoms until it grows quite large. Common signs and symptoms include:

- Enlarged lymph nodes
- Swollen abdomen (due to enlarged lymph nodes in the abdomen)
- Chest pain or pressure (due to enlarged lymph nodes in the chest)

- Shortness of breath or cough (due to enlarged lymph nodes in the chest)
- Fever, Drenching night sweats (enough to soak clothing and sheets)
- Fatigue (extreme tiredness, from low red blood cell counts: hemolytic anemia)
- Unexplained weight loss
- Severe or frequent infections (from low white blood cell counts)
- Easy bruising or bleeding (from low blood platelet counts)

Diagnosis

Pathology: Biopsies can be taken through Excisional or incisional biopsy or core needle biopsy. The final diagnosis cannot be done based on fine needle aspiration (FNA)

Blood tests: Full blood count, serology for risk factor infections

Imaging tests: Chest x-ray, Ultrasound, CT scan.

Treatment

The main types of treatment for lymphomas are:

- Chemotherapy
- Immunotherapy
- Targeted therapy
- Radiation
- Stem cell transplant
- In rare cases, surgery is also used.

Key recommendations

a) Health center level

- Symptoms such as fever, night sweats and lymphadenopathy can mimic tuberculosis
- If the patient presents with the symptoms above and a negated TB smear exam, refer to the DH for further examination

b) District hospital level

- If GeneXpert for TB is negative, perform lymph node biopsy if available
(refer for biopsy, if not available)

8.4.3 LEUKEMIAS

Definition

Leukemia is a cancer of the early blood-forming cells. Most often, leukemia is a cancer of the white blood cells, but some leukemias start in other blood cell types. Leukemia is often described as being either **acute** (fast growing) or **chronic** (slow growing). Different types of leukemia have different treatment options and outlooks.

Four main types

- Acute myeloid (or myelogenous) leukemia (AML)Chronic myeloid (or myelogenous) leukemia (CML)
- Acute lymphocytic (or lymphoblastic) leukemia (ALL)
- Chronic lymphocytic leukemia (CLL)

Leukemia is the most common cancer in children and adolescents, accounting for almost 1 out of 3 cancers. Most childhood leukemias are acute lymphocytic leukemia (ALL). Most of the remaining cases are acute myeloid leukemia (AML). Chronic leukemias are rare in children.

Risk factors and causes

There exists many risk factors for leukemias, the most frequent are listed below:

- Cigarette smoking
- Exposure to chemicals: Most Benzene also present in cigarette smoking
- Certain viral infections: human T-cell lymphoma/leukemia virus-1 (HTLV-1), Epstein-Barr virus (EBV)

- Some chemotherapy drugs used for long time
- Radiation exposure: Atomic bombs, nuclear radiations, x-rays
- Certain genetic syndromes (down syndrome, Trisomy 21, Fanconi disease)

Signs and Symptoms

Leukemias may cause many signs and symptoms

- **Problems caused by low blood cell counts:** Feeling tired, Feeling weak, Feeling dizzy or lightheaded, Shortness of breath, Fever, Infections that don't go away or keep coming back, Bruising easily, Bleeding such as frequent or severe nosebleeds and bleeding gums
- **Swelling in the abdomen:** Invasion of the spleen, abdominal lymph nodes
- Enlarged lymph nodes, Thymus
- Bone or joint pain

Diagnosis

Certain signs and symptoms can suggest that a person might have acute lymphocytic leukemia, but tests are needed to confirm the diagnosis.

- **Bone marrow tests:** Bone marrow aspiration and biopsy for various tests
- **Lymph node biopsy:** Rarely needed as bone marrow biopsy is usually adequate

Other tests can be informative:

- **Blood tests:** Complete blood count (CBC) and blood cell exam (peripheral blood smear), Blood chemistry and coagulation tests
- **Imaging tests:** X-ray, CT scan, Ultrasound, MRI scan, Gallium and bone scans
- **Genetic tests:** to diagnoses some chromosomal abnormalities.

Treatment

There are various treatments for leukemia depending on their type and stages. The main types of treatment used for leukemias are:

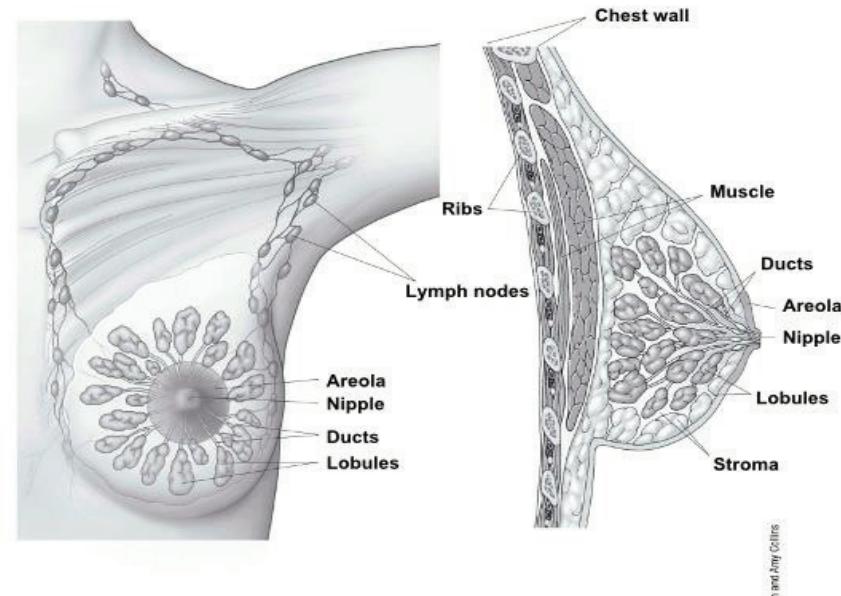
- Chemotherapy
- Targeted therapies
- Stem cell transplant
- Other treatments such as surgery, radiation therapy, or monoclonal antibodies, may be used in special circumstances.

8.4.4 BREAST CANCER

Definition

Breast cancer is a malignant tumor that starts in the cells of the breast.

Anatomy of breast



Most breast cancers begin in the cells that line the ducts (ductal cancers). Some begin in the cells that line the lobules (lobular cancers), while a small number start in other tissues

Benign breast lumps

Most breast lumps are not cancerous (benign). Still, some may need to be biopsied (sampled and viewed under a microscope) to prove they are not cancer.

Fibrosis and cysts: Fibrosis is the formation of scar-like (fibrous) tissue, and cysts are fluid-filled sacs. These conditions are most often diagnosed by a doctor based on symptoms, such as breast lumps, swelling, and tenderness or pain. These symptoms tend to be worse just before a woman's menstrual period is about to begin.

Fibroadenomas and intraductal papillomas: Benign breast tumors such as fibroadenomas or intraductal papillomas are abnormal growths, but they are not cancerous and do not spread outside the breast to other organs. They are not life threatening. Still, some benign breast conditions are important because women with these conditions have a higher risk of developing breast cancer.

Causes and risk factors of breast cancer

Non-modifiable Risk factors

- **Gender:** female
- **Aging:** The risk of developing breast cancer increases as the person gets older
- **Genetic risk factors:** About 5% to 10% of breast cancer cases are thought to be hereditary.
- **Family history of breast cancer:** Breast cancer risk is higher among women whose close blood relatives have this disease.
- **Race and ethnicity:** White or Caucasian
- **Certain benign breast conditions:** Fibrosis, cysts, fibroadenomas

- **Previous chest radiation:** Due to prior radiation treatment of other conditions

Lifestyle-related factors

- **Not Having children:** Women who have had no children or who had their first child after age 30 have a slightly higher breast cancer risk overall.
- **Oral contraceptives:** The risk is slightly increased
- **Hormone therapy after menopause:** Hormone therapy with estrogen (often combined with progesterone)
- **Not Breastfeeding:** Some studies suggest that breastfeeding may slightly lower breast cancer risk
- **Drinking alcohol:** The use of alcohol is clearly linked to an increased risk of developing breast cancer. The risk increases with the amount and frequency of alcohol consumed.
- **Being overweight or obese:** Being overweight or obese increases breast cancer risk.
- **No Physical activity:** Evidence is growing that physical inactivity increases breast cancer risk
- **Tobacco smoke:** The risk is increased in smokers

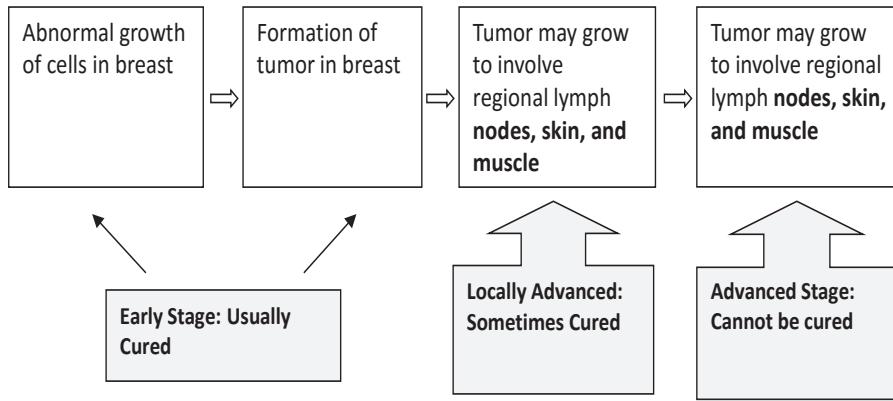
Signs and symptoms

The most common symptom of breast cancer is a new lump or mass. A painless, hard mass that has irregular edges is more likely to be cancerous, but breast cancers can be tender, soft, or rounded. They can even be painful. For this reason, it is important to have any breast mass or lump or breast change checked by a health care professional experienced in diagnosing breast diseases. Possible symptoms of breast cancer include:

- Swelling of all or part of a breast (even if no distinct lump is felt)
- Skin irritation or dimpling

- Breast or nipple pain
- Nipple retraction (turning inward)
- Redness, scaliness, or thickening of the nipple or breast skin
- Nipple discharge (other than breast milk)

Figure 6: Breast Cancer Progression and Spread



Diagnosis

Imaging tests: Mammograms, Breast ultrasound, CT scan and MRI of the breast

Pathology: A biopsy is done when mammograms, other imaging tests, or the physical exam finds a breast change (or abnormality) that is possibly cancer. A biopsy is the only way to tell if cancer is really present. Biopsy can be done through **Fine needle aspiration biopsy**, **Core needle biopsy**, **Surgical (open) biopsy**.

Treatment

The treatment of breast cancer depends on the type and stage of the disease, the main types of treatment for breast cancer are:

- Surgery
- Radiation therapy

- Chemotherapy
- Hormone therapy
- Targeted therapy
- Bone-directed therapy (for bone metastases)

Practical approach to handle a patient with breast concern at the level of health center and district hospital.

Questions to ask a patient with a breast concern

- How long has she had the problem?
- Does she have any other symptoms? (e.g. pain, nipple discharge, fevers)
- Has she been pregnant before?
- Is she pregnant or breastfeeding? Are symptoms related to menstrual cycle?
- Does she have any personal history of breast cancer?
- Has she had this problem before or had treatment for this or other breast problems?
- Does she have any family history of breast cancer?

Clinical Breast Exam

Step 1: Visual inspection: GOAL: Identify any visible abnormalities or asymmetry or nipple retraction

1. Patient should be naked from waist up
2. Patient sitting up, hands on hips and pushing into hips
3. The patient has to raise her arms up and press her hands together over her head
4. Pay attention to the size, form, symmetry of the breast tissue, color and changes on the skin, condition of the nipple and nipple discharge

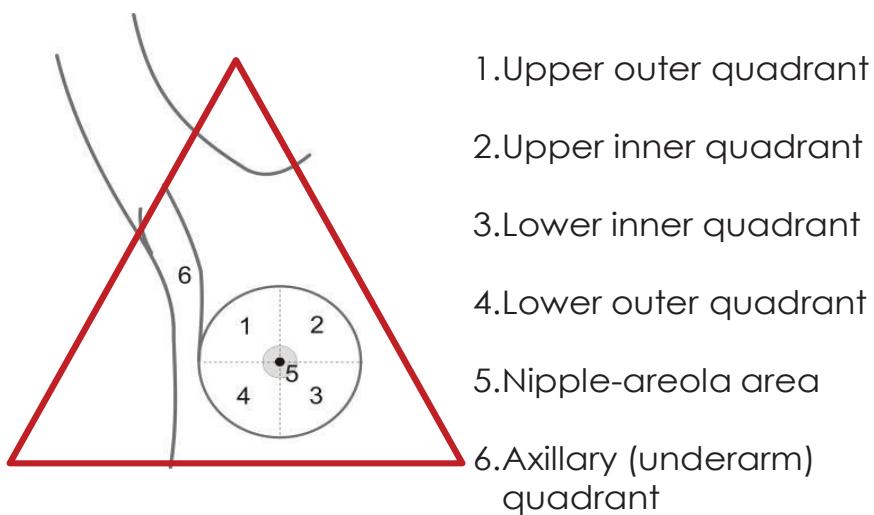


Step 2: Nodal Examination (while sitting): GOAL: Identify any enlarged lymph nodes

1. Cervical nodes
2. Supra/infraclavicular nodes
3. Axillary nodes: Have the patient relax her arm, for example by resting it on your shoulder

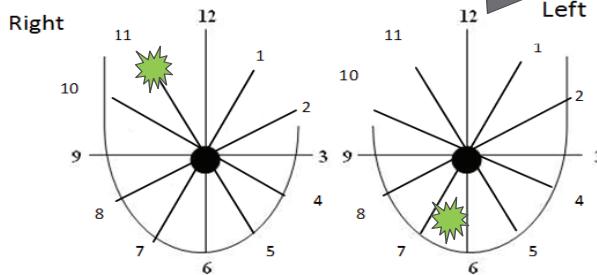


Quadrants of the Breast



Using a Clock Face

How would you describe the location of these tumors?



Distance from nipple ____ cm. Distance from nipple ____ cm.

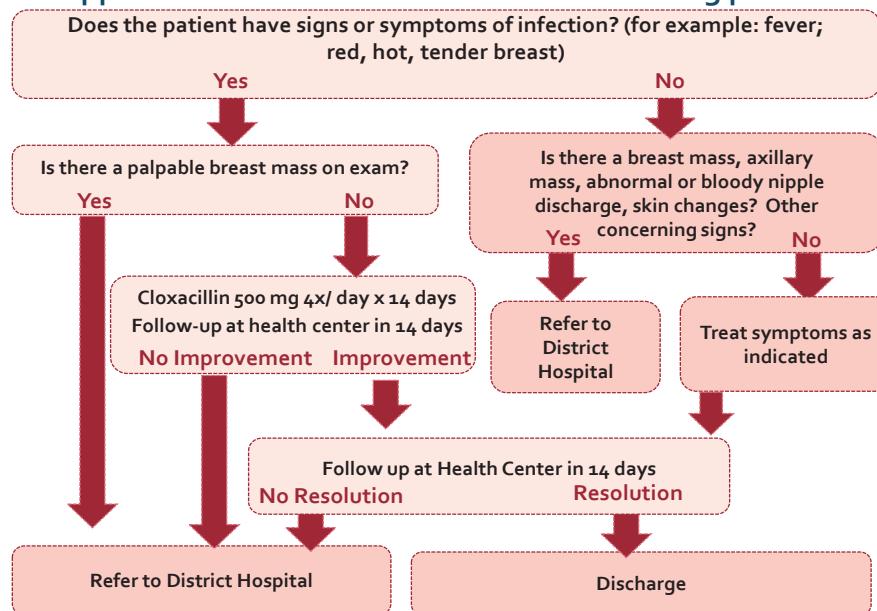
Step 3: Breast Palpation (lying) :GOAL: Identify any abnormal masses, tenderness, or nipple discharge

1. Place hand of side examining above head to flatten breast tissue over chest wall
2. Palpate with pads of middle fingers
3. Use 3 levels of pressure (light, deeper)over each area, in circular motion
4. Don't lift fingers off breast
5. Palpate entire breast using grid technique
6. Don't forget axillary tail!
7. TAKE YOUR TIME – some recommendations have proposed 2-3 minutes PER BREAST

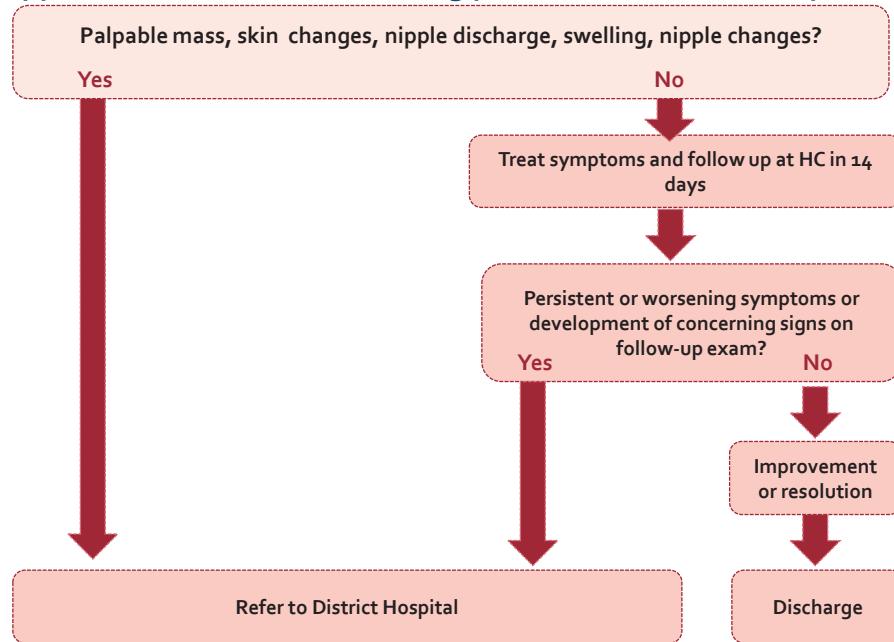


three
middle,
motion

Approach to breast concerns in a breastfeeding patient



Approach to a non-breastfeeding patient with breast complaint



Recommendations at the District Hospital

- Confirm mass or other finding on clinical breast exam and refer to referral hospital
- If clinical symptoms are present in addition to risk factors, then patient should be referred to referral hospital

8.4.5 KAPOSI'S SARCOMA

Definition

Kaposis sarcoma (KS) is a cancer that develops from the cells that line lymph or blood vessels. It usually appears as tumors on the skin or on mucosal surfaces such as inside the mouth, but tumors can also develop in other parts of the body,

such as in the lymph nodes (bean-sized collections of immune cells throughout the body), the lungs, or digestive tract.

Risk factors and causes

Kaposi sarcoma (KS) is caused by infection with a virus called the Kaposi sarcoma associated herpesvirus (KSHV), also known as human herpesvirus 8 (HHV8). Infection with KSHV seems to be needed to cause KS, but in most cases infection with KSHV alone does not lead to KS. Risk factors such as **weakened immune system**, due to **HIV infection**, organ transplant, or older age may predispose patients to develop KS.

Signs and symptoms

- Skin and mucosal lesions:
- Flat ->plaques ->rubbery nodules
- Hyper pigmented (reddish-
- Non-painful
- Distribution includes: cutaneous (extremities, abdomen), oral eye, face
- The skin lesions range in size from very small to several centimeters in diameter, and they can remain unchanged for months to years, or grow rapidly within a few weeks and disseminate



(ole)

(palate),

Diagnosis

- Histology of biopsy taken from the lesions
- Chest x-ray for pulmonary presentation
- Bronchoscopy to look in the trachea and other large airways of the lungs
- Gastrointestinal endoscopy: upper or lower to see digestive tube lesions
- Serology for possible underlying infections: **HIV**
- Clinical diagnosis can be performed at the referral level

Treatment

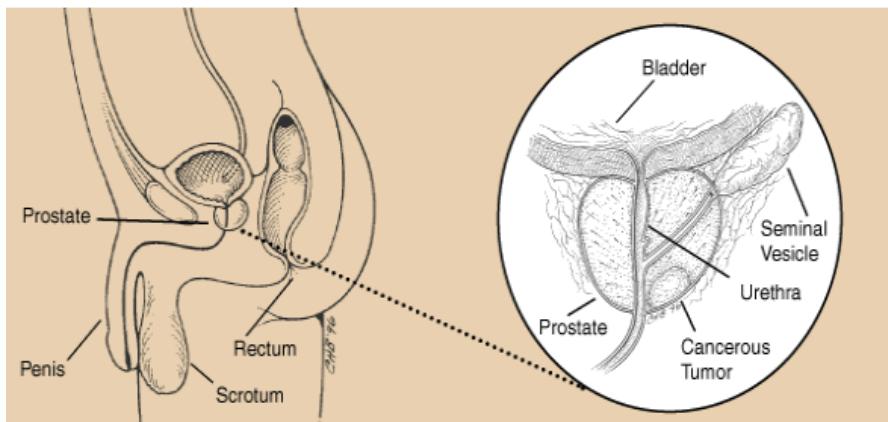
For patients with immune system problems, the most important treatment is keeping the immune system healthy and any **related infections** under control, **HAART** for **HIV positive** people. Some of the other treatments used for KS are: **Radiation therapy, Chemotherapy**

8.4.6 PROSTATE CANCER

Definition

Prostate cancers develop from the prostate gland cells (the cells that make the prostate fluid that is added to the semen). The medical term for a cancer that starts in gland cells is **adenocarcinoma**.

Anatomy of the prostate



Risk factors

- **Age:** The risk of having prostate cancer rises rapidly after age 50. About 6 in 10 cases of prostate cancer are found in men over the age of 65
- **Race/ethnicity:** Prostate cancer occurs more often in men of African ancestry than in men of other origins

- Family history: Prostate cancer in the family
- Genetic predisposition
- Diet and Obesity: Meals rich in red meat
- Smoking
- Inflammation of the prostate

Signs and symptoms

Early prostate cancer usually causes no symptoms. But more advanced prostate cancers can sometimes cause symptoms, such as:

- Problems passing urine, including a slow or weak urinary stream or the need to urinate more often, especially at night.
- Blood in the urine
- Trouble getting an erection (erectile dysfunction)
- Pain in the hips, back (spine), chest (ribs), or other areas from cancer that has spread to bones
- Weakness or numbness in the legs or feet, or even loss of bladder or bowel control from cancer pressing on the spinal cord.

Diagnosis

- **Blood tests: In our setting, the prostate-specific antigen (PSA)** blood test is not preferred as a routine mechanism for screening. It can be informative but not definitively diagnose
- **Transrectal ultrasound (TRUS):** TRUS is often used to look at the prostate when a man has a high PSA level or has an abnormal digital rectal exam (DRE) result. It is also used during a prostate biopsy to guide the needles into the right area of the prostate.
- **Pathology examination**
- **Imaging tests to look for prostate cancer spread:** Computed tomography (CT) scan, Magnetic resonance imaging (MRI), X-ray

Treatment

Depending on the situation, the treatment options for men with prostate cancer might include:

- Expectant management (watchful waiting) or active surveillance:
Because prostate cancer often grows very slowly, some men (especially those who are older or have other serious health problems) might never need treatment for their prostate cancer.
- Surgery
- Radiation therapy
- Cryosurgery (cryotherapy)
- Hormone therapy
- Chemotherapy
- Bone-directed treatment

These treatments are generally used one at a time, although in some cases they may be combined.

8.4.7 COLORECTAL CANCER

Definition

Colorectal cancer is a term used for cancer that starts in the colon or the rectum. These cancers can also be referred to separately as colon cancer or rectal cancer, depending on where they start. Colon cancer and rectal cancer have many features in common.

Abnormal growths in the colon or rectum

Most colorectal cancers develop slowly over several years. Before a cancer develops, a growth of tissue or tumor usually begins as a non-cancerous polyp on the inner lining of the colon or rectum.

- Adenomatous polyps (adenomas) are polyps that can change into cancer. Because of this, adenomas are called a pre-cancerous condition.
- Dysplasia is an area in the lining of the colon or rectum where the cells look abnormal (but not like true cancer cells) when viewed under a microscope.
- Hyperplastic polyps and inflammatory polyps: in general, are not pre-cancerous.

Causes and risk factors

Lifestyle-related factors: Several lifestyle-related factors have been linked to colorectal cancer. In fact, the links between diet, weight, and exercise and colorectal cancer risk are some of the strongest for any type of cancer.

- Diet rich in red meat especially when it's grilled can **increase** colorectal cancer risk. Diets high in vegetables, fruits, and whole grains have been linked with a **decreased** risk of colorectal cancer
- Physical inactivity
- Obesity
- Smoking
- Heavy alcohol use

Other risk factors: Increased age over 50 years, Personal history of colorectal polyps or colorectal cancer, Personal history of inflammatory bowel disease, Family history of colorectal cancer or adenomatous polyps, Racial and ethnic background (Black people), genetic predisposition, Type 2 diabetes

Signs and symptoms

Colorectal cancer may cause one or more of the symptoms below.

- A change in bowel habits, such as diarrhea, constipation, or narrowing of the stool that lasts for more than a few days
- A feeling that you need to have a bowel movement that is not relieved by doing so
- Rectal bleeding
- Blood in the stool which may make it look dark
- Cramping or abdominal (belly) pain
- Weakness and fatigue
- Unintended weight loss

Diagnosis

- **Blood tests:** Complete blood count (CBC) to look for anemia, Tumor markers (carcinoembryonic antigen (CEA)).
- Colonoscopy
- Pathology test of the biopsy
- CT scan
- Ultrasound
- MRI scan
- Chest x-ray for lung metastasis

Treatment

After the cancer is found and staged, the main types of treatment that can be used for colon and rectal cancer are:

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted therapy

8.4.8 CERVICAL CANCER

Definition

Cervical cancer starts in the cells lining the uterine cervix. The main types of cervical cancers are squamous cell carcinoma (9/10) and adenocarcinoma (1/10).

Risk factors and causes

- High risk sexual behavior
- Early sexual activity
- Multiple sexual partners
- Human papilloma virus infection: The most important risk factor for cervical cancer is infection by the human papilloma virus (HPV).
 - Chlamydia infection
 - Human immunodeficiency virus (HIV), the virus that causes AIDS, damages the immune system and puts women at higher risk for HPV infections
 - Smoking
 - Unhealthy diet
 - Being overweight
 - Having multiple full-term pregnancies
 - Having a family history of cervical cancer

Signs and Symptoms

Women with early cervical cancers and pre-cancers usually have no symptoms. Symptoms often do not begin until the cancer becomes invasive and grows into nearby tissue. When this happens, the most common symptoms are:

- Abnormal vaginal bleeding, such as bleeding after vaginal intercourse, peri-menopausal bleeding, bleeding and spotting between periods
- An unusual discharge from the vagina – the discharge may contain some blood and may occur between your periods or after menopause.
- Pain during intercourse.

Screening and Diagnosis

- Visual Inspection with acetic acid (VIA): Screening (age 30-50 years old if HIV+; age 35-50 years old if HIV negative) and initial diagnostic evaluation
- Pap smear
- HPV test, HIV test (risk factors)
- Colposcopy: For symptoms that suggest cancer or of Pap smear or VIA are abnormal.
- Pathology for cervical biopsies
- Imaging tests to detect spreading: Chest x-ray, CT scan, MRI scan

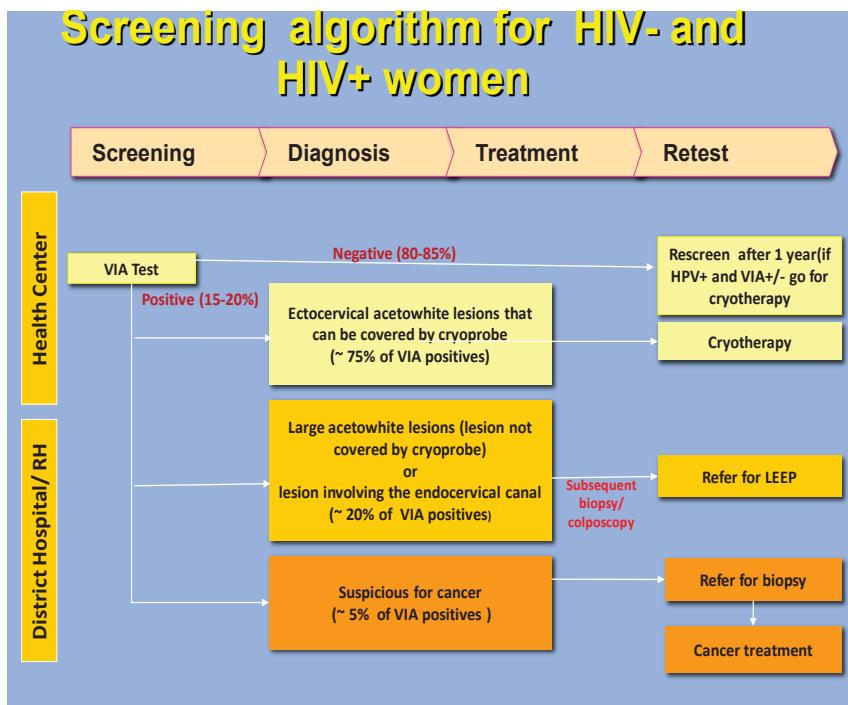
Treatment

Depending on the type and stage of your cancer, you may need more than one type of treatment. Common types of treatments for cervical cancer include:

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted-therapy

NB: Precancerous lesions can be treated using Cryotherapy and Loop electrosurgical procedure (LEEP)

Figure 7: Algorithm for cervical cancer screening and treatment of cervical precancerous lesions



8.4.9 LIVER CANCER

Classification

Liver cancers can be classified into two types. They are either primary, when cancer starts in the liver itself or secondary (metastatic) when the cancer has spread to the liver from some other parts of the body.

Primary liver cancer

In adults, most primary liver cancers belong to one of two types: hepatomas, or hepatocellular carcinomas (HCC), which start in the liver tissue itself; and cholangiomas, or cholangiocarcinomas, which are cancers that develop in the bile ducts inside the liver. About 80% to 90% of primary liver cancers are hepatomas.

Metastatic liver cancer

The second major category of liver cancer, metastatic liver cancer; primary cancers in the colon, stomach, pancreas, rectum, esophagus, breast, lung, or skin are the most likely to metastasize (spread) to the liver.

Risk factors

- **Chronic viral hepatitis:** Hepatitis B and C
- **Liver cirrhosis:** Cirrhosis is a disease in which liver cells become damaged and are replaced by scar tissue. It can be caused by viruses, HBV & HCV, heavy alcohol use,..
- **Heavy alcohol use:** this leads to liver cirrhosis
- **Tobacco use:** Smoking increases the risk of getting liver cancer. Former smokers have a lower risk than current smokers, but both groups have a higher risk than those who never smoked.
- **Obesity:** This is probably because it can result in fatty liver disease and cirrhosis.

- **Inherited metabolic diseases:** Certain inherited metabolic diseases can lead to cirrhosis (e.g., hereditary hemochromatosis)
- **Aflatoxins:** These cancer-causing substances are made by a fungus that contaminates peanuts, wheat, soybeans, ground nuts, corn, and rice. Storage in a moist, warm environment can lead to the growth of this fungus.
- **Infection with parasites:** Schistosomiasis can cause liver damage and is linked to liver cancer

Vaccination of Hepatitis B Virus and treatment of chronic hepatitis B and C infection can prevent and reduce the risk of developing liver cancers

Signs and symptoms

Signs and symptoms of liver cancer often do not show up until the later stages of the disease, but sometimes they may show up sooner. Some of the most common symptoms of liver cancer are:

- Weight loss without any cause
- Loss of appetite
- Feeling full after a small meal
- Nausea or vomiting
- An enlarged liver, felt as a mass under the ribs on the right side
- An enlarged spleen, felt as a mass under the ribs on the left side
- Pain in the abdomen or near the right shoulder blade
- Swelling or fluid build-up in the abdomen
- Itching
- Yellowing of the skin and eyes (jaundice)

Some other symptoms can include fever, enlarged veins on the belly that can be seen through the skin, and abnormal bruising or bleeding.

Diagnosis

- Medical history and physical exam
- **Blood tests:** Alpha-fetoprotein blood (**AFP**) test, if AFP levels are very high in someone with a liver tumor, it can be a sign that liver cancer is present, Liver function tests (LFTs), Blood clotting tests, **Tests for viral hepatitis**, Kidney function tests, Full blood count (FBC), Blood chemistry tests
- **Imaging tests:** Ultrasound, Computed tomography (CT), Magnetic resonance imaging (MRI), Angiography
- **Pathology** on liver biopsy

Treatment

In creating your treatment plan, important factors to consider include the stage (extent) of the cancer and the health of the rest of the liver.

- Surgery
- Tumor ablation
- Radiation therapy
- Targeted therapy
- Chemotherapy

8.4.10 GASTRIC CANCER

Definition

Gastric cancer, also called stomach cancer, is a cancer that starts in the stomach. About 90% to 95% of cancers of the stomach are adenocarcinomas. These cancers develop from the cells that form the innermost lining of the stomach (known as the mucosa). 10% include gastrointestinal stromal tumors (GIST), lymphoma and leiomyosarcoma

Risk factors and causes

- Helicobacter pylori infection
- Epstein Barr Virus infection: 5-10% of gastric cancer found to be associated with EBV infection
- Smoking
- Diet: Diets that have large amounts of smoked foods, salted fish and meat
- Obesity
- Atrophic gastritis
- Intestinal metaplasia and dysplasia
- Pernicious anemia
- Increased age (over 50 years)

Signs and symptoms

Unfortunately, early-stage stomach cancer rarely causes symptoms. This is one of the reasons stomach cancer is so hard to detect early. The signs and symptoms of stomach cancer can include:

- Poor appetite
- Weight loss
- Epigastric pain
- Vague discomfort in the abdomen, usually above the navel
- A sense of fullness in the upper abdomen after eating a small meal
- Indigestion
- Nausea & vomiting, with or without blood
- Swelling or fluid build-up in the abdomen

These signs are similar to peptic ulcer signs; investigations are needed to distinguish from gastric cancer to peptic ulcers or gastritis

Diagnosis

- Medical history and physical exam
- Upper endoscopy
- Endoscopic ultrasound
- Pathology on biopsies
- Imaging tests

Treatment

Once the cancer has been diagnosed and staged, the main treatments for stomach cancer are:

- Surgery
- Chemotherapy
- Targeted therapy
- Radiation therapy

8.4.11 EYES CANCER

Definition

An eye cancer starts in the eye. There are different types of eye cancers:

Primary intraocular cancers start inside the eyeball. In adults, melanoma is the most common primary intraocular cancer. In children, retinoblastoma (a cancer that starts in cells in the retina) is the most common primary intraocular cancer,

Secondary intraocular cancers start somewhere else in the body and then spread to the eye.

Risk factors and causes

- Weakened immune system: infection with HIV/AIDS, people who take anti-rejection drugs after organ or tissue transplants
- Other factors: Age, certain inherited conditions, sun exposure,

Signs and symptoms

Certain signs and symptoms might suggest that a person could have an eye melanoma, but tests are needed to confirm the diagnosis.

- Problems with vision (blurry vision or sudden loss of vision)
- Floaters (spots or squiggles drifting in the field of vision) or flashes of light
- Visual field loss (losing part of your field of sight)
- A growing dark spot on the colored part of the eye (iris)
- Change in the size or shape of the pupil (the dark spot in the center of the eye)
- Change in position of the eyeball within its orbit
- Bulging of the eye
- Change in the way the eye moves within the orbit

Diagnosis

- History and physical exam
- Exam with ophthalmoscope
- Imaging tests: Echography, chest x-ray, CT scan, MRI
- Pathology on biopsies

Treatment

After an eye cancer is found and staged, depending on the type and stage of the cancer and other factors, treatment options for eye cancer can include:

- Surgery
- Radiation therapy
- Laser therapy
- Chemotherapy
- Targeted therapy

8.4.12 BONE CANCER (OSTEOSARCOMA)

Definition

Osteosarcoma (also called osteogenic sarcoma) is a type of cancer that starts in the bones.

Risk factors and causes

- **Age:** Risk is highest in teens and young adults, but it is also higher in people over 60 years
- **Gender:** Osteosarcoma is more common in males than in females.
- **Radiation to bones:** Young people who were treated with radiation for an earlier cancer have a higher risk of osteosarcoma in the same area later.
- **Certain bone diseases:** Paget disease of the bone, Hereditary multiple osteochondromas
- **Certain cancer syndromes:** People with certain rare, inherited cancer syndromes have an increased risk of getting osteosarcoma

Signs and Symptoms

Osteosarcomas are usually found because of the symptoms they cause.

Pain and swelling: Pain in the affected bone (usually around the knee or in the upper arm) is the most common symptom of osteosarcoma. Swelling in the area is another common symptom, although it may not occur until several weeks after the pain starts

Bone fractures (breaks): Fractures at the site of the tumor are very common as the bone has been weakened by the cancer.

Diagnosis

- **Medical history and physical exam:** to find signs and symptoms
- **Imaging tests:** Bone x-ray, Magnetic resonance imaging (MRI) scan, Computed tomography (CT) scan
- **Pathology on biopsy**

Treatment

The treatment depends on the staging on the disease, the types of treatment used for osteosarcomas include:

- Surgery
- Chemotherapy
- Radiation therapy (in certain cases)

Most often, both chemotherapy and surgery are needed.

8.4.13 MALIGNANT GESTATIONNAL TROPHOBLASTIC DISEASE

Definition

Malignant gestational trophoblastic disease (GTD) is the persistence of gestational trophoblastic tissue, usually following a molar pregnancy. Malignant GTD includes invasive mole and choriocarcinoma.

The presence of malignant GTD can become apparent clinically (for example, through persistent bleeding following a pregnancy or evidence of disease or metastases on physical exam), radiologically (for example, through persistent molar tissue noted on pelvic ultrasound or evidence of metastases on other imaging), or hormonally (through a persistently elevated beta HCG level).

Diagnosis

Diagnosis is confirmed by the presence of a **persistently elevated or rising** beta HCG level ≥ 3 weeks after evacuation of a molar pregnancy. Note: Evacuation of the uterus must occur to rule out other explanations for persistently elevated HCG or bleeding after a pregnancy, such as retained products of conception. Ectopic pregnancy should also be considered.

Diagnosis is supported by:

- a) Clinical symptoms such as persistent abnormal vaginal bleeding or evidence of metastases on physical exam;

- b) Persistent molar tissue on pelvic ultrasound or evidence of metastases on imaging;
- c) Pathologic diagnosis of molar tissue upon repeated evacuation of the uterus.

Evaluation (minimal):

- o Quantitative serum beta HCG level
- o Pelvic ultrasound and physical exam
- o CXR
- o Abdominal ultrasound

Management

a) Hydatidiform mole (molar pregnancy): initial management

- Suction curettage is the standard treatment; sharp curettage two weeks later is then done for histopathological diagnosis.
- Provide combined oral contraceptive pill for at least one year after treatment.
- Monitor by serum -hCG levels monthly until three negative values.
- Hysterectomy is an alternative in special cases that should be decided by gynecology oncologists and discussed with the patient.
- Administer anti-D after uterine evacuation.

The common treatments for GTD are:

1)Surgery: For women not desiring future fertility, hysterectomy should be performed, especially for women with choriocarcinoma.

2) Chemotherapy

-All patients should start a family planning method (oral contraceptives, implants, or injection) prior to starting chemotherapy

Subsequent follow-up

-Patients who have completed chemotherapy and have hormonal and radiographic evidence of remission can be followed every month x 3 months, and then every 3 months, for a year. Beta HCG should be checked at each visit.

-Family planning. All patients with active malignant GTD, including those who are on treatment must be on effective family planning methods. Patients with non-metastatic disease should continue family planning for 12 months following completion of chemotherapy. Patients with metastatic disease should continue family planning for 24 months following completion of chemotherapy.

8.4.14 HEAD AND NECK CANCERS

Introduction

Head and neck cancers include a heterogeneous group of malignant tumors arising in all structures above the clavicles, except for the brain, spinal cord, base of the skull and usually the skin. A meaningful understanding of these malignant tumors requires anatomic separation into those cancers arising in the oral cavity, oropharynx, hypopharynx, nasopharynx, larynx, nasal fossa, paranasal sinuses, thyroid and salivary glands.

Risk Factors

Alcohol and tobacco are the two most important risk factors for head and neck cancers, especially cancers of the oral cavity, oropharynx, hypopharynx, and larynx

Infection with cancer-causing types of human papillomavirus (HPV), especially HPV-16, is a risk factor for some types of head and neck cancers, particularly oropharyngeal.

Prevention includes

- Abstinence from the use of alcoholic beverages and tobacco is recommended.
- Elimination of chronic irritants, such as an irregular sharp tooth or ill-fitting denture, is desirable.
- Appropriate, life style modification is recommended.

Symptoms and signs:

- Painless mass
- Local ulceration with or without pain
- Referred pain to teeth or ear
- Dysphagia
- Alteration of speech, such as difficulty pronouncing words (tongue) or change in character (larynx, nasopharynx)
- Persistent hoarseness (larynx)
- Unilateral tonsillar enlargement in an adult

- Persistent unilateral “sinusitis”
- Persistent unilateral nosebleed or obstruction
- Unilateral hearing loss
- Cranial nerve palsies
- Loosening of the teeth

Physical examination

Complete physical examination with special emphasis on the ear, nose, oral cavity, pharynx and neck with emphasis on presence and location of swellings, ulcers and neurological defects.

Diagnosis

- All primary and metastatic cancers must be documented histologically or cytologically. Additional investigations such as immunohistochemistry may be required to confirm the diagnosis
- FNA cytology is advised for cervical masses as a screening test to be confirmed by histology if malignant.
- Open biopsies of metastatic neck disease is not recommended.
- Chest x-rays and other relevant x-rays remain part of the evaluation,
- Computed tomography (CT) or/and Magnetic resonance imaging (MRI) extent of the tumor.
- Ultrasound should be considered in determining the nature of the neck mass.
- Endoscopy for visualization of the oral cavity, nasal cavity, nasopharynx, oropharynx, hypopharynx, larynx, cervical esophagus, and trachea is essential in establishing the presence and extent of tumor.

Management

- Surgery
- Radiotherapy
- Chemotherapy

8.4.15 KEY RECOMENDATION

At Health center and District level

Refer any patient who presents the following signs at Referral Hospital:

- Red or red and white patches of the oral mucosa which persist for more than three weeks at any particular site.
- Ulceration of oral mucosa or oropharynx which persists for more than three weeks.
- Oral swellings which persist for more than three weeks.
- Unexplained tooth mobility not associated with periodontal disease.
- Persistent, particularly unilateral, discomfort in the throat for more than four weeks.
- Pain on swallowing persisting for three weeks that does not resolve with antibiotics.
- Dysphagia which persists for more than three weeks.
- Hoarseness which persists for more than three weeks.
- Stridor (requires same day referral).
- Unresolved head or neck mass which persists for more than three weeks.
- Unilateral serosanguineous nasal discharge which persists for more than three weeks particularly with associated symptoms.
- Facial palsy, weakness or severe facial pain or numbness.
- Orbital masses.
- Unilateral Ear pain without evidence of local ear abnormalities.

PART 7: Palliative care

9 PALLIATIVE CARE GUIDELINES

9.1 Introduction

Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual.

Palliative care:

- provides relief from pain and other distressing symptoms;
- affirms life and regards dying as a normal process;
- intends neither to hasten or postpone death;
- integrates the psychological and spiritual aspects of patient care;
- offers a support system to help patients live as actively as possible until death;
- offers a support system to help the family cope during the patients illness and in their own bereavement;
- uses a team approach to address the needs of patients and their families, including bereavement counselling, if indicated;
- will enhance quality of life, and may also positively influence the course of illness;

It is applicable early in the course of illness, in conjunction with other therapies that are intended to prolong life, such as chemotherapy or radiation therapy, and includes those investigations needed to better understand and manage distressing clinical complications.

9.2 Guiding Principles

The Initial Visit

The initial visit plan emphasizes a systematic approach, which will help you:

1. Identify palliative care needs

Identify the following needs

- Physical
- Psychological
- Social
- Spiritual

2. Identify physical needs

Identify symptoms that are most troubling to the patient

- Pain
- Breathlessness
- Nausea/Vomiting
- Constipation
- Drowsiness
- Diarrhea

3. Identify type of pain, then severity of pain

- Understand that there are different types of pain and are treated with different medications.
- Using pain assessment tools to classify the severity of pain and treat according to the WHO analgesic ladder

SYSTEMATIC APPROACH

This guide takes you through the following framework for each patient visit:

1. History
2. Vital Signs
3. Holistic assessment
4. Lab Review
5. Impression and management
6. Plan

The Follow-up Visit

The follow-up visit emphasizes a systematic approach, which will help you:

1. Assess patient's medication adherence

Evaluate the patient's ability to follow the treatment plan from last visit.

2. Assess the patient's quality of pain control on the current WHO step of therapy.

Determine if current medication class, dose, and frequency are adequate for the patient.

9.3 The Initial Visit

This section emphasizes a systematic approach, which will help answer the following basic questions: 1. What are the patient's palliative care needs? 2. What are the patient's physical, psychological, social, and spiritual needs? 3. What is the type, severity of the patient's pain?

Patient Background

Review the following information before the patient visit, if available:

- How was the patient referred to the palliative care clinic?
- What chronic illness does the patient have?
- Has the patient's illness been explained to him/her?
- Has the patient received medication for pain or other symptoms including Psychological, social and spiritual?

9.3.1 HISTORY

9.3.1.1 Clinical history

9.3.1.1.1 Emergency

- Find out if the patient has experienced any of the following emergency signs:

<input type="checkbox"/> Seizure	<input type="checkbox"/> Confusion	<input type="checkbox"/>
<input type="checkbox"/> Intolerance to food/water	<input type="checkbox"/> Severe nausea or vomiting	<input type="checkbox"/> Severe uncontrolled pain
<input type="checkbox"/> Spinal cord compression	<input type="checkbox"/> Acute Urine retention	<input type="checkbox"/> Constipation
<input type="checkbox"/> Attempt and ideas of suicide	<input type="checkbox"/> Haemoptysis	<input type="checkbox"/> Breathlessness
<input type="checkbox"/> Fever.....	<input type="checkbox"/> Hiccup	<input type="checkbox"/> Bleeding
<input type="checkbox"/> Pathological fracture		<input type="checkbox"/>

2. If the patient has these symptoms, call the physician and initiate transfer. However you should complete the patient's workup and begin treatment before the transfer.

9.3.1.1.2 Pain Type & Severity

Ask the patient the following questions:

- **Location:** Where is your pain located?
- **Quality:** Is your pain sharp, dull, burning?
- **Intensity:** Use a pain scale (i.e. faces, number of fingers)?
- **Aggravating:** What makes the pain worse?
- **Relieving:** Does anything relieve the pain?
- **Medications:** Do the medications that you take now help control your pain?
- **Radiation:** To where does the pain start and then travel?

9.3.1.1.3 Other symptoms

Ask the patient or their family the following questions:

- **Constipation:** Is it difficult to have a bowel movement?
- **Nausea/Vomiting:** How many times in the past week have you vomited? Are you able to tolerate food?
- **Breathlessness:** Is it difficult to breath while performing daily activities? Or at rest?
- **Fluid Overload: Are your legs swelling? Is it difficult to breath?**
- **Itching:** Do you itch all the time or only after taking medication?
- **Confusion:** Ask family members if patient has been forgetful or behaving differently?

- **Anxiety:** Do you feel more tense or irritable?

9.3.1.1.4 Co-Morbidities

1. The presence of specific co-morbidities may help direct therapy:

- | | | |
|-----------------------------------|--|------------------------------------|
| <input type="checkbox"/> HIV | <input type="checkbox"/> Kidney Disease | <input type="checkbox"/> Hepatitis |
| <input type="checkbox"/> Cancer | <input type="checkbox"/> Respiratory Disease | |
| <input type="checkbox"/> Diabetic | <input type="checkbox"/> CVD | |

9.3.1.1.5 Medications

1. Ask the patient if they are taking or have taken any of the following medicines now or in the past:

- Morphine
 - Brufen
 - Paracetamol
 - Tramadol
 - Dexamethasone or prednisolone
 - Adjuvants vomiting
 - Medications for nausea and vomiting(moclopramide, andansetron, haloperidol)
 - Medications for depression (i.e. amitriptyline, anafranil, tofranil)
 - Medications for constipation (i.e. forlax, Colace, bisacodyl)
 - Medications for itching (i.e. promethazine, diphenhydramine)
- 

9.3.1.2 PSYCHOSOCIAL AND SPIRITUAL HISTORY

1. Ask about the following:

Psychological

- How are you coping with your illness?
- How have your emotions changed as your illness has become more severe?
- Are you able to do things that you enjoy?

Social

- Have family & friends supported you while you have been sick?
- Which relationships are the most supportive for you?
- Which relationships do you wish were stronger?
- Are you facing any resource challenge?

Spiritual

- Have you felt close to God during your illness?
- Are there ways that you wish you felt closer to God?
- Where do you find hope and strength?

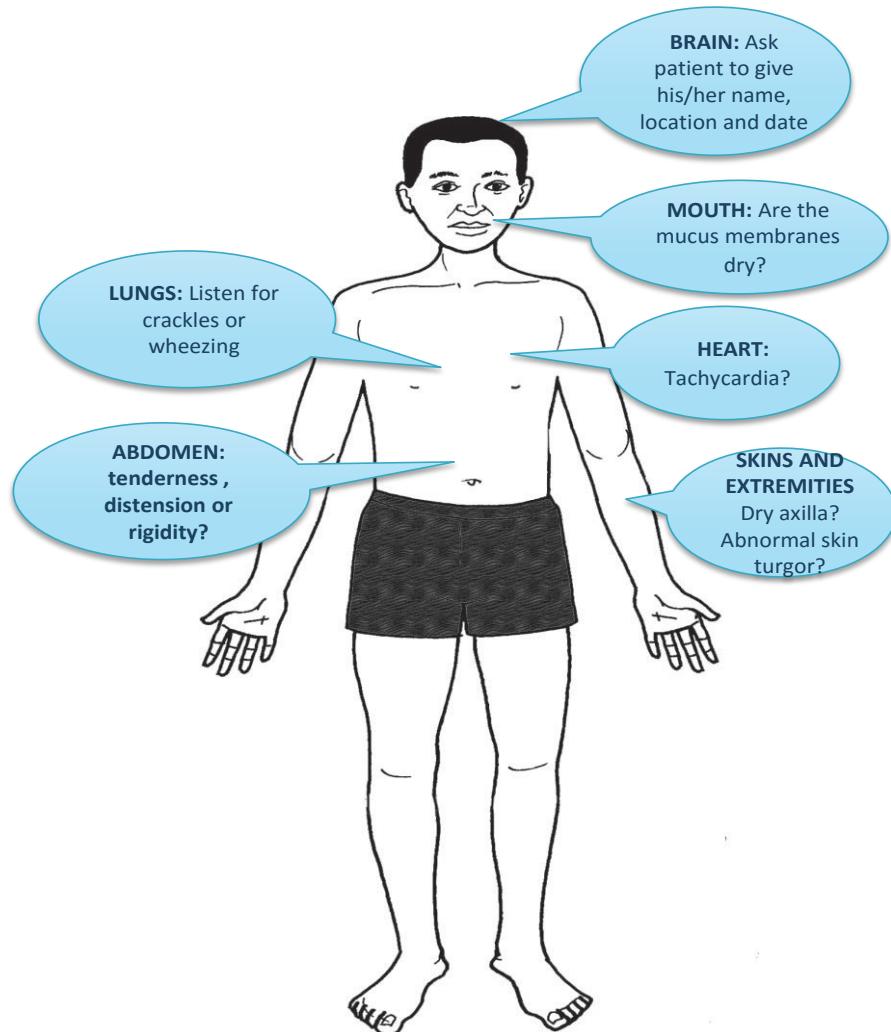
9.3.2 Vital SIGNS

Always review vital signs before the physical exam. They will almost always help you understand if a patient is sick and will provide important information about whether the patient should be referred to the district hospital.

VITAL SIGN	Notes
<i>If a patient has unstable vital signs then therapy can usually be provided to ease suffering!</i>	
Temperature	Infections are common at the end of life and should be addressed if the patient will benefit.
Heart Rate	Tachycardia: IV fluids may help relieve distress
Blood Pressure	Low blood pressure: Medications to lower the blood pressure may need to be stopped. However, more extreme measures are not indicated.
Respiratory Rate	Tachypnea: Sign of respiratory distress or anxiety
O ₂ Saturation	Hypoxia: Sign of respiratory distress!
Weight	Should be done at initial visit and all follow-up visits. May become irrelevant as the end of life approaches

9.3.3 PHYSICAL EXAM

Observe the patient. Sometimes it is possible to determine that a patient is delirious or has severe pain or breathlessness simply from observing the patient.



9.3.4 LAB REVIEW

LAB	WHEN	Notes
Creatinine	Only Indicated	Progressive renal failure is expected in patients who are dying Increasing creatinine may be a sign of dehydration, which may be relieved with IV fluids.
FBC	Only as indicated	HB/Hct: Anemia can mimic dehydration. WBC: Very important to identify a patient who has an infection. Infections should be treated in dying if he/she will benefit. Platelets: If very low (< 10) then the patient may need a platelet transfusion to help prevent bleeding.
Urea	Only as indicated	Elevated urea can suggest dehydration (less blood reaches the kidneys so less urea gets excreted in the urine).
Bilirubin, SGOT/SGPT	Only as indicated	Liver failure could herald multi-organ failure in palliative care patients.
Electrolytes	Only as indicated	Sodium: Patients usually become hyponatremic due to multiple causes. Potassium: Replete if low. Bicarbonate: Acidosis should NOT be treated with bicarbonate in dying patients.

9.3.5 IMPRESSION

9.3.5.1 Identify palliative care needs

PHYSICAL

Much of palliative medical management addresses a patient's physical needs. Please remember that family, spiritual, cultural, and psychological needs are often more important to patients than physical needs at the end of life.

PSYCHOLOGICAL

SOCIAL

SPIRITUAL

9.3.5.2 Identify physical needs

DELIRIUM

Always physician and admit to district hospital

NAUSEA / VOMITING

ANXIETY

PAIN

BREATHLESSNESS

CONSTIPATION

9.3.5.3 Identify type of pain, then severity of pain

TYPE OF PAIN

Nociceptive Pain – Including somatic and visceral

Neuropathic Pain

SEVERITY OF PAIN

Use one of the following pain scales to determine pain severity



0
no hurt



1
hurts little bit



2
hurts little more



3
hurts even more



4
hurts whole lot



5
hurts worse



0



1



2



3



4



5

1-2: MILD PAIN

3: MODERATE PAIN

4: SEVERE PAIN

5: PAIN EMERGENCY

9.3.6 PLAN

COMMON MEDICAL PROBLEMS IN PALLIATIVE CARE PATIENTS	
Weight loss	This is a normal pattern of many chronic illnesses and may not be related to nutritional status
Dehydration	<p>It is normal for dying patients to stop eating. .</p> <p>Important note: In end stage parenteral fluids are contraindicated because fluids given parenterally build up in the body causing oedema including swelling of the brain</p> <p>Food and drink should be given on request by the patient</p>
GI Bleeding / Anemia	NFS Give NS Order PRBCs Call physician and admit to the hospital
Fever	If easily able to localize infection, prescribe antibiotics. If unable to identify source, admit for further assessment
HIV Positive	Patients with HIV are at risk for many complications. Call physician with any questions.

9.3.6.1 *Emergencies*

Pain level #5 – Unable to achieve adequate control with oral medications

- Give morphine 5-10 mg P.O immediately.
- If pain not improved after 30 minutes give another 5-10 mg P.O of morphineAdmit the patient

Breathlessness – Subjective dyspnea with RR > 30 or O₂ sat < 90%

- Reassure the patient, breathlessness can be extremely frightening and is exacerbated by anxiety.
- Give shorter acting
- Breathing exercises and relaxation techniques should be taught to the patient
- Find the most comfortable position for the patient(usually sitting up)
- Ensure good ventilation : open windowsconserve energy by limiting or reducing activities
- Treat the underlying causes:
- Bronchial secretions or asthma/COPD - nebulized salbutamol in 09% saline.
- Pulmonary Edema – furosemide 40mg oral x1
- benzodiazepines to reduce anxiety (ex diazepam 2mg-10mg . note that oral or rectal route act quickly than IV because of the metabolism of diazepam)
- the low dose of morphine e.g 2.5 peros 4hrly can improve the symptom s breathlessness
- Hypoxia – O₂ by nasal cannula
- Admit the patient.

Delirium (acute confusional state) –

Never manage as an outpatient

Confusion is a common and distressing problem. It involves abnormalities of thoughts, perceptions, and fluctuating level of consciousness.

It is common in patient with advanced diseases, especially elderly and those approaching end of life.

In management good holistic care requires a combination of general non-clinical measures and advice, investigation and treatment of any underlying causes and appropriate symptomatic treatment.

The management of these patients should focus on improving symptoms and quality of life whilst regularly reassessing

- Ensure a safe environment for the patient :
- A caretaker should remain with the patient
- Remove any objects that could be harmful
- Educate the family regarding delirium and provide support both emotionally and psychologically
- Give haloperidol 2.5mg-5mg PO or SC first line
- Give chlorpromazine 25-50mg PO or SC Second line Admit the patient h al.

Nausea/Vomiting

Vomiting is less distressing to many patients than persistent nausea and sometimes easier to control. Neither symptom is always be accompanied by vomiting the two symptoms are best considered together.

Management:

- correct cause and exacerbating factors where possible
- non drug measures :
- avoid strong smells if possible
- Manipulate diet, the temperature of the food and timing of meals. Use small portions
- Give IV normal saline
- Metoclopramide 10mg IVtds
- In case of severe vomiting not responding to metoclopramide , give haloperidol 2.5mg OD
- Admit if patient is unable to tolerate food or liquid

Other Emergencies

Palliative care does not mean no care! Terminal heart failure, renal failure, or respiratory disease patients can still be treated in the hospital for these problems. With agreement of the hospital, the patient and the family, those issues may also be managed at home with support.

.

9.3.6.2 Pain Control

9.3.6.2.1 Nociceptive Pain:

Use the WHO analgesic ladder as a guide to pain control,

Morphine

Increase by 20% if patient needs additional relief for breathlessness

STEP #4 PAIN EMERGENCY

Revert to Respiratory Emergency

STEP #3 Severe Pain

1. Morphine 7.5 – 10 mg every 4 hrs PRN
2. Adjuvants

STEP #2 Moderate

1. Morphine 5mg every 4 hours PRN
2. PCT/Codeine 500/30mg every 6 hrs PRN
3. Tramadol 50-100mg PO TID
4. Adjuvants

STEP #1 Mild

1. Aspirin 500mg every 6 hrs PRN
2. Paracetamol 500mg every 6 hrs PRN
3. NSAID
 - Diclofenac 50mg every 8hrs PRN
 - Ibuprofen 400mg every 6hrs PRN
4. Adjuvants

Move up and down the ladder based on patient's severity of pain.

Correct use of analgesic medicines will relieve pain in most patients and should be based on the following principles:

- By the mouth/appropriate route (use oral route whenever possible).
- By the clock.
- By the ladder(use WHO analgesic ladder)

- Individualized treatment
- Use of adjuvants drugs

Type of Pain	Medication	Starting Dose	Max Dose	Notes
Neuropathic	Amitriptyline (1st Line)	25mg oral 1x/day	75mg oral 1x/day	Contraindicated in patients who have attempted suicide or expressed a desire to hurt themselves.
	Clonazepam (2nd Line)	0.5mg oral 1x/day	1mg oral 1x/day	
RUQ pain from liver capsule stretch	Dexamethasone	4mg oral 1x/day	8mg oral x/day	Can cause delirium & immunosuppression Worsens glucose control in DM patients
Skeletal Pain	Diazepam	5mg oral 1x/day	5mg oral 3x/day	Titrate slowly in patients also taking morphine
Visceral Pain	Buscopan	20mg oral 3x/day		For smooth muscle pain

9.3.6.2.2 Non-Nociceptive Pain:

Use the paragraphs below to treat other types of pain

Breathlessness

Emergency: Revert to Emergency section above

Treat underlying cause:

- Heart Failure -> furosemide, control blood pressure
- Chronic Respiratory Disease -> salbutamol, beclamethasone, oxygen
- Chronic Kidney Disease -> furosemide, control blood pressure
- Anxiety -> diazepam 2.5-5mg PO TD

Symptomatic Treatment:

- Morphine 5mg PO every 4 hrs as needed.
- Diazepam 2.5-5mg PO TD (best for anxiety)

Morphine & Diazepam

Increase by 20% if patient needs additional relief for breathlessness

Constipation

Constipation refer to the passage of small,hard feces infrequently and with difficult.Treat underlying cause:

- Medications: opioids (morphine), ondansetron,cough sedatives,anticholinergic drugs, tricyclic antidepressants,phenothiazines,diuretics etc...)
- Dehydration
- Relative immobility/weakness
- Small food intakes of predominantly low roughage,high milk content diet('invalid foods')

Treatment

- Encourage fluid intake
- Increase fibre in diet
- Encourage exercise
- Bisacodyl 5-15mg oral daily
- Forlax 1 packet mixed with water daily

- Docusate 100mg oral 2x/day
- Liquid Paraffin 10mls OD
- Glycerine suppository 1PR od

Nausea & vomiting

Emergency: Revert to Emergency section above

- End of life care management
- Most patients find taking medication a burden especially towards the end of life.
- Focus on giving medication that will improve the patient's quality of life and discontinue any unnecessary medications.
- Assess if the patient is unable to swallow choose an appropriate route to give necessary medication(e.g NG tube, parenteral or PR)
- Subcutaneous(SC) is recommended when the enteral route is not possible(e.g patient have bowel obstruction)

Management:

Common symptoms encountered towards the end of life include pain, agitation, nausea and excessive respiratory secretions. Management of these symptoms is highlighted below.

Symptoms	Enteral route	Subcutaneous route
Pain	Morphine 5-7.5 mg 4hourly	2.5mg- 5mg 4hourly
Nausea and vomiting	Haloperidol 2.5mg od titrated to bd	Haloperidol 2.5mg od titrated to bd
Anxiety or agitation	Diazepam 5mg-10mg od titrated to tds	Diazepam 5mg-10mg od titrated to tds
Excessive bronchial secretions		Hyocinebutylbromide 20mg od titrated tds

Issues of hydration and nutrition

- Patients should eat and drink as they wish and take sips of water as long as they are able
- Families should be educated that it is normal for patients to lose their appetite, sense of thirst and feeding towards the end of life. They should not feed patients if they are no longer able to swallow as this may cause choking and distress
- IV fluids at this stage will not prolong life and will not prevent thirst. Over hydration may contribute to distressing respiratory secretions or generalized oedema and are generally discouraged; good regular mouth care is the best way to keep the patient comfortable.
- If there is a reduced level of consciousness patient should be not be fed due to the risk of aspiration and artificial nutrition is generally discouraged at the end of life.

Spinal cord compression

SCC occurs in 3% of patients with advanced cancer, most commonly occurring in cancers of the breast, bronchus and prostate but also associated with cell carcinoma, lymphoma, multiple myeloma, melanoma, sarcoma, head and neck cancer.

The commonest site for compression is in the thoracic spine 70%, followed by the lumbar spine 20%, and cervical spine 10%

Spinal cord compression usually presents with back pain (<90%). Typically pain is the earliest sign.

Investigations

- Plain X-rays
- MRI
- CT scan

Treatment

- Steroids: dexamethasone 16mg- 24mg in divided dose with the first dose given IV if possible.
- Referral for urgent Radiotherapy should be made if available and appropriate.
- Management of paraplegia
- Particular attention should be paid to continence, bowel care and pressure areas.
- Patients with urine retention will require catheterization.
- Those with complete cord compression unresponsive to treatment and constipation are likely to require enemas or manual evacuation of rectum regularly, with a regular routine arranged for convenience, privacy and less smells.
- Helping the patient to sit out for periods and regular changing of position, will be required to prevent pressure areas. Massage for pressure oints by a carer three times a day can also assist using wet soap but not methylated as in the past.
- Family members can be taught how to care their relative in this way.
- Educate the patient and family about the prognosis.

Seizures

Seizures can be caused by the tumor itself, metastases, metabolic, disturbances, radiation injury, cerebral infarctions, or infections.

Treatment:

- Abolish active seizure with benzodiazepine (eg diazepam 10-20mg) IM then give anticonvulsive treatment with Phenobarbital or other anticonvulsant of choice.
- The Prophylactic anticonvulsant therapy is not recommended unless the patient is at a high risk for seizures (melanoma primary or hemorrhagic metastases).

9.3.6.3 Psychological, social, & spiritual Needs

Psychological

- Assess patient's emotions (guilt, sadness, worry, shame, depression)
- Assess patient's ability to carry out his/her role as a parent, mother, provider
- Provide support for the patient once psychological needs are identified
- Consider the family too

Social

- Assess familial support (Who helps the patient? Are they supportive? Are they able to meet patient's needs?)
- Assess social needs (Money, job, family members that will need support)
- Maximize support for patient's social needs & family

Spiritual Needs

- Assess sources of hope and strength
- Assess if patient's spiritual needs are being met
- Help patient identify a spiritual leader in the community that the patient trusts who might provide counseling

9.3.7 EDUCATION

SYMPTOM MONITORING	
Pain:	Instruct patients and family to return to the clinic if pain is worsening on the current “WHO treatment step”. Explain the principles of medication management
Constipation:	Teach patients that pain medications can cause constipation and laxatives might be essential.
Nausea/Vomiting:	Teach patients that nausea and vomiting have many causes and can be treated
Psychological, social , & Spiritual Needs	
Monitoring:	Stress to the patient that the most important aspects of palliative cannot be ‘treated with a pill.’ Counsel the patient to express psychological, physical, & spiritual needs at future appointments.
DIET	
Diet Counseling:	Explain that loss of appetite is a normal part of the dying process.

9.4 The Follow-up Patient Visit

This section emphasizes a systematic approach, which will help you:

1. Assess medication adherence; and 2. Assess pain control.

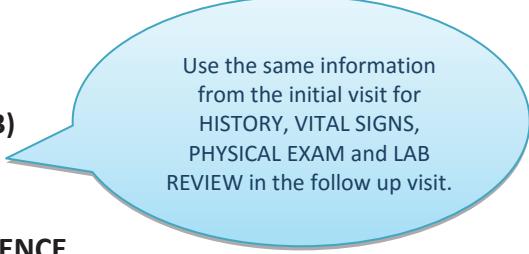
1. History (See par 0)

2. Vital Signs (See par 9.3.2)

3. Physical Exam (See par 9.3.3)

4. Lab Review (See par 9.3.4)

5. Impression



Use the same information from the initial visit for HISTORY, VITAL SIGNS, PHYSICAL EXAM and LAB REVIEW in the follow up visit.

9.4.1 MEDICATION ADHERENCE

Evaluate the patient's ability to follow the treatment plan from last visit.

9.4.2 PAIN CONTROL

Determine if current medication class, dose, and frequency are adequate for patient.

Good Control

- Medication class, dose, and frequency control pain greater than 75% of the time.
- Continue therapy on the 'current step.'

Poor Control

- Medication class, dose, and frequency control pain less than 75% of the time.
- Re-assess pain holistically and think of all causes
- Consider moving to a 'higher step' of therapy.
- Or change the therapy according the causes

Emergency

- Pain level #5, delirium, severe dyspnea, intractable nausea/vomiting
- Requires emergency attention!

9.4.3 PLAN

Refer to par 9.3.6 for planning and management.

PART 8: Community Check-up

10 COMMUNITY CHECK-UP GUIDELINES

Rwanda Community Health Assessment Checklist				
Patient Name:				
Date of birth:	Gender:			
Age:	Date of evaluation:			
BMI:	Blood pressure:	Pulse:		
Past medical history:		Current medications:		

Please check one for each of the following	Yes	No	n/a	Comments
<u>General Aspects</u>				
Have you had recent unexplained weight loss?				
Do you have dizziness?				
Do you have unusual thirst?				
Do you have frequent/abundant urination?				
Do you have mood changes?				
Do you have hallucinations?				
Are you pregnant?				
<u>Head and Neck</u>				
Do you have difficulties seeing objects close to you?				
Do you have difficulties seeing objects far away?				
Do you have difficulties seeing things in the periphery?				
Do you have blurred vision?				
Do your eyes itch?				
Have your eyes changed color?				

Please check one for each of the following	Yes	No	n/a	Comments
Do you have any difficulties hearing?				
Do you have pain in your teeth?				
Do your gums bleed?				
Have you had pain in your throat?				
Do you have pain during swallowing?				
Do you have difficulty swallowing solids, liquids or both?				
Do you have often morning headaches?				
<u>Thorax</u>				
Do you have shortness of breath related to exertion?				
Do you have a persistent cough?				
Do you have a history of pulmonary TB?				
Do you have heart palpitations?				
Do you have chest pain?				
Is there a history of asthma or skin allergy in your family?				
Do you have breast pain?				
Do you palpate a lump in your breast? (Nodule)				
Do you have skin modification on your breast?				
Do you have breast discharge?				
Is there any history of breast cancer in your family?				
<u>Abdomen</u>				
Have you noticed blood in your stools?				
Do you have constipation?				
Do you have persistent diarrhea?				
Do you have abdominal pain?				
Do you have epigastric or chest pain?				
Do you have heart burn?				
Do you feel any mass in your abdomen?				

Please check one for each of the following	Yes	No	n/a	Comments
<u>Genito-urinary</u>				
Do you have urine incontinence?				
Do you have urine in your vagina or in your stools?				
Do you have pain during urination?				
Do you have urine retention?				
Do you have abnormal genital discharge?				
Do you have post-coital spots/bleeding?				
Do you have pain during sexual intercourse?				
Do you palpate any mass in your genital area?				
How often do you wake up during the night for urination?				
<u>Limbs/ Musculoskeletal</u>				
Do you have blue color of fingers/toes?				
Do you have restriction of limb movement?				
Do you have limb pain?				



