2078

STANDARD TREATMENT PROTOCOL OF EMERGENCY HEALTH SERVICE PACKAGE

GOVERNMENT OF NEPAL
MINISTRY OF HEALTH AND POPULATION

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Photograph courtesy:

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Government of Nepal
Ministry of Health
DEPARTMENT OF HEALTH SERVICES

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ACKNOWLEDGEMENT

I feel honoured to pen down a few words of appreciation for the commendable act of developing this Standard Treatment Protocol of Emergency Health Service Package (EHSP), a landmark step in managing emergency conditions in Nepal.

It is pragmatic to make necessary amendments to establish citizens' access to free basic health services and emergency health services by making them regular, effective, qualitative, and readily available. As legal provisions are enacted by Federal Parliament, the published Public Health Service Act 2018 and Public Health Service Regulation 2020 act as guiding documents for health facilities to provide emergency health care services. I am highly thankful to each and every individual who worked persistently to develop this document. I would like to acknowledge all subject experts and representatives of the Curative Service Division for their invaluable feedback in the series of consultative meetings of STP of EHSP development.

I would also like to applaud the support and guidance of the Secretary of Ministry of Health and Population (MoHP) Mr. Laxman Aryal, Chief Specialists of MoHP Dr. Roshan Pokhrel and Mr. Mahendra Prasad Shrestha, Division Chiefs of MoHP- Chief of Policy Planning and Monitoring Division Dr. Gunaraj Lohani, Chief of Quality Standard and Regulation Division Dr. Bikash Devkota, Chief of Health Coordination Division Prof. Dr. Jageshwar Gautam. I would like to sincerely thank the directors of different Divisions and centres of the Department of Health Services.

I am indebted to the technical and financial support of WHO Country Office Nepal in developing this protocol. The hard work and regular contributions of Dr. Madan Kumar Upadhyaya, Director and Section Chief Dr. Pomawati Thapa from the Curative Service Division, independent consultants Dr. Senendra Raj Upreti, Dr. Olita Shilpakar, Prof. Dr. Abhinav Vaidya, Mr. Janak Thapa, and WHO Country Office Colleagues Dr. Rajesh Sambhajirao Pandav, Dr. Md. Khurshid Alam Hyder, Dr. Khin Pa Pa Naing, and Ms. Kimat Adhikari is praiseworthy.

Last but not the least, I would like to sincerely thank all independent experts, supporting organizations, and government representatives for their valued feedback and continuous support.

Date: 2078, Jestha

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FOREWORD

I feel privileged to put some words on Standard Treatment Protocol of Emergency Health Service Package. The constitution of Nepal has promulgated health as a fundamental human right of the people and has stated in Part 3 article 35, that "Every citizen shall have the right to free basic health services from the State and no one shall be deprived of emergency health services." The Public health service regulation 2020 has defined emergency health services as guided by Public health service act 2018. This Standard Treatment Protocol of Emergency Health Service Package is a milestone in strengthening readiness of health institutions to deliver quality emergency health care services. There were a series of consultative workshops at different levels while drafting and finalizing this protocol.

In this regard, I would like to acknowledge the support and guidance of the Secretary of Ministry of Health and Population (MoHP) Mr. Laxman Aryal, Chief Specialists of MoHP Dr. Roshan Pokhrel and Mr. Mahendra Prasad Shrestha, Director General of Department of Health Services Dr. Dipendra Raman Singh, Division Chiefs of MoHP- Chief of Policy Planning and Monitoring Division Dr. Gunaraj Lohani, Chief of Quality Standard and Regulation Division Dr. Bikash Devkota, Chief of Health Coordination Division Prof. Dr. Jageshwar Gautam. I would like to sincerely thank the directors of different Divisions and centres of Department of Health Services.

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Date: 2078, Jestha

Dr. Madan Kumar Upadhyaya
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LIST OF FIGURES

ABBREVIATIONS

ABC:	Airway, Breathing, and Circulation
ABCDE:	Airway, Breathing, Circulation, Disability and Exposure
ABG:	Arterial Blood Gas
AC:	Alternating Current
ACEI:	Angiotensin Converting Enzyme Inhibitors
ACS:	Acute Coronary Syndrome
AE COPD:	Acute exacerbation of chronic obstructive pulmonary disease
AE:	Acute Exacerbation
AF:	Atrial Fibrillation
AHW:	Auxiliary Health Worker
ALS:	Advanced Life Support
AMS:	Acute Mountain Sickness
ANM:	Auxiliary Nurse Midwife
AP:	Angina Pectoris
APH:	Antepartum Haemorrhage
ARB:	Angiotensin Receptor Blockers
ARDS:	Acute Respiratory Distress Syndrome
ASV:	Anti Snake Venom
ATLS:	Advanced Trauma Life Support
AV:	Atrioventricular
AVF:	Arteriovenous Fistula
AVNRT:	Atrioventricular Nodal Re-entry Tachycardia
AVRT:	Atrioventricular Re-entry Tachycardia
AWS:	Alcohol Withdrawal Syndrome
AXR:	Abdominal X-ray
BAC:	Blood Alcohol Concentration
BAL:	Broncho Alveolar Lavage
BBB:	Blood Brain Barrier
BD:	Twice a Day
BEP:	Benign Enlargement of Prostate
BHC:	Basic Health Center
BiPAP:	Bilevel Positive Airway Pressure
BLS:	Basic Life Support
BMV:	Bag and Mask Ventilation
BP:	Blood Pressure

BT:	Bleeding Time
CABG:	Coronary Artery Bypass Graft
CAD:	Coronary Artery Disease
CAP:	Community Acquired Pneumonia
CBC:	Complete Blood Count
CBD:	Common Bile Duct
CCEEV:	Cell Culture Vaccines and Embryonated Egg-based Vaccines
CCF:	Congestive Cardiac Failure
CCU:	Critical Care Unit
CHB:	Complete Heart Block
CHF:	Congestive Heart Failure
CIWA:	Clinical Institute Withdrawal Assessment
CK:	Creatine Kinase
CNS:	Central Nervous system
COPD:	Chronic Obstructive Pulmonary Disease
CP:	Cerebral Palsy
CPAP:	Continuous Positive Airway Pressure
CPK:	Creatinine Phosphokinase
CPR:	Cardio-Pulmonary Resuscitation
CSD:	Curative Service Division
CSF:	Cerebrospinal Fluid
CT:	Computed Tomography
CTPA:	CT Pulmonary angiogram
CTVS:	Cardiothoracic and Vascular Surgery
CURB:	Confusion, Urea, Respiratory rate, Blood pressure
CVA:	Cerebrovascular Accident
CVS:	Cardiovascular System
CXR:	Chest X-ray
DAI:	Diffuse Axonal Injury
DBP:	Diastolic Blood Pressure
DC:	Direct Current
DKA:	Diabetic Ketoacidosis
DMSA:	Dimercapto Succinic Acid
DNVS:	Distal Neurological Vascular Status
DVT:	Deep Vein Thrombosis

ECC:	Emergency Cardiovascular Care
ECG:	Electrocardiogram
ED:	Emergency Department
EEG:	Electroencephalogram
EHS:	Emergency Health Service
EMTC:	Early Management of Trauma Course
ENLS:	Emergency Neurological Life Support
ENT:	Ear, Nose and Throat
EPAP:	Expiratory Positive Airway Pressure
ER:	Emergency Room
ESR:	Erythrocyte Sedimentation Rate
FB:	Foreign Body
FFP:	Fresh Frozen Plasma
FHF:	Fulminant Hepatic Failure
FMC:	First Medical Contact
FSH:	Follicle Stimulating Hormone
FVR:	Fast Ventricular Rate
GA:	General Anaesthesia
GBS:	Guillain-Barre syndrome
GCS:	Glasgow Coma Scale
GI:	Gastro-Intestinal
GIB:	Gastrointestinal Bleeding
GPEM:	General Practice and Emergency Medicine
GRBS:	General Random Blood Sugar
GTCS:	Generalized Tonic- Clonic Seizure
GTN:	Glyceryl trinitrate
HA:	Health Assistant
HACE:	High Altitude Cerebral Edema
HAPE:	High Altitude Pulmonary Edema
HB:	Haemoglobin
HBIG:	Hepatitis B Immunoglobulin
HBV:	Hepatitis B Virus
HCV:	Hepatitis C Virus
HDU:	High Dependency Unit
HFNC:	High Flow Nasal Cannula

HIV:	Human Immunodeficiency Virus
HMIS:	Health Management Information Systems
HP:	Health Post
HR:	Heart Rate
ICP:	Intracranial Pressure
ICU:	Intensive Care Unit
IHD:	Ischemic Heart Disease
IHIMS:	Integrated Health Information Management Section
IM:	Intramuscular
INR:	International Normalized Ratio
IPAP:	Inspiratory Positive Airway Pressure
IPPV:	Intermittent Positive Pressure Ventilation
IV PPI:	Intravenous Proton Pump Inhibitor
IU:	International Unit
IV:	Intravenous
IVC:	Inferior Venacava
IVP:	Intravenous Pyelogram
JVP:	Jugular Venous Pulse
KCL:	Potassium Chloride
KUB:	Kidney, Ureter and Bladder
LA/IVA:	Local Anaesthesia/ Intravenous Anaesthesia
LAAC:	Long Acting Anticholinergic
LABA:	Long Acting Beta 2 Agonist
LBBB:	Left Bundle Branch Block
LFT:	Liver Function Test
LMWH:	Low Molecular Weight Heparin
LOC:	Level of Consciousness
LOV:	Loss of Vision
LP:	Lumbar Puncture
LTRA:	Leukotriene Receptor Antagonist
MAO:	Monoamine Oxidase
MAP:	Mean Arterial Pressure
MDGP:	Medicine Doctor in General Practice
MI:	Myocardial Infarction
MO:	Medical Officer

MRI:	Magnetic Resonance Imaging
MRSA:	Methicillin-resistant Staphylococcus aureus
MV:	Minute Ventilation
NAC:	N-acetyl Cysteine
NICU:	Neonatal Intensive Care Unit
NIV:	Non-invasive Ventilation
NMA:	Nepal Medical Association
NMC:	Nepal Medical Council
NNC:	Nepal Nursing Council
NS:	Normal Saline
NPO:	Nil per oral
NSAID:	Nonsteroidal Anti-inflammatory Drugs
NSSD:	National Strategy for Sustainable Development
NSTEMI:	Non- ST Segment Elevation Myocardial Infarction
O/B:	Occult Blood
OCS:	Oral Cortico Steriods
OD:	Once Daily
OP:	Organophosphorus Poisoning
OPIDN:	Opioid Induced Delayed Neuropathy
ORS:	Oral Rehydration Solution
PAD:	Peripheral artery disease
PALS:	Paediatric Advanced Life Support
PCI:	Percutaneous Intervention
PCR:	Polymerase Chain Reaction
PCV:	Pneumococcal Conjugate Vaccine
PE:	Pulmonary Embolism
PEP:	Post Exposure Prophylaxis
PEEP:	Positive End Expiratory Pressure
PEFR:	Peak Expiratory Flow Rate
PHCC:	Primary Health Care Centre
PHRD:	Nepal Public Health Research and Development Center
PICU:	Paediatric Intensive Care Unit
PIH:	Pregnancy Induced Hypertension
PNES:	Psychogenic Non epileptic Seizure
PO:	Per Oral

PPH:	Post-partum Haemorrhage
PPI:	Proton Pump Inhibitors
PSVT:	Paroxysmal Supraventricular Tachycardia
PT:	Prothrombin Time
PTC:	Primary Trauma Care
PUJ:	Pelvi-ureteral Junction
PV:	Polycythemia Vera
QID:	Four times a day
QRS:	Q Wave, R Wave, S Wave
QT:	Q wave, T wave
RBC:	Red Blood Cell
RBG:	Random Blood Glucose
RBS:	Random Blood Sugar
R/E:	Routine Examination
RF:	Rheumatoid Factor
RFT:	Renal Function Test
RHD:	Rheumatic Heart Disease
RIG:	Rabies immunoglobulin
RR:	Respiratory Rate
RSV:	Respiratory Syncytial Virus
RWMA:	Regional Wall Motion Abnormality
SAAC:	Short Acting Anticholinergics
SBP:	Spontaneous Bacterial Peritonitis
SIADH:	Syndrome of Inappropriate Antidiuretic Hormone Secretion
SOB:	Shortness of Breath
STEMI:	ST elevation MI
STK:	Streptokinase
STP:	Standard Treatment Protocol
SVT:	Supraventricular Tachycardia
TBSA:	Total Body Surface Area
TDS:	Ter Die Sumendum (Thrice a day)
TE:	Thromboembolism
TIA:	Transient Ischemic Attack
TIMI:	Thrombolysis in Myocardial Infarction
TMJ:	Temporomandibular Joint

TMP:	Trimethoprim
TWG:	Technical Working Group
UA:	Unstable Angina
UFH:	Unfractionated Heparin
UGI:	Upper Gastrointestinal
USG:	Ultrasonography
UTI:	Urinary Tract Infection
UGI:	Upper Gastrointestinal
VAS:	Visual Analog Scale
VF:	Ventricular Fibrillation
VT:	Ventricular Tachycardia
VUJ:	Vesico Ureteric Junction
WBCT:	Whole Blood Clotting Test
WBI:	Whole Bowel Irrigation
WHO:	World Health Organization

Introduction

Background

The Constitution of Nepal under the Article 35 Clause 1 mentions 'Every citizen shall have the right to free basic health services from the state, and no one shall be deprived of emergency health services.' The Public Health Service Act 2018 formulated to ensure the constitutional rights related to health, has defined "Emergency health services" as the initial and immediate service to be provided as it is necessary to free the lives of the persons from risk, save the lives or organs from being lost, whose lives are in the risky condition upon falling into unexpected incident or emergency condition.[1] Constitutional essence of Emergency health services has been further addressed under Chapter 2 – Rights, Duties of Service Recipients and Responsibilities of Health Institutions, Article 33 of which describes establishment of emergency health service fund, while Article 48 of Chapter 6 describes Emergency health service and management. Furthermore, in the Chapter 4 of Public Health Regulation 2020, Rule 8 commits that 'every health institution shall immediately provide emergency services to patients that have come for treatment in such institution and, if it is necessary, the patient shall be admitted to the hospital', while Rule 7 ensures that 'if the emergency health services required to treat the patient are not available in a given health institution, the health institution shall immediately provide whatever emergency health services are available, and after providing the reason for additional treatment, the patient shall be immediately referred to the most convenient health institution that provides the required services.'

Towards this, the Ministry of Health and Population has already developed the Basic health services package and some basic emergency health services have already been incorporated in this package.

Definition of Emergency Health Services

Emergency Health Service is well-defined to encompass, in addition to emergency medical service, the service provided in response to emergency events of public health importance.[2] Emergency Medical Services (EMS), also known as ambulance services or paramedic services, are emergency services that provide urgent pre-hospital treatment and stabilization for serious illness and injuries and transport to definitive care.[3] The purpose of emergency medical service is to stabilize patients who have a life-threatening or limb-threatening injury or illness.[4] These services are established to essentially address the basic principles of first aid, i.e. preserve life, prevent further injury and damage, and promote recovery.

1. Public Health Services Act, 2018
2. Public Health Services Act, 2018
3. What is EMS?". NHTSA.
4. Emergency medical care in developing countries: is it worthwhile? Junaid A. Razzak1 & Arthur L. Kellermann2

Features of the Emergency Health Services

The Public Health Service Regulation 2020 states the following important features regarding the Emergency Health Services.

(1) Emergency health services shall be as mentioned in Schedule 2 (listed in the Annex I of this document).

(2) General hospitals, specialist hospitals, specialised hospitals, teaching hospitals under the Institute of Health Sciences and other teaching hospitals shall provide emergency health services as mentioned in Schedule 2.

(3) Ayurveda service centres, specialist Ayurveda hospitals and homeopathy hospitals shall provide emergency health services as per their related medical practices.

(4) At least Primary Hospitals shall provide 24-hour emergency health services in accordance with this Regulation.

(5) While providing emergency health services, priority shall be given on the basis of the severity of the patient's condition.

(6) If the emergency health services required to treat the patient are not available in a given health institution, the health institution shall immediately provide whatever emergency health services are available, and the patient shall be immediately referred to the most convenient health institution that provides the required services, with proper counselling to the patient or his/her visitor/patient party.

(7) Every health institution shall immediately provide emergency services to patients that have come for treatment in such institution and, if necessary, the patient shall be admitted to the hospital.

(8) Notwithstanding anything mentioned elsewhere in this Regulation, if the patient seeking emergency health services cannot immediately pay the expenses of the treatment, such patient too shall not be deprived of emergency health services.

(9) The expenses required in delivering emergency health services as per this Regulation shall be paid pursuant to Section 4 of the Act.[5]

Rationale of the STP

Standard Treatment Protocol (STP) lists the preferred pharmaceutical and non-pharmaceutical treatments for common health problems experienced by people in a specific health system. As such, they represent approach of therapeutically effective and economically efficient prescribing. When implemented effectively, an STP offers advantages to patients (e.g., it provides more consistency and treatment efficacy), providers (e.g., it gives an expert consensus, quality of care standard, and basis for monitoring), supply managers (e.g., it makes demand more predictable and allows for pre-packaging), and health policy makers (e.g., it provides focus for therapeutic integration of special programs and promotes efficient use of funds).[6]

5. Public Health Regulation 2077
6. Management Sciences for Health and World Health Organization. 2007. Drug and Therapeutics Committee Training Course.

Development Process of the STP

The STP has been developed through a series of steps. The Ministry of Health and Population had begun working on the issue of emergency health care right after it was clearly stated in the Constitution of Nepal that no citizen will be deprived of emergency health care. These efforts have been refined and finalized through phase-wise discussions with various stakeholders at different levels.

Step 1: A Pre-planning meeting was conducted to start the STP of EHS and mechanism of consultative meetings. The meeting was attended by key government officials from MoHP, Director General of the Department of Health Services, and Directors of the various divisions under the Department, PHRD Nepal and WHO- Nepal. (Participants listed in Annex IV)

Step 2: A Consultative meeting with Technical Working Group (TWG) at Curative Service Division was conducted. Members of the TWG provided vital feedback and suggestions (members of the TWG listed in Annex V).

Step 3: Preparation and consultative meetings/virtual with MoHP, DoHS, WHO, and national and sub-national experts including staffs of emergency departments (Participants listed in Annex VI).

Step 4: A Consultative meeting was done to discuss the first draft of STP with DoHS, MoHP, WHO, PHRD Nepal and subject experts (Participants listed in Annex VII).

Step 5: A Consultative meeting about the final draft of STP of EHS was done with senior management team of MoHP, DoHS, WHO, PHRD Nepal, and subject experts, and submission and process for endorsement (Participants listed in Annex VIII).

Utilization of the STP

The guidelines provided in this Standard Treatment Protocol of Emergency Health Service Package is expected to be useful for all health workers including nurses and doctors and other health-care providers, and health promoters. This can be used to:

- Support the emergency health services by developing a national standard treatment protocol in all health institutions.
- Ensure that all the necessary equipments and resources are available.

The STP is proposed to be used at the following levels of health service as endorsed recently by the Government of Nepal, depending on the resources available:

1. Basic Health Service Centers (BHSC)
2. Primary hospitals (up to 5-15 bedded hospitals)
3. General hospitals (up to 50 bedded hospitals)

Assumptions made for the implementation of the STP

While developing the STP of EHS, following implementations will be carried out:

1. The minimum necessary infrastructure and human resources with adequate skill will be available to provide the service.
2. Management of supply/ procurement (supply chain) of necessary medicines and equipment will be ensured, improved and functional.
3. Institution with operational/ implementation plans will be developed to implement the STP of emergency health care.
4. Standard Treatment Protocol of Emergency Health Service package will be oriented to health workers.
5. Each health institution will provide timely emergency health care based on STP. In addition, as emergency health problems can occur at any time, health institutions, including health posts that are not open for 24 hours, will continue to coordinate with authority to develop mechanism to provide 24 hours emergency services.
6. All the levels of government (federal, provincial, local) shall develop emergency plan and enforce it.

How to use the STP

The STP has been developed to fulfill the need of having a comprehensive guidance to health care providers while treating patients in the Emergency room.

The ABCDE approach in the emergency room has been described.

The management of Airway, Breathing and Circulation has been elaborated with tables, figures and flowcharts along with the services that are needed to be provided as per the levels of health facilities.

Common emergency diseases/conditions, as outlined in the Public Health Service Regulations 2020 Schedule 2 is presented, and are grouped as the following:

1. **Respiratory emergencies:** Shortness of breath, Acute exacerbation of chronic obstructive pulmonary disease (COPD), Bronchial Asthma, Pneumonia, Aspiration Pneumonia, Pneumothorax, Hemoptysis, Acute Pulmonary Embolism, Acute Mountain Sickness, High Altitude Pulmonary Edema (HAPE), High Altitude Cerebral Edema (HACE), Acute Respiratory Failure, Acute Respiratory Distress Syndrome (ARDS)
2. **Cardiac Emergencies:** Chest pain, Acute Coronary Syndrome, Acute Myocardial Infarction, Arrhythmias- tachyarrhythmias and bradyarrhythmias, Acute Pulmonary Edema, Cardiac Tamponade, Cardiogenic Shock, Hypertensive Emergencies

3. **Neurological Emergencies:** Coma, Seizures, Acute CNS Infections, Cerebrovascular Accidents, Guillain-Barre Syndrome (GBS), Raised Intracranial Pressure
4. **Gastrointestinal Emergencies:** Abdominal pain, Acute Gastritis, Acute Gastroenteritis, Acute Appendicitis, Acute Cholecystitis, Gastrointestinal Bleeding (GIB), Fulminant Hepatic Failure, Acute Pancreatitis, Strangulated/ Obstructed Hernia, Intestinal Obstruction, Hollow Viscous Perforation, Peritonitis
5. **Genitourinary Emergencies:** Renal Colic, Hematuria, Acute Retention of Urine, Testicular Torsion, Para phimosis
6. **Gynaecology and Obstetrical Emergencies:** Ectopic pregnancy, Antepartum Haemorrhage, Ruptured uterus, Pregnancy Induced Hypertension (PIH), Obstructed labour, Postpartum Haemorrhage, Puerperal pyrexia, Hyperemesis gravidarum
7. **Orthopedics and Trauma:** Head Injury, Abdominal and Pelvic Injuries, Chest injuries, Musculoskeletal Injuries, Compartment Syndrome, Traumatic Amputation, Dental Emergencies- Toothache/Odontalgia, Dental fractures, Temporomandibular joint (TMJ) Dislocation, Gum Bleeding
8. **Metabolic Emergencies:** Hypo/hyperkalemia, Hypo/hypernatremia, Hypoglycemia, Diabetic Ketoacidosis (DKA), Acute Adrenal Crisis
9. **Ocular Emergencies:** Foreign Body Eye, Sudden Loss of Vision, Chemical Injuries
10. **ENT Emergencies:** Epistaxis, Foreign body ENT
11. **Burns:** Thermal burns, Electrical and Lightening Injuries
12. **Mental Health Emergencies:** Alcohol Intoxication, Alcohol Use Disorders, Anxiety Disorder, Conversion Disorder, Depression, Acute Psychosis
13. **Toxicological Emergencies:** Outline of Poisoning, Organophosphorus Poisoning, Zinc Phosphide (Rodenticides), Aluminium Phosphide, Mushroom Poisoning, Wild Honey Poisoning, Dhatura Poisoning, Paracetamol Poisoning, Antidotes
14. **Snake Bite, Animal Bite-Rabies, Insect Bite.**
15. **Paediatric Emergencies:** Diarrhoea, Acute Respiratory Tract Infection-Acute epiglottitis, laryngitis and laryngotracheobronchitis, Pneumonia, Febrile Convulsions
16. **Miscellaneous:** Anaphylaxis, Needle stick injuries, Pain management in the Emergency
    i. Each system starts with the commonest symptom encountered in the emergency room and includes:
        a. Introduction
        b. Causes
        c. Clinical features (common symptoms and signs of presentation)
        d. Differential diagnosis of the related symptoms and signs
        e. Investigations
        f. Management

ii. Each disease/emergency condition includes:
    a. Introduction
    b. Causes
    c. Clinical features (common symptoms and signs of presentation)
    d. Investigations
    e. Management and disposition (shown in flowcharts)

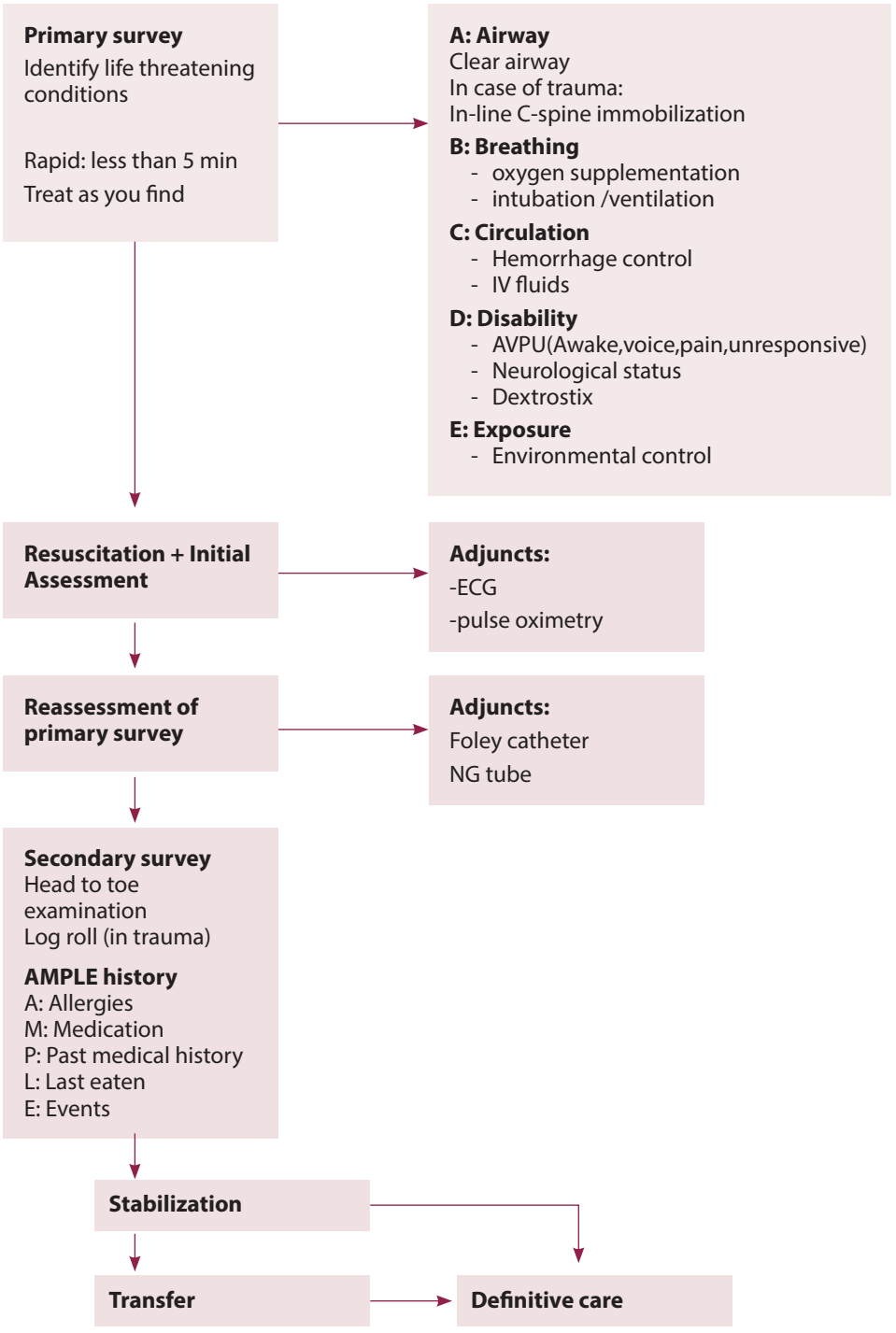
iii. Management of each disease/emergency condition starts with the resuscitation and initial management in case the patient presents in an unstable condition followed by the recommended pharmacological and definitive management. This includes doses, routes and duration of the pharmacological agent and the active interventions and emergency procedures. It is based on the latest national and international evidence-based guidelines and medical literature, which can be adopted by the health care provider, and bring into practice in the emergency room.

iv. Competence of the health care provider, availability of resources including human resources, lab facilities, diagnostics, medications, infrastructure and equipment present in the level of health facility where s/he is working are important factors that affect compliance to this STP.

v. Care should be taken for arrangement of referral services when the health care provider is unable to manage the patient either due to lack of experience or the unavailability of necessary resources. Patients should be referred to facilities where the necessary competence, diagnosis and support facilities exist after providing the necessary emergency services and stabilizing the patient. A patient referral form has been provided in the annex.

vi. The emergency drug list, referral form, bibliography and list of participants of the various consultative meetings are provided in the annexes.

ABCDE Approach in the Emergency Room



	Assessment	Beware	Management
A	Can the patient talk? Look, feel, listen - colour, conscious state - accessory muscle use - sounds	- airway obstruction - breathing difficulty C spine injury in trauma cases	- clear mouth - Basic airway - Advanced airway - C spine protection
B	Is breathing normal? Chest injuries? Look, feel, listen - chest movement - Respiratory rate, tracheal deviation, accessory muscle use - percussion / auscultation	Life threatening conditions - airway injury - Tension/open pneumothorax	- give oxygen - assist ventilation - decompress pneumothorax
C	Is the patient in shock? Is there bleeding? Look, feel, listen Signs of shock (fast pulse, low BP, poor capillary return)	Life threatening haemorrhage/ infections	- stop bleeding - 2 large bore IV cannulas - take blood for cross match and investigations - give IV fluids - monitor urine output
D	AVPU A: is patient awake? V: is patient responding to voice? P: is patient responding to pain? U: is patient unresponsive?		
E	Exposure and temperature control		

Airway Management

Airway management in the emergency department is a challenging task where prompt action needs to be taken to prevent morbidity and mortality. Airway compromise can occur as sudden or insidious and complete or partial. Airway management should be done in all forms of health facilities as per the resources and manpower available to stabilize the patient before referring the patient to higher centres.

For Basic and Primary level facilities (up to 15 bedded hospitals):

Positioning

- Positioning of the patient supine on a flat, firm surface with the arms along the sides of the body. Unless trauma can be definitely excluded, consider the possibility of a spine injury and stabilize the cervical spine by maintaining the head, neck, and trunk in a straight line.
- Talk to the patient. A positive appropriate verbal response indicates a patent airway, intact ventilation and brain perfusion.

Airway assessment	
Look	• Conscious / Agitated • Colour (Cyanosis) • Chest movement (Retractions and use of accessory muscles of respiration) • Respiratory distress • Foreign body (loose dentures)/secretions • Injury/swelling of neck, face, throat
Listen	• Noisy breathing (snoring, gurgling, stridor) • Hoarseness (laryngeal obstruction)
Feel	• Tenderness • Crepitus • Chest movement

Airway management: Basic techniques

1. Head tilt chin lift (in non-trauma cases)

Technique:

- Place palm of one hand on the victim's forehead and tilt the head back.
- Place fingers of the other hand on the bony part of the inferior surface of the lower jaw.

Caution:

- Avoid pressing the soft tissues under the chin deeply.
- Avoid closing the victim's mouth completely.

Figure 1. Head tilt and chin lift

Figure 2. Head tilt and chin lift

2. Jaw thrust: (in trauma cases)

Technique:

Place one hand over each side of the victim's head, lifting the angle of the jaw with one hand on each side displacing the mandible forward.

Figure 3. **Jaw thrust**

Figure 4. **Jaw thrust**

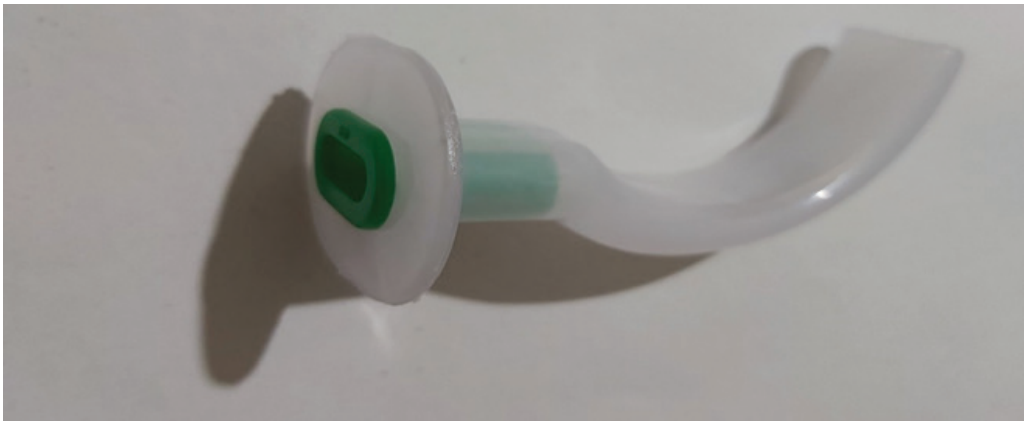
Adjuncts

1. Oropharyngeal airway (Guedel airway)

Technique

- Inserted into the mouth behind the tongue. Alternatively, it can be inserted upside down with concavity facing upwards till it reaches the soft palate. Then it is rotated 180 degrees and slipped inside.
- Guedel airway is contraindicated in patients with gag reflex.

Figure 5. Oropharyngeal airway (Guedel airway)

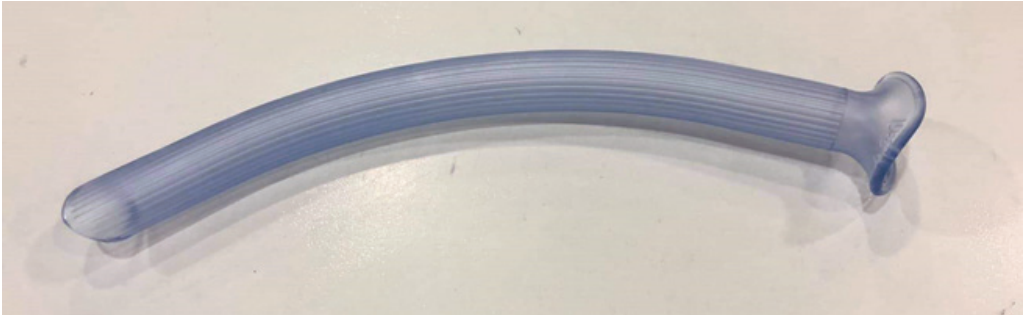


2. Nasopharyngeal airway

Technique

- Passed in through one of the nostrils with adequate lubrication into the posterior oropharynx
- Contraindicated in head injury especially anterior cranial fossa fracture.

Figure 6. Nasopharyngeal airway



3. BMV (Bag and mask ventilation)

If the patient requires ventilation assistance and more oxygen supplementation, a face mask with self-inflating bag is used. Two techniques have been demonstrated in the figures.

Figure 7. Bag and mask ventilation (One person technique)

Figure 8. Bag and mask ventilation (Two person technique)

4. LMA (Laryngeal mask airway)

It is a supraglottic airway device which can be used in situations with a difficult mask fit during BMV. It may also be used as a backup device when endotracheal intubation is not successful in the management of difficult airway.

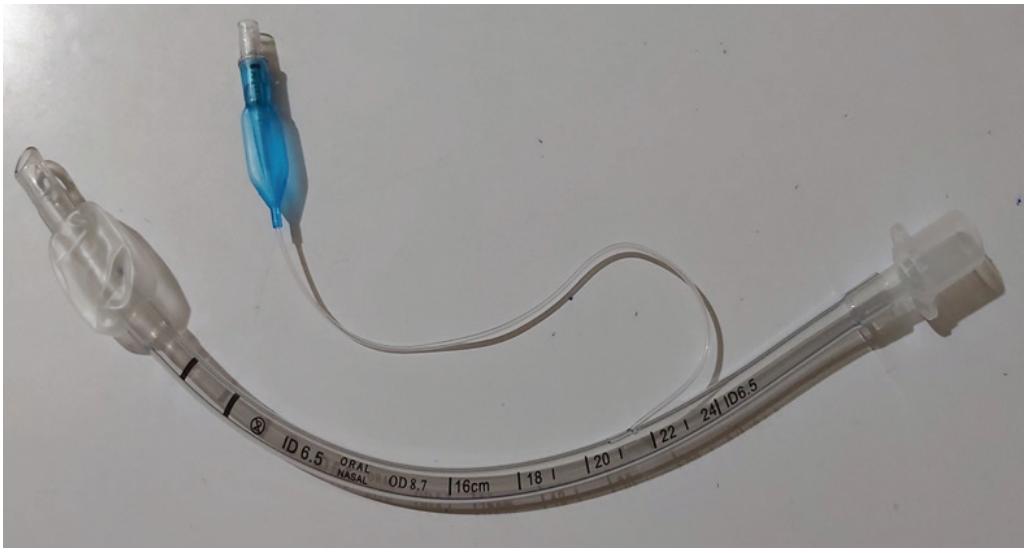
Figure 9. LMA (Laryngeal mask airway)

For General hospitals and above (25-50 bedded and above)

Advanced airway techniques:

Intubation:

Figure 10. Endotracheal tube



7 P s of RSI (Rapid Sequence Intubation)

Preparation

S: Suction
T: Tools for intubation (Laryngoscope handle and blade, check if it is functional or not)
O: Oxygen source for pre oxygenation and ventilation
P: Positioning
M: Monitors, including ECG, pulse oximetry, blood pressure
A: Assistant; Ambu bag with face mask; Airway devices (ETTs, Syringe, Stylets, LMA); Airway assessment
I: Intravenous access
D: Drugs, including induction agent, neuromuscular blocking agent and desired adjuncts

Preoxygenation

Pre intubation optimization

- Management of Hypoxaemia (HFNC, NRB)
- Hypovolemia (Fluid, Noradrenaline)

Paralysis with induction

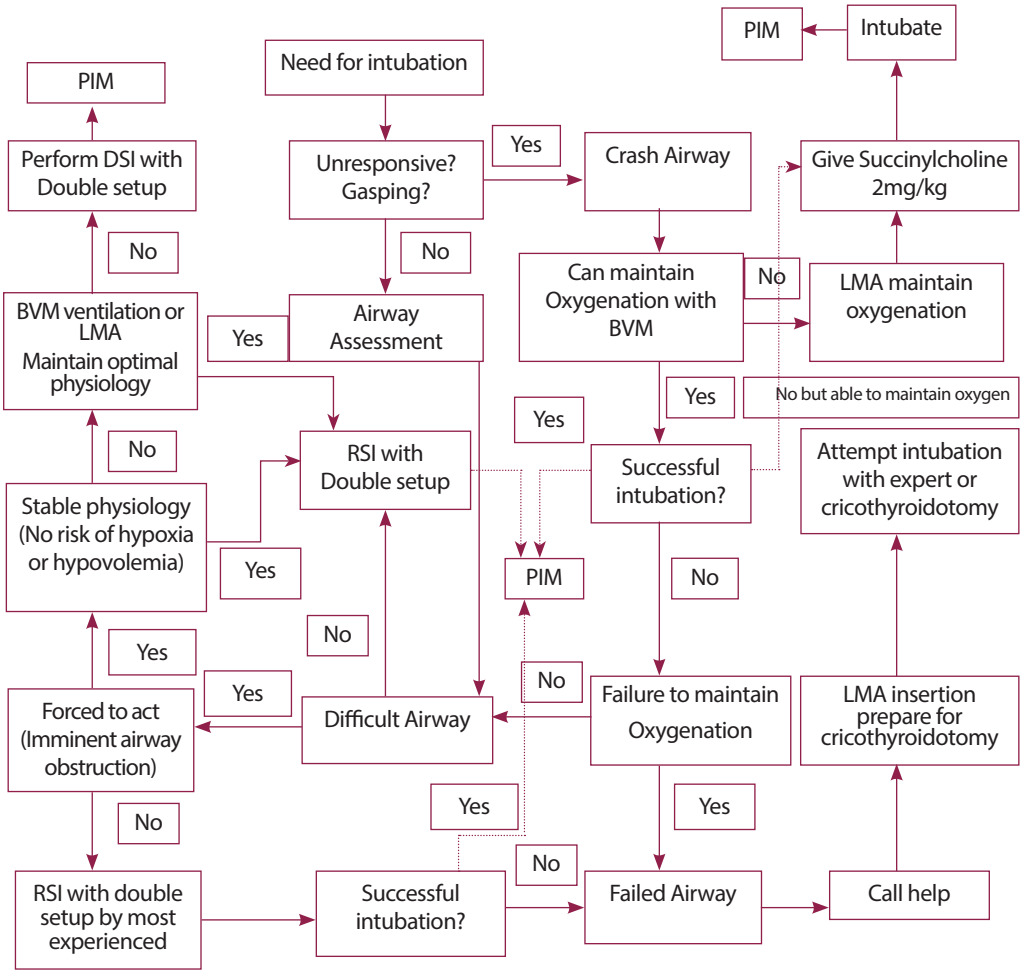
- Induction: Ketamine @ 1 to 2 mg/kg
- Paralysis: Succinylcholine: 2mg/kg maximum 150 mg
- or Rocuronium: 0.6 mg/kg or Vecuronium 0.08-0.1 mg/kg

Positioning

Placement with Proof

Post Intubation Management (PIM)

- Monitor Oxygen Saturation, Blood Pressure, Pulse and Respiratory rate
- Maintain Sedation with Midazolam 1 mg/hour
- Paralysis with Vecuronium 0.01-0.015 mg/kg Or Rocuronium 0.1-0.2 mg/kg intermittent dosing
- Analgesia with Morphine 1 mg/hour
- Check tubes, Urobag and IV lines



Crash Airway: A patient in cardiopulmonary arrest, deep coma who cannot maintain ventilation and oxygenation

Difficult Airway: A clinical situation in which a conventionally trained anaesthesiologist experience difficulty with mask ventilation, difficulty with tracheal intubation or both

Failed Airway: If unable to intubate by multiple attempts or failure to intubate and oxygenation cannot be maintained

Breathing Management

Once the airway has been secured, check for adequacy of breathing and oxygenation.

Breathing assessment	
Look	• Respiratory rate • Symmetrical chest movement • Respiratory distress • Paradoxical breathing (in trauma)
Listen	• Air entry on both sides of chest (decreased or absent breath sounds indicate chest pathology)
Feel	• Tracheal shift Opposite side: Hemothorax, pneumothorax Same side: Lung collapse • Chest wall tenderness • Percussion on the side with decreased air entry Hyperresonant: Pneumothorax, Dull: Hemothorax

Breathing management:

Steps 1-3 should be followed by the Basic and Primary level health facilities.

Management from step 4 onwards should be continued by the general hospitals and higher level health facilities.

Steps	Actions	Descriptions
1	Evaluate oxygen requirement	Following patient requires oxygen therapy 1. Respiratory rate more than 20 breath per minute 2. Oxygen saturation less than 94% in room air
2	Determine initial oxygen flow rate	1. RR 20-30 per minute: Give oxygen at 1-5 litres per minute 2. RR 30-40 per minute: Give oxygen at 6-10 litres per minute 3. RR more than 40 per minute: Give oxygen at 10-15 litres per minute
3	Choose appropriate oxygen delivery device	Start on 4. Nasal Prongs: 1-5 litres per minute (RR Up to 20-30 per min) 5. Face mask: 6-10 litre per minute (Up to 30-40 per min) 6. Non-rebreathing mask: 10-15 litre per minute (More than 40)

Steps	Actions	Descriptions
4	ABG (if available)	ABG if oxygen requirement is more than 5 litres per minute Calculate PaO_2/FiO_2 ratio and A-a gradient as following patient requires pressure support in form of HFNC, NIV or MV 1. PaO_2/FiO_2 ratio less than 200 2. A-a gradient not improving with oxygen A-a gradient = {(150 mmHg - $PaCO_2$)/0.8} - PaO_2 Normal A-a gradient estimate for the patient = (age in years/4)+4 (FiO_2=0.21)
4	Evaluate in less than 5 minutes and titre flow rate to achieve expected oxygen saturation	Expected oxygen saturation is 94% Anticipate pressure support in form of HFNC, NIV or MV in patient whose oxygen saturation is not improving despite oxygen therapy.
5	Start on high flow nasal cannula (HFNC) if patient is not maintaining saturation with non-rebreathing mask or on clinician discretion if oxygen requirement is more than 10 litres per minute Rule out pneumothorax clinically and with USG	1. Check distilled water connection in HFNC 2. Turn on HFNC 3. Start on following parameter FiO_2 = 100% Temperature = 34 -37 degrees Celsius Flow rate = 20 L/minutes 4. Wait for flow to be warm 5. Inform patient that he/she will experience high flow and warm air. Explain that this will help him/her 6. Let patient experience warmth of flow in his hand 7. Adjust cannula and head strap 8. Increase flow rate by 2 litres per minute every 3-5 minute until desired oxygen saturation is reached
6	Start on BiPAP if patient is not tolerating HFNC Rule out pneumothorax clinically and with USG	Oxygen flow = 10-15 litres per minute IPAP = 8 AND EPAP = 5 Make increment in IPAP and EPAP by 1 every 3-5 minutes till expected oxygen saturation is reached. Consult if not maintaining oxygen saturation at IPAP 15 and EPAP 12

Circulation Management

Shock is an abnormality of the circulatory system that results from organ hypo perfusion and tissue hypoxia.

Circulation assessment

- Colour of peripheries
- Capillary refill
- Heart rate
- Temperature of the peripheries
- Blood pressure
- Urine output

Types of shock and its management

(For Basic and Primary levels of health facilities and General Hospitals)

Hypovolaemic Shock

Clinical signs

- Skin: cold, pale, sweaty, cyanosed
- Capillary refilling time: >2seconds
- Pulse present or not?
  - Radial pulse : Systolic > 80 mmHg
  - Femoral pulse: Systolic > 70 mmHg
  - Carotid pulse: Systolic > 60 mmHg
- Increased pulse rate
- Decreased blood pressure
- Increased respiratory rate
- Urine output <0.5ml/kg/hr
- Altered mental status

Parameter	Class 1	Class 2	Class 3	Class 4
Blood loss	<750ml	750-1500ml	1500-2000ml	>2000ml
Blood Volume lost	<15%	15-30%	30-40%	>40%
Heart Rate	<100/min	100-120/min	120-140/min	>140/min
Capillary refill time	Normal	Delayed	Delayed	Delayed
SBP	Normal	Normal	Low	Low
DBP	Normal	Raised	Low	Often unrecordable
Respiratory rate	Normal	20-30/min	30-40/min	>35/min
Urine output	>30ml/hr	20-30ml/hr	<20ml/hr	<20ml/hr
Mental state	Mildly anxious	Anxious	confused	Confused/ drowsy
Resuscitation	Crystalloid	Crystalloid	Crystalloid and blood	Crystalloid and blood

Management of hypovolemic shock

- Open two wide bore cannulas (16G)
- During the first 30 minutes give 30 ml/kg RL or NS bolus.
- If still in shock, repeat bolus. Over next 2½ hours give 70 ml/kg.
- Monitor the patient every 30 minutes and titrate fluids according to response. If the patient remains in shock, give fluids at increased rates.

Anaphylactic shock

- Give epinephrine (adrenaline) 0.5 ml 1:1000 IM
- May repeat every 5 minutes several times if no or incomplete response (patient remains in shock).

Cardiogenic shock

- Assessment and treatment for MI, cardiac tamponade and cardiac arrhythmia
- If there is no clinical evidence of fluid overload, give fluids cautiously (250–500 ml).
- If there is clinical evidence of fluid overload, consider vasopressors.

Septic shock

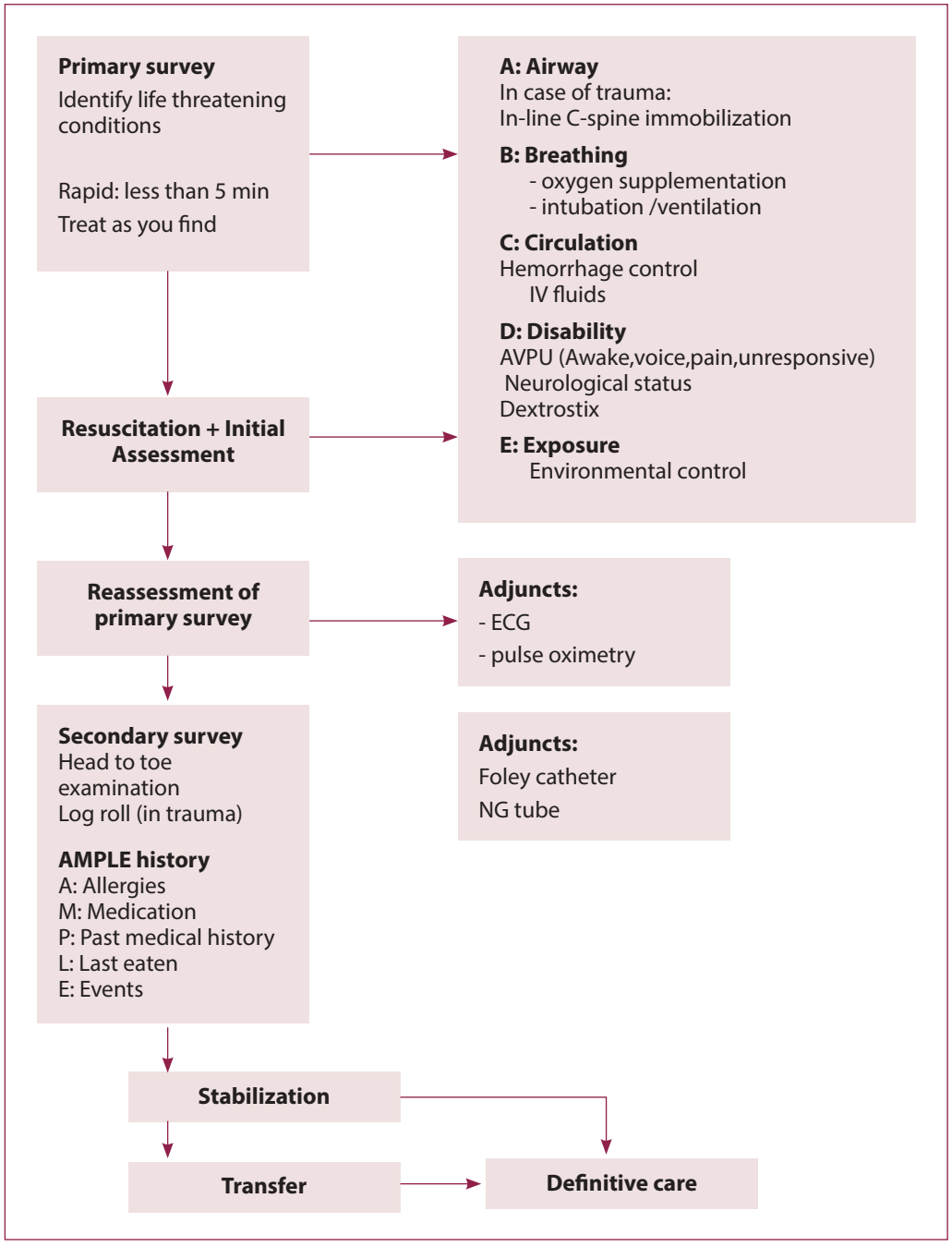
- Initial 1000 ml RL or NS bolus
- Continue RL or NS at 20 ml/kg/hour, not to exceed a maximum of 60 ml/kg in the first 2 hours (including the initial bolus).
- Monitor SBP and clinical signs of perfusion (urine output, mental status).
- Consider adding vasopressors (Noradrenaline) if SBP remains <90 and signs of poor perfusion continue after fluid resuscitation (estimated 60 ml/kg) even within first 2 hours.
- Give antibiotics within first hour of patient's arrival.

Primary Trauma Care

Aimed at preventing death and disability in seriously injured patients using the available resources. Primary trauma care should be provided by all the health workers from the basic levels, primary levels of health facilities and general hospitals before referring the patient to higher centres.

Primary Trauma Care System

- Prevention
- Triage
- Primary survey
- Secondary survey
- Stabilization
- Transfer


Primary survey
Identify life threatening conditions
Rapid: less than 5 min
Treat as you find
A: Airway
In case of trauma:
In-line C-spine immobilization
B: Breathing
- oxygen supplementation
- intubation /ventilation
C: Circulation
Hemorrhage control
IV fluids
D: Disability
AVPU (Awake,voice,pain,unresponsive)
Neurological status
Dextrostix
E: Exposure
Environmental control
Resuscitation + Initial Assessment
Reassessment of primary survey
Adjuncts:
- ECG
- pulse oximetry
Secondary survey
Head to toe examination
Log roll (in trauma)
AMPLE history
A: Allergies
M: Medication
P: Past medical history
L: Last eaten
E: Events
Adjuncts:
Foley catheter
NG tube
Stabilization
Transfer
Definitive care

Primary Survey

Assessment		Beware	Management
A	Can the patient talk? Look, feel, listen - colour, conscious state - accessory muscle use - sounds	- airway obstruction - breathing difficulty with chest injuries - C spine injury	- clear mouth - Basic airway - Advanced airway - C spine protection
B	Is breathing normal? Chest injuries? Look, feel, listen - chest movement - R/R, tracheal deviation, accessory muscle use - percussion / auscultation	Life threatening injuries - airway injury - Tension/open pneumothorax - massive hemothorax - flail chest	- give oxygen - assist ventilation - decompress pneumothorax - drain hemothorax
C	Is the patient in shock? Is there bleeding? Look, feel, listen Signs of shock (fast pulse, low B.P. , poor capillary return)	Life threatening hemorrhage - chest - abdomen - pelvis - long bones	- stop bleeding - 2 large bore IV cannulas - take blood for cross match and investigations - give IV fluids - monitor urine output
D	AVPU A: is patient awake? V: is patient responding to voice? P: is patient responding to pain? U: is patient unresponsive?		
E	Exposure and temperature control		

Cervical collar application

Application of cervical collar in any case of trauma is very important where cervical injury is suspected or is not ruled out yet since further movement of the cervical spine could cause additional damage to the spinal cord. In case of unavailability of cervical collar, use blocks, sand bags or saline bottles as per availability for stabilization of the spine.

Figure 11. Cervical collar application

Figure 12. Cervical collar application

Secondary Survey

Head to toe examination
Head Examination Scalp injuries, ocular injuries, periorbital injuries External ear injuries
Neck Examination Tracheal deviation Penetrating wounds Subcutaneous emphysema
Chest Examination Blunt/ penetrating trauma Rib Fractures Subcutaneous emphysema Chest movement
Abdomino-pelvic Examination Blunt /penetrating trauma (distension, tenderness, guarding, rigidity) Rectal injuries Urethral injuries
Neurological Examination Glasgow coma scale Tone, power, reflexes
Limb Examination Abrasions, lacerations, fractures DNVS
Back (Perform Log Roll to examine back) Examine the back for any injuries, swellings. Perform per rectal examination.

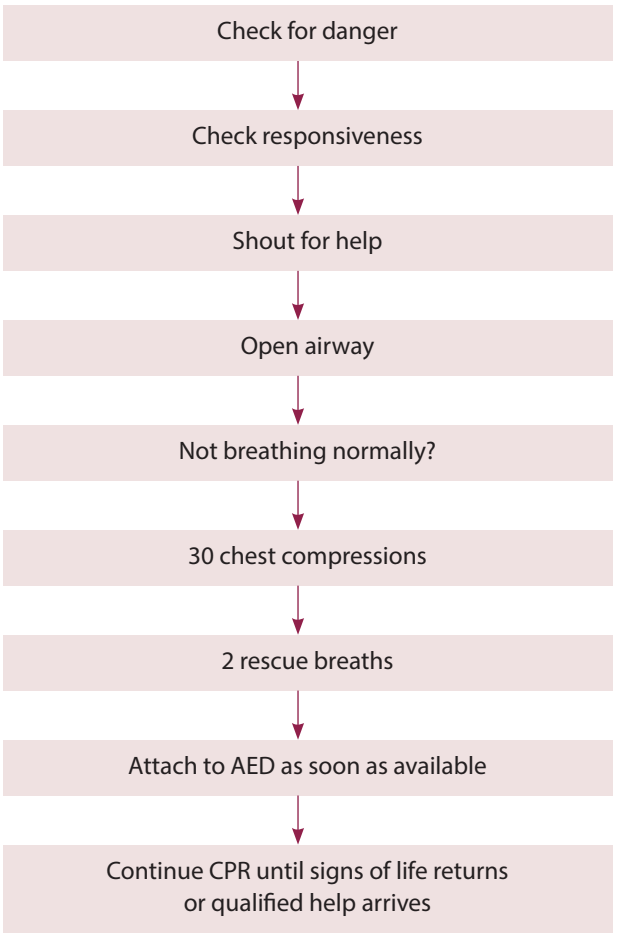
Log roll

- The team leader should give commands clearly to the team so that all the rescuers perform the log roll at the same time. The team leader protects the head and neck.
- The second person places one hand over the patient's shoulder and the other hand over the patient's hip.
- The third person places one hand over the patient's hip and the other hand over the patient's knee.
- On the count of three by the leader, the patient is log rolled and a fourth person should examine the back.

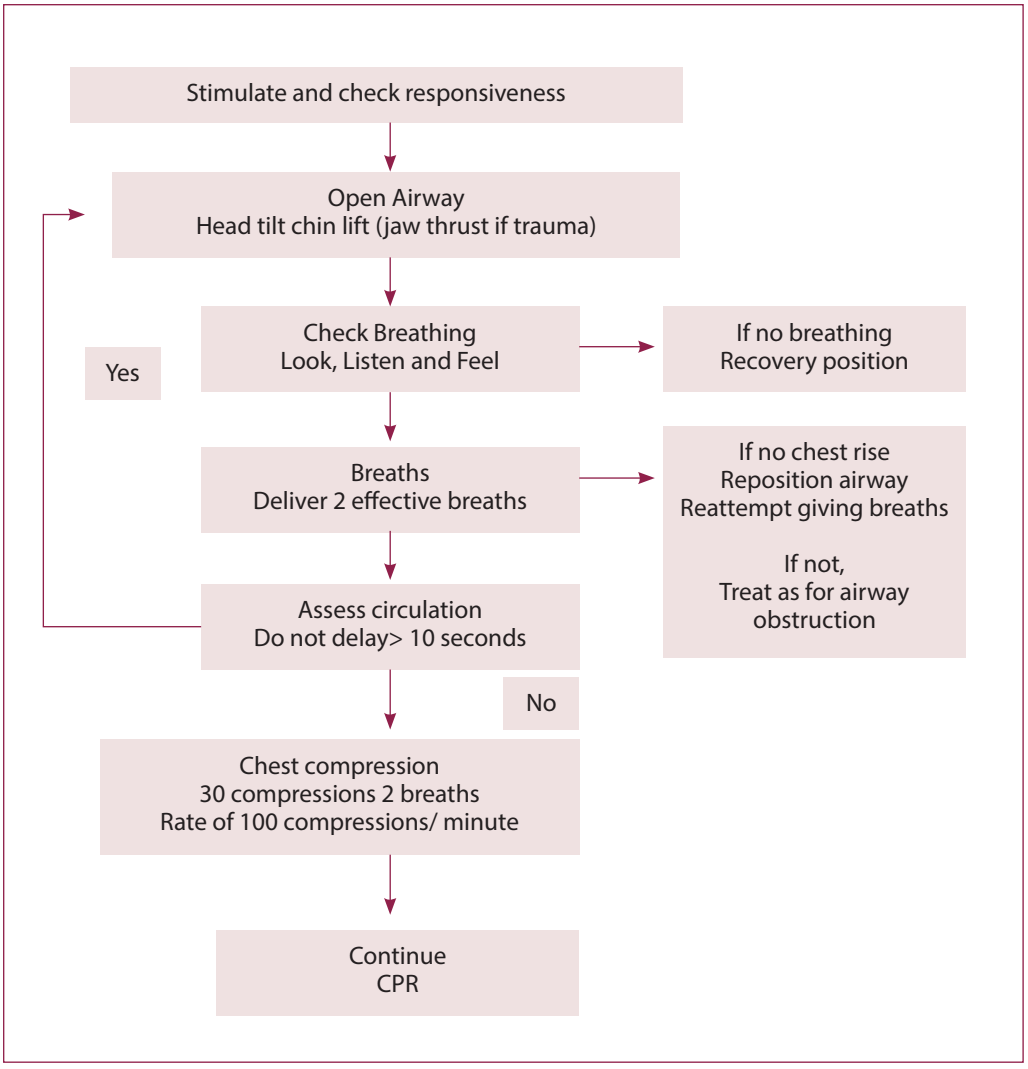
Figure 13. Log roll

Figure 14. Log roll

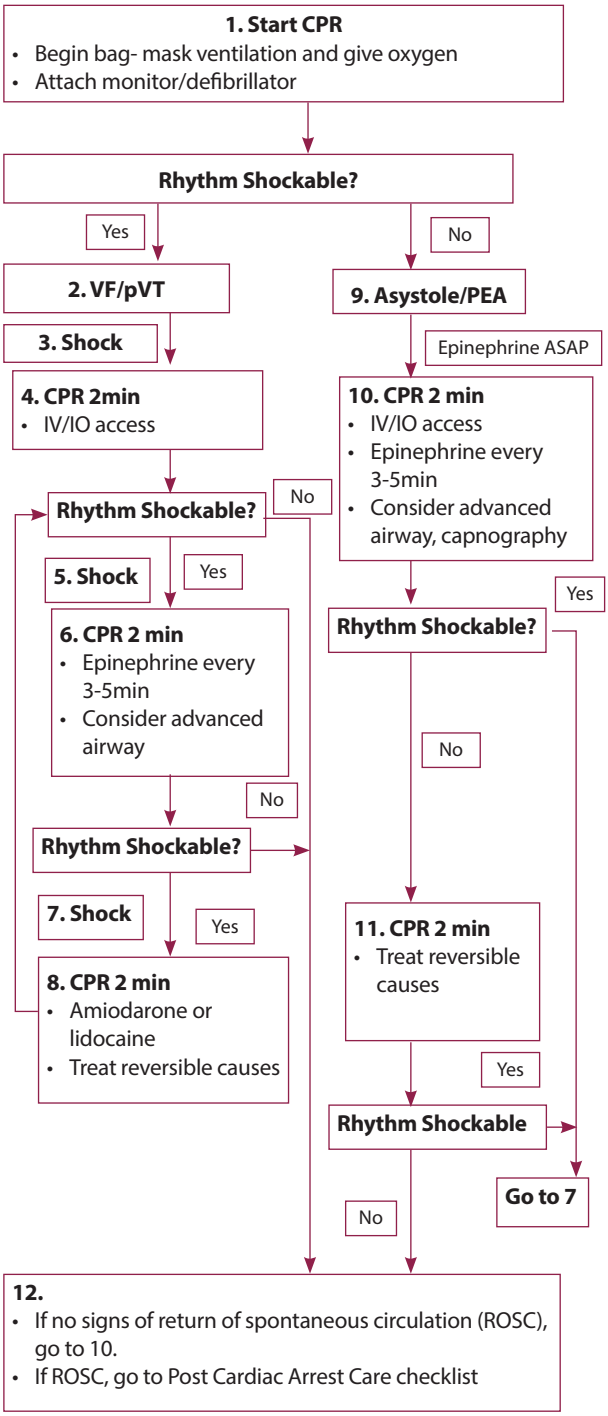
Adult Basic Life Support



Paediatric Basic Life Support



Paediatric Cardiac Arrest Algorithm



CPR Quality

- Push hard (≥1/2 of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruption in compressions.
- Change compressor every 2 min, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.
- If advanced airway, provide continuous compressions and give a breath every 2-3 seconds.

Shock Energy for Defibrillation

- First shock 2 J/ kg
- Second shock 4 J/kg
- Subsequent shocks ≥ 4 J/kg, maximum 10 J/kg or adult dose

Drug Therapy

- **Epinephrine IV/IO dose:** 0.01mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration)
  Max dose 1 mg.
  Repeat every 3-5 minutes. If no IV/IO access, may give endotracheal dose: 0.1 mg/kg. (0.1 mL/kg of the 1 mg/mL concentration).
- **Amiodarone IV/IO dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 3 total doses for refractory VF/pulseless VT or
  Lidocaine IV/IO dose: Initial: 1 mg/kg loading dose

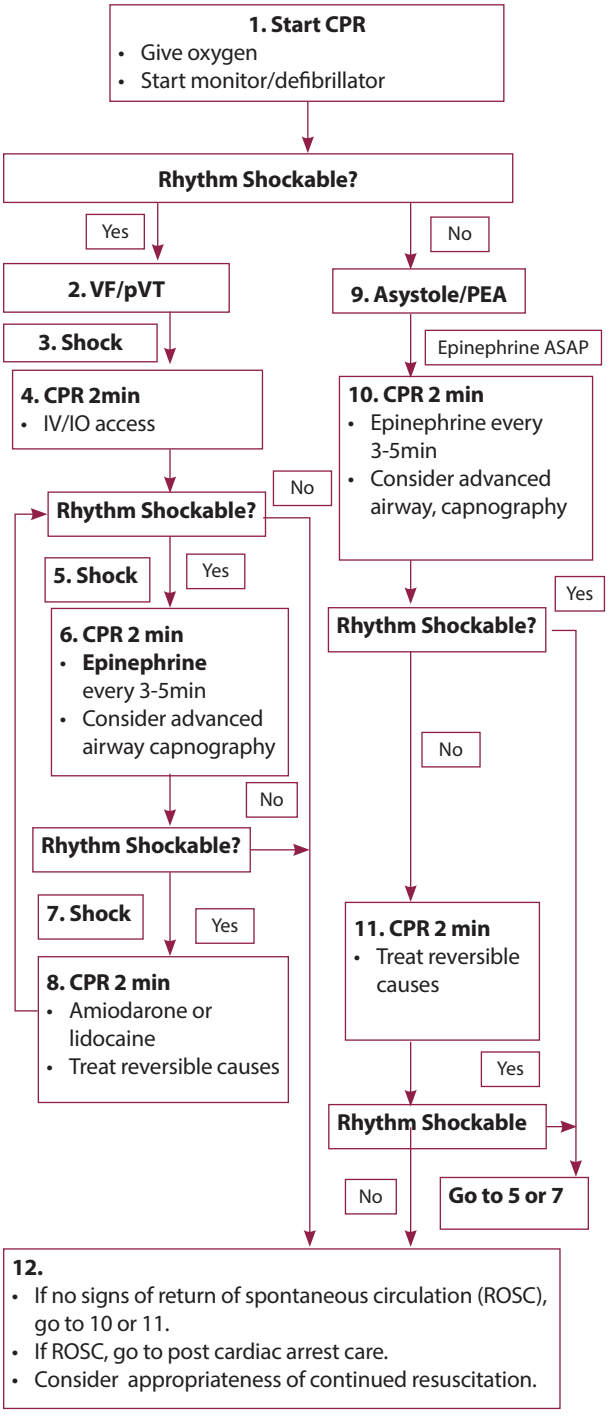
Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypoglycemia
Hypokalemia/hyperkalemia
Hypothermia
Tension Pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, Pulmonary
Thrombosis, Coronary

Adult Cardiac Arrest Algorithm



CPR Quality

- Push hard (at least 2 inches or 5cm) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruption in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 min, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography (If PETCO2 is low or decreasing, reassess CPR quality)

Shock Energy for Defibrillation

Biphasic: Manufacturer recommendation (eg.initial dose of 120-200J); if unknown, use maximum available
- Second and subsequent doses should be equivalent, and higher doses may be considered

Monophasic: 360J

Drug Therapy

- **Epinephrine IV/IO dose:** 1mg every 3-5 minutes
- **Amiodarone IV/IO dose:**
  First dose: 300mg bolus
  Second dose: 150mg, or
- **Lidocaine IV/IO dose:**
  First dose: 1-1.5mg/kg
  Second dose: 0.5-0.75mg/kg

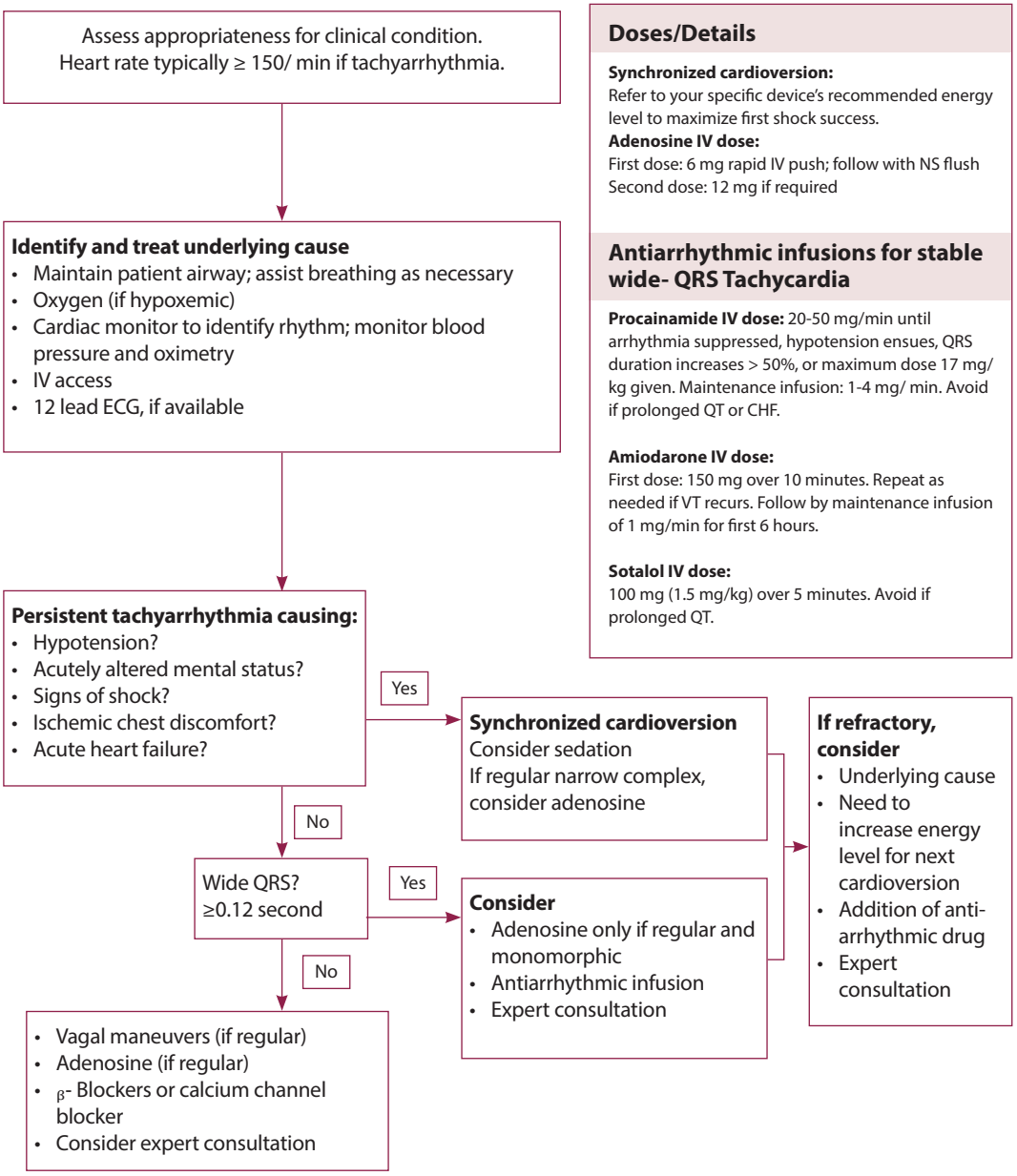
Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10breaths/min) with continuous chest compressions

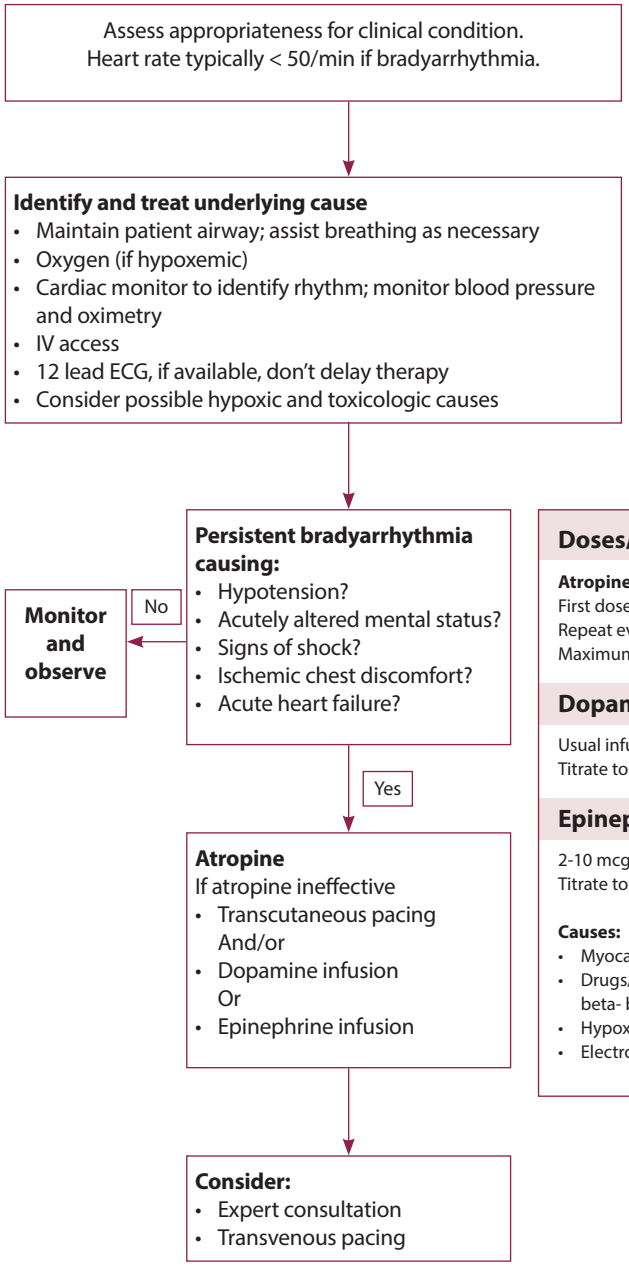
Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypoglycemia
Hypokalemia/hyperkalemia
Hypothermia
Tension Pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, Pulmonary
Thrombosis, Coronary

Adult Tachycardia with a Pulse Algorithm



Adult Bradycardia Algorithm



Doses/ Details

Atropine IV dose:
First dose: 1 mg bolus.
Repeat every 3-5 minutes.
Maximum: 3 mg

Dopamine IV infusion:

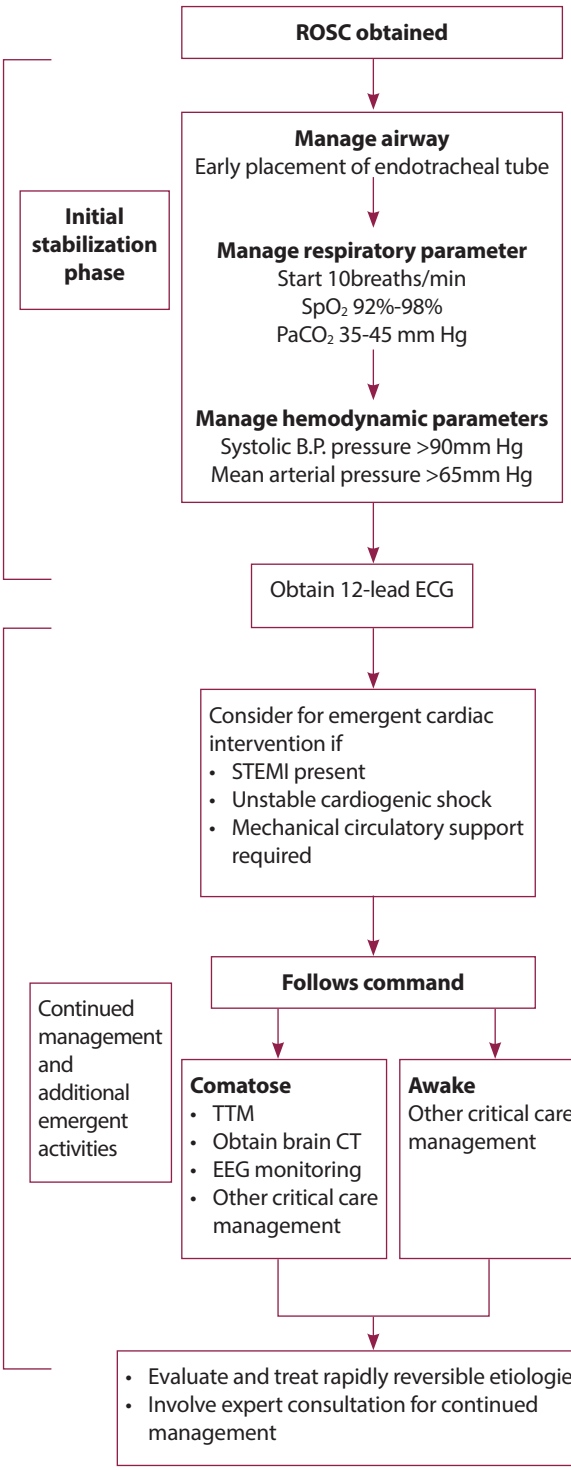
Usual infusion rate is 5-20 mcg/kg per minute.
Titrate to patient response; taper slowly.

Epinephrine IV infusion:

2-10 mcg per minute infusion.
Titrate to patient response.

Causes:
- Myocardial ischemic/ infarction
- Drugs/toxicologic (eg. calcium- channel blockers, beta- blockers, digoxin)
- Hypoxia
- Electrolyte abnormality (eg. hyperkalemia)

Adult Post- Cardiac Arrest Care Algorithm



Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:-

- Airway management: Waveform capnography or capnometry to conform or monitor endotracheal tube placement.
- Manage respiratory parameters: Titrate FiO_2 for SpO_2, 92-98%, start at 10breaths/min, titrate to $PaCO_2$ of 35-45mm Hg.
- Manage hemodynamic parameters: Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90mm Hg or mean arterial pressure >65mm Hg.

Continued Management and Additional Emergent Activities

These evaluations should be done concurrently so that decision on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention.
- TTM: If patient isn't following commands, start TTM as soon as possible; begin 32-36 degrees Celsius for 24 hours by using a cooling device with feedback loop.
- Other critical care management:
  - Continuously monitor core temperature (esophageal, rectal, bladder)
  - Maintain normoxia, normocapnia, euglycemia
  - Provide continuous or intermittent electroencephalogram (EEG) monitoring
  - Provide lung protective ventilation

H's and T's

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypokalemia/hyperkalemia
Hypothermia
Tension Pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, Pulmonary
Thrombosis, Coronary

LIST OF EMERGENCY CONDITIONS

1 RESPIRATORY EMERGENCIES

Shortness of Breath

Common presenting feature in the emergency which can be life threatening.

It is an unpleasant awareness of sensation of breathing.

Causes

System	Causes
Pulmonary	AE COPD Acute severe asthma Pneumothorax Pneumonia Pulmonary embolism Trauma
Cardiovascular	Acute pulmonary edema Acute coronary syndrome Cardiac tamponade Heart failure
Neurological	Acute stroke Neuromuscular disease
Upper airway	Foreign body Trauma
Metabolic	Diabetic ketoacidosis Metabolic acidosis
Others	Psychogenic Obesity Pregnancy Anemia Poisoning

History	Physical examination
Onset: sudden/acute onset (within minutes to hours) chronic (within days to months) Associated symptoms: ▪ Cough ▪ Sputum (colour, amount, blood mixed or not) ▪ Fever ▪ Chest pain ▪ Orthopnea, paroxysmal nocturnal dyspnoea ▪ Edema ▪ Confusion ▪ Past medical/ surgical history	**Vitals :** check for tachycardia, tachypnea, fever, hypertension/ hypotension, oxygen saturation ▪ Use of accessory muscles of respiration and retractions ▪ Fragmented speech ▪ Audible stridor/ wheezes ▪ Profound diaphoresis ▪ Agitation/ altered mental status

Investigations

- Chest x-ray
- Ultrasound (bedside if available)
- ECG
- ABG
- Chest CT/ VQ scan
- Pulmonary function tests

Management

1. Initial assessment and resuscitation: Maintain airway, breathing, circulation
2. Establish the most likely cause of dyspnea and initiate treatment.
3. Acute exacerbation of COPD/ Acute bronchial asthma
   a. Bronchodilators
   b. Steroids
   c. Antibiotics (if presence of infective exacerbation)
4. Acute pulmonary edema
   a. Diuretics
   b. Antihypertensives
5. Pneumonia
   a. Antibiotics
6. Pneumothorax / Pleural effusion
   a. Tube thoracostomy
7. Pulmonary embolism
   a. Anticoagulants

Acute exacerbation of chronic obstructive pulmonary disease (COPD)

It is a chronic slowly progressive irreversible airflow obstruction characterized by progressive dyspnea, chronic intermittent cough with sputum, recurrent lower respiratory tract infection with history of risk factors (smoking, indoor or outdoor pollution,etc)

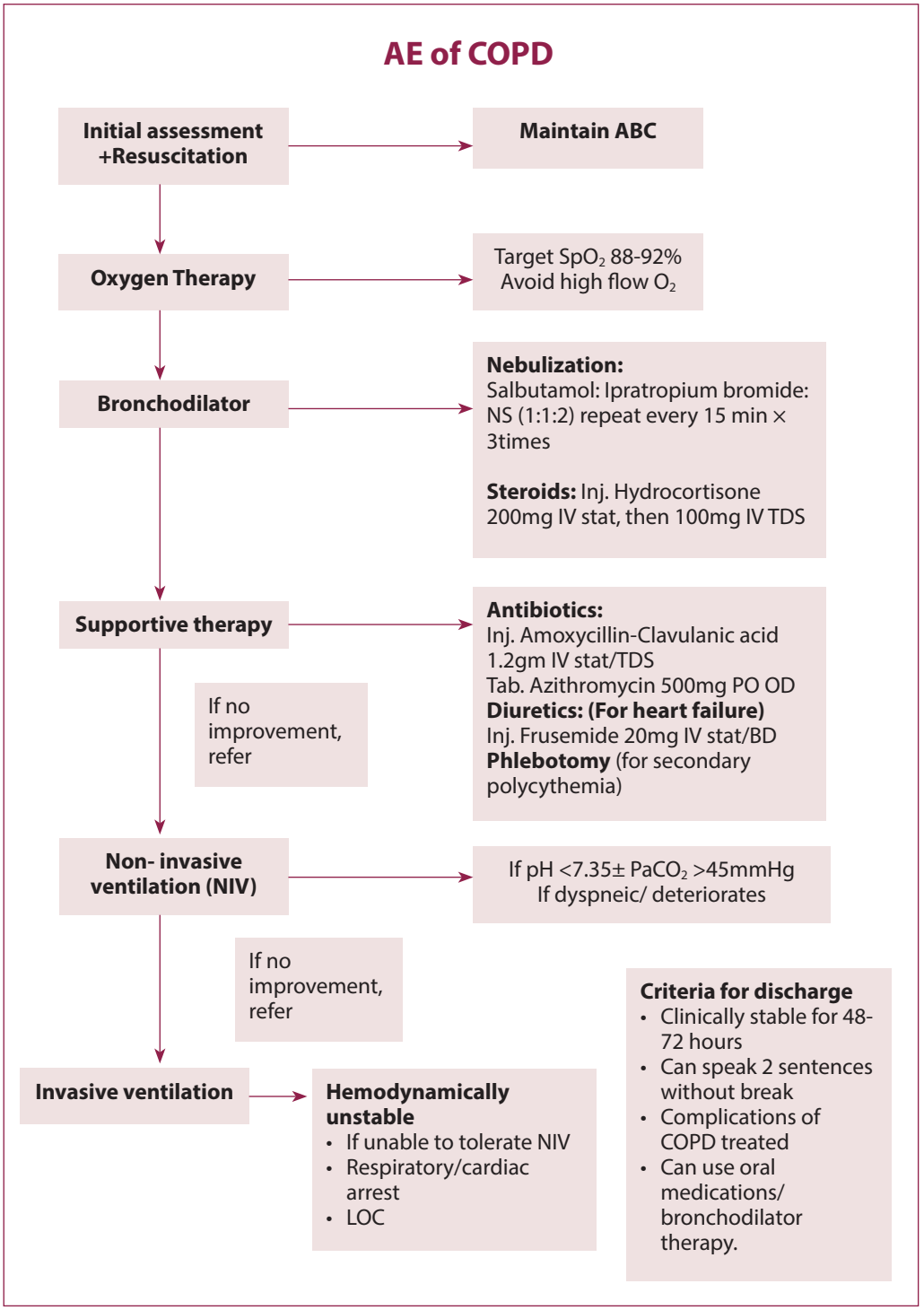
AE of COPD: Sudden increase in shortness of breath with increase in sputum volume and/ or change in sputum colour.

Clinical Features

Symptoms	Signs
▪ Cough ▪ Sputum (productive/ purulent) ▪ Shortness of breath ▪ Chest tightness	▪ Tachypnea, tachycardia ▪ Prominent accessory muscles of respiration, intercostal indrawing, excavation of suprasternal and supra clavicular fossa ▪ Hyperinflated chest, tracheal tug, pursed lip breathing ▪ Flapping tremor, cyanosis ▪ Polycythemia (secondary) ▪ Features of right heart failure: ↑JVP, hepatomegaly, pedal edema ▪ Vesicular breath sounds with prolonged expiration, wheezes, crepitations

Investigations:

1. CBC
2. RFT, RBS
3. Chest X ray
   *Look for pneumothorax/bulla
4. ECG
5. Sputum profile
6. ABG (if available)


AE of COPD
Initial assessment +Resuscitation
Maintain ABC
Oxygen Therapy
Target SpO2 88-92%
Avoid high flow O2
Bronchodilator
Nebulization:
Salbutamol: Ipratropium bromide: NS (1:1:2) repeat every 15 min × 3times
Steroids: Inj. Hydrocortisone 200mg IV stat, then 100mg IV TDS
Supportive therapy
Antibiotics:
Inj. Amoxycillin-Clavulanic acid 1.2gm IV stat/TDS
Tab. Azithromycin 500mg PO OD
Diuretics: (For heart failure)
Inj. Frusemide 20mg IV stat/BD
Phlebotomy (for secondary polycythemia)
If no improvement, refer
Non- invasive ventilation (NIV)
If pH <7.35± PaCO2 >45mmHg
If dyspneic/ deteriorates
If no improvement, refer
Invasive ventilation
Hemodynamically unstable
• If unable to tolerate NIV
• Respiratory/cardiac arrest
• LOC
Criteria for discharge
• Clinically stable for 48-72 hours
• Can speak 2 sentences without break
• Complications of COPD treated
• Can use oral medications/ bronchodilator therapy.

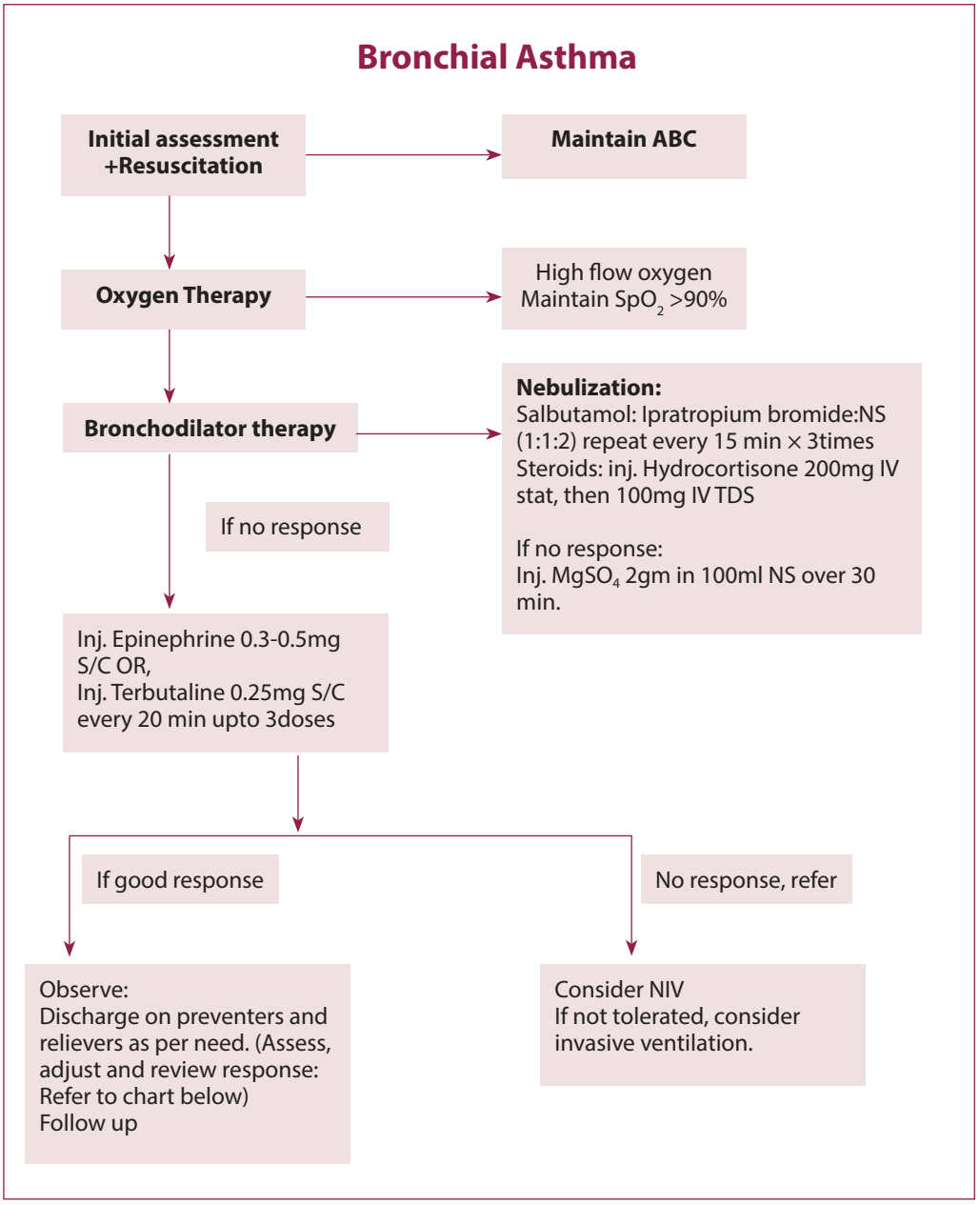
Bronchial Asthma

Chronic inflammatory disorder with airway hyper responsiveness characterized by variability of symptoms (wheeze, cough, shortness of breath and chest tightness) and proven reversibility with bronchodilators.

Acute severe asthma	Life threatening asthma
Respiratory rate > 30/min	Central cyanosis
Pulse rate >110/min	Silent chest
Prominent accessory muscles of respiration	Confusion, coma
Unable to speak in sentences (cannot complete one sentence in a breath)	Cannot speak
Bilateral rhonchi	Bradycardia, hypotension
PEFR < 50% of expected	PEFR< 33% of expected

Investigations

1. CBC,
2. RFT, RBS
3. Chest X ray
    a. *Need to rule out pneumothorax
4. ECG
5. Sputum profile
6. ABG (for severe causes)
    a. Anticoagulants


Bronchial Asthma
Initial assessment +Resuscitation
Maintain ABC
Oxygen Therapy
High flow oxygen
Maintain SpO2 >90%
Bronchodilator therapy
Nebulization:
Salbutamol: Ipratropium bromide:NS (1:1:2) repeat every 15 min × 3times
Steroids: inj. Hydrocortisone 200mg IV stat, then 100mg IV TDS
If no response:
Inj. MgSO4 2gm in 100ml NS over 30 min.
If no response
Inj. Epinephrine 0.3-0.5mg S/C OR,
Inj. Terbutaline 0.25mg S/C every 20 min upto 3doses
If good response
No response, refer
Observe:
Discharge on preventers and relievers as per need. (Assess, adjust and review response: Refer to chart below)
Follow up
Consider NIV
If not tolerated, consider invasive ventilation.

Adults and adolescents 12+ years asthma management

Assess→ Adjust→ Review response

Preferred Controller To prevent exacerbations and control symptoms	**STEP 1** As needed low dose ICS-formoterol (Budesonide-formoterol)	**STEP 2** Daily low dose inhaled corticosteroid (ICS) or as needed low dose ICS formoterol	**STEP 3** Low dose ICS – LABA (long acting Beta 2 agonist)	**STEP 4** ICS – LABA	**STEP 5** High dose ICS- LABA Add-on therapy e.g. tiotropium
Other controller options	Low dose ICS taken whenever SABA is taken +	Leukotriene receptor antagonist (LTRA) or low dose ICS taken whenever SABA taken +	Medium dose ICS, a low dose ICS + LTRA	High dose ICS, add on tiotropium or add on LTRA	Add low dose OCS but consider side effects
Preferred Reliever	As needed low dose ICS formoterol		As needed low dose ICS formoterol		
Other controller options	As needed short acting Beta2-agonist (SABA)				

ICS: Inhaled corticosteroids (Budesonide, Fluticasone)

ICS-LABA (Long acting Beta 2 agonist): Formoterol, salmeterol

SABA (Short acting Beta 2 agonist): Salbutamol

LTRA: Leukotriene receptor antagonist: Monteleukast

SAAC: Short acting anticholinergics: Ipratropium bromide

LAAC: Long acting anticholinergics: Tiotropium

OCS: Prednisolone

Systemic corticosteroids: Prednisolone, Methylprednisolone, Hydrocortisone

Pneumonia

Pneumonia is the acute inflammation of the lung parenchyma distal to terminal bronchioles.

Community acquired pneumonia (CAP)

Etiology

Causative organisms:

- *Streptococcus pneumoniae*
- *Hemophilus influenzae*
- *Klebsiella pneumoniae*
- *Chlamydia pneumoniae*
- *Mycoplasma pneumoniae*
- *Legionella species*
- *Respiratory syncytial virus*
- *Influenza A and B*
- *Coronavirus (MERS-CoV, SARS)*

Clinical Features

Symptoms	Signs
Fever, high grade, continuous Cough, SOB Sputum (rusty, blood stained) Pleuritic chest pain Malaise, anorexia	Tachycardia Tachypnea Hypotension Cyanosis Confusion Coarse crepitations Bronchial breath sounds

Assessment of severity: CURB-65 score

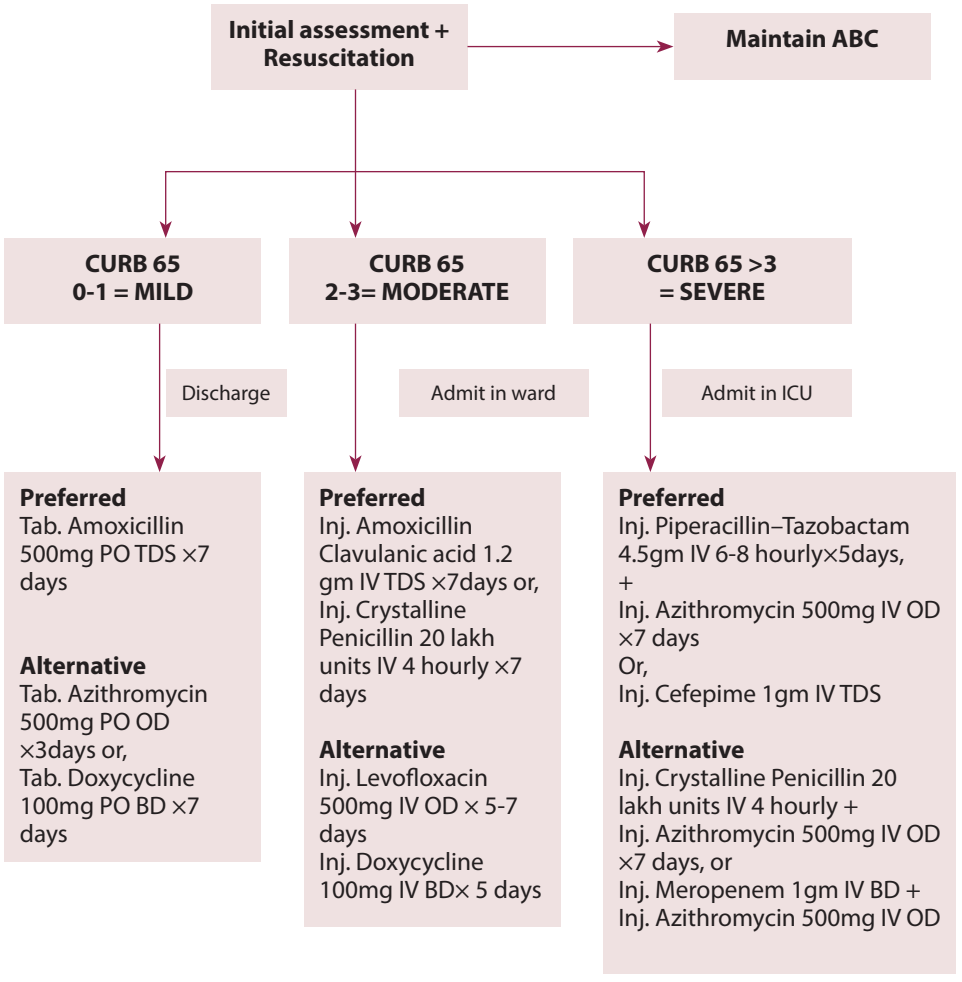
Confusion	(No orientation to time, place and person OR, abbreviated mental test score<8)
Urea	(>42 mg/dl)
Respiratory rate	>30/min
Blood pressure	(SBP< 90mmHg or DBP< 60mmHg)
Age	>65 years

CURB 65	0-1	Outpatient
CURB 65	2	Inpatient (ward)
CURB 65	>3	Inpatient (ICU)

Investigations

- CBC
- RFT, RBS
- ABG
- Blood, sputum C/S
- CXR
- ECG

Community acquired pneumonia (CAP)



Note: Levofloxacin is used with caution in the treatment of lower respiratory tract infections since it is included in the Tuberculosis guideline for Isoniazide resistant and Fluroquinolone sensitive tuberculosis, so rational and targeted use of this medicine is recommended.

For Mild pneumonia

Age less than 65, nonsmoker and no history of antibiotics intake in the past three months	Age more than 65 or smoker or history antibiotics intake in the past three months
Tab. Amoxycillin 500mg PO TDS X 7days, or Tab. Azithromycin 500mg PO OD X 5 days, or Tab. Doxycycline 100mg PO BD X 7 days	Tab. Amoxycillin-clavulanic acid 625 mg PO TDS X 7 days + Tab. Azithromycin 500mg PO OD X 5 days, or Tab. Doxycycline 100mg PO BD X 7 days

For Moderate to Severe Pneumonia

No risk or Pseudomonas or MRSA	Tab. Amoxycillin-clavulanic acid 625 mg PO TDS X 7 days + Tab. Azithromycin 500mg PO OD X 5 days
Risk of Pseudomonas: IV antibiotics in last 3 months, structural abnormality in lung (bronchiectasis), COPD with frequent AE (more than 2 per year or more than 1 or more requiring hospital admission)	First choice: Inj. Cefipime 1gm IV TDS or Inj. Piperacillin–Tazobactam 4.5gm IV 6-8 hourly + Inj. Azithromycin 500mg IV OD or Second choice: Inj. Levofloxacin 750mg IV OD
Risk of MRSA: IV antibiotics in last 3 months, following influenza, pneumonia with empyema or cavitary lesion, history of drug abuse, end stage renal disease	Inj. Ceftriaxone 1gm IV BD + Inj. Azithromycin 500mg IV OD + Inj. Vancomycin 1gm IV BD, or Inj. Linezolid 600mg IV BD
Risk of Pseudomonas and MRSA	Inj. Cefepime 1gm IV TDS + Inj. Azithromycin 500mg IV OD + Inj. Vancomycin 1gm IV BD, or Inj. Linezolid 600mg IV BD
If Influenza (Influenza A or B)	Tab. Oseltamivir 75mg PO OD to be started

Aspiration Pneumonia

Pneumonic consolidation in which there is destruction of lung parenchyma by inflammatory process due to inhalation of any septic material or vomitus. It refers to any adverse pulmonary consequences due to entry of gastric or oropharyngeal fluids or exogenous substances like ingested food particles or liquids into the lower airways.

Predisposing factors

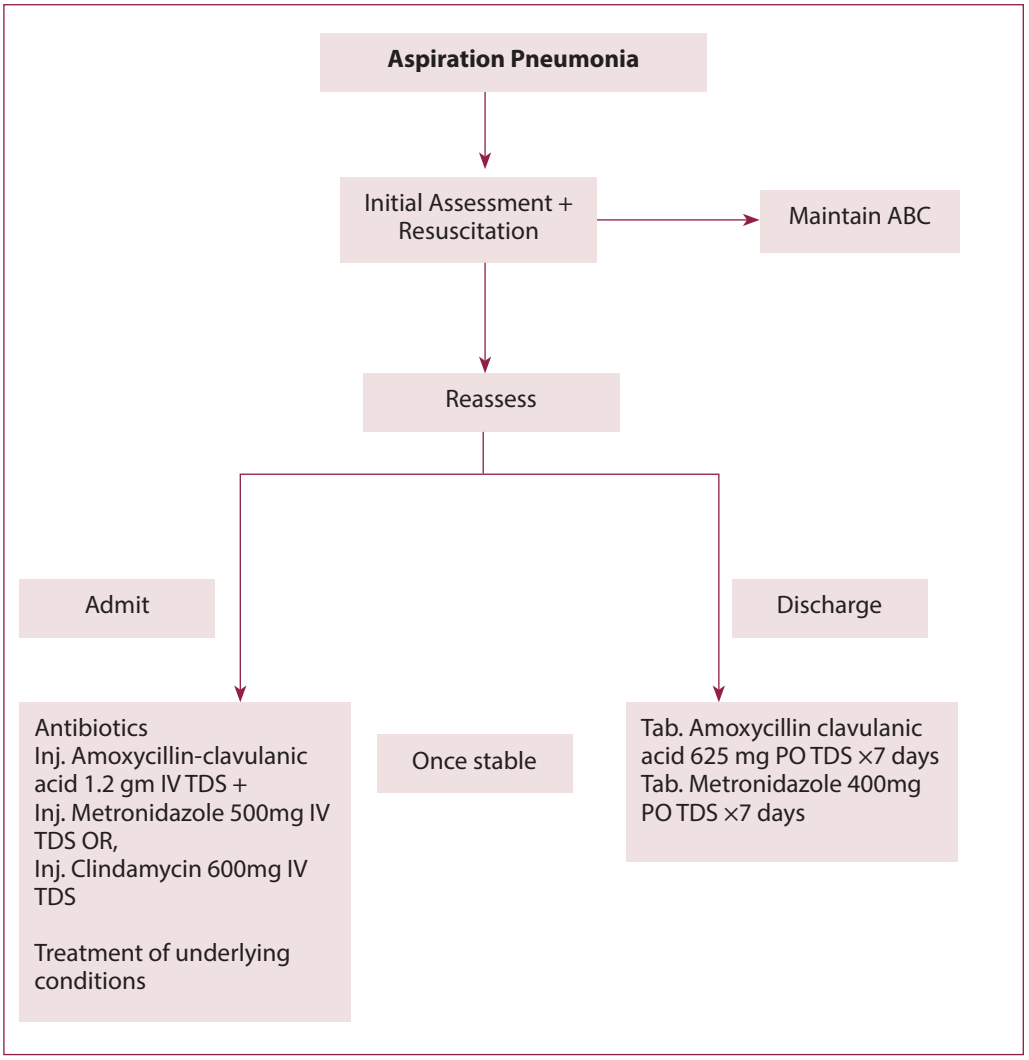
Altered sensorium -Head trauma, seizures, drug overdose, alcoholism
Dysphagia -Oesophageal strictures, neoplasms, achalasia
Others -vomiting, general debility, recumbent position

Clinical features

Symptoms	Signs
- Productive cough, SOB - Blood stained/ fetid sputum - Chest pain on deep inspiration - Fever, high grade, sudden onset	- Tachycardia - Tachypnea - Signs of consolidation

Investigations:

- CBC
- RFT, RBG
- Sputum profile
- CXR
- Blood C/S


Aspiration Pneumonia
Initial Assessment + Resuscitation
Maintain ABC
Reassess
Admit
Discharge
Antibiotics
Inj. Amoxycillin-clavulanic acid 1.2 gm IV TDS +
Inj. Metronidazole 500mg IV TDS OR,
Inj. Clindamycin 600mg IV TDS
Treatment of underlying conditions
Once stable
Tab. Amoxycillin clavulanic acid 625 mg PO TDS ×7 days
Tab. Metronidazole 400mg PO TDS ×7 days

Pneumothorax

Pneumothorax is the collection of air in the pleural cavity.

Classification

1. Primary spontaneous pneumothorax: Occurs in patients without underlying pulmonary disease due to rupture of a sub pleural bleb into the pleural cavity. Seen in young thin males.
2. Secondary spontaneous pneumothorax: Occurs in patients with underlying pulmonary disease. Eg. COPD, bronchial asthma, lung abscess, Carcinoma lung
3. Traumatic pneumothorax: Occurs due to penetrating or blunt chest trauma.
4. Iatrogenic pneumothorax: Occurs as a result of medical interventions e.g. thoracentesis, central venous catheter placement, mechanical ventilation.

3 types

Closed	Open	Tension
Communication between lung and pleura seals as lung collapses.	Communication between pleural space and bronchus doesn't close (bronchopleural fistula)	Communication between lung and pleura persists. Acts as a one-way valve. Important emergency condition.

Clinical Features

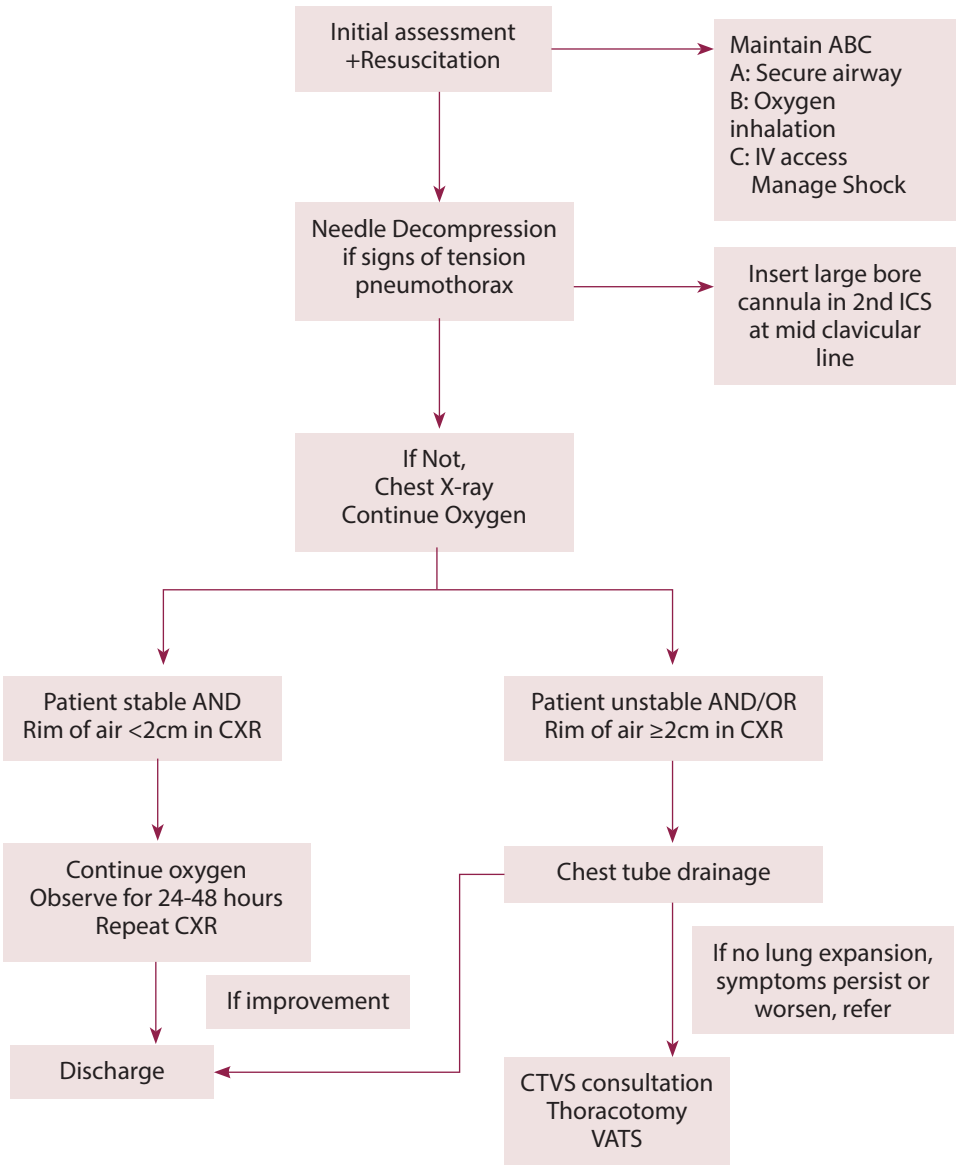
Symptoms	Signs
Sudden onset shortness of breath Pleuritic chest pain Fever, cough H/O underlying disease H/O trauma to chest	Tachypnea, tachycardia Decreased movement of affected side Decreased vocal resonance Decreased/ absent breath sounds over affected side. Chest/E- (Tension Pneumothorax): Raised JVP, Hypotension, trachea shifted to opposite side

Investigations:

Chest X-ray: Small pneumothorax <2 cm between lung and chest wall
Large pneumothorax ≥ 2 cm between lung and chest wall

USG chest: Absence of lung sliding
Tension pneumothorax

Pneumothorax



Hemoptysis

Hemoptysis is the coughing up of blood from the respiratory tract.
Massive hemoptysis is defined as coughing up of:

≥ 500ml of blood over 24 hrs. or,
≥ 100ml per hour

It is a life-threatening emergency and can cause death immediately.

Causes:

- Pulmonary tuberculosis (most common in our country)
- Bronchiectasis
- Acute bronchitis
- Lung abscess
- Pneumonia
- Carcinoma lung
- Pulmonary infarction
- Mitral stenosis
- Bleeding disorders

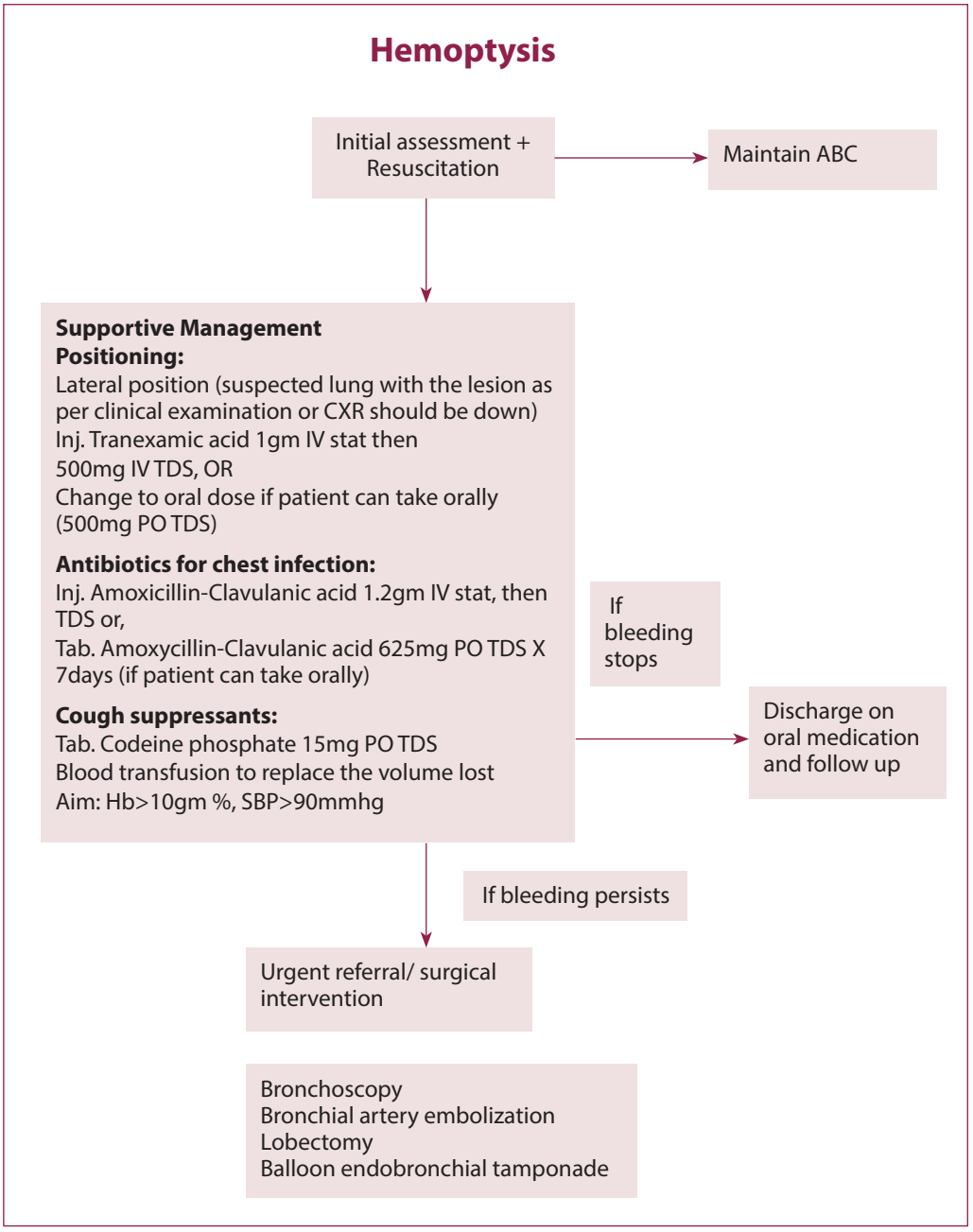
Clinical Features:

- Coughing up of blood, bright red frank blood or blood mixed with sputum
- Chest pain, SOB, fever
- Clubbing, lymphadenopathy

Investigations

- CBC
- RFT, RBS
- Blood grouping and cross matching
- Sputum profile
- CXR

Hemoptysis


Initial assessment + Resuscitation
Maintain ABC
Supportive Management
Positioning:
Lateral position (suspected lung with the lesion as per clinical examination or CXR should be down)
Inj. Tranexamic acid 1gm IV stat then
500mg IV TDS, OR
Change to oral dose if patient can take orally (500mg PO TDS)
Antibiotics for chest infection:
Inj. Amoxicillin-Clavulanic acid 1.2gm IV stat, then TDS or,
Tab. Amoxycillin-Clavulanic acid 625mg PO TDS X 7days (if patient can take orally)
Cough suppressants:
Tab. Codeine phosphate 15mg PO TDS
Blood transfusion to replace the volume lost
Aim: Hb>10gm %, SBP>90mmhg
If bleeding stops
Discharge on oral medication and follow up
If bleeding persists
Urgent referral/ surgical intervention
Bronchoscopy
Bronchial artery embolization
Lobectomy
Balloon endobronchial tamponade

Acute Pulmonary Embolism

Acute Pulmonary embolism is a form of venous thromboembolism causing obstruction of pulmonary circulation.

Usually displaced from deep vein of legs.

Risk factors

Any cause of immobility/ hypercoagulability

- Prolonged bed rest
- Recent surgery (pelvic/orthopedic)
- Disseminated malignancy
- Disorder of clotting mechanism
- Pregnancy/ postpartum
- Hormone replacement therapy

Clinical Features

Symptoms	Signs
Shortness of breath Central chest pain Cough Hemoptysis Syncope Symptoms of deep vein thrombosis	Sinus tachycardia Hypotension Increased JVP Peripheral oedema Cyanosis

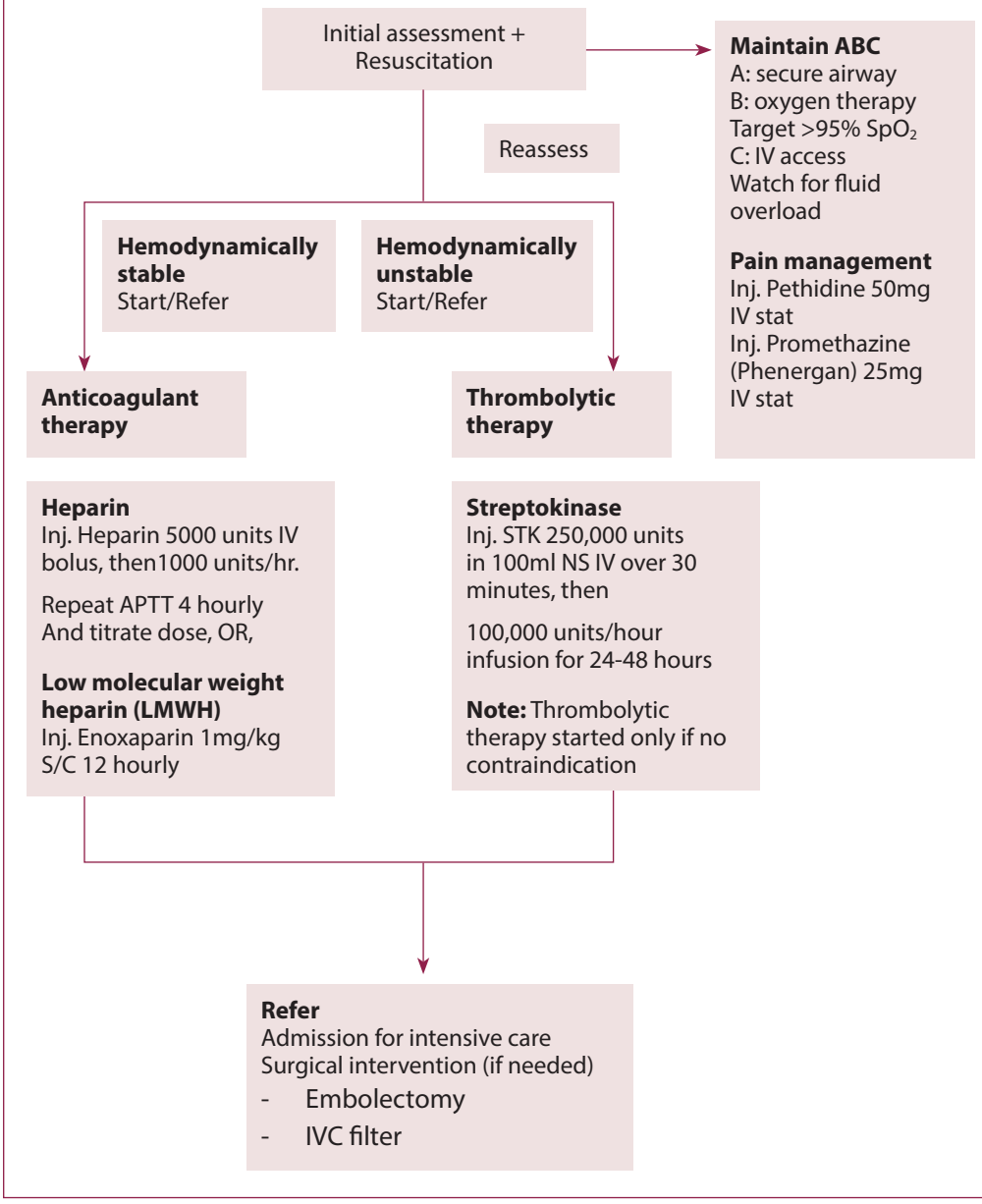
Investigations

- ECG: sinus tachycardia,
  Classical triad (seen in 10% only) = S1Q3T3
- CXR: usually normal
  Westermark's sign – focal oligemia
  Hampton's hump – peripheral wedge shaped density above diaphragm
- D-dimer
- CTPA (pulmonary angiography) – Gold Standard

Modified Well's scoring for clinical assessment of suspected PE

Parameter	Points
Clinical symptoms of DVT (leg swelling, pain with palpitation)	3
Other diagnosis less likely than pulmonary embolism	3
Heart rate >100	1.5
Immobilization (≥3 days) or surgery in the previous 4 weeks	1.5
Previous DVT/PE	1.5
Hemoptysis	1
Malignancy	1
Probability	Score
PE likely	>4
PE unlikely	≤4

Acute Pulmonary Embolism



Acute Mountain Sickness

High Altitude Pulmonary Edema (HAPE)

It is a non-cardiogenic pulmonary edema that occurs during rapid ascent to high altitude >3000 meters in objects without prior acclimatization.

Clinical Features:

- Cough, shortness of breath (out of proportion to exertion)
- Fatigue, chest tightness
- Tachypnea, cyanosis, tachycardia, bilateral crepitations
- Blood stained frothy sputum

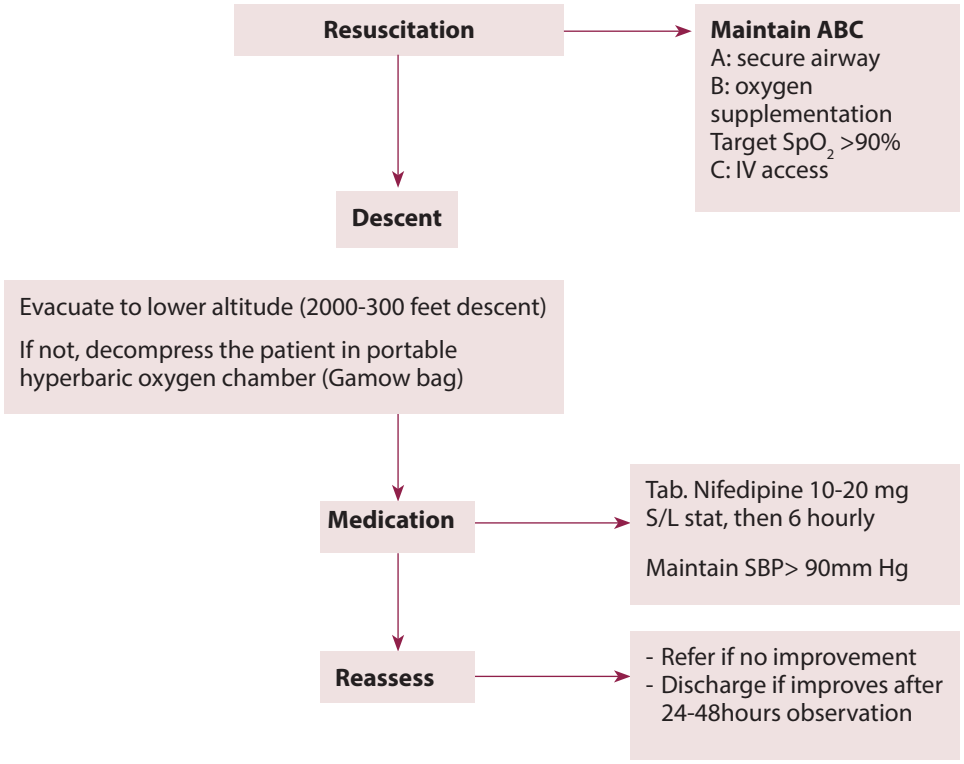
Investigations:

- CBC, RFT, RBG
- CXR – bilateral patchy opacities
- ECG
- ABG (if available)

Management

- Maintain ABC, Descent to altitude less than 3000 m
- Stabilization and symptomatic management (Rest, warmth and oxygen)
- Definitive management as per flowchart.

High Altitude Pulmonary Edema (HAPE)



High Altitude Cerebral Edema (HACE)

Cerebral edema that occurs during rapid ascent to high altitude without prior acclimatization.

It is the neurological deterioration in a person with AMS or HAPE.

Clinical Features:

- Headache, confused, drowsy, comatose
- Nausea, vomiting, dizziness
- Ataxia, tandem gait
- Focal deficit
- Visual impairment- papilledema, retinal hemorrhage
- Respiratory depression

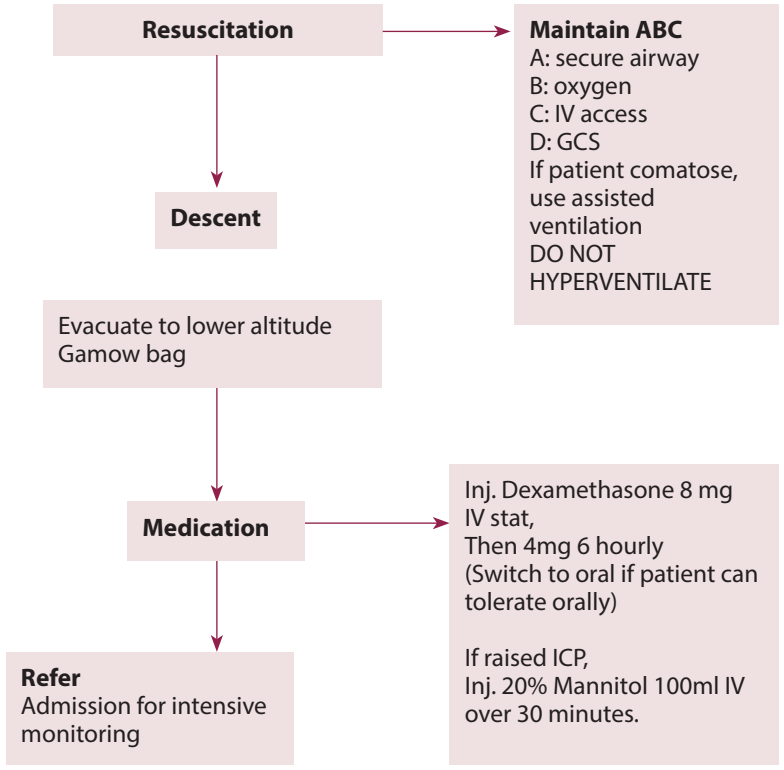
Investigations

- CBC, RFT, RBG
- CXR
- CT head
- ECG
- ABG (if available)

Management

- Maintain ABC
- Descent
- Stabilization and symptomatic management (Rest, warmth and oxygen)
- Definitive management as per flowchart.

High Altitude Cerebral Edema (HACE)



Acute Respiratory Failure

Inadequate gas exchange in the lungs causing fall of PaO_2< 60mm Hg resulting in tissue hypoxia. Diagnosis can be done following arterial blood gas analysis.

Classification

	Type I	Type II
	Hypoxemia with normal $PaCO_2$ Acute hypoxemic respiratory failure	Hypoxemia and hypercapnia ($PaCO_2$ high) Ventilatory failure
Causes	Severe pneumonia Acute severe asthma Acute pneumothorax	AE of COPD Drugs: sedatives, narcotic overdose Brainstem lesions GBS, myasthenia gravis
Clinical features	Severe dyspnea Tachypnea Cyanosis Wheezes, crepitations	Dyspnoea Tachypnea Cyanosis Signs of CO_2 retention: bounding pulse, flapping tremor, warm peripheries
Investigations	CXR, ECG ABG: PaO_2 < 60mmHg $PaCO_2$ normal	CXR, ECG ABG: PaO_2 <60mmHg $PaCO_2$ >50mmHg
Management	Oxygen therapy to achieve adequate oxygen saturations. (High concentration oxygen via face mask and titer to maintain oxygen saturation more than 94%) Treat underlying causes	Oxygen therapy (controlled) Ventilatory support: NIV (Non-invasive ventilation) or, Mechanical ventilation Treat underlying causes

Acute Respiratory Distress Syndrome (ARDS)

ARDS Berlin Definition

Timing	Within 1 week of known clinical insult or new or worsening respiratory symptoms
Chest imaging	Bilateral opacities – not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload Need objective assessment (e.g. Echocardiography) to exclude hydrostatic edema if no risk factor present
Oxygenation Mild Moderate Severe	 200 mm Hg $<PaO_2/FiO_2 \leq$300 mm Hg with PEEP or CPAP ≥ 5cm H2O 100 mm Hg $<PaO_2/FiO_2 \leq$200 mm Hg with PEEP ≥5cm H2O $PaO_2/FiO_2 \leq$100 mm Hg with PEEP ≥ 5cm H2O

Clinical Features

- Rapid onset dyspnea
- Tachypnea
- Features of systemic infection, sepsis, shock
- Restlessness, confusion, coma

Investigations

- CBC, RFT, RBG
- CXR
- ABG (if available)

Management

1. Maintain ABC
2. Oxygen Therapy: Increase flow and/or FiO_2 (High concentration oxygen)
3. NIV
4. Ventilatory support
    - Low tidal volume (6 ml/ Kg body weight)
    - CPAP (Continuous positive airway pressure)
    - IPPV (Intermittent positive pressure ventilation)
    - PEEP (Positive end expiratory pressure)
    - Prone Ventilation
5. Treatment of underlying cause.

2 CARDIAC EMERGENCIES

Chest pain

Acute chest pain is the recent onset of pain, pressure or tightness in the anterior thorax between the suprasternal notch, xiphoid process and bilateral midaxillary lines.

Chest pain could be a major and frequent manifestation of both cardiac and respiratory disease.

Common causes of acute chest pain

Visceral Pain	• Angina (stable/unstable) • Acute myocardial infarction • Aortic dissection • Aortic aneurysm • Esophageal reflux • Mitral valve prolapse syndrome
Pleuritic pain	• Pulmonary embolism • Pneumonia • Spontaneous pneumothorax • Pericarditis • Pleurisy • Malignancy
Chest Wall pain	• Costochondritis (Tietze Syndrome) • Radicular syndromes • Fibromyalgia • Rib fractures • Herpes Zoster
Psychogenic pain	• Anxiety disorder

Symptoms of potentially life threatening causes of chest pain

Classification

Disorder	Location	Character	Radiation/ Associated features
Acute Coronary Syndrome	Retrosternal left sided chest or epigastric region	Squeezing crushing tightness	Left shoulder, arm, jaw followed by right side. Sweating, shortness of breath
Pneumonia	Focal chest	Pleuritic sharp	None, Fever, dyspnea
Pulmonary embolism	Focal chest	Pleuritic	None, Tachycardia, dyspnea
Aortic Dissection	Substernal	Tearing	Intrascapular, dyspnea
Esophageal rupture	Substernal	Sharp pain	Back, Dyspnea, tachycardia
Pneumothorax	Unilateral	Sudden, sharp pleuritic	Back, shoulder sudden onset dyspnea
Perforated peptic ulcer	Epigastric	Severe, sharp	Chest

Difference between cardiac and non-cardiac chest pain

Cardiac	Non-Cardiac or pleuritic
▪ Centrally located or left sided ▪ Described as pressure/ tightness or squeezing ▪ Radiation to left arm, shoulder ▪ Aggravated by exertion /emotions ▪ Associated with diaphoresis, nausea	▪ Located anywhere in the chest ▪ Described as pleuritic or sharp, ▪ No radiation ▪ Worsening with movement or deep inspiration ▪ Association with dyspnea, cough

Investigations:

1. Imaging: Chest X-ray, CT Chest
2. ECG
3. USG chest / abdomen
4. Cardiac biomarkers

Management:

1. Initial assessment and resuscitation
   a. Maintain ABC
   b. Establish the most likely cause and initiate treatment promptly. (refer to relevant chapters)

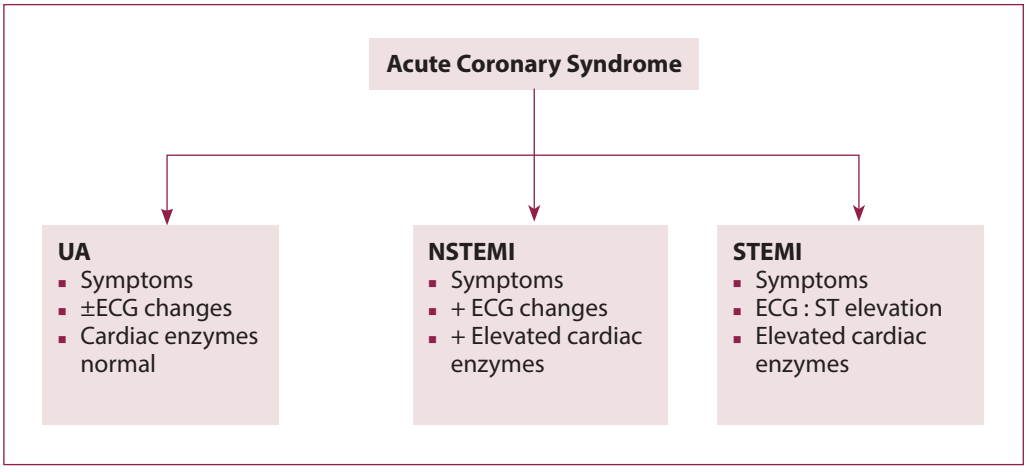
Acute Coronary Syndrome

The term ACS applies to patients with suspicion of myocardial ischemia. It includes a clinical spectrum of ischemic discomfort resulting from atheromatous plaque rupture in a coronary artery leading to complete or near complete obstruction of coronary artery with thrombus.

3 Types

Disorder
Unstable Angina (UA)
Non- ST segment elevation Myocardial infarction (NSTEMI)
ST elevation MI (STEMI)

Clinical features



Unstable Angina/ NSTEMI

- Often described together as NSTE- ACS
- May be indistinguishable at initial evaluation.

Clinical Features

Chest Pain
▪ Retrosternal ▪ Radiation to neck, jaw, left shoulder ▪ Described as heaviness or feeling of tight band ▪ Lasts for > 20 minutes ▪ Not relieved by rest or nitroglycerine ▪ Precipitating factors: Exertion, large meal, cold, sexual intercourse ▪ Associated factors: Nausea, vomiting, profuse sweating, desire to urinate/ defecate

Investigations

1) ECG: - ST depression > 1 mm in two consecutive leads or more
   - Transient ST elevation
   - New T wave inversion > 3 mm
2) Cardiac biomarkers

	CK- MB	Troponin
UA	Normal	Normal
NSTEMI	Raised	Raised

3) Echocardiogram
   RWMA (Regional Wall Motion Abnormality)

Risk Stratification: (TIMI Score)

a) Age ≥ 65 years
b) ≥ 3 Coronary artery disease (CAD) risk factors [family history of CAD, diabetes mellitus, hypertension, dyslipidemia, smoking, obesity]
c) Known CAD (≥ 50% stenosis)
d) ST deviation≥ 0.5 mm
e) Elevated Cardiac markers
f) ≥ 2 episodes of Angina in 24 hours
g) Aspirin use in 7 days

*One point for each	
Low risk	0-2
Intermediate risk	3-4
High risk	5-7

Management

1) Maintain ABC
2) Administer oxygen to maintain SpO_2> 90%
3) Secure IV access
4) Pain management:
a) Nitrates: Tab. Isosorbide dinitrate Sublingual 2.5-5mg every 5 minutes up to 3 doses (if not contraindicated: Right ventricular infarction, hypotension)
b) Morphine: Inj. Morphine 2.5-5 mg IV stat
Repeat after 30 minutes if needed

5) Antiplatelet drugs:
a) Aspirin- Loading: 300 mg per oral (To be chewed)
Maintenance: 75-150 mg OD to be continued
b) Clopidogrel- Loading: 300 mg per oral
Maintenance: 75 mg OD for 9-12 months

6) Statins:
Tab. Atorvastatin 80 mg PO stat

7) Anticoagulation:
- LMWH (Low Molecular Weight Heparin)
Inj. Enoxaparin 40 mg SC stat and 12 hourly X 5-7 days OR
- Unfractionated Heparin 5000 U IV stat and 6 hourly

8) Beta- blockers:
Tab. Metoprolol 25-50 mg PO 6 hourly (If no contraindication: Acute heart failure, acute bronchospasm, cardiogenic shock, AV block)

9) Calcium channel blockers:
Tab. Diltiazem 30-60 mg PO 8 hourly

10) ACE inhibitors:
Tab. Enalapril 2.5- 5 mg PO OD

Disposition

Refer to higher center as soon as possible after stabilization for the following:

Invasive therapy

- PCI (Percutaneous intervention)
- CABG (Coronary Artery Bypass Graft)

Acute Myocardial Infarction

A clinical syndrome characterized by sudden onset of severe chest pain due to complete occlusion of coronary artery by thrombus.

WHO Criteria

1. Chest Pain- Classical
2. ECG changes - ST elevation
   - T wave inversion
   - Pathological Q wave
3. Increase in cardiac markers- Troponin, CPK- MB

*Diagnosis of MI if 2 out of 3 criterias are met

Clinical Features:

Chest Pain

a) Sudden onset, heavy, squeezing, crushing, stabbing pain, not relieved by rest or nitroglycerine
b) Site: Retrosternal
c) Duration: >30 minutes to several hours
d) Radiation: Left arm, jaw, neck
e) Precipitating factors: Exertion, emotional stress, heavy meal
f) Associated factors: Nausea, vomiting, weakness, profuse sweating, pain epigastrium, urge to urinate and defecate, feeling of impending doom

On examination

a) Restless, sweating
b) Respiratory: Bilateral crackles
c) Cardiovascular: S3, systolic murmur, pericardial rub

Investigations

1) ECG

ST elevation MI (STEMI)

- ST elevation > 1 mm in limb leads OR > 2 mm in at least 2 consecutive chest leads
- Hyper acute T wave, broad based, symmetrical, increase in amplitude
- New Q wave 30 ms wide and 2 mm deep in at least 2 leads
- New onset left bundle branch block (LBBB)

Figure 15. **Acute anterior wall myocardial infarction**

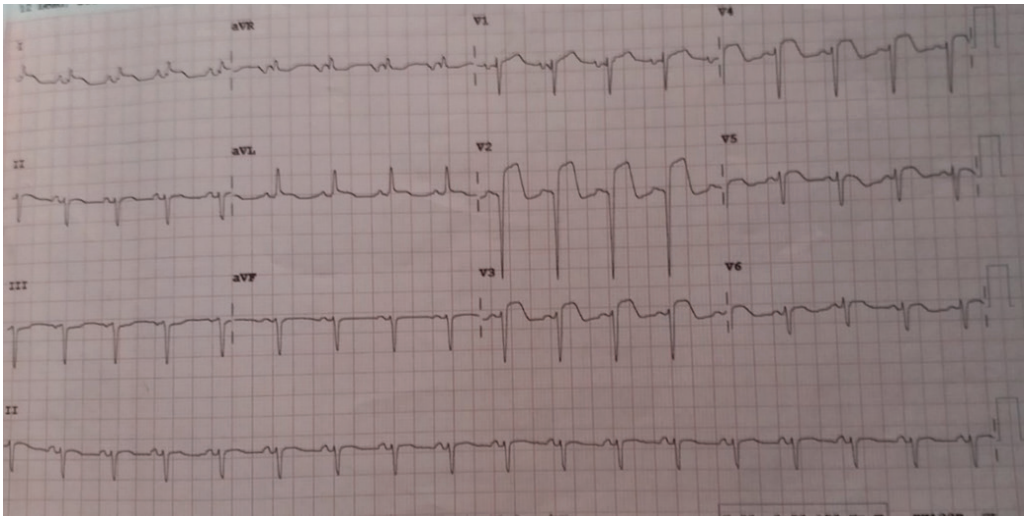
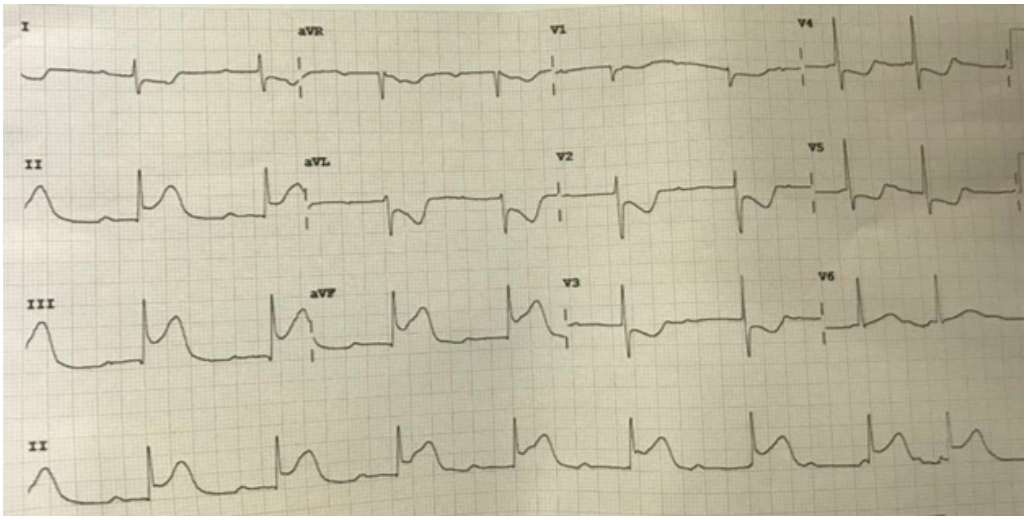


Figure 16. **Acute inferior wall myocardial infarction**



Size of infarct	Changes in Lead
1) Anteroseptal	V_1- V_3
2) Anterolateral	I, aVL, V_4-V_6
3) Extensive anterior wall	V_2-V_5
4) Lateral wall	I, II, aVL
5) Inferior wall	II, III, aVF
6) Posterior wall	Tall R in V_1-V_2, ST elevation in V_7-V_9
7) Right Ventricle	V_4R, V_3R- V_6R

2) Cardiac enzymes:
   - CPK- MB
   - Troponin I
3) Echo
   - RWMA present
   - Ejection fraction: Normal or reduced

Management:

a) Emergency management

1) Maintain ABC
2) Administer oxygen to maintain SpO_2> 90%
3) Open IV line

4) Pain management:
   a. Nitrates: Tab. Isosorbide dinitrate Sublingual 2.5-5mg every 5 minutes up to 3 doses (if not contraindicated: Right ventricular infarction, hypotension)
   b. Morphine: Inj. Morphine 2.5-5 mg IV stat

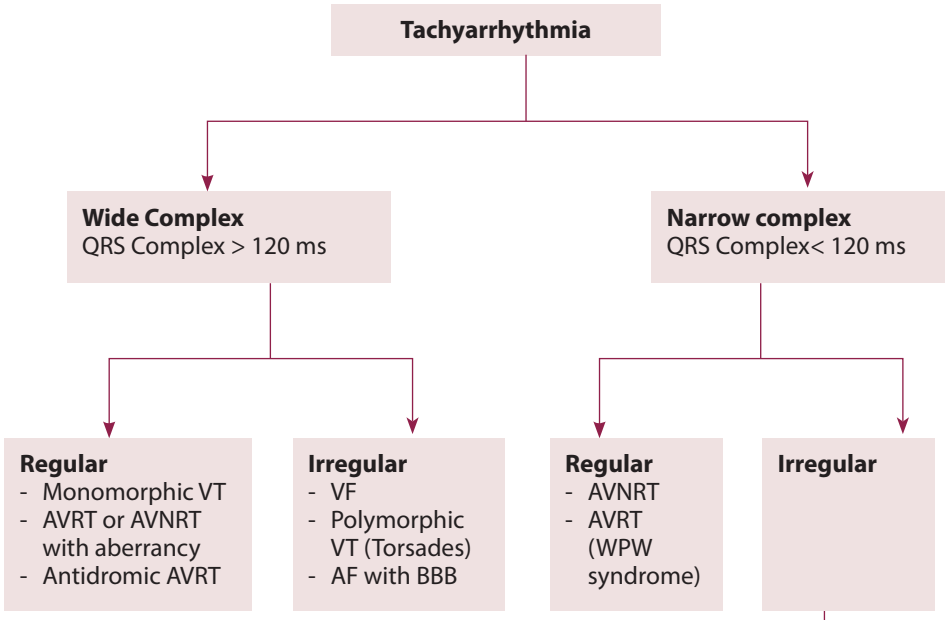
   Repeat after 30 minutes if needed
5) Antiplatelet drugs:
   a. Aspirin- Loading: 300 mg per oral (To be chewed)
      Maintenance: 75-150 mg OD to be continued
   b. Clopidogrel- Loading: 300 mg per oral
      Maintenance: 75 mg OD for 9-12 months
6) Statins:
   Tab. Atorvastatin 80 mg PO stat
7) Anticoagulation
   - LMWH (Low Molecular Weight Heparin)
     Inj. Enoxaparin 40 mg SC stat and 12 hourly X 5-7 days OR
   - Unfractionated Heparin 5000 U IV stat and 6 hourly
8) Beta- blockers:
   Tab. Metoprolol 25-50 mg PO 6 hourly (If no contraindication: Acute heart failure, acute bronchospasm, cardiogenic shock, AV block)
9) Calcium channel blockers:
   Tab. Diltiazem 30-60 mg PO 8 hourly
10) ACE inhibitors:
    Tab. Enalapril 2.5- 5 mg PO OD

b) Reperfusion therapy

1) PCI (Immediate referral after stabilization)
2) Thrombolysis

Indication	
▪ Delay of >120 min from first medical contact (FMC) to Primary PCI ▪ Ischemic symptoms < 12 hours ▪ PCI facility not available (consider it as option)	
Agents	
▪ Inj. Streptokinase 1.5 million units in 100 ml NS IV over 60 minutes	
▪ Adverse effects: Anaphylactic reaction Hypertension Arrhythmias	
Contraindication	
Absolute	**Relative**
▪ Prior intracranial hemorrhage ▪ Surgery within 2 months ▪ Prior streptokinase use within 6 months ▪ Suspected aortic dissection ▪ Known cerebral vascular lesion ▪ Severe uncontrolled hypertension	▪ Hypertension on presentation (> 180/110 mm Hg) ▪ History of ischemic shock > 3 months ▪ CPR > 10 minutes ▪ Major surgery < 3 weeks ▪ Pregnancy ▪ Oral anticoagulant therapy

Cardiac Arrhythmias
Tachyarrhythmia



VT: Ventricular Tachycardia

AVRT: Atrioventricular re-entry tachycardia

AVRT: Atrioventricular nodal re-entry tachycardia

VF: Ventricular Fibrillation

WPW: Wolf Parkinson White Syndrome

Sinus Tachycardia

A heart rate of > 100 bpm is known as sinus tachycardia.

Causes

- Exercise
- Anxiety
- Physical stress/ emotional stress
- Anemia
- Fever
- Thyrotoxicosis
- Heart failure
- Hypotension

ECG Findings

- Regular sinus rhythm
- Rate >100bpm

Management

- Treatment of underlying disorders.

Atrial Flutter

It is a type of supraventricular tachycardia caused by re- entry circuit within the right atrium. There is a rapid atrial rate around 250-300 bpm.

Causes

- RHD
- IHD
- Alcohol
- Hypertension
- Thyrotoxicosis
- Pericarditis
- Congenital heart disease

ECG Findings:

- Regular atrial rate around 300 bpm
- Flutter waves ('saw toothed' pattern) best seen in leads II, III, aVF.

Management

- Treat underlying causes.
- Rate control
- Rhythm control
- Anticoagulation

Atrial Fibrillation

AF is the most common sustained arrhythmia.

Causes

- RHD
- IHD
- Thyrotoxicosis
- Alcohol
- Pericarditis
- Hypertension
- Cardiomyopathies
- Acute infections (pneumonia)
- Pulmonary embolism
- Drugs (sympathomimetic)

Clinical Features

- Palpitation
- Shortness of breath
- Chest pain
- Dizziness, syncope
- Easy fatigability
- Embolic episodes (stroke)

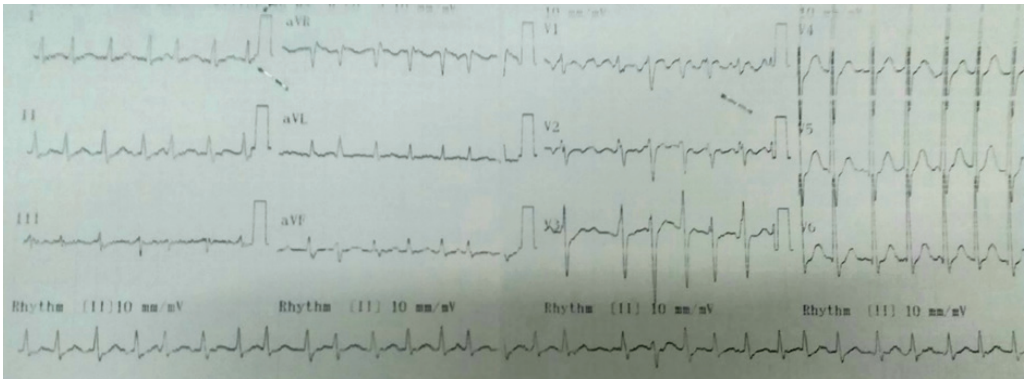
ECG Findings

- Irregularly irregular rhythm
- Absent P waves
- QRS complex < 120 ms
- Variable ventricular rate
- AF with FVR when ventricular rate is > 100 bpm

Management

- Treat underlying causes
- Rate control
- Rhythm control
- Anticoagulation

Figure 17. Atrial fibrillation with fast ventricular rate



Rate Control

- Target HR< 110 bpm
- In hemodynamically stable patients, pharmacological rate control is done with one of these drugs.

1. **Beta blockers:**
   Metoprolol
   - IV Metoprolol 2.5-5 mg over 2 min. Repeat every 5 min (max 15 mg) if patient tolerates
   - Oral Metoprolol 25 mg stat and BD started

2. **Calcium channel blockers:**
   Diltiazem
   - IV Diltiazem 20 mg over 2 min.
   - Oral Diltiazem 30 mg stat and 6 hourly started.

   Verapamil
   - IV Verapamil 5-10 mg over 2 min. Repeat every 15-30 min if patient tolerates.
   - Oral Verapamil 40 mg stat and 8 hourly started.

3. **Digoxin**
   - IV Digoxin 0.5 mg in 100 ml NS over 30 min. Repeat with 0.25 mg dose if needed (only in patients with AF due to heart failure).
   - Oral Digoxin 0.125 mg stat and OD started.

4. **Amiodarone**
   Loading dose: 150 mg in 100 ml 5% Dextrose over 10 minutes.
   Maintenance dose: 1 mg/min for first 6 hours, then 0.5 mg/ min for next 18 hours.

Rhythm Control

1. **DC cardioversion**
   - Done in emergency situation in hemodynamically unstable patients.
   - DC synchronized cardioversion with 100 J biphasic shock.
   - If DC shock fails, attempt further with 200 J
   - Adequate sedation (Inj. Midazolam 2mg IV stat) before the procedure.

2. **Pharmacological cardioversion**
   - Inj. Amiodarone 150 mg IV in 100 ml 5% Dextrose over 10 min, then maintenance dose 1 mg/min for first 6 hours, then 0.5 mg/min for next 18 hours.
   - Inj. Sotalol 100 mg (1.5 mg/kg) over 5 min.

Anticoagulation

Thromboembolic complications can be prevented by anticoagulation when given to patients with AF. Validated scores like CHA_2DS_2 VASc are used for this purpose.

CHA_2DS_2- VASc Score

Condition	Score
1. Congestive Heart Failure	1
2. Hypertension	1
3. Age ≥ 75 years	2
4. Diabetes	1
5. Stroke/ TIA/ Thromboembolism	2
6. Vascular disease (prior MI, PAD)	1
7. Age 65- 74 years	1
8. Sex (female)	1
Maximum Score	**9**

Score	Risk	Anticoagulation
0 (Male) Or 1 (Female)	Low	None
1 (Male)	Moderate	None or Oral anticoagulant (as per clinical judgement) Tab. Warfarin 5 mg OD (target INR 2-3)
≥ 2	High	Oral anticoagulant Tab. Warfarin 5 mg OD (target INR 2-3)

Surgical intervention

Catheter ablation therapy in persistent AF.

Paroxysmal Supraventricular Tachycardia (PSVT)

It is a narrow complex tachycardia that occurs and ends suddenly originating in the heart tissues often as a result of re- entry circuit.

Causes

- Occur spontaneously or on provocation with exertion, alcohol, caffeine, beta-agonists (salbutamol)
- 60% cases due to AVNRT (AV nodal re- entrant tachycardia)
- 30% cases due to AVRT (AV re-entrant tachycardia)
- 10% cases due to AT (Atrial tachycardia)

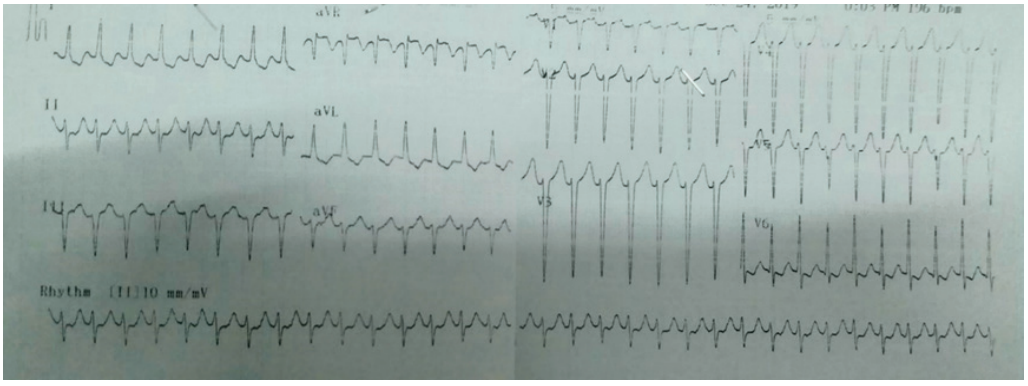
Clinical Features

- Sudden onset of palpitations
- Shortness of breath
- Anxiety
- Chest pain
- Dizziness, syncope

ECG Findings

- Tachycardia (regular) 140-280 bpm
- Narrow QRS complex (< 120 ms)
- No P waves (P waves may be buried in QRS complex)
- ST segment depression may be seen.

Figure 18. Supraventricular tachycardia



Management

1. Hemodynamically unstable patient:

- Maintain ABC
- Synchronized cardioversion starting at 25 Joules
  If no response, increase to 100 J, then 150 J

2. Hemodynamically stable patient:

A. Vagal maneuvers

- Valsalva maneuver
- Carotid massage

Procedure:

- Connect the patient to ECG monitor
- Apply pressure on the carotid artery at the outer and lateral border of thyroid cartilage for 10-20 seconds (one side).
- If no response, repeat the procedure on other side after a minute.

Avoid carotid massage if carotid bruit is heard.

B. Pharmacological therapy

1. Adenosine: - Place patient supine with ECG and BP monitoring

- Rapid IV bolus over 1-2 seconds via large (central) vein, preferably brachial, followed by NS flush using a three-way stopcock
- Initial dose: 6 mg IV bolus, if ineffective,
  Repeat dose: 6-12 mg IV
  (If central venous access is used, initial dose 3 mg)

2. Calcium channel blockers:

- Alternatives to adenosine.
  Verapamil: 5-10 mg IV bolus, repeat up to 20 mg IV
  Maintenance: 40-80 mg PO TDS
  Diltiazem: 5-10 mg slow IV
  Maintenance: 30- 120 mg PO TDS

3. Beta- blockers:

Metoprolol: 5 mg slow IV, repeat same dose after 5- 10 min
Maintenance: 25- 50 mg BD

C. Surgical intervention

- Radio ablation therapy

Ventricular Tachycardia

It is a wide complex tachyarrhythmia characterized by QRS > 120 ms.

Sustained VT	Non- sustained VT
Lasting ≥ 30 sec Terminated by cardioversion or pacing before that time	Lasting < 30 sec Terminating spontaneously

Causes

- IHD
- Hypertrophic cardiomyopathy
- Mitral valve prolapse
- Myocarditis
- Hypokalemia

ECG Findings

- HR> 100/ min
- QRS complex > 120 ms to even > 160 ms
- Extreme axis deviation
- AV dissociation (Different rates of P and QRS)
- RSR' complexes with a tall 'left rabbit ear'

Clinical Features

- Dizziness, syncope
- Chest pain
- Shock
- Seizures

Management:

1. Hemodynamically unstable patients
   Synchronized cardioversion starting at 100 J, increase to 200 J if no response
2. Hemodynamically stable patients

Monomorphic	Polymorphic with long QT (Torsades de pointes)
a. Amiodarone: 150 mg IV over 10 minutes, then 1 mg/min for 6 hours, then 0.5 mg/ min for 18 hours Alternatives: b. $MgSo_4$: 2 gm IV over 5 min c. Lignocaine: 100 mg IV over 5 min	a. Magnesium sulphate 2 gm IV in 100 ml NS/ D5 over 5-60 min b. Correct electrolyte imbalance c. Unsynchronized cardioversion if no response.

Ventricular Fibrillation

It is the most important shockable cardiac arrest rhythm. Rapid irregular uncoordinated contraction of the ventricles resulting in immediate loss of cardiac output and can be fatal.

ECG findings

- Rate >150bpm
- Chaotic irregular deflections of varying amplitude
- No identifiable P waves or QRS complexes

Management

- Unsynchronised defibrillation with 200J (biphasic)
- Pharmacological therapy: (Refer to ACLS flowchart)

Bradyarrhythmias

Bradyarrhythmias occur due to interruption of electrical impulse in the conducting system. It is a rhythm disorder in which the HR is < 60/min.

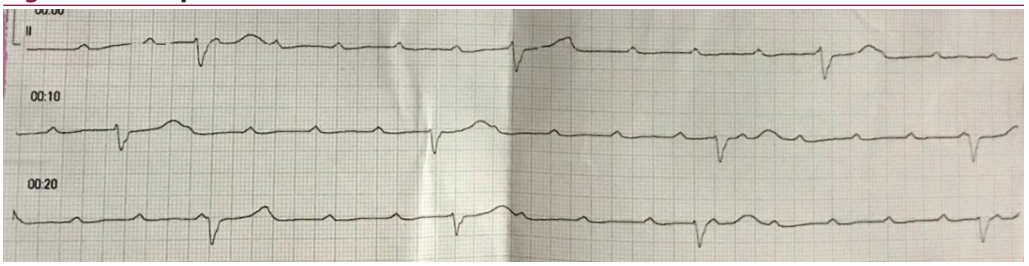
Symptomatic bradyarrhythmias

Symptoms	Signs
▪ Chest pain ▪ Shortness of breath ▪ Palpitations ▪ Light headedness ▪ Dizziness ▪ Syncope	▪ Hypotension ▪ Orthostatic hypotension ▪ Diaphoresis ▪ Pulmonary congestion ▪ Embolic events (stroke)

Types of Bradyarrhythmias

Types	Rhythm	P wave	PR interval	QRS Complex
Sinus bradycardia	Regular	Precedes QRS, Identical	120-200 ms (5 small squares)	<120 ms
First Degree AV block	Regular	Precedes QRS identical	>200 ms	<120 ms
Second Degree AV Block Wenkebach's phenomenon (Mobitz Type 1)	Irregular	Present	Progressive prolongation of PR culminating in a non-conducted P wave	Dropped repeatedly
Second Degree AV block (Mobitz Type 2)	Irregular	Present	Constant	Dropped intermittently
Third Degree AV block (Complete heart block)	Irregular	Present P-P interval regular	Variable	R-R interval regular but no relation with P wave AV dissociation

Figure 19. Complete heart block



Management:

1. Maintain ABC
2. Pharmacological therapy

a. Atropine

Drug of choice

Inj. Atropine 0.6 mg IV bolus

Repeat every 3-5 min upto a total of 3 mg

Note: Atropine administration should not delay the implementation of external pacing if indicated.

b. Isoprenaline

Inj. Isoprenaline 0.02 mg IV bolus, then as an infusion of 5 mcg/ min (to be titrated as per heart rate)

Note: used when there is delay in external pacing.

3. Transcutaneous pacing

Refer to cardiac center for TCP.

Acute Pulmonary Edema

- Life threatening emergency characterized by rapid onset of breathlessness due to accumulation of fluid in alveolar and interstitial spaces of lung
- 'Flash' pulmonary edema = Dramatic form of acute decompensated heart failure

Clinical Features

- Sudden onset shortness of breath
- Cough
- Pink frothy/ blood stained sputum
- Restlessness
- Cold extremities, Cyanosis, tachycardia, hypotension
- Bilateral crepitations on auscultation

Investigations

- Chest X-ray
- ECG
- Echo

Management

1) Initial Management

a. ABC : A- Maintain airway
B- Start oxygen therapy (60-100%) via face mask
C- Secure IV access

- Propped up position

b. If normal/ high BP

- Inj. Furosemide 40 mg IV stat, repeat dose (max 200 mg) OR,
- Inj. Torsinex 20 mg IV stat
- Inj. Morphine 2 mg IV stat
- Inj. GTN infusion @ 5-10 mcg/min, increase by 10 mcg every 15-30 min (Target MAP 70 mm Hg)

If low BP

- Inj. Dopamine infusion
- Inj. Dobutamine infusion

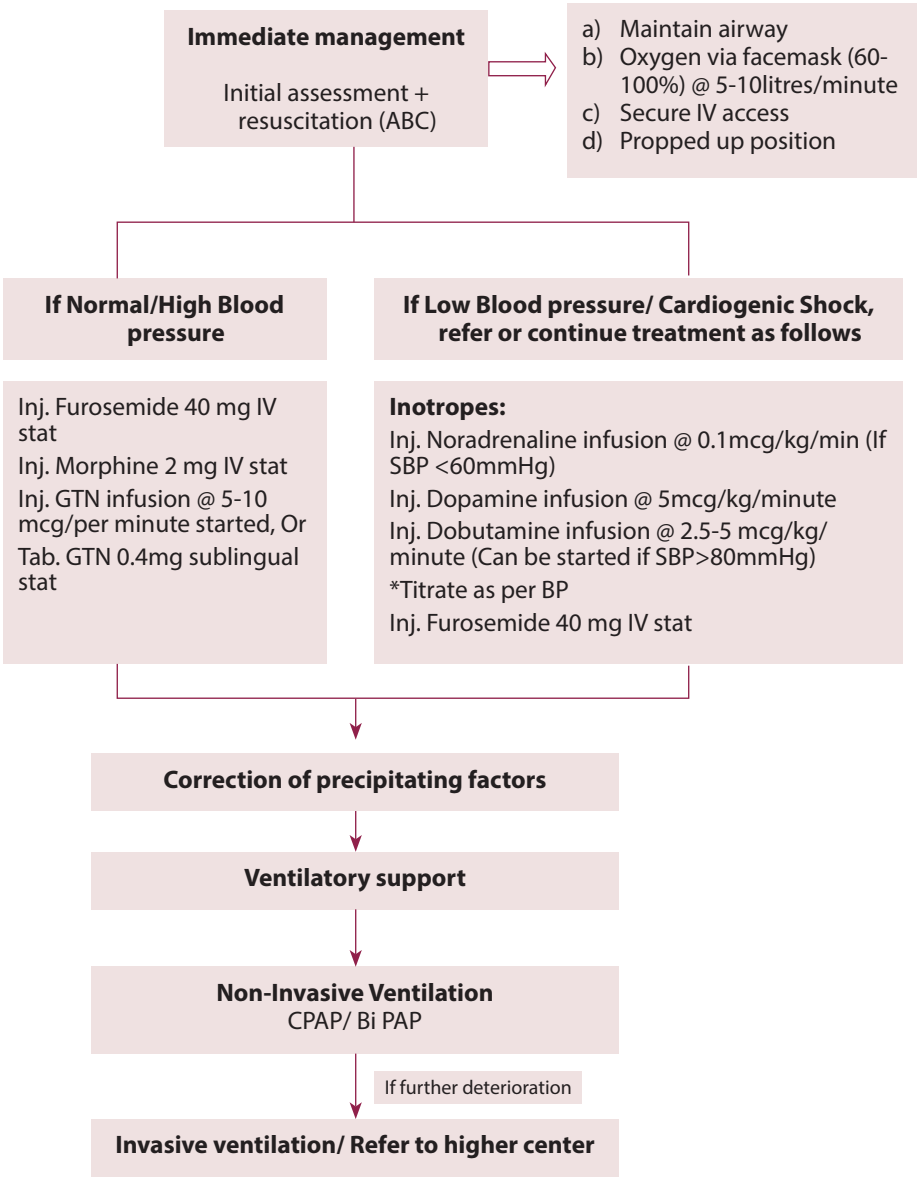
2) Correction of precipitating factor

- Arrhythmias
- Hypertension
- Renal failure- Dialysis

3) Ventilatory Support

- Non- invasive- Bi PAP, CPAP
- Invasive: Referral for intensive/ cardiac care

Acute Pulmonary Edema



Cardiac Tamponade

Rapid accumulation of fluid in the pericardial cavity causing decrease in cardiac output and inability to sustain vital functions.

Clinical Features:

Symptoms	Signs
▪ Shortness of breath ▪ Cough ▪ Dizziness ▪ Fatigue ▪ Chest pain ▪ Anxiety	▪ Tachycardia ▪ Tachypnea ▪ Raised JVP ▪ Kussmaul's sign ▪ Decreased heart sounds

Investigations:

ECG: Low voltage ECG, electrical alternans
CXR: Enlarged cardiac silhouette
Echo: Confirmation of diagnosis

Management

1) Maintain ABC

Refer after stabilization for surgical intervention:

2) Percutaneous needle pericardiocentesis
3) Pericardiectomy
4) Treatment of underlying disease

Cardiogenic Shock

Persistent severe hypotension with SBP less than 90 mmHg due to diseases of heart or major blood vessels.

Clinical Features:

- Cold clammy extremities
- Mental confusion
- Shortness of breath
- Hypotension
- Raised JVP
- Basal crepitations

Investigations

- ECG
- Echo
- CXR

Management

1. Maintain ABC
   - IV access (Start Inj. NS 250 ml IV stat)
   - Oxygen supplementation to keep SpO_2 more than 90%.
2. Inotropic support
   a. Inj. Noradrenaline infusion @ 0.1mcg/kg/min (If SBP <60mmHg)
   b. Inj. Dopamine infusion @ 5mcg/kg/minute
   c. Inj. Dobutamine infusion @ 2.5-5 mcg/kg/minute (Can be started if SBP>80mmHg)*
   *Titrate as per BP to a maximum of 20 mcg/kg/minute
3. Correct underlying cause

Disposition

Refer to higher center with cardiac care after stabilization.

Hypertensive Emergencies

Classification	Blood Pressure range
Normal Blood pressure	<120/80 mmHg
Pre Hypertension	(120-139)/(80-89) mmHg
Hypertension Stage 1 Stage 2	 (140-159)/(90-99) mmHg ≥160/100 mmHg

Hypertensive Urgency (Severe asymptomatic hypertension)	Hypertensive Emergency
SBP ≥ 180 mmHg DBP ≥ 120 mmHg	SBP ≥ 180 mmHg DBP ≥ 120 mmHg
No target organ damage	Target organ damage- life threatening

Clinical Features of hypertensive emergency:

- Headache, vomiting, focal neurological deficit
- Chest pain, palpitation, dizziness
- Blurring of vision

Investigations:

- Urea, creatinine, electrolytes, urine analysis
- ECG
- Chest X-ray
- Echo
- CT head
- USG abdomen

Management

- Maintain ABC
- Oral anti-hypertensives
  Tab. Amlodipine 5 mg Stat or
  Tab. Losartan 50 mg Stat

Observe for 12 hours and discharge on oral antihypertensives. Follow up within a week.

Hypertensive Emergency

1) Maintain ABC
2) IV access
3) Inj. Labetalol: Initial bolus 20 mg IV followed by 20- 80 mg every 10 minutes (maximum 300 mg)
4) Inj. Nitroglycerine: 5-200 mcg/ min as IV infusion
5) Inj. Sodium nitroprusside: 0.25-10 mcg/kg/min as IV infusion (invasive BP monitoring necessary)

Refer to higher center after stabilization for further evaluation and management.

Aim: Reduce BP by 10-20% decrease in MAP in the first hour and another 15% over the next 12-24 hours.

3 NEUROLOGICAL EMERGENCIES

Coma

Coma is the state in which the patient is unarousable and unresponsive to vocal commands or physical stimuli.

Causes

1. CNS causes: CVA, infections, space occupying lesions.
2. Metabolic: DKA, hypoglycaemia, hepatic/uremic encephalopathy
3. Head injury
4. Hypoxic ischemic encephalopathy
5. Drug overdose

Clinical Features

- GCS (Glasgow coma scale)-level of coma
- Breathing pattern, rate, depth
- Neurological assessment
  a. Pupil size and reaction to light
  b. Brainstem reflexes
  c. Motor function
- Focussed history: Medications, exposure, co-morbidities

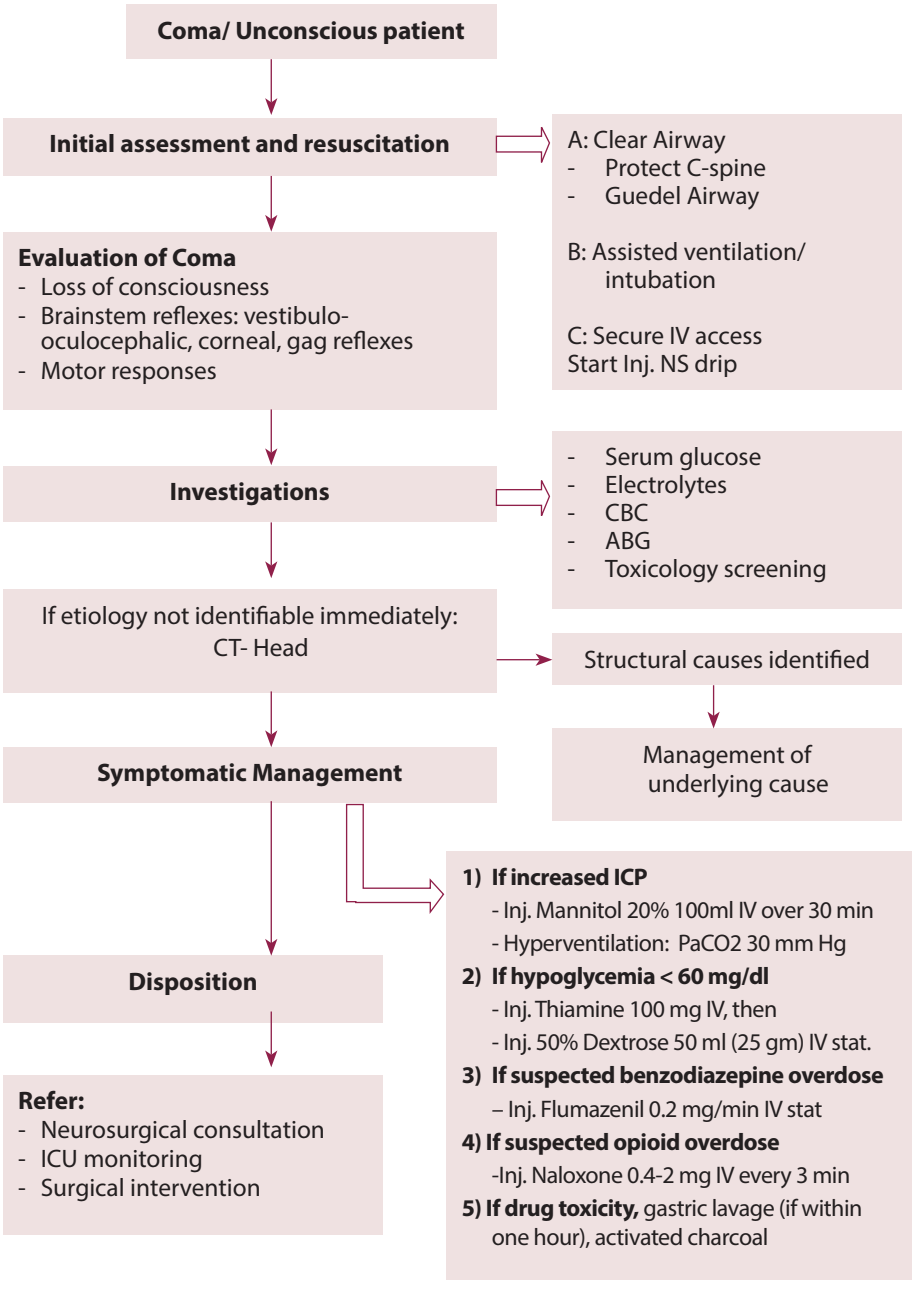
Investigations

- Lab: CBC, blood sugar, RFT, toxicology, blood gas, CSF analysis
- CT, MRI

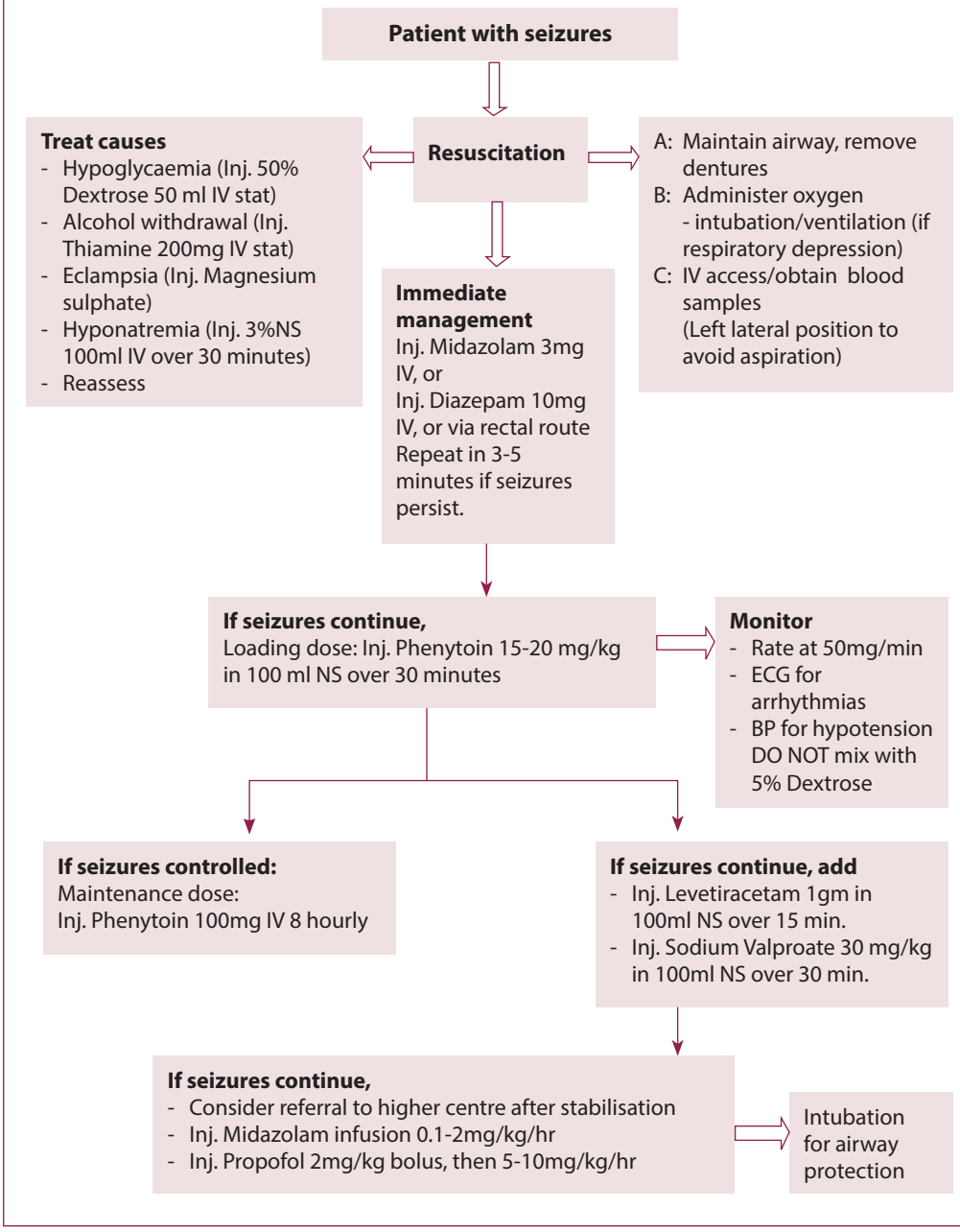
Management

1. Initial assessment and resuscitation – maintain ABC
2. Symptomatic management : Treat raised ICP, hypoglycaemia, drug overdose as required
3. Management of underlying causes.

Coma


Coma/ Unconscious patient
Initial assessment and resuscitation
A: Clear Airway
- Protect C-spine
- Guedel Airway
B: Assisted ventilation/ intubation
C: Secure IV access
Start Inj. NS drip
Evaluation of Coma
- Loss of consciousness
- Brainstem reflexes: vestibulo-oculocephalic, corneal, gag reflexes
- Motor responses
Investigations
- Serum glucose
- Electrolytes
- CBC
- ABG
- Toxicology screening
If etiology not identifiable immediately: CT- Head
Structural causes identified
Management of underlying cause
Symptomatic Management
1) If increased ICP
- Inj. Mannitol 20% 100ml IV over 30 min
- Hyperventilation: PaCO2 30 mm Hg
2) If hypoglycemia < 60 mg/dl
- Inj. Thiamine 100 mg IV, then
- Inj. 50% Dextrose 50 ml (25 gm) IV stat.
3) If suspected benzodiazepine overdose
– Inj. Flumazenil 0.2 mg/min IV stat
4) If suspected opioid overdose
-Inj. Naloxone 0.4-2 mg IV every 3 min
5) If drug toxicity, gastric lavage (if within one hour), activated charcoal
Disposition
Refer:
- Neurosurgical consultation
- ICU monitoring
- Surgical intervention

Seizures


Patient with seizures
Resuscitation
Treat causes
- Hypoglycaemia (Inj. 50% Dextrose 50 ml IV stat)
- Alcohol withdrawal (Inj. Thiamine 200mg IV stat)
- Eclampsia (Inj. Magnesium sulphate)
- Hyponatremia (Inj. 3%NS 100ml IV over 30 minutes)
- Reassess
A: Maintain airway, remove dentures
B: Administer oxygen
- intubation/ventilation (if respiratory depression)
C: IV access/obtain blood samples
(Left lateral position to avoid aspiration)
Immediate management
Inj. Midazolam 3mg IV, or
Inj. Diazepam 10mg IV, or via rectal route
Repeat in 3-5 minutes if seizures persist.
If seizures continue,
Loading dose: Inj. Phenytoin 15-20 mg/kg in 100 ml NS over 30 minutes
Monitor
- Rate at 50mg/min
- ECG for arrhythmias
- BP for hypotension
DO NOT mix with 5% Dextrose
If seizures controlled:
Maintenance dose:
Inj. Phenytoin 100mg IV 8 hourly
If seizures continue, add
- Inj. Levetiracetam 1gm in 100ml NS over 15 min.
- Inj. Sodium Valproate 30 mg/kg in 100ml NS over 30 min.
If seizures continue,
- Consider referral to higher centre after stabilisation
- Inj. Midazolam infusion 0.1-2mg/kg/hr
- Inj. Propofol 2mg/kg bolus, then 5-10mg/kg/hr
Intubation for airway protection

Acute CNS infections

Meningitis	Encephalitis
▪ Inflammation of the meninges ▪ Fever , headache, vomiting, neck stiffness	▪ Inflammation of the brain ▪ Fever, altered mental status, focal deficit, seizures. ▪ Abnormalities in brain function (early and common) ▪ LP-usually normal.

Clinical Features:

1. Fever
2. Headache
3. Altered mental status
4. Seizure, focal deficit, photophobia
5. Stiff neck/ meningismus
   - Kernig's sign: inability to perform full extension of knee when hip flexed at 90 degrees.
   - Brudzinski's sign: spontaneous hip flexion during passive flexion of neck.
6. Petechiae and purpuric rashes (meningococcemia)

Investigations:

1. CBC, RFT, RBS
2. CSF analysis

- Measure opening pressure with manometer prior to CSF collection
- 4 tubes

Tube 1 and 4: TC, DC, RBC
Tube 2: sugar, protein
Tube 3: Gram's stain, Culture, India ink, PCR.
*Check concomittant GRBS during LP
*Perform fundoscopy to rule out papilloedema prior to LP.

CT- head (prior to LP) if

- History of CNS disease
- History of seizures
- Immunocompromised
- Papilloedema
- Focal neurological deficit

Management:

1. **Resuscitation**
   - Secure ABC- Maintain airway, supplement oxygen, IV access.
2. **Empirical therapy:**

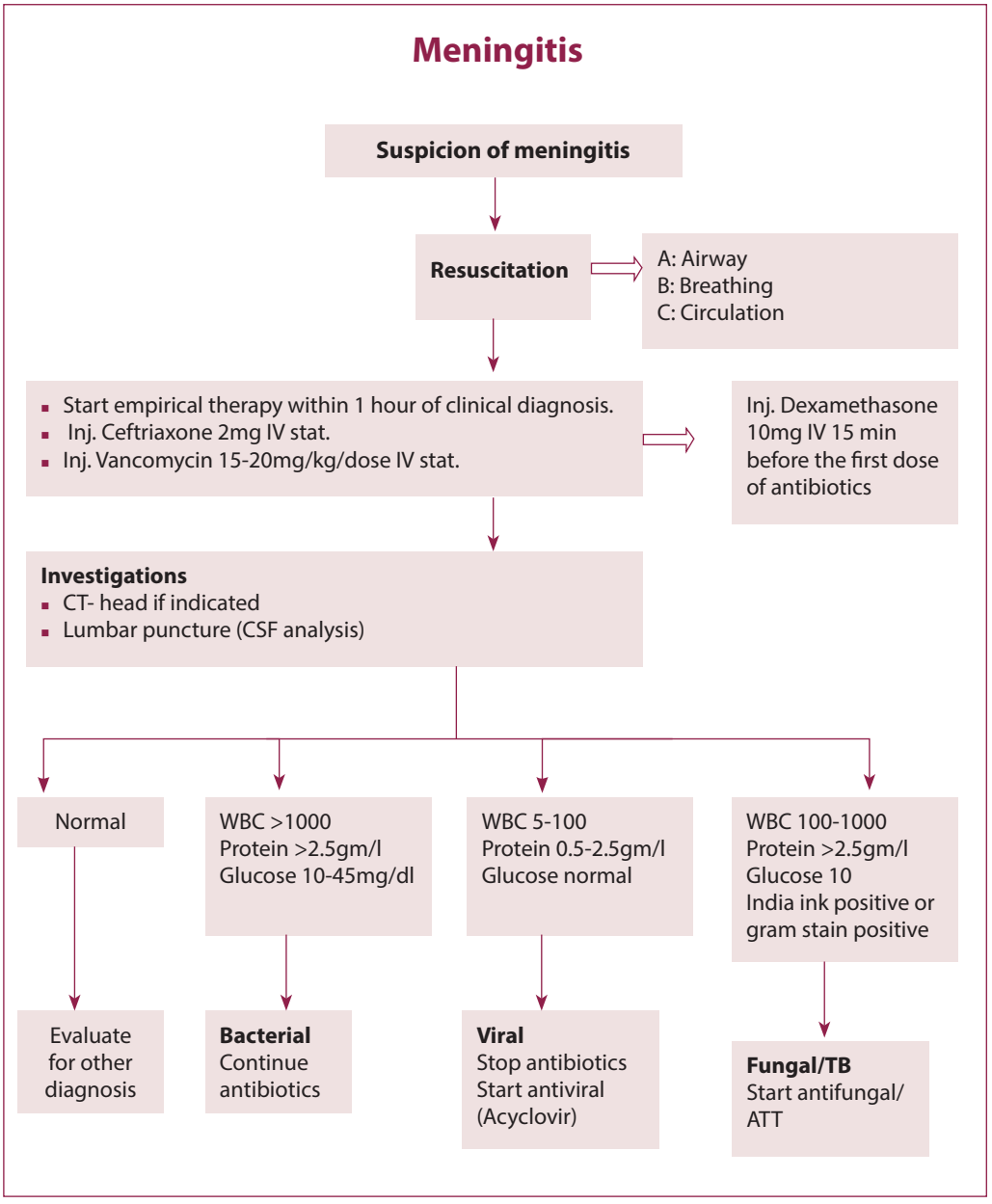
	Common organisms	Empirical Therapy
Bacterial	**Adult:** ▪ *Neisseria meningitidis* ▪ *Streptococcus pneumoniae* Elderly/ immunocompromised ▪ *Streptococcus pneumoniae* ▪ *Listeria monocytogenes*	▪ Inj. Ceftriaxone 2 gm IV stat and BD PLUS ▪ Inj. Vancomycin 15-20 mg/kg/ dose IV BD PLUS ▪ Add Inj. Ampicillin 2 gm IV stat and 4 hourly. (In patients more than 50 years) *Inj. Dexamethasone 10mg IV given 15min before the first dose of antibiotics
Viral	▪ Herpes simplex virus ▪ Varicella zoster virus	Inj. Acyclovir 10mg /kg/dose IV 8hourly.
Fungal	▪ Cryptococcus ▪ Nocardia	Inj. Amphotericin B 5mg/kg/ dose IV OD (premedicate with paracetamol + antihistaminics to prevent hypersensitivity)
Mycobacterial	*Mycobacterium tuberculosis*	Antitubercular therapy

3. Definitive management: Continue/modify pharmacological therapy after re-viewing LP reports.

Disposition:

- Admission.
- Discharge after completing antibiotics dose and clinical improvement

Meningitis


Suspicion of meningitis
Resuscitation
A: Airway
B: Breathing
C: Circulation
Start empirical therapy within 1 hour of clinical diagnosis.
Inj. Ceftriaxone 2mg IV stat.
Inj. Vancomycin 15-20mg/kg/dose IV stat.
Inj. Dexamethasone 10mg IV 15 min before the first dose of antibiotics
Investigations
CT- head if indicated
Lumbar puncture (CSF analysis)
Normal
WBC >1000
Protein >2.5gm/l
Glucose 10-45mg/dl
WBC 5-100
Protein 0.5-2.5gm/l
Glucose normal
WBC 100-1000
Protein >2.5gm/l
Glucose 10
India ink positive or gram stain positive
Evaluate for other diagnosis
Bacterial
Continue antibiotics
Viral
Stop antibiotics
Start antiviral (Acyclovir)
Fungal/TB
Start antifungal/ ATT

Cerebrovascular accident (CVA)

CVA is defined as rapid onset of neurological deficit due to sudden impairment of circulation to a specific region of the brain.

Types:

1. Ischemic stroke 80%
2. Haemorrhagic stroke 20%
3. TIA (transient ischemic attack) – focal deficit with complete recovery in 24 hours.

Clinical Features:

Ischemic	Haemorrhagic
Traditional Symptoms (SUDDEN) ▪ Numbness or weakness of face, arm, or leg—especially unilateral ▪ Aphasia or dysarthria ▪ Memory deficit or spatial orientation or perception difficulties ▪ Visual deficit or diplopia ▪ Dizziness, gait disturbance, or ataxia **Non-traditional Symptom (SUDDEN)** ▪ Impaired consciousness or syncope ▪ Generalized weakness ▪ Altered mental status ▪ Dysphagia ▪ Pain in the face, chest, arms, or legs ▪ Falls or accidents ▪ Hiccups, fatigue ▪ Sudden severe headache with no known cause	▪ Sudden loss of consciousness with focal deficit ▪ Headache, vomiting, seizures. ▪ Pontine haemorrhage- pinpoint pupil, hyperpyrexia ▪ Cerebellar haemorrhage – headache, vertigo, nystagmus, ataxia ▪ Subarachnoid haemorrhage – severe 'worst' headache of life.

Investigations

- CT-head: to confirm diagnosis and distinguish ischemic from haemorrhagic stroke.
- ECG
- RBG, RFT
- Lipid profile

Management

i. Maintain ABC
ii. Ischemic stroke
    - Reperfusion therapy if eligible
    - Medical management
iii. Haemorrhagic stroke
    - Medical management
    - Consider surgery if indicated.
iv. Manage
    - Atrial fibrillation
    - Hypertension:
    - In Ischemic Stroke: Treat if SBP >220 mmHg, DBP >120 mmHg (Target: 10% reduction in 1-2 hours and another 15-20% in 6 hours)
    - In hemorrhagic stroke, target blood pressure of 160/90 mmHg.
    - Control seizures
    - Treat raised ICP
    - Control blood sugar: 140-180 mg/dl (Treat if <60mg/dl)
    - Temperature <38 degrees C
    - Maintain saturation of >94%

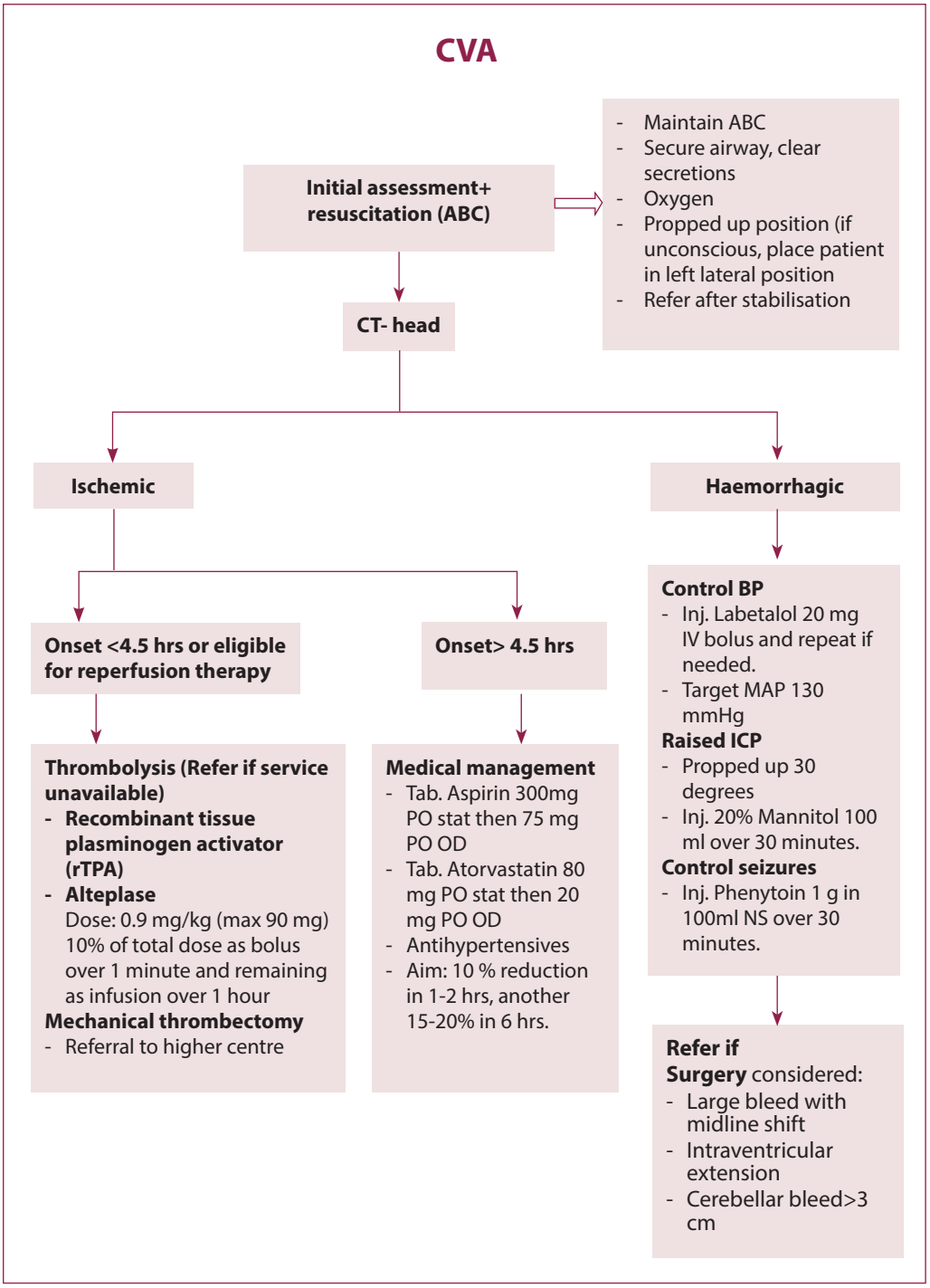
If TIA is suspected: ABCD^2 Score

ABCD^2 Score (Score of 4 or more needs admission and evaluation)
Age ≥ 60 years =1
BP≥140/90 mmHg at initial evaluation =1
Clinical features of TIA o Speech disturbance with or without weakness =1 o Unilateral weakness =2
Duration of symptoms o 10-59 minutes =1 o ≥60 minutes =2
History of diabetes =1

If ABCD^2 score is less than 4 then the patient can be sent home on single antiplatelet drug (Aspirin) but requires detailed investigations within the next 48 hours.

If ABCD^2 score is more than or equal to 4 then the patient must be admitted and be on dual antiplatelet therapy (Aspirin and Clopidogrel) for 21 days. Needs completion of investigations in the next 48 hours.

If there is MRI evidence of minor stroke then dual antiplatelet therapy should be continued for 90 days.


CVA
Initial assessment+ resuscitation (ABC)
- Maintain ABC
- Secure airway, clear secretions
- Oxygen
- Propped up position (if unconscious, place patient in left lateral position
- Refer after stabilisation
CT- head
Ischemic
Haemorrhagic
Onset <4.5 hrs or eligible for reperfusion therapy
Onset> 4.5 hrs
Thrombolysis (Refer if service unavailable)
- Recombinant tissue plasminogen activator (rTPA)
- Alteplase
Dose: 0.9 mg/kg (max 90 mg) 10% of total dose as bolus over 1 minute and remaining as infusion over 1 hour
Mechanical thrombectomy
- Referral to higher centre
Medical management
- Tab. Aspirin 300mg PO stat then 75 mg PO OD
- Tab. Atorvastatin 80 mg PO stat then 20 mg PO OD
- Antihypertensives
- Aim: 10 % reduction in 1-2 hrs, another 15-20% in 6 hrs.
Control BP
- Inj. Labetalol 20 mg IV bolus and repeat if needed.
- Target MAP 130 mmHg
Raised ICP
- Propped up 30 degrees
- Inj. 20% Mannitol 100 ml over 30 minutes.
Control seizures
- Inj. Phenytoin 1 g in 100ml NS over 30 minutes.
Refer if
Surgery considered:
- Large bleed with midline shift
- Intraventricular extension
- Cerebellar bleed>3 cm

Guillain Barre Syndrome (GBS)

GBS is an acute neuropathy causing weakness of limbs and areflexia.

Clinical Features:

- Progressive, symmetric muscle weakness and areflexia of lower limbs.
- Ascending weakness involving upper limbs and intercostals.
- History of respiratory infection or gastrointestinal upset 1-4 weeks prior to onset of weakness.
- Respiratory muscle paralysis- life threatening.

Investigations:

CSF analysis: Increased protein, normal cell count (Albuminocytological dissociation)

1. Immediate management
   - Resuscitation: Maintain ABC
   - Watch for signs of respiratory muscle paralysis:
     - Tachypnea
     - Single breath count
   - Watch for tachyarrhythmia

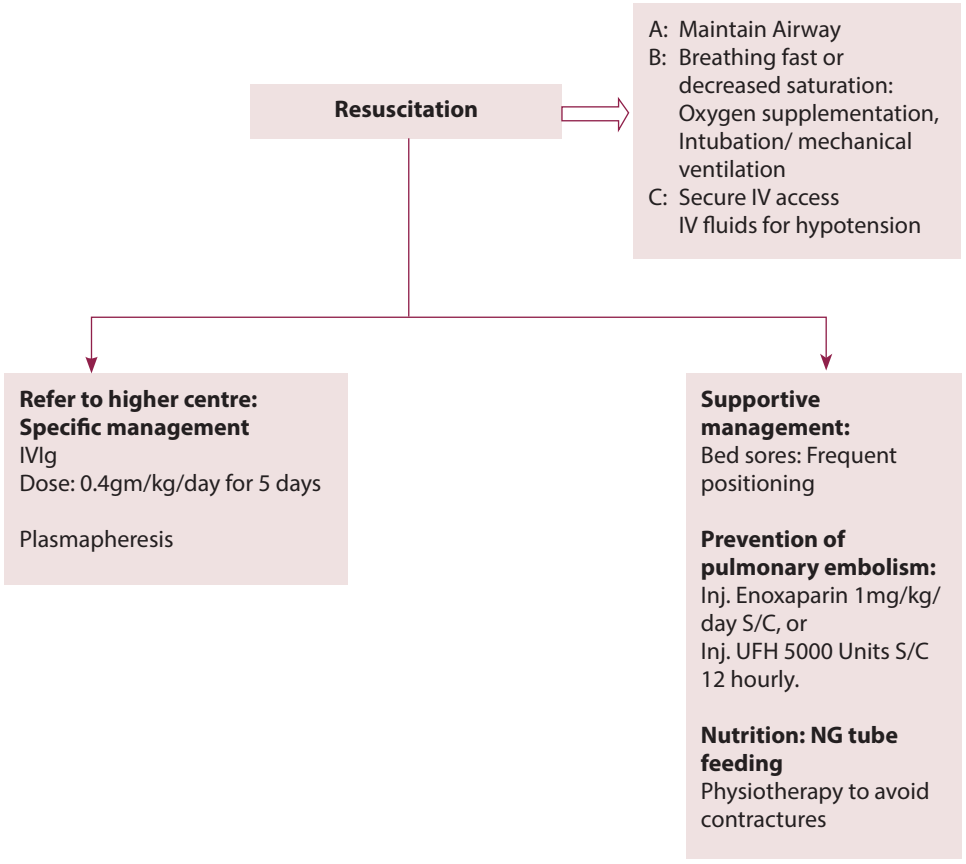
2. Specific management
   - IVIg (Intravenous Immunoglobulin):
     Dose: 0.4gm/kg/day for 5 days
   - Plasmapheresis

3. Ventilatory support
   - If bulbar involvement, aspiration, vital capacity <1 litre, PaO_2<70mmHg

Supportive management

- Prevent bed sores
- Prevent pulmonary embolism: Inj. Heparin(UFH) 5000 units subcutaneously 12 hourly
- Physiotherapy

Guillain Barre Syndrome (GBS)



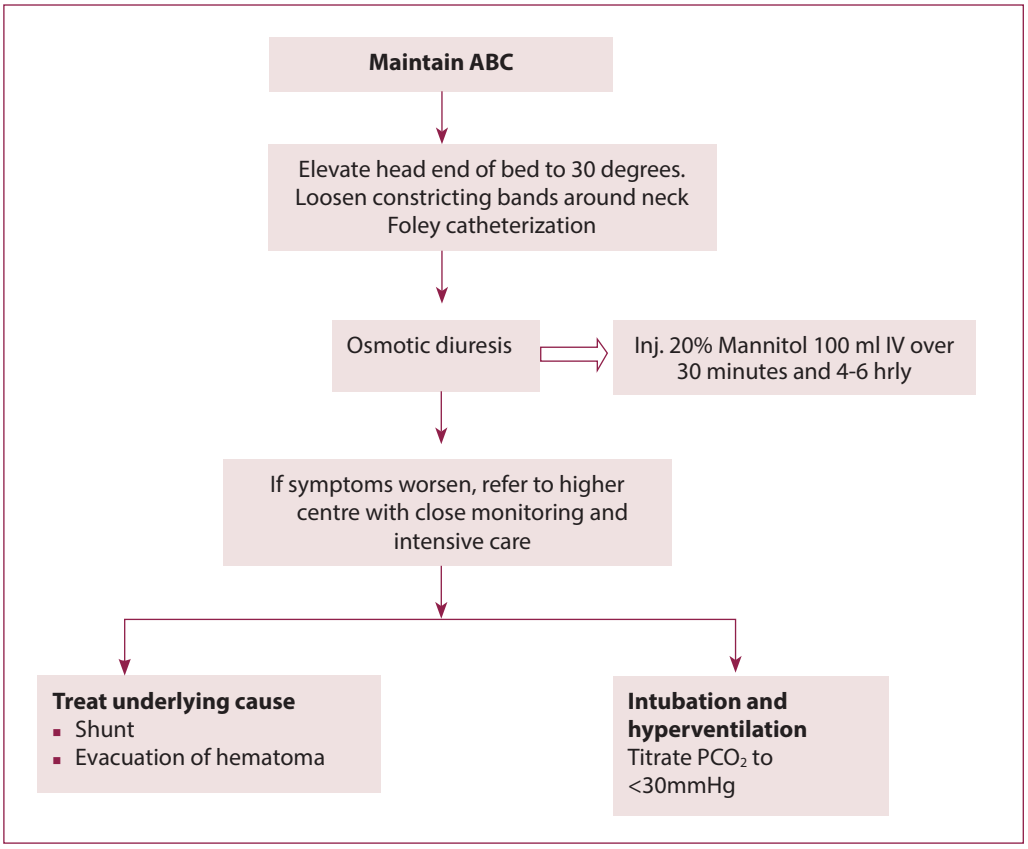
Raised intracranial pressure (ICP)

ICP higher than 20 mmHg is considered as raised ICP.

Clinical Features:

- Features of raised ICP: Headache, vomiting, drowsiness, papilloedema
- Early sign of herniation: Unilateral pupillary dilatation
- Late signs of herniation: Bradycardia, hypertension, irregular respiration
- Danger sign: stupor or coma

Management:



4 GASTROINTESTINAL EMERGENCIES

Abdominal pain

Abdominal pain is the most common complaint which brings the patient to the ER. It is divided into three types.

a. Visceral pain:

Described as dull, crampy or achy or can be steady or colicky. Stretching of unmyelinated fibres innervating the organs due to obstruction, ischemia or inflammation results in visceral pain.

Embryologic origin	Organs	Location of pain
Foregut	Stomach, first and second part of duodenum, liver, pancreas, gall bladder	Epigastrium
Midgut	Third and fourth part of duodenum, jejunum, ileum, appendix, ascending colon, first 2/3 of transverse colon	Periumbilical area
Hindgut	Last 1/3 of transverse colon, descending colon, rectum, intraperitoneal genitourinary organs	Suprapubic area

b. Parietal pain:

Usually acute, due to irritation of peritoneum located above the involved organ. It can be localized to a dermatome superficial to the site of painful stimulus and may develop tenderness, guarding, rebound and rigidity as peritonitis sets in.

c. Referred pain:

Felt at a location distant from the diseased organ. Eg. Gall bladder pain referred to right shoulder.

Differential diagnosis of acute abdominal pain by location:

Diffuse pain
- Aortic dissection/Ruptured aortic aneurysm
- Early appendicitis
- Bowel Obstruction
- Gastroenteritis
- Diabetic Ketoacidosis
- Peritonitis
- Pancreatitis

Right Upper quadrant pain
- Appendicitis (retrocaecal)
- Cholecystitis/Cholangitis/Hepatitis
- Myocardial ischemia
- Perforated peptic ulcer
- Right sided pneumonia

Left Upper quadrant pain
- Myocardial ischemia
- Left sided pneumonia
- Splenic rupture
- Pancreatitis
- Acute gastritis
- Gastric ulcer

Right Lower quadrant pain
- Appendicitis
- Diverticulitis (caecal)
- Ectopic pregnancy
- Endometriosis
- Inguinal hernia
- Ruptured ovarian cyst
- Meckel's diverticulum
- Psoas abscess
- Pelvic inflammatory disease
- Ovarian torsion
- Testicular torsion
- Ureteric calculi

Left Lower quadrant pain
- Diverticulitis (sigmoid)
- Appendicitis
- Ectopic pregnancy
- Inguinal hernia
- Ruptured ovarian cyst
- Psoas abscess
- Pelvic inflammatory disease
- Ovarian torsion
- Testicular torsion
- Ureteric calculi

History:

- Pain: Onset, provocative/ palliative factors, quality, radiation, associated symptoms, timing and what the patient has taken for pain.
- Concomitant symptoms: Ask for fever, hematemesis/ melena, vomiting, nausea, loose stools, constipation, jaundice, weight loss
- Past medical history and medications

Clinical Examination:

- Vitals
- Abdominal Examination
  a. Inspection: Signs of distension (ascites, ileus, obstruction), mass (hernia, tumour, distended bladder), scars (adhesions), ecchymoses (trauma, bleeding diathesis), stigmata of liver disease (spider nevi, caput medusa)
  b. Palpation: Palpate all quadrants, look for areas of tenderness, guarding, rigidity, rebound tenderness (peritoneal irritation), masses (hernia, tumour)
  c. Percussion for fluid, masses or to measure span of organs in organomegaly
  d. Auscultation of bowel sounds

Investigations:

1. Lab tests: CBC, electrolytes, LFT, RFT, amylase, lipase, ABG
2. Diagnostics:
   Imaging
   - Plain radiograph: abdominal (erect/supine)
   - USG
   - CT abdomen
3. ECG

Management:

1. Initial assessment and resuscitation
   a. Maintain ABC
   b. Establish the most likely cause and initiate treatment promptly. (refer to relevant chapters)

Acute Gastritis

Gastritis is the inflammation of gastrointestinal mucosa.

Types:

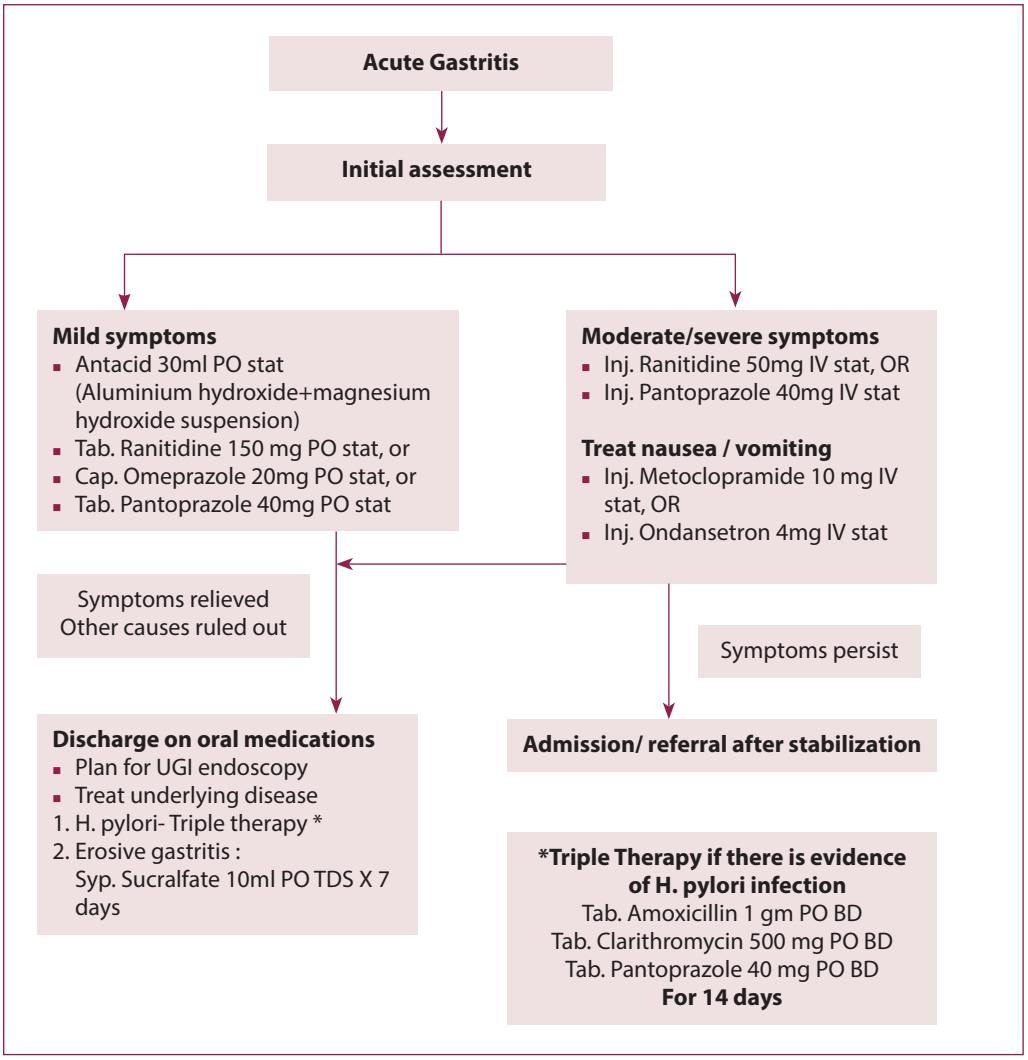
1. Type A gastritis: autoimmune disease
2. Type B gastritis: Helicobacter pylori infection
3. Reflux gastritis: after gastric surgeries
4. Erosive gastritis: NSAIDS, alcohol, steroids
5. Stress gastritis: trauma, burns

Clinical features:

- Pain epigastrium, burning in nature
- Dyspepsia
- Anorexia, nausea, vomiting
- Bloating, indigestion
- Haematuria/melena

Investigations:

- CBC
- RFT, RBS
- Amylase, lipase
- ECG- to rule out ischemic heart disease
- UGI endoscopy


Acute Gastritis
Initial assessment
Mild symptoms
Antacid 30ml PO stat (Aluminium hydroxide+magnesium hydroxide suspension)
Tab. Ranitidine 150 mg PO stat, or
Cap. Omeprazole 20mg PO stat, or
Tab. Pantoprazole 40mg PO stat
Moderate/severe symptoms
Inj. Ranitidine 50mg IV stat, OR
Inj. Pantoprazole 40mg IV stat
Treat nausea / vomiting
Inj. Metoclopramide 10 mg IV stat, OR
Inj. Ondansetron 4mg IV stat
Symptoms relieved
Other causes ruled out
Symptoms persist
Discharge on oral medications
Plan for UGI endoscopy
Treat underlying disease
1. H. pylori- Triple therapy *
2. Erosive gastritis :
Syp. Sucralfate 10ml PO TDS X 7 days
Admission/ referral after stabilization
*Triple Therapy if there is evidence of H. pylori infection
Tab. Amoxicillin 1 gm PO BD
Tab. Clarithromycin 500 mg PO BD
Tab. Pantoprazole 40 mg PO BD
For 14 days

Acute Gastroenteritis

A very common emergency condition caused by the consumption of contaminated food or water.

Common pathogens:

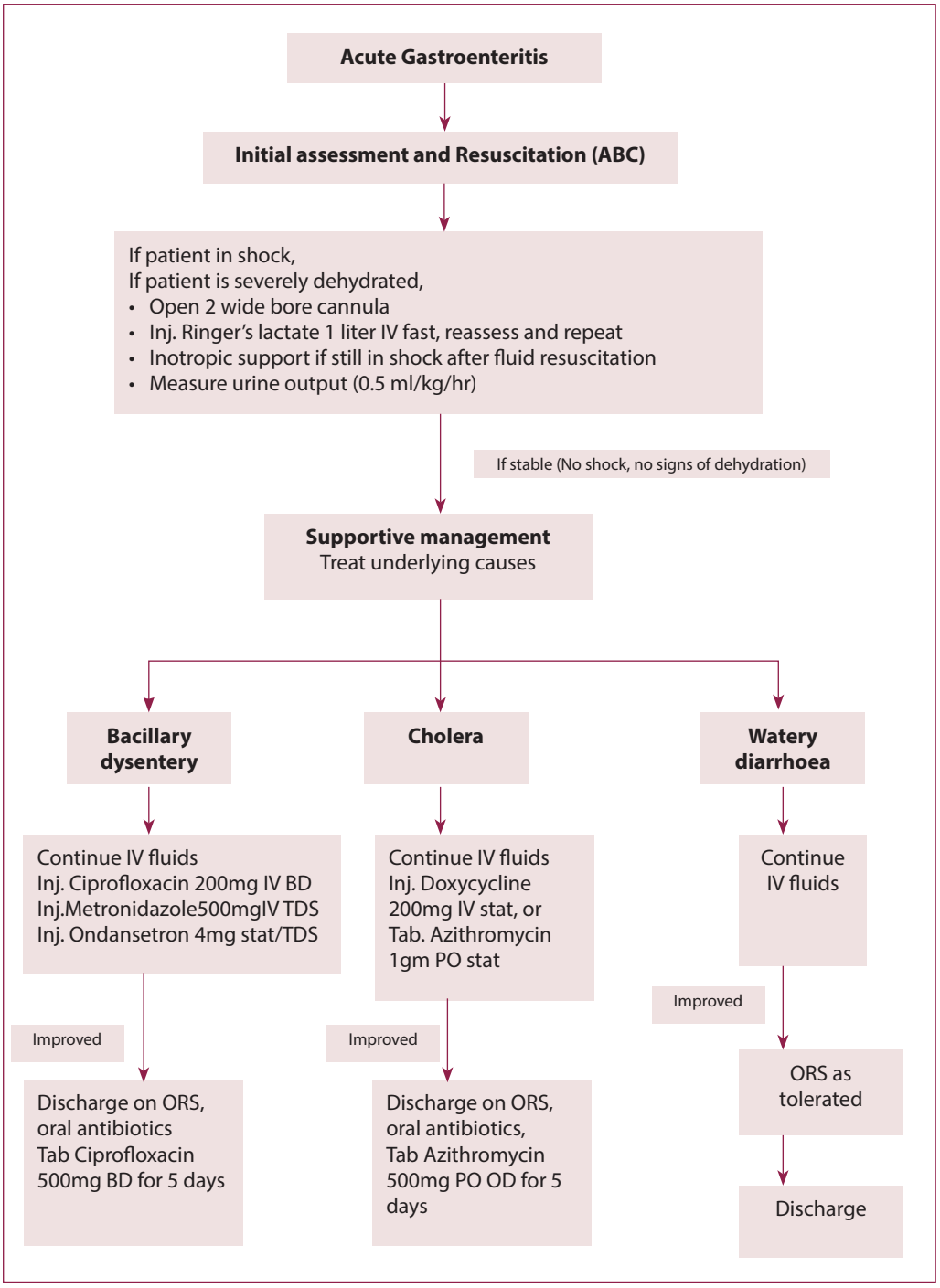
Pathogens	Signs/symptoms	Sources
Virus - Rotavirus	Vomiting, watery diarrhoea, mild fever	Contaminated food and water
Bacteria - *Bacillus cereus* - *Staphylococcus aureus*	Watery diarrhoea, vomiting	Improperly refrigerated rice, meat, eggs
Vibrio cholera	Profuse rice watery diarrhoea	Water, fish
Shigella spp, E.coli	Often mucoid, bloody diarrhoea	Contaminated food and water
Protozoa - *Giardia lamblia* - *Entamoeba histolytica*	Mucoid diarrhoea, blood mixed.	Contaminated food and water

Danger signs:

- Watch for features of shock
  Tachycardia, hypotension, cold clammy extremities
- Watch for signs of dehydration
  Sunken eyes, dry tongue

Investigations:

- Stool R/E, occult blood, hanging drop
- Serum electrolytes, urea, creatinine


Acute Gastroenteritis
Initial assessment and Resuscitation (ABC)
If patient in shock,
If patient is severely dehydrated,
• Open 2 wide bore cannula
• Inj. Ringer's lactate 1 liter IV fast, reassess and repeat
• Inotropic support if still in shock after fluid resuscitation
• Measure urine output (0.5 ml/kg/hr)
If stable (No shock, no signs of dehydration)
Supportive management
Treat underlying causes
Bacillary dysentery
Cholera
Watery diarrhoea
Continue IV fluids
Inj. Ciprofloxacin 200mg IV BD
Inj.Metronidazole500mgIV TDS
Inj. Ondansetron 4mg stat/TDS
Continue IV fluids
Inj. Doxycycline 200mg IV stat, or
Tab. Azithromycin 1gm PO stat
Continue IV fluids
Improved
Improved
Improved
Discharge on ORS, oral antibiotics
Tab Ciprofloxacin 500mg BD for 5 days
Discharge on ORS, oral antibiotics,
Tab Azithromycin 500mg PO OD for 5 days
ORS as tolerated
Discharge

Gastrointestinal Bleeding (GIB)

GI bleeding: Intraluminal blood loss anywhere from oropharynx to anus.

Common pathogens:

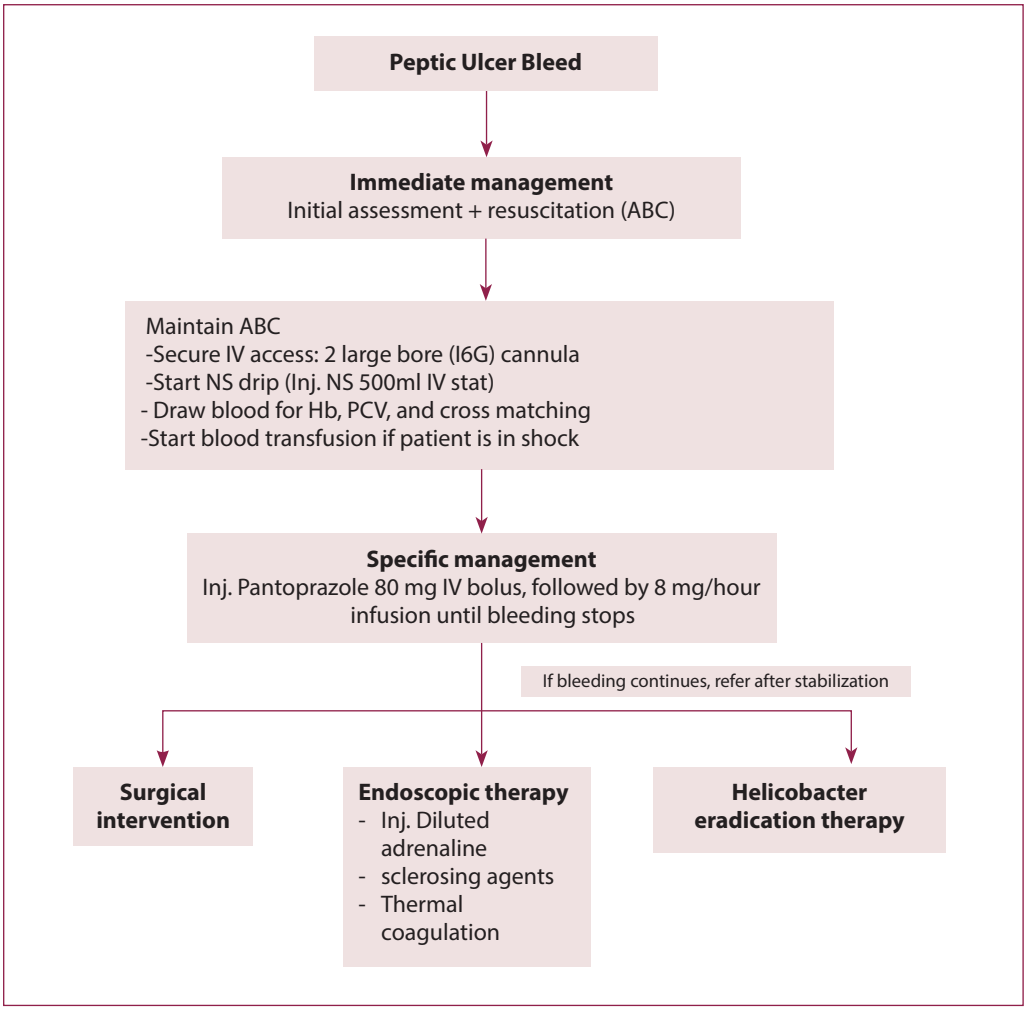
	Upper GIB	Lower GIB
Site	Above ligament of Treitz	Below ligament of Treitz
Symptoms Signs	Nausea, vomiting, hematemesis, coffee ground vomitus, pain epigastrium, melena, vasovagal attack	Diarrhoea, tenesmus, bright red blood PR, hematochezia
Causes	▪ Peptic ulcer disease ▪ NSAIDS ▪ Oesophageal varices ▪ Mallory Weiss tear ▪ Erosive oesophagitis/ gastritis/ duodenitis ▪ AV malformation ▪ Carcinoma stomach	▪ Hemorrhoids ▪ Anal fissure ▪ Inflammatory bowel disease ▪ Diverticular disease

Investigations

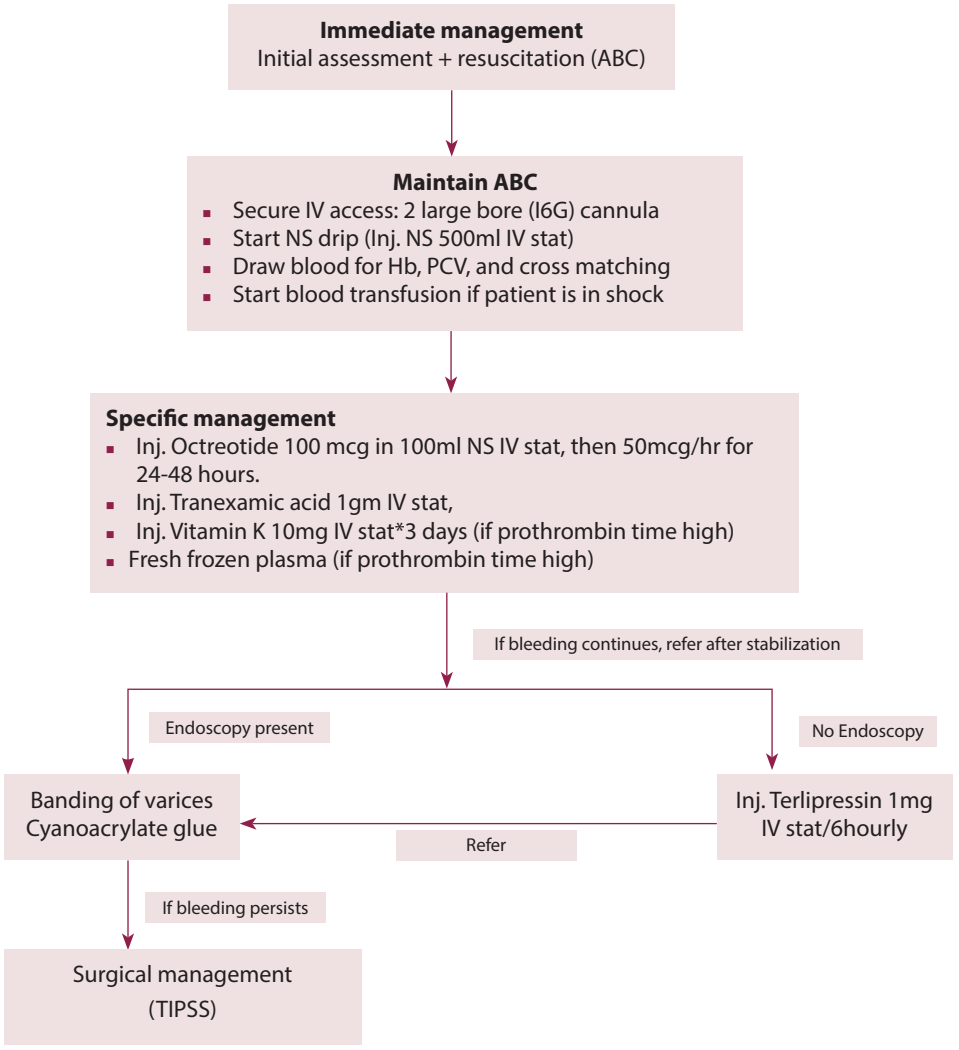
1. Hb, PCV, TC, DC, platelets
2. Blood grouping/ cross matching
3. PT/INR
4. RFT/LFT, RBG
5. UGI endoscopy
6. Colonoscopy
7. ECG

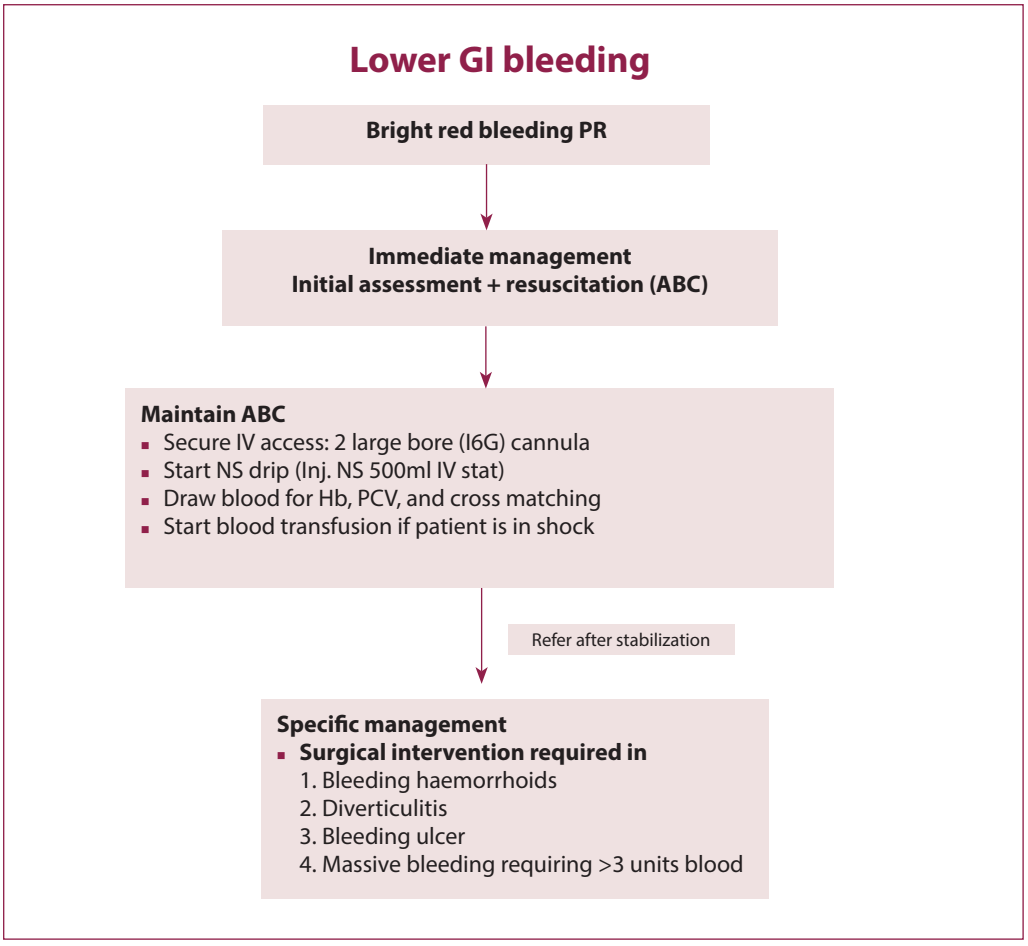
Pathophysiology

Volume loss %	Signs
15%	Tachycardia (>100 beats/min)
>15% – 30%	Tachycardia + postural hypotension
30%– 40%	Tachycardia + postural hypotension + anxiety
>40%	Tachycardia + shock (SBP<80mmHg) + confusion + oliguria


Peptic Ulcer Bleed
Immediate management
Initial assessment + resuscitation (ABC)
Maintain ABC
-Secure IV access: 2 large bore (I6G) cannula
-Start NS drip (Inj. NS 500ml IV stat)
- Draw blood for Hb, PCV, and cross matching
-Start blood transfusion if patient is in shock
Specific management
Inj. Pantoprazole 80 mg IV bolus, followed by 8 mg/hour infusion until bleeding stops
If bleeding continues, refer after stabilization
Surgical intervention
Endoscopic therapy
- Inj. Diluted adrenaline
- sclerosing agents
- Thermal coagulation
Helicobacter eradication therapy

Oesophageal Variceal Bleeding




Lower GI bleeding
Bright red bleeding PR
Immediate management
Initial assessment + resuscitation (ABC)
Maintain ABC
Secure IV access: 2 large bore (I6G) cannula
Start NS drip (Inj. NS 500ml IV stat)
Draw blood for Hb, PCV, and cross matching
Start blood transfusion if patient is in shock
Refer after stabilization
Specific management
Surgical intervention required in
1. Bleeding haemorrhoids
2. Diverticulitis
3. Bleeding ulcer
4. Massive bleeding requiring >3 units blood

Fulminant Hepatic Failure

Rapid deterioration in liver function with neuropsychiatric manifestations developing within 8 weeks.

Causes

Acute viral hepatitis
Autoimmune hepatitis
Paracetamol poisoning
Mushroom poisoning
Drugs- Isoniazid, aspirin, valproate

Clinical Features:

- Jaundice, pain abdomen, constipation
- Flapping tremor
- Fetor hepaticus
- Bleeding abnormalities (ecchymosis, petechiae)

Features of encephalopathy

Grade	Clinical Features
I	Reversal of sleep wake pattern, confusion, slurred speech, slow response
II	Drowsy, lethargic, flapping tremor, moderate confusion
III	Stuporous, responds to painful stimuli, marked confusion, incoherent speech
IV	Comatose, unresponsive to verbal or painful stimulus

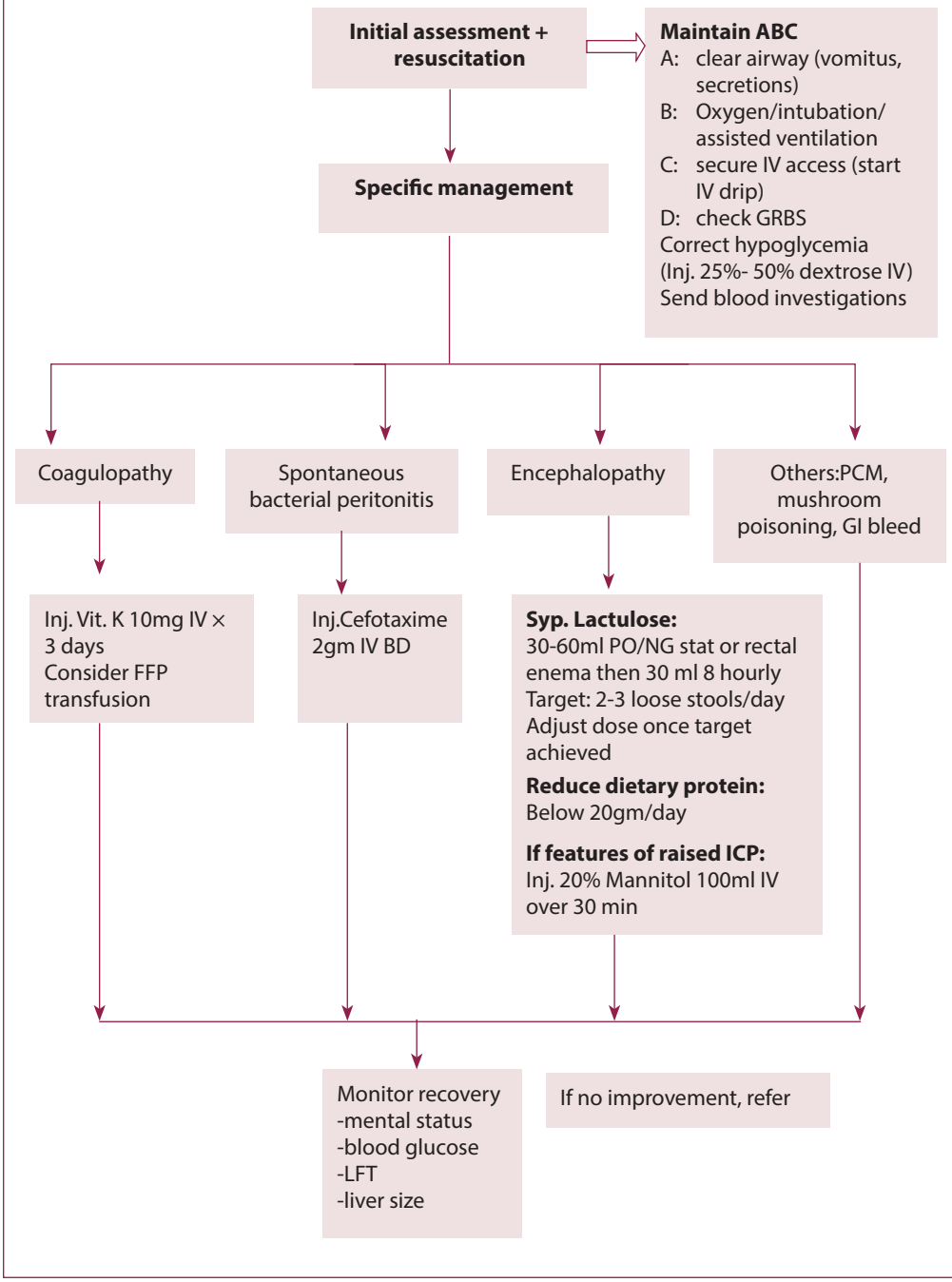
Investigations

1. CBC, RFT, LFT
2. Coagulation profile (PT, INR)
3. Serology (Hepatitis panel)
4. USG abdomen

Management

- Resuscitation and initial assessment
- Specific management

Fulminant Hepatic Failure



Acute Appendicitis

Appendicitis is the painful inflammation of the vermiform appendix.
It is one of the most common causes of acute abdomen.

Clinical Features:

Right lower quadrant abdominal pain
Sudden onset, starts around the umbilicus and shifts towards the right lower quadrant within a few hours
Nausea, vomiting, fever, loss of appetite

Important signs:

1. **Mc Burney's point tenderness:** Maximum tenderness at the junction between lateral 1/3 and 2/3 of right spinoumbilical line.
2. **Rovsing's sign:** Pain in right on palpation of left lower quadrant.
3. **Psoas sign: (Retrocecal appendix)**: Right lower quadrant pain on passive right hip extension.
4. **Obturator sign: (Pelvic appendix)** Right lower quadrant pain on flexion of right hip and knee followed by internal rotation of right hip.

Modified Alvarado Score:

Grade	Condition	Score	Interpretation
M	Migratory right iliac fossa pain	1	0-3 low risk
A	Anorexia	1	
N	Nausea/vomiting	1	
T	Tenderness in right iliac fossa	2	4-6 probable
R	Rebound tenderness in right iliac fossa	1	
E	Elevated temperature (>37.5°c)	1	
L	Leukocytosis	2	
S	Shift to the left	1	7-9 very probable

Investigations

1. CBC
2. RFT, Urine R/E
3. USG abdomen: if available
   Tubular, non-compressible, more than 6mm structure in USG is suggestive of appendicitis.

Acute Appendicitis

Initial assessment + Resuscitation
- Maintain ABC
- Secure IV access
  Start Inj. NS 500ml IV
- Nil per oral

Pain management
Inj. Paracetamol 1gram IV stat, OR
Inj. Hyoscine butylbromide 10mg IVstat, OR
Inj. Tramadol 50 mg IV stat

Antiemetic
Inj. Ondansetron 4 mg IV stat

Antibiotics: (if surgery planned)
Inj. Ceftriaxone 1gm IV stat
Inj. Metronidazole 500mg IV stat

Refer to surgical facility after stabilization

Reassessment
Surgical management

Acute Cholecystitis

Cholecystitis is the inflammation of the gall bladder.

Clinical Features:

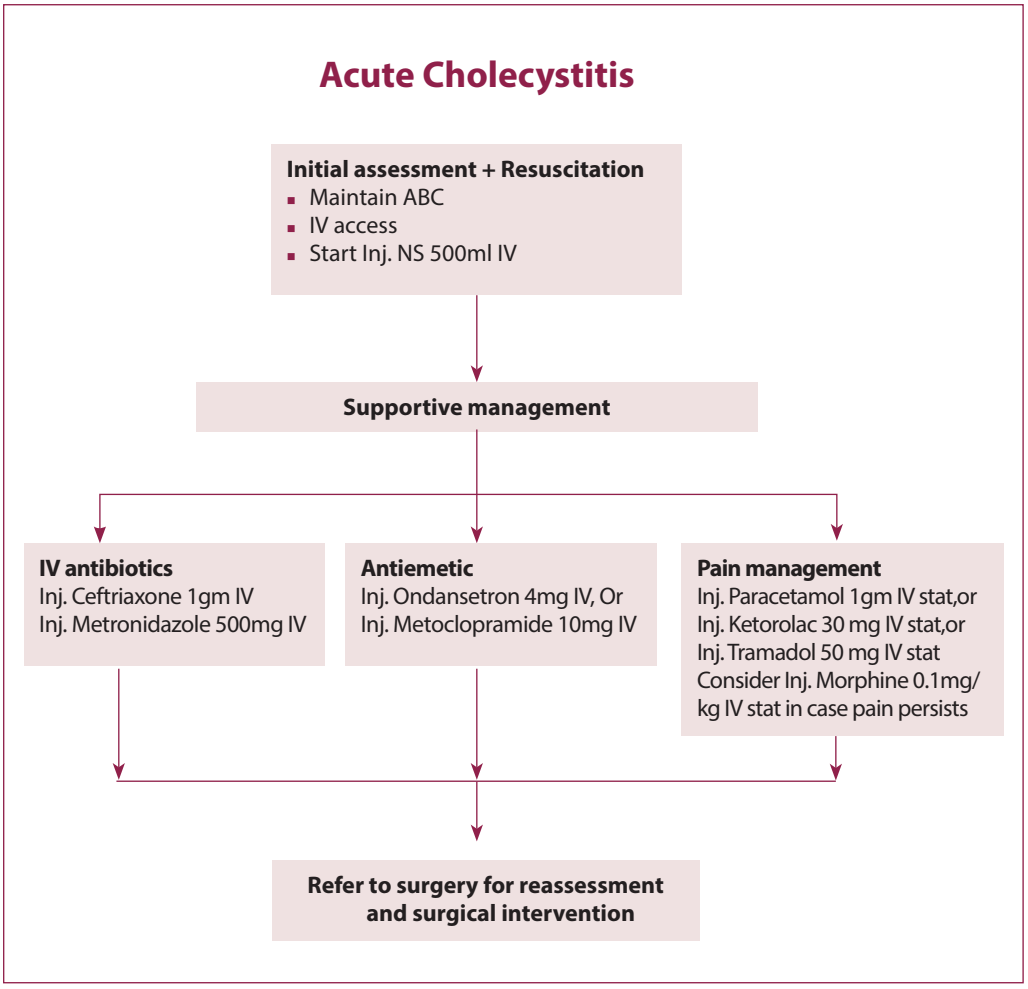
- Sudden onset of severe right upper quadrant pain. (mediate to right shoulder or back)
- Fever, vomiting, sweating, tachycardia
- Murphy's sign: right upper quadrant tenderness on inspiration
- Acute cholecystitis: usually related to gallstone
- Acalculous cholecystitis: not associated with gallstone, seen in critically ill

Diagnosis (Any two of the three):

1. Increase in total leucocyte counts
2. Positive Murphy's sign
3. USG suggestive of acute cholecystitis (GB wall thickness more than 5 mm, collection around GB)

Investigations

- CBC
- RFT,RBS, LFT
- Lipase, amylase
- USG abdomen: to look for gallstones, CBD dilatation


Acute Cholecystitis
Initial assessment + Resuscitation
Maintain ABC
IV access
Start Inj. NS 500ml IV
Supportive management
IV antibiotics
Inj. Ceftriaxone 1gm IV
Inj. Metronidazole 500mg IV
Antiemetic
Inj. Ondansetron 4mg IV, Or
Inj. Metoclopramide 10mg IV
Pain management
Inj. Paracetamol 1gm IV stat,or
Inj. Ketorolac 30 mg IV stat,or
Inj. Tramadol 50 mg IV stat
Consider Inj. Morphine 0.1mg/kg IV stat in case pain persists
Refer to surgery for reassessment and surgical intervention

Acute Pancreatitis

It is the acute inflammation of pancreas. Identifying patients with severe acute pancreatitis is very important for optimizing management and determining the outcomes.

Causes:

1. Gall stones (60%)
2. Alcohol (20%)
3. Viral infections: Mumps, Coxsackie B
4. Hypertriglyceridemia, Hypercalcemia
5. Drugs: NSAIDS, thiazides, tetracyclines

Diagnosis:2 out of 3 features

1) Pain abdomen consistent with acute pancreatitis
   (Acute onset of severe, persistent pain abdomen radiating to the back)
2) Serum lipase or amylase three times greater than upper limit
3) Characteristic findings on USG or CT abdomen.

Atlanta classification:

Interstitial edematous acute pancreatitis	Necrotizing acute pancreatitis
Acute inflammation of pancreatic parenchyma+peri pancreatic tissues No tissue necrosis	Tissue necrosis present

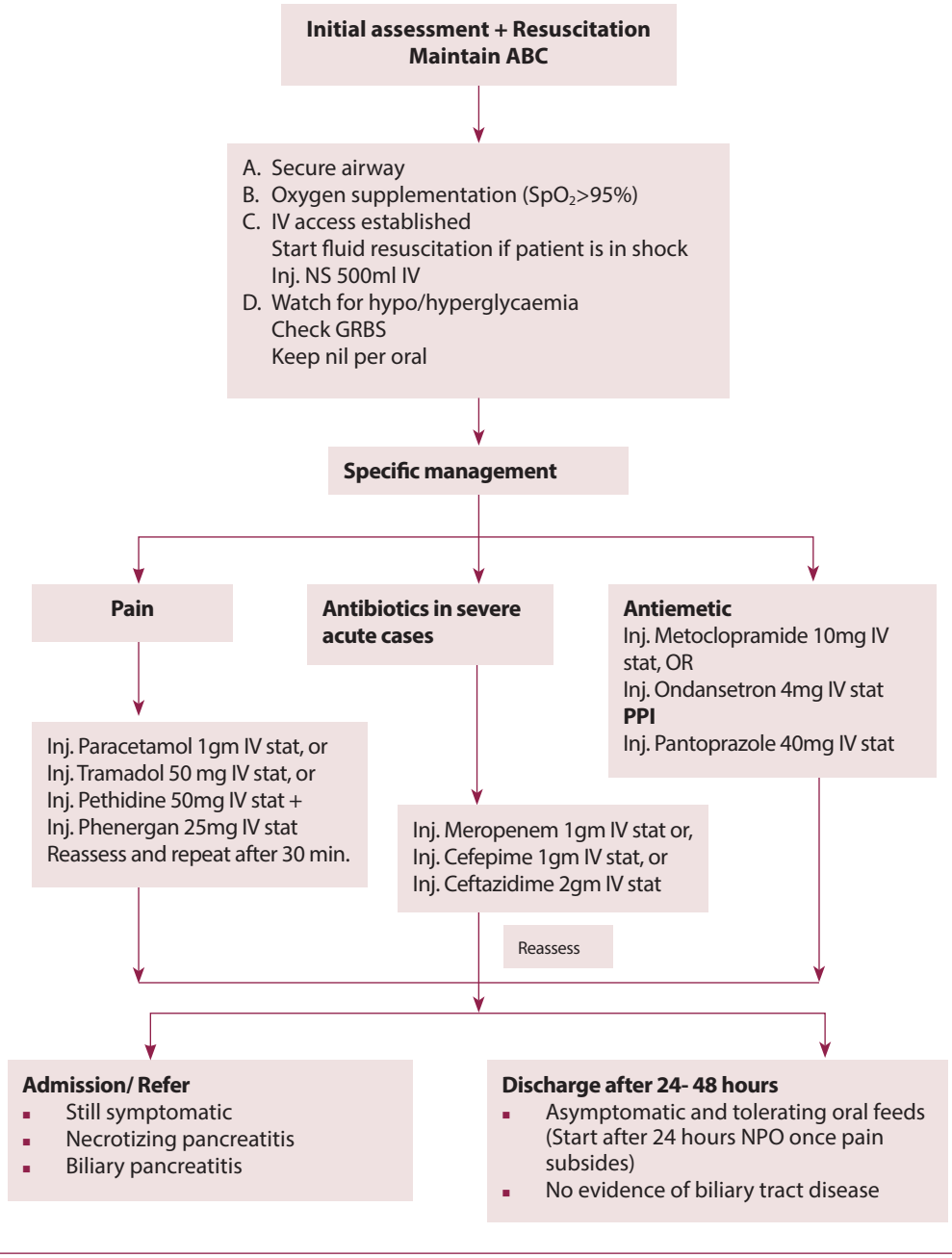
Clinical features:

- Pain abdomen
- Nausea, vomiting
- Tachycardia, hypotension, shock
- Epigastric tenderness
- Rarely in case of acute hemorrhagic pancreatitis
- Grey turner's sign- Discoloration of flanks
- Cullen's sign- Periumbilical discoloration

Investigations:

- CBC, RFT, LFT, amylase, lipase
- Serum calcium
- CXR, AXR
- CT- abdomen

Acute Pancreatitis



Strangulated / Obstructed Hernia

Hernia is defined as an abnormal protrusion of a viscous or a part of a viscous through an artificial or natural opening with a sac.

Clinical classification

Types	Clinical Features
Reducible	Hernia gets reduced on its own / cough impulse present.
Irreducible	Hernia cannot get reduced Can predispose to strangulation
Obstructed	Irreducible Blood supply to bowel not interfered Eventually leads to strangulation
Inflamed	Due to inflammation of sac contents eg. appendicitis Tender but not tensed Overlying skin is edematous, red
Strangulated	Irreversible Blood supply to bowel obstructed Tense, tender swelling, nausea, vomiting No cough impulse, rebound tenderness Features of intestinal obstruction present Peritonitis

Investigations

- Abdominal X- ray (erect):- multiple air fluid levels
- CBC
- RFT, RBS
- USG abdomen

Strangulated / Obstructed Hernia

Resuscitation
Maintain ABC
A: Secure airway
B: Oxygen supplementation
C: Secure IV access
Fluid resuscitation (if patient in shock) Inj. NS 500ml IV stat
Keep nil per oral
Foley catheterization

↓

Specific management

↓

Pain management
Inj. Paracetamol 1gm IV stat, or
Inj. Tramadol 50mg IV stat

Antiemetics
Inj. Ondansetron 4mg IV stat

Antibiotics
Inj. Ceftriaxone 1gm IV stat
Inj. Metronidazole 500mg IV stat

↓

Admission/ refer to surgical team

↓

Emergency surgical intervention

Intestinal Obstruction

Causes

Mechanical	Paralytic
Adhesions after previous surgery	Post-operative ileus
Obstructed hernia	Electrolyte imbalance: hypokalemia
Intussusception	
Volvulus	
Gall stones	
Round worms	
Impacted feces	
Tumours	

Clinical Features:

4 cardinal features (symptoms)	Signs
Abdominal pain	Guarding, rebound tenderness
Vomiting	Rigidity
Distension	Exaggerated bowel sounds in mechanical obstruction Absence of bowel sounds if paralytic or perforation/peritonitis
Constipation	Signs of dehydration, shock Per-rectal exam: empty, dilated rectum

Investigations

- CBC
- RFT, RBS
- CXR with both dome of diaphragm- check for gas under diaphragm
- Abdominal X ray (erect and supine) check for air fluid level

Intestinal Obstruction

Resuscitation

Maintain ABC
Secure IV access
Fluid resuscitation (if patient is in shock)
Inj. NS 500ml IV stat
Keep nil per oral and NG tube insertion
Foley catheterisation if needed

↓

Specific management

↓

Pain management (Refer to pain management chapter)
NSAIDS/ opioids

Antiemetics
Inj. Ondansetron 4mg IV stat

Antibiotics
Inj. Ceftriaxone 1gm IV stat

↓

Admission/ refer to surgical team

↓

Exploratory laparotomy and proceed
Resection anastomosis

Hollow Viscous Perforation

Perforation of any segment of the gastrointestinal tract.
Duodenal ulcer perforation is a common type of perforation presenting to the ER.

Causes

- Peptic ulcer disease
- Enteric fever
- Trauma
- Foreign body
- Inflammatory bowel disease
- Carcinoma colon

Clinical Features:

Phase	Clinical features
Initial phase (within 2 hours of onset)	Sudden severe pain abdomen, localized to epigastrium
Second phase (2-12 hrs. after onset)	Generalized pain abdomen. Rigidity (board like)
Third phase (>12 hours after onset)	Pain abdomen persists, hypovolemic shock

Investigations

- CBC
- RFT, LFT, RBS
- Blood grouping
- CXR with both dome of diaphragm
- ECG

Hollow Viscous Perforation

Resuscitation

Maintain ABC
Secure IV access
Fluid resuscitation (if patient is in shock)
Inj. NS 500ml IV stat
Keep nil per oral
Foley's catheterization

↓

Specific management

↓

Pain management (Refer to pain management chapter)
NSAIDS/ opioids

Antiemetic
Inj. Ondansetron 4mg IV stat

Antibiotics
(Inj. Ceftriaxone 1 gm IV + Inj. Metronidazole 500 mg IV stat)

↓

Admission/ refer to surgical team

↓

Exploratory laparotomy

Peritonitis

Inflammation of the peritoneum due to various causes. It is a surgical emergency so prompt action need to be taken to avoid life threatening complications.

Causes

- Perforation of gastrointestinal tract
- Trauma (penetrating/ blunt)
- Appendicitis, cholecystitis
- Intestinal obstruction
- Foreign body
- Surgery, drain

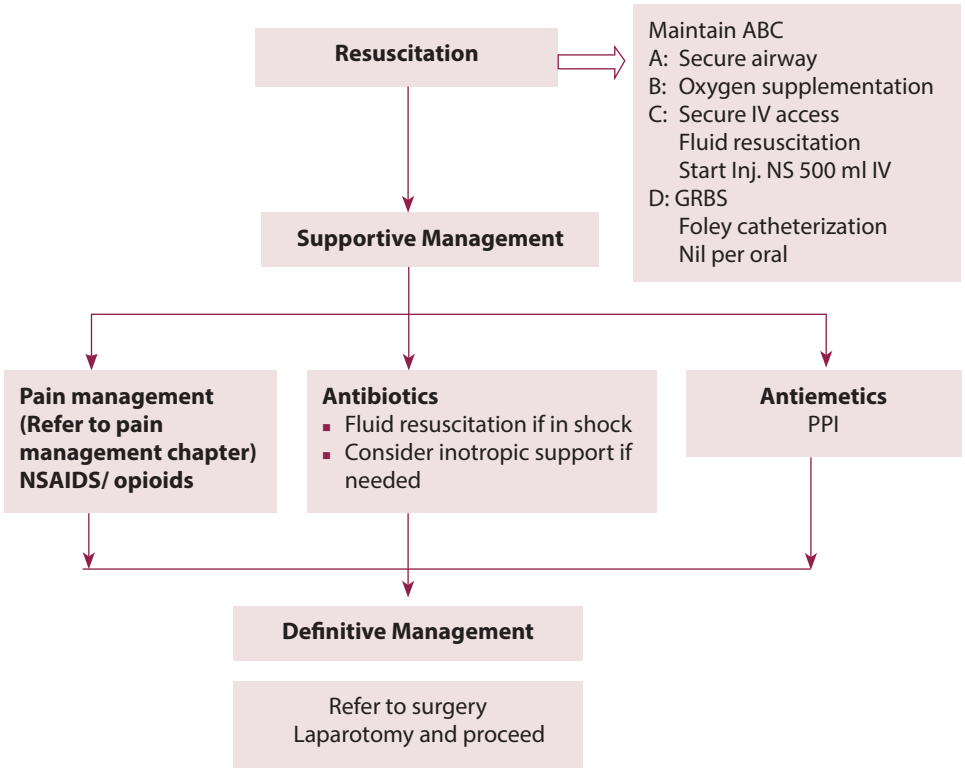
Clinical Features:

- Sudden onset of pain
- Fever, nausea, vomiting
- Initially localized tenderness, later becomes diffuse
- Guarding, rigidity, rebound tenderness
- Distension, bowel sounds absent
- Tachycardia, tachypnea, hypotension

Investigations

- X-ray abdomen (erect):- ground glass appearance
- CBC
- RFT, LFT
- USG abdomen

Peritonitis



5 GENITOURINARY EMERGENCIES

Hematuria

Hematuria is the presence of blood in urine.
Gross hematuria: visible to the naked eyes
Microscopic hematuria: >5 RBC/ hpf

Causes

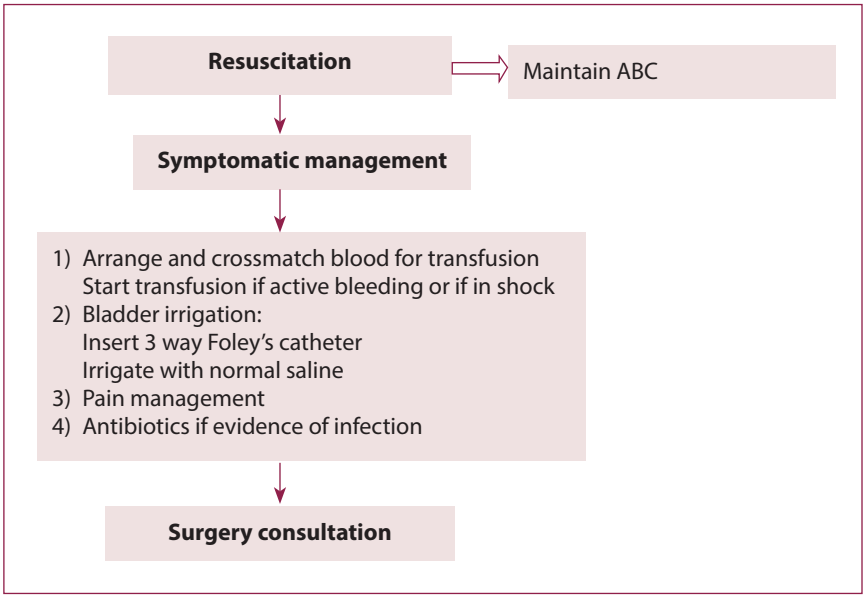
- Renal calculus
- Renal tuberculosis
- Post streptococcal glomerulonephritis
- Trauma
- Carcinoma
- Bleeding disorders

Clinical Features:

1. History of blood in urine
   Ask about painless hematuria/ initial hematuria
2. Associated features, fever, sore throat, weight loss, weakness
3. Tachycardia, hypotension

Investigations

- Urine R/E, casts
- X-ray KUB
- CBC, RFT
- Abdominal ultrasound



Renal Colic

Renal colic is the pain caused by obstruction of urinary tract due to renal calculi.

Clinical Features:

- SUDDEN onset severe intermittent flank pain radiating to back or groin along with a dull aching continuous pain
  (Renal angle tenderness on examination- if associated with hydronephrosis)
- Nausea, vomiting
- Cloudy or blood in urine
- Fever with chills (in the presence of infection)

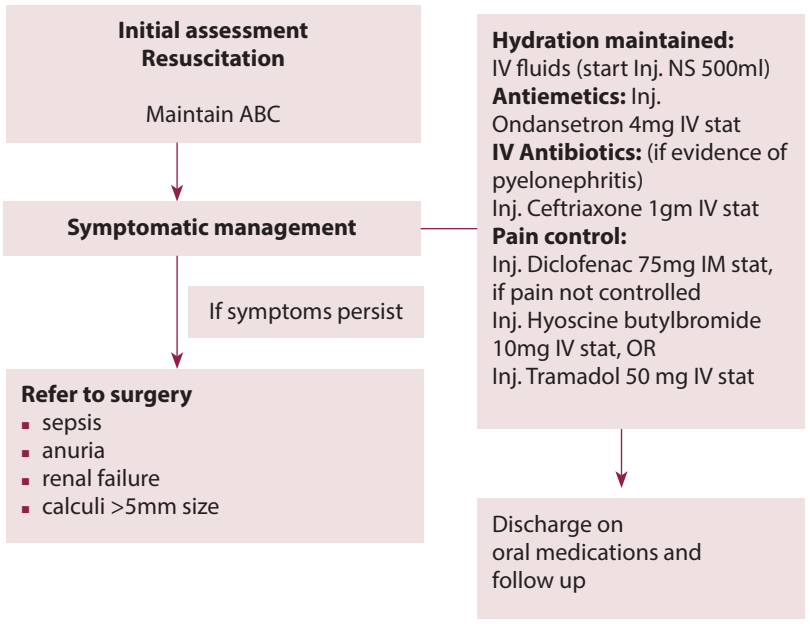
Sites of impaction of calculi in the urinary tract

- Renal calyces
- PUJ (pelvi-ureteral junction)
- Pelvic brim
- VUJ (vesico ureteral junction)
- Bladder neck

Investigations

- CBC
- RFT, RBG
- Urine R/E, C/S
- X-ray KUB
- IVU
- USG abdomen/pelvis

Renal Colic


Initial assessment
Resuscitation
Maintain ABC
Symptomatic management
If symptoms persist
Refer to surgery
sepsis
anuria
renal failure
calculi >5mm size
Hydration maintained:
IV fluids (start Inj. NS 500ml)
Antiemetics: Inj.
Ondansetron 4mg IV stat
IV Antibiotics: (if evidence of pyelonephritis)
Inj. Ceftriaxone 1gm IV stat
Pain control:
Inj. Diclofenac 75mg IM stat, if pain not controlled
Inj. Hyoscine butylbromide 10mg IV stat, OR
Inj. Tramadol 50 mg IV stat
Discharge on oral medications and follow up

Acute Retention of Urine

Acute retention of urine is the inability to pass urine due to obstruction in the flow of urine.

Causes

Phase	Clinical features
Obstructive	Benign enlargement of prostate (BEP) Bladder calculi, bladder neck stenosis Urethral stricture/stone, blood clot Phimosis and para phimosis Carcinoma bladder or prostate
Neuropathic	Trauma, mass lesion, stroke, diabetes, multiple sclerosis
Medications	Antipsychotics, antidepressants

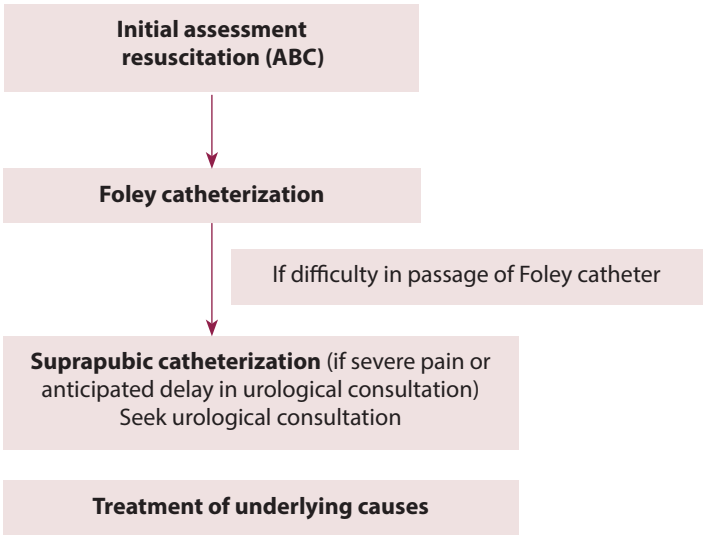
Clinical Features:

- Inability to pass urine, painful urge to pass urine
- Suprapubic pain and pain abdomen
- H/O hematuria, infection

Investigations

- Urine R/E
- CBC, RFT
- USG abdomen

Acute Retention of Urine



Testicular Torsion

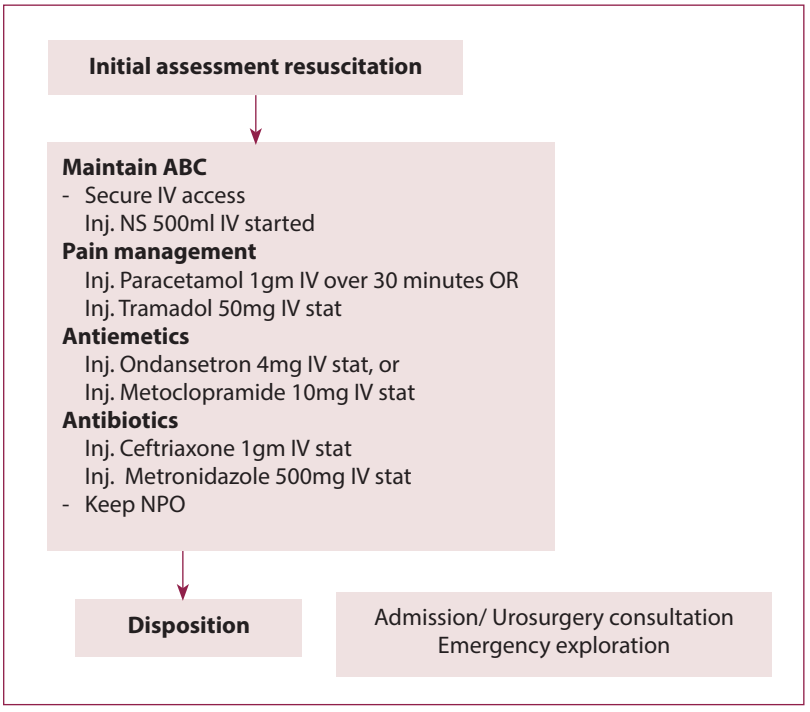
It is a urological emergency.
It is a condition wherein the testis rotate in its axis compromising its blood supply.
It should be intervened as soon as possible within 12-24 hours to prevent gangrene.

Clinical Features

- Occurs in children and adolescent males
- Sudden onset of severe pain in the scrotum, groin, and lower abdomen
- Nausea, vomiting
- Scrotal swelling, redness
- Fever
- Decreased frequency of urine

Investigations

- Urine R/E
- CBC
- USG scrotum



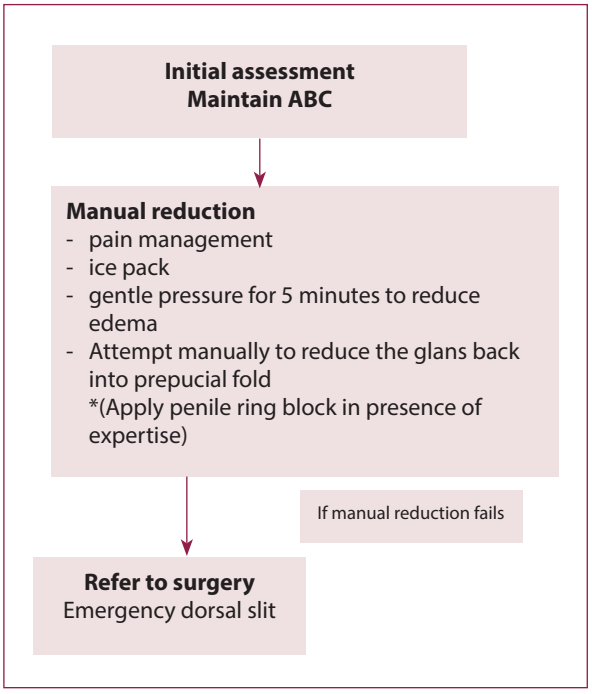
Para phimosis

Inability to cover or place back the glans due to retracted prepucial skin.

Clinical Features

- Painful swollen glands penis
- Necrosis, gangrene if intervention delayed

Management:



6 GYNAECOLOGY AND OBSTETRICAL EMERGENCIES

Ectopic Pregnancy

- An ectopic pregnancy is any pregnancy outside the uterine cavity.
- Commonest site: fallopian tube (91%)

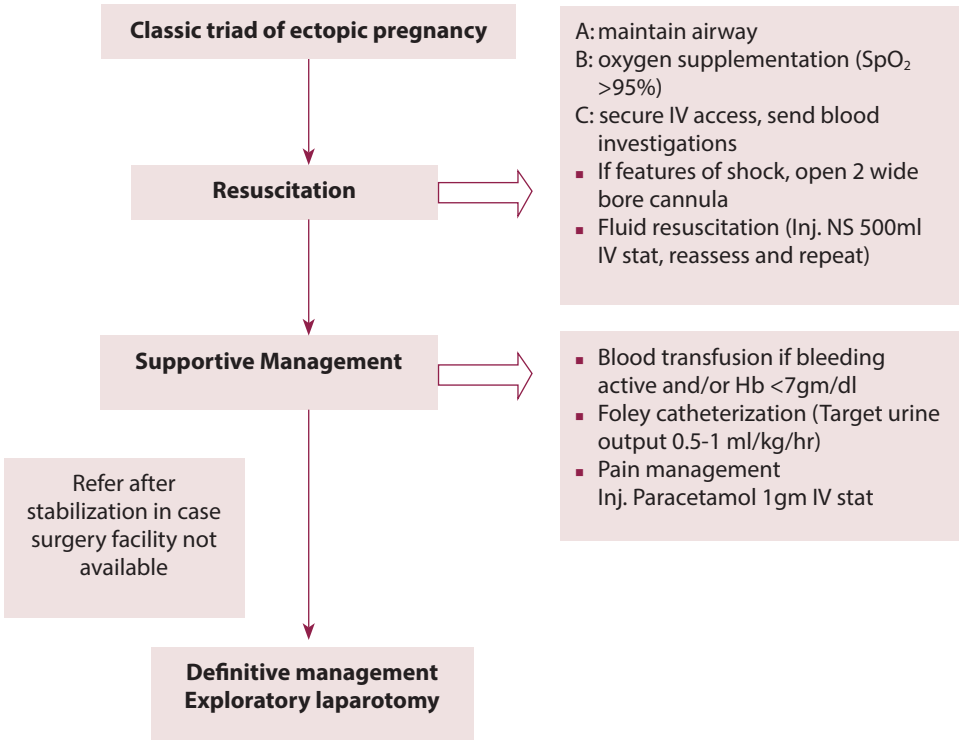
Clinical Features:

Symptoms	Signs
Classic triad: 1. Amenorrhoea 6-8 weeks 2. Pain abdomen 3. Vaginal bleeding ▪ Fainting attacks /syncope ▪ Nausea , vomiting	▪ Pallor ▪ Features of shock (rapid feeble pulse, low BP) ▪ Abdominal tenderness ▪ Tender adnexal mass, bulky uterus.
Neuropathic	Trauma, mass lesion, stroke, diabetes, multiple sclerosis
Medications	Antipsychotics, antidepressants

Investigations:

- CBC, RFT, RBS
- Blood grouping and cross matching
- Serum beta hCG/urine pregnancy test
- USG abdomen

Ectopic Pregnancy



Antepartum Haemorrhage

- Bleeding per vagina after 22 weeks of pregnancy but before the birth of the baby is known as APH.

Clinical Features

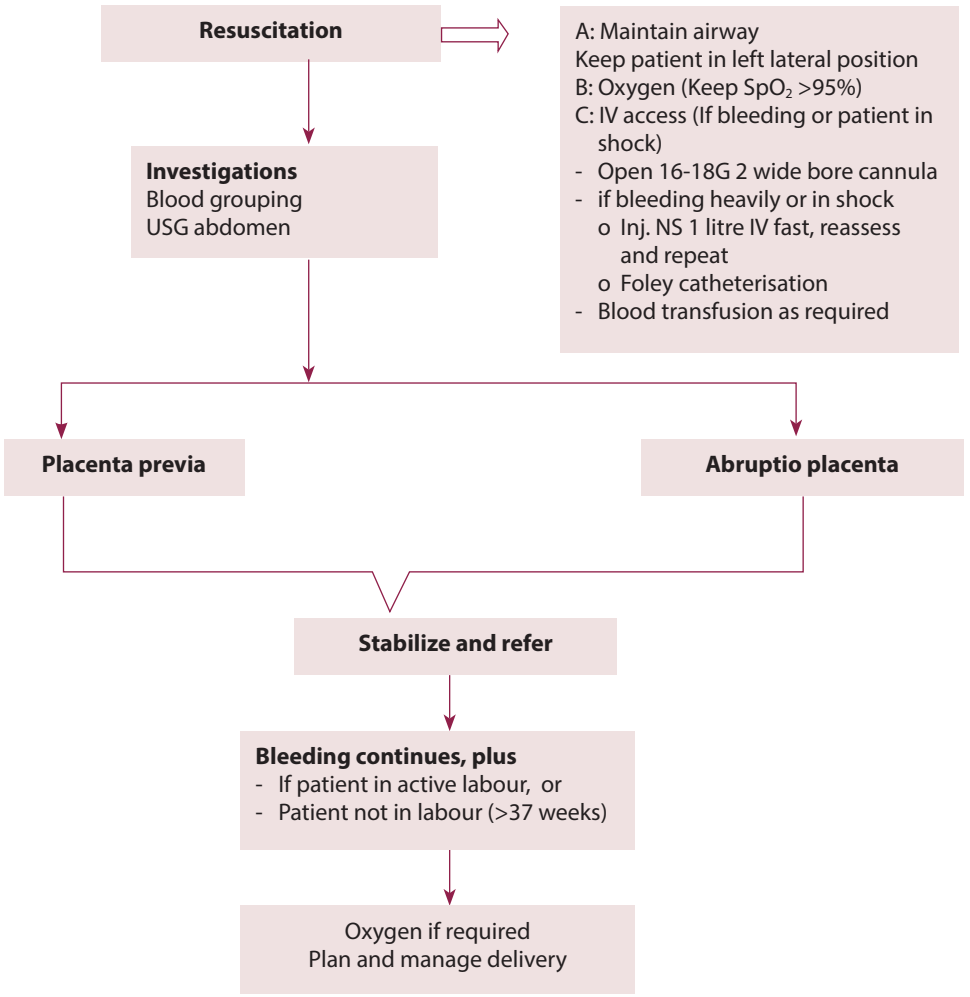
Features	Placenta previa	Abruptio placenta
Nature of bleeding	▪ Painless bleeding	▪ Painful bleeding
Colour of blood	▪ Bright red	▪ Red
General condition	▪ Proportionate to visible blood loss	▪ Not proportionate to visible blood loss
Abdominal /E	▪ Soft relaxed uterus ▪ FHS+	▪ Tense, tender uterus ▪ FHS+/-
Placenta	▪ Lower segment	▪ Upper segment

NOTE: No P/V examination unless placenta previa is ruled out.

Investigations:

1. CBC
2. RFT, RBS, LFT
3. Coagulation profile
4. Blood grouping/ cross matching
5. USG abdomen

Antepartum Haemorrhage



Ruptured Uterus

Dissolution in the continuity of the uterine wall any time beyond 28 weeks of pregnancy is called rupture of uterus.

Causes:

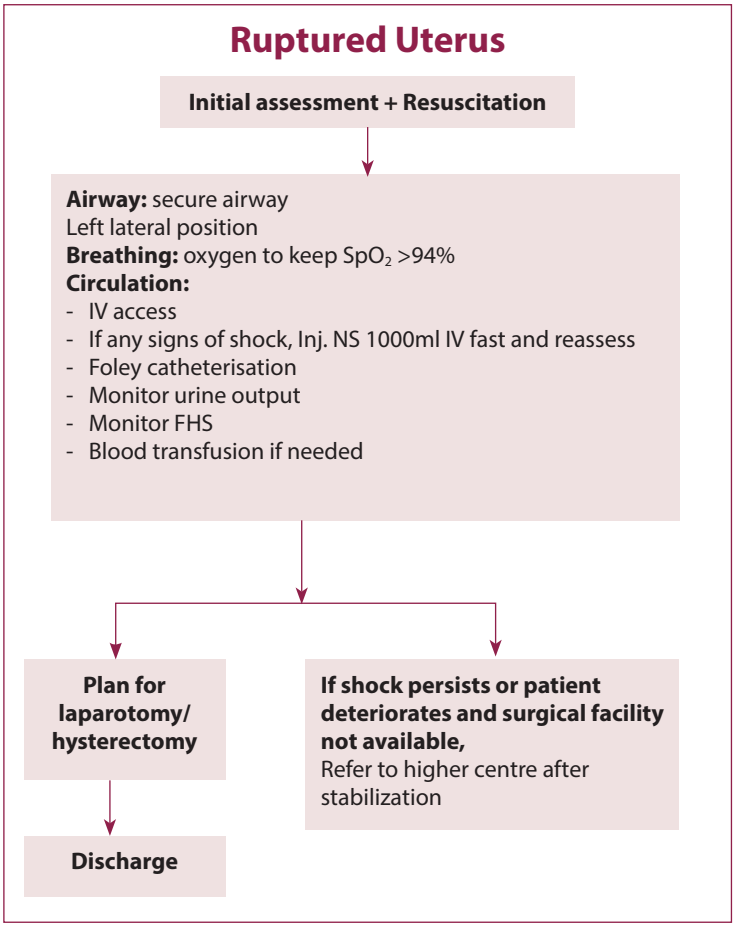
1. Spontaneous
2. Scar rupture
3. Iatrogenic

Clinical features:

Symptoms and signs
Bleeding (intra-abdominal and/or vaginal) Severe abdominal pain (may decrease after rupture) Signs of shock (Rapid maternal pulse, hypotension) Abdominal distension Abnormal uterine contour Abdominal tenderness Easily palpable fetal parts Absent fetal movements Absent fetal heart sounds

Investigations:

1. CBC, RFT, RBS, LFT
2. Blood grouping/ cross matching
3. USG abdomen and pelvis


Ruptured Uterus
Initial assessment + Resuscitation
Airway: secure airway
Left lateral position
Breathing: oxygen to keep SpO2 >94%
Circulation:
- IV access
- If any signs of shock, Inj. NS 1000ml IV fast and reassess
- Foley catheterisation
- Monitor urine output
- Monitor FHS
- Blood transfusion if needed
Plan for laparotomy/ hysterectomy
Discharge
If shock persists or patient deteriorates and surgical facility not available,
Refer to higher centre after stabilization

Pregnancy Induced Hypertension (PIH)

PIH is defined as hypertension that develops as direct result of the gravid state.

Pre-eclampsia	Eclampsia
Hypertension (≥140/90 mmHg) + Proteinuria (+2) +/- Pathological edema	Pre- eclampsia + Convulsions
After 20 weeks gestation	
2 readings 4 hours apart	
Mild: ≥140/90 mmHg Severe: ≥160/110 mmHg	

Clinical Features:

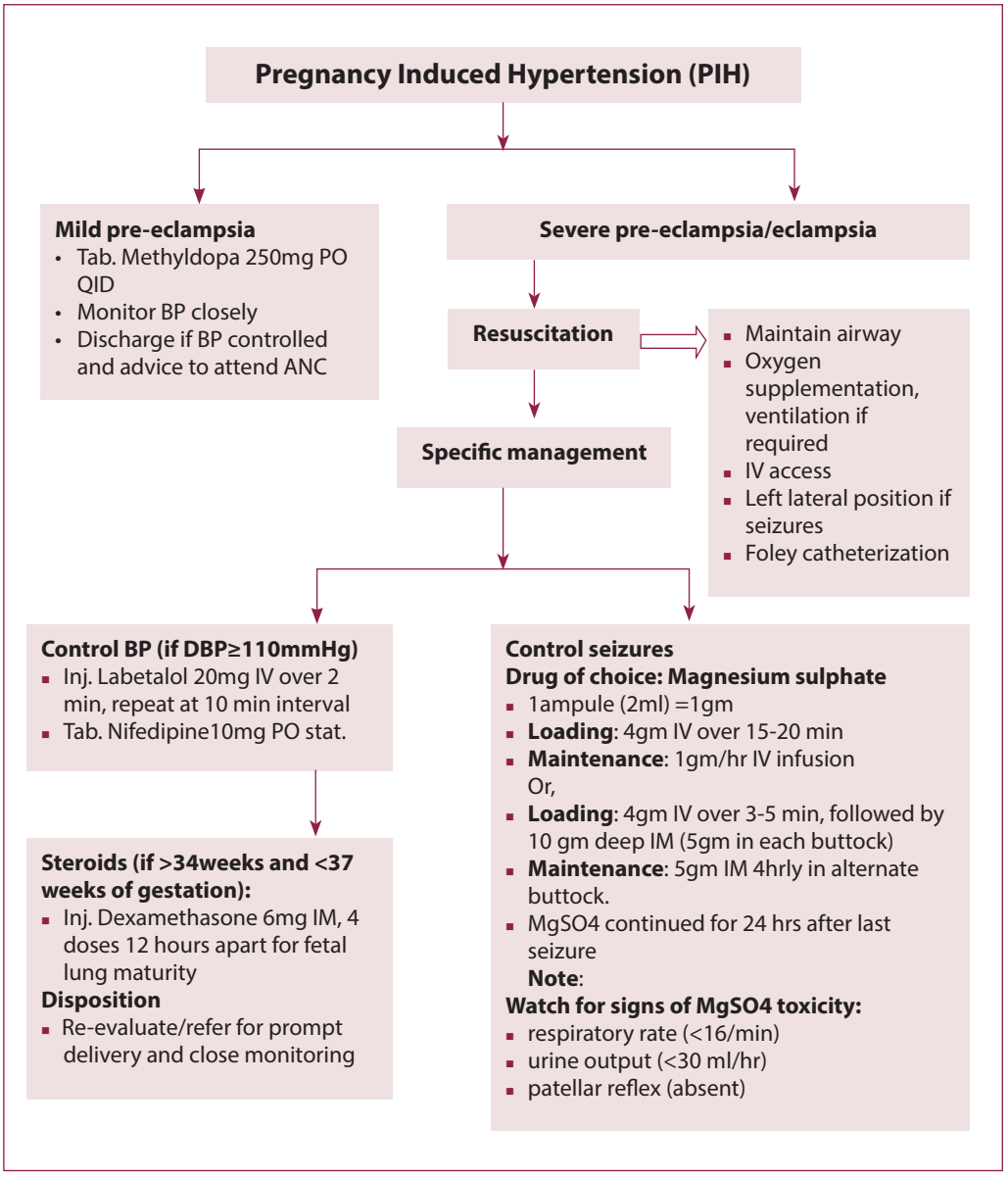
Mild symptoms
Slight swelling of ankles extending to face, vulva, whole body

Alarming symptoms

- Rise in DBP ≥ 90mmHg
- Headache
- Decreased urine output
- Pain epigastrium
- Blurring of vision
- Oedema (generalized)
- Shortness of breath (pulmonary oedema)
- Seizures- GTCS

Investigations:

- CBC, RFT, uric acid, RBG
- Urine R/E
- Antenatal foetal monitoring


Pregnancy Induced Hypertension (PIH)
Mild pre-eclampsia
• Tab. Methyldopa 250mg PO QID
• Monitor BP closely
• Discharge if BP controlled and advice to attend ANC
Severe pre-eclampsia/eclampsia
Resuscitation
▪ Maintain airway
▪ Oxygen supplementation, ventilation if required
▪ IV access
▪ Left lateral position if seizures
▪ Foley catheterization
Specific management
Control BP (if DBP≥110mmHg)
▪ Inj. Labetalol 20mg IV over 2 min, repeat at 10 min interval
▪ Tab. Nifedipine10mg PO stat.
Steroids (if >34weeks and <37 weeks of gestation):
▪ Inj. Dexamethasone 6mg IM, 4 doses 12 hours apart for fetal lung maturity
Disposition
▪ Re-evaluate/refer for prompt delivery and close monitoring
Control seizures
Drug of choice: Magnesium sulphate
▪ 1ampule (2ml) =1gm
▪ Loading: 4gm IV over 15-20 min
▪ Maintenance: 1gm/hr IV infusion
Or,
▪ Loading: 4gm IV over 3-5 min, followed by 10 gm deep IM (5gm in each buttock)
▪ Maintenance: 5gm IM 4hrly in alternate buttock.
▪ MgSO4 continued for 24 hrs after last seizure
Note:
Watch for signs of MgSO4 toxicity:
▪ respiratory rate (<16/min)
▪ urine output (<30 ml/hr)
▪ patellar reflex (absent)

Obstructed Labour

Obstructed labour is the labour in which the presenting part of the fetus cannot progress into the birth canal with fetal distress and third-degree moulding despite adequate uterine contractions.

Causes:

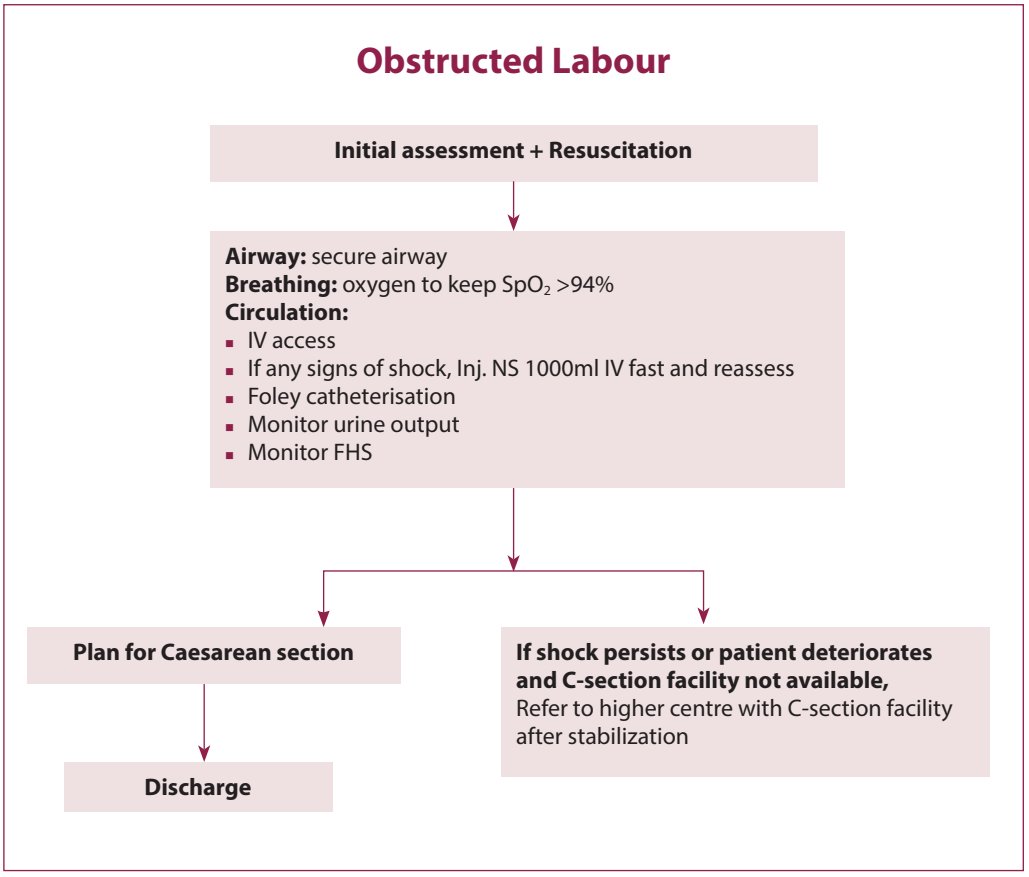
Fault in the passage	Fault in the passenger
Bony: contracted pelvis, cephalopelvic disproportion Soft tissue: cervical dystocia, cervical or broad ligament fibroid	Transverse lie Brow presentation Congenital malformation of fetus: hydrocephalus, fetal ascites Big baby Compound presentation

Clinical Features:

History	Clinical examination
Age Disability affecting pelvic bone Obstetric history: indication for previous C-section, still birth, duration of labour pain Uterine contractions increased or stopped Membrane status (if ruptured – duration, colour of liquor) Check partograph (whether cervical dilation crosses the alert or action lines)	**General** Temperature, rapid and weak pulse, hypotension, increased respiration, maternal/ fetal distress, FHS, signs of dehydration, decreased urinary output **Abdominal: sign of obstruction** Presenting part 5/5 palpable Frequent, strong and long contraction Bandl's ring may be seen FHS may not be heard **Vaginal** Oedematous vulva, dry hot vagina Oedematous and dilated cervix Caput/moulding

Investigations:

- CBC, RFT, RBS, LFT
- Blood grouping/ cross matching


Obstructed Labour
Initial assessment + Resuscitation
Airway: secure airway
Breathing: oxygen to keep SpO2 >94%
Circulation:
IV access
If any signs of shock, Inj. NS 1000ml IV fast and reassess
Foley catheterisation
Monitor urine output
Monitor FHS
Plan for Caesarean section
Discharge
If shock persists or patient deteriorates and C-section facility not available,
Refer to higher centre with C-section facility after stabilization

Postpartum Haemorrhage (PPH)

PPH is an important emergency condition. It is defined as the amount of blood loss in excess of 500ml following the birth of baby.

Types:

Primary: Haemorrhage occurs within 24 hrs following birth
Secondary: Haemorrhage occurs beyond 24 hrs and within puerperium

Clinical Features:

- Bleeding PV
- Tachycardia, hypotension (>20-25% loss of blood volume)
- Traumatic PPH (20%)- uterus well controlled
- Atonic PPH (80%) – uterus flabby

Investigations:

- CBC, RFT, RBS
- Blood grouping and cross matching

Management:

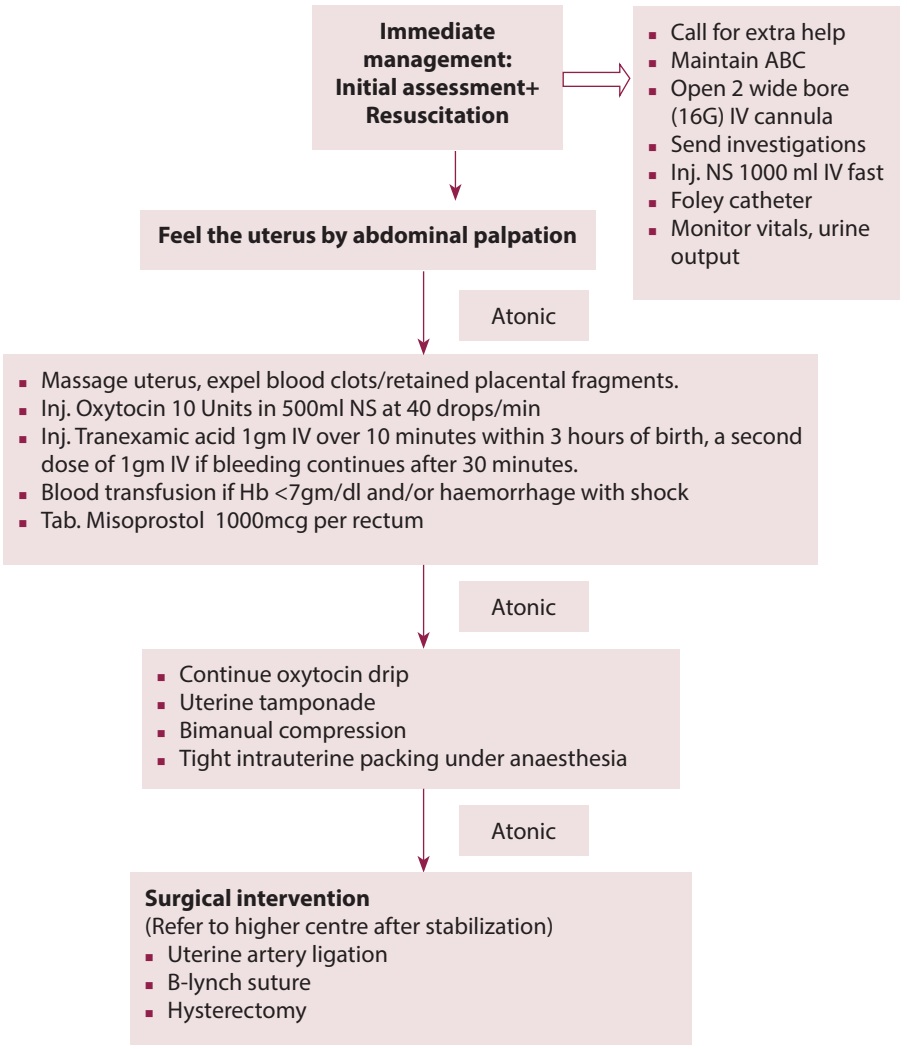
- Resuscitation
- Definitive management
  - Medical/Surgical

***Address the "4Ts plus 1"**

Tone
Trauma
Tissue
Traction
Thrombosis

Management of "tone" or atonic uterus is described in detail below.

Post Partum Haemorrhage (PPH)



Management of 4 "T"s:

Trauma:

- Direct pressure in case of lacerations or hematomas
- Repair perineal, vaginal or cervical lacerations
- Packing of uterine cavity in case of uterine bleeding

Tissue:

- Manual extraction of retained bits of placenta or cotyledons
- Packing of uterus
- Suction evacuation or laparotomy if required

Traction:

- In case of uterine inversion, try to push the uterus gently back into position
- If replacement attempts fail, emergency surgical intervention needed

Thrombosis:

- If evidence of coagulation disorders, transfuse blood and blood products if bleeding is profuse.

Puerperal pyrexia

It is defined as the rise of temperature reaching 100.4 degrees Fahrenheit (38°C) or more on two separate occasions 24 hours apart within the first 10 days following delivery.

Causes:

- Puerperal sepsis
- UTI
- Mastitis
- Respiratory tract infection
- Wound infection

Clinical Features:

- Fever
- Pain abdomen
- Foul smelling discharge PV
- Signs of septic shock: pulse increased, BP decreased

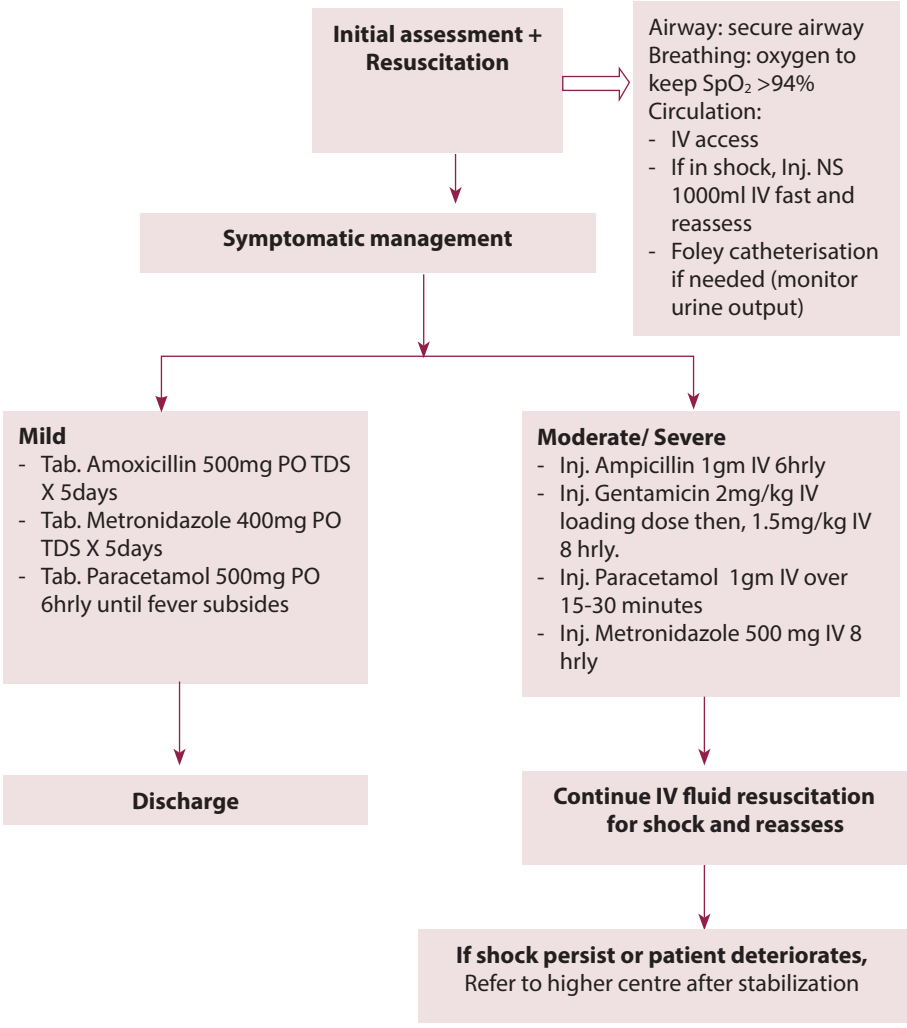
Investigations:

- CBC, RFT, RBS, ESR
- Urine R/E
- Blood & urine C/S
- CXR
- High vaginal swab

Management:

1. Maintain ABC
2. Symptomatic management:
   Antibiotics
   Oral (mild cases): discharge and follow up.
   IV (moderate/severe cases)
   Refer if persistence of symptoms and shock despite resuscitation

Puerperal Pyrexia



Hyperemesis Gravidarum

Severe intractable form of vomiting in pregnancy affecting the wellbeing of both mother and foetus. It is usually seen at 8-12 weeks of gestation. It may lead to fluid and electrolyte imbalance, weight loss of 5% or greater; and nutritional deficiency requiring hospital admission. The etiology is not well understood and it is thought to be caused by endocrine, infectious, psychosocial, and hereditary factors.

Clinical Features:

- Nausea
- Vomiting- multiple episodes with retching
- Pain epigastrium
- Signs of severe dehydration:
  i. Sunken eyes
  ii. Dry, thick coated tongue
  iii. Inelastic and lustreless skin
  iv. Tachycardia (Pulse 100 or more per minute)
  v. Hypotension
  vi. Rise in temperature
  vii. Decreased urine output
  viii. Progressive emaciation

Investigations:

- Urine R/E
- Urine acetone
- CBC, RFT, LFT, RBS
- USG abdomen to rule out molar pregnancy or multiple pregnancy

Hyperemesis Gravidarum

Initial assessment + Resuscitation
Assess hydration status
- Start Inj. RL or NS 500ml IV 4 hourly
- Strict input/output charting

↓

Symptomatic management

↓

Mild (Urine acetone-negative/trace, no dehydration)
Antiemetic:
Tab. Metoclopramide 10mg PO stat/BD
Evaluate and follow up in OPD

Severe (Urine acetone positive with signs of dehydration)
Admission
IV fluids 4 hourly
Inj. Metoclopramide 10mg IV BD, or
Inj. Ondansetron 8mg over 15 minutes IV BD
Inj. Thiamine/ B-Complex IV OD (until no vomiting)

Reassess every 4 hours

↓

Discharge
- If symptoms decrease
- Two consecutive urine acetone negative
- Nutritional support
- Cap. Vitamin B complex 1Cap PO OD
- Tab. Metoclopramide 10 mg PO BD, or
- Tab. Ondansetron 4mg PO TDS

Refer if
Persistence of symptoms
No urine output

7 ORTHOPEDICS AND TRAUMA

Head Injury

Traumatic brain injury

Primary brain injury	Secondary brain injury
▪ At the time of accident ▪ DAI (Diffuse Axonal Injury) ▪ Acceleration and deceleration ▪ Cerebral contusion ▪ Penetrating injury	Occur later after the accident Causes ▪ Hypoxia ▪ Hypovolemia ▪ Hypoperfusion ▪ Hyperglycemia ▪ Hyperthermia ▪ Seizures

Assessment

A. History: Mechanism of injury.

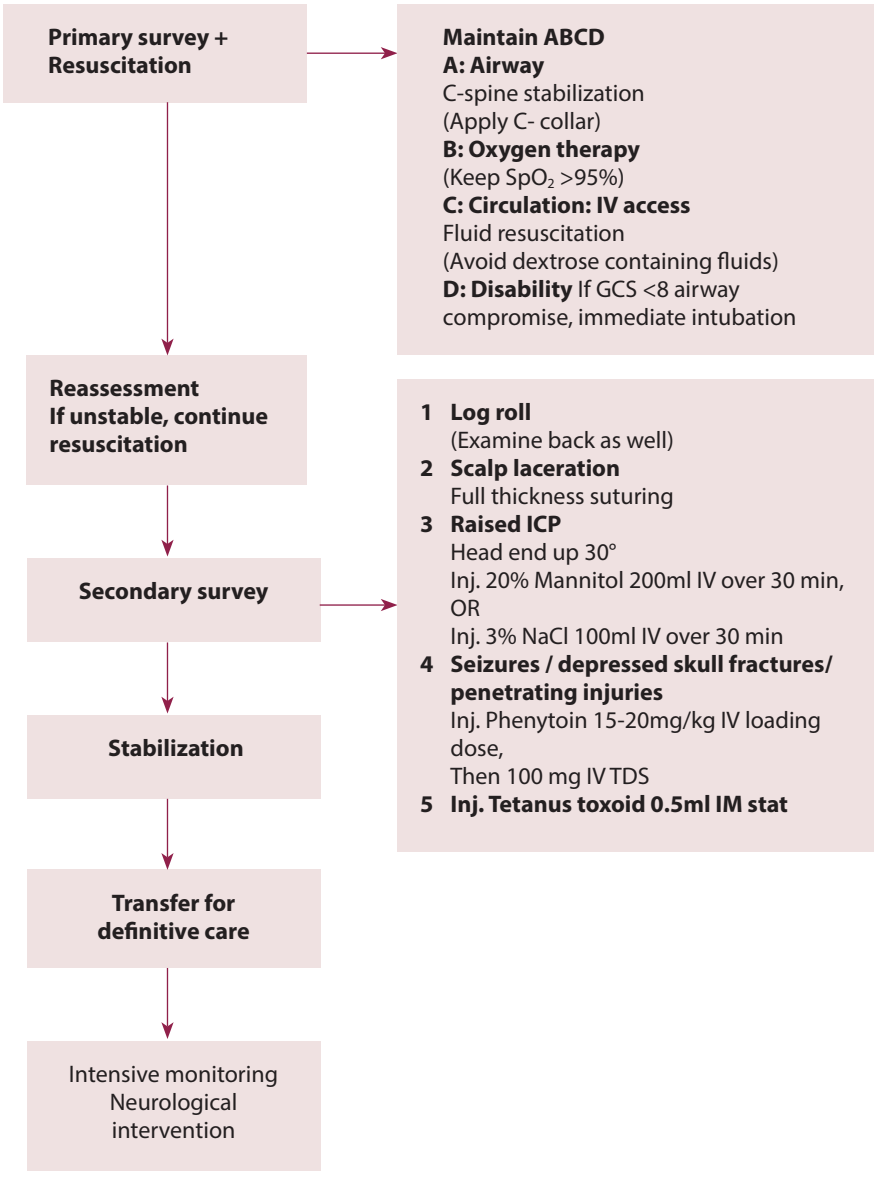
B. Examination

1. Glasgow coma scale
   - Grades severity of head injury
   - Score out of 15
     - o Severe: 8 or less
     - o Moderate: 9-13
     - o Mild: 14-15
2. Pupils
   - Size
   - Reactivity
   - Equality
3. Focal deficit
   - present
   - absent

Investigations

- CBC, RFT
- Blood Grouping/ cross matching
- X-ray C spine
- CT- brain

Head Injury


Primary survey + Resuscitation
Maintain ABCD
A: Airway
C-spine stabilization
(Apply C- collar)
B: Oxygen therapy
(Keep SpO_2 >95%)
C: Circulation: IV access
Fluid resuscitation
(Avoid dextrose containing fluids)
D: Disability If GCS <8 airway compromise, immediate intubation
Reassessment
If unstable, continue resuscitation
Secondary survey
1 Log roll
(Examine back as well)
2 Scalp laceration
Full thickness suturing
3 Raised ICP
Head end up 30°
Inj. 20% Mannitol 200ml IV over 30 min, OR
Inj. 3% NaCl 100ml IV over 30 min
4 Seizures / depressed skull fractures/ penetrating injuries
Inj. Phenytoin 15-20mg/kg IV loading dose,
Then 100 mg IV TDS
5 Inj. Tetanus toxoid 0.5ml IM stat
Stabilization
Transfer for definitive care
Intensive monitoring
Neurological intervention

Abdominal and Pelvic Injuries

Abdominal and pelvic injury is a cause of potentially preventable deaths, however, it can go unnoticed if inappropriately evaluated.

Types

Blunt trauma	Penetrating trauma
▪ Motor vehicle accident ▪ Fall ▪ Organ involved: spleen, liver, bowel	▪ Stab injuries ▪ Gun shot ▪ Organ involved: liver, colon, diaphragm

Assessment

1. **History –** Mechanism of injury, extent of impact
2. **Examination –**

   Look – bruising, swelling, impression marks, distension, laceration

   LOG ROLL: To inspect the back

   Feel – tenderness, guarding, rigidity, crepitus

   Vaginal examination- pelvic injuries

   Rectal examination-pelvic injuries

   Penile examination- blood at the tip of urethral meatus

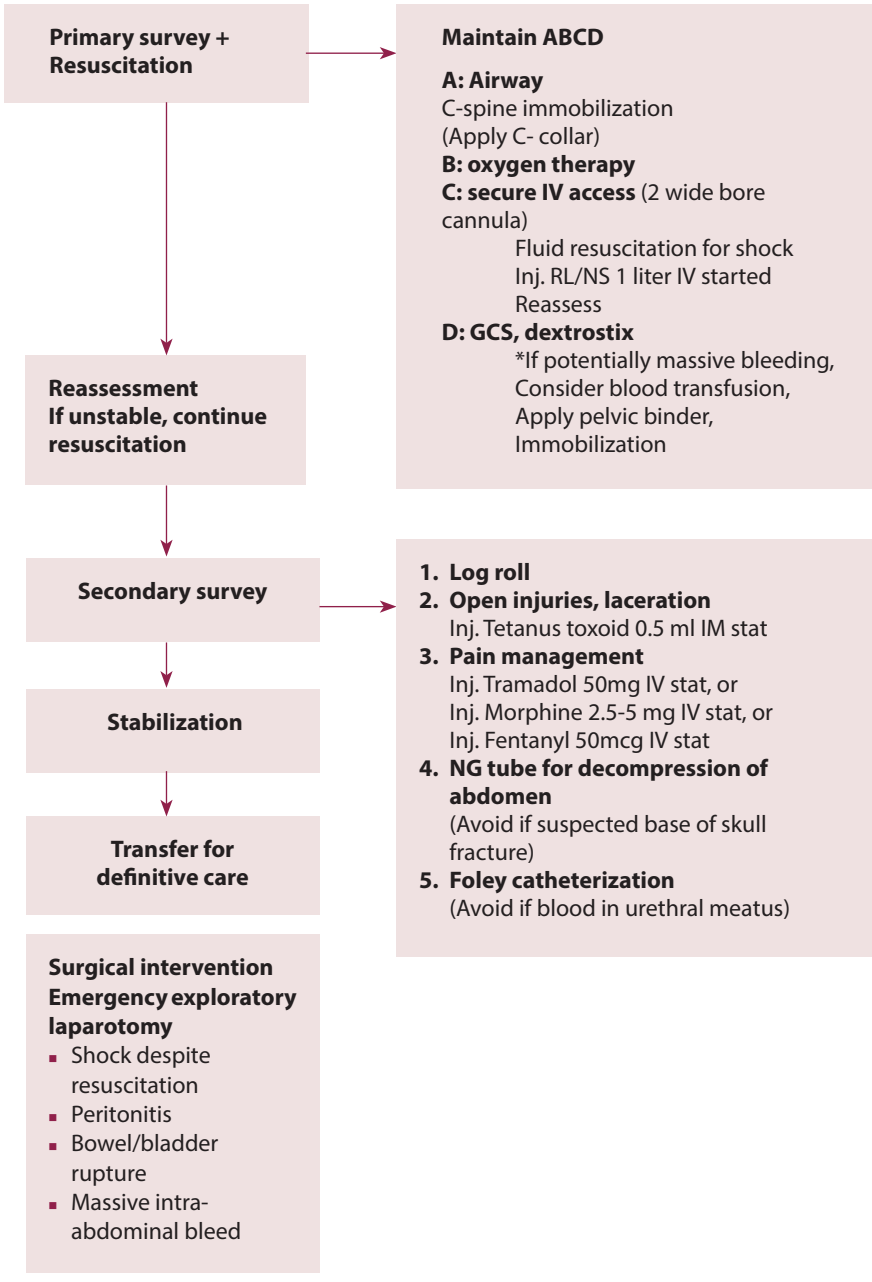
   Listen- Presence or absence of bowel sounds

NOTE: A negative physical examination does not always rule out abdominal injury.

Investigations:

- CBC, RFT, LFT, blood grouping
- CXR, C- spine, X-ray pelvis
- eFAST (extended focussed assessment with sonography in trauma)
  (If patient unstable but with negative eFAST, repeat after 10 min)
- CT scan **(DO NOT shift a patient with unstable vitals for CT scan)**

Abdominal and Pelvic Injuries



Chest Injuries

Approximately 25% of deaths due to trauma are attributed to chest injury. These injuries can be life threatening in case of disruption of the airway, injury to the great vessels or the heart.

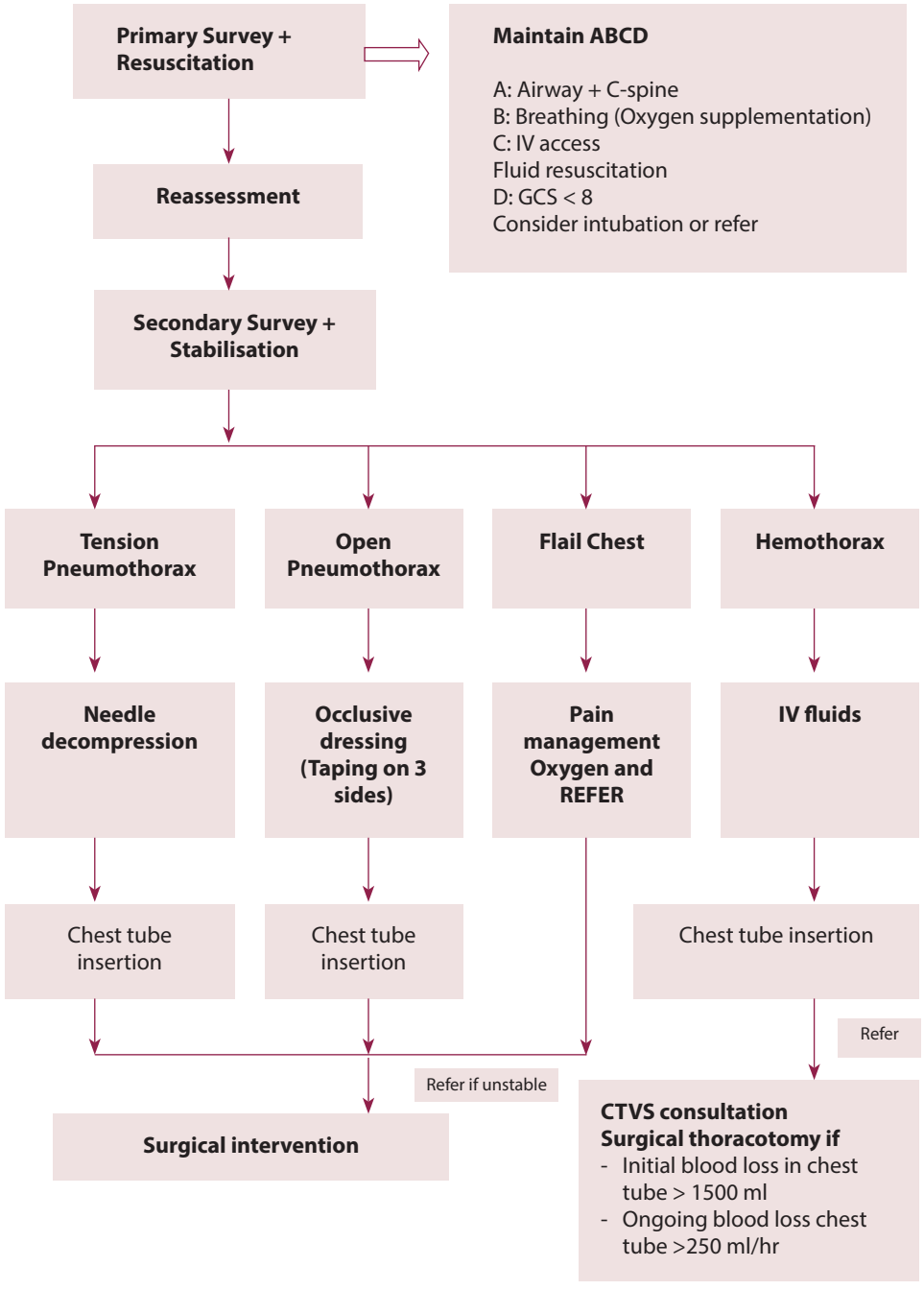
The life threatening chest injuries to be identified during primary assessment are:

1. Tension pneumothorax
2. Open pneumothorax
3. Flail chest and pulmonary contusion
4. Massive hemothorax

	Tension pneumothorax	Open Pneumothorax	Flail chest	Massive Hemothorax
Definition	Develops when air enters pleural space and cannot leave, leading to increase in intrathoracic pressure on affected side	Large open wound in chest wall which leads to complete collapse of lung on affected side since air is sucked into thoracic cavity	≥ 2 rib fractures at ≥ 2 sites. The bony segment moves independently of the rest of thoracic cavity	Presence of blood in thoracic cavity
Chest movement	Decreased	Decreased	Paradoxical movement	Decreased
Breath sounds	Decreased/ absent	Decreased	Normal/ crackles	Diminished if large
Percussion	Hyper resonant	Hyper resonant/ normal	Normal	Dull

Note: Do not wait for radiological confirmation (Chest X-ray) in case of tension pneumothorax.
Diagnose clinically.

Chest Injuries



Musculoskeletal Injuries

Fractures

A fracture is any break in the continuity of the bone.

1. **Open fractures:** The fractured bone communicates with the exterior exposing bone at the fracture site.
2. **Closed fractures:** Higher chances of infection. No communication with the exterior.

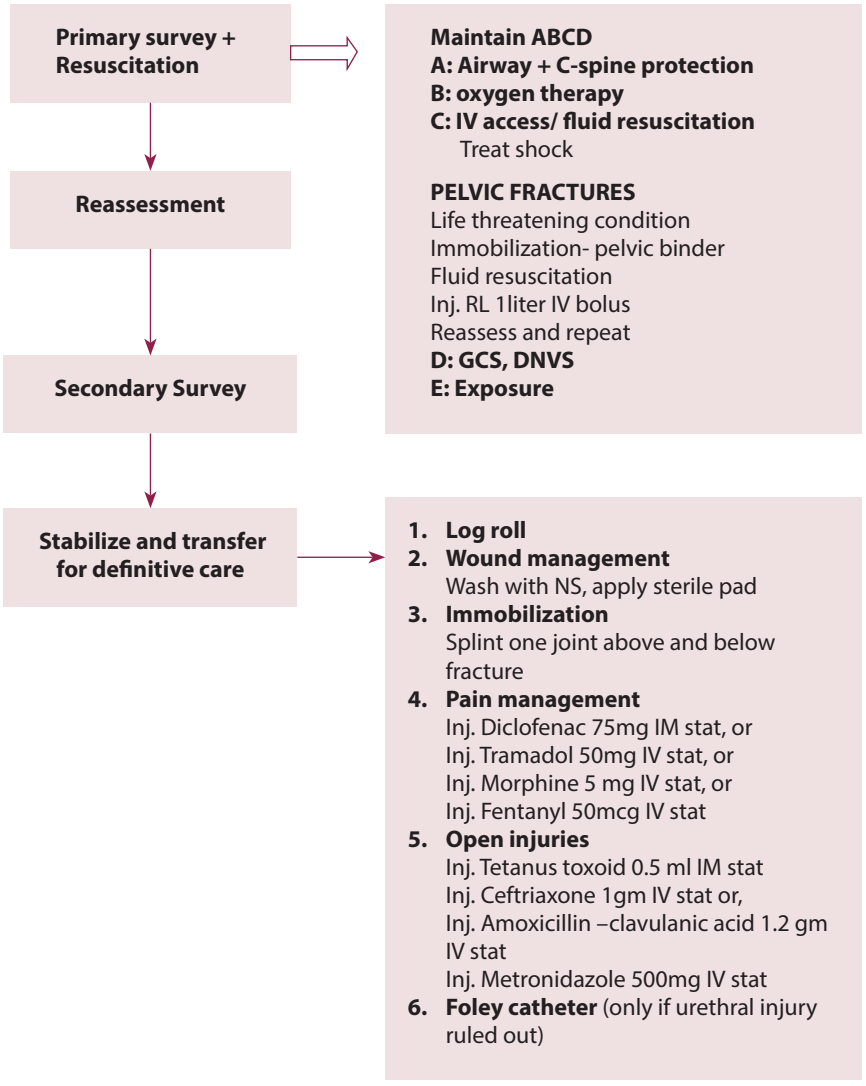
Clinical features:

- Swelling or a gross deformity of limb
- Pain
- Decreased/ absent range of movement of joints
- DNVS (Distal Neurological Vascular Status) – intact/ not
- Associated wounds

Investigations

- CBC, RFT
- Blood grouping, cross matching
- X-ray of fractured limb:
    - Involve one joint above and below the fractured site
    - Order 2 views

Musculoskeletal Injuries



Compartment Syndrome

It is a condition where the circulation within a closed compartment is compromised by an increase in pressure resulting in ischemia and necrosis of muscle and nerves.

Common site: leg, fore arm

Causes

- Severe crush injuries
- Tight/constricting casts
- Compression injuries
- Closed fractures
- Infections
- Burns

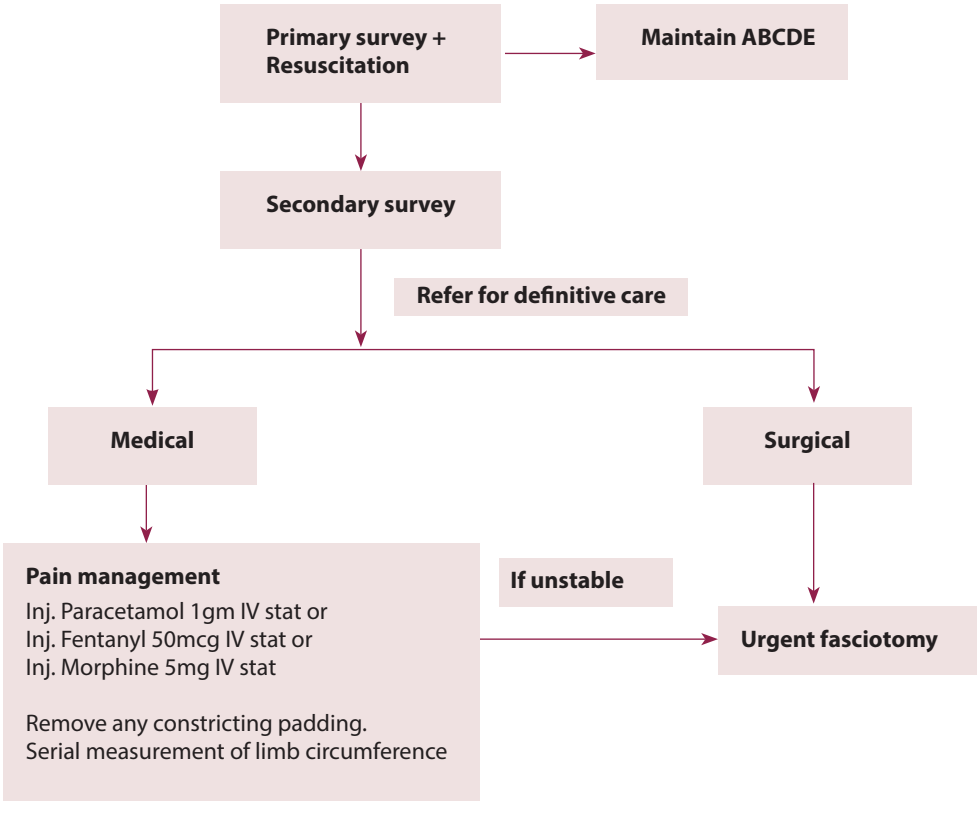
Clinical Features:

- Pain: out of proportion to expected and increased by passive stretching
- Paresthesia
- Pallor
- Paralysis
- Pulselessness (late sign)

Investigations:

- If available, measurement of compartment pressure (>30mmHg) indicates compartment syndrome
- Routine blood tests, CPK
- X-ray of affected limb

Compartment Syndrome



Traumatic Amputation

Traumatic amputation may cause a significant threat to life and the survival of the residual limb.

It can also cause life threatening hemorrhage.

Clinical Features:

- Pain
- Severe bleeding
- Hypotension, tachycardia

Management

- Primary survey+ resuscitation: Maintain ABC
- Preservation of amputated part:
  - Wash the part in normal saline thoroughly.
  - Wrap it in sterile gauge (soak it with 100,000 units Penicillin in 50ml NS)
  - Wrap it further in a sterile moist towel.
  - Place in a plastic bag, keep it in crusted ice but avoid freezing.
  - Refer immediately for definitive care.

NOTE: only clean cut amputation can be salvaged.

Dental Emergencies

Toothache/ Odontalgia

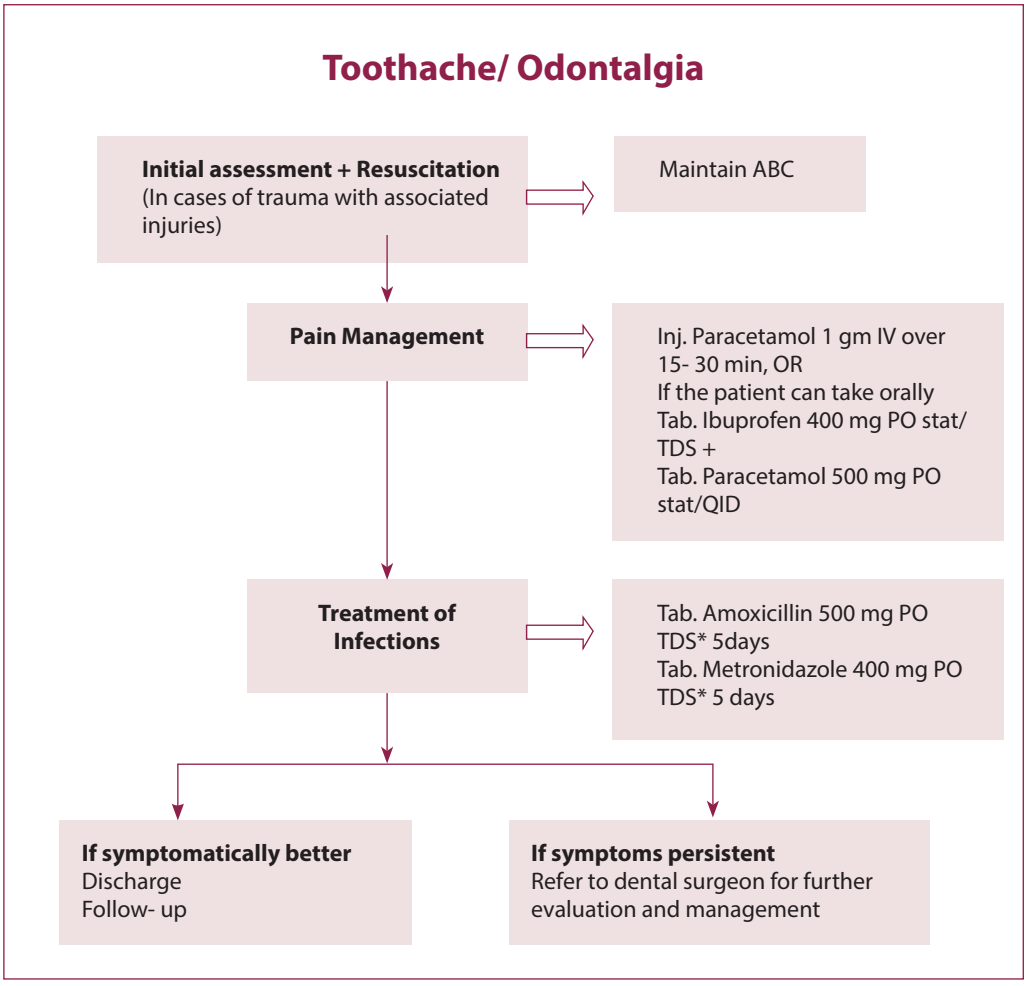
Toothache is a common problem encountered around the world which can even present as a dental emergency as per the severity of the pain.

Causes:

Non-traumatic	Traumatic
1. Tooth eruption 2. Dental caries 3. Periodontitis 4. Pericoronitis 5. Gingivitis 6. Abscess- Gingival, periodontal 7. Cracked tooth syndrome 8. Malignancies	Dental fractures Dental crown and/ or root fractures Dental avulsions Dental luxation Facial bone fractures Soft tissue lacerations

Clinical Features:

1) Pain associated with the underlying cause.
   - Pain could range from dull aching to throbbing in nature
   - Pain may be localized or radiating to surrounding structures
   - Aggravated by movement and changes in temperature in oral cavity
2) Fever, headache
3) Examination reveals tenderness of the offending tooth.


Toothache/ Odontalgia
Initial assessment + Resuscitation
(In cases of trauma with associated injuries)
Maintain ABC
Pain Management
Inj. Paracetamol 1 gm IV over 15- 30 min, OR
If the patient can take orally
Tab. Ibuprofen 400 mg PO stat/ TDS +
Tab. Paracetamol 500 mg PO stat/QID
Treatment of Infections
Tab. Amoxicillin 500 mg PO TDS* 5days
Tab. Metronidazole 400 mg PO TDS* 5 days
If symptomatically better
Discharge
Follow- up
If symptoms persistent
Refer to dental surgeon for further evaluation and management

Dental fractures

Toothache is a common problem encountered around the world which can even present as a dental emergency as per the severity of the pain.

Ellis Classification:

Class	Characteristics	On examination	Treatment
Ellis 1	Injury of crown into enamel only	Non tender, no change in colour, rough edges may be present	File down sharp edges. Follow up with dentist
Ellis 2	Injury of enamel and dentin	Tender, Dentin can be seen which appears as yellow layer	Cover exposed dentin, can use calcium hydroxide composition, an adhesive barrier. Pain medication sos. Follow up with dentist in 24 hours
Ellis 3	Injury of enamel, dentin and pulp	Tender, color change, pink or red, possible visible blood	Cover exposed dentin/pulp. Initiate antibiotics. Emergent dental referral

Temporomandibular Joint (TMJ) Dislocation

TMJ consists of the articulation of temporal and mandibular bones. TMJ dislocation is a common condition encountered in the emergency room which needs to be addressed immediately by the emergency physician. Anterior dislocation of TMJ is the commonest condition.

Causes:

a) Congenital weakness of ligaments/ muscles associated with the opening and closing of mouth.
b) Yawning, laughing (extreme opening of mouth)
c) Traumatic extractions
d) Prolonged dental procedures
e) Direct laryngoscopy
f) Epilepsy
g) Drugs (dystonic reaction)
h) Trauma

Clinical Features:

- The patient presents with the complaint of inability to close the mouth fully and presents with an open mouth.
- Associated pain in the ear

Management:

Reduction of TMJ dislocation manually.

Temporomandibular Joint (TMJ) Dislocation

Manual reduction of TMJ dislocation

1. Place patient seated with posterior head support
2. Sedation and muscle relaxation
   - Inj. Midazolam 3 mg IV stat, +
   - Inj. Morphine 5 mg IV stat
3. Grasp the mandible with both hands with thumb intraorally just lateral to lower molars and fingers wrapped around the outside of jaw
4. Apply pressure downwards and backwards to the mandibular condyle followed by upward pressure which reduces the dislocation

Refer if no improvement OR for follow up

Post reduction X-ray (done if)
If failure to reduce or
If severe pain post reduction, suspect fracture

Discharge with instruction:
1. Avoid extreme opening of jaw (3 weeks)
2. Support lower jaw while yawning
3. Take Tab. Ibuprofen 400 mg PO SOS
   or,
   Tab. Paracetamol 500 mg PO SOS

Urgent referral to dental surgeon
1. TMJ dislocation with fracture
2. Failure to reduce after multiple attempts
3. History of two prior TMJ dislocations

Gum Bleeding

Bleeding gums are the most common symptoms of gum disease, however frequent bleeding can be an indication of serious health conditions.

Causes:

1.Vigorous brushing of teeth
2. Ill-fitting worn out dentures
3. Periodontitis
4. Gingivitis
5. Dental Abscess
6. Nutritional deficiency
7. Bleeding disorder
8. Leukemia
9. Drugs

Clinical Features:

1. Bleeding from the gums associated with swelling and pain around the gums
2. Features of underlying disease conditions

Management:

1. Reassurance
2. Rinse the mouth with water
3. Apply direct pressure for 15-20 minutes over the site of bleeding
4. Packing with sterile gauze soaked in lignocaine with adrenaline
5. Pain management
6. Refer to dental surgeon for further evaluation

8 METABOLIC EMERGENCIES

Hypokalemia

- Normal: Serum potassium: 3.5 – 5.5 mEq/L
- Hypokalemia: Serum potassium: <3.5 mEq/L

Causes

1. Gastrointestinal: - Diarrhoea, Vomiting
2. Renal
   - Cushing's Syndrome
   - Hyperaldosteronism
   - Renal tubular acidosis
3. Drugs: - Diuretics, steroids

Clinical Features:

- No symptoms at ≥ 3 mEq/L
- If < 3 mEq/L: malaise, weakness

Investigations:

- ECG – flattening of T wave, appearance of U wave

Management:

1. Potassium replacement
   - Oral : For mild asymptomatic hypokalemia
   - IV : For severe symptomatic hypokalemia

   Inj. KCl 40 mEq in NS 500 ml IV at 10mEq/hr (Caution: running drip too quickly can cause life threatening conditions)

   1 ampule KCl (10 ml) = 20 mEq K^+

   Note – Maximum rate 10 mEq/hr via peripheral access
   Maximum rate 40 mEq/hr via central line
   Monitor potassium levels 4-6 hourly.
2. Treatment of underlying causes
   - Watch for arrhythmias

Disposition

- Discharge mild asymptomatic cases and follow up
- Admit – If symptomatic case requiring IV KCl

Hyperkalemia

- Hyperkalemia : Serum potassium >5.5 mEq/L
- Serum potassium >6.5 mEq/L = Emergency (Due to risk of arrhythmia)

Causes

1. Excessive intake
2. Drugs – ACE inhibitors, ARB, potassium sparing diuretics, NSAIDS
3. Renal – Renal failure, hypoadrenal state, Addison's disease
4. Burns, rhabdomyolysis
5. Pseudohyperkalemia: hemolyzed sample

Clinical Features

- Muscle weakness, tingling, flaccid paralysis
- Abdominal distension, ileus
- Collapse / syncope – Cardiac arrhythmias

Investigations: ECG

K^+ level	ECG changes
5.5 – 6.5	No changes / Tall T waves
>6.5	Tall peaked T waves
7-8	- Prolonged PR interval - Flat P waves - CHB
>8	- Wide QRS, sine wave (merging of QRS and T wave) - VF - Asystole

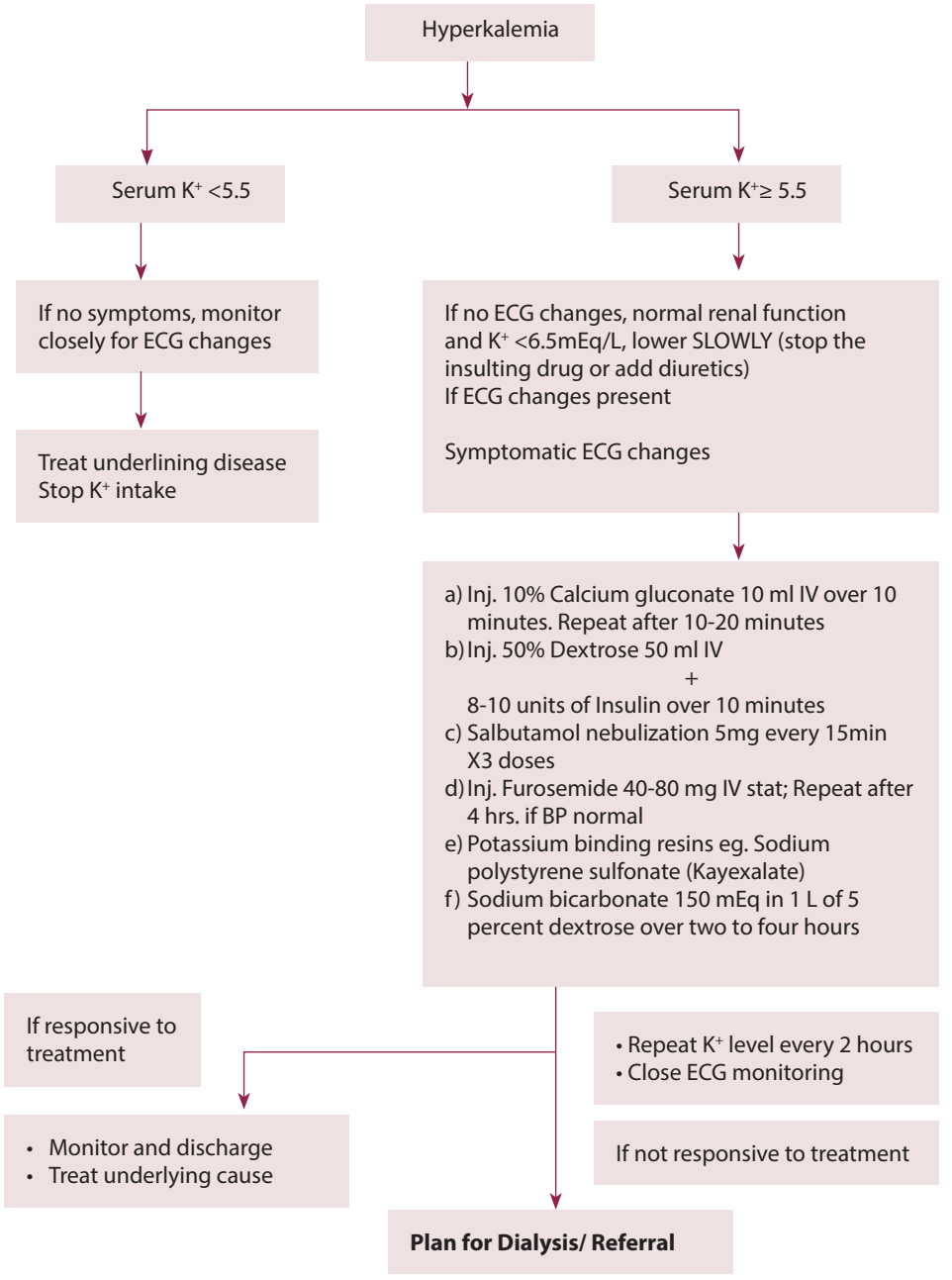
Management

- Maintain ABC
- Stop potassium intake (drugs, supplements)
- Pharmacological therapy
- Dialysis
- Treatment of underlying causes

Disposition

- Admit and monitor
  - if K^+ corrected, discharge and follow up.
  - If K^+ not corrected, consider referral for dialysis and needful.

Hyperkalemia



Hyponatremia

- Normal serum sodium: 135-145 mEq/L
- Hyponatremia: <135 mEq/L

Types

Type	Water	Sodium	Causes
Hypovolemic hyponatremia (Depletional)	Decreased	Decreased	GI – vomiting, diarrhea Renal – renal tubular disease, diuretics
Euvolemic hyponatremia	Increased	Same	SIADH Hypothyroidism
Hypervolemic / dilutional hyponatremia	Increased	Increased	CHF Cirrhosis Nephrotic syndrome

Clinical Features:

- Generalized weakness, muscle cramps
- Nausea, vomiting
- Headache, confusion, drowsiness
- Seizures, coma

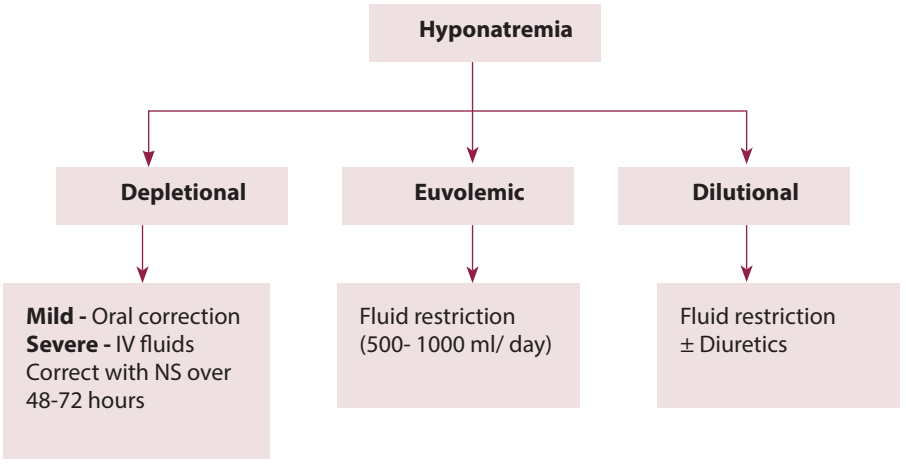
Investigations:

- Serum Na^+
- Serum osmolality
- Urine osmolality

Management:

- As per the type of hyponatremia
- Treatment of underlying causes

Hyponatremia



Treatment of severe symptomatic hyponatremia

1. **Infusion**
   - 3% Sodium chloride (513 mEq/L)

2. **Indication**
   - Seizures
   - Altered sensorium
   - Severe hyponatremia (< 120 mEq/L)

3. **Calculation:**
   - Total sodium deficit = Body weight ×0.6× [Expected Na^+ (135) – Measured Na^+]
   - Aim to correct by not more than 10-12 mEq/L/24 hrs.
   - Avoid rapid correction since it can cause seizures and central pontine myelinolysis.

Hypernatremia

Hypernatremia (serum sodium): >145 mEq/L

Causes

Water	Sodium
Inadequate intake of water • Impaired thirst mechanism • Comatose patients	**Decreased Na^+ excretion** Hyperaldosteronism
Increased water loss • Diarrhoea, vomiting • Renal loss – Diabetes insipidus	**Increased sodium intake** • Drugs- $NaHCO_3$, penicillin • Hypertonic saline

Clinical Features

- Lethargy, muscle twitching, confusion, coma
- Signs of dehydration, exaggerated reflexes

Investigation

- Serum Na^+
- Serum osmolality
- Urine osmolality

Management

If symptomatic,

- Repletion with free water @100 ml per hour orally/ NG tube
- Inj. 5% dextrose IV after calculating water deficit
  Water deficit (in Litres) = 0.6×body wt. ×{(Measured Na^+ /140) -1}
  Aim to lower Na^+ concentration by 10 – 12 mEq/L over 24 hrs.
  Aim to complete correction in 36 –72 hrs.
  Avoid rapid correction which may cause cerebral edema.

Hypoglycemia

- Hypoglycemia is also known as low blood sugar. It is a fall in blood sugar level below normal.
- Usually symptomatic at serum glucose level below 40 mg/dl (2.2 mmol/L).
- Commonest cause: Overdose of insulin or oral hypoglycemic drugs in a diabetic.

Clinical Features

Neurogenic symptoms	Neuroglycopenic symptoms
Tremor, sweating, palpitation	Mental confusion, disorientation, stupor, seizures, coma

Investigations

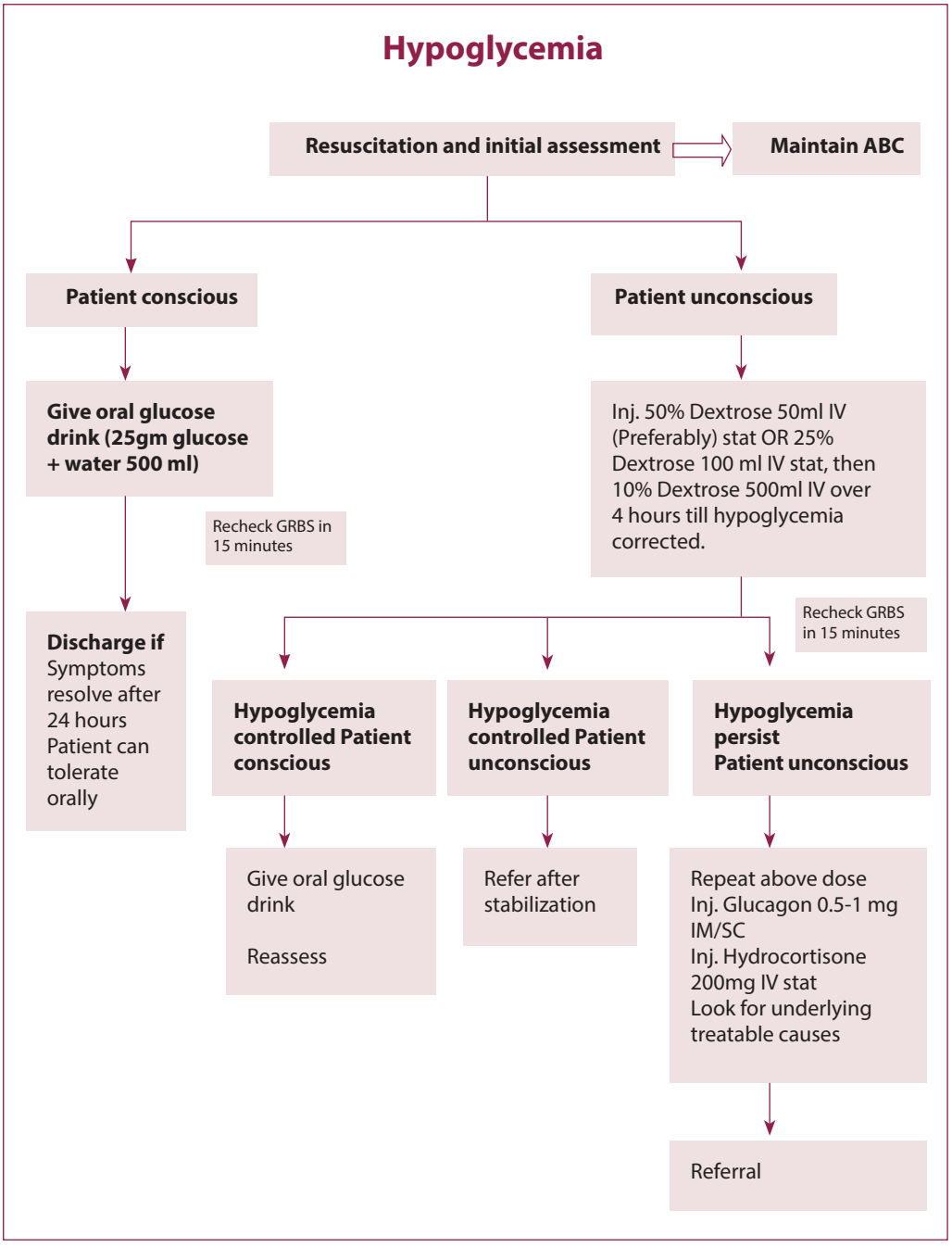
- Plasma glucose, RFT

Management

1. Maintain ABC
2. Conscious patient: oral glucose
   Unconscious patient: IV dextrose administration
3. Monitor GRBS every 4 hours
4. Treatment of underlying condition

Disposition

- Discharge if asymptomatic after 24 hours of observation and follow up
- If symptomatic or recurrent hypoglycemic episodes: Refer to higher center


Hypoglycemia
Resuscitation and initial assessment
Maintain ABC
Patient conscious
Patient unconscious
Give oral glucose drink (25gm glucose + water 500 ml)
Recheck GRBS in 15 minutes
Inj. 50% Dextrose 50ml IV (Preferably) stat OR 25% Dextrose 100 ml IV stat, then 10% Dextrose 500ml IV over 4 hours till hypoglycemia corrected.
Recheck GRBS in 15 minutes
Discharge if Symptoms resolve after 24 hours Patient can tolerate orally
Hypoglycemia controlled Patient conscious
Hypoglycemia controlled Patient unconscious
Hypoglycemia persist Patient unconscious
Give oral glucose drink
Reassess
Refer after stabilization
Repeat above dose
Inj. Glucagon 0.5-1 mg IM/SC
Inj. Hydrocortisone 200mg IV stat
Look for underlying treatable causes
Referral

Diabetic Ketoacidosis (DKA)

- DKA is a metabolic emergency and an acute life threatening complication of diabetes.
- Commonly occurs in type 1 diabetes mellitus but it is not uncommon in type 2 when complicated by concurrent infections.

Diagnostic triad:

Hypoglycemia (high plasma glucose)	>300 mg %
Ketosis	Urine ketone positive (2+ or 3+)
Acidosis	Serum bicarbonate <15 mEq/L pH <7.3

Clinical Features:

Symptoms	Signs
Polyuria, thirst	Signs of dehydration (loss of skin turgor, dry tongue)
Nausea, vomiting	Hypotension
Malaise, generalized weakness	Tachycardia
Abdominal pain	Air hunger (Kussmaul's breathing) Acetone breath Confusion, drowsiness, stupor, coma

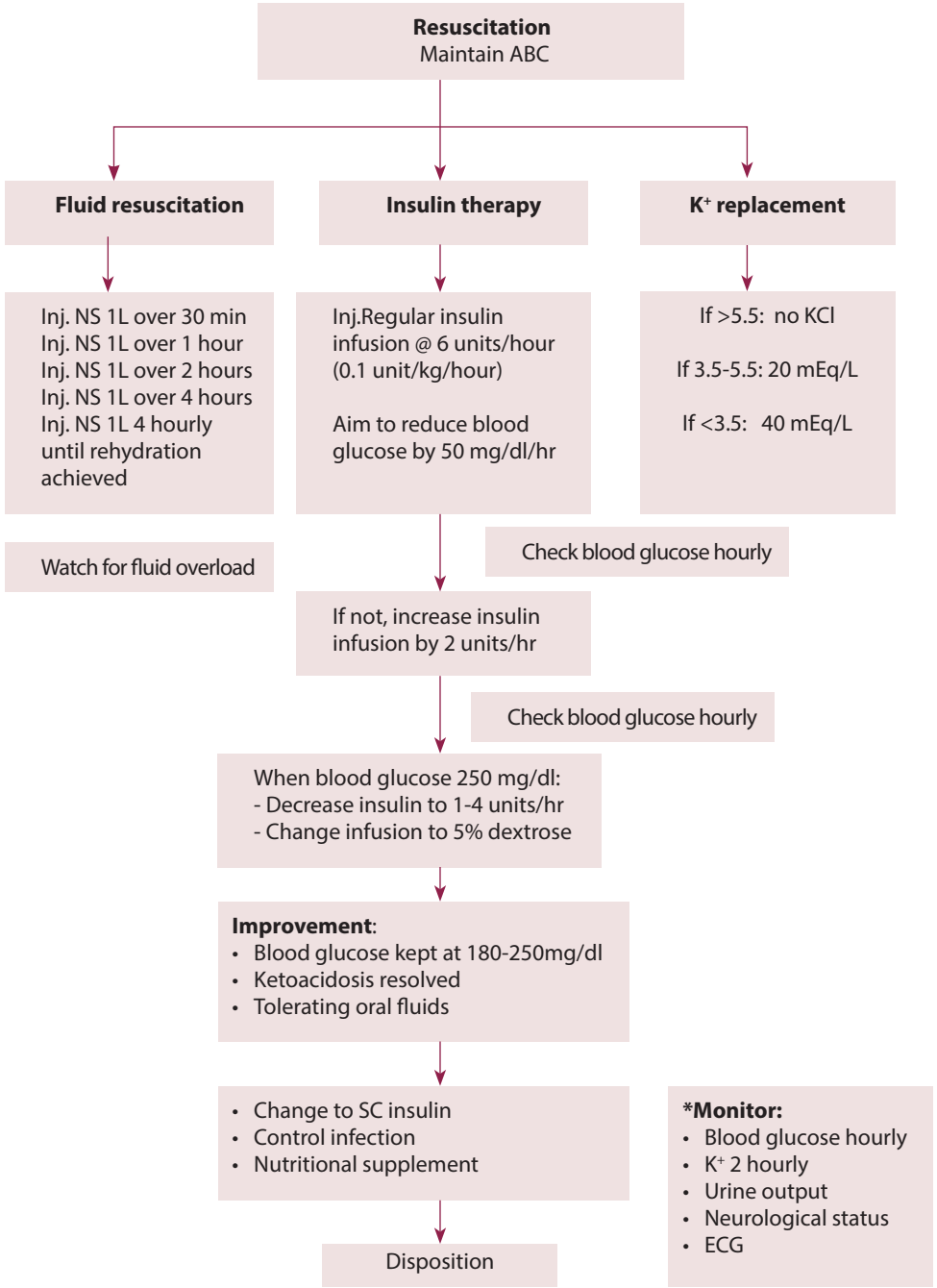
Investigations:

- Plasma glucose
- Urine R/E, Urine acetone, C/S
- Serum electrolytes
- Urea, creatinine
- ABG
- ECG

Management

- Maintain ABC
- Specific management
  - Fluid replacement
  - Insulin therapy
  - Potassium replacement
  - Correct severe metabolic acidosis
    If pH<6.9 : Administer Inj. Sodium bicarbonate 100ml IV bolus
  - Treat precipitating causes

Diabetic Ketoacidosis (DKA)



Acute Adrenal Crisis

Acute adrenal crisis is the sudden decline of adrenal cortical function characterized by shock. It is a medical emergency.

Clinical Features:

- Pain abdomen, nausea, vomiting
- Fever, high grade
- Confusion, coma, seizures
- Tachycardia, hypotension, tachypnea
- Skin rashes, pigmentation of face and buccal mucosa

Investigations

- Serum cortisol assay
- Fasting blood sugar
- CBC, RFT
- USG abdomen
- CT abdomen

Management

1. Maintain ABC
2. Fluid replacement
   - Inj Normal saline 1 litre IV stat and reassess
   - Watch for fluid overload
   - Watch for urine output
3. Steroids :
   Inj. Hydrocortisone 200 mg IV stat, then 100 mg IV 6 hrly
4. Treat underlying causes
   - Antibiotics for infections
   - Correct hypoglycemia

Disposition:

Admission for intensive monitoring OR
Refer to higher center.

9 OCULAR EMERGENCIES

Foreign Body Eye

- Common ocular emergency
- Foreign body- Husks, sand, twigs

Clinical Features:

- Redness of the affected eye.
- Acute sensation of foreign body
- Photophobia
- Excessive lacrimation
- Decreased vision

Management

- Examination using a magnifying glass.
- Remove visible foreign body under eyelid with damp cotton.
- Pull out lower eyelid or press down on skin below eyelid.
- If foreign body visible, remove with damp cotton.
- Try to flush with flowing water on the eyelid as you hold it open.
- Pain management:
  - o Tab. Paracetamol 500mg PO stat and QID,or
  - o Tab Ibuprofen 400mg PO stat and TDS
- Refer immediately if FB in cornea or conjunctiva (Start Ciprofloxacin eye drops)

Sudden loss of vision

Sudden painless LOV	Sudden painful LOV
Central retinal artery occlusion	Acute congestive glaucoma
Central retinal vein occlusion	Acute iridocyclitis
Vitreous hemorrhage	Chemical injuries to eye ball
Retinal detachment	Mechanical injuries to eye ball

Chemical Injuries

Chemical injuries are considered as the most important ocular emergency. Two important types of ocular burns have been encountered as follows.

	Alkali burns	Acid burns
Severity	Most severe	Less serious
Common agents	Lime, caustic soda, liquid ammonia	Sulphuric acid, hydrochloric acid, citric acid
Mechanism	Dissociation and saponification of fatty acids thus destroying cell membrane structures by deep penetration into the tissues.	Coagulation of protein which then act as a barrier and prevent deep penetration of acid into the tissues.

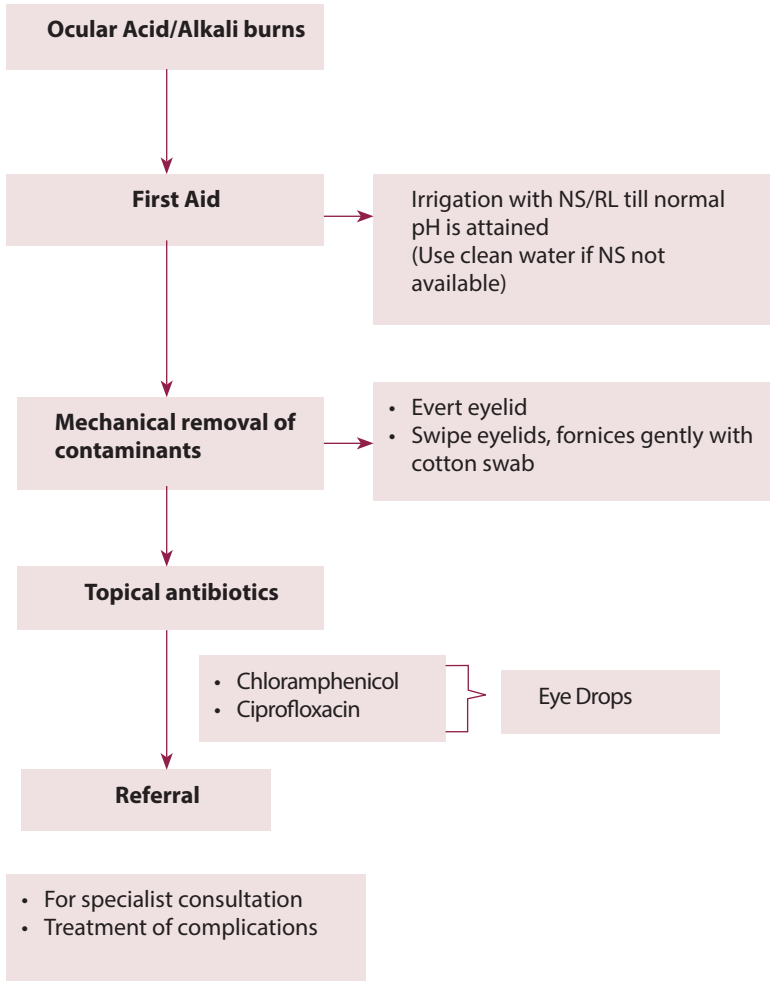
Management

1. Immediate and thorough wash / irrigation with saline or clean water.
2. Mechanical removal of contaminant.
3. Topical antibiotics: Ciprofloxacin eye drops, Ofloxacin eye drops

Disposition:

- Referral for specialist consultation

Ocular Acid/Alkali burns



10 ENT EMERGENCIES

Epistaxis

Epistaxis or nose bleeding is a common ENT emergency.

Causes:

Trauma, blood dyscrasias, anticoagulation therapy, hypertension.

Types:

Classified as anterior and posterior bleeding depending upon its source.

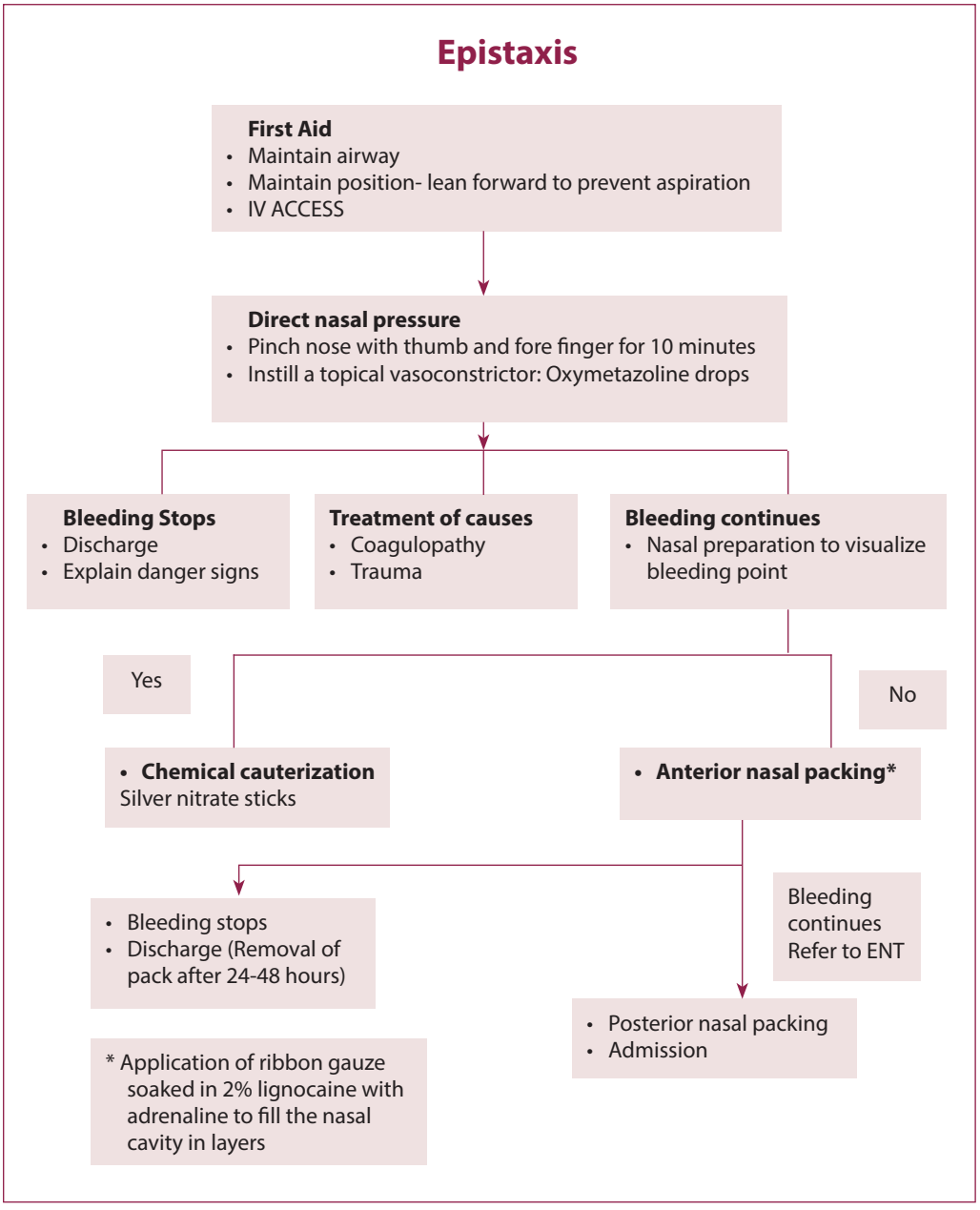
- Most common causes of anterior epistaxis: - Bleeding from Little's area (Kiesselbach's plexus).

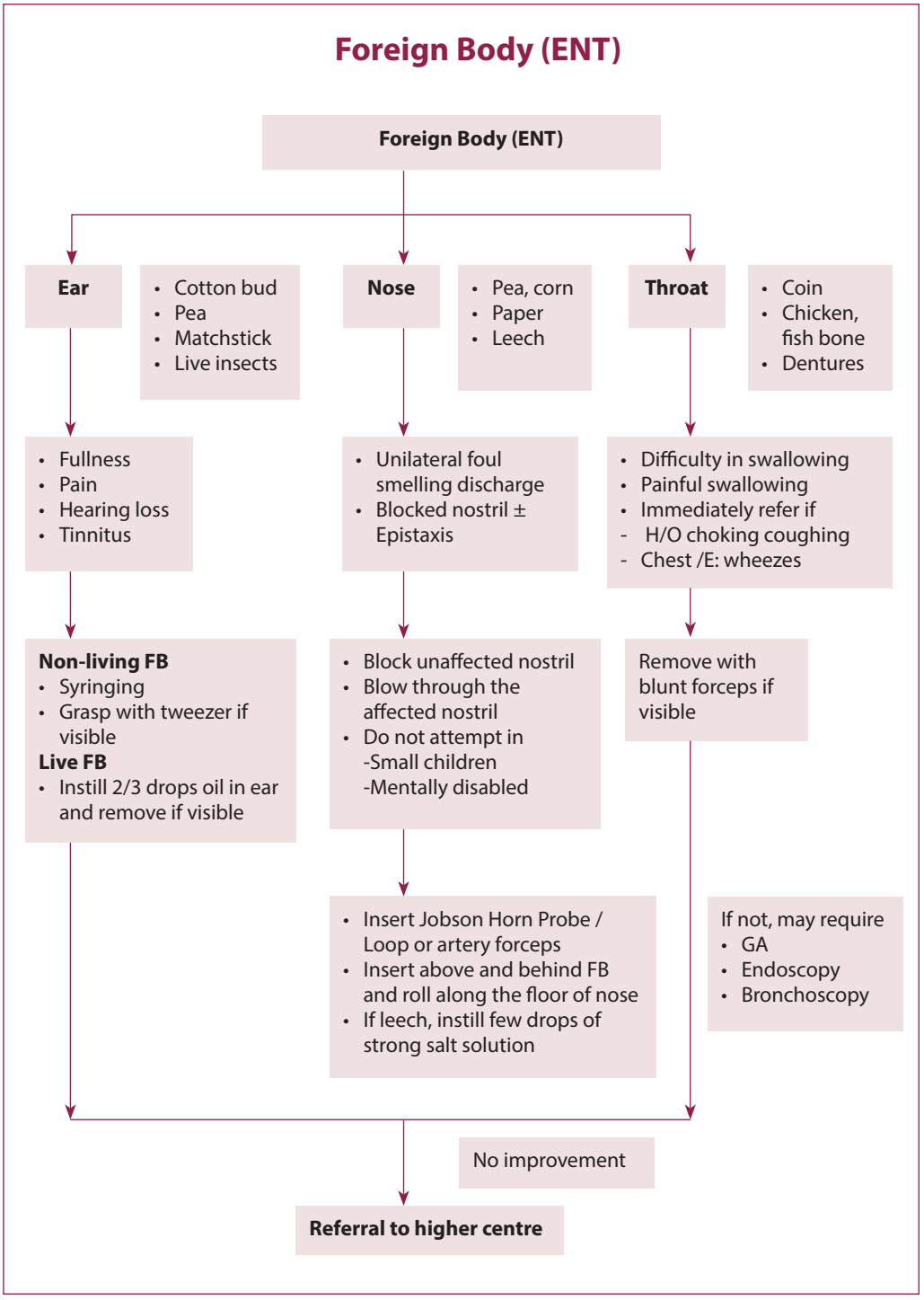
Management

1. Maintain ABC
   - First Aid
   - Positioning
2. Direct nasal pressure
3. Medical Management
   - Topical vasoconstrictors
   - Oxymetazoline drops
4. Chemical cauterization
5. Anterior nasal packing
6. Posterior nasal packing
7. Treatment of causes
   - Hypertension (Rapid lowering of BP not recommended unless BP is >180/120mmHg)
   - Coagulopathy

Disposition

- ENT referral


Epistaxis
First Aid
• Maintain airway
• Maintain position- lean forward to prevent aspiration
• IV ACCESS
Direct nasal pressure
• Pinch nose with thumb and fore finger for 10 minutes
• Instill a topical vasoconstrictor: Oxymetazoline drops
Bleeding Stops
• Discharge
• Explain danger signs
Treatment of causes
• Coagulopathy
• Trauma
Bleeding continues
• Nasal preparation to visualize bleeding point
Yes
No
• Chemical cauterization
Silver nitrate sticks
• Anterior nasal packing*
• Bleeding stops
• Discharge (Removal of pack after 24-48 hours)
Bleeding continues Refer to ENT
• Posterior nasal packing
• Admission
* Application of ribbon gauze soaked in 2% lignocaine with adrenaline to fill the nasal cavity in layers


Foreign Body (ENT)
Foreign Body (ENT)
Ear
Cotton bud
Pea
Matchstick
Live insects
Nose
Pea, corn
Paper
Leech
Throat
Coin
Chicken, fish bone
Dentures
Fullness
Pain
Hearing loss
Tinnitus
Unilateral foul smelling discharge
Blocked nostril ± Epistaxis
Difficulty in swallowing
Painful swallowing
Immediately refer if
- H/O choking coughing
- Chest /E: wheezes
Non-living FB
Syringing
Grasp with tweezer if visible
Live FB
Instill 2/3 drops oil in ear and remove if visible
Block unaffected nostril
Blow through the affected nostril
Do not attempt in
-Small children
-Mentally disabled
Remove with blunt forceps if visible
Insert Jobson Horn Probe / Loop or artery forceps
Insert above and behind FB and roll along the floor of nose
If leech, instill few drops of strong salt solution
If not, may require
GA
Endoscopy
Bronchoscopy
No improvement
Referral to higher centre

11 BURNS

Thermal Burns

Thermal burns are encountered by the emergency physician very commonly. The severity of the burns, the presence of inhalation injury, the patient's comorbid condition and acute organ failure are the factors that influence the prognosis.

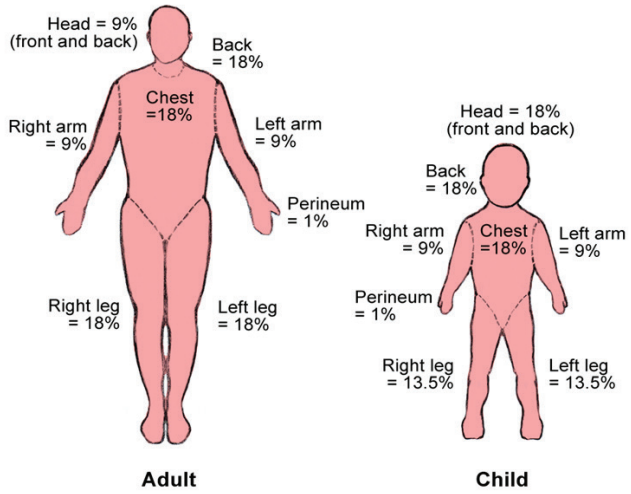
Clinical Features:

Evaluation of Depth of Burns: (classified by degree of burns):

Clinical Features	Superficial burn (1st degree burn)	Partial thickness burn (2nd degree burn)		Full thickness burn (3rd degree burn)	4th degree burn
		Superficial	Deep		
Anatomy	Epidermis	Epidermis, Superficial dermis	Epidermis Deep dermis	Epidermis, dermis	Epidermis bone, fat, muscle
Appearance	No blister	Blister	Blister	Charred, pale waxy, leathery	Charred, pale or white with exposed bone or muscle tissue
Sensation	Painful	Very painful	Very painful	No pain	No pain
Healing	7-10 days	10-21 days	2-6 weeks	Months Requires graft	Months Requires multiple surgeries

Evaluation of external of burns (burn size):

Rule of Nine:



Management

Initial assessment and resuscitation (ABC)

- Airway
- Breathing
- Circulation

1. **Maintain airway:**
   - Look for inhalational or facial injury
   - Suspect airway compromise: Secure airway/ early intubation as needed
2. **Breathing:**
   - Look for
     - o Increased respiratory rate
     - o Decreased SpO_2
   - Supplemental oxygen
   - Mechanical ventilation as needed
3. **Circulation:**
   - Two 16G or 18G peripheral IV lines in unburnt skin.
   - Send samples for CBC, RFT, LFT, CPK-total, carboxy Hb level, CXR, ECG.
   - Start IV fluids using Parkland formula after assessment of burns (Rule of Nine).

Calculation of fluid for Fluid Resuscitation: (Reference: ATLS 10th edition)

Adult patients with deep-partial and full-thickness burns involving more than 20% of the total body surface area (TBSA) should receive initial fluid resuscitation of 2ml of lactated ringers/kg/%TBSA.
Pediatric burn patients: fluid resuscitation is calculated based on 3 ml/kg/%TBSA
Electric Burns: 4 ml/kg/%TBSA
Half of the fluid is given over the course of 8 hours and the remaining half is provided over a span of 16 hours. The rate of fluid administration should be titrated to effect using a target urine output of 0.5 ml/kg/hr in adults or 1 ml/kg/hr in children who are hemodynamically normal. Boluses are reserved for unstable patients.

4. Supportive Management

i) Foley's catheter: Monitor urine output (0.5 ml/kg/hr)

ii) Pain management
- Inj. Morphine 0.1mg/kg IV in small boluses
- Inj. Paracetamol 1 gm in 100ml NS over 15-30 minutes
- No NSAIDS
- Anxiolytics

iii) Wound Management
- Inj. Tetanus toxoid 0.5 ml IM stat
- Supply sterile Dressing
- Silver sulfadiazine for full thickness burns
- Debridement, Escharotomy
- IV antibiotics as per need

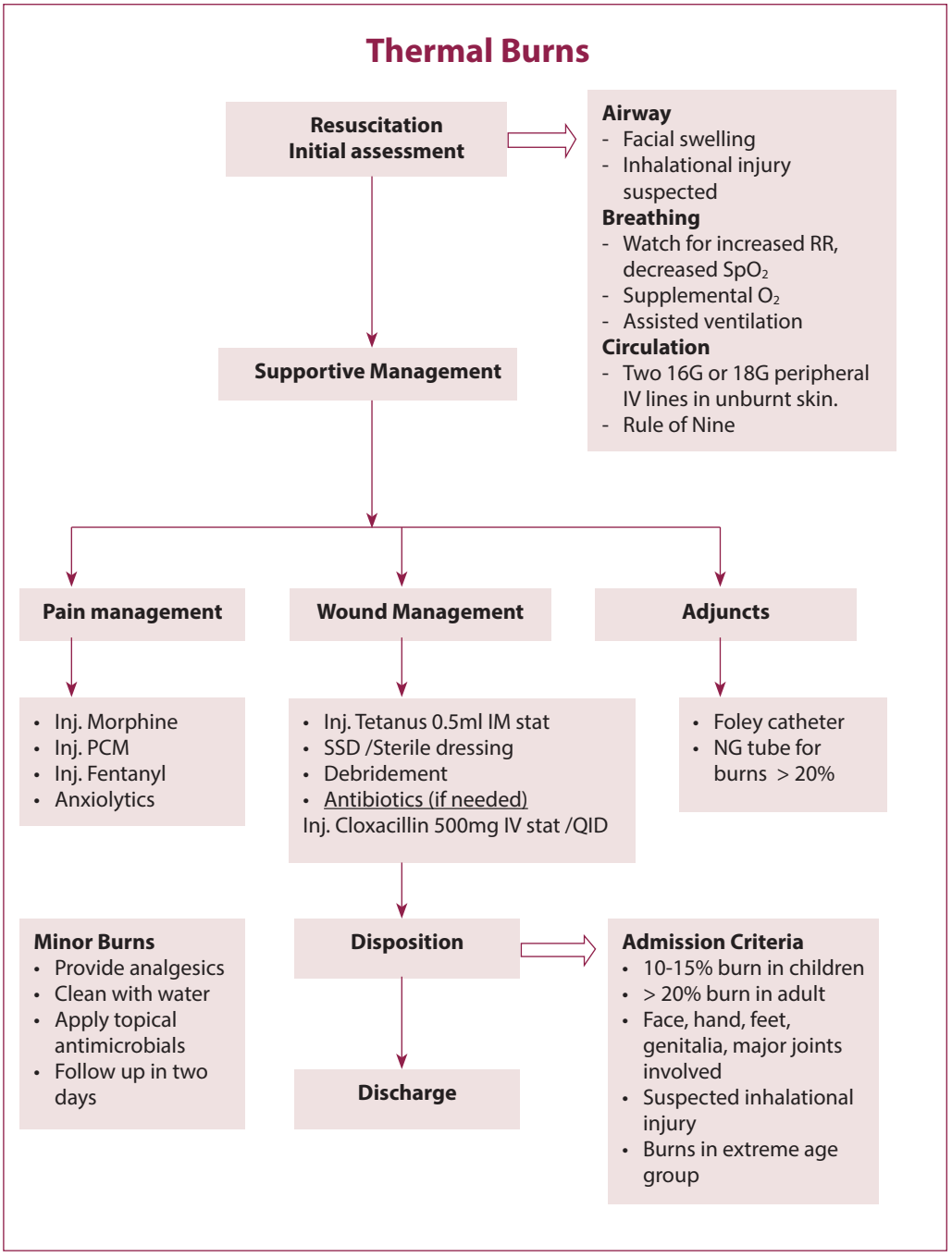
Symptomatic airway burns need intubation for airway protection

5. Disposition

Following patients can be treated on an outpatient basis:
Partial thickness burn < 15% in age 10-50 years
Partial thickness burn <10% in age <10 years and > 50 years
Full thickness <2% in anyone
No major burn

Rest should be hospitalized.

Thermal Burns



Electrical and Lightening Injury

- Electrical injuries occur due to accidental touching of live wires in the household or following exposure to high voltage lines.
- Lightening injuries may occur due to severe electric shock after being struck by lightening causing cardiac or respiratory arrest.
- Alternating current (AC):
  - More dangerous than direct current (DC)
  - Household power supply
  - Cause tetanic contraction of muscles
  - Can result in ventricular fibrillation

Clinical Features:

Skin
- Cutaneous burns at the site of entry of circuit
- Exit wound is larger than the entry wound.

Cardiac
- Arrhythmias (most common: Ventricular Fibrillation)
- Cardiac arrest

Neurological
- Seizure, coma
- Transient paralysis

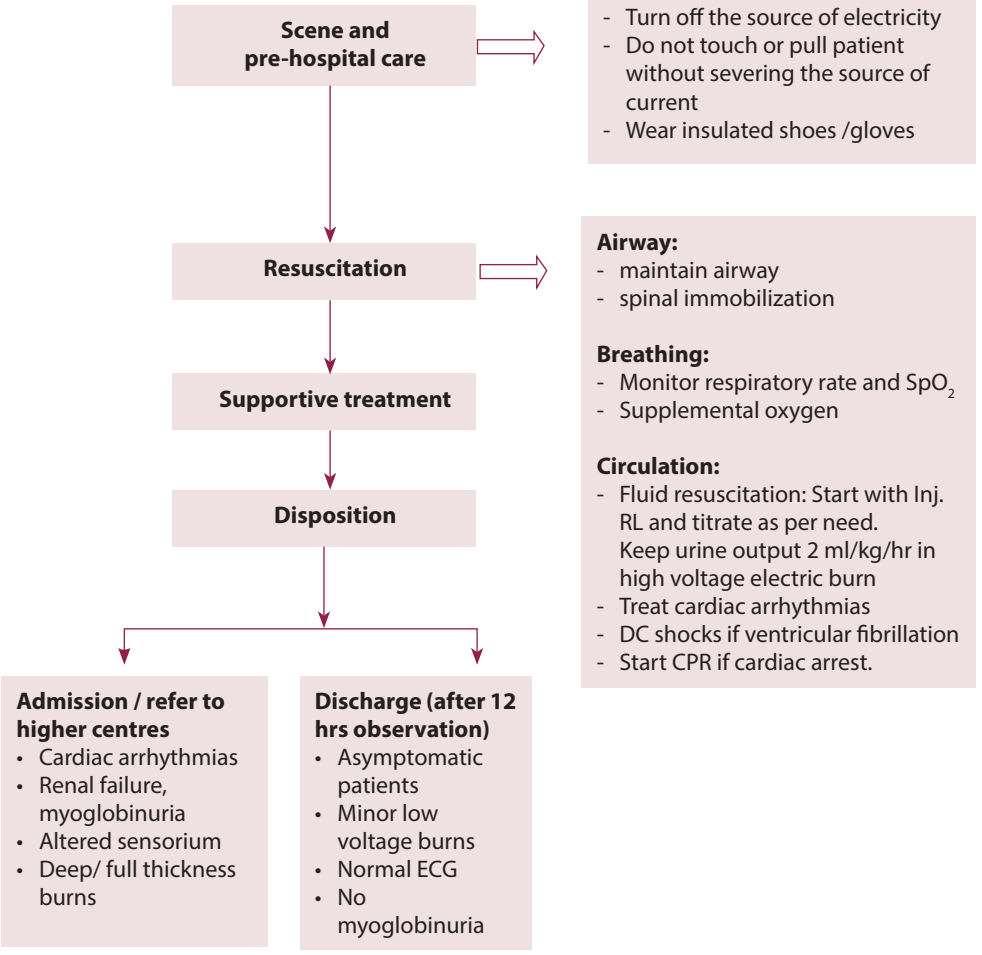
Renal
- Acute Renal Failure
- Rhabdomyolysis
- Myoglobinuria

Others
- Associated fractures
- Spinal cord injuries

Investigation:
- CBC, Serum electrolytes, RFT
- ECG, Cardiac enzymes

Management
- Scene and Pre-hospital care
- Resuscitation: ABC
- Supportive management

Electrical/ Lightening injuries



12 MENTAL HEALTH EMERGENCIES

Alcohol intoxication

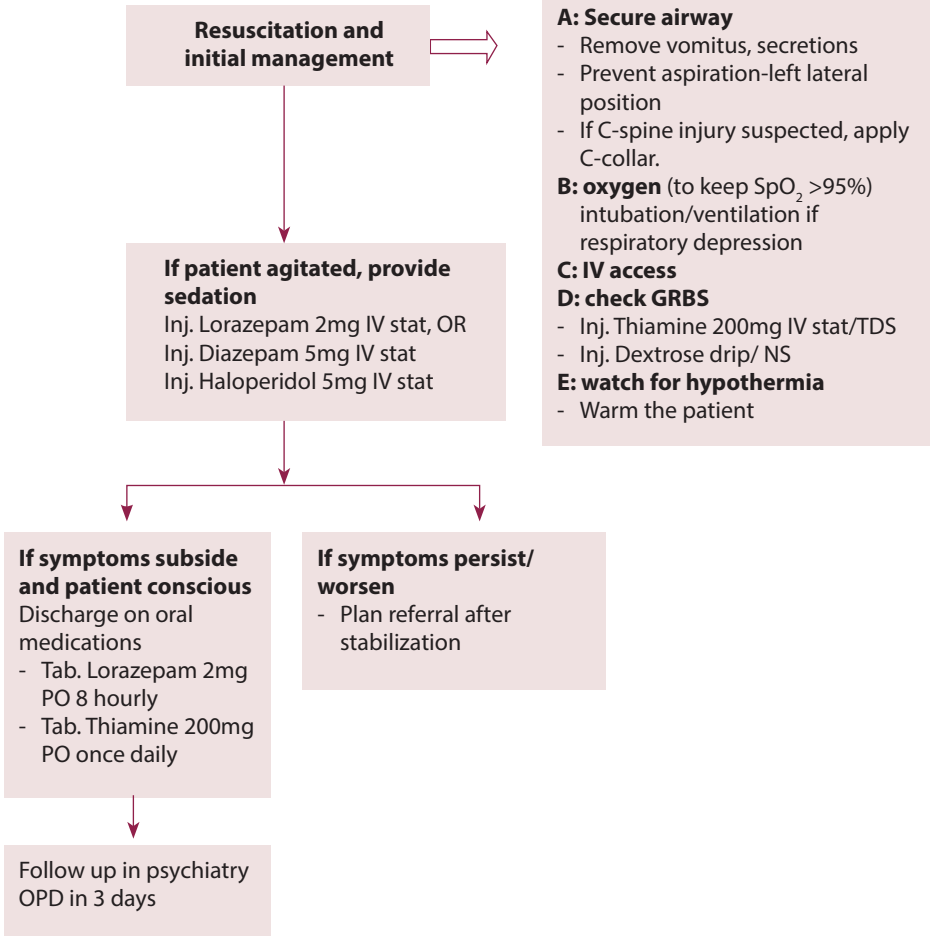
It is a clinically harmful condition which follows ingestion of a large amount of alcohol. Also known as drunkenness or alcohol poisoning.

Clinical Features:

Symptoms depend upon the blood alcohol concentration level (BAC)

BAC (mg/dl)	Symptoms
<25	Sense of well-being and warmth
25-50	Euphoria, talkativeness,
50-100	Incoordination, impaired judgement, decreased reaction time.
100-150	Ataxia/gait imbalance, slurred speech, nystagmus
150-250	Lethargy, amnesia, dysarthria, hypothermia
>250	Coma
>400	Respiratory depression, loss of protective reflexes, death.

Alcohol intoxication



Alcohol Use Disorders

Alcohol use disorder is an important public health concern.

Alcohol dependence (diagnostic criteria):

Clinical Features:

Symptoms depend upon the blood alcohol concentration level (BAC)

- Craving: a strong compulsion to drink alcohol.
- Loss of control: urge to drink more and longer.
- Tolerance: a need for markedly increased amount than before to achieve desired effect.
- Continue use of alcohol despite harm: liver disease, mental illness,
- Progressively neglect social responsibility or activity due to alcohol
- Withdrawal symptoms (on reduction/cessation of alcohol for 24-48 hours)
  -Headache, nausea, vomiting, tremors, sweating, seizures.

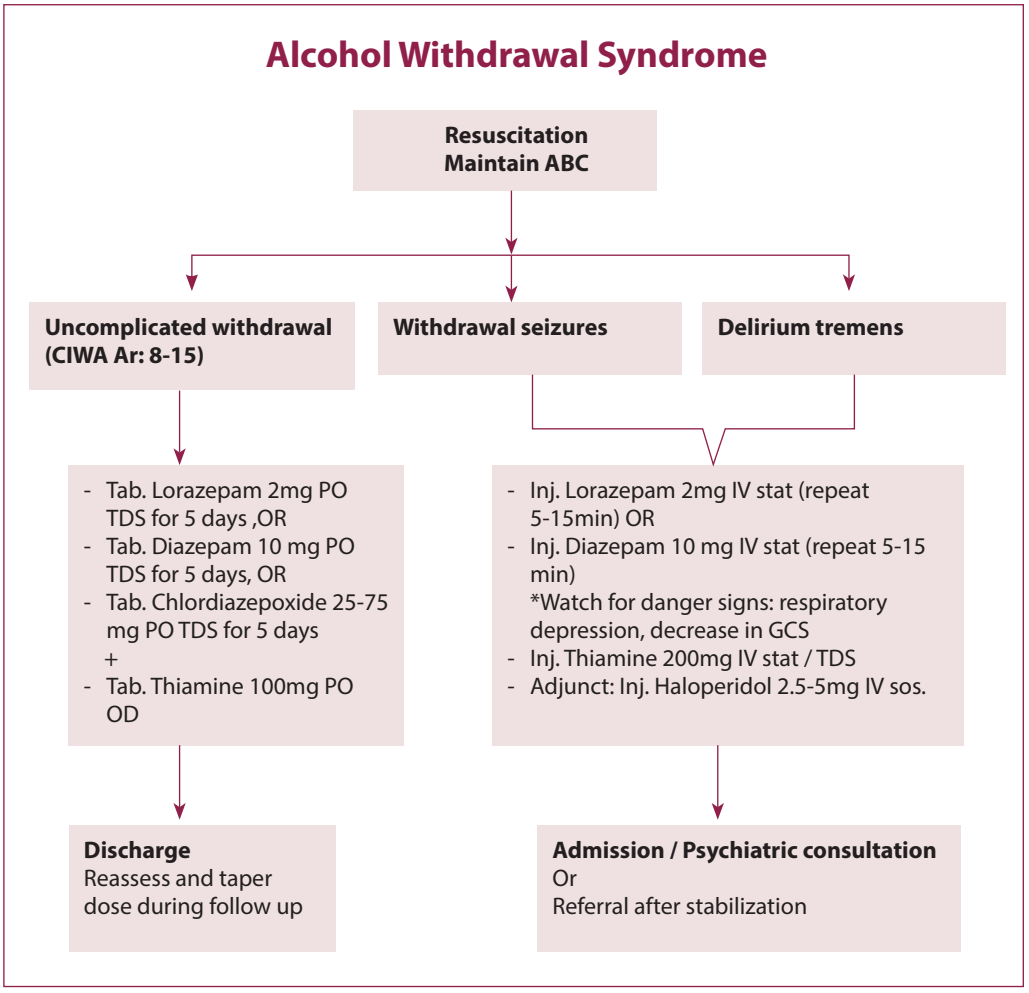
If ≥3 features for at least 1 month within 12 month period: Alcohol dependence.

Alcohol withdrawal

Uncomplicated withdrawal	Withdrawal seizures	Delirium tremens
- Insomnia - Mild anxiety - Tremulousness - GI upset - Anorexia - Headache - Diaphoresis - Palpitation	- GCTS (generalized tonic clonic seizures) - Occur within 12-48 hours after last drink.	- Hallucinations (auditory and tactile) - Agitation - Diaphoresis - Tachycardia - hypertension - Occur within 24-48 hours after last drink.

Investigations:

- CBC, RFT, LFT
- ECG
- CXR


Alcohol Withdrawal Syndrome
Resuscitation
Maintain ABC
Uncomplicated withdrawal (CIWA Ar: 8-15)
Withdrawal seizures
Delirium tremens
- Tab. Lorazepam 2mg PO TDS for 5 days ,OR
- Tab. Diazepam 10 mg PO TDS for 5 days, OR
- Tab. Chlordiazepoxide 25-75 mg PO TDS for 5 days
+
- Tab. Thiamine 100mg PO OD
- Inj. Lorazepam 2mg IV stat (repeat 5-15min) OR
- Inj. Diazepam 10 mg IV stat (repeat 5-15 min)
*Watch for danger signs: respiratory depression, decrease in GCS
- Inj. Thiamine 200mg IV stat / TDS
- Adjunct: Inj. Haloperidol 2.5-5mg IV sos.
Discharge
Reassess and taper dose during follow up
Admission / Psychiatric consultation
Or
Referral after stabilization

Clinical institute withdrawal assessment scale for alcohol revised (CIWA- Ar)

Clinical Features	Score
Nausea and Vomiting	
No nausea or vomiting	0
Intermittent nausea with dry heaves	4
Constant nausea, frequent dry heaves and vomiting	7
Paroxysmal Sweats	
No sweats visible	0
Barely perceptible sweating, palms moist	1
Beads of sweat obvious on forehead	4
Drenching sweats	7
Anxiety	
No anxiety, at ease	0
Moderately anxious, guarded	4
Acute panic state, consistent with severe delirium or acute schizophrenia	7
Agitation	
Normal activity	0
Somewhat more than normal activity	1
Moderately fidgety and restless	4
Paces back and forth during most of the interview or constantly thrashes about	7
Tremor	
No tremor	0
Not visible, but can be felt at fingertips	1
Moderate when patient's hands extended	4
Severe, even with arms not extended	7
Headache	
Not present	0
Very mild	1
Mild	2

Clinical Features	Score
Moderate	3
Moderately severe	4
Severe	5
Very Severe	6
Extremely severe	7
Auditory disturbances	
Not present	0
Very mild harshness or ability to frighten	1
Mild harshness or ability to frighten	2
Moderate harshness or ability to frighten	3
Moderately severe hallucinations	4
Severe hallucinations	5
Extremely severe hallucinations	6
Continuous hallucinations	7
Visual Disturbances	
Not present	0
Very mild photosensitivity	1
Mild photosensitivity	2
Moderate photosensitivity	3
Moderately severe visual hallucinations	4
Severe visual hallucinations	5
Extremely severe visual hallucinations	6
Continuous visual hallucinations	7
Tactile Disturbances	
None	0
Very mild paresthesias	1
Mild paresthesias	2

Clinical Features	Score
Moderate paresthesias	3
Moderately severe hallucinations	4
Severe hallucinations	5
Extremely severe hallucinations	6
Continuous hallucinations	7
Orientation and clouding of sensorium	
Oriented and can do serial additions	0
Cannot do serial additions	1
Disoriented for date by no more than 2 calendar days	2
Disoriented for date by more than 2 calendar days	3
Disoriented for place and/or patient	4

Disposition

- CIWA-Ar score <8 — Detoxification may not be needed. Can be discharged
- CIWA-Ar score 8 to 15 — Discharge with ambulatory medical detoxification
- CIWA-Ar score >15 - Admission

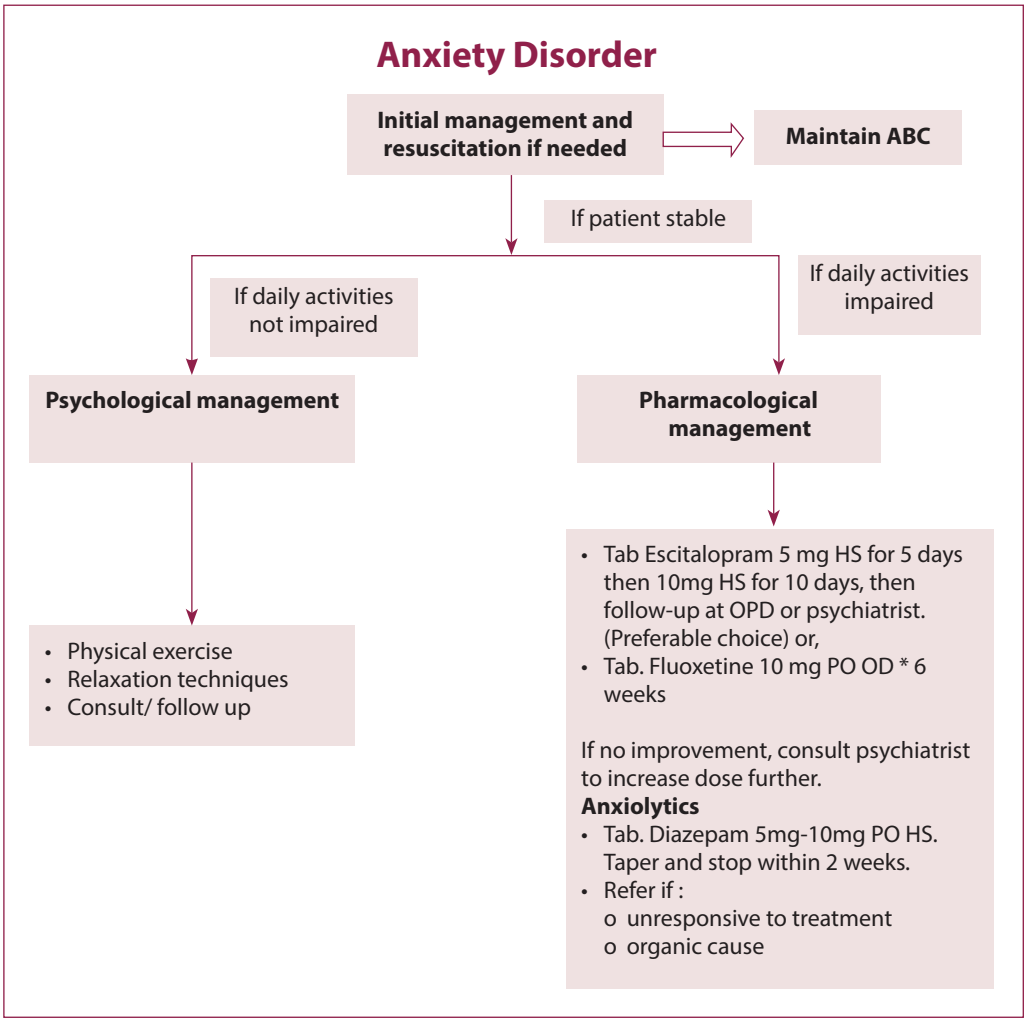
Anxiety Disorder

A commonly encountered disorder with which patients present to the emergency.

Symptoms:

(Symptoms present on most days for several weeks to months)

1. Generalized and persistent anxiety
2. Worrying about future, difficulty in concentration
3. Restlessness, headache, trembling, tingling sensation
4. Sweating, tachycardia, tachypnea
5. Disturbed sleep, dizziness, dry mouth



Conversion Disorder

It is defined as an alteration or loss of physical function as a result of expression of an underlying physiological conflict or need. It is also known as functional neurological symptom disorder.

Clinical features:

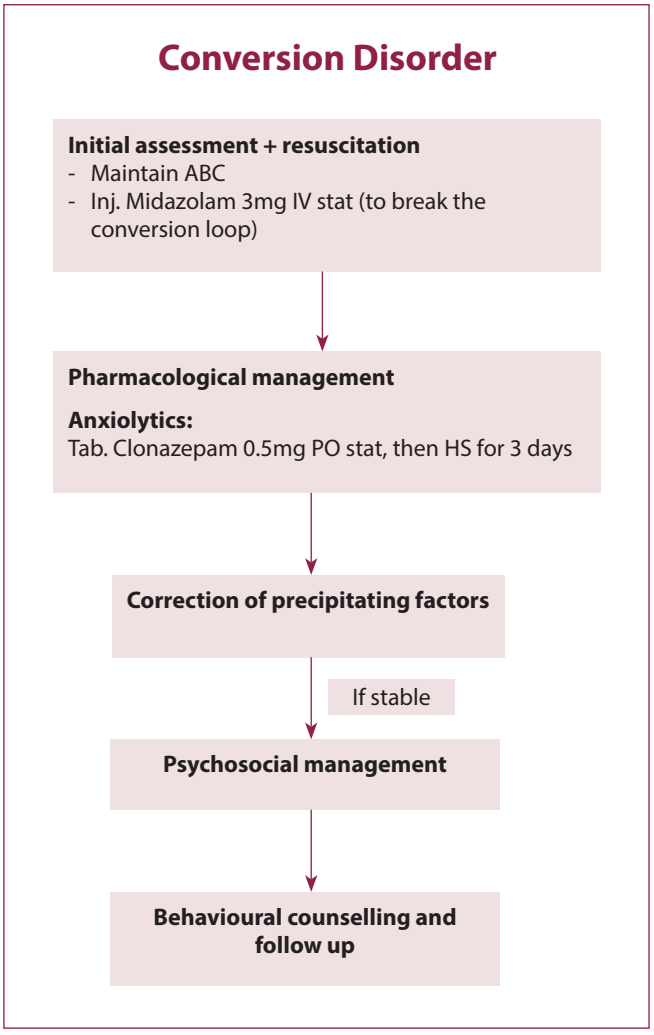
- Paralysis, blindness
- Motor symptoms: Abnormal movement, gait disturbances, weakness
- Sensory symptoms: Unilateral or bilateral paresthesia
- Seizure like episode known as PNES (psychogenic non epileptic seizures)
- Depressive or anxiety symptoms
- Secondary gain: attention seeking, sympathy seeking, avoid / miss work

NOTE:

- Symptoms last for minutes to hours
- Does not occur during sleep
- Bowel/ bladder incontinence absent
- No injuries sustained to patients

Tests:

- **Drop test:** the 'affected' limb when dropped from above the face of the patient by the examiner will drop slowly and will miss the face.
- **Corneal reflex:** present


Conversion Disorder
Initial assessment + resuscitation
- Maintain ABC
- Inj. Midazolam 3mg IV stat (to break the conversion loop)
Pharmacological management
Anxiolytics:
Tab. Clonazepam 0.5mg PO stat, then HS for 3 days
Correction of precipitating factors
If stable
Psychosocial management
Behavioural counselling and follow up

Depressive Disorder

Depression is a disorder of mood (emotion).

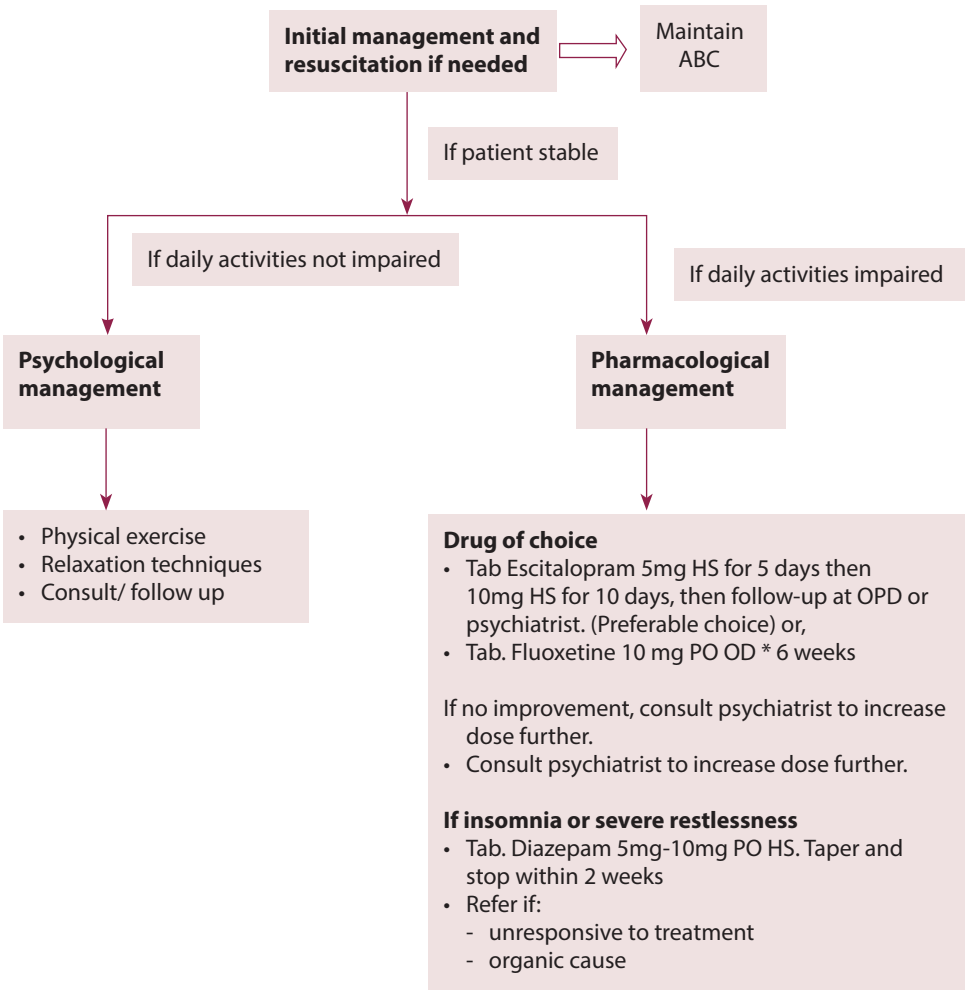
Diagnostic criteria:

Core symptoms	Other symptoms
▪ Depressed mood ▪ Loss of interest in previously pleasurable activities ▪ Easy fatigability (>2 weeks)	▪ **Feeling of worthlessness** ▪ Feeling of guilt ▪ Decreased concentration, attention ▪ Decreased sleep ▪ Decreased appetite ▪ Low self esteem ▪ Suicidal ideation /attempts
At least 2 core symptoms + 3 other symptoms for 2 weeks: DEPRESSION	

Assess risk of suicide:

- Ask about suicidal ideas/thoughts
- Ask about previous plans/attempts

Depressive Disorder



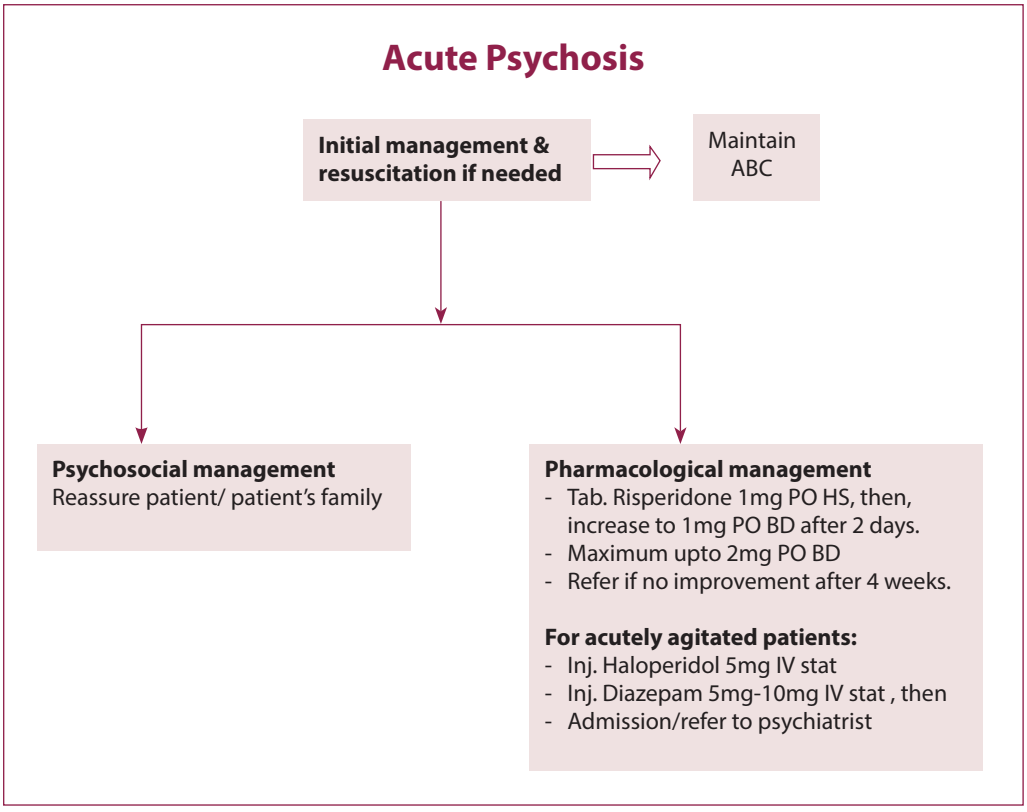
Acute Psychosis

Diagnostic criteria

Symptoms:

1. Delusion
2. Hallucinations
3. Incoherent in disorganized speech
4. Disorganized behaviour
5. Social withdrawal / neglect of responsibilities

To diagnose: > 2 symptoms persistently present



13 TOXICOLOGICAL EMERGENCIES

Toxicology/poisoning

Poisoning or acute drug overdose/toxicity is an event in the course of a psychiatric or social underlying condition. It could either be recreational or an act of intentional harm.

Risk assessment based approach to poisoning

1) Resuscitation

A: Airway
B: Breathing
C: Circulation
D: Detect and correct - Hypoglycemia - Seizures - Hypo/hyperthermia
E: Emergency Antidote Administration

2) Risk Assessment

• Agent • Dose — Collect pills, Packages, bottles, History from family
• Time since ingestion
• Clinical features
• Patient factors/ Co-morbidities

3) Supportive care and monitoring

A: Airway	- Endotracheal intubation
B: Breathing	- Supplemental oxygen - Ventilation
C: Circulation	- IV fluids - Inotropes, antihypertensives, antiarrhythmics, defibrillation/cardiac pacing
Metabolic	- Hypertonic dextrose, Hypertonic saline - Insulin, Sodium bicarbonate
Agitation/ delirium	- Benzodiazepines
Seizures	- Benzodiazepines/ Barbiturates
Body temperature	- External rewarming/cooling
Impaired renal function	- Rehydration/ Hemodialysis

4) Investigation

a. Screening⇢12 lead ECG
b. Specific⇢ Organophosphorus⇢ Serum Cholinesterase
⇢ Drug levels

5) Decontamination

- To bind/remove ingested materials before it is absorbed into the circulation making it unable to exert its toxic effect.
  a. Dermal decontamination⇢ Remove clothing, wash body
  b. Gastric decontamination
- Gastric emptying: - Ipecac
  - Gastric lavage if patient comes within 1hour of ingestion
    Contraindications of gastric lavage: unprotected airway, altered mental state, in patients with risk of GI hemorrhage or perforation, ingestion of corrosive or a hydrocarbon.
- Administration of an absorbent
- Activated charcoal (1mg/kg stat, then 50gm 4 hourly)
- Whole Bowel Irrigation (WBI)

6) Enhanced Elimination

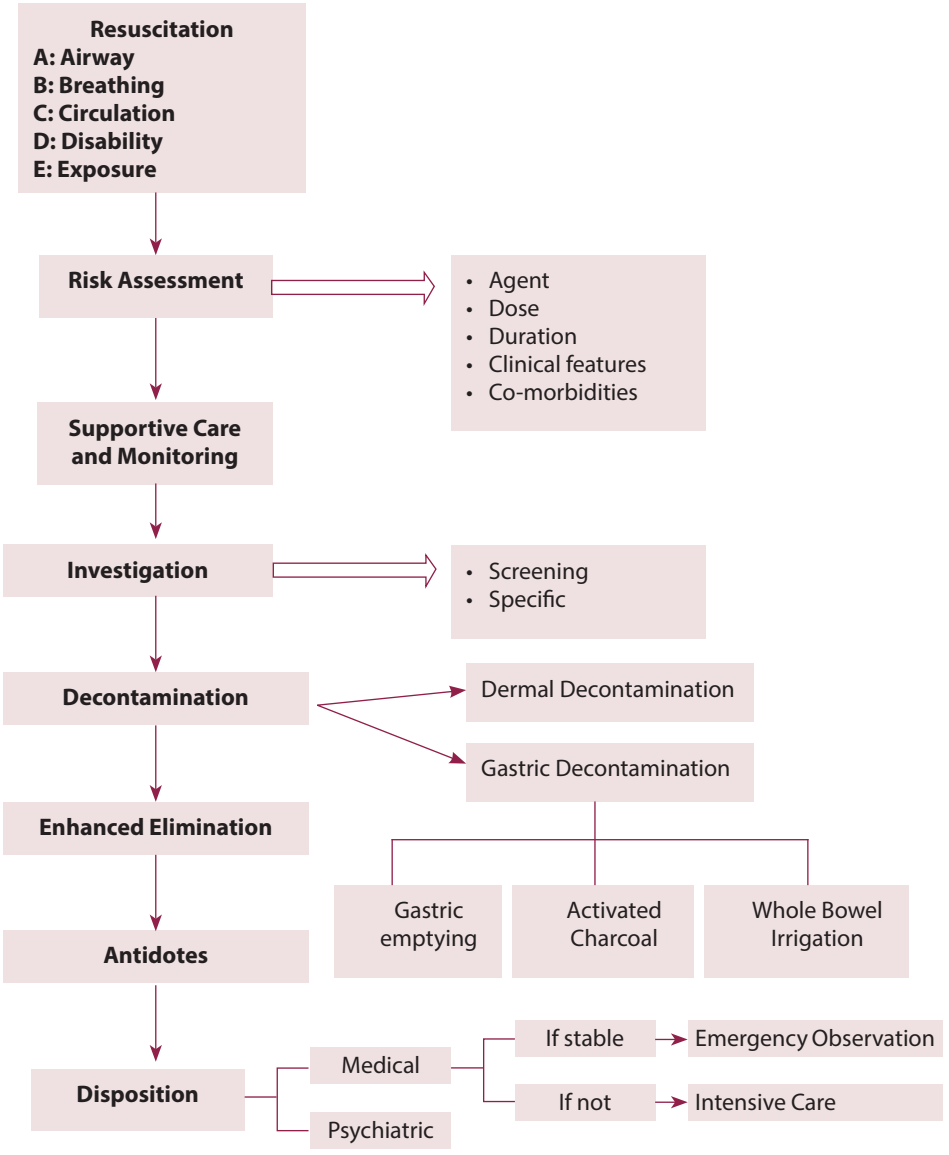
Technique	Suitable toxin
Multiple dose Activated charcoal	Carbamazepine/ Phenytoin/ Phenobarbitone
Urinary Alkalinization	Phenobarbitone/ Salicylate
Hemodialysis	Lithium/ Ethylene glycol/ Metformin

7) Antidotes: (Refer to Table of Antidotes)

8) Disposition:

- Medical — If patient is stable 4-6 hours after ingestion ⇢ Observation
- Psychiatric

Toxicology (Risk Assessment based Approach to Poisoning)



Organophosphorus Poisoning

It is the most common insecticide poisoning encountered in the ER due to its easy availability over the counter. These drugs are potent acetylcholinesterase inhibitors causing cholinergic toxicity.

Trade Name: Diethyl OP: Chlorpyrifos [Durmet/ Dhanuban/ Radar]
Dimethyl OP: Methyl parathion [Metacid/ Parahit], Dichlorovos [Nuvan]

Clinical features:

- Onset of action is within minutes
- Garlicky smell

Muscarinic Effects:

DUMBELS

D Diarrhoea
U Urination
M Miosis
B Bradycardia/ Bronchospasm/ Bronchorrhea
E Emesis/ Excitation
L Lacrimation
S Salivation/Sweating

Nicotinic Effects:

- Muscle twitching/ fasciculation
- Hyperreflexia: flaccid paralysis, decreased tendon reflexes

CNS Effects

- Headache, dizziness, confusion, drowsiness, fits

Management

1. **Airway:** Clear airway: If compromised, secure airway
   Breathing: Oxygen supplementation to keep SpO_2> 95%
   Circulation: Secure IV access
2. **Decontamination**
   - Dermal⇢- Remove clothing, Wash skin
   - Gastric ⇢ Gastric lavage (if presents within 1hr of ingestion)
     ⇢ Activated Charcoal
3. **Antidote: Atropine**

Atropinization:

- Administer 3-5 ampules (1 ampule of 1ml atropine=0.6 mg) bolus initially.

Assess: i) Pupil size
ii) Heart rate
iii) Air entry into lungs
iv) BP
v) Axilla for sweating

- If no improvement, increase the dose under strict monitoring and assess every 5-15 minutes until atropinization is achieved.

Note: Doubling the dose is necessary only if the patient has not vomited after ingestion, has severe symptoms like unconsciousness, agitation. Watch for atropine toxicity and increase/ adjust the dose as per clinical progression.

Signs of Atropinization:

1)	Heart rate > 80 beats/minute
2)	Systolic BP > 80 mm Hg
3)	Pupils- Mydriasis
4)	Chest- Clear on auscultation/ no crepitations or wheezes
5)	Dry axilla/dry tongue

Maintenance dose	Tapering dose
▪ 20% of atropinizing dose per hour as infusion in normal saline ▪ Maintain for 24-48 hours	▪ Reduce the dose by ¼ of previous day's dose ▪ Taper off over 5-7 days

Atropine Toxicity

- Tachycardia, delirium, fever, dry mouth, urinary retention
- Discontinue atropine infusion
- When symptoms settle, restart infusion at 75% of previous rate

4. Pralidoxime

- Use early, preferably within 24 hours of ingestion of OP
- Inj. Pralidoxime 2 gm in 100 ml normal saline over 30 minutes (30 mg/kg) then 1 gm 6 hourly OR infusion of 8-10 mg/kg/hour for at least 48 hours.

5. Benzodiazepines:

- For anxiety, restlessness, seizures, atropine toxicity
- Inj. Diazepam 5-10 mg IV stat and sos

6. Disposition:

If stable: Emergency observation
If not: ICU for cardiac monitoring/ ventilation
Watch for:

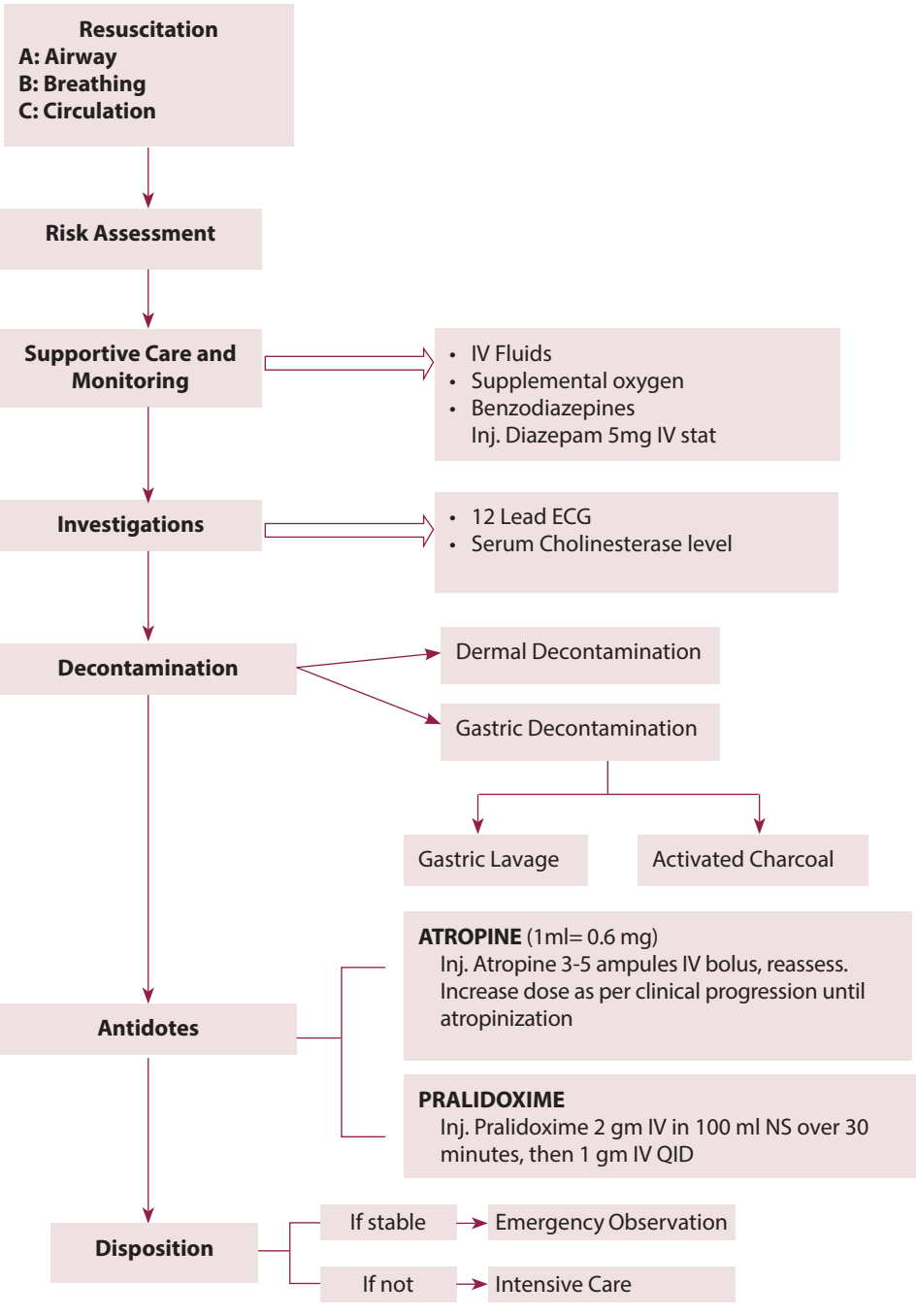
1) Intermediate syndrome:

- Develops around 3-5 days after poisoning
- Rapid onset of weakness of muscles (respiratory, ocular, limb, neck, back) seen as inability to raise head from pillow and difficulty in respiration
- Management: Respiratory support

2) OPIDN (Opioid induced delayed neuropathy)

- Develops 1-3 weeks after poisoning
- Muscle cramps, numbness, fasciculation, flaccid paralysis
- Management: Physiotherapy

Organophosphorus Poisoning



Zinc Phosphide (Rodenticide) Poisoning

- It is the commonly available as rat poison.
- Rodenticides may be available in the form of zinc phosphide or as combination products containing anticoagulants known as Coumadin derivatives or super warfarin.

Clinical Features:

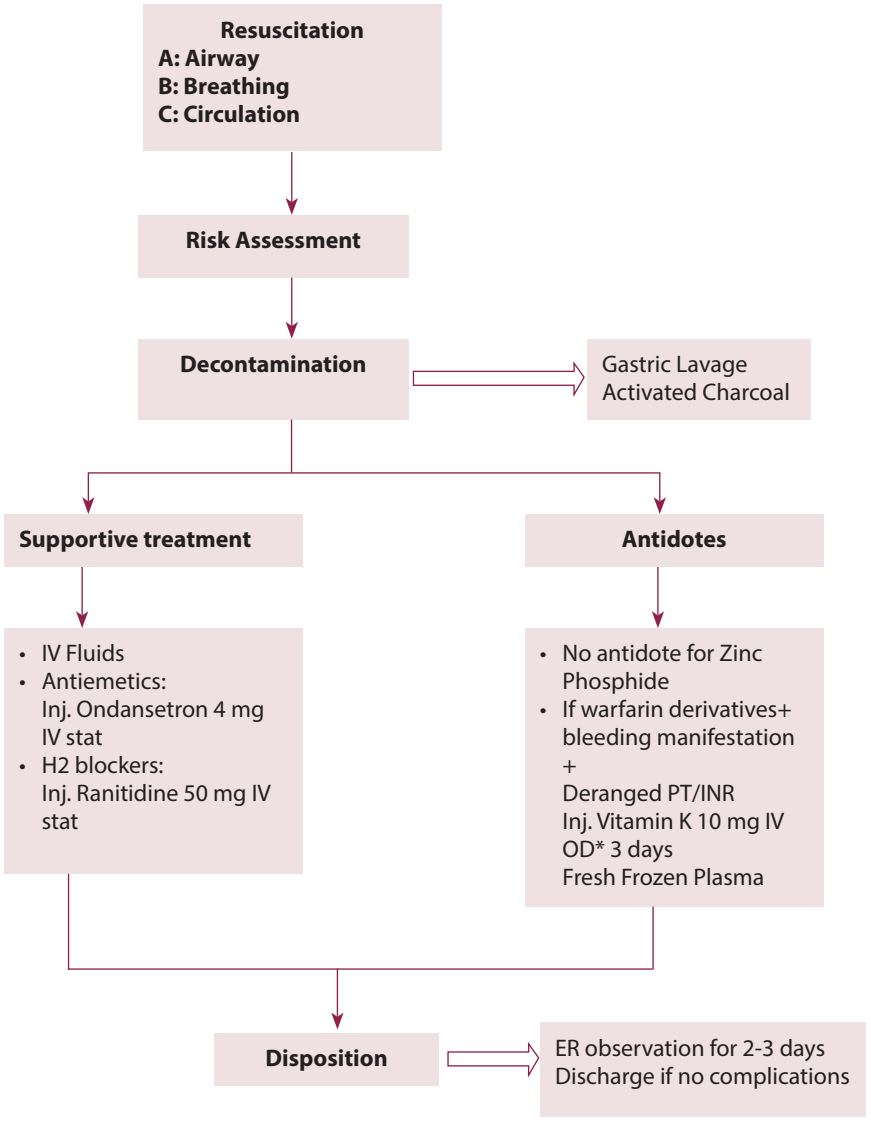
1) Initially nausea, vomiting, pain abdomen, chest discomfort
2) Hepatic- liver dysfunction, deranged coagulation profile, bleeding manifestations
   Cardiac- ST and T wave changes
   Respiratory- Pulmonary edema

Management

- Maintain ABC
- Decontamination:
  Gastric Lavage (if presents within 1hour of ingestion)

  Activated Charcoal
- Supportive treatment
- Antidote: No antidote for zinc phosphide
  If warfarin/ coumadin derivatives present, Inj. Vitamin K 10 mg IV OD * 3 days
- Disposition: Observe for 2-3 days
  Discharge if no complications

Zinc Phosphide (Rodenticide) Poisoning



Aluminium Phosphide Poisoning

- It is a highly toxic insecticide used commonly for agricultural purposes.
- Trade Name: Celphos/ Quickphos/ Phosfume
- It is available in the form of pellets/diskettes.
- $AlP + H_2O = Al(OH)_2 + PH_3$ (Phosphine gas)
  Very toxic fumigant

Clinical Features

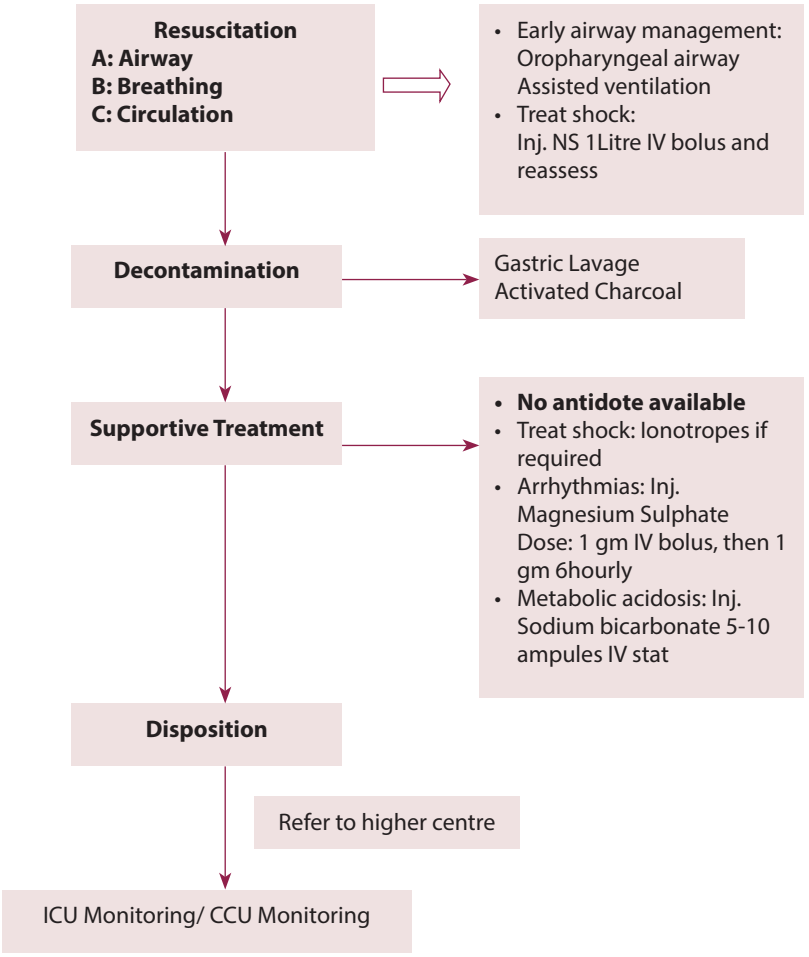
1) Fishy odor in breath
2) Nausea, vomiting, pain abdomen
3) Shortness of breath, chest tightness
4) Hypotension, shock, cardiac arrhythmias
5) Metabolic acidosis

Management

1) Airway Breathing	• Early airway management since the patient deteriorates very fast. • Oropharyngeal airway • Assisted ventilation
Circulation	• IV fluids: Inj. Normal Saline 500ml IV started, reassess and continue as per need.
2) Decontamination:	• Gastric lavage (if presents within 1hour of ingestion) • Activated Charcoal
3) Supportive treatment	• No antidote available • Treat shock • Treat cardiac arrhythmias • Treat metabolic acidosis

4) Disposition: ICU monitoring

Aluminium Phosphide Poisoning



Mushroom Poisoning

- Most common and potentially life threatening: *Amanita phalloides*
- Also known as death cap.

Clinical Features:

- Latent period: 6-24 hours
- GI symptoms: - Nausea, vomiting, pain abdomen
  - Profuse watery diarrhea → fluid/ electrolyte imbalance
  - Jaundice (after 24-72 hours) → Hypoglycemia, coma
- Bradycardia/ hypotension/ lacrimation/ blurring of vision
- Acute kidney injury
- Multi-organ failure, coma, death

Investigations

- Complete blood count
- RFT, LFT
- PT/INR

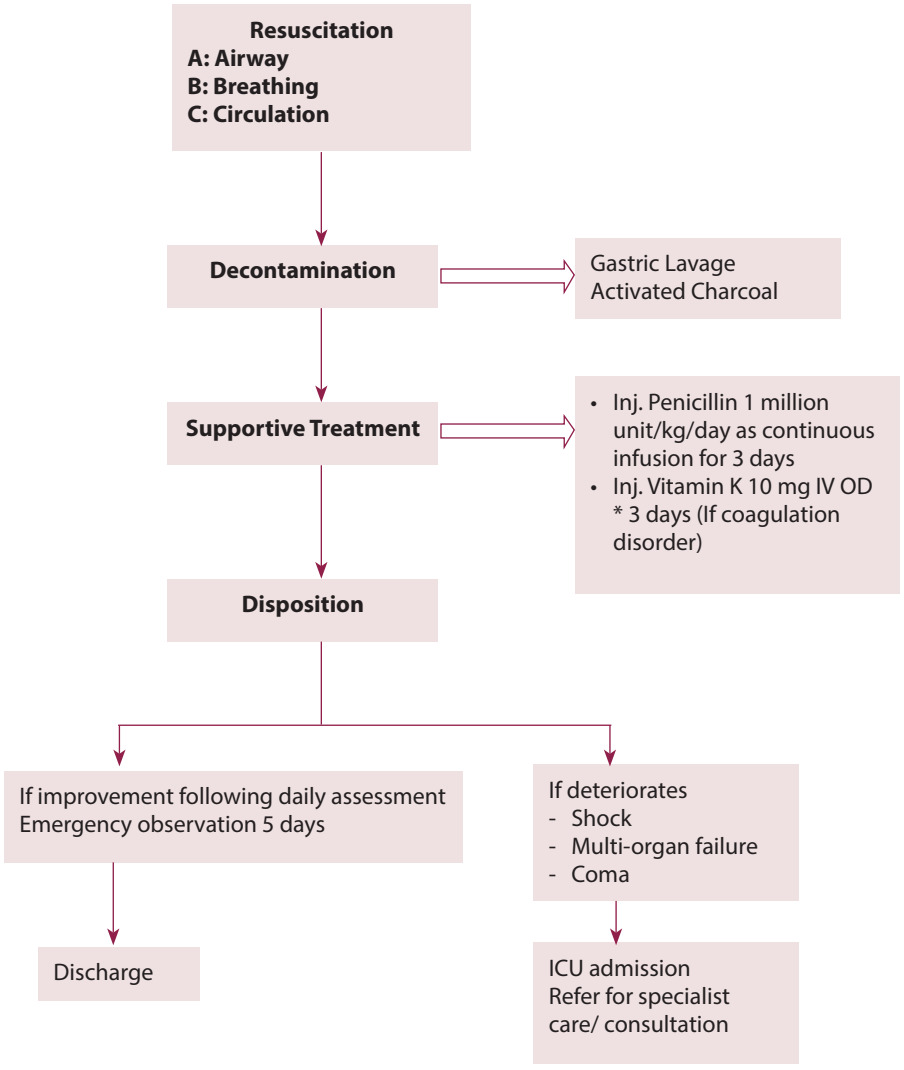
Management

- Maintain ABC
- Decontamination: Gastric lavage (if presents within one hour of ingestion)
  Activated charcoal
- Supportive Management
  - Inj. Penicillin 1 million unit/kg/day as continuous infusion for 3 days
  - Inj. Vitamin K 10 mg IV OD * 3 days (If coagulation disorder)

Disposition

- If improvement, Emergency observation for 4-5 days → Discharge
- If deteriorates, ICU admission/ referral

Mushroom Poisoning



Wild honey Poisoning

- It is consumed as an alternate source of medicine with the belief of reducing cardiovascular, gastrointestinal ailments.
- Intoxication is produced from the vector of a few species of rhododendron due to a toxin known as grayanotoxin.
- It binds to receptors in the voltage gated sodium channels and manifests parasympathetic over activity.

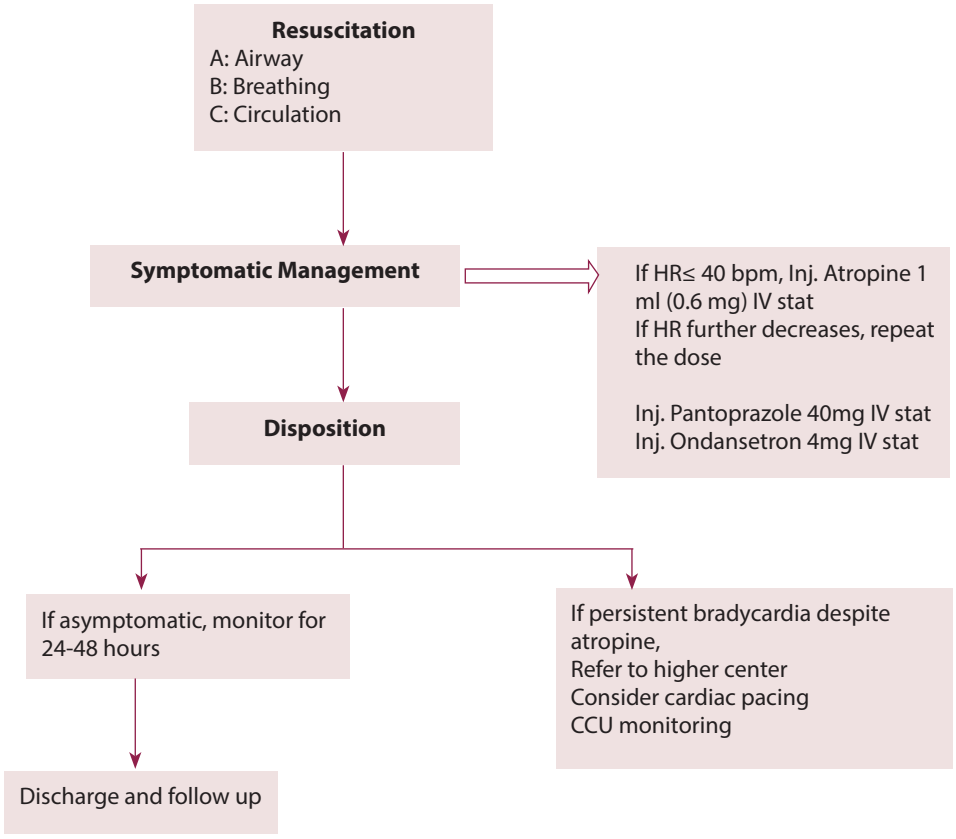
Clinical Features:

CVS	Hypotension, bradycardia, complete heart block, MI
GI	Nausea, vomiting, pain abdomen
CNS	Dizziness, syncope, coma

Management

1) Maintain ABC
2) Symptomatic Management
   - Hypotension: IV fluids
     Inotropes
   - Bradycardia (HR≤ 40): Inj. Atropine 1 ampule (1 ml=0.6 mg) IV stat
     Cardiac pacing considered if persistent bradycardia despite atropine
3) Disposition
   - Close ECG monitoring for 24-48 hours→ Discharge if asymptomatic
   - Hypotension, bradycardia despite medical management→ ICU/CCU

Wild honey Poisoning



Dhatura Poisoning

- Dhatura or *Dhatura stramonium* is also known as thorn apple/ Jimsonweed
- It contains atropine / Hyoscyanine / scopolamine
- Roots, seeds or entire plant is consumed to obtain hallucinogenic and euphoric effects.

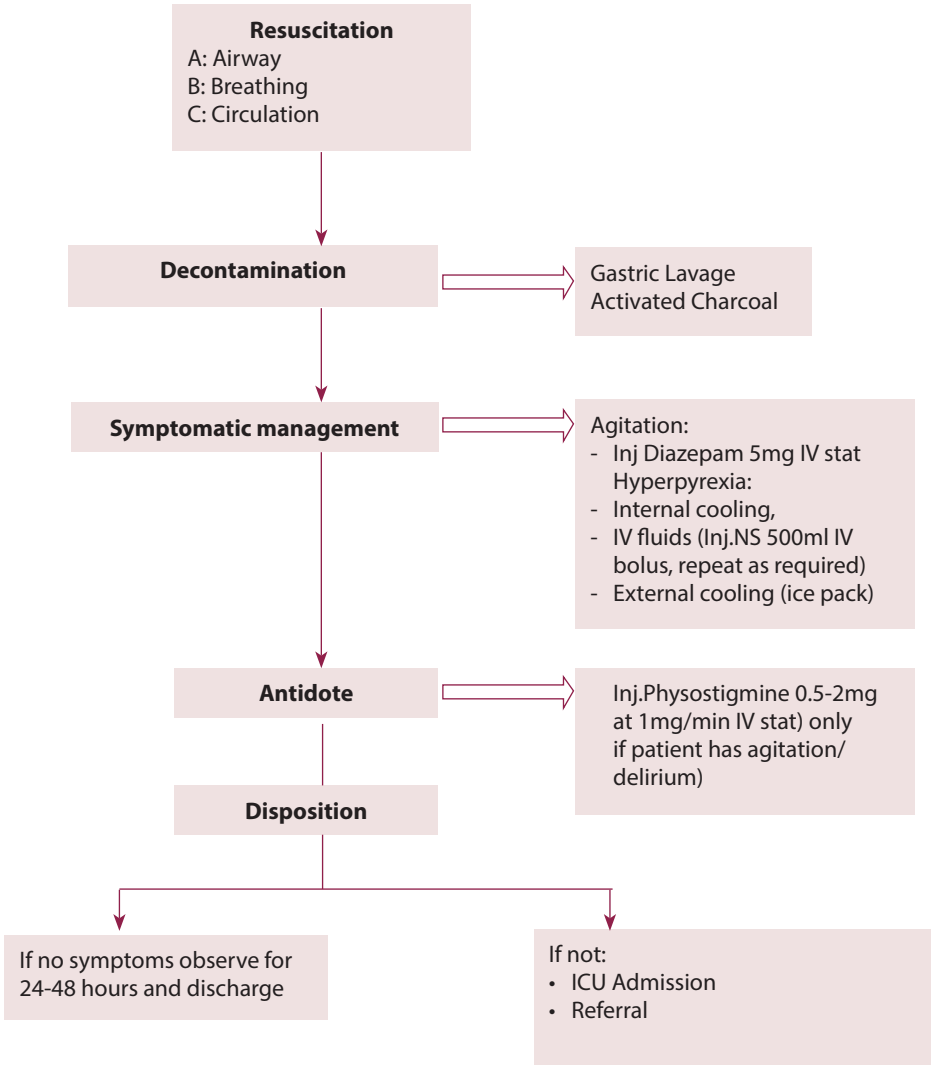
Clinical Features:

• Dry skin and mucosa, flushing, hyperpyrexia
• Tachycardia
• Mydriasis
• Decreased bowel activity, urinary retention
• Disorientation, confusion, hallucinations, agitated delirium, seizure , coma

Management

1. Maintain ABC
2. Decontamination
    - Gastric Lavage (if presents within 1hour of ingestion)
    - Activated Charcoal
3. Symptomatic management
    - Agitation :- Benzodiazepines
    - Hyperpyrexia :- IV fluids , cooling methods
4. Antidote
    - Physostigmine (cholinesterase inhibitor) indicated only if patient has agitation/ delirium
    - Dose: Inj.Physostigmine 0.5 mg -2 mg at 1mg/min stat.
    - Contraindication : cardiac conduction defect
5. Disposition
    - Observation for 24-48 hours : discharge if asymptomatic
    - If not, ICU or referral for admission.

Dhatura Poisoning



Paracetamol Poisoning

One of the commonest presentation to the ER due to its easy availability of the drugs.

- Toxic dose :- 200mg/kg (single dose)
- More than 12 gm consumption may be fatal, however, the threshold is less in hepatic impairment.

Clinical Features:

Stage	Clinical features	Investigations
Stage-1 (0-24 hours)	Nausea, vomiting, Malaise	Normal lab reports
Stage- 2 (24-48 hours)	• Rt. Upper quadrant pain • Hepatic tenderness	• LFT deranged • PT/ INR high
Stage-3 (72-96 hours)	Jaundice, hepatic encephalopathy	• LFT deranged • PT/ INR high
Stage- 4 (>96 hours)	Stage of resolution or, FHF, renal failure	• LFT deranged • RFT deranged

Investigations:

- Complete Blood Count (CBC), LFT, RFT, PT/INR
- Serum paracetamol level (4hrs after ingestion and daily till improvement)

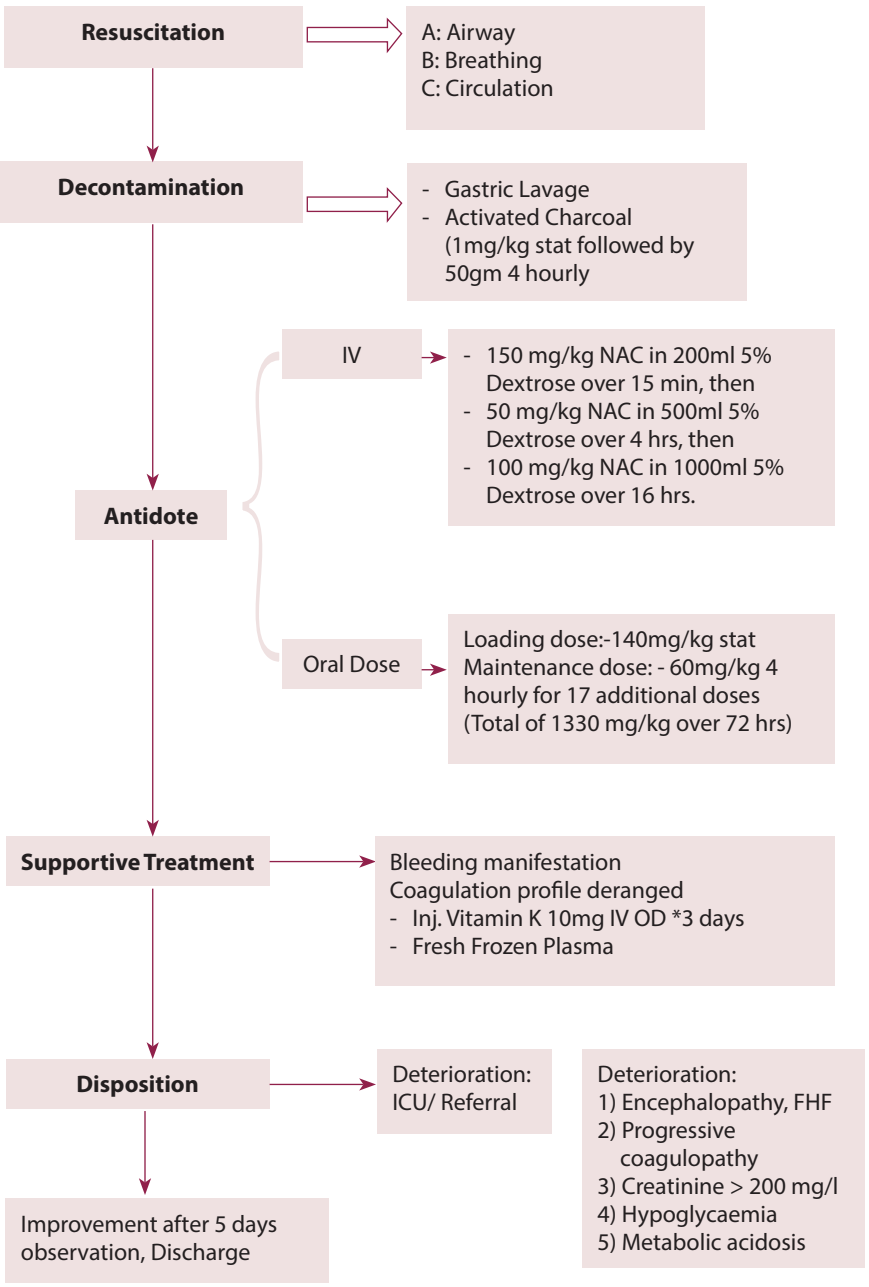
Management:

1) Maintain ABC
2) Decontamination
   - Gastric lavage (if patient presents within an hour)
   - Activated Charcoal
3) Antidote: NAC (N-acetyl cysteine) – if patient has ingested toxic dose (Caution: Anaphylaxis)
4) Supportive management
   Inj. Vitamin K
   FFP

Disposition

Observation for 5 days- if improvement – discharge
If no improvement- Refer to higher centre after stabilisation.

Paracetamol Poisoning



Antidotes

Common Poisons and Antidotes

SN.	Poison	Antidote
1	Benzodiazepine	Flumazenil
2	Beta Blockers	Glucagon, Calcium, Dextrose+insulin
3	Carbon Monoxide	100% Oxygen
4	Cyanide	Amyl Nitrate, Sodium thiosulphate
5	Digitalis	Digoxin immune fab (digibind)
6	Heparin	Protamine sulphate
7	Lead	2,3-dimercaptosuccinic acid [DMSA], BAL
8	Mercury, Arsenic, Gold	British antilewisite, dimercaprol (BAL) in peanut oil
9	Methanol	Ethanol, Fomepizole
10	Opiates	Naloxone, naltrexone
11	Organophosphates	Atropine
12	Carbamates	Pralidoxime
13	Paracetamol	N acetylcysteine
14	Tricyclic antidepressants	Sodium Bicarbonate
15	Warfarin	Vitamin K, FFP, Prothrombinex

14 SNAKE BITE, ANIMAL BITE, INSECT BITE

Snake bite

- Snake bite is a common life threatening medical emergency. It is an important occupational hazard affecting farmers, herders, fishermen and children.
- It is an important public health problem with an estimated 20,000 snake bites each year as per WHO.

Clinical features of three medically important groups of snakes

Clinical features	Cobra	Krait	Viper
Family	Elapidae	Elapidae	Viperidae
Local name	Goman , Nag	Karet	Baghe sarpa, haryou sarpa
Local effects	Swelling, local pain, blister, bulla	No signs painless	Local pain, swelling, bleeding at bite site.
General features	Nausea, vomiting , abdominal pain, anxiety	Nausea, vomiting, abdominal pain, anxiety	Nausea, vomiting , abdominal pain, anxiety
Systemic manifestations	**1. Neurotoxicity** • Ptosis • Opthalmoplegia • Pupillary dilatation • Difficult to open mouth or protrude tongue, swallow • Broken neck sign (cannot hold neck when sitting up from supine position) **2. Respiratory Failure**	**1. Neurotoxicity** (less common than in cobra) **2. Respiratory Failure** **3. Renal failure**	**1. Hematotoxicity** • Venipuncture site bleeding • Gum bleed • Epistaxis • Hemoptysis • Hematemesis / melena • Petechiae, purpura • Internal organ bleeding

Investigations

1) CBC
2) Coagulation profile (PT/INR , BT, CT)
3) Bed side clotting test: 20WBCT (20 minute whole blood clotting test)

Management (5 steps)

1) First and immediate transport
2) Rapid assessment and resuscitation
3) Antivenom treatment
4) Supportive treatment
5) Care of the bitten part

1) First aid and transport

- Reassurance
- Immobilization of the bitten part with a splint or sling
- Removal of rings, tight fitting clothing.
- Rapid transport to health facility.

Do's	Dont's
• Early transfer of patient to nearest health facility • If patient is vomiting or having difficulty in swallowing, keep in left lateral position and don't feed. • Snake identification: - photograph - If killed, take it along to the expert	• Avoid tight tourniquet • If already applied, do not release it unless treatment is started. • Avoid cutting or sucking of bite site • Avoid application of herbs, chemicals, cow dung, etc.

2) Rapid assessment and resuscitation

Airway:

- Clear airway (vomitus, secretions)
- Positioning

Breathing:

- Oxygen (via nasal prongs, face mask, bag and mask)
- Assisted ventilation

Circulation:

- IV access
- IV fluids

3) Antivenom:

a) Indication of antivenom administration:

Evidence of neurotoxicity	- Ptosis, opthalmoplegia - Respiratory difficulty
Evidence of hematotoxicity/coagulopathy (The antivenom available in Nepal is effective against Krait, Cobra, Russell's Viper and Saw Scaled Viper, it does not contain antidote for Pit Viper, so the available antivenom is not indicated for Pit Viper even if there is coagulopathy)	- 20WBCT positive - Systemic bleeding - Rapid extension of local swelling more than half of limb
Evidence of cardiovascular collapse	- Shock - Hypotension
Evidence of acute kidney injury	- Low urine output - Deranged RFT

b) Dose and route of antivenom administration

Initial dose	10 vials (100ml) antivenom + Normal Saline (400ml) Intravenous infusion @ 2ml/ min (60-70 drops/ min)
Repeat dose	**Neurological:** - If neurological signs worsen, repeat 5 vials (50ml) antivenom IV @ 2ml/min. **Haematological:** - If 20WBCT Positive (incoagulable), repeat 5 vials (50ml) antivenom IV @ 2 ml/min **NOTE:- DO NOT USE MORE THAN 20 VIALS**

Watch For EAR (Early Anaphylactic Reaction)

- Occurs within 3 hours after initiation of antivenom
- Itching, swollen lips, tongue
- Cough ,wheezing, stridor, "lump in throat"
- Nausea, vomiting, pain abdomen

Management of EAR:

- Stop antivenom, place patient in recumbent position
- Inj. Adrenaline 0.5mg IM stat
- Oxygen supplementation (via face mask or nasal prongs)
- Inj. Chlorpheniramine 10mg IV slowly over several minutes
- Inj. Hydrocortisone 100mg IV stat
- REFER

c) If antivenom not available and envenoming features are present :

Adult	**Atropine** • Inj. Atropine 0.6mg IV stat • Repeat as indicated by bradycardia	**Neostigmine** • Inj. 0.01 mg/kg upto 0.5mg IV or IM every 30 minutes till improvement
Child	Inj. Atropine 0.02mg/kg IV upto 0.6 mg	• Inj. 0.025-0.04 mg/kg upto 0.6mg IV or IM every 30 minutes till improvement.

4) Supportive Treatment:

- Airway protection
- Treat hypotension: IV fluids
- Treat AKI

5) Care of bitten part:

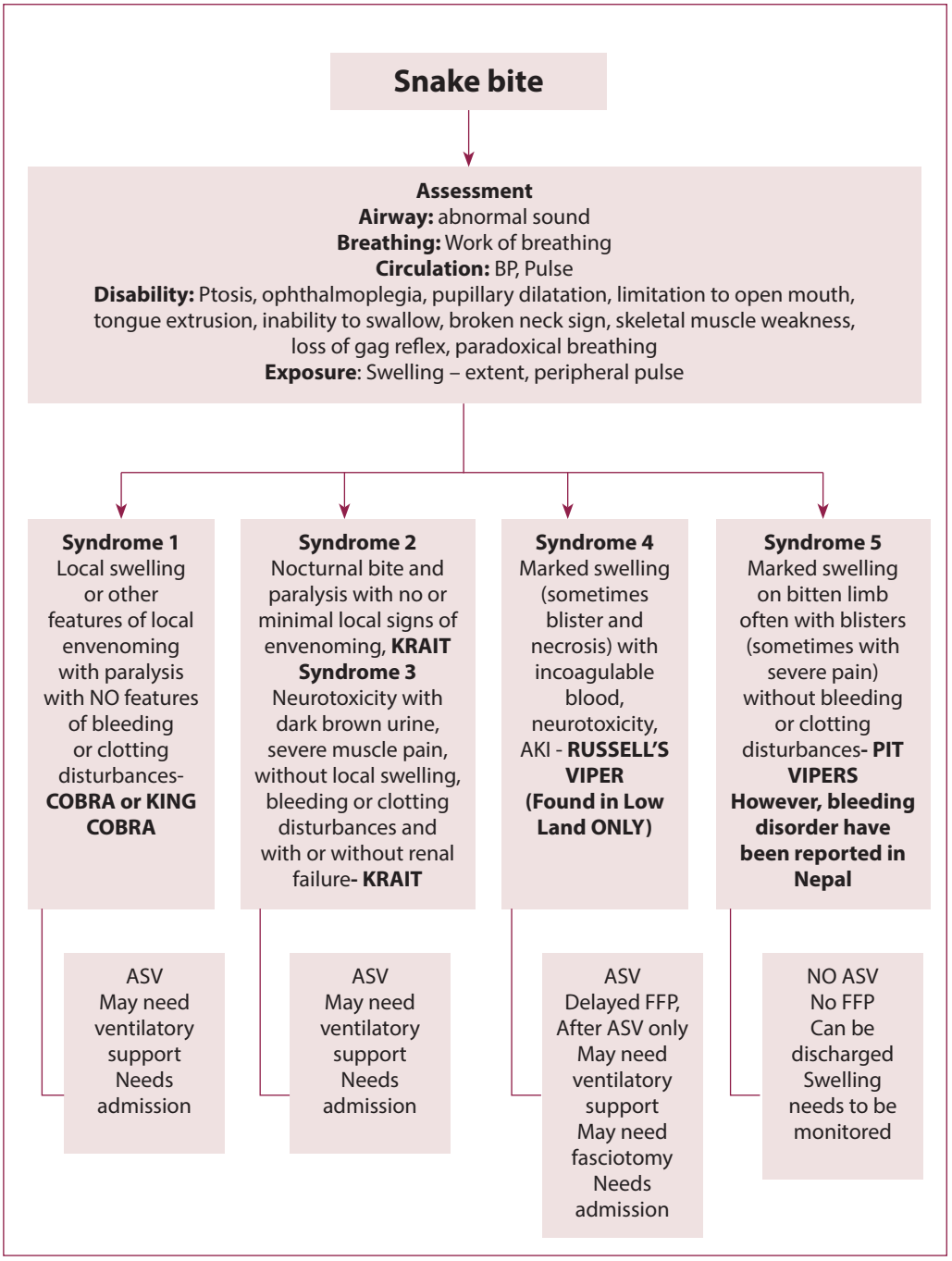
- Limb elevation and rest.
- Wash wound with antiseptic solution
- If infected, start antibiotics
  - o Inj. Cloxacillin 500mg IV QID
  - o Inj. Metronidazole 500mg IV TDS
- If necrosis/gangrene: Debridement
  Inj. TT 0.5ml IM stat (after correcting coagulopathy)

Disposition:

Observe for at least 48-72 hours: Discharge if no further symptoms with warning signs explained.

Refer if:

- Respiratory support needed
- Neurological deterioration
- Fasciotomy/grafting
- Spontaneous persistent bleeding
- AKI
- Anaphylaxis


Snake bite
Assessment
Airway: abnormal sound
Breathing: Work of breathing
Circulation: BP, Pulse
Disability: Ptosis, ophthalmoplegia, pupillary dilatation, limitation to open mouth, tongue extrusion, inability to swallow, broken neck sign, skeletal muscle weakness, loss of gag reflex, paradoxical breathing
Exposure: Swelling – extent, peripheral pulse
Syndrome 1
Local swelling or other features of local envenoming with paralysis with NO features of bleeding or clotting disturbances- COBRA or KING COBRA
Syndrome 2
Nocturnal bite and paralysis with no or minimal local signs of envenoming, KRAIT
Syndrome 3
Neurotoxicity with dark brown urine, severe muscle pain, without local swelling, bleeding or clotting disturbances and with or without renal failure- KRAIT
Syndrome 4
Marked swelling (sometimes blister and necrosis) with incoagulable blood, neurotoxicity, AKI - RUSSELL'S VIPER (Found in Low Land ONLY)
Syndrome 5
Marked swelling on bitten limb often with blisters (sometimes with severe pain) without bleeding or clotting disturbances- PIT VIPERS However, bleeding disorder have been reported in Nepal
ASV
May need ventilatory support
Needs admission
ASV
May need ventilatory support
Needs admission
ASV
Delayed FFP, After ASV only
May need ventilatory support
May need fasciotomy
Needs admission
NO ASV
No FFP
Can be discharged
Swelling needs to be monitored

Animal Bite

Rabies

Rabies is a zoonotic disease of the nervous system caused by rabies virus. It is acquired through the bite of a rabid animal. It usually follows bite by dogs in 99% of cases, however it can also occur following bites by cats, monkeys, foxes, jackals and bats.

Incubation period: 10 days to 2 years

Clinical Features:

History of a bite by dog or any rabid animal

Initial Symptoms	Later
• Pain or paresthesia at the wound site. • Fever	• Hyperactivity • Fluctuating consciousness • Hallucinations • Hydrophobia (furious rabies) • Paralysis and coma (Paralytic rabies) • Followed by death

WHO Classification of Exposures and PEP (Post exposure prophylaxis)

Category of Exposure	Type of Contact	PEP
Category I	• Touching or feeding of animals • Animal licks on intact skin (NO EXPOSURE)	No PEP required
Category II	• Nibbling of uncovered skin • Minor scratches or abrasions without bleeding (EXPOSURE)	Wound washing immediate vaccination
Category III	• Single or multiple transdermal bites or scratches • Contamination of mucous membrane or broken skin with saliva from animal licks (SEVERE EXPOSURE)	Wound washing and immediate vaccination and RIG administration

PEP Components

1. Local wound treatment
2. Rabies Immunoglobulin (Passive Immunity)
3. Rabies Vaccine

1. Local Wound Treatment

- Thorough washing and flushing of wounds (approximately 15 mins) with soap or detergent and plenty of water.
- If no soap, wash with running water for 15 minutes
- Application of local remedies like herbs, oil, and turmeric avoided.
- Inj. Tetanus toxoid 0.5 ml IM stat

2. Rabies Immunoglobulin (RIG)

Administered only once, as soon as possible after initiation of post exposure vaccination.

a. Human RIG
   Dose: 20 IU/ Kg body weight
   The entire immunoglobulin dose should be infiltrated into or as close as possible to wound or exposure site.

b. Equine RIG
   Dose: 40 IU/Kg body weight.

3. Rabies Vaccine : (CCEEVS)

Cell Culture and embryonated egg based vaccine
Indication: All animal bite victim of category II & III exposures irrespective of age and body weight, require same number of injections and dose per injection.
Route: Intradermal (ID)

WHO approved regimen for Rabies PEP (ID)

Dose	Route	Duration	No. of Injection sites per clinic Visit	Sites
0.1 ml Each Site	ID	1 week - Day 0 - Day 3 - Day 7	2-2-2-0-0	-Deltoid OR -Lateral thigh

Insect Bite

An insect bite or sting is common and often causes a small itchy painful lump on the skin however, it can present in the form of a medical emergency occasionally.

Commonly encountered insect bites are wasp stings, hornet stings, mosquito bites, spider bites, ticks and mite bites.

Clinic features:

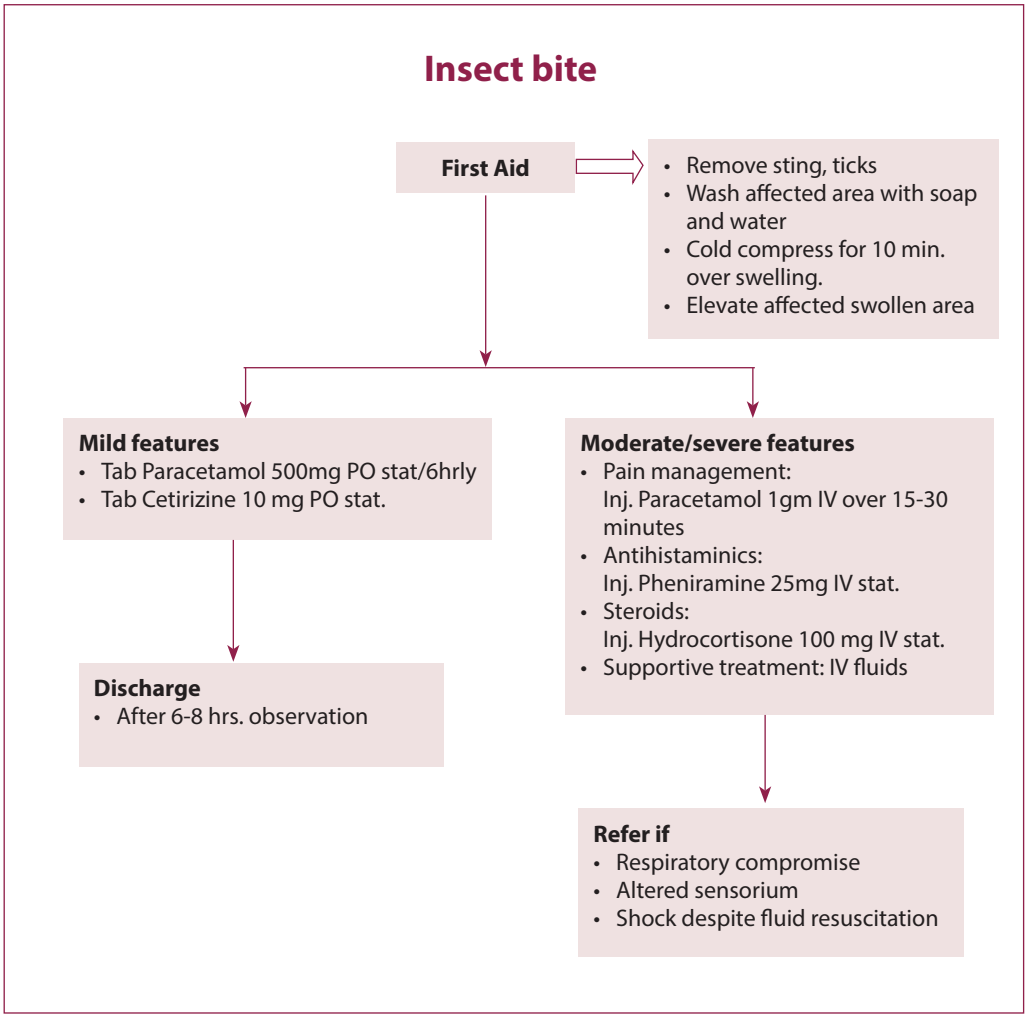
- Redness, painful itchy lump over the skin for few hours
- Fluid filled blisters
- Moderate to severe cases may present with high grade temperature, anaphylaxis, and multisystem involvement.

Management:

- Remove sting, ticks or hairs if still in the skin.
- Wash affected area with soap and water.
- Cold compress for 10 minutes over the swelling.
- Raise/ elevate affected swollen area.
- Avoid traditional home remedies like cow dung, soil, etc.
- Pain management by Inj. Paracetamol 1gm IV over 15-30 minutes OR Tab Paracetamol 500 mg PO stat / 6 hrly.
- Antihistaminics: Inj. Pheniramine 25mg IV stat.
- Steroids: Inj. Hydrocortisone 100 mg IV stat.

Disposition:

Discharge after observation if asymptomatic.
Refer or admit in case of persistent or worsening symptoms.


Insect bite
First Aid
• Remove sting, ticks
• Wash affected area with soap and water
• Cold compress for 10 min. over swelling.
• Elevate affected swollen area
Mild features
• Tab Paracetamol 500mg PO stat/6hrly
• Tab Cetirizine 10 mg PO stat.
Discharge
• After 6-8 hrs. observation
Moderate/severe features
• Pain management: Inj. Paracetamol 1gm IV over 15-30 minutes
• Antihistaminics: Inj. Pheniramine 25mg IV stat.
• Steroids: Inj. Hydrocortisone 100 mg IV stat.
• Supportive treatment: IV fluids
Refer if
• Respiratory compromise
• Altered sensorium
• Shock despite fluid resuscitation

15 PEDIATRIC EMERGENCIES

Diarrhoea

Diarrhoea is the passage of watery stools at least three times in a 24 hour period with recent change in the consistency of stools.

Types:

Acute Watery Diarrhoea (including cholera)	Starts suddenly and lasts several hours Causes dehydration, weight loss
Acute Bloody Diarrhoea (dysentery)	Associated with blood in stool Causes dehydration, sepsis, malnutrition
Persistent Diarrhoea	Acute watery diarrhoea lasting 14 days or longer Causes dehydration, malnutrition
Diarrhoea with severe malnutrition (Marasmus or Kwashiorkor)	Causes severe systemic infection, dehydration, heart failure

Assessment of dehydration in patients with diarrhoea:

Look at condition	Well, alert	Restless, irritable	Lethargic or unconscious, floppy
Eyes	Normal	Sunken	Very sunken and dry
Tears	Present	Absent	Absent
Tongue	Moist	Dry	Very dry
Throat	Drinks normally, not thirsty	Thirsty Drinks eagerly	Drinks poorly or not able to drink
Feel skin pinch	Goes back quickly	Goes back slowly	Goes back very slowly
Decide	The patient has **NO SIGNS OF DEHYDRATION**	If 2 or more signs, **SOME DEHYDRATION**	If 2 or more signs, **SEVERE DEHYDRATION**
Treat	Use **Treatment plan A**	Weigh the patient if possible and use **Treatment plan B**	Weigh the patient and use **Treatment plan C URGENTLY**

Treatment plan A (to treat diarrhoea at home)

Age	Amount of ORS to give after each loose stool	Amount of ORS to provide for use at home
<24 months	50-100 ml	500 ml/day
2-10 years	100-200 ml	1000 ml/day
≥ 10 years	As much as wanted	2000 ml/day

- Show the mother to mix and give ORS.
- If diarrhoea persists, repeated vomiting, marked thirst, fever, or blood in stool, take the child to health center.

Treatment plan B

Age	Less than 4 months	4-11 months	12-23 months	2-4 years	5-14 years	≥15 years
Approx. (wt. in kg)	Less than 5	5-7.9	8-10.9	11-15.9	16-29.9	≥30
ORS in ml	200-400	400-600	600-800	800-1200	1200-2200	>2200

- Give 75 ml/kg ORS in first 4 hours.
- Use child's age only when weight is not known.
- Reassess the child after 4 hours.
  If no signs of dehydration, shift to plan A
  If some signs of dehydration, continue plan B
  If severe dehydration, shift to plan C.

Treatment plan C

- Start IV fluids immediately.
- Give ORS if the patient can drink while the drip is set up.
- Give 100ml/kg ringer's lactate solution divided as

Age	First give	Then give
<12 months	30ml/kg in 1 hour	70ml/kg in 5 hours
12months-5 years	30ml/kg in 30 minutes	70ml/kg in 2.5 hours

- Repeat once if radial pulse weak/ not detectable.
- Reassess every 1-2 hours, if hydration not improving give IV drip more rapidly.
- Give ORS (5ml/kg/hour) as soon as patient can drink.
- Reassess and choose plan A, B, or C to continue

Antimicrobial agents used for the treatment of specific causes of diarrhoea in children:

Cause	Antibiotics
Cholera	Tetracycline: 12.5 mg/kg/body wt. 4 times a day × 3 days, OR Cotrimoxazole (trimethoprim – sulfamethoxazole) TMP 5mg/kg/dose + SM × 25mg/kg/dose 2 times a day × 3 days
Shigella dysentery	TMP 5mg/kg/dose + SM × 25mg/kg/dose 2 times a day × 5 days, OR Ampicillin 25mg/kg 4 times a day × 5 days, OR Nalidixic acid 15mg/kg 4 times a day × 5 days
Amoebiasis	Metronidazole 10mg/kg 4 times a day × 5 days(10 days for severe disease)
Giardiasis	Metronidazole 10mg/kg 4 times a day × 5 days(10 days for severe disease)

- Plenty of ORS to treat and prevent dehydration.

Acute respiratory tract infection

Commonly used term to describe

- Acute epiglottitis
- Acute laryngitis
- Acute laryngotracheobronchitis
- Spasmodic laryngitis

Acute Epiglottitis

- It is a pediatric emergency.
- Common causative agent is *Haemophilus influenzae*
- *Streptococcus pneumoniae,* including strains that may be penicillin-resistant
- Group A Streptococcus
- *Staphylococcus aureus,* including community-acquired methicillin-resistant S. aureus (MRSA) strains

Clinical features:

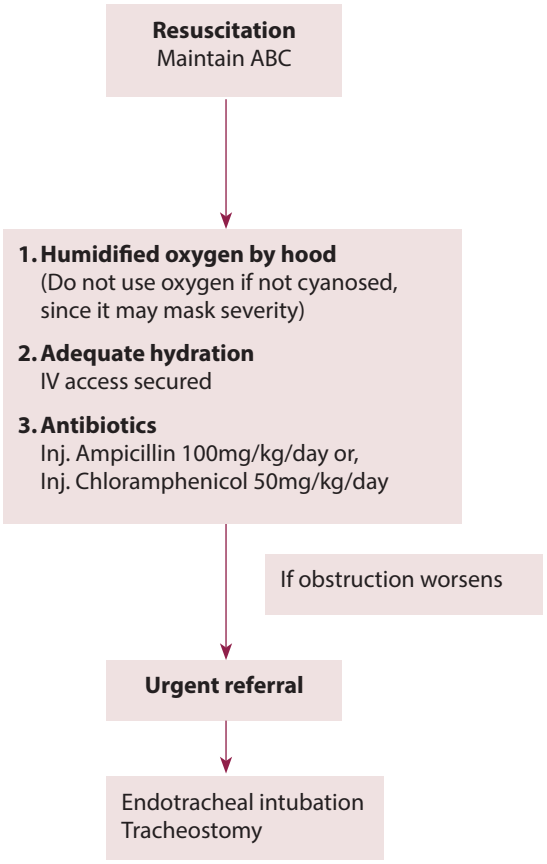
- Brief history of fever, cough, and cold which rapidly progress within few hours.
- High fever, shortness of breath
- Noisy breathing
- Dyspnea, dysphagia, drooling of saliva
- Neck hyper extended with the child preferring to lean forward

Note:

Throat examination contraindicated unless provision of endotracheal intubation since forcible attempts may cause death by sudden reflex spasm of larynx and choking.

Caution! Direct laryngoscopy → angry and swollen epiglottis

Acute Epiglottitis



Laryngitis and laryngotracheobronchitis

Common causative agents are parainfluenza virus type 1, adenovirus and rhinovirus.

Severity of laryngotracheobronchitis

	Mild	Moderate	Severe
General appearance	Happy, feeds well	Irritable but can be comforted	Restless or Agitated or Altered sensorium
Stridor	Stridor on coughing, no stridor at rest	Stridor at rest, worse when agitated	Stridor at rest and worse on agitation
Respiratory distress	No distress	Tachypnea Chest indrawing	Marked tachypnea Chest indrawing
Oxygen saturation	>92% (room air)	>92% (room air)	<92% (room air) Cyanosis

Laryngitis and laryngotracheobronchitis

Resuscitation
Maintain ABC

Mild

Treat fever with paracetamol 15mg/kg/dose
Encourage oral liquids

Moderate to severe

Admission

Racemic epinephrine (2.25%) diluted with water (1:8) administered via nebulizer

Inj. Dexamethasone (0.3-0.6mg/kg) IM stat

Budesonide 1mg inhalation twice daily

Pneumonia

Pneumonia can be classified as:

- Lobar pneumonia
- Bronchopneumonia
- Interstitial pneumonia

Etiology

Viral	Bacterial	Atypical
RSV, influenza	*Klebsiella pneumoniae*	Chlamydia
Parainfluenza	*Escherichia coli*	Mycoplasma
Adenovirus	*Staphylococcus aureus*	
	Streptococcus pneumoniae	
	Hemophilus influenzae	

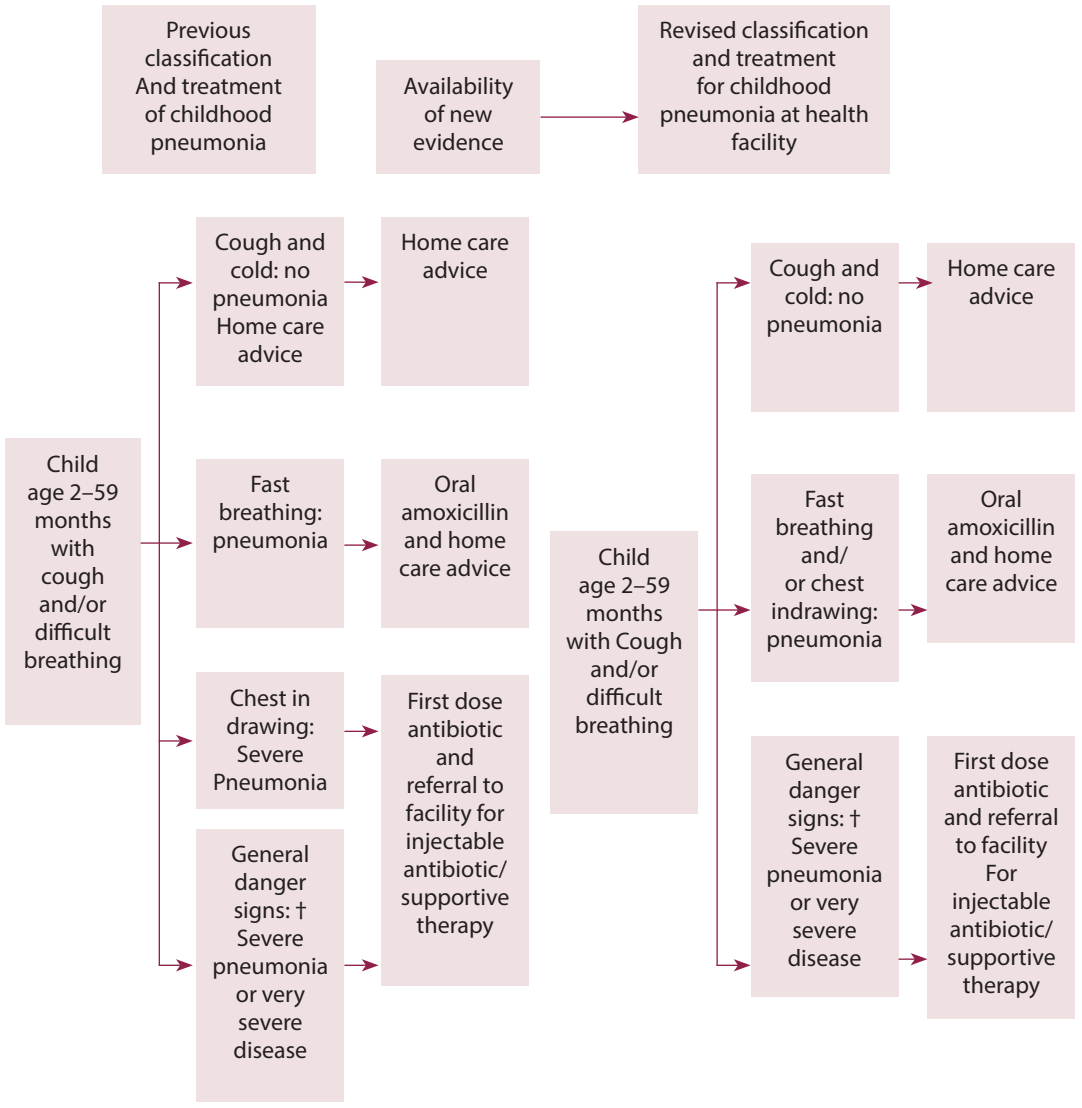
Clinical Features:

- Cough, difficulty in breathing
- Fever, dyspnea, tachypnea
- Diminished air entry, crepitations
- Chest indrawing, grunting, cyanosis

Cut-off of fast breathing for the diagnosis of pneumonia:

Age group	Respiratory rate/min
<2 months	60 or more
2months-11months	50 or more
12months-5years	40 or more

Pneumonia


Previous classification And treatment of childhood pneumonia
Availability of new evidence
Revised classification and treatment for childhood pneumonia at health facility
Child age 2–59 months with cough and/or difficult breathing
Cough and cold: no pneumonia Home care advice
Home care advice
Fast breathing: pneumonia
Oral amoxicillin and home care advice
Chest in drawing: Severe Pneumonia
General danger signs: † Severe pneumonia or very severe disease
First dose antibiotic and referral to facility for injectable antibiotic/ supportive therapy
Child age 2–59 months with Cough and/or difficult breathing
Cough and cold: no pneumonia
Home care advice
Fast breathing and/ or chest indrawing: pneumonia
Oral amoxicillin and home care advice
General danger signs: † Severe pneumonia or very severe disease
First dose antibiotic and referral to facility For injectable antibiotic/ supportive therapy

†General danger signs: not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in calm child or severe malnutrition.

Table: Doses of amoxicillin for children 2–59 months of age with pneumonia

Category of Pneumonia	Age/Weight of Child	Dosage of Amoxicillin Dispersible Tablets (250 mg)
Fast breathing pneumonia	2 months up to 12 months (4–<10 kg)	1 tab twice a day x 5 days (10 tabs)
	12 months up to 5 years (10–19 kg)	2 tabs twice a day x 5 days (20 tabs)
Fast breathing and chest in drawing pneumonia	2 months up to 12 months (4–<10 kg)	1 tab twice a day x 5 days (10 tabs)
	12 months up to 3 years (10–<14 kg)	2 tabs twice a day x 5 days (20 tabs)
	3 years up to 5 years (14–19 kg)	3 tabs twice a day x 5 days (30 tabs)

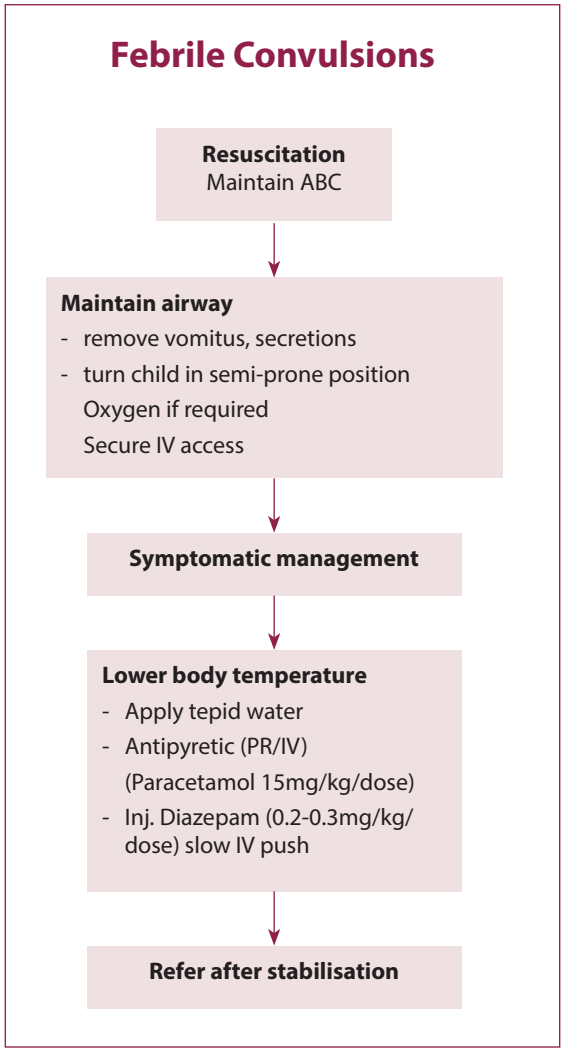
Febrile Convulsions

Characteristics

- Seizures during fever occurring between 6 months to five years of age.
- Absence of infection of central nervous system.
- Occurs with rise of temperature (fever ≥102°F).
- Short duration (15 minutes or less).
- Generalized tonic with no neurological deficit postictal.
- Interictal EEG normal.
- Lumbar puncture normal.

Investigations:

- CBC
- RFT
- Urine R/E and C/S
- Blood C/S
- Chest X ray
- Lumbar puncture:
- LP is indicated only if:
  - There are meningeal signs or symptoms or clinical features that suggest meningitis or intracranial infection.
  - 6-12 month old if immunization status of Hib or Streptococcus pneumoniae is absent or not known
  - In those who are on antibiotics
- EEG


Febrile Convulsions
Resuscitation
Maintain ABC
Maintain airway
- remove vomitus, secretions
- turn child in semi-prone position
Oxygen if required
Secure IV access
Symptomatic management
Lower body temperature
- Apply tepid water
- Antipyretic (PR/IV)
(Paracetamol 15mg/kg/dose)
- Inj. Diazepam (0.2-0.3mg/kg/dose) slow IV push
Refer after stabilisation

16 MISCELLANEOUS

Anaphylaxis

It is an acute generalized immunologically mediated event that occurs within minutes following exposure to any foreign substances in previously sensitized persons and manifests with respiratory distress and vascular collapse.

It is a serious, life threatening generalized or systemic hypersensitivity reaction.

Clinical criteria for diagnosis:

Anaphylaxis is likely when any one out of the three criterias are met:

Criteria 1	Acute onset of an illness (minutes to hours) involving the skin, mucosal tissue or both (eg. generalized hives, pruritis, flushing, swollen lips, tongue, uvula) AND at least one of the following: 1. Respiratory compromise (eg. dyspnea, wheeze-bronchospasm, stridor, reduced peak expiratory flow, hypoxemia) OR 2. Reduced BP or associated symptoms and signs of end- organ dysfunction (eg. hypotonia, collapse, syncope, incontinence)
Criteria 2	Two or more of the following that occurs rapidly after exposure to a LIKELY allergen for that patient (minutes to several hours): 1. Involvement of skin- mucosal tissue (eg. generalized hives, itch-flush, swollen lips-tongue-uvula) 2. Respiratory compromise (eg. dyspnea, wheeze- bronchospasm, stridor, reduced peak expiratory flow, hypoxemia) 3. Reduced BP or associated symptoms and signs (eg. hypotonia, collapse, syncope, incontinence) 4. Persistent gastrointestinal symptoms and signs (eg. crampy abdominal pain, vomiting)
Criteria 3	Reduced BP after exposure to a KNOWN allergen for that patient (minutes to several hours) 1. Infants and children: low SBP (age specific or greater than 30% decrease in SBP). 2. Adults: SBP less than 90 mmHg or greater than 30% decrease from that person's baseline.

Causes of anaphylaxis:

1. Drugs, chemical: Penicillin, cephalosporin, sulphonamides, muscle relaxants, vaccines, monoclonal antibodies, antivenoms, NSAIDS, opiates, NAC, ACEI
2. Foods: Peanuts, fish, shellfish, milk, eggs, flour
3. Insect sting, saliva: Bees, wasps, hornets, ticks, scorpions, jellyfish
4. Environmental: Pollen, horse dander
5. Physical: Exercise, heat, cold
6. Idiopathic

Clinical Features

Cutaneous (90%)	Respiratory (70%)	Cardiovascular (45%)	Neurological (45%)	Gastro-intestinal (45%)
• Erythema • Tingling • Warmth • Pruritis • Urticaria • Angiodema	• Cough • Shortness of breath • Stridor • Hoarseness	• Hypotension • Tachycardia • Arrhythmias • Chest pain	• Confusion • Aura • Anxiety • Lightheadedness • Sweating • Incontinence • coma	• Odynophagia • Abdominal cramps • Nausea, vomiting • Diarrhea

Investigations:

The diagnosis of anaphylaxis is clinical.

Anaphylaxis

Initial assessment and Resuscitation ⇒
Removal of potential causative agent
A: Maintain airway
B: Start oxygen (high flow) via mask to keep SpO_2 >94% (consider intubation early in case of angioedema/ upper airway swelling.
C: If patient in shock,
-insert 2 large bore cannula
- give IV fluid bolus NS/ RL

↓

ADRENALINE

↓

IM Adrenaline
Adult:0.3-0.5 mg (0.3-0.5ml of 1:1000 dilution)
Pediatric: 0.01mg/kg (0.01ml/kg of 1:1000 dilution)
Frequency: Repeat every 5-15 minutes as per response
Site: IM in anterolateral thigh

↓ If Hypotensive/ failure to respond after 3-4 doses

IV Adrenaline
IV Bolus (Adult): 100mcg over 5-10min
Mix 0.1mg (0.1ml of 1:1000 dilution) in 10ml NS and infuse over 5-10min
IV Infusion:
Adult: Start at 1mcg/min;
Mix 1mg (1ml of 1:1000 dilution) in 500ml NS and infuse at 0.5ml/min, titrate dose as needed
Pediatric: 0.1-0.3 mcg/kg/min; titrate dose as needed; maximum 1.5mcg/kg/min

↓

Second line agents:
1. H1 blockers: Inj. Chlorpheniramine 1-2 ml slow IV/IM
   Inj. Phenergan (Promethazine 25 mg IV/IM)
2. H2 blockers: Inj. Ranitidine 50 mg IV stat
3. Steroids: Inj. Hydrocortisone 100-200 mg IV stat (not useful in acute stage)
4. Bronchodilators: Salbutamol nebulization
   Adrenaline nebulization (2.5 mg in 2 ml NS)
5. Glucagon: 1-5 mg IV over 5 min, followed by 5-15 mcg/min infusion in patients on Beta blockers

Disposition

- Mild symptoms: observe for 4-6 hours and discharge if stable
- Life threatening symptoms: Admit and closely monitor

  Discharge after patient stable for at least 24 hours

Discharge medications:

1. Tab Prednisolone 0.5 mg/kg PO OD * 3 days
2. Tab Levocetirizine 5 mg PO HS *5 days
3. Tab Ranitidine 150 mg PO BD * 5 days

Needle Stick Injuries

Needle stick injuries are wounds caused by needles that accidentally puncture the skin.

These injuries are a hazard to health workers and can occur any time while using hypodermic syringes or related needle equipment. Body fluids which are proven to be more infective in causing infections are blood, semen and vaginal secretions. Similarly, CSF, synovial, pleural, peritoneal fluids are also considered to be potentially infectious.

The major pathogens of concern in such occupational body fluid exposure via needle stick injuries and their risks of seroconversion due to sharps injury from a known positive source are:

1. HIV: 0.3%
2. Hepatitis B: 6-30 %
3. Hepatitis C: 2%

Post Exposure Prophylaxis (PEP)

General Measures:

1. Do not squeeze or rub the injury site.
2. Wash with soap and water for 10 minutes.
   Alcohol can also be used in case of small punctures since it is virucidal to HIV, HBV and HCV.
3. If mucosa is involved, irrigate with clean running water or normal saline for around 10 minutes.

PEP for HIV

Indications for PEP:

1. Exposed person is HIV negative
2. Source person is HIV positive, or at high risk of recent infection
3. Significant risk of transmission if:
   - Parenteral or mucous membrane exposure (sexual exposure and splashes to eye, nose or oral cavity)
   - Bodily fluids: blood, blood-stained saliva, breast milk, genital secretions, cerebrospinal, pericardial, peritoneal, pleural, etc.
   - Non-intact skin or mucus membrane exposure to potentially infective body fluids

Recommendations for PEP:

- Start within 2 hours and maximum within 72 hours.
- Duration of treatment: 28 days
- Get baseline HIV Antibody test and monitor 6 weeks, 3 months, 6 months after exposure.

Protocol for HIV PEP (Preferred Regimen):

Adults and adolescents (>10years)	Children ≤10years
TDF + 3TC + DTG	AZT + 3TC + LPV/r

TDF: Tenofovir; 3TC: lamivudine; AZT: zidovudine; DTG: dolutegravir; LPV: lopinavir; r: ritonavir

PEP for Hepatitis B

Exposed	Source		
	HBs Ag+ ve	HBs Ag-ve	Status Unknown
Unvaccinated	HBIG 0.06 mg/ kg and initiate HBV vaccine	Initiate HBV vaccine	Initiate HBV vaccine
Vaccinated	Check Anti HBs titre >10 milli IU: No therapy < 10 milli IU: HBIG + 1 dose of HBV vaccine	No PEP	Check Anti HBs titre > 10 milli IU: No therapy < 10 milli IU: 1 dose of HBV vaccine

- If presenting after 72 hours of exposure, administer only HBV vaccine (0, 1 and 2 months)
- Check HBs Ag status→ 6 months and 12 months

PEP for Hepatitis C

- Wash the affected area thoroughly with soap and clean water for 5- 10 minutes
- No PEP

Pain Management in the ED

Pain is the most common concern among patients coming to the Emergency Department (ED). Approximately 70-80% of all patients present to the ED as their primary complaint.

Pain is the physiologic response to any noxious stimulus. The pain assessment in the ED should determine the duration, location, quality, severity, exacerbating and relieving factors. Pain assessment could be performed by various pain scales.

1. Adjective rating scale

No pain	Mild pain	Moderate pain	Severe pain	Very severe pain	Worst possible pain

- Patient rates pain by choosing from list of pain descriptors, ranging from no pain to worst possible pain.
- Easy to administer.

2. Visual Analog Scale (VAS)

No pain — Worst imaginable pain

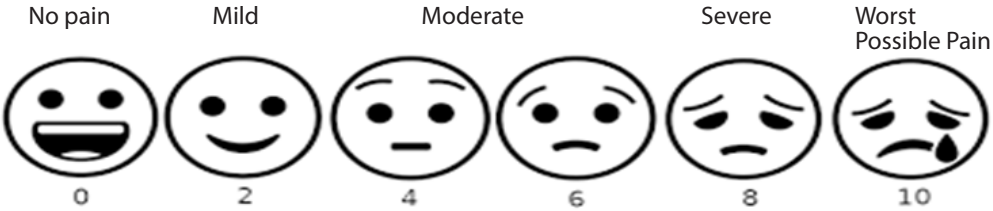
- A 10cm linear scale marked at one end with 'no pain' and the other end with 'worst imaginable pain'.

Severity	VAS (0-100 mm)
Mild	VAS: 0 to 30-40 mm
Moderate	VAS: 40 to 60-70 mm
Severe	VAS: > 60-70 mm

1. Numeric pain scale

0	1	2	3	4	5	6	7	8	9	10
No pain					Moderate pain				Worst possible pain	

2. Wong- Baker FACES Pain Scale



Pharmacological therapy

1. Opioid analgesics
2. Non- opioid analgesics

Opioid analgesics

Opioid analgesics are the mainstay of acute moderate to severe pain management in the ED. These group of drugs have beneficial effects physiologically and should be titrated to effect after the initial dose as patients may differ in their responses to these drugs. Fear of inducing addiction has led the clinician to underuse opioids, however, its short- term use for acute pain management has not shown any dependence.

Opioids analgesics commonly used in the ED are:

Drug	Dose(Adult)	Remarks
Morphine	2-6 mg IV 10 mg IM/SC 10-30 mg PO Onset: 1-2 min IV 10-15 min IM/SC 30 min PO Duration: 1-2 hour IV 3-4 hour IM/SC 3-5 hour PO	Caution: - Histamine release - Respiratory depression - Hypotension - Sedation
Fentanyl	50-100 mcg IV Onset < 1 min IV Duration: 30-60 min IV	Caution: High dose (> 5 mcg/kg IV) can cause chest wall rigidity
Pethidine	25-50 mg IV 50-150 mg IM/SC Onset: 5 min IV Duration: 2-3 hour IV	Contraindication: In patients taking MAO inhibitors within past 14 days
Codeine	30-60 mg PO 30-100 mg IM Onset: 30-60 min PO 10-30 min IM Duration: 4-6 hour PO and IM	Caution: May cause GI side effects like constipation.
Tramadol	50-100 mg PO Onset: 1 hour PO Duration: 4-6 hour PO	Caution: May cause CNS side effects.

Adjuncts in opioid pain management

Adjuncts are used to enhance the analgesic effect, reduce the amount of opioid required and prevent side effects.

Drugs	Dosing
Ondansetron	4-8 mg IV/PO
Promethazine	25-50 mg IV/ IM
Metoclopramide	5-10 mg IV/IM/PO

Non opioid Analgesics

These group of drugs are effective against acute mild to moderate pain, however, not effective for chronic pain.

Drug	Dose	Remarks
Paracetamol	500-1000 mg PO 4-6 hour If > 50 kg: 1 gm IV 6 hourly If < 50 kg: 15 mg/kg IV 6 hourly	Caution: Liver dysfunction Not effective for chronic pain
Ibuprofen (NSAID)	400 mg PO 4-6 hour	GI upset, platelet dysfunction renal dysfunction
Ketorolac (NSAID)	15 mg IV/IM every 6 hour 10 mg PO every 4-6 hour	GI upset, platelet dysfunction renal dysfunction
Naproxen (NSAID)	250- 500 mg PO 8-12 hour	GI upset, platelet dysfunction renal dysfunction
Ketamine	0.1-0.3 mg/ kg (max 30 mg) IV over 10-15 min	No renal/ hepatic dose adjustment Dizziness, hallucinations with higher doses
Hyoscine butylbromide (Anticholinergic)	10-20mg PO/IV TDS	Constipation, dry mouth

Neuropathic pain management:

Nerve pain is also a common concern in the ED though it is difficult to treat the patient in this setting. The most common medications used for this purpose are as follows:

Drug	Indication	Dosage
Amitriptyline	Chronic pain	25-50 mg PO HS Decrease over 2 weeks
Carbamazepine	Trigeminal neuralgia	100 mg PO BD Increase 100- 200 mg/day
Duloxetine	Diabetic neuropathic pain	30 mg PO OD Increase after 1 week
Pregabalin	Neuropathic pain Post herpetic neuralgia	75 mg PO BD Increase over 1 week

NOTE:

Caution during pain management in the elderly.

Special situations:

a) **Pain abdomen:** Early administration of IV opioids is considered safe for pain abdomen management in the ED. It doesn't affect the accuracy of evaluation or diagnosis.

b) **Trauma:** Trauma with hemodynamic instability can consider IV opioids (e.g. Fentanyl) as their first choice. NSAIDS are mostly avoided due to risk of bleeding from platelet dysfunction or acute renal injury in patients with hypovolemia.

Other options:

1. Regional blocks
2. Non- pharmacologic treatments

ANNEXES

ANNEX I: Schedule 2. Emergency Health Services

Relating to Sub-rules 1, 2 and 3 of Rule 4

S. N.	Emergency Health Services	Health Problems	
1	Respiratory problems	Acute exacerbation of Chronic Obstructive Pulmonary Disease (COPD) Acute mountain sickness Acute pulmonary embolism Acute pulmonary oedema Acute Respiratory Distress Syndrome (ARDS) Aspiration pneumonia Asthma Decompression syndrome	Foreign body in respiratory tract High-altitude Pulmonary Oedema (HAPE) Respiratory acidosis Respiratory alkalosis Ruptured diaphragm Status Asthmaticus Severe pneumonia Tension Pneumothorax Others
2	Cardiology	Atrial fibrillation Cardiac arrhythmias (e.g. ventricular tachycardia, ventricular arrhythmias) Cardiac tamponade Cardiogenic shock Congestive Cardiac Failure (CCF)	Heart block Infective endocarditis Ischaemic heart diseases (e.g. angina pectoris, myocardial infarction) Myocarditis Pericardial effusion Pericarditis Others
3	Brain and neurology	Cerebrovascular Accident (CVA) Coma of any cause Encephalitis Encephalopathy (Hypoxic/hepatic/uraemic)	Epilepsy Guillain-Barré Syndrome High-altitude Cerebral Oedema (HACE) Meningitis Status epilepticus Others
4	Gastrointestinal	Acute appendicitis Acute cholecystitis Acute pancreatitis Duodenal perforation Erosive gastritis Foreign body in oesophagus Fulminant hepatitis Gastric perforation Gastrointestinal bleeding (upper and lower)	Intestinal obstruction Intestinal perforation Intussusception peritonitis Ruptured oesophagus Splenic rupture Strangulated and obstructed hernia Trauma to abdominal viscera Variceal bleeding Others

5	Urology	Acute urinary retention Acute pyelonephritis Acute renal failure Hematuria Metabolic acidosis and alkalosis	Pyonephrosis Testicular torsion Paraphimosis Ruptured bladder Others
6	Reproductive health	Antepartum haemorrhage Eclampsia Ectopic rupture Obstructed labour Post-partum haemorrhage Preeclampsia	Pregnancy-induced hypertension Puerperal sepsis Retention of placenta Ruptured uterus Others
7	Orthopedic	Amputations Bleeding Compartment syndrome	Fractures, e.g. femur fracture, spine fracture Gangrene Lacerations Others
8	Metabolic and endocrinological	Adrenal insufficiency Hypo/hyperkalemia Hypo/hypernatremia	Ketoacidosis Metabolic acidosis Metabolic alkalosis Others
9	Ophthalmology	Chemical burn Corneal ulcer Double vision	Foreign body in eye Sudden vision loss Traumatic injury to eye Others
10	ENT	Acute epiglottitis Choking	Epistaxis Foreign body in nose Others
11	Burn	Chemical burns Electrical injuries	Lightning injuries Thermal burns Others
12	Mental health	Acute Psychosis Alcohol intoxication Alcohol withdrawal syndrome Catatonic stupor Conversion disorder Delirium tremens Drug toxicity Lithium toxicity	Narcoleptic malignant syndrome Panic attack Schizophrenia Suicide attempt Transient situational disturbances Violent and aggressive behavior or over-excitement Others

13	Poisoning and overdose of drugs	Aluminum phosphide poisoning Dhatura poisoning Drug overdose Mushroom poisoning	Organophosphorus poisoning Paracetamol poisoning Wild honey poisoning Zinc phosphide poisoning Others
14	Snake bite/ insect bite/ animal bite	Animal bite	Insect bite Snake bite
15	Paediatric	Acute abdomen Central cyanosis Coma (or seriously reduced level of consciousness) Diarrhoea with signs of dehydration Neonatal emergencies (e.g. trachaeo-oesophageal fistula, imperforated anus, pinhole meatus, neonatal sepsis)	Obstructed or absent breathing Severe respiratory distress Shock (cold extremities with capillary refill time >3 seconds and weak and fast pulse) Seizures Rashes (viral exanthems) Others
16	Common emergency health services		
	Injuries and wounds	Dressing on injuries and wounds, necessary referral and counselling	
		Stitching of cuts, necessary referral and counselling	
		Treatment of abscess or boil, necessary referral and counselling	
	Common emergency conditions	Shock: Management and necessary referral	
		Assessment of unconsciousness: Preliminary management, necessary treatment and referral	
		Convulsion: Management and necessary referral	
		Serious injuries from accidents: Stabilisation, necessary management and referral	
		Fracture, joint subluxation, dislocation: Stabilisation, diagnosis, management of pain, referral and counselling	
		Burn and scald: Provisional diagnosis, symptomatic treatment, referral and counselling	
		Poisoning: Preliminary management including gastric lavage, use of available antidote and necessary referral	
		Drowning: Preliminary management and necessary referral	
	Snake bite	Primary treatment, referral and counselling	

ANNEX II: List of Essential Medicines

Drug list used for the STP (Standard Treatment Protocol) of the Emergency Health Services 2077

Drugs for resuscitation and lifesaving conditions				
S. N.	**Name of drug**	**Form**	**Availability**	**Group of drug**
1.	Adrenaline	Injection	1mg/ml	Alpha and beta adrenergic agonist
2.	Amiodarone	Injection	50 mg (hydrochloride)/ ml in 3 ml ampoule	Class III Antiarrhythmics (potassium channel blockers)
3.	Lidocaine	Injection	20 mg (hydrochloride)/ ml in vial	Class IB Antiarrhythmics (Sodium channel blocker)
4.	Magnesium sulphate	Injection	500 mg/ ml in 2 ml ampoule	Antidysrrhythmic Anticonvulsant
5.	Sodium bicarbonate	Injection	7.5 % solution in 10 ml ampoule	Alkalinising agent
6.	Calcium gluconate	Injection	100 mg/ ml in 10 ml ampoule	Antidote
Drugs used for induction and muscle relaxation				
1.	Ketamine	Injection	50 mg (as hydrochloride)/ ml in 10 ml vial	Intravenous general anaesthetic agent
2.	Succinylcholine	Injection	50 mg (chloride)/ ml in 10ml vial	Neuromuscular blocking agent (depolarizing)
3.	Rocuronium	Injection	10mg/ml in 5ml vial	Neuromuscular blocking agent (non depolarizing)
4.	Vecuronium	Injection	Powder 1mg/ml	Neuromuscular blocking agent (non depolarizing)

Drugs used for respiratory conditions				
1.	Salbutamol	Injection MDI/RC Respiratory solution Tablet	Injection: 50 mcg / ml in 5 ml ampoule Metered dose inhaler (aerosol): 200 mcg (as sulfate) per dose Inhalation: 100 mcg/dose Oral liquid: 2mg (as sulfate)/5ml Tablet: 2 mg, 4 mg (as sulfate)	Short acting Beta 2 adrenergic agonist (SABA)
2.	Salmeterol	MDI/RC	Metered dose inhaler (aerosol): 25 mcg and 50mcg per dose	Long acting Beta 2 adrenergic agonist (LABA)
3.	Formoterol	MDI/RC	20 mcg per dose	Long acting Beta 2 adrenergic agonist (LABA)
4.	Tiotropium	MDI	Metered dose inhaler (aerosol): 18 mcg per dose	Long acting anticholinergic (LAAC)
5.	Ipratropium bromide	Respiratory solution	1ml/250mcg	Short acting anticholinergic (SAAC)
6.	Hydrocortisone	Injection	50mg/ml	Systemic corticosteroids
7.	Methylprednisolone	Injection	40mg/ml vial 125mg/2ml vial	Systemic corticosteroids
8.	Prednisolone	Tablet	5mg, 10mg, 20mg	Oral corticosteroids (OCS)
9.	Budesonide	MDI/RC	Metered dose inhaler (aerosol): 200mcg per dose	Inhaled Corticosteroids (ICS)
10.	Fluticasone	MDI/RC	Metered dose inhaler (aerosol): 125mcg and 250mcg per dose	Inhaled Corticosteroids (ICS)
11.	Terbutaline	Injection	1mg/ml (0.25ml provides 0.25mg SC/dose)	Beta 2 adrenergic agonist
12.	Magnesium sulphate	Injection	500mg/ml	Bronchodilator Anticonvulsant

13.	Racemic epinephrine	Injection	1mg/ml	Bronchodilator Alpha and beta adrenergic agonist

Antimicrobial drugs				
	Antibaterials			
1.	Amoxycillin	Capsule	250mg, 500mg	Penicillin
2.	Amoxycillin + clavulanic acid	Injection Tablet	1.2gm/ml 625mg	Penicillin + Beta lactam
3.	Ampicillin	Capsule	250mg, 500mg	Penicillin
4.	Crystalline Penicillin	Injection		Penicillin
5.	Azithromycin	Tablet	500mg	Macrolides
6.	Doxycycline	Tablet Injection	100mg	Tetracycline
7.	Ceftriaxone	Injection	500mg/ml	Cephalosporin
8.	Cefotaxime	Injection	500mg/ml	Cephalosporin
9.	Cefepime	Injection	1gm/ml	Cephalosporin
10.	Ceftazidime	Injection	500mg/ml	Cephalosporin
11.	Vancomycin	Injection	250mg/ml	Glycopeptide
12.	Linezolid	Injection Tablet	2 mg/ mL in 300 mL bag Tablet: 400 mg, 600 mg	Oxazolidinones
13.	Meropenem	Injection	500mg, 1g (as trihydrate) in vial	Carbapenem
14.	Piperacillin tazobactam	Injection	Powder for injection: 2g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	Penicillin + Beta lactamase inhibitor
15.	Gentamicin	Injection	10 mg, 40 mg (as sulfate)/ ml in 2 ml vial	Aminoglycoside
16.	Metronidazole	Tablet Injection	400mg 500mg per vial of 100ml	Nitroimidazole
17.	Ciprofloxacin	Injection Tablet	200mg per vial of 100ml 500mg	Fluoroquinolone
18.	Clindamycin	Injection Tablet	Capsule: 150mg (as hydrochloride) Injection: 150 mg (as phosphate)/ ml	Macrolide

19.	Clarithromycin	Tablet	500mg	Macrolide
20.	Tetracycline	Tablet	250mg, 500mg	Tetracycline
21.	Cotrimoxazole (Trimethoprim-Sulfamethoxazole)	Oral liquid Tablet	Oral liquid:200 mg + 40 mg /5 ml Tablet: 100 mg + 20 mg (DT), 400 mg +80 mg, 800 mg + 160 mg	Sulfonamide
22.	Nalidixic acid	Tablet	250mg, 500mg	Quinolones
23.	Chloramphenicol	Capsule Injection Oral liquid Eye drops	Capsule:250 mg, 500 mg Powder for injection: 1g (as sodium succinate) in vial Oral liquid: 125 mg (as palmitate)/ 5 ml Eye drops	Broad spectrum antibiotic
	Antivirals			
1.	Dolutegravir	Tablet	50mg	HIV integrase inhibitors
2.	Lamivudine	Tablet	300mg	NRTIs (nucleoside reverse transcriptase inhibitor)
3.	Tenofovir	Tablet	300mg	NRTIs (nucleoside reverse transcriptase inhibitor)
4.	Acyclovir	Injection Tablet	500mg vial 500mg	Nucleoside analogues
	Antifungals			
1.	Amphotericin B	Injection	Powder for injection: 50 mg in vial (as deoxycholate or liposomal complex)	Antifungal
2.	Fluconazole	Tablet	150mg, 200mg	Antifungal
Drugs used for cardiovascular conditions				
	Antiarrhythmic drugs			
1.	Amiodarone	Injection	50 mg (hydrochloride)/ ml in 3 ml ampoule	Class III Antiarrhythmics (potassium channel blockers)

2.	Lidocaine	Injection	20 mg (hydrochloride)/ ml in vial	Class IB Antiarrhythmics (Sodium channel blocker)
3.	Adenosine	Injection	3mg/ml vial	Antiarrhythmic
4.	Digoxin	Tablet Injection	0.25mg, 0.5mg 0.25mg/ml	Digitalis glycoside
5.	Esmolol	Injection	10mg/ml vial	Class II Antiarrhythmics (beta blockers)
6.	Sotalol	Injection	15mg/ ml	Class II, III Antiarrhythmics (beta blockers)
7.	Isoprenaline	Injection	0.2mg/ml	Beta agonist
	Antianginal drugs			
1.	Isosorbide dinitrate	Tablet (Sublingual)	2.5mg	Vasodilators
2.	Isosorbide mononitrate	Tablet	20mg	Vasodilators
3.	GTN (Glyceryl trinitrate)	Injection	5mg/ml in 5ml vial	Vasodilators
4.	Metoprolol	Tablet Injection	12.5 mg, 25 mg, 50 mg (as tartrate) 1mg/ml	Beta blocker
	Antiplatelet drugs			
1.	Aspirin	Tablet	150mg, 75mg	Antiplatelet
2.	Clopidogrel	Tablet	75mg	Antiplatelet
	Anticoagulant drugs			
1.	Low molecular weight heparin (Enoxaparin)	Injection (SC)	40mg, 60mg	Anticoagulant
2.	Unfractionated heparin	Injection		Anticoagulant
3.	Warfarin	Tablet	1mg	Anticoagulant
	Fibrinolytic agents			
1.	Streptokinase	Injection		Fibrinolytic
2.	Alteplase	Injection		Fibrinolytic

3.	Tenecteplase	Injection		Fibrinolytic
Lipid lowering agents				
1.	Atorvastatin	Tablet	20mg, 40mg	Lipid lowering
2.	Rosuvastatin	Tablet	20mg	Lipid lowering
Antihypertensive agents				
1.	Labetalol	Injection	5mg/ml	Alpha and Beta blocker
2.	Atenolol	Tablet	50mg	Beta blocker
3.	Diltiazem	Tablet	30mg	Calcium channel blocker
4.	Verapamil	Tablet Injection	40mg 2.5mg/ml	Calcium channel blocker
5.	Amlodipine	Tablet	2.5mg, 5mg	Calcium channel blocker
6.	Nifedipine	Tablet	10mg	Calcium channel blocker
7.	Nimodipine	Tablet	30mg	Calcium channel blocker
8.	Enalapril	Tablet	2.5mg	ACE inhibitor
9.	Losartan	Tablet	25mg, 50mg	ARB (Angiotensin receptor blockers)
10.	Clonidine	Tablet	0.1mg, 0.2mg	Alpha 2 agonist
11.	Methyldopa	Tablet	250mg, 500mg	Alpha 2 agonist
12.	Hydralazine	Injection	20mg/ml	Vasodilator
13.	Sodium nitroprusside	Injection	Power for infusion: 50mg in ampoule	Vasodilator
Inotropes and vasopressors				
1.	Noradrenaline	Injection	1mg/ ml in 2 ml ampoule	Vasopressor
2.	Dopamine	Injection	40 mg (hydrochloride)/ ml in 5 ml vial	Inotropic agent
3.	Dobutamine	Injection	12.5 mg (as hydrochloride)/ ml in 20 ml ampoule	Inotropic agent
4.	Vasopressin	Injection	20units/ml	Antidiuretic hormone, vasopressor
Diuretics				

1.	Furosemide	Injection	20mg	Loop diuretic
2.	Torsemide	Injection	20mg	Loop diuretic

Drugs used for neurological conditions

Anticonvulsants

1.	Phenytoin	Injection Tablet	100mg/ml vial 100mg	Anticonvulsant
2.	Valproic Acid	Injection Tablet	100mg/ml 500mg	Anticonvulsant
3.	Levetiracetam	Injection Tablet	500mg/ml 500mg	Anticonvulsant
4.	Phenobarbital	Injection Tablet	Injection: 200mg (sodium)/ ml Tablet: 15 mg, 30 mg, 60 mg	Anticonvulsant
5.	Magnesium sulphate	Injection	500mg/ml	Anticonvulsant (Eclampsia)
6.	Thiopentone	Injection	500mg per vial	IV general anaesthetic, Anticonvulsant
7.	Propofol	Injection	10 mg/ ml in 20 ml ampoule	IV general anaesthetic, Anticonvulsant

Immunoglobulins

1.	Intravenous Immunoglobulin (IVIg)	Injection		Immunoglobulin

Drugs used for cerebral edema

1.	20% Mannitol	Injection	20% in 100ml vial	Osmotic diuretic
2.	3% Sodium chloride	Injection	3% in 100ml vial	Hypertonic saline
3.	Acetazolamide	Tablet	250mg	Carbonic anhydrase inhibitors

Drugs used for gastrointestinal conditions

Antiemetics

1.	Ondansetron	Injection Tablet	2mg/ml 4mg, 8mg	5-HT3 antagonist

2.	Metoclopramide	Injection Tablet	10mg/ml 10mg	Prokinetic agent
3.	Promethazine	Injection Oral liquid Tablet	Injection: 25 mg (hydrochloride)/ ml in 2 ml ampoule Oral liquid: 5 mg (hydrochloride)/ 5 ml Tablet: 25 mg (theoclate)	Phenothiazine
Drugs used for acid peptic disorders				
Antacids				
1.	Aluminium hydroxide + Magnesium hydroxide	Oral Suspension		Antacid
H2 Blockers				
1.	Ranitidine	Injection Tablet	Injection: 25 mg (as hydrochloride)/ ml in 2 ml ampoule Tablet: 150 mg, 300 mg (as hydrochloride)	H2 Blockers
Proton pump inhibitors				
1.	Omeprazole	Capsule	20mg	Proton pump inhibitors
2.	Pantoprazole	Tablet Injection	40mg 40mg vial	Proton pump inhibitors
Antiulcer drugs				
1.	Sucralfate	Suspension		Ulcer protective
Drugs used for gastrointestinal bleed				
1.	Octreotide	Injection	100mcg/ ml	Somatostatin analog
2.	Terlipressin	Injection	1mg/10ml	Vasopressin analog
3.	Sclerosing agents (Cyanoacryl glue)	Injection		Sclerosing agent
4.	Tranexamic acid	Injection	500mg/5ml	Antifibrinolytic

5.	Vitamin K	Injection	10mg/ml	Phytonadione (Vitamin)
Laxatives				
1.	Lactulose	Syrup	10gm/15ml	Laxative
Drugs used for pain management				
Opioid Analgesics				
1.	Morphine	Injection Oral liquid Tablet	Injection: 10 mg (morphine sulfate or morphine hydrochloride) in 1 ml ampoule Oral liquid: 10 mg (hydrochloride or sulfate)/ 5 ml Tablet (immediate release): 10 mg (sulfate) Tablet (prolonged release): 10 mg, 30 mg, 60 mg (hydrochloride or sulfate)	Opioid Analgesics
2.	Pethidine	Injection	Injection: 50 mg (hydrochloride) in 1 ml ampoule	Opioid Analgesics
3.	Fentanyl	Injection	50mcg/ml	Opioid Analgesics
4.	Codeine	Tablet	15mg, 30mg (phosphate)	Opioid Analgesics
5.	Tramadol	Injection	50mg/ml	Opioid Analgesics
Non Opioids				
1.	Paracetamol	Injection Oral liquid Suppository Tablet	Injection: 150 mg/ ml in 2 ml ampoule, 10 mg/ ml in 100 ml bottle Oral liquid: 125 mg/ 5 ml [c] as suspension, 100 mg/ ml as drops Suppository: 125 mg, 250 mg Tablet: 500mg	Analgesic Antipyretic

2.	Ibuprofen	Tablet	400mg	NSAIDS
3.	Ketorolac	Tablet Injection	10mg 15mg/ml	NSAIDS
4.	Naproxen	Tablet	250mg	NSAIDS
5.	Diclofenac	Injection Tablet	75mg/ml 50mg, 100mg	NSAIDS
6.	Hyoscine butyl bromide	Tablet Injection	10mg, 20mg 10mg/ml	Anticholinergics
Drugs for neuropathic pain management				
1.	Amitriptyline	Tablet	10mg, 25mg	TCA (Tricyclic antidepressants)
2.	Carbamazepine	Tablet	100mg, 200mg	Anticonvulsant
3.	Duloxetine	Tablet	20mg	Antidepressant, SNRIs (Serotonin-norepinephrine reuptake inhibitors)
4.	Pregabalin	Tablet	75mg	Anticonvulsant
Drugs used for gynaecological and obstetric emergencies				
1.	Oxytocin	Injection	Injection: 5 IU/ ml, 10 IU/ ml in 1 ml ampoule	Uterotonics (Neuropeptide)
2.	Methergin	Injection	200mcg/ml	Ergot alkaloids
3.	Misoprostol	Tablet	200mcg	Prostaglandins
5.	Mifepristone	Tablet	200mg	Antiprogestins
6.	Methyldopa	Tablet	250mg, 500mg	Alpha 2 agonist
7.	Magnesium sulphate	Injection	500mg/ml	Anticonvulsant
8.	Nifedipine	Tablet	10mg	Calcium channel blocker
9.	Pyridoxime	Tablet	10mg	Vitamin
10.	Promethazine	Injection	Injection: 25 mg (hydrochloride)/ ml in 2 ml ampoule	Antihistaminic Antiemetic
11.	Tranexamic acid	Injection Tablet	500mg/5ml 500mg	Antifibrinolytic
Drugs used for metabolic and acid base disorders				
Drugs for fluid and electrolyte imbalance				
1.	Normal saline	Injection	0.9% 3%	Crystalloid

2.	Ringer's Lactate	Injection		Crystalloid
3.	Dextrose normal saline	Injection		Crystalloid
4.	Dextrose solution	Injection	5% 10% 25% 50%	Crystalloid
5.	Water for injection	Injection		
6.	Potassium chloride	Injection		Electrolyte supplement
	Sodium bicarbonate	Injection	7.5 % solution in 10 ml ampoule	Alkalinising agent
7.	Calcium gluconate	Injection	100 mg/ ml in 10 ml ampoule	Antidote
9.	Insulin	Injection	40 IU / ml in 10 ml vial	Peptide hormone
10.	Kayexalate (sodium polystyrene)	Powder		Potassium binding resin

Drugs for ocular, ENT and dental emergencies				
1.	Ciprofloxacin	Eye drops	Eye ointment: 0.3% Solution (eye/ ear drops): 0.3% (as hydrochloride)	Fluoroquinolone
2.	Ofloxacin	Eye drops	Solution (eye drop): 0.3%	Fluoroquinolone
3.	Chloramphenicol	Eye drops	Eye ointment: 1% w/w Solution (eye drop): 0.5%	Broad spectrum antibiotic
4.	Oxymetazoline	Nasal drops	Solution (nasal drops): 0.025%, 0.05%	Nasal decongestant
6.	Silver nitrate	Powder		Anti-infective agent (for chemical cautery)
7.	Aluminium hydroxide	Powder/ paste		Inorganic compound
8.	Zinc oxide	Powder/ paste		Inorganic compound

Drugs used for plastic and burns				
1.	Silver sulfadiazine	Ointment		Topical sulfonamide antibacterial

Drugs used for mental health disorders				
Sedatives				
1.	Diazepam	Tablet Injection	5mg 5mg/ ml in 2 ml ampoule	Benzodiazepines
2.	Lorazepam	Tablet Injection	2mg 1mg/ml	Benzodiazepines
3.	Midazolam	Injection	1mg/ml in 5ml vial	Benzodiazepines
5.	Chlordiazepoxide	Tablet	10mg, 25mg	Benzodiazepines
6.	Alprazolam	Tablet	0.25mg	Benzodiazepines
7.	Clonazepam	Tablet	0.25mg, 0.5mg	Benzodiazepines
Antidepressants/ antipsychotics				
1.	Escitalopram	Tablet	5mg	SSRIs
2.	Fluoxetine	Tablet	10mg	SSRIs
3.	Risperidone	Tablet	1mg	Atypical antipsychotic
4.	Haloperidol	Injection	5mg	Antipsychotic
Drugs used for toxicological emergencies/ antidotes				
1.	Activated Charcoal	Powder	10 g in sachet	Antidote
2.	Atropine	Injection	0.6mg/ml	Antidote
3.	Flumazemil	Injection	0.1mg/ml	Antidote
4.	Glucagon	Injection	1mg/ml	Antidote (Glycogenolytic agent)
5.	Protamine	Injection	10 mg/ ml in 5 ml ampoule	Antidote
6.	Pralidoxime	Injection	Injection: 500 mg, 1 g in ampoule	Antidote
7.	N acetylcysteine	Injection Tablet	Injection: 200 mg/ ml in 10 ml ampoule Tablet (effervescent): 600 mg	Antidote
8.	Sodium bicarbonate	Injection		Antidote
9.	Naloxone	Injection	400 mcg (hydrochloride) in 1 ml ampoule	Antidote
10.	Fomepizole	Injection	1gm/ml	Antidote
11.	Vitamin K	Injection	10mg/ml	Antidote
12.	Physostigmine	Injection	1mg/ml	Antidote

Drugs used for reptile bites, animal bites and insect stings				
1.	Tetanus toxoid	Injection	0.5ml	Vaccine
2.	Anti-tetanus immunoglobulin	Injection	1000 IU/ ml, 3000 IU/ ml in vial	Vaccine
3.	Rabies immunoglobulin	Injection		Vaccine
4.	Rabies vaccine	Injection		CCEEVs (Cell culture and embryonated egg based vaccine)
5.	Polyvalent anti snake venom	Injection	10ml vial	Antivenom
6.	Hepatitis B Immunoglobulin	Injection		Vaccine
7.	HBV (Hepatitis B vaccine)	Injection		Vaccine
Drugs used for anaphylactic reactions				
1.	Adrenaline	Injection	1mg/ml Injection: 1mg (as hydrochloride or hydrogen tartrate) in 1ml ampoule (1:1000)	Alpha and beta adrenergic agonist (sympatho-mimetics)
2.	Hydrocortisone	Injection	Powder for injection:100mg (as sodium succinate) in vial with water for injection	Corticosteroids
3.	Promethazine	Injection	Injection: 25 mg (hydrochloride)/ ml in 2 ml ampoule	Antihistaminic Antiemetic
4.	Chlorpheniramine	Injection Tablet	Injection: 22.75 mg (maleate)/ ml Tablet: 25mg, 50 mg	Antihistaminic H1 blocker
5.	Glucagon	Injection	1mg/ml	Glycogenolytic agent
6.	Prednisolone	Tablet	5mg, 10mg, 20mg	Oral Corticosteroid
7.	Levocetirizine	Tablet	5mg	Antihistaminic H1 blocker
8.	Ranitidine	Tablet Injection	150mg 50mg	H2 blocker

ANNEX III: Patient Referral Form

Patient Information: Name: Age: Sex: Address: Occupation: Date of admission: Time of admission: AM/PM	**History and Physical Findings:** **Treatment received:**
Reason for referral: **Provisional diagnosis at the time of referral:**	**At the time of referral:** GCS Temperature BP R/R Pulse SpO_2
Referring Health Center: Name/address of health centre: Name of treating health worker: Phone No.:	**Referred to:** Name/address of health centre: Phone No.:
Mode of transport: Ambulance Others: (Please Specify) Escorting personnel:	**Monitoring during transfer:** **Treatment received during transfer:** **Feedback from the receiving health centre:**
Informed Written Consent: Taken/ not taken Name: Relation: Phone No: Signature: Date and Time:	**Consent taken by:** Name: Designation: Signature: Date and Time:

ANNEX IV: Participants on Pre-Planning/ Preliminary Consultative Meeting with key government officials on STP of EHS

SN.	Name	Designation	Institution
1	Mr. Mahendra Prasad Shrestha	Chief Specialist	MoHP
2	Dr. Dipendra Raman Singh	DG	DoHS
3	Dr. Tara Nath Pokharel	Director	CSD
4	Dr. Basu Dev Pandey	Director	EDCD
5	Ms. Roshani Laxmi Tuitui	Director	NSSD-DoHS
6	Dr. Ramesh Kumar Kharel	Director	MD-DoHS
7	Dr. Narendra K. Khanal	Senior Consultant, MDGP	CSD
8	Dr. Prakash Budhathoki	Senior Consultant, Dental Surgeon	CSD
9	Dr. Pomawati Thapa	Section Chief	CSD
10	Mr. Bharat Mani Marhatta	Sr. Pharmacy officer	CSD
11	Ms. Uma Kumari Rijal	Nursing Officer	CSD
12	Ms. Nilam Kumari Singh	Nursing Officer	CSD
13	Mr. Kamlesh K. Mishra	PHI	CSD
14	Ms. Kimat Adhikari	National Professional Officer-Health System	WHO Country Office Nepal
15	Dr. Sudesha Khadka	FMO	WHO
16	Dr. Olita Shilpakar	Sr. Consultant Emergency Physician	PHRD Nepal
17	Mr. Janak Thapa	Executive Director	PHRD Nepal
18	Ms. Saimona Karki	Documentation Officer	PHRD Nepal

ANNEX V: Participants on Consultative TWG Meeting on STP of EHS

SN.	Name	Designation	Institution
1	Dr. Narendra K. Khanal	Sr. Consultant, MDGP	CSD
2	Dr. Prakash Budhathoki	Sr. Consultant, Dental Surgeon	CSD
3	Dr. Pomawati Thapa	Section Chief	CSD
4	Mr. Bijay Kanti Shakya	Sr. Public Health Officer (PHO)	MoHP
5	Mr. Sudip Kumar Aale	Sr. PHO	MoHP
6	Ms. Bala Rai	Nursing Administrator	NSSD
7	Dr. Sujan Shrestha	Medical Officer	CSD
8	Ms. Uma Kumari Rijal	Nursing Officer	CSD
9	Ms. Nilam Kumari Singh	Nursing Officer	CSD
10	Mr. Kamlesh K. Mishra	Public Health Inspector (PHI)	CSD
11	Mr. Prakash Pokharel	Sr. Medical Technologist	CSD
12	Mr. Daulet Tuladhar	Public Health Supervisor	CSD
13	Mr. Navaraj K.C	Administration Staff	CSD
14	Mr. Rishi Ram Ghimire	Accountant	CSD
15	Mr. Ashal Raj Ghimire	Computer Operator	CSD
16	Ms. Kimat Adhikari	National Professional Officer-Health System	WHO Country Office Nepal
17	Dr. Olita Shilpakar	Sr. Consultant Emergency Physician	PHRD Nepal
18	Mr. Janak Thapa	Executive Director	PHRD Nepal
19	Ms. Saimona Karki	Documentation Officer	PHRD Nepal

ANNEX VI: Participants on Consultative Meeting with Subject/ Emergency Experts on STP of EHS

SN.	Name	Designation	Institution
1	Dr. Narendra K. Khanal	Sr. Consultant, MDGP	CSD
2	Dr. Shree Ram Tiwari	Emergency Medicine Expert/Reviewer	MoHP
3	Dr. Pomawati Thapa	Section Chief	CSD
4	Dr. Ashis Shrestha	Emergency Medicine Expert/Reviewer	Patan Hospital
5	Dr. Sanu Krishna Shrestha	Emergency Medicine Expert/Reviewer	Dhulikhel Hospital
6	Dr. Ajay Singh Thapa	Emergency Medicine Expert/Reviewer	Grande Int. Hospital
7	Mr. Bharat Mani Marhatta,	Sr. Pharmacy Officer	CSD
8	Ms. Nilam Kumari Singh	Nursing Officer	CSD
9	Dr. Khin Pa Pa Naing	Technical Officer-HSS	WHO Country Office Nepal
10	Dr. Olita Shilpakar	Sr. Consultant Emergency Physician	PHRD Nepal
11	Mr. Janak Thapa	Executive Director	PHRD Nepal
12	Ms. Saimona Karki	Documentation Officer	PHRD Nepal

ANNEX VII: Participants on Consultative Meeting with Professional Councils and Associations on STP of EHS

SN.	Name	Designation	Institution
1	Dr. Madan Kumar Upadhaya	Director	CSD
2	Dr. Shree Ram Tiwari	Emergency Medicine Expert/Reviewer	MoHP
3	Dr. Narendra K. Khanal	Sr. Consultant, MDGP	CSD
4	Dr. Prakash Budhathoki	Sr. Dental Surgeon	CSD
5	Dr. Pomawati Thapa	Section Chief	CSD
6	Dr. Krishna Prasad Adhikari	Registrar	NMC
7	Dr. Lochan Karki	President	NMA
8	Mr. Data Ram Adhikari	Member	HAAN
9	Mr. Laxmi Raj Joshi	Member	HAAN
10	Dr. Narayan Shrestha	Registrar	NAC
11	Dr. Phanindra Prasad Baral	Section Chief	EDCD
12	Dr. Roshan Neupane	Sr. MS	MoHP
13	Ms. Shankuntala Prajapati	Member	NNC
14	Dr. Krishna Raj Joshi	MO	CSD
15	Dr. Sujan Shrestha	MO	CSD
16	Dr. Khin Pa Pa Naing	Technical Officer- Health System	WHO Country Office Nepal
17	Ms. Kimat Adhikari	National Professional Officer – Health System	WHO Country Office Nepal
18	Dr. Sudesha Khadka	FMO	WHO
19	Dr. Olita Shilpakar	Sr. Consultant Emergency Physician	PHRD Nepal
20	Mr. Bharat Mani Marhatta	Sr. Pharmacy Officer	CSD
21	Mr. Dipak Raj Bhatta	PHI	CSD
22	Ms. Uma Kumari Rijal	Nursing Officer	CSD
23	Ms. Nilam Kumari Singh	Nursing Officer	CSD
24	Mr. Janak Thapa	Executive Director	PHRD Nepal
25	Ms. Saimona Karki	Documentation Officer	PHRD Nepal

ANNEX VIII: Participants of High-Level Consultative Meeting on STP of EHS

SN.	Name	Designation	Institution
1	Mr. Laxman Aryal	Secretary	MoHP
2	Dr. Roshan Pokharel	Chief Specialist	MoHP
3	Mr. Mahendra Prasad Shrestha	Chief Specialist	MoHP
4	Dr. Dipendra Raman Singh	DG	DoHS
5	Dr. Bikash Devkota	Chief, QSRD	MoHP
6	Dr. Gunaraj Lohani	Chief, PPMD	MoHP
7	Dr. Jageshwor Gautam	Chief, HCD	MoHP
8	Dr. Madan Kumar Upadhaya	Director	CSD/DoHS
9	Dr. Krishna Prasad Poudel	Director	EDCD/DoHS
10	Ms. Roshani Laxmi Tuitui	Director	NSSD/DoHS
11	Dr. Rajesh Pandav	Representative	WHO
12	Dr. Runa Jha	Director	NPHL
13	Dr. Yadu Chandra Ghimire	Director	NHTC
14	Dr. Bibek Kumar Lal	Director	STAC
15	Mr. Sunil Raj Sharma	Director	NHEICC
16	Dr. Guna Nidhi Sharma	Senior Health Administrator	MoHP
17	Dr. Shree Ram Tiwari	Emergency Medicine Expert/Reviewer	MoHP
18	Dr. Roshan Neupane	Sr. MS	MoHP
19	Dr. Surendra Chaurasia	Sr. Health Administrator	MD/DoHS
20	Dr. Narendra K. Khanal	Senior Consultant, MDGP	CSD
21	Dr. Prakash Budhathoki	Senior Consultant, Dental Surgeon,	CSD
22	Dr. Pomawati Thapa	Section Chief	CSD
23	Dr. Anil Shrestha	Executive Director	NSI
24	Dr. Maureen Dar Lay	Advisor	NHSSP
25	Dr. Kashim Shah	Sr. Program Manager	NSI
26	Mr. Pravin Tiwari	TA	GIZ
27	Dr. Krishna Raj Joshi	MO	CSD
28	Dr. Sujan Shrestha	MO	CSD
29	Mr. Deepak Raj Bhatta	PHO	CSD
30	Dr. Ajay Singh Thapa	Emergency Medicine Expert/Reviewer	Grande Int. Hospital
31	Dr. Sanu Krishna Shrestha	Emergency Medicine Expert/Reviewer	Dhulikhel Hospital
32	Dr. Ashis Shrestha	Emergency Medicine Expert/Reviewer	Patan Hospital
33	Mr. Bharat Mani Marhatta	Sr. Pharmacy officer	CSD

34	Ms. Nilam Kumari Singh	Nursing Officer	CSD
35	Mr. Kamlesh K. Mishra	PHI	CSD
36	Dr. Khin Pa Pa Naing	Technical Officer- Health System	WHO Country Office Nepal
37	Ms. Kimat Adhikari	National Professional Officer-Health System	WHO Country Office Nepal
38	Dr. Olita Shilpakar	Sr. Consultant Emergency Physician	PHRD Nepal
39	Prof. Dr. Abhinav Vaidya	Consultant	PHRD Nepal
40	Mr. Janak Thapa	Executive Director	PHRD Nepal
41	Ms. Saimona Karki	Documentation Officer	PHRD Nepal
42	Ms. Prativa Bhandari	Research Officer	PHRD Nepal
43	Ms. Salina Thapa	Program Officer	PHRD Nepal

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