STANDARD TREATMENT PROTOCOL OF EMERGENCY HEALTH SERVICE PACKAGE

GOVERNMENT OF NEPAL
MINISTRY OF HEALTH AND POPULATION
Photograph courtesy:
Dr. Ashis Shrestha
Dr. Olita Shilpakar
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

Dr. Dipendra Raman Singh
Director General
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.

We are indebted to the technical and financial support of WHO Country Office Nepal in developing this protocol. The hard work and regular contributions of Section Chiefs from the Curative Service Division Dr. Pomawati Thapa, Dr. Narendra Kumar Khanal, Dr. Prakash Budhathoki, independent consultants Dr. Olita Shilpakar, Dr. Senendra Raj Upreti, 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. Similarly, I am grateful to the contribution of different independent emergency experts and health development partners for their valuable feedback and support.

Date: 2078, Jestha

Dr. Madan Kumar Upadhyaya
Director
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<td>ABC</td>
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<td>ABCDE</td>
<td>Airway, Breathing, Circulation, Disability and Exposure</td>
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<td>ABG</td>
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<td>AC</td>
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<td>ACEI</td>
<td>Angiotensin Converting Enzyme Inhibitors</td>
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<td>ACS</td>
<td>Acute Coronary Syndrome</td>
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<td>AE COPD</td>
<td>Acute exacerbation of chronic obstructive pulmonary disease</td>
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<td>AE</td>
<td>Acute Exacerbation</td>
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<td>AF</td>
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<tr>
<td>AHW</td>
<td>Auxiliary Health Worker</td>
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<td>ALS</td>
<td>Advanced Life Support</td>
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<td>AMS</td>
<td>Acute Mountain Sickness</td>
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<td>ANM</td>
<td>Auxiliary Nurse Midwife</td>
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<td>AP</td>
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<td>APH</td>
<td>Antepartum Haemorrhage</td>
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<td>ARB</td>
<td>Angiotensin Receptor Blockers</td>
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<td>ATLS</td>
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<td>BBB</td>
<td>Blood Brain Barrier</td>
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<td>BD</td>
<td>Twice a Day</td>
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<td>Benign Enlargement of Prostate</td>
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<td>BHC</td>
<td>Basic Health Center</td>
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<td>BiPAP</td>
<td>Bilevel Positive Airway Pressure</td>
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<td>BLS</td>
<td>Basic Life Support</td>
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<td>BMV</td>
<td>Bag and Mask Ventilation</td>
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<td>BP</td>
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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
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<th>Abbreviation</th>
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<tr>
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<td>Health Post</td>
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<td>Intracranial Pressure</td>
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<td>ICU</td>
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<td>IHD</td>
<td>Ischemic Heart Disease</td>
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<td>IHIMS</td>
<td>Integrated Health Information Management Section</td>
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<td>IM</td>
<td>Intramuscular</td>
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<td>INR</td>
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<td>IPAP</td>
<td>Inspiratory Positive Airway Pressure</td>
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<td>IPPV</td>
<td>Intermittent Positive Pressure Ventilation</td>
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<td>IV PPI</td>
<td>Intravenous Proton Pump Inhibitor</td>
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<td>IU</td>
<td>International Unit</td>
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<tr>
<td>IV</td>
<td>Intravenous</td>
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<td>IVC</td>
<td>Inferior Venacava</td>
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<td>IVP</td>
<td>Intravenous Pyelogram</td>
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<td>JVP</td>
<td>Jugular Venous Pulse</td>
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<tr>
<td>KCL</td>
<td>Potassium Chloride</td>
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<td>KUB</td>
<td>Kidney, Ureter and Bladder</td>
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<td>LA/IVA</td>
<td>Local Anaesthesia/ Intravenous Anaesthesia</td>
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<td>LAAC</td>
<td>Long Acting Anticholinergic</td>
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<td>LABA</td>
<td>Long Acting Beta 2 Agonist</td>
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<td>LBBB</td>
<td>Left Bundle Branch Block</td>
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<td>LFT</td>
<td>Liver Function Test</td>
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<td>LMWH</td>
<td>Low Molecular Weight Heparin</td>
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<td>LOC</td>
<td>Level of Consciousness</td>
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<td>LOV</td>
<td>Loss of Vision</td>
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<td>LP</td>
<td>Lumbar Puncture</td>
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<td>LTRA</td>
<td>Leukotriene Receptor Antagonist</td>
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<tr>
<td>MAO</td>
<td>Monoamine Oxidase</td>
</tr>
<tr>
<td>MAP</td>
<td>Mean Arterial Pressure</td>
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<tr>
<td>MDGP</td>
<td>Medicine Doctor in General Practice</td>
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<tr>
<td>MI</td>
<td>Myocardial Infarction</td>
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<tr>
<td>MO</td>
<td>Medical Officer</td>
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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 Steroids
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
<table>
<thead>
<tr>
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<tr>
<td>TMP:</td>
<td>Trimethoprim</td>
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<tr>
<td>TWG:</td>
<td>Technical Working Group</td>
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<td>UA:</td>
<td>Unstable Angina</td>
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<tr>
<td>UFH:</td>
<td>Unfractionated Heparin</td>
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<tr>
<td>UGI:</td>
<td>Upper Gastrointestinal</td>
</tr>
<tr>
<td>USG:</td>
<td>Ultrasonography</td>
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<tr>
<td>UTI:</td>
<td>Urinary Tract Infection</td>
</tr>
<tr>
<td>UGI:</td>
<td>Upper Gastrointestinal</td>
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<tr>
<td>VAS:</td>
<td>Visual Analog Scale</td>
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<td>VF:</td>
<td>Ventricular Fibrillation</td>
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<td>VT:</td>
<td>Ventricular Tachycardia</td>
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<td>VUJ:</td>
<td>Vesico Ureteric Junction</td>
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<tr>
<td>WBCT:</td>
<td>Whole Blood Clotting Test</td>
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<td>WBI:</td>
<td>Whole Bowel Irrigation</td>
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<td>WHO:</td>
<td>World Health Organization</td>
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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. 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. 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. The purpose of emergency medical service is to stabilize patients who have a life-threatening or limb-threatening injury or illness. 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.
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
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


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

**Primary survey**
Identify life threatening conditions

Rapid: less than 5 min
Treat as you find

**Resuscitation + Initial Assessment**

**Rescue assessment of primary survey**

**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

**A: Airway**
Clear 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

**Adjuncts:**
- ECG
- Pulse oximetry

**Adjuncts:**
- Foley catheter
- NG tube

**Stabilization**

**Transfer**

**Definitive care**
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Beware</th>
<th>Management</th>
</tr>
</thead>
</table>
| **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.

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

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](image)
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.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Actions</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| 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)  

<table>
<thead>
<tr>
<th>Steps</th>
<th>Actions</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>ABG (if available)</td>
<td><strong>ABG if oxygen requirement is more than 5 litres per minute</strong>&lt;br&gt;Calculate PaO₂/FiO₂ ratio and A-a gradient as following patient requires pressure support in form of HFNC, NIV or MV&lt;br&gt;1. PaO₂/FiO₂ ratio less than 200&lt;br&gt;2. A-a gradient not improving with oxygen&lt;br&gt;A-a gradient = (150 mmHg - PaCO₂)/0.8 - PaO₂&lt;br&gt;Normal A-a gradient estimate for the patient = (age in years/4)+4 (FiO₂=0.21)</td>
</tr>
<tr>
<td>4</td>
<td>Evaluate in less than 5 minutes and titre flow rate to achieve expected oxygen saturation</td>
<td><strong>Expected oxygen saturation is 94%</strong>&lt;br&gt;Anticipate pressure support in form of HFNC, NIV or MV in patient whose oxygen saturation is not improving despite oxygen therapy.</td>
</tr>
<tr>
<td>5</td>
<td>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</td>
<td><strong>Rule out pneumothorax clinically and with USG</strong>&lt;br&gt;1. Check distilled water connection in HFNC&lt;br&gt;2. Turn on HFNC&lt;br&gt;3. Start on following parameter&lt;br&gt;   FiO₂ = 100%&lt;br&gt;   Temperature = 34 -37 degrees Celsius&lt;br&gt;   Flow rate = 20 L/minutes&lt;br&gt;4. Wait for flow to be warm&lt;br&gt;5. Inform patient that he/she will experience high flow and warm air. Explain that this will help him/her&lt;br&gt;6. Let patient experience warmth of flow in his hand&lt;br&gt;7. Adjust cannula and head strap&lt;br&gt;8. Increase flow rate by 2 litres per minute every 3-5 minute until desired oxygen saturation is reached</td>
</tr>
<tr>
<td>6</td>
<td>Start on BiPAP if patient is not tolerating HFNC</td>
<td><strong>Rule out pneumothorax clinically and with USG</strong>&lt;br&gt;Oxygen flow = 10-15 litres per minute&lt;br&gt;IPAP = 8 AND EPAP = 5&lt;br&gt;Make increment in IPAP and EPAP by 1 every 3-5 minutes till expected oxygen saturation is reached.&lt;br&gt;Consult if not maintaining oxygen saturation at IPAP 15 and EPAP 12</td>
</tr>
</tbody>
</table>
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

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

Resuscitation + Initial Assessment

Reassessment of primary survey

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

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

Adjuncts:
- ECG
- pulse oximetry

Adjuncts:
Foley catheter
NG tube

Stabilization

Transfer

Definitive care
# Primary Survey

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

1. Check for danger
2. Check responsiveness
3. Shout for help
4. Open airway
5. Not breathing normally?
6. 30 chest compressions
7. 2 rescue breaths
8. Attach to AED as soon as available
9. Continue CPR until signs of life returns or qualified help arrives
Paediatric Basic Life Support

1. Stimulate and check responsiveness
2. Open Airway
   - Head tilt chin lift (jaw thrust if trauma)
3. Check Breathing
   - Look, Listen and Feel
4. Breaths
   - Deliver 2 effective breaths
5. Assess circulation
   - Do not delay > 10 seconds
6. Chest compression
   - 30 compressions 2 breaths
   - Rate of 100 compressions/minute
7. Continue CPR

If no breathing
- Recovery position
- If no chest rise
  - Reposition airway
  - Reattempt giving breaths
  - If not, treat as for airway obstruction
Paediatric Cardiac Arrest Algorithm

1. Start CPR
   • Begin bag-mask ventilation and give oxygen
   • Attach monitor/defibrillator

Rhythm Shockable?
   Yes
   2. VF/pVT
   3. Shock
      4. CPR 2min
         • IV/IO access
      5. Shock
         6. CPR 2 min
            • Epinephrine every 3-5 min
            • Consider advanced airway
      7. Shock
      8. CPR 2 min
         • Amiodarone or lidocaine
         • Treat reversible causes
      9. Asystole/PEA
         Epinephrine ASAP
      10. CPR 2 min
          • IV/IO access
          • Epinephrine every 3-5 min
          • Consider advanced airway, capnography
      11. CPR 2 min
          • Treat reversible causes
      12. If no signs of return of spontaneous circulation (ROSC), go to 10.
      • If ROSC, go to Post Cardiac Arrest Care checklist

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: 0.01 mg/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

1. Start CPR
   - Give oxygen
   - Start monitor/defibrillator

Rhythm Shockable?

Yes

2. VF/pVT

3. Shock

4. CPR 2min
   - IV/IO access

Rhythm Shockable?

Yes

5. Shock

6. CPR 2min
   - Epinephrine every 3-5min
   - Consider advanced airway capnography

Rhythm Shockable?

No

7. Shock

8. CPR 2min
   - Amiodarone or lidocaine
   - Treat reversible causes

Rhythm Shockable?

No

9. Asystole/PEA

Epinephrine ASAP

10. CPR 2 min
    - Epinephrine every 3-5min
    - Consider advanced airway, capnography

Rhythm Shockable?

Yes

11. CPR 2 min
    - Treat reversible causes

Rhythm Shockable?

No

Go to 5 or 7

12.
   - If no signs of return of spontaneous circulation (ROSC), go to 10 or 11.
   - If ROSC, go to post cardiac arrest care.
   - Consider appropriateness of continued resuscitation.

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

Assess appropriateness for clinical condition. Heart rate typically ≥ 150/ min if tachyarrhythmia.

Identify and treat underlying cause
- Maintain patient airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12 lead ECG, if available

Persistent tachyarrhythmia causing:
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

Wide QRS? ≥0.12 second
- Vagal maneuvers (if regular)
- Adenosine (if regular)
- β- Blockers or calcium channel blocker
- Consider expert consultation

Doses/Details

Synchronized cardioversion:
Refer to your specific device's recommended energy level to maximize first shock success.

Adenosine IV dose:
First dose: 6 mg rapid IV push; follow with NS flush
Second dose: 12 mg if required

Antiarrhythmic infusions for stable wide- QRS Tachycardia

Procainamide IV dose: 20-50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases > 50%, or maximum dose 17 mg/ kg given. Maintenance infusion: 1-4 mg/ min. Avoid if prolonged QT or CHF.

Amiodarone IV dose:
First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.

Sotalol IV dose:
100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

If refractory, consider
- Underlying cause
- Need to increase energy level for next cardioversion
- Addition of antiarrhythmic drug
- Expert consultation

Consider
- Adenosine only if regular and monomorphic
- Antiarrhythmic infusion
- Expert consultation
Adult Bradycardia Algorithm

Assess appropriateness for clinical condition. Heart rate typically < 50/min if bradyarrhythmia.

Identify and treat underlying cause
- Maintain patient airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12 lead ECG, if available, don’t delay therapy
- Consider possible hypoxic and toxicologic causes

Persistent bradyarrhythmia causing:
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

Monitor and observe

Atropine
If atropine ineffective
- Transcutaneous pacing
  And/or
- Dopamine infusion
  Or
- Epinephrine infusion

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.
Titrated to patient response; taper slowly.

Epinephrine IV infusion:
2-10 mcg per minute infusion.
Titrated to patient response.

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

Consider:
- Expert consultation
- Transvenous pacing
**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:** Use waveform capnography or capnometry to confirm or monitor endotracheal tube placement.
- **Manage respiratory parameters:** Titrate FiO\textsubscript{2} for Sp\textsubscript{O}\textsubscript{2} to achieve 92-98%, start at 10 breaths/min, titrate to PaCO\textsubscript{2} of 35-45 mm Hg.
- **Manage hemodynamic parameters:** Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm 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

**Initial Stabilization Phase**

- Airway management: Waveform capnography or capnometry to confirm or monitor endotracheal tube placement.
- Manage respiratory parameters: Titrate FiO\textsubscript{2} for Sp\textsubscript{O}\textsubscript{2} to achieve 92-98%, start at 10 breaths/min, titrate to PaCO\textsubscript{2} of 35-45 mm Hg.
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- Hypokalemia/hyperkalemia
- Hypothermia
- Tension Pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, Pulmonary
- Thrombosis, Coronary

- Evaluate and treat rapidly reversible etiologies
- Involve expert consultation for continued management
LIST OF EMERGENCY CONDITIONS
Shortness of Breath

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

It is an unpleasant awareness of sensation of breathing.

Causes

<table>
<thead>
<tr>
<th>System</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary</td>
<td>AE COPD</td>
</tr>
<tr>
<td></td>
<td>Acute severe asthma</td>
</tr>
<tr>
<td></td>
<td>Pneumothorax</td>
</tr>
<tr>
<td></td>
<td>Pneumonia</td>
</tr>
<tr>
<td></td>
<td>Pulmonary embolism</td>
</tr>
<tr>
<td></td>
<td>Trauma</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Acute pulmonary edema</td>
</tr>
<tr>
<td></td>
<td>Acute coronary syndrome</td>
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<tr>
<td></td>
<td>Cardiac tamponade</td>
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<tr>
<td></td>
<td>Heart failure</td>
</tr>
<tr>
<td>Neurological</td>
<td>Acute stroke</td>
</tr>
<tr>
<td></td>
<td>Neuromuscular disease</td>
</tr>
<tr>
<td>Upper airway</td>
<td>Foreign body</td>
</tr>
<tr>
<td></td>
<td>Trauma</td>
</tr>
<tr>
<td>Metabolic</td>
<td>Diabetic ketoacidosis</td>
</tr>
<tr>
<td></td>
<td>Metabolic acidosis</td>
</tr>
<tr>
<td>Others</td>
<td>Psychogenic</td>
</tr>
<tr>
<td></td>
<td>Obesity</td>
</tr>
<tr>
<td></td>
<td>Pregnancy</td>
</tr>
<tr>
<td></td>
<td>Anemia</td>
</tr>
<tr>
<td></td>
<td>Poisoning</td>
</tr>
</tbody>
</table>
## History

<table>
<thead>
<tr>
<th>Onset:</th>
<th>Physical examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>sudden/acute onset (within minutes to hours)</td>
<td>Vitals: check for tachycardia, tachypnea, fever, hypertension/ hypotension, oxygen saturation</td>
</tr>
<tr>
<td>chronic (within days to months)</td>
<td></td>
</tr>
<tr>
<td>Associated symptoms:</td>
<td>Use of accessory muscles of respiration and retractions</td>
</tr>
<tr>
<td>- Cough</td>
<td></td>
</tr>
<tr>
<td>- Sputum (colour, amount, blood mixed or not)</td>
<td></td>
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<tr>
<td>- Fever</td>
<td></td>
</tr>
<tr>
<td>- Chest pain</td>
<td></td>
</tr>
<tr>
<td>- Orthopnea, paroxysmal nocturnal dyspnoea</td>
<td></td>
</tr>
<tr>
<td>- Edema</td>
<td></td>
</tr>
<tr>
<td>- Confusion</td>
<td></td>
</tr>
<tr>
<td>- Past medical/ surgical history</td>
<td></td>
</tr>
</tbody>
</table>

## 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

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

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

Target SpO₂ 88-92%
Avoid high flow O₂

Oxygen Therapy

Bronchodilator

Supportive therapy

Nebulization:
Salbutamol: Ipratropium bromide: NS (1:1:2) repeat every 15 min × 3times
Steroids: Inj. Hydrocortisone 200mg IV stat, then 100mg IV TDS

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)

Non-invasive ventilation (NIV)

If no improvement, refer

Invasive ventilation

Hemodynamically unstable
- If unable to tolerate NIV
- Respiratory/cardiac arrest
- LOC

If pH <7.35 ± PaCO₂ >45mmHg
If dyspneic/ deteriorates

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.

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

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**

**Bronchodilator therapy**

If no response

- Inj. Epinephrine 0.3-0.5mg S/C OR,
- Inj. Terbutaline 0.25mg S/C every 20 min up to 3 doses

If good response

- Observe: Discharge on preventers and relievers as per need. (Assess, adjust and review response: Refer to chart below)
- Follow up

No response, refer

**Nebulization:**

- Salbutamol: Ipratropium bromide:NS (1:1:2) repeat every 15 min × 3 times
- Steroids: Inj. Hydrocortisone 200mg IV stat, then 100mg IV TDS

If no response:

- Inj. MgSO₄ 2gm in 100ml NS over 30 min.

Consider NIV

If not tolerated, consider invasive ventilation.
## Adults and adolescents 12+ years asthma management

Assess → Adjust → Review response

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

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**

<table>
<thead>
<tr>
<th>Causative organisms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
</tr>
<tr>
<td><em>Hemophilus influenzae</em></td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
</tr>
<tr>
<td><em>Chlamydia pneumoniae</em></td>
</tr>
<tr>
<td><em>Mycoplasma pneumoniae</em></td>
</tr>
<tr>
<td><em>Legionella species</em></td>
</tr>
<tr>
<td><em>Respiratory syncytial virus</em></td>
</tr>
<tr>
<td><em>Influenza A and B</em></td>
</tr>
<tr>
<td><em>Coronavirus (MERS-CoV, SARS)</em></td>
</tr>
</tbody>
</table>

**Clinical Features**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
</table>
| 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**

<table>
<thead>
<tr>
<th>Confusion</th>
<th>(No orientation to time, place and person OR, abbreviated mental test score&lt;8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>(&gt;42 mg/dl)</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>&gt;30/min</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>(SBP&lt; 90mmHg or DBP&lt; 60mmHg)</td>
</tr>
<tr>
<td>Age</td>
<td>&gt;65 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CURB 65</th>
<th>0-1</th>
<th>Outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURB 65</td>
<td>2</td>
<td>Inpatient (ward)</td>
</tr>
<tr>
<td>CURB 65</td>
<td>&gt;3</td>
<td>Inpatient (ICU)</td>
</tr>
</tbody>
</table>

**Investigations**

- CBC  
- RFT, RBS  
- ABG  
- Blood, sputum C/S  
- CXR  
- ECG
Community acquired pneumonia (CAP)

**Initial assessment + Resuscitation**

**Maintain ABC**

- **CURB 65 0-1 = MILD**
  - **Preferred** Tab. Amoxicillin 500mg PO TDS ×7 days
  - **Alternative** Tab. Azithromycin 500mg PO OD ×3 days or, Tab. Doxycycline 100mg PO BD ×7 days

- **CURB 65 2-3 = MODERATE**
  - **Preferred** Inj. Amoxicillin Clavulanic acid 1.2 gm IV TDS ×7 days or, Inj. Crystalline Penicillin 20 lakh units IV 4 hourly ×7 days
  - **Alternative** Inj. Levofloxacin 500mg IV OD × 5-7 days Inj. Doxycycline 100mg IV BD × 5 days

- **CURB 65 >3 = SEVERE**
  - **Preferred** Inj. Piperacillin–Tazobactam 4.5gm IV 6-8 hourly×5 days, + Inj. Azithromycin 500mg IV OD ×7 days Or, Inj. Cefepime 1gm IV TDS
  - **Alternative** Inj. Crystalline Penicillin 20 lakh units IV 4 hourly + Inj. Azithromycin 500mg IV OD ×7 days, or Inj. Meropenem 1gm IV BD + Inj. Azithromycin 500mg IV OD

- **Discharge**
- **Admit in ward**
- **Admit in ICU**
**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

<table>
<thead>
<tr>
<th>Age less than 65, nonsmoker and no history of antibiotics intake in the past three months</th>
<th>Age more than 65 or smoker or history of antibiotics intake in the past three months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tab. Amoxycillin 500mg PO TDS X 7 days, or Tab. Azithromycin 500mg PO OD X 5 days, or Tab. Doxycycline 100mg PO BD X 7 days</td>
<td>Tab. Amoxicillin-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</td>
</tr>
</tbody>
</table>

### For Moderate to Severe Pneumonia

<table>
<thead>
<tr>
<th>No risk or Pseudomonas or MRSA</th>
<th>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)</th>
<th>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</th>
<th>Risk of Pseudomonas and MRSA</th>
<th>If Influenza (Influenza A or B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tab. Amoxicillin-clavulanic acid 625 mg PO TDS X 7 days + Tab. Azithromycin 500mg PO OD X 5 days</td>
<td>First choice: Inj. Cefpipime 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</td>
<td>Inj. Ceftriaxone 1gm IV BD + Inj. Azithromycin 500mg IV OD + Inj. Vancomycin 1gm IV BD, or Inj. Linezolid 600mg IV BD</td>
<td>Inj. Cefepime 1gm IV TDS + Inj. Azithromycin 500mg IV OD + Inj. Vancomycin 1gm IV BD, or Inj. Linezolid 600mg IV BD</td>
<td>Tab. Oseltamivir 75mg PO OD to be started</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Factor</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered sensorium</td>
<td>- Head trauma, seizures, drug overdose, alcoholism</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>- Oesophageal strictures, neoplasms, achalasia</td>
</tr>
<tr>
<td>Others</td>
<td>- Vomiting, general debility, recumbent position</td>
</tr>
</tbody>
</table>

Clinical features

**Symptoms**
- Productive cough, SOB
- Blood stained/ fetid sputum
- Chest pain on deep inspiration
- Fever, high grade, sudden onset

**Signs**
- Tachycardia
- Tachypnea
- Signs of consolidation

Investigations:
- CBC
- RFT, RBG
- Sputum profile
- CXR
- Blood C/S
Aspiration Pneumonia

Initial Assessment + Resuscitation

Maintain ABC

Reassess

Admit

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

Discharge

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

<table>
<thead>
<tr>
<th>Closed</th>
<th>Open</th>
<th>Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication between lung and pleura seals as lung collapses.</td>
<td>Communication between pleural space and bronchus doesn't close (bronchopleural fistula)</td>
<td>Communication between lung and pleura persists. Acts as a one-way valve. Important emergency condition.</td>
</tr>
</tbody>
</table>

Clinical Features

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden onset shortness of breath</td>
<td>Tachypnea, tachycardia</td>
</tr>
<tr>
<td>Pleuritic chest pain</td>
<td>Decreased movement of affected side</td>
</tr>
<tr>
<td>Fever, cough</td>
<td>Decreased vocal resonance</td>
</tr>
<tr>
<td>H/O underlying disease</td>
<td>Decreased/ absent breath sounds over affected side.</td>
</tr>
</tbody>
</table>
| H/O trauma to chest | 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**

1. Initial assessment + Resuscitation

2. Needle Decompression if signs of tension pneumothorax

   - Maintain ABC
     - A: Secure airway
     - B: Oxygen inhalation
     - C: IV access
     - Manage Shock

   - Insert large bore cannula in 2nd ICS at mid clavicular line

3. If Not, Chest X-ray Continue Oxygen

4. Patient stable AND Rim of air <2cm in CXR
   - Continue oxygen
   - Observe for 24-48 hours
   - Repeat CXR

5. Patient unstable AND/OR Rim of air ≥2cm in CXR
   - Chest tube drainage

   - If no lung expansion, symptoms persist or worsen, refer

6. If improvement
   - Discharge

7. CTVS consultation
   - Thoracotomy
   - VATS
Hemoptysis
Hemoptysis is the coughing up of blood from the respiratory tract. Massive hemoptysis is defined as coughing up of:

- $\geq 500 \text{ml} \text{ of blood over 24 hrs. or,}$
- $\geq 100 \text{ml} \text{ per hour}$

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
**STANDARD TREATMENT PROTOCOL OF EMERGENCY HEALTH SERVICE PACKAGE**

---

**Hemoptysis**

1. **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

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortness of breath</td>
<td>Sinus tachycardia</td>
</tr>
<tr>
<td>Central chest pain</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Cough</td>
<td>Increased JVP</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>Peripheral oedema</td>
</tr>
<tr>
<td>Syncope</td>
<td>Cyanosis</td>
</tr>
<tr>
<td>Symptoms of deep vein thrombosis</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical symptoms of DVT (leg swelling, pain with palpitation)</td>
<td>3</td>
</tr>
<tr>
<td>Other diagnosis less likely than pulmonary embolism</td>
<td>3</td>
</tr>
<tr>
<td>Heart rate &gt;100</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilization (≥3 days) or surgery in the previous 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Malignancy</td>
<td>1</td>
</tr>
<tr>
<td>Probability</td>
<td>Score</td>
</tr>
<tr>
<td>PE likely</td>
<td>&gt;4</td>
</tr>
<tr>
<td>PE unlikely</td>
<td>≤4</td>
</tr>
</tbody>
</table>
Acute Pulmonary Embolism

Initial assessment + Resuscitation

Reassess

Hemodynamically stable
Start/Refer

Hemodynamically unstable
Start/Refer

Anticoagulant therapy

Heparin
Inj. Heparin 5000 units IV bolus, then 1000 units/hr.
Repeat APTT 4 hourly
And titrate dose, OR,

Low molecular weight heparin (LMWH)
Inj. Enoxaparin 1mg/kg
S/C 12 hourly

Thrombolytic therapy

Streptokinese
Inj. STK 250,000 units in 100ml NS IV over 30 minutes, then
100,000 units/hour infusion for 24-48 hours

Note: Thrombolytic therapy started only if no contraindication

Maintain ABC
A: secure airway
B: oxygen therapy
Target >95% SpO₂
C: IV access
Watch for fluid overload

Pain management
Inj. Pethidine 50mg
IV stat
Inj. Promethazine (Phenergan) 25mg
IV stat

Refer
Admission for intensive care
Surgical intervention (if needed)
- Embolectomy
- IVC filter
**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)

**Resuscitation**
- Maintain ABC
  - A: secure airway
  - B: oxygen supplementation
  - Target SpO\textsubscript{2} > 90%
  - C: IV access

**Descent**
Evacuate to lower altitude (2000-3000 feet descent)
If not, decompress the patient in portable hyperbaric oxygen chamber (Gamow bag)

**Medication**
- Tab. Nifedipine 10-20 mg
  - S/L stat, then 6 hourly
- Maintain SBP > 90mm Hg

**Reassess**
- Refer if no improvement
- Discharge if improves after 24-48 hours observation
**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)

- **Resuscitation**
  - Maintain ABC
    - A: secure airway
    - B: oxygen
    - C: IV access
    - D: GCS
    - If patient comatose, use assisted ventilation
    - DO NOT HYPERVENTILATE

- **Descent**
  - Evacuate to lower altitude
  - Gamow bag

- **Medication**
  - Inj. Dexamethasone 8 mg IV stat,
    Then 4 mg 6 hourly
    (Switch to oral if patient can tolerate orally)
  - If raised ICP,
    Inj. 20% Mannitol 100 ml IV over 30 minutes.

- **Refer**
  - Admission for intensive monitoring
Acute Respiratory Failure

Inadequate gas exchange in the lungs causing fall of $\text{PaO}_2 < 60\text{mm Hg}$ resulting in tissue hypoxia. Diagnosis can be done following arterial blood gas analysis.

### Classification

<table>
<thead>
<tr>
<th></th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypoxemia with normal $\text{PaCO}_2$</td>
<td>Hypoxemia and hypercapnia ($\text{PaCO}_2$ high)</td>
</tr>
<tr>
<td></td>
<td>Acute hypoxic respiratory failure</td>
<td>Ventilatory failure</td>
</tr>
<tr>
<td>Causes</td>
<td>Severe pneumonia</td>
<td>AE of COPD</td>
</tr>
<tr>
<td></td>
<td>Acute severe asthma</td>
<td>Drugs: sedatives, narcotic overdose</td>
</tr>
<tr>
<td></td>
<td>Acute pneumothorax</td>
<td>Brainstem lesions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GBS, myasthenia gravis</td>
</tr>
<tr>
<td>Clinical features</td>
<td>Severe dyspnea</td>
<td>Dyspnoea</td>
</tr>
<tr>
<td></td>
<td>Tachypnea</td>
<td>Tachypnea</td>
</tr>
<tr>
<td></td>
<td>Cyanosis</td>
<td>Cyanosis</td>
</tr>
<tr>
<td></td>
<td>Wheezes, crepitations</td>
<td>Signs of $\text{CO}_2$ retention: bounding pulse, flapping tremor, warm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>peripheries</td>
</tr>
<tr>
<td>Investigations</td>
<td>CXR, ECG</td>
<td>CXR, ECG</td>
</tr>
<tr>
<td></td>
<td>ABG: $\text{PaO}_2 &lt; 60\text{mm Hg}$</td>
<td>ABG: $\text{PaO}_2 &lt; 60\text{mm Hg}$</td>
</tr>
<tr>
<td></td>
<td>$\text{PaCO}_2$ normal</td>
<td>$\text{PaCO}_2 &gt; 50\text{mm Hg}$</td>
</tr>
<tr>
<td>Management</td>
<td>Oxygen therapy to achieve adequate oxygen saturations.</td>
<td>Oxygen therapy (controlled)</td>
</tr>
<tr>
<td></td>
<td>(High concentration oxygen via face mask and titer to maintain oxygen</td>
<td>Ventilatory support:</td>
</tr>
<tr>
<td></td>
<td>saturation more than 94%)</td>
<td>NIV (Non-invasive ventilation) or,</td>
</tr>
<tr>
<td></td>
<td>Treat underlying causes</td>
<td>Mechanical ventilation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treat underlying causes</td>
</tr>
</tbody>
</table>
Acute Respiratory Distress Syndrome (ARDS)

**ARDS Berlin Definition**

<table>
<thead>
<tr>
<th>Timing</th>
<th>Within 1 week of known clinical insult or new or worsening respiratory symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest imaging</td>
<td>Bilateral opacities – not fully explained by effusions, lobar/lung collapse, or nodules</td>
</tr>
<tr>
<td>Origin of edema</td>
<td>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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oxygenation</th>
<th>Multiplied by each other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>$200 \text{ mm Hg} &lt; \frac{\text{PaO}_2}{\text{FiO}_2} \leq 300 \text{ mm Hg}$ with PEEP or CPAP $\geq 5 \text{cm H2O}$</td>
</tr>
<tr>
<td>Moderate</td>
<td>$100 \text{ mm Hg} &lt; \frac{\text{PaO}_2}{\text{FiO}_2} \leq 200 \text{ mm Hg}$ with PEEP $\geq 5 \text{cm H2O}$</td>
</tr>
<tr>
<td>Severe</td>
<td>$\text{PaO}_2/\text{FiO}_2 \leq 100 \text{ mm Hg}$ with PEEP $\geq 5 \text{cm H2O}$</td>
</tr>
</tbody>
</table>

**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 FiO₂ (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.
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**

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

**Difference between cardiac and non-cardiac chest pain**

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

**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

<table>
<thead>
<tr>
<th>Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstable Angina (UA)</td>
</tr>
<tr>
<td>Non-ST segment elevation</td>
</tr>
<tr>
<td>Myocardial infarction (NSTEMI)</td>
</tr>
<tr>
<td>ST elevation MI (STEMI)</td>
</tr>
</tbody>
</table>

Clinical features

- **UA**
  - Symptoms
  - ±ECG changes
  - Cardiac enzymes normal

- **NSTEMI**
  - Symptoms
  - + ECG changes
  - + Elevated cardiac enzymes

- **STEMI**
  - Symptoms
  - ECG: ST elevation
  - Elevated cardiac enzymes
Unstable Angina/ NSTEMI
- Often described together as NSTE- ACS
- May be indistinguishable at initial evaluation.

Clinical Features

<table>
<thead>
<tr>
<th>Chest Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Retrosternal</td>
</tr>
<tr>
<td>- Radiation to neck, jaw, left shoulder</td>
</tr>
<tr>
<td>- Described as heaviness or feeling of tight band</td>
</tr>
<tr>
<td>- Lasts for &gt; 20 minutes</td>
</tr>
<tr>
<td>- Not relieved by rest or nitroglycerine</td>
</tr>
<tr>
<td>- Precipitating factors: Exertion, large meal, cold, sexual intercourse</td>
</tr>
<tr>
<td>- Associated factors: Nausea, vomiting, profuse sweating, desire to urinate/ defecate</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>CK- MB</th>
<th>Troponin</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>Raised</td>
<td>Raised</td>
</tr>
</tbody>
</table>

3) Echocardiogram
   RWMA (Regional Wall Motion Abnormality)
Risk Stratification: (TIMI Score)

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0-2</td>
</tr>
<tr>
<td>Intermediate</td>
<td>3-4</td>
</tr>
<tr>
<td>High</td>
<td>5-7</td>
</tr>
</tbody>
</table>

Management

1) Maintain ABC
2) Administer oxygen to maintain \( \text{SpO}_2 > 90\% \)
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

<table>
<thead>
<tr>
<th>Size of infarct</th>
<th>Changes in Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Anteroseptal</td>
<td>V1 - V3</td>
</tr>
<tr>
<td>2) Anterolateral</td>
<td>I, aVL, V4-V6</td>
</tr>
<tr>
<td>3) Extensive anterior wall</td>
<td>V2-V5</td>
</tr>
<tr>
<td>4) Lateral wall</td>
<td>I, II, aVL</td>
</tr>
<tr>
<td>5) Inferior wall</td>
<td>II, III, aVF</td>
</tr>
<tr>
<td>6) Posterior wall</td>
<td>Tall R in V1-V2, ST elevation in V7-V9</td>
</tr>
<tr>
<td>7) Right Ventricle</td>
<td>V4R, V3R-V6R</td>
</tr>
</tbody>
</table>
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 SpO₂ > 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
   o LMWH (Low Molecular Weight Heparin)
      Inj. Enoxaparin 40 mg SC stat and 12 hourly X 5-7 days OR
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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

<table>
<thead>
<tr>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Delay of &gt;120 min from first medical contact (FMC) to Primary PCI</td>
</tr>
<tr>
<td>• Ischemic symptoms &lt; 12 hours</td>
</tr>
<tr>
<td>• PCI facility not available (consider it as option)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inj. Streptokinase 1.5 million units in 100 ml NS IV over 60 minutes</td>
</tr>
<tr>
<td>• Adverse effects: Anaphylactic reaction</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Arrhythmias</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute</strong></td>
</tr>
<tr>
<td>• Prior intracranial hemorrhage</td>
</tr>
<tr>
<td>• Surgery within 2 months</td>
</tr>
<tr>
<td>• Prior streptokinase use within 6 months</td>
</tr>
<tr>
<td>• Suspected aortic dissection</td>
</tr>
<tr>
<td>• Known cerebral vascular lesion</td>
</tr>
<tr>
<td>• Severe uncontrolled hypertension</td>
</tr>
<tr>
<td><strong>Relative</strong></td>
</tr>
<tr>
<td>• Hypertension on presentation (&gt;180/110 mm Hg)</td>
</tr>
<tr>
<td>• History of ischemic shock &gt; 3 months</td>
</tr>
<tr>
<td>• CPR &gt; 10 minutes</td>
</tr>
<tr>
<td>• Major surgery &lt; 3 weeks</td>
</tr>
<tr>
<td>• Pregnancy</td>
</tr>
<tr>
<td>• Oral anticoagulant therapy</td>
</tr>
</tbody>
</table>
Cardiac Arrhythmias
Tachyarrhythmia

Wide Complex
QRS Complex > 120 ms

- Regular
  - Monomorphic VT
  - AVRT or AVNRT with aberrancy
  - Antidromic AVRT

- Irregular
  - VF
  - Polymorphic VT (Torsades)
  - AF with BBB

Narrow complex
QRS Complex < 120 ms

- Regular
  - AVNRT
  - AVRT (WPW syndrome)

- Irregular

VT: Ventricular Tachycardia
AVRT: Atrioventricular re-entry tachycardia
AVNRT: 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 CHA₂DS₂-VASc are used for this purpose.

**CHA₂DS₂-VASc Score**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Congestive Heart Failure</td>
<td>1</td>
</tr>
<tr>
<td>2. Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>3. Age ≥ 75 years</td>
<td>2</td>
</tr>
<tr>
<td>4. Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>5. Stroke/ TIA/ Thromboembolism</td>
<td>2</td>
</tr>
<tr>
<td>6. Vascular disease (prior MI, PAD)</td>
<td>1</td>
</tr>
<tr>
<td>7. Age 65-74 years</td>
<td>1</td>
</tr>
<tr>
<td>8. Sex (female)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Maximum Score</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Risk</th>
<th>Anticoagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Male) Or 1 (Female)</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>1 (Male)</td>
<td>Moderate</td>
<td>None or Oral anticoagulant (as per clinical judgement) Tab. Warfarin 5 mg OD (target INR 2-3)</td>
</tr>
<tr>
<td>≥ 2</td>
<td>High</td>
<td>Oral anticoagulant Tab. Warfarin 5 mg OD (target INR 2-3)</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Sustained VT</th>
<th>Non- sustained VT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lasting ≥ 30 sec</td>
<td>Lasting &lt; 30 sec</td>
</tr>
<tr>
<td>Terminated by cardioversion or pacing before that time</td>
<td>Terminating spontaneously</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Monomorphic</th>
<th>Polymorphic with long QT (Torsades de pointes)</th>
</tr>
</thead>
</table>
| 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. MgSO₄: 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**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>Orthostatic hypotension</td>
</tr>
<tr>
<td>Palpitations</td>
<td>Diaphoresis</td>
</tr>
<tr>
<td>Light headedness</td>
<td>Pulmonary congestion</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Embolic events (stroke)</td>
</tr>
<tr>
<td>Syncope</td>
<td></td>
</tr>
</tbody>
</table>

**Types of Bradyarrhythmias**

<table>
<thead>
<tr>
<th>Types</th>
<th>Rhythm</th>
<th>P wave</th>
<th>PR interval</th>
<th>QRS Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus bradycardia</td>
<td>Regular</td>
<td>Precedes QRS, Identical</td>
<td>120-200 ms (5 small squares)</td>
<td>&lt;120 ms</td>
</tr>
<tr>
<td>First Degree AV block</td>
<td>Regular</td>
<td>Precedes QRS identical</td>
<td>&gt;200 ms</td>
<td>&lt;120 ms</td>
</tr>
<tr>
<td>Wenkebach's phenomenon (Mobitz Type 1)</td>
<td>Irregular</td>
<td>Present</td>
<td>Progressive prolongation of PR culminating in a non-conducted P wave</td>
<td>Dropped repeatedly</td>
</tr>
<tr>
<td>Second Degree AV block (Mobitz Type 2)</td>
<td>Irregular</td>
<td>Present</td>
<td>Constant</td>
<td>Dropped intermittently</td>
</tr>
<tr>
<td>Third Degree AV block (Complete heart block)</td>
<td>Irregular</td>
<td>Present P-P interval regular</td>
<td>Variable</td>
<td>R-R interval regular but no relation with P wave AV dissociation</td>
</tr>
</tbody>
</table>
Management:
1. Maintain ABC
2. Pharmacological therapy
   
   **a. Atropine**
   - Drug of choice
   - Inj. Atropine 0.6 mg IV bolus
   - Repeat every 3-5 min up to 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

Immediate management
Initial assessment + resuscitation (ABC)

If Normal/High Blood pressure
- Inj. Furosemide 40 mg IV stat
- Inj. Morphine 2 mg IV stat
- Inj. GTN infusion @ 5-10 mcg/per minute started, Or Tab. GTN 0.4mg sublingual stat

If Low Blood pressure/ Cardiogenic Shock, refer or continue treatment as follows
- Inotropes:
  - Inj. Noradrenaline infusion @ 0.1mcg/kg/min (If SBP <60mmHg)
  - Inj. Dopamine infusion @ 5mcg/kg/minute
  - Inj. Dobutamine infusion @ 2.5-5 mcg/kg/minute (Can be started if SBP>80mmHg)
*Titrate as per BP
- Inj. Furosemide 40 mg IV stat

Correction of precipitating factors

Ventilatory support

Non-Invasive Ventilation
CPAP/ Bi PAP

If further deterioration

Invasive ventilation/ Refer to higher center
Cardiac Tamponade
Rapid accumulation of fluid in the pericardial cavity causing decrease in cardiac output and inability to sustain vital functions.

Clinical Features:

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortness of breath</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Cough</td>
<td>Tachypnea</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Raised JVP</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Kussmaul's sign</td>
</tr>
<tr>
<td>Chest pain</td>
<td>Decreased heart sounds</td>
</tr>
<tr>
<td>Anxiety</td>
<td></td>
</tr>
</tbody>
</table>

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 SpO₂ 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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Blood Pressure range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Blood pressure</td>
<td>&lt;120/80 mmHg</td>
</tr>
<tr>
<td>Pre Hypertension</td>
<td>(120-139)/(80-89) mmHg</td>
</tr>
<tr>
<td>Hypertension</td>
<td>(140-159)/(90-99) mmHg</td>
</tr>
<tr>
<td>Stage 1</td>
<td>≥160/100 mmHg</td>
</tr>
<tr>
<td>Stage 2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypertensive Urgency (Severe asymptomatic hypertension)</th>
<th>Hypertensive Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP ≥ 180 mmHg</td>
<td>SBP ≥ 180 mmHg</td>
</tr>
<tr>
<td>DBP ≥ 120 mmHg</td>
<td>DBP ≥ 120 mmHg</td>
</tr>
<tr>
<td>No target organ damage</td>
<td>Target organ damage- life threatening</td>
</tr>
</tbody>
</table>

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.
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
  - Pupil size and reaction to light
  - Brainstem reflexes
  - 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
Coma/ Unconscious patient

Initial assessment and resuscitation

Evaluation of Coma
- Loss of consciousness
- Brainstem reflexes: vestibulo-oculocephalic, corneal, gag reflexes
- Motor responses

Investigations

If etiology not identifiable immediately:
CT- Head

Symptomatic Management

Disposition

Refer:
- Neurosurgical consultation
- ICU monitoring
- Surgical intervention

A: Clear Airway
- Protect C-spine
- Guedel Airway

B: Assisted ventilation/ intubation

C: Secure IV access
Start Inj. NS drip

- Serum glucose
- Electrolytes
- CBC
- ABG
- Toxicology screening

Structural causes identified

Management of underlying cause

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
Seizures

Patient with seizures

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

Resuscitation

Immediate management
Inj. Midazolam 3mg IV, or Inj. Diazepam 10mg IV, or via rectal route Repeat in 3-5 minutes if seizures persist.

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)

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

<table>
<thead>
<tr>
<th>Meningitis</th>
<th>Encephalitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation of the meninges</td>
<td>Inflammation of the brain</td>
</tr>
<tr>
<td>Fever, headache, vomiting, neck stiffness</td>
<td>Fever, altered mental status, focal deficit, seizures.</td>
</tr>
<tr>
<td></td>
<td>Abnormalities in brain function (early and common)</td>
</tr>
<tr>
<td></td>
<td>LP-usually normal.</td>
</tr>
</tbody>
</table>

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**:

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

3. **Definitive management**: Continue/modify pharmacological therapy after reviewing LP reports.

**Disposition**:
- Admission.
- Discharge after completing antibiotics dose and clinical improvement.
Meningitis

Suspicion of meningitis

Resuscitation

- 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

Evaluate for other diagnosis

Bacterial
Continue antibiotics

Viral
Stop antibiotics
Start antiviral (Acyclovir)

Fungal/TB
Start antifungal/ATT

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
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:

<table>
<thead>
<tr>
<th>Ischemic</th>
<th>Haemorrhagic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traditional Symptoms (SUDDEN)</strong></td>
<td><strong>Non-traditional Symptom (SUDDEN)</strong></td>
</tr>
<tr>
<td>Numbness or weakness of face, arm, or leg—especially unilateral</td>
<td>Impaired consciousness or syncope</td>
</tr>
<tr>
<td>Aphasia or dysarthria</td>
<td>Generalized weakness</td>
</tr>
<tr>
<td>Memory deficit or spatial orientation or perception difficulties</td>
<td>Altered mental status</td>
</tr>
<tr>
<td>Visual deficit or diplopia</td>
<td>Dysphagia</td>
</tr>
<tr>
<td>Dizziness, gait disturbance, or ataxia</td>
<td>Pain in the face, chest, arms, or legs</td>
</tr>
<tr>
<td>Sudden loss of consciousness with focal deficit</td>
<td>Falls or accidents</td>
</tr>
<tr>
<td>Headache, vomiting, seizures.</td>
<td>Hiccups, fatigue</td>
</tr>
<tr>
<td>Pontine haemorrhage- pinpoint pupil, hyperpyrexia</td>
<td>Sudden severe headache with no known cause</td>
</tr>
</tbody>
</table>

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: ABCD² Score

<table>
<thead>
<tr>
<th>ABCD² Score</th>
<th>Score of 4 or more needs admission and evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 60 years</td>
<td>=1</td>
</tr>
<tr>
<td>BP≥140/90 mmHg at initial evaluation</td>
<td>=1</td>
</tr>
<tr>
<td>Clinical features of TIA</td>
<td></td>
</tr>
<tr>
<td>o Speech disturbance with or without weakness</td>
<td>=1</td>
</tr>
<tr>
<td>o Unilateral weakness</td>
<td>=2</td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td></td>
</tr>
<tr>
<td>o 10-59 minutes</td>
<td>=1</td>
</tr>
<tr>
<td>o ≥60 minutes</td>
<td>=2</td>
</tr>
<tr>
<td>History of diabetes</td>
<td>=1</td>
</tr>
</tbody>
</table>

If ABCD² 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 ABCD² 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)

CT - head

Ischemic

Onset <4.5 hrs or eligible for reperfusion therapy

- 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

Haemorrhagic

Onset > 4.5 hrs

- Medical management
  - Tab. Aspirin 300 mg 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.

Thrombolysis (Refer if service unavailable)

- Recombinant tissue plasminogen activator (rTPA)

Control if surgery considered:
- Large bleed with midline shift
- Intraventricular extension
- Cerebellar bleed > 3 cm

- Maintain ABC
- Secure airway, clear secretions
- Oxygen
- Propped up position (if unconscious, place patient in left lateral position)
- Refer after stabilisation

Ischemic

Onset < 4.5 hrs or eligible for reperfusion therapy

- 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

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Haemorrhagic

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- Medical management
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Control 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, PaO₂<70mmHg

**Supportive management**
- Prevent bed sores
- Prevent pulmonary embolism: Inj. Heparin(UFH) 5000 units subcutaneously 12 hourly
- Physiotherapy
Guillain Barre Syndrome (GBS)

A: Maintain Airway
B: Breathing fast or decreased saturation:
   Oxygen supplementation,
   Intubation/mechanical ventilation
C: Secure IV access
   IV fluids for hypotension

Refer to higher centre:
Specific management
IV Ig
Dose: 0.4gm/kg/day for 5 days
Plasmapheresis

Supportive management:
Bed sores: Frequent positioning

Prevention of pulmonary embolism:
Inj. Enoxaparin 1mg/kg/day S/C, or
Inj. UFH 5000 Units S/C 12 hourly.

Nutrition: NG tube feeding
Physiotherapy to avoid contractures
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:

Maintain ABC

Elevate head end of bed to 30 degrees.
Loosen constricting bands around neck
Foley catheterization

Osmotic diuresis

Inj. 20% Mannitol 100 ml IV over 30 minutes and 4-6 hrly

If symptoms worsen, refer to higher centre with close monitoring and intensive care

Treat underlying cause
- Shunt
- Evacuation of hematoma

Intubation and hyperventilation
Titrate PCO₂ to <30mmHg
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.

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

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

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

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:

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

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
STANDARD TREATMENT PROTOCOL OF EMERGENCY HEALTH SERVICE PACKAGE

**Acute Gastroenteritis**

**Initial assessment and Resuscitation (ABC)**

- If patient in shock,
  - 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**
  - Continue IV fluids
  - Inj. Ciprofloxacin 200mg IV BD
  - Inj. Metronidazole 500mg IV TDS
  - Inj. Ondansetron 4mg stat/TDS

  - Improved

  - Discharge on ORS, oral antibiotics
    - Tab Ciprofloxacin 500mg BD for 5 days

- **Cholera**
  - Continue IV fluids
  - Inj. Doxycycline 200mg IV stat, or
  - Tab. Azithromycin 1gm PO stat

  - Improved

  - Discharge on ORS, oral antibiotics,
    - Tab Azithromycin 500mg PO OD for 5 days

- **Watery diarrhoea**
  - Continue IV fluids

  - Improved

  - ORS as tolerated

  - Discharge
Gastrointestinal Bleeding (GIB)

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

Common pathogens:

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

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

<table>
<thead>
<tr>
<th>Volume loss %</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>Tachycardia (&gt;100 beats/min)</td>
</tr>
<tr>
<td>&gt;15% – 30%</td>
<td>Tachycardia + postural hypotension</td>
</tr>
<tr>
<td>30%– 40%</td>
<td>Tachycardia + postural hypotension + anxiety</td>
</tr>
<tr>
<td>&gt;40%</td>
<td>Tachycardia + shock (SBP&lt;80mmHg) + confusion + oliguria</td>
</tr>
</tbody>
</table>
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

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. Octreotide 100 mcg in 100ml NS IV stat, then 50mcg/hr for 24-48 hours.
- Inj. Tranexamic acid 1gm IV stat,
- Inj. Vitamin K 10mg IV stat*3 days (if prothrombin time high)
- Fresh frozen plasma (if prothrombin time high)

If bleeding continues, refer after stabilization

Endoscopy present
- Banding of varices
- Cyanoacrylate glue

No Endoscopy
- Inj. Terlipressin 1mg IV stat/6hourly

Refer

If bleeding persists

Surgical management (TIPSS)
Immediate management
Initial assessment + resuscitation (ABC)

Maintain ABC
- Secure IV access: 2 large bore (16G) 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

Lower GI bleeding
Bright red bleeding PR
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**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Reversal of sleep wake pattern, confusion, slurred speech, slow response</td>
</tr>
<tr>
<td>II</td>
<td>Drowsy, lethargic, flapping tremor, moderate confusion</td>
</tr>
<tr>
<td>III</td>
<td>Stuporous, responds to painful stimuli, marked confusion, incoherent speech</td>
</tr>
<tr>
<td>IV</td>
<td>Comatose, unresponsive to verbal or painful stimulus</td>
</tr>
</tbody>
</table>

**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**

**Initial assessment + resuscitation**

**Specific management**

**Maintain ABC**
- A: clear airway (vomitus, secretions)
- B: Oxygen/intubation/assisted ventilation
- C: secure IV access (start IV drip)
- D: check GRBS
  Correct hypoglycemia (Inj. 25%-50% dextrose IV)
  Send blood investigations

**Coagulopathy**
- Inj. Vit. K 10mg IV × 3 days
  Consider FFP transfusion

**Spontaneous bacterial peritonitis**
- Inj. Cefotaxime 2gm IV BD

**Encephalopathy**
- Syp. Lactulose:
  30-60ml PO/NG stat or rectal enema then 30ml 8 hourly
  Target: 2-3 loose stools/day
  Adjust dose once target achieved

**Reduce dietary protein:**
Below 20gm/day

**If features of raised ICP:**
- Inj. 20% Mannitol 100ml IV over 30 min

**Monitor recovery**
- mental status
- blood glucose
- LFT
- liver size

**If no improvement, refer**
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:

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

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 IV stat, 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:**

<table>
<thead>
<tr>
<th>Interstitial edematous acute pancreatitis</th>
<th>Necrotizing acute pancreatitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute inflammation of pancreatic parenchyma + peri pancreatic tissues</td>
<td>Tissue necrosis present</td>
</tr>
<tr>
<td>No tissue necrosis</td>
<td></td>
</tr>
</tbody>
</table>

**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

Initial assessment + Resuscitation
Maintain ABC

A. Secure airway
B. Oxygen supplementation (SpO$_2>$95%)
C. IV access established
   Start fluid resuscitation if patient is in shock
   Inj. NS 500ml IV
D. Watch for hypo/hyperglycaemia
   Check GRBS
   Keep nil per oral

Specific management

Pain

Inj. Paracetamol 1gm IV stat, or
Inj. Tramadol 50 mg IV stat, or
Inj. Pethidine 50mg IV stat +
Inj. Phenergan 25mg IV stat
Reassess and repeat after 30 min.

Antibiotics in severe acute cases

Inj. Meropenem 1gm IV stat or,
Inj. Cefepime 1gm IV stat, or
Inj. Ceftazidime 2gm IV stat
Reassess

Antiemetic
Inj. Metoclopramide 10mg IV stat, OR
Inj. Ondansetron 4mg IV stat
PPI
Inj. Pantoprazole 40mg IV stat

Admission/ Refer
- Still symptomatic
- Necrotizing pancreatitis
- Biliary pancreatitis

Discharge after 24-48 hours
- Asymptomatic and tolerating oral feeds
  (Start after 24 hours NPO once pain subsides)
- No evidence of biliary tract disease
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

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

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

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Paralytic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesions after previous surgery</td>
<td>Post-operative ileus</td>
</tr>
<tr>
<td>Obstructed hernia</td>
<td>Electrolyte imbalance: hypokalemia</td>
</tr>
<tr>
<td>Intussusception</td>
<td></td>
</tr>
<tr>
<td>Volvulus</td>
<td></td>
</tr>
<tr>
<td>Gall stones</td>
<td></td>
</tr>
<tr>
<td>Round worms</td>
<td></td>
</tr>
<tr>
<td>Impacted feces</td>
<td></td>
</tr>
<tr>
<td>Tumours</td>
<td></td>
</tr>
</tbody>
</table>

Clinical Features:

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

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:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Clinical features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial phase (within 2 hours of onset)</td>
<td>Sudden severe pain abdomen, localized to epigastrium</td>
</tr>
<tr>
<td>Second phase (2-12 hrs. after onset)</td>
<td>Generalized pain abdomen. Rigidity (board like)</td>
</tr>
<tr>
<td>Third phase (&gt;12 hours after onset)</td>
<td>Pain abdomen persists, hypovolemic shock</td>
</tr>
</tbody>
</table>

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

Resuscitation

Maintain ABC
A: Secure airway
B: Oxygen supplementation
C: Secure IV access
   Fluid resuscitation
   Start Inj. NS 500 ml IV
D: GRBS
   Foley catheterization
   Nil per oral

Supportive Management

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

Antibiotics
- Fluid resuscitation if in shock
- Consider inotropic support if needed

Antiemetics
PPI

Definitive Management

Refer to surgery
Laparotomy and proceed
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

Resuscitation
Maintain ABC
Symptomatic management
1) Arrange and crossmatch blood for transfusion
   Start transfusion if active bleeding or if in shock
2) Bladder irrigation:
   Insert 3 way Foley’s catheter
   Irrigate with normal saline
3) Pain management
4) Antibiotics if evidence of infection

Surgery consultation
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.

<table>
<thead>
<tr>
<th>Causes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive</td>
<td>Benign enlargement of prostate (BEP)</td>
</tr>
<tr>
<td></td>
<td>Bladder calculi, bladder neck stenosis</td>
</tr>
<tr>
<td></td>
<td>Urethral stricture/stone, blood clot</td>
</tr>
<tr>
<td></td>
<td>Phimosis and para phimosis</td>
</tr>
<tr>
<td></td>
<td>Carcinoma bladder or prostate</td>
</tr>
<tr>
<td>Neuropathic</td>
<td>Trauma, mass lesion, stroke, diabetes, multiple sclerosis</td>
</tr>
<tr>
<td>Medications</td>
<td>Antipsychotics, antidepressants</td>
</tr>
</tbody>
</table>

**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

Initial assessment resuscitation (ABC)

Foley catheterization

If difficulty in passage of Foley catheter

Suprapubic catheterization (if severe pain or anticipated delay in urological consultation)
   Seek urological consultation

Treatment of underlying causes
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

Initial assessment resuscitation

Maintain ABC
- Secure IV access
  Inj. NS 500ml IV started

Pain management
- Inj. Paracetamol 1gm IV over 30 minutes OR
- Inj. Tramadol 50mg IV stat

Antiemetics
- Inj. Ondansetron 4mg IV stat, or
- Inj. Metoclopramide 10mg IV stat

Antibiotics
- Inj. Ceftriaxone 1gm IV stat
- Inj. Metronidazole 500mg IV stat
- Keep NPO

Disposition
Admission/ Urosurgery consultation
Emergency exploration
Para phimosis
Inability to cover or place back the glans due to retracted prepuce skin.

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

Management:

1. **Initial assessment**
   Maintain ABC

2. **Manual reduction**
   - Pain management
   - Ice pack
   - Gentle pressure for 5 minutes to reduce edema
   - Attempt manually to reduce the glans back into prepuceal fold
   *(Apply penile ring block in presence of expertise)*

3. **Refer to surgery**
   Emergency dorsal slit

If manual reduction fails
**Ectopic Pregnancy**

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

**Clinical Features:**

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

**Investigations:**

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

Classic triad of ectopic pregnancy

Resuscitation

Supportive Management

Refer after stabilization in case surgery facility not available

Definitive management
Exploratory laparotomy

A: maintain airway
B: oxygen supplementation (SpO$_2$ >95%)
C: secure IV access, send blood investigations
  - If features of shock, open 2 wide bore cannula
  - Fluid resuscitation (Inj. NS 500ml IV stat, reassess and repeat)

- Blood transfusion if bleeding active and/or Hb <7gm/dl
- Foley catheterization (Target urine output 0.5-1 ml/kg/hr)
- Pain management
  Inj. Paracetamol 1gm IV stat
Antepartum Haemorrhage

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

Clinical Features

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

**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

Resuscitation

Investigations
Blood grouping
USG abdomen

A: Maintain airway
   Keep patient in left lateral position
B: Oxygen (Keep SpO₂ >95%)
C: IV access (If bleeding or patient in shock)
   - Open 16-18G 2 wide bore cannula
   - if bleeding heavily or in shock
     o Inj. NS 1 litre IV fast, reassess and repeat
     o Foley catheterisation
   - Blood transfusion as required

Placenta previa

Abruptio placenta

Stabilize and refer

Bleeding continues, plus
   - If patient in active labour, or
   - Patient not in labour (>37 weeks)

Oxygen if required
Plan and manage delivery
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:

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

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 $\text{SpO}_2 > 94$

*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**

**If shock persists or patient deteriorates and surgical facility not available,**
Refer to higher centre after stabilization

**Discharge**
**Pregnancy Induced Hypertension (PIH)**

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

<table>
<thead>
<tr>
<th>Pre-eclampsia</th>
<th>Eclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension (≥140/90 mmHg) + Proteinuria (+2) +/- Pathological edema</td>
<td>Pre-eclampsia + Convulsions</td>
</tr>
</tbody>
</table>

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

**Steroids (if >34 weeks 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

**Severe pre-eclampsia/eclampsia**

**Resuscitation**
- Maintain airway
- Oxygen supplementation, ventilation if required
- IV access
- Left lateral position if seizures
- Foley catheterization

**Control BP (if DBP ≥ 110mmHg)**
- Inj. Labetalol 20mg IV over 2 min, repeat at 10 min interval
- Tab. Nifedipine 10mg PO stat.

**Control seizures**
**Drug of choice: Magnesium sulphate**
- 1 ampule (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:

<table>
<thead>
<tr>
<th>Fault in the passage</th>
<th>Fault in the passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bony: contracted pelvis, cephalopelvic disproportion</td>
<td>Transverse lie</td>
</tr>
<tr>
<td>Soft tissue: cervical dystocia, cervical or broad ligament fibroid</td>
<td>Brow presentation</td>
</tr>
<tr>
<td></td>
<td>Congenital malformation of fetus:</td>
</tr>
<tr>
<td></td>
<td>hydrocephalus, fetal ascites</td>
</tr>
<tr>
<td></td>
<td>Big baby</td>
</tr>
<tr>
<td></td>
<td>Compound presentation</td>
</tr>
</tbody>
</table>

Clinical Features:

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

Investigations:

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

Initial assessment + Resuscitation

Airway: secure airway
Breathing: oxygen to keep $\text{SpO}_2 > 94$
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

If shock persists or patient deteriorates and C-section facility not available, Refer to higher centre with C-section facility after stabilization

Discharge
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”

<table>
<thead>
<tr>
<th>Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
</tr>
<tr>
<td>Tissue</td>
</tr>
<tr>
<td>Traction</td>
</tr>
<tr>
<td>Thrombosis</td>
</tr>
</tbody>
</table>

Management of “tone” or atonic uterus is described in detail below.
Post Partum Haemorrhage (PPH)

Immediate management:
Initial assessment+
Resuscitation

Feel the uterus by abdominal palpation

Atonic

- Massage uterus, expel blood clots/retained placental fragments.
- Inj. Oxytocin 10 Units in 500ml NS at 40 drops/min
- Inj. Tranexamic acid 1gm IV over 10 minutes within 3 hours of birth, a second dose of 1gm IV if bleeding continues after 30 minutes.
- Blood transfusion if Hb <7gm/dl and/or haemorrhage with shock
- Tab. Misoprostol 1000mcg per rectum

Atonic

- Continue oxytocin drip
- Uterine tamponade
- Bimanual compression
- Tight intrauterine packing under anaesthesia

Surgical intervention
(Refer to higher centre after stabilization)
- Uterine artery ligation
- B-lynch suture
- Hysterectomy

- Call for extra help
- Maintain ABC
- Open 2 wide bore (16G) IV cannula
- Send investigations
- Inj. NS 1000 ml IV fast
- Foley catheter
- Monitor vitals, urine output
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

Initial assessment + Resuscitation

Symptomatic management

Mild
- Tab. Amoxicillin 500mg PO TDS X 5days
- Tab. Metronidazole 400mg PO TDS X 5days
- Tab. Paracetamol 500mg PO 6hrly until fever subsides

Moderate/ Severe
- Inj. Ampicillin 1gm IV 6hrly
- Inj. Gentamicin 2mg/kg IV loading dose then, 1.5mg/kg IV 8 hrly.
- Inj. Paracetamol 1gm IV over 15-30 minutes
- Inj. Metronidazole 500 mg IV 8 hrly

Discharge

Continue IV fluid resuscitation for shock and reassess

If shock persist or patient deteriorates, Refer to higher centre after stabilization
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
Head Injury

Traumatic brain injury

<table>
<thead>
<tr>
<th>Primary brain injury</th>
<th>Secondary brain injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the time of accident</td>
<td>Occur later after the accident</td>
</tr>
<tr>
<td>DAI (Diffuse Axonal Injury)</td>
<td>Causes</td>
</tr>
<tr>
<td>Acceleration and deceleration</td>
<td>- Hypoxia</td>
</tr>
<tr>
<td>Cerebral contusion</td>
<td>- Hypovolemia</td>
</tr>
<tr>
<td>Penetrating injury</td>
<td>- Hypoperfusion</td>
</tr>
<tr>
<td></td>
<td>- Hyperglycemia</td>
</tr>
<tr>
<td></td>
<td>- Hyperthermia</td>
</tr>
<tr>
<td></td>
<td>- Seizures</td>
</tr>
</tbody>
</table>

Assessment

A. History: Mechanism of injury.

B. Examination

1. Glasgow coma scale
   - Grades severity of head injury
   - Score out of 15
     - Severe: 8 or less
     - Moderate: 9-13
     - 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
Primary survey + Resuscitation

Maintain ABCD
A: Airway
C-spine stabilization
(Apply C-collar)
B: Oxygen therapy
(Keep $\text{SpO}_2 > 95\%$)
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

<table>
<thead>
<tr>
<th>Blunt trauma</th>
<th>Penetrating trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor vehicle accident</td>
<td>Stab injuries</td>
</tr>
<tr>
<td>Fall</td>
<td>Gun shot</td>
</tr>
<tr>
<td>Organ involved: spleen, liver, bowel</td>
<td>Organ involved: liver, colon, diaphragm</td>
</tr>
</tbody>
</table>

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

Primary survey + Resuscitation

Reassessment
If unstable, continue resuscitation

Secondary survey

Stabilization

Transfer for definitive care

Surgical intervention
Emergency exploratory laparotomy
- Shock despite resuscitation
- Peritonitis
- Bowel/bladder rupture
- Massive intra-abdominal bleed

Maintain ABCD
A: Airway
C-spine immobilization
(Apply C-collar)
B: oxygen therapy
C: secure IV access (2 wide bore cannula)
  Fluid resuscitation for shock
  Inj. RL/NS 1 liter IV started
  Reassess
D: GCS, dextrostix
  *If potentially massive bleeding,
  Consider blood transfusion,
  Apply pelvic binder,
  Immobilization

1. Log roll
2. Open injuries, laceration
   Inj. Tetanus toxoid 0.5 ml IM stat
3. Pain management
   Inj. Tramadol 50mg IV stat, or
   Inj. Morphine 2.5-5 mg IV stat, or
   Inj. Fentanyl 50mcg IV stat
4. NG tube for decompression of abdomen
   (Avoid if suspected base of skull fracture)
5. Foley catheterization
   (Avoid if blood in urethral meatus)
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

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

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

Primary Survey + Resuscitation

Reassessment

Secondary Survey + Stabilisation

Maintain ABCD
A: Airway + C-spine
B: Breathing (Oxygen supplementation)
C: IV access
Fluid resuscitation
D: GCS < 8
Consider intubation or refer

Tension Pneumothorax

Needle decompression

Chest tube insertion

Surgical intervention

Open Pneumothorax

Occlusive dressing (Taping on 3 sides)

Chest tube insertion

Refer if unstable

Flail Chest

Pain management Oxygen and REFER

Chest tube insertion

Hemothorax

IV fluids

CTVS consultation
Surgical thoracotomy if
- Initial blood loss in chest tube > 1500 ml
- Ongoing blood loss chest tube > 250 ml/hr

Refer
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**

- **Primary survey + Resuscitation**
  - Maintain ABCD
    - A: Airway + C-spine protection
    - B: oxygen therapy
    - C: IV access/ fluid resuscitation
      - Treat shock
  - PELVIC FRACTURES
    - Life threatening condition
    - Immobilization- pelvic binder
    - Fluid resuscitation
    - Inj. RL 1liter IV bolus
    - Reassess and repeat
  - D: GCS, DNVS
  - E: Exposure

- **Reassessment**

- **Secondary Survey**

- **Stabilize and transfer for definitive care**
  - 1. Log roll
  - 2. Wound management
    - Wash with NS, apply sterile pad
  - 3. Immobilization
    - Splint one joint above and below fracture
  - 4. Pain management
    - Inj. Diclofenac 75mg IM stat, or
    - Inj. Tramadol 50mg IV stat, or
    - Inj. Morphine 5 mg IV stat, or
    - Inj. Fentanyl 50mcg IV stat
  - 5. Open injuries
    - Inj. Tetanus toxoid 0.5 ml IM stat
    - Inj. Ceftriaxone 1gm IV stat or,
    - Inj. Amoxicillin –clavulanic acid 1.2 gm IV stat
    - Inj. Metronidazole 500mg IV stat
  - 6. **Foley catheter** (only if urethral injury ruled out)
**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

Primary survey + Resuscitation → Maintain ABCDE

Secondary survey

Refer for definitive care

Medical

Surgical

Pain management
Inj. Paracetamol 1gm IV stat or
Inj. Fentanyl 50mcg IV stat or
Inj. Morphine 5mg IV stat

If unstable

Urgent fasciotomy

Remove any constricting padding.
Serial measurement of limb circumference
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:

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

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* 5 days
- 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:

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

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
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

<table>
<thead>
<tr>
<th>K⁺ level</th>
<th>ECG changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5 – 6.5</td>
<td>No changes / Tall T waves</td>
</tr>
<tr>
<td>&gt;6.5</td>
<td>Tall peaked T waves</td>
</tr>
<tr>
<td>7-8</td>
<td>- Prolonged PR interval</td>
</tr>
<tr>
<td></td>
<td>- Flat P waves</td>
</tr>
<tr>
<td></td>
<td>- CHB</td>
</tr>
<tr>
<td>&gt;8</td>
<td>- Wide QRS, sine wave (merging of QRS and T wave)</td>
</tr>
<tr>
<td></td>
<td>- VF</td>
</tr>
<tr>
<td></td>
<td>- Asystole</td>
</tr>
</tbody>
</table>

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

Serum K⁺ < 5.5

If no symptoms, monitor closely for ECG changes

Treat underling disease
Stop K⁺ intake

Serum K⁺ ≥ 5.5

If no ECG changes, normal renal function and K⁺ < 6.5mEq/L, lower SLOWLY (stop the insulting drug or add diuretics)
If ECG changes present

Symptomatic ECG changes

a) Inj. 10% Calcium gluconate 10 ml IV over 10 minutes. Repeat after 10-20 minutes
b) Inj. 50% Dextrose 50 ml IV +
   8-10 units of Insulin over 10 minutes
c) Salbutamol nebulization 5mg every 15min X3 doses
d) Inj. Furosemide 40-80 mg IV stat; Repeat after 4 hrs. if BP normal
e) Potassium binding resins eg. Sodium polystyrene sulfonate (Kayexalate)
f) Sodium bicarbonate 150 mEq in 1 L of 5 percent dextrose over two to four hours

If responsive to treatment

• Monitor and discharge
• Treat underlying cause

If not responsive to treatment

• Repeat K⁺ level every 2 hours
• Close ECG monitoring

Plan for Dialysis/ Referral
Hyponatremia

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

Types

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

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

- **Depletional**
  - **Mild** - Oral correction
  - **Severe** - IV fluids
    Correct with NS over 48-72 hours

- **Euvolemic**
  - Fluid restriction (500-1000 ml/day)

- **Dilutional**
  - Fluid restriction ± Diuretics
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 \(\times\) 0.6 \(\times\) \([\text{Expected Na}^+ (135) – \text{Measured Na}^+]\)
   - 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**

<table>
<thead>
<tr>
<th>Water</th>
<th>Sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inadequate intake of water</strong></td>
<td><strong>Decreased Na(^+) excretion</strong></td>
</tr>
<tr>
<td>• Impaired thirst mechanism</td>
<td>Hyeraldosteronism</td>
</tr>
<tr>
<td>• Comatose patients</td>
<td></td>
</tr>
<tr>
<td><strong>Increased water loss</strong></td>
<td><strong>Increased sodium intake</strong></td>
</tr>
<tr>
<td>• Diarrhoea, vomiting</td>
<td>• Drugs- NaHCO(_3), penicillin</td>
</tr>
<tr>
<td>• Renal loss – Diabetes insipidus</td>
<td>• Hypertonic saline</td>
</tr>
</tbody>
</table>

**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) = \(0.6\times\)body wt. \(\times\)(((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**
  - Tremor, sweating, palpitation
- **Neuroglycopenic symptoms**
  - 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**

1. Maintain ABC

2. **Patient conscious**
   - Give oral glucose drink (25gm glucose + water 500 ml)
   - **Discharge if**
     - Symptoms resolve after 24 hours
     - Patient can tolerate orally

3. **Patient unconscious**
   - 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.

4. Recheck GRBS in 15 minutes

5. **Hypoglycemia controlled Patient conscious**
   - Give oral glucose drink
   - Reassess

6. **Hypoglycemia controlled Patient unconscious**
   - Refer after stabilization

7. **Hypoglycemia persist Patient unconscious**
   - Repeat above dose
     - Inj. Glucagon 0.5-1 mg IM/SC
     - Inj. Hydrocortisone 200mg IV stat
     - Look for underlying treatable causes

8. 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:**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyuria, thirst</td>
<td>Signs of dehydration (loss of skin turgor, dry tongue)</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Malaise, generalized weakness</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>Air hunger (Kussmaul's breathing)</td>
</tr>
<tr>
<td></td>
<td>Acetone breath</td>
</tr>
<tr>
<td></td>
<td>Confusion, drowsiness, stupor, coma</td>
</tr>
</tbody>
</table>

**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)

**Resuscitation**
Maintain ABC

**Fluid resuscitation**
- Inj. NS 1L over 30 min
- Inj. NS 1L over 1 hour
- Inj. NS 1L over 2 hours
- Inj. NS 1L over 4 hours
- Inj. NS 1L 4 hourly until rehydration achieved

Watch for fluid overload

**Insulin therapy**
- Inj. Regular insulin infusion @ 6 units/hour (0.1 unit/kg/hour)
  - Aim to reduce blood glucose by 50 mg/dl/hr
- If not, increase insulin infusion by 2 units/hr

When blood glucose 250 mg/dl:
- Decrease insulin to 1-4 units/hr
- Change infusion to 5% dextrose

**K+ replacement**
- If >5.5: no KCl
- If 3.5-5.5: 20 mEq/L
- If <3.5: 40 mEq/L

Check blood glucose hourly

If not, increase insulin infusion by 2 units/hr

Check blood glucose hourly

**Improvement:**
- Blood glucose kept at 180-250mg/dl
- Ketoadidosis resolved
- Tolerating oral fluids

- Change to SC insulin
- Control infection
- Nutritional supplement

*Monitor:
- Blood glucose hourly
- K+ 2 hourly
- Urine output
- Neurological status
- ECG

Disposition
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.
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:
  - Tab. Paracetamol 500mg PO stat and QID, or
  - Tab Ibuprofen 400mg PO stat and TDS
- Refer immediately if FB in cornea or conjunctiva (Start Ciprofloxacin eye drops)

Sudden loss of vision

<table>
<thead>
<tr>
<th>Sudden painless LOV</th>
<th>Sudden painful LOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central retinal artery occlusion</td>
<td>Acute congestive glaucoma</td>
</tr>
<tr>
<td>Central retinal vein occlusion</td>
<td>Acute iridocyclitis</td>
</tr>
<tr>
<td>Vitreous hemorrhage</td>
<td>Chemical injuries to eye ball</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>Mechanical injuries to eye ball</td>
</tr>
</tbody>
</table>
Chemical Injuries

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

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

Management

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

Disposition:

- Referral for specialist consultation
Ocular Acid/Alkali burns

First Aid

- Irrigation with NS/RL till normal pH is attained
- (Use clean water if NS not available)

Mechanical removal of contaminants

- Evert eyelid
- Swipe eyelids, fornices gently with cotton swab

Topical antibiotics

- Chloramphenicol
- Ciprofloxacin

Eye Drops

Referral

- For specialist consultation
- Treatment of complications
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

- Chemical cauterization
  Silver nitrate sticks

- Bleeding stops
- Discharge (Removal of pack after 24-48 hours)

No

- Anterior nasal packing*

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)

Ear
- Cotton bud
- Pea
- Matchstick
- Live insects

• Fullness
• Pain
• Hearing loss
• Tinnitus

Nose
- Pea, corn
- Paper
- Leech

• Unilateral foul smelling discharge
• Blocked nostril ± Epistaxis

Throat
- Coin
- Chicken, fish bone
- Dentures

• 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

- 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

- 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

- GA
- Endoscopy
- Bronchoscopy

No improvement

Referral to higher centre
**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):**

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Superficial burn (1st degree burn)</th>
<th>Partial thickness burn (2nd degree burn)</th>
<th>Full thickness burn (3rd degree burn)</th>
<th>4th degree burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>Epidermis</td>
<td>Epidermis, Superficial dermis</td>
<td>Epidermis, Deep dermis</td>
<td>Epidermis bone, fat, muscle</td>
</tr>
<tr>
<td>Appearance</td>
<td>No blister</td>
<td>Blister</td>
<td>Blister</td>
<td>Charred, pale or white with exposed bone or muscle tissue</td>
</tr>
<tr>
<td>Sensation</td>
<td>Painful</td>
<td>Very painful</td>
<td>Very painful</td>
<td>No pain</td>
</tr>
<tr>
<td>Healing</td>
<td>7-10 days</td>
<td>10-21 days</td>
<td>2-6 weeks</td>
<td>Months Requires multiple surgeries</td>
</tr>
</tbody>
</table>
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
     - Increased respiratory rate
     - 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

Resuscitation
Initial assessment

Supportive Management

Pain management
- Inj. Morphine
- Inj. PCM
- Inj. Fentanyl
- Anxiolytics

Wound Management
- Inj. Tetanus 0.5ml IM stat
- SSD /Sterile dressing
- Debridement
- Antibiotics (if needed)
  Inj. Cloxacillin 500mg IV stat /QID

Adjuncts
- Foley catheter
- NG tube for burns > 20%

Minor Burns
- Provide analgesics
- Clean with water
- Apply topical antimicrobials
- Follow up in two days

Disposition

Discharge

Admission Criteria
- 10-15% burn in children
- > 20% burn in adult
- Face, hand, feet, genitalia, major joints involved
- Suspected inhalational injury
- Burns in extreme age group

Airway
- Facial swelling
- Inhalational injury suspected

Breathing
- Watch for increased RR, decreased SpO₂
- Supplemental O₂
- Assisted ventilation

Circulation
- Two 16G or 18G peripheral IV lines in unburnt skin.
- Rule of Nine


**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:**

<table>
<thead>
<tr>
<th>Skin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutaneous burns at the site of entry of circuit</td>
</tr>
<tr>
<td>Exit wound is larger than the entry wound.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardiac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrhythmias (most common: Ventricular Fibrillation)</td>
</tr>
<tr>
<td>Cardiac arrest</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neurological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seizure, coma</td>
</tr>
<tr>
<td>Transient paralysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Renal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Renal Failure</td>
</tr>
<tr>
<td>Rhabdomyolysis</td>
</tr>
<tr>
<td>Myoglobinuria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated fractures</td>
</tr>
<tr>
<td>Spinal cord injuries</td>
</tr>
</tbody>
</table>

**Investigation:**

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

**Management**

- Scene and Pre-hospital care
- Resuscitation: ABC
- Supportive management
**Electrical/ Lightening injuries**

**Scene and pre-hospital care**
- Turn off the source of electricity
- Do not touch or pull patient without severing the source of current
- Wear insulated shoes /gloves

**Resuscitation**
- maintain airway
- spinal immobilization

**Supportive treatment**
- Airway:
  - Monitor respiratory rate and SpO₂
  - Supplemental oxygen
- Breathing:
  - Fluid resuscitation: Start with Inj. RL and titrate as per need.
  - Keep urine output 2 ml/kg/hr in high voltage electric burn
- Circulation:
  - Treat cardiac arrhythmias
  - DC shocks if ventricular fibrillation
  - Start CPR if cardiac arrest

**Disposition**

**Admission / refer to higher centres**
- Cardiac arrhythmias
- Renal failure, myoglobinuria
- Altered sensorium
- Deep/ full thickness burns

**Discharge (after 12 hrs observation)**
- Asymptomatic patients
- Minor low voltage burns
- Normal ECG
- No myoglobinuria
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)

<table>
<thead>
<tr>
<th>BAC (mg/dl)</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>Sense of well-being and warmth</td>
</tr>
<tr>
<td>25-50</td>
<td>Euphoria, talkativeness,</td>
</tr>
<tr>
<td>50-100</td>
<td>Incoordination, impaired judgement, decreased reaction time.</td>
</tr>
<tr>
<td>100-150</td>
<td>Ataxia/gait imbalance, slurred speech, nystagmus</td>
</tr>
<tr>
<td>150-250</td>
<td>Lethargy, amnesia, dysarthria, hypothermia</td>
</tr>
<tr>
<td>&gt;250</td>
<td>Coma</td>
</tr>
<tr>
<td>&gt;400</td>
<td>Respiratory depression, loss of protective reflexes, death.</td>
</tr>
</tbody>
</table>
**Alcohol intoxication**

**Resuscitation and initial management**

If patient agitated, provide sedation
- Inj. Lorazepam 2mg IV stat, OR
- Inj. Diazepam 5mg IV stat
- Inj. Haloperidol 5mg IV stat

If symptoms subside and patient conscious
Discharge on oral medications
- Tab. Lorazepam 2mg PO 8 hourly
- Tab. Thiamine 200mg PO once daily

Follow up in psychiatry OPD in 3 days

If symptoms persist/worsen
- Plan referral after stabilization

**A: Secure airway**
- Remove vomitus, secretions
- Prevent aspiration-left lateral position
- If C-spine injury suspected, apply C-collar.

**B: Oxygen** (to keep SpO₂ >95%)
- intubation/ventilation if respiratory depression

**C: IV access**
- Inj. Thiamine 200mg IV stat/TDS
- Inj. Dextrose drip/NS

**D: check GRBS**
- Inj. Thiamine 200mg IV stat/TDS
- Inj. Dextrose drip/NS

**E: watch for hypothermia**
- Warm the patient
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

<table>
<thead>
<tr>
<th>Uncomplicated withdrawal</th>
<th>Withdrawal seizures</th>
<th>Delirium tremens</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Insomnia</td>
<td>- GCTS (generalized tonic clonic seizures) Occur within 12-48 hours after last drink.</td>
<td>- Hallucinations (auditory and tactile)</td>
</tr>
<tr>
<td>- Mild anxiety</td>
<td></td>
<td>- Agitation</td>
</tr>
<tr>
<td>- Tremulousness</td>
<td></td>
<td>- Diaphoresis</td>
</tr>
<tr>
<td>- GI upset</td>
<td></td>
<td>- Tachycardia</td>
</tr>
<tr>
<td>- Anorexia</td>
<td></td>
<td>- Hypertension</td>
</tr>
<tr>
<td>- Headache</td>
<td></td>
<td>- Occur within 24-48 hours after last drink.</td>
</tr>
<tr>
<td>- Diaphoresis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Palpitation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Investigations:

- CBC, RFT, LFT
- ECG
- CXR
Alcohol Withdrawal Syndrome

**Resuscitation**
Maintain ABC

**Uncomplicated withdrawal (CIWA Ar: 8-15)**

- 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

**Withdrawal seizures**

- 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.

**Delirium tremens**

**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)

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nausea and Vomiting</strong></td>
<td></td>
</tr>
<tr>
<td>No nausea or vomiting</td>
<td>0</td>
</tr>
<tr>
<td>Intermittent nausea with dry heaves</td>
<td>4</td>
</tr>
<tr>
<td>Constant nausea, frequent dry heaves and vomiting</td>
<td>7</td>
</tr>
<tr>
<td><strong>Paroxysmal Sweats</strong></td>
<td></td>
</tr>
<tr>
<td>No sweats visible</td>
<td>0</td>
</tr>
<tr>
<td>Barely perceptible sweating, palms moist</td>
<td>1</td>
</tr>
<tr>
<td>Beads of sweat obvious on forehead</td>
<td>4</td>
</tr>
<tr>
<td>Drenching sweats</td>
<td>7</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td></td>
</tr>
<tr>
<td>No anxiety, at ease</td>
<td>0</td>
</tr>
<tr>
<td>Moderately anxious, guarded</td>
<td>4</td>
</tr>
<tr>
<td>Acute panic state, consistent with severe delirium or acute schizophrenia</td>
<td>7</td>
</tr>
<tr>
<td><strong>Agitation</strong></td>
<td></td>
</tr>
<tr>
<td>Normal activity</td>
<td>0</td>
</tr>
<tr>
<td>Somewhat more than normal activity</td>
<td>1</td>
</tr>
<tr>
<td>Moderately fidgety and restless</td>
<td>4</td>
</tr>
<tr>
<td>Paces back and forth during most of the interview or constantly thrashes about</td>
<td>7</td>
</tr>
<tr>
<td><strong>Tremor</strong></td>
<td></td>
</tr>
<tr>
<td>No tremor</td>
<td>0</td>
</tr>
<tr>
<td>Not visible, but can be felt at fingertips</td>
<td>1</td>
</tr>
<tr>
<td>Moderate when patient's hands extended</td>
<td>4</td>
</tr>
<tr>
<td>Severe, even with arms not extended</td>
<td>7</td>
</tr>
<tr>
<td><strong>Headache</strong></td>
<td></td>
</tr>
<tr>
<td>Not present</td>
<td>0</td>
</tr>
<tr>
<td>Very mild</td>
<td>1</td>
</tr>
<tr>
<td>Mild</td>
<td>2</td>
</tr>
<tr>
<td>Clinical Features</td>
<td>Score</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
</tr>
<tr>
<td>Moderately severe</td>
<td>4</td>
</tr>
<tr>
<td>Severe</td>
<td>5</td>
</tr>
<tr>
<td>Very Severe</td>
<td>6</td>
</tr>
<tr>
<td>Extremely severe</td>
<td>7</td>
</tr>
</tbody>
</table>

### Auditory disturbances

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not present</td>
<td>0</td>
</tr>
<tr>
<td>Very mild harshness or ability to frighten</td>
<td>1</td>
</tr>
<tr>
<td>Mild harshness or ability to frighten</td>
<td>2</td>
</tr>
<tr>
<td>Moderate harshness or ability to frighten</td>
<td>3</td>
</tr>
<tr>
<td>Moderately severe hallucinations</td>
<td>4</td>
</tr>
<tr>
<td>Severe hallucinations</td>
<td>5</td>
</tr>
<tr>
<td>Extremely severe hallucinations</td>
<td>6</td>
</tr>
<tr>
<td>Continuous hallucinations</td>
<td>7</td>
</tr>
</tbody>
</table>

### Visual Disturbances

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not present</td>
<td>0</td>
</tr>
<tr>
<td>Very mild photosensitivity</td>
<td>1</td>
</tr>
<tr>
<td>Mild photosensitivity</td>
<td>2</td>
</tr>
<tr>
<td>Moderate photosensitivity</td>
<td>3</td>
</tr>
<tr>
<td>Moderately severe visual hallucinations</td>
<td>4</td>
</tr>
<tr>
<td>Severe visual hallucinations</td>
<td>5</td>
</tr>
<tr>
<td>Extremely severe visual hallucinations</td>
<td>6</td>
</tr>
<tr>
<td>Continuous visual hallucinations</td>
<td>7</td>
</tr>
</tbody>
</table>

### Tactile Disturbances

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Very mild paresthesias</td>
<td>1</td>
</tr>
<tr>
<td>Mild paresthesias</td>
<td>2</td>
</tr>
<tr>
<td>Clinical Features</td>
<td>Score</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Moderate paresthesias</td>
<td>3</td>
</tr>
<tr>
<td>Moderately severe hallucinations</td>
<td>4</td>
</tr>
<tr>
<td>Severe hallucinations</td>
<td>5</td>
</tr>
<tr>
<td>Extremely severe hallucinations</td>
<td>6</td>
</tr>
<tr>
<td>Continuous hallucinations</td>
<td>7</td>
</tr>
<tr>
<td>Orientation and clouding of sensorium</td>
<td></td>
</tr>
<tr>
<td>Oriented and can do serial additions</td>
<td>0</td>
</tr>
<tr>
<td>Cannot do serial additions</td>
<td>1</td>
</tr>
<tr>
<td>Disoriented for date by no more than 2 calendar days</td>
<td>2</td>
</tr>
<tr>
<td>Disoriented for date by more than 2 calendar days</td>
<td>3</td>
</tr>
<tr>
<td>Disoriented for place and/or patient</td>
<td>4</td>
</tr>
</tbody>
</table>

**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

Initial management and resuscitation if needed
Maintain ABC

If patient stable

If daily activities not impaired

Psychological management
- Physical exercise
- Relaxation techniques
- Consult/ follow up

If daily activities impaired

Psychological management
- Physical exercise
- Relaxation techniques
- Consult/ follow up

Pharmacological management
- Tab. Escitalopram 5 mg HS for 5 days then 10mg HS for 10 days, then follow-up at OPD or psychiatrist. (Preferable choice) or,
- Tab. Fluoxetine 10 mg PO OD * 6 weeks

If no improvement, consult psychiatrist to increase dose further.

Anxiolytics
- Tab. Diazepam 5mg-10mg PO HS.
  Taper and stop within 2 weeks.
- Refer if :
  o unresponsive to treatment
  o organic cause
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:

<table>
<thead>
<tr>
<th>Core symptoms</th>
<th>Other symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Depressed mood</td>
<td>• Feeling of worthlessness</td>
</tr>
<tr>
<td>• Loss of interest in previously pleasurable activities</td>
<td>• Feeling of guilt</td>
</tr>
<tr>
<td>• Easy fatigability (&gt;2 weeks)</td>
<td>• Decreased concentration, attention</td>
</tr>
<tr>
<td></td>
<td>• Decreased sleep</td>
</tr>
<tr>
<td></td>
<td>• Decreased appetite</td>
</tr>
<tr>
<td></td>
<td>• Low self esteem</td>
</tr>
<tr>
<td></td>
<td>• Suicidal ideation /attempts</td>
</tr>
</tbody>
</table>

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

Initial management and resuscitation if needed

Maintain ABC

If patient stable

If daily activities not impaired

Psychological management

• Physical exercise
• Relaxation techniques
• Consult/ follow up

If daily activities impaired

Pharmacological management

Drug of choice

• Tab. Escitalopram 5mg HS for 5 days then 10mg HS for 10 days, then follow-up at OPD or psychiatrist. (Preferable choice) or,
• Tab. Fluoxetine 10 mg PO OD * 6 weeks

If no improvement, consult psychiatrist to increase dose further.
• Consult psychiatrist to increase dose further.

If insomnia or severe restlessness

• Tab. Diazepam 5mg-10mg PO HS. Taper and stop within 2 weeks
• Refer if:
  - unresponsive to treatment
  - organic cause
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

Initial management & resuscitation if needed

Psychosocial management
Reassure patient/ patient’s family

Pharmacological management
- Tab. Risperidone 1mg PO HS, then, increase to 1mg PO BD after 2 days.
- Maximum upto 2mg PO BD
- Refer if no improvement after 4 weeks.

For acutely agitated patients:
- Inj. Haloperidol 5mg IV stat
- Inj. Diazepam 5mg-10mg IV stat , then
- Admission/refer to psychiatrist

Maintain ABC
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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>Airway</td>
</tr>
<tr>
<td>B:</td>
<td>Breathing</td>
</tr>
<tr>
<td>C:</td>
<td>Circulation</td>
</tr>
<tr>
<td>D:</td>
<td>Detect and correct</td>
</tr>
<tr>
<td></td>
<td>- Hypoglycemia</td>
</tr>
<tr>
<td></td>
<td>- Seizures</td>
</tr>
<tr>
<td></td>
<td>- Hypo/hyperthermia</td>
</tr>
<tr>
<td>E:</td>
<td>Emergency Antidote Administration</td>
</tr>
</tbody>
</table>

2) Risk Assessment

- **Agent**
  - Collect pills,
- **Dose**
  - Packages, bottles, History from family

- Time since ingestion
- Clinical features
- Patient factors/ Co-morbidities
3) Supportive care and monitoring

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

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 1 hour 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

<table>
<thead>
<tr>
<th>Technique</th>
<th>Suitable toxin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple dose Activated charcoal</td>
<td>Carbamazepine/ Phenytoin/ Phenobarbitone</td>
</tr>
<tr>
<td>Urinary Alkalization</td>
<td>Phenobarbitone/ Salicylate</td>
</tr>
<tr>
<td>Hemodialysis</td>
<td>Lithium/ Ethylene glycol/ Metformin</td>
</tr>
</tbody>
</table>

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)

- Resuscitation
  - A: Airway
  - B: Breathing
  - C: Circulation
  - D: Disability
  - E: Exposure

- Risk Assessment
  - Agent
  - Dose
  - Duration
  - Clinical features
  - Co-morbidities

- Supportive Care and Monitoring

- Investigation
  - Screening
  - Specific

- Decontamination
  - Dermal Decontamination
  - Gastric Decontamination

- Enhanced Elimination
  - Gastric emptying
  - Activated Charcoal
  - Whole Bowel Irrigation

- Antidotes

- Disposition
  - Medical
  - Psychiatric
  - If stable → Emergency Observation
  - If not → Intensive Care
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

<table>
<thead>
<tr>
<th>Muscarinic Effects:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUMBELS</strong></td>
</tr>
<tr>
<td>D Diarrhoea</td>
</tr>
<tr>
<td>U Urination</td>
</tr>
<tr>
<td>M Miosis</td>
</tr>
<tr>
<td>B Bradycardia/ Bronchospasm/ Bronchorrhea</td>
</tr>
<tr>
<td>E Emesis/ Excitation</td>
</tr>
<tr>
<td>L Lacrimation</td>
</tr>
<tr>
<td>S Salivation/Sweating</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nicotinic Effects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Muscle twitching/ fasciculation</td>
</tr>
<tr>
<td>• Hyperreflexia: flaccid paralysis, decreased tendon reflexes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CNS Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Headache, dizziness, confusion, drowsiness, fits</td>
</tr>
</tbody>
</table>

Management
1. **Airway:** Clear airway: If compromised, secure airway
   - **Breathing:** Oxygen supplementation to keep $\text{SpO}_2 > 95$
   - **Circulation:** Secure IV access
2. **Decontamination**
   - Dermal → Remove clothing, Wash skin
   - Gastric → Gastric lavage (if presents within 1 hr 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
- 20% of atropinizing dose per hour as infusion in normal saline
- Maintain for 24-48 hours

Tapering dose
- 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

Resuscitation
A: Airway
B: Breathing
C: Circulation

Risk Assessment

Supportive Care and Monitoring
- IV Fluids
- Supplemental oxygen
- Benzodiazepines
  Inj. Diazepam 5mg IV stat

Investigations
- 12 Lead ECG
- Serum Cholinesterase level

Decontamination
- Dermal Decontamination
- Gastric Decontamination
- Gastric Lavage
- Activated Charcoal

Antidotes
- ATROPINE (1ml= 0.6 mg)
  Inj. Atropine 3-5 ampules IV bolus, reassess. Increase dose as per clinical progression until atropinization
- PRAVIDOXIME
  Inj. Pralidoxime 2 gm IV in 100 ml NS over 30 minutes, then 1 gm IV QID

Disposition
- If stable → Emergency Observation
- If not → Intensive Care
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 1 hour 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

**Resuscitation**
A: Airway  
B: Breathing  
C: Circulation

**Risk Assessment**

**Decontamination**
Gastraic Lavage  
Activated Charcoal

**Supportive treatment**
- IV Fluids
- Antiemetics:  
  Inj. Ondansetron 4 mg IV stat
- H2 blockers:  
  Inj. Ranitidine 50 mg IV stat

**Antidotes**
- No antidote for Zinc Phosphide
- If warfarin derivatives + bleeding manifestation +  
  Deranged PT/INR  
  Inj. Vitamin K 10 mg IV OD* 3 days  
  Fresh Frozen Plasma

**Disposition**
ER observation for 2-3 days  
Discharge if no complications
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.
- \[\text{AlP} + \text{H}_2\text{O} = \text{Al(OH)}_2 + \text{PH}_3\] (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 1 hour 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

Resuscitation
A: Airway
B: Breathing
C: Circulation

• Early airway management: Oropharyngeal airway
  Assisted ventilation
• Treat shock: Inj. NS 1Litre IV bolus and reassess

Decontamination

Gastric Lavage
Activated Charcoal

Supportive Treatment

• No antidote available
• Treat shock: Ionotropes if required
• Arrhythmias: Inj. Magnesium Sulphate
  Dose: 1 gm IV bolus, then 1 gm 6hourly
• Metabolic acidosis: Inj. Sodium bicarbonate 5-10
  ampules IV stat

Disposition

Refer to higher centre

ICU Monitoring/ CCU Monitoring
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

Resuscitation
A: Airway
B: Breathing
C: Circulation

Decontamination
- Gastric Lavage
- Activated Charcoal

Supportive Treatment
- 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 following daily assessment
  Emergency observation 5 days
  Discharge
- If deteriorates
  - Shock
  - Multi-organ failure
  - Coma
  ICU admission
  Refer for specialist care/ consultation
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:

<table>
<thead>
<tr>
<th>System</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVS</td>
<td>Hypotension, bradycardia, complete heart block, MI</td>
</tr>
<tr>
<td>GI</td>
<td>Nausea, vomiting, pain abdomen</td>
</tr>
<tr>
<td>CNS</td>
<td>Dizziness, syncope, coma</td>
</tr>
</tbody>
</table>

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

**Resuscitation**
A: Airway  
B: Breathing  
C: Circulation

**Symptomatic Management**

If HR ≤ 40 bpm, Inj. Atropine 1 ml (0.6 mg) IV stat  
If HR further decreases, repeat the dose  
Inj. Pantoprazole 40mg IV stat  
Inj. Ondansetron 4mg IV stat

**Disposition**

If asymptomatic, monitor for 24-48 hours

Discharge and follow up

If persistent bradycardia despite atropine,  
Refer to higher center  
Consider cardiac pacing  
CCU monitoring
Dhatura Poisoning

- Dhatura or *Dhatura stramonium* is also known as thorn apple/ Jimsonweed
- It contains atropine / Hyoscyamine / 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 1 hour 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

Resuscitation
A: Airway
B: Breathing
C: Circulation

Decontamination
Gastric Lavage
Activated Charcoal

Symptomatic management
Agitation:
- Inj. Diazepam 5mg IV stat
Hyperpyrexia:
- Internal cooling,
- IV fluids (Inj. NS 500ml IV bolus, repeat as required)
- External cooling (ice pack)

Antidote
Inj. Physostigmine 0.5-2mg at 1mg/min IV stat) only if patient has agitation/delirium

Disposition
If no symptoms observe for 24-48 hours and discharge
If not:
- ICU Admission
- Referral
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:
<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical features</th>
<th>Investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage-1 (0-24 hours)</td>
<td>Nausea, vomiting, Malaise</td>
<td>Normal lab reports</td>
</tr>
<tr>
<td>Stage-2 (24-48 hours)</td>
<td>• Rt. Upper quadrant pain</td>
<td>• LFT deranged</td>
</tr>
<tr>
<td></td>
<td>• Hepatic tenderness</td>
<td>• PT/INR high</td>
</tr>
<tr>
<td>Stage-3 (72-96 hours)</td>
<td>Jaundice, hepatic encephalopathy</td>
<td>• LFT deranged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PT/INR high</td>
</tr>
<tr>
<td>Stage-4 (&gt;96 hours)</td>
<td>Stage of resolution or, FHF, renal failure</td>
<td>• LFT deranged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RFT deranged</td>
</tr>
</tbody>
</table>

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

**Resuscitation**
- A: Airway
- B: Breathing
- C: Circulation

**Decontamination**
- Gastric Lavage
- Activated Charcoal
  (1mg/kg stat followed by 50gm 4 hourly)

**Antidote**
- IV
  - 150 mg/kg NAC in 200ml 5% Dextrose over 15 min, then
  - 50 mg/kg NAC in 500ml 5% Dextrose over 4 hrs, then
  - 100 mg/kg NAC in 1000ml 5% Dextrose over 16 hrs.

**Oral Dose**
- Loading dose: 140mg/kg stat
- Maintenance dose: 60mg/kg 4 hourly for 17 additional doses
  (Total of 1330 mg/kg over 72 hrs)

**Supportive Treatment**
- Bleeding manifestation
  - Coagulation profile deranged
  - Inj. Vitamin K 10mg IV OD *3 days
  - Fresh Frozen Plasma

**Disposition**
- Deterioration: ICU/ Referral
- Improvement after 5 days observation, Discharge

**Deterioration:**
1) Encephalopathy, FHF
2) Progressive coagulopathy
3) Creatinine > 200 mg/l
4) Hypoglycaemia
5) Metabolic acidosis
## Antidotes

### Common Poisons and Antidotes

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

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

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

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, ophthalmoplegia  
|                          | - Respiratory difficulty |
| Evidence of hematotoxicity/coagulopathy | - 20WBCT positive  
| (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) | - 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:

<table>
<thead>
<tr>
<th></th>
<th>Atropine</th>
<th>Neostigmine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>Inj. Atropine 0.6mg IV stat</td>
<td>Inj. 0.01 mg/kg upto 0.5mg IV or IM every 30 minutes till improvement</td>
</tr>
<tr>
<td></td>
<td>Repeat as indicated by bradycardia</td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>Inj. Atropine 0.02mg/kg IV upto 0.6 mg</td>
<td>Inj. 0.025-0.04 mg/kg upto 0.6mg IV or IM every 30 minutes till improvement.</td>
</tr>
</tbody>
</table>

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
  - Inj. Cloxacillin 500mg IV QID
  - 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
ASV
May need ventilatory support
Needs admission

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
ASV
May need ventilatory support
Needs admission

Syndrome 4
Marked swelling (sometimes blister and necrosis) with incoagulable blood, neurotoxicity, AKI - RUSSELL’S VIPER (Found in Low Land ONLY)
ASV
Delayed FFP, After ASV only May need ventilatory support May need fasciotomy Needs admission

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
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

<table>
<thead>
<tr>
<th>Initial Symptoms</th>
<th>Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pain or paresthesia at the wound site.</td>
<td>• Hyperactivity</td>
</tr>
<tr>
<td>• Fever</td>
<td>• Fluctuating consciousness</td>
</tr>
<tr>
<td></td>
<td>• Hallucinations</td>
</tr>
<tr>
<td></td>
<td>• Hydrophobia (furious rabies)</td>
</tr>
<tr>
<td></td>
<td>• Paralysis and coma (Paralytic rabies)</td>
</tr>
<tr>
<td></td>
<td>• Followed by death</td>
</tr>
</tbody>
</table>

WHO Classification of Exposures and PEP (Post exposure prophylaxis)

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

<table>
<thead>
<tr>
<th>Dose</th>
<th>Route</th>
<th>Duration</th>
<th>No. of Injection sites per clinic Visit</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 ml Each Site</td>
<td>ID</td>
<td>1 week</td>
<td>2-2-2-0-0</td>
<td>-Deltoid OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Day 0</td>
<td></td>
<td>-Lateral thigh</td>
</tr>
</tbody>
</table>
**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.
- 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
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:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Watery Diarrhoea (including cholera)</td>
<td>Starts suddenly and lasts several hours</td>
<td>Dehydration, weight loss</td>
</tr>
<tr>
<td>Acute Bloody Diarrhoea (dysentery)</td>
<td>Associated with blood in stool</td>
<td>Dehydration, sepsis, malnutrition</td>
</tr>
<tr>
<td>Persistent Diarrhoea</td>
<td>Acute watery diarrhoea lasting 14 days or longer</td>
<td>Dehydration, malnutrition</td>
</tr>
<tr>
<td>Diarrhoea with severe malnutrition (Marasmus or Kwashiorkor)</td>
<td>Causes severe systemic infection, dehydration, heart failure</td>
<td></td>
</tr>
</tbody>
</table>

Assessment of dehydration in patients with diarrhoea:

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

<table>
<thead>
<tr>
<th>Age</th>
<th>Amount of ORS to give after each loose stool</th>
<th>Amount of ORS to provide for use at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;24 months</td>
<td>50-100 ml</td>
<td>500 ml/day</td>
</tr>
<tr>
<td>2-10 years</td>
<td>100-200 ml</td>
<td>1000 ml/day</td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>As much as wanted</td>
<td>2000 ml/day</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Age</th>
<th>Less than 4 months</th>
<th>4-11 months</th>
<th>12-23 months</th>
<th>2-4 years</th>
<th>5-14 years</th>
<th>≥15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. (wt. in kg)</td>
<td>Less than 5</td>
<td>5-7.9</td>
<td>8-10.9</td>
<td>11-15.9</td>
<td>16-29.9</td>
<td>≥30</td>
</tr>
<tr>
<td>ORS in ml</td>
<td>200-400</td>
<td>400-600</td>
<td>600-800</td>
<td>800-1200</td>
<td>1200-2200</td>
<td>&gt;2200</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Age</th>
<th>First give</th>
<th>Then give</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12 months</td>
<td>30ml/kg in 1 hour</td>
<td>70ml/kg in 5 hours</td>
</tr>
<tr>
<td>12 months-5 years</td>
<td>30ml/kg in 30 minutes</td>
<td>70ml/kg in 2.5 hours</td>
</tr>
</tbody>
</table>

- 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:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>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</td>
</tr>
<tr>
<td>Shigella dysentery</td>
<td>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</td>
</tr>
<tr>
<td>Amoebiasis</td>
<td>Metronidazole 10mg/kg 4 times a day × 5 days(10 days for severe disease)</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>Metronidazole 10mg/kg 4 times a day × 5 days(10 days for severe disease)</td>
</tr>
</tbody>
</table>

- 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**

**Resuscitation**
Maintain ABC

1. **Humidified oxygen by hood**
(Do not use oxygen if not cyanosed, since it may mask severity)

2. **Adequate hydration**
IV access secured

3. **Antibiotics**
   - Inj. Ampicillin 100mg/kg/day or,
   - Inj. Chloramphenicol 50mg/kg/day

   If obstruction worsens

**Urgent referral**

Endotracheal intubation
Tracheostomy
Laryngitis and laryngotracheobronchitis

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

Severity of laryngotracheobronchitis

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

**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

<table>
<thead>
<tr>
<th>Viral</th>
<th>Bacterial</th>
<th>Atypical</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSV, influenza</td>
<td><em>Klebsiella pneumoniae</em></td>
<td>Chlamydia</td>
</tr>
<tr>
<td>Parainfluenza</td>
<td><em>Escherichia coli</em></td>
<td>Mycoplasma</td>
</tr>
<tr>
<td>Adenovirus</td>
<td><em>Staphylococcus aureus</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Streptococcus pneumoniae</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Hemophilus influenzae</em></td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Age group</th>
<th>Respiratory rate/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 months</td>
<td>60 or more</td>
</tr>
<tr>
<td>2months-11months</td>
<td>50 or more</td>
</tr>
<tr>
<td>12months-5years</td>
<td>40 or more</td>
</tr>
</tbody>
</table>
Pneumonia

Child age 2–59 months with cough and/or difficult breathing

- Cough and cold: no pneumonia
  - Home care advice

- Fast breathing: pneumonia
  - Oral amoxicillin and home care advice

- Chest indrawing: Severe Pneumonia
  - General danger signs: † Severe pneumonia or very severe disease

- First dose antibiotic and referral to facility for injectable antibiotic/supportive therapy

- Fast breathing: pneumonia
  - Child age 2–59 months with Cough and/or difficult breathing

- Severe Pneumonia or very severe disease
  - 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**

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

**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
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:

<table>
<thead>
<tr>
<th>Criteria 1</th>
<th>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:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria 2</th>
<th>Two or more of the following that occurs rapidly after exposure to a LIKELY allergen for that patient (minutes to several hours):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria 3</th>
<th>Reduced BP after exposure to a KNOWN allergen for that patient (minutes to several hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Cutaneous (90%)</th>
<th>Respiratory (70%)</th>
<th>Cardiovascular (45%)</th>
<th>Neurological (45%)</th>
<th>Gastro-intestinal (45%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Erythema</td>
<td>• Cough</td>
<td>• Hypotension</td>
<td>• Confusion</td>
<td>• Odynophagia</td>
</tr>
<tr>
<td>• Tingling</td>
<td>• Shortness of breath</td>
<td>• Tachycardia</td>
<td>• Aura</td>
<td>• Abdominal cramps</td>
</tr>
<tr>
<td>• Warmth</td>
<td>• Stridor</td>
<td>• Arrhythmias</td>
<td>• Anxiety</td>
<td>• Nausea, vomiting</td>
</tr>
<tr>
<td>• Pruritis</td>
<td>• Hoarseness</td>
<td>• Chest pain</td>
<td>• Lightheadedness</td>
<td>• Diarrhea</td>
</tr>
<tr>
<td>• Urticaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Angiodema</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**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

**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
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):

<table>
<thead>
<tr>
<th>Adults and adolescents (＞10 years)</th>
<th>Children ≤ 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDF + 3TC + DTG</td>
<td>AZT + 3TC + LPV/r</td>
</tr>
</tbody>
</table>

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

PEP for Hepatitis B

<table>
<thead>
<tr>
<th>Exposed</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HBs Ag+ ve</td>
</tr>
<tr>
<td>Unvaccinated</td>
<td>HBIG 0.06 mg/kg and initiate HBV vaccine</td>
</tr>
<tr>
<td>Vaccinated</td>
<td>Check Anti HBs titre ≥10 milli IU: No therapy</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>No pain</th>
<th>Mild pain</th>
<th>Moderate pain</th>
<th>Severe pain</th>
<th>Very severe pain</th>
<th>Worst possible pain</th>
</tr>
</thead>
</table>

- 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

<table>
<thead>
<tr>
<th>Severity</th>
<th>VAS (0-100 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>VAS: 0 to 30-40 mm</td>
</tr>
<tr>
<td>Moderate</td>
<td>VAS: 40 to 60-70 mm</td>
</tr>
<tr>
<td>Severe</td>
<td>VAS: &gt; 60-70 mm</td>
</tr>
</tbody>
</table>

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

1. Numeric pain scale

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>Moderate pain</td>
<td>Worst possible pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Wong-Baker FACES Pain Scale

No pain | Mild | Moderate | Severe | Worst Possible Pain

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>Worst Possible Pain</td>
<td></td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose (Adult)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>2-6 mg IV 10 mg IM/SC 10-30 mg PO</td>
<td>Onset: 1-2 min IV 10-15 min IM/SC 30 min PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duration: 1-2 hour IV 3-4 hour IM/SC 3-5 hour PO</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>50-100 mcg IV Onset &lt; 1 min IV Duration: 30-60 min IV</td>
<td>Caution: High dose (&gt; 5 mcg/kg IV) can cause chest wall rigidity</td>
</tr>
<tr>
<td>Pethidine</td>
<td>25-50 mg IV 50-150 mg IM/SC Onset: 5 min IV Duration: 2-3 hour IV</td>
<td>Contraindication: In patients taking MAO inhibitors within past 14 days</td>
</tr>
<tr>
<td>Codeine</td>
<td>30-60 mg PO 30-100 mg IM Onset: 30-60 min PO 10-30 min IM Duration: 4-6 hour PO and IM</td>
<td>Caution: May cause GI side effects like constipation.</td>
</tr>
<tr>
<td>Tramadol</td>
<td>50-100 mg PO Onset: 1 hour PO Duration: 4-6 hour PO</td>
<td>Caution: May cause CNS side effects.</td>
</tr>
</tbody>
</table>
Adjuncts in opioid pain management
Adjuncts are used to enhance the analgesic effect, reduce the amount of opioid required and prevent side effects.

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ondansetron</td>
<td>4-8 mg IV/PO</td>
</tr>
<tr>
<td>Promethazine</td>
<td>25-50 mg IV/ IM</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>5-10 mg IV/IM/PO</td>
</tr>
</tbody>
</table>

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

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

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

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

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Emergency Health Services</th>
<th>Health Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Respiratory problems</td>
<td>Acute exacerbation of Chronic Obstructive Pulmonary Disease (COPD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute mountain sickness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute pulmonary embolism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute pulmonary oedema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute Respiratory Distress Syndrome (ARDS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspiration pneumonia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asthma</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decompression syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>2</td>
<td>Cardiology</td>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiac arrhythmias (e.g. ventricular tachycardia, ventricular arrhythmias)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiac tamponade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiogenic shock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Congestive Cardiac Failure (CCF)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>3</td>
<td>Brain and neurology</td>
<td>Cerebrovascular Accident (CVA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coma of any cause</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encephalitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encephalopathy (Hypoxic/hepatic/uraemic)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>4</td>
<td>Gastrointestinal</td>
<td>Acute appendicitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute cholecystitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute pancreatitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duodenal perforation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erosive gastritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign body in oesophagus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fulminant hepatitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gastric perforation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gastrointestinal bleeding (upper and lower)</td>
</tr>
<tr>
<td>Number</td>
<td>Category</td>
<td>Conditions</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Urology</td>
<td>Acute urinary retention, Acute pyelonephritis, Acute renal failure, Hematuria, Metabolic acidosis and alkalosis</td>
</tr>
<tr>
<td>6</td>
<td>Reproductive health</td>
<td>Antepartum haemorrhage, Eclampsia, Ectopic rupture, Obstructed labour, Post-partum haemorrhage, Preeclampsia</td>
</tr>
<tr>
<td>7</td>
<td>Orthopedic</td>
<td>Amputations, Bleeding, Compartment syndrome</td>
</tr>
<tr>
<td>8</td>
<td>Metabolic and endocrinological</td>
<td>Adrenal insufficiency, Hypo/hyperkalemia, Hypo/hyponatremia</td>
</tr>
<tr>
<td>9</td>
<td>Ophthalmology</td>
<td>Chemical burn, Corneal ulcer, Double vision</td>
</tr>
<tr>
<td>10</td>
<td>ENT</td>
<td>Acute epiglottitis, Choking</td>
</tr>
<tr>
<td>11</td>
<td>Burn</td>
<td>Chemical burns, Electrical injuries</td>
</tr>
<tr>
<td>12</td>
<td>Mental health</td>
<td>Acute Psychosis, Alcohol intoxication, Alcohol withdrawal syndrome, Catatonic stupor, Conversion disorder, Delirium tremens, Drug toxicity, Lithium toxicity</td>
</tr>
</tbody>
</table>
| 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., tracheo-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 | 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 | 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 |
## 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

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Name of drug</th>
<th>Form</th>
<th>Availability</th>
<th>Group of drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Adrenaline</td>
<td>Injection</td>
<td>1mg/ml</td>
<td>Alpha and beta adrenergic agonist</td>
</tr>
<tr>
<td>2.</td>
<td>Amiodarone</td>
<td>Injection</td>
<td>50 mg (hydrochloride)/ml in 3 ml ampoule</td>
<td>Class III Antiarrhythmics (potassium channel blockers)</td>
</tr>
<tr>
<td>3.</td>
<td>Lidocaine</td>
<td>Injection</td>
<td>20 mg (hydrochloride)/ml in vial</td>
<td>Class IB Antiarrhythmics (Sodium channel blocker)</td>
</tr>
<tr>
<td>4.</td>
<td>Magnesium sulphate</td>
<td>Injection</td>
<td>500 mg/ml in 2 ml ampoule</td>
<td>Antidysrhythmic Anticonvulsant</td>
</tr>
<tr>
<td>5.</td>
<td>Sodium bicarbonate</td>
<td>Injection</td>
<td>7.5 % solution in 10 ml ampoule</td>
<td>Alkalising agent</td>
</tr>
<tr>
<td>6.</td>
<td>Calcium gluconate</td>
<td>Injection</td>
<td>100 mg/ml in 10 ml ampoule</td>
<td>Antidote</td>
</tr>
</tbody>
</table>

### Drugs used for induction and muscle relaxation

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Name of drug</th>
<th>Form</th>
<th>Availability</th>
<th>Group of drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ketamine</td>
<td>Injection</td>
<td>50 mg (as hydrochloride)/ml in 10 ml vial</td>
<td>Intravenous general anaesthetic agent</td>
</tr>
<tr>
<td>2.</td>
<td>Succinylcholine</td>
<td>Injection</td>
<td>50 mg (chloride)/ml in 10ml vial</td>
<td>Neuromuscular blocking agent (depolarizing)</td>
</tr>
<tr>
<td>3.</td>
<td>Rocuronium</td>
<td>Injection</td>
<td>10mg/ml in 5ml vial</td>
<td>Neuromuscular blocking agent (non depolarizing)</td>
</tr>
<tr>
<td>4.</td>
<td>Vecuronium</td>
<td>Injection</td>
<td>Powder 1mg/ml</td>
<td>Neuromuscular blocking agent (non depolarizing)</td>
</tr>
<tr>
<td></td>
<td>Drugs used for respiratory conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Salbutamol Injection MDI/RC Respiratory solution Tablet</td>
<td>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)</td>
<td>Short acting Beta 2 adrenergic agonist (SABA)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Salmeterol MDI/RC</td>
<td>Metered dose inhaler (aerosol): 25 mcg and 50mcg per dose</td>
<td>Long acting Beta 2 adrenergic agonist (LABA)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Formoterol MDI/RC</td>
<td>20 mcg per dose</td>
<td>Long acting Beta 2 adrenergic agonist (LABA)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Tiotropium MDI</td>
<td>Metered dose inhaler (aerosol): 18 mcg per dose</td>
<td>Long acting anticholinergic (LAAC)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Ipratropium bromide Respiratory solution</td>
<td>1ml/250mcg</td>
<td>Short acting anticholinergic (SAAC)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Hydrocortisone Injection</td>
<td>50mg/ml</td>
<td>Systemic corticosteroids</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Methylprednisolone Injection</td>
<td>40mg/ml vial 125mg/2ml vial</td>
<td>Systemic corticosteroids</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Prednisolone Tablet</td>
<td>5mg, 10mg, 20mg</td>
<td>Oral corticosteroids (OCS)</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Fluticasone MDI/RC</td>
<td>Metered dose inhaler (aerosol): 125mcg and 250mcg per dose</td>
<td>Inhaled Corticosteroids (ICS)</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Terbutaline Injection</td>
<td>1mg/ml (0.25ml provides 0.25mg SC/dose)</td>
<td>Beta 2 adrenergic agonist</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Magnesium sulphate Injection</td>
<td>500mg/ml</td>
<td>Bronchodilator Anticonvulsant</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Racemic epinephrine</td>
<td>Injection</td>
<td>1mg/ml</td>
<td>Bronchodilator Alpha and beta adrenergic agonist</td>
</tr>
<tr>
<td>14.</td>
<td>Doxycycline</td>
<td>Tablet</td>
<td>100mg</td>
<td>Tetracycline</td>
</tr>
<tr>
<td>15.</td>
<td>Gentamicin</td>
<td>Injection</td>
<td>10 mg, 40 mg (as sulfate)/ml in 2 ml vial</td>
<td>Aminoglycoside</td>
</tr>
<tr>
<td>16.</td>
<td>Metronidazole</td>
<td>Tablet</td>
<td>400mg</td>
<td>Nitroimidazole</td>
</tr>
<tr>
<td>17.</td>
<td>Ciprofloxacin</td>
<td>Injection</td>
<td>200mg per vial of 100ml</td>
<td>Fluoroquinolone</td>
</tr>
<tr>
<td>18.</td>
<td>Clindamycin</td>
<td>Injection</td>
<td>Capsule: 150mg (as hydrochloride) Injection: 150 mg (as phosphate)/ml</td>
<td>Macrolide</td>
</tr>
</tbody>
</table>

## Antimicrobial drugs

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Amoxicillin</td>
<td>Capsule</td>
<td>250mg, 500mg</td>
</tr>
<tr>
<td>2.</td>
<td>Amoxicillin + clavulanic acid</td>
<td>Injection</td>
<td>1.2gm/ml</td>
</tr>
<tr>
<td>3.</td>
<td>Amoxicillin + clavulanic acid</td>
<td>Tablet</td>
<td>625mg</td>
</tr>
<tr>
<td>4.</td>
<td>Crystalline Penicillin</td>
<td>Injection</td>
<td>Penicillin</td>
</tr>
<tr>
<td>5.</td>
<td>Azithromycin</td>
<td>Tablet</td>
<td>500mg</td>
</tr>
<tr>
<td>6.</td>
<td>Doxycycline</td>
<td>Tablet</td>
<td>100mg</td>
</tr>
<tr>
<td>7.</td>
<td>Ceftriaxone</td>
<td>Injection</td>
<td>500mg/ml</td>
</tr>
<tr>
<td>8.</td>
<td>Cefotaxime</td>
<td>Injection</td>
<td>500mg/ml</td>
</tr>
<tr>
<td>9.</td>
<td>Cefepime</td>
<td>Injection</td>
<td>1gm/ml</td>
</tr>
<tr>
<td>10.</td>
<td>Ceftazidime</td>
<td>Injection</td>
<td>500mg/ml</td>
</tr>
<tr>
<td>11.</td>
<td>Vancomycin</td>
<td>Injection</td>
<td>250mg/ml</td>
</tr>
<tr>
<td>12.</td>
<td>Linezolid</td>
<td>Injection</td>
<td>2 mg/mL in 300 mL bag Tablet: 400 mg, 600 mg</td>
</tr>
<tr>
<td>13.</td>
<td>Meropenem</td>
<td>Injection</td>
<td>500mg, 1g (as trihydrate) in vial</td>
</tr>
<tr>
<td>14.</td>
<td>Piperacillin tazobactam</td>
<td>Injection</td>
<td>Powder for injection: 2g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial</td>
</tr>
<tr>
<td>15.</td>
<td>Gentamicin</td>
<td>Injection</td>
<td>10 mg, 40 mg (as sulfate)/ml in 2 ml vial</td>
</tr>
<tr>
<td>16.</td>
<td>Metronidazole</td>
<td>Tablet</td>
<td>400mg</td>
</tr>
<tr>
<td>17.</td>
<td>Ciprofloxacin</td>
<td>Injection</td>
<td>200mg per vial of 100ml</td>
</tr>
<tr>
<td>18.</td>
<td>Clindamycin</td>
<td>Injection</td>
<td>Capsule: 150mg (as hydrochloride) Injection: 150 mg (as phosphate)/ml</td>
</tr>
<tr>
<td></td>
<td>Drug Name</td>
<td>Formulations</td>
<td>Dosages</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------</td>
<td>---------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>19.</td>
<td>Clarithromycin</td>
<td>Tablet</td>
<td>500mg</td>
</tr>
<tr>
<td>20.</td>
<td>Tetracycline</td>
<td>Tablet</td>
<td>250mg, 500mg</td>
</tr>
<tr>
<td>21.</td>
<td>Cotrimoxazole (Trimethoprim-Sulfamethoxazole)</td>
<td>Oral liquid</td>
<td>Oral liquid: 200 mg + 40 mg /5 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tablet</td>
<td>Tablet: 100 mg + 20 mg (DT), 400 mg +80 mg, 800 mg + 160 mg</td>
</tr>
<tr>
<td>22.</td>
<td>Nalidixic acid</td>
<td>Tablet</td>
<td>250mg, 500mg</td>
</tr>
<tr>
<td>23.</td>
<td>Chloramphenicol</td>
<td>Capsule</td>
<td>Capsule: 250 mg, 500 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Injection</td>
<td>Powder for injection: 1g (as sodium succinate) in vial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral liquid</td>
<td>Oral liquid: 125 mg (as palmitate)/ 5 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eye drops</td>
<td>Eye drops</td>
</tr>
<tr>
<td></td>
<td><strong>Antivirals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Dolutegravir</td>
<td>Tablet</td>
<td>50mg</td>
</tr>
<tr>
<td>2.</td>
<td>Lamivudine</td>
<td>Tablet</td>
<td>300mg</td>
</tr>
<tr>
<td>3.</td>
<td>Tenofovir</td>
<td>Tablet</td>
<td>300mg</td>
</tr>
<tr>
<td>4.</td>
<td>Acyclovir</td>
<td>Injection</td>
<td>500mg vial, 500mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tablet</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Antifungals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Amphotericin B</td>
<td>Injection</td>
<td>Powder for injection: 50 mg in vial (as deoxycholate or liposomal complex)</td>
</tr>
<tr>
<td>2.</td>
<td>Fluconazole</td>
<td>Tablet</td>
<td>150mg, 200mg</td>
</tr>
<tr>
<td></td>
<td><strong>Drugs used for cardiovascular conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Antiarrhythmic drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Amiodarone</td>
<td>Injection</td>
<td>50 mg (hydrochloride)/ ml in 3 ml ampoule</td>
</tr>
</tbody>
</table>
### Standard Treatment Protocol of Emergency Health Service Package

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Lidocaine</td>
<td>Injection</td>
<td>20 mg (hydrochloride)/ml in vial</td>
<td>Class IB Antiarrhythmics (Sodium channel blocker)</td>
</tr>
<tr>
<td>3.</td>
<td>Adenosine</td>
<td>Injection</td>
<td>3mg/ml vial</td>
<td>Antiarrhythmic</td>
</tr>
<tr>
<td>4.</td>
<td>Digoxin</td>
<td>Tablet Injection</td>
<td>0.25mg, 0.5mg, 0.25mg/ml</td>
<td>Digitalis glycoside</td>
</tr>
<tr>
<td>5.</td>
<td>Esmolol</td>
<td>Injection</td>
<td>10mg/ml vial</td>
<td>Class II Antiarrhythmics (beta blockers)</td>
</tr>
<tr>
<td>6.</td>
<td>Sotalol</td>
<td>Injection</td>
<td>15mg/ml</td>
<td>Class II, III Antiarrhythmics (beta blockers)</td>
</tr>
<tr>
<td>7.</td>
<td>Isoprenaline</td>
<td>Injection</td>
<td>0.2mg/ml</td>
<td>Beta agonist</td>
</tr>
</tbody>
</table>

#### Antianginal Drugs

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Isosorbide dinitrate</td>
<td>Tablet (Sublingual)</td>
<td>2.5mg</td>
<td>Vasodilators</td>
</tr>
<tr>
<td>2.</td>
<td>Isosorbide mononitrate</td>
<td>Tablet</td>
<td>20mg</td>
<td>Vasodilators</td>
</tr>
<tr>
<td>3.</td>
<td>GTN (Glyceryl trinitrate)</td>
<td>Injection</td>
<td>5mg/ml in 5ml vial</td>
<td>Vasodilators</td>
</tr>
<tr>
<td>4.</td>
<td>Metoprolol</td>
<td>Tablet Injection</td>
<td>12.5 mg, 25 mg, 50 mg (as tartrate) 1mg/ml</td>
<td>Beta blocker</td>
</tr>
</tbody>
</table>

#### Antiplatelet Drugs

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspirin</td>
<td>Tablet</td>
<td>150mg, 75mg</td>
<td>Antiplatelet</td>
</tr>
<tr>
<td>2.</td>
<td>Clopidogrel</td>
<td>Tablet</td>
<td>75mg</td>
<td>Antiplatelet</td>
</tr>
</tbody>
</table>

#### Anticoagulant Drugs

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Low molecular weight heparin (Enoxaparin)</td>
<td>Injection (SC)</td>
<td>40mg, 60mg</td>
<td>Anticoagulant</td>
</tr>
<tr>
<td>2.</td>
<td>Unfractionated heparin</td>
<td>Injection</td>
<td></td>
<td>Anticoagulant</td>
</tr>
<tr>
<td>3.</td>
<td>Warfarin</td>
<td>Tablet</td>
<td>1mg</td>
<td>Anticoagulant</td>
</tr>
</tbody>
</table>

#### Fibrinolytic Agents

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Form</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Streptokinase</td>
<td>Injection</td>
<td>Fibrinolytic</td>
</tr>
<tr>
<td>2.</td>
<td>Alteplase</td>
<td>Injection</td>
<td>Fibrinolytic</td>
</tr>
</tbody>
</table>
### Standard Treatment Protocol of Emergency Health Service Package

#### Lipid Lowering Agents

1. **Atorvastatin**
   - Type: Tablet
   - Dose: 20mg, 40mg
   - Category: Lipid Lowering

2. **Rosuvastatin**
   - Type: Tablet
   - Dose: 20mg
   - Category: Lipid Lowering

#### Antihypertensive Agents

1. **Labetalol**
   - Type: Injection
   - Dose: 5mg/ml
   - Category: Alpha and Beta Blocker

2. **Atenolol**
   - Type: Tablet
   - Dose: 50mg
   - Category: Beta Blocker

3. **Diltiazem**
   - Type: Tablet
   - Dose: 30mg
   - Category: Calcium Channel Blocker

4. **Verapamil**
   - Type: Tablet, Injection
   - Dose: 40mg, 2.5mg/ml
   - Category: Calcium Channel Blocker

5. **Amlodipine**
   - Type: Tablet
   - Dose: 2.5mg, 5mg
   - Category: Calcium Channel Blocker

6. **Nifedipine**
   - Type: Tablet
   - Dose: 10mg
   - Category: Calcium Channel Blocker

7. **Nimodipine**
   - Type: Tablet
   - Dose: 30mg
   - Category: Calcium Channel Blocker

8. **Enalapril**
   - Type: Tablet
   - Dose: 2.5mg
   - Category: ACE Inhibitor

9. **Losartan**
   - Type: Tablet
   - Dose: 25mg, 50mg
   - Category: ARB (Angiotensin Receptor Blockers)

10. **Clonidine**
    - Type: Tablet
    - Dose: 0.1mg, 0.2mg
    - Category: Alpha 2 Agonist

11. **Methyldopa**
    - Type: Tablet
    - Dose: 250mg, 500mg
    - Category: Alpha 2 Agonist

12. **Hydralazine**
    - Type: Injection
    - Dose: 20mg/ml
    - Category: Vasodilator

13. **Sodium Nitroprusside**
    - Type: Injection
    - Dose: Power for infusion: 50mg in ampoule
    - Category: Vasodilator

#### Inotropes and Vasopressors

1. **Noradrenaline**
   - Type: Injection
   - Dose: 1mg/ml in 2 ml ampoule
   - Category: Vasopressor

2. **Dopamine**
   - Type: Injection
   - Dose: 40 mg (hydrochloride)/ml in 5 ml vial
   - Category: Inotropic Agent

3. **Dobutamine**
   - Type: Injection
   - Dose: 12.5 mg (as hydrochloride)/ml in 20 ml ampoule
   - Category: Inotropic Agent

4. **Vasopressin**
   - Type: Injection
   - Dose: 20units/ml
   - Category: Antidiuretic Hormone, Vasopressor

#### Diuretics
1. **Furosemide**
   - **Injection**
   - **20mg**
   - **Loop diuretic**

2. **Torsemide**
   - **Injection**
   - **20mg**
   - **Loop diuretic**

### Drugs used for neurological conditions

#### Anticonvulsants

<table>
<thead>
<tr>
<th>No.</th>
<th>Drug Name</th>
<th>Form</th>
<th>Dosage</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Phenytoin</td>
<td>Injection</td>
<td>100mg/ml vial</td>
<td>100mg</td>
</tr>
<tr>
<td>2.</td>
<td>Valproic Acid</td>
<td>Injection</td>
<td>100mg/ml Tablet: 500mg</td>
<td>500mg</td>
</tr>
<tr>
<td>3.</td>
<td>Levetiracetam</td>
<td>Injection</td>
<td>500mg/ml Tablet: 500mg</td>
<td>500mg</td>
</tr>
<tr>
<td>4.</td>
<td>Phenobarbital</td>
<td>Injection</td>
<td>Injection: 200mg (sodium)/ml Tablet: 15 mg, 30 mg, 60 mg</td>
<td>Anticonvulsant</td>
</tr>
<tr>
<td>5.</td>
<td>Magnesium sulphate</td>
<td>Injection</td>
<td>500mg/ml</td>
<td>Anticonvulsant (Eclampsia)</td>
</tr>
<tr>
<td>6.</td>
<td>Thiopentone</td>
<td>Injection</td>
<td>500mg</td>
<td>IV general anaesthetic, Anticonvulsant</td>
</tr>
<tr>
<td>7.</td>
<td>Propofol</td>
<td>Injection</td>
<td>10 mg/ ml in 20 ml ampoule</td>
<td>IV general anaesthetic, Anticonvulsant</td>
</tr>
</tbody>
</table>

#### Immunoglobulins

<table>
<thead>
<tr>
<th>No.</th>
<th>Drug Name</th>
<th>Form</th>
<th>Dosage</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intravenous Immunoglobulin (IVIg)</td>
<td>Injection</td>
<td></td>
<td>Immunoglobulin</td>
</tr>
</tbody>
</table>

### Drugs used for cerebral edema

<table>
<thead>
<tr>
<th>No.</th>
<th>Drug Name</th>
<th>Form</th>
<th>Dosage</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20% Mannitol</td>
<td>Injection</td>
<td>20% in 100ml vial</td>
<td>Osmotic diuretic</td>
</tr>
<tr>
<td>2.</td>
<td>3% Sodium chloride</td>
<td>Injection</td>
<td>3% in 100ml vial</td>
<td>Hypertonic saline</td>
</tr>
<tr>
<td>3.</td>
<td>Acetazolamide</td>
<td>Tablet</td>
<td>250mg</td>
<td>Carbonic anhydrase inhibitors</td>
</tr>
</tbody>
</table>

### Drugs used for gastrointestinal conditions

#### Antiemetics

<table>
<thead>
<tr>
<th>No.</th>
<th>Drug Name</th>
<th>Form</th>
<th>Dosage</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ondansetron</td>
<td>Injection</td>
<td>2mg/ml Tablet: 4mg, 8mg</td>
<td>5-HT3 antagonist</td>
</tr>
<tr>
<td></td>
<td>Drug Name</td>
<td>Form</td>
<td>Dose</td>
<td>Category</td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>2.</td>
<td>Metoclopramide</td>
<td>Injection, Tablet</td>
<td>10mg/ml, 10mg</td>
<td>Prokinetic agent</td>
</tr>
<tr>
<td>3.</td>
<td>Promethazine</td>
<td>Injection, Oral liquid, Tablet</td>
<td>Injection: 25 mg (hydrochloride)/ ml in 2 ml ampoule, Oral liquid: 5 mg (hydrochloride)/ 5 ml, Tablet: 25 mg (theoclate)</td>
<td>Phenothiazine</td>
</tr>
</tbody>
</table>

**Drugs used for acid peptic disorders**

### Antacids

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aluminium hydroxide + Magnesium hydroxide</td>
<td>Oral Suspension</td>
<td></td>
<td>Antacid</td>
</tr>
</tbody>
</table>

### H2 Blockers

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ranitidine</td>
<td>Injection, Tablet</td>
<td>Injection: 25 mg (as hydrochloride)/ ml in 2 ml ampoule, Tablet: 150 mg, 300 mg (as hydrochloride)</td>
<td>H2 Blockers</td>
</tr>
</tbody>
</table>

### Proton pump inhibitors

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Omeprazole</td>
<td>Capsule</td>
<td>20mg</td>
<td>Proton pump inhibitors</td>
</tr>
<tr>
<td>2.</td>
<td>Pantoprazole</td>
<td>Tablet, Injection</td>
<td>40mg, 40mg vial</td>
<td>Proton pump inhibitors</td>
</tr>
</tbody>
</table>

### Antiulcer drugs

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Form</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sucralfate</td>
<td>Suspension</td>
<td>Ulcer protective</td>
</tr>
</tbody>
</table>

### Drugs used for gastrointestinal bleed

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Form</th>
<th>Dose</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Octreotide</td>
<td>Injection</td>
<td>100mcg/ ml</td>
<td>Somatostatin analog</td>
</tr>
<tr>
<td>2.</td>
<td>Terlipressin</td>
<td>Injection</td>
<td>1mg/10ml</td>
<td>Vasopressin analog</td>
</tr>
<tr>
<td>3.</td>
<td>Sclerosing agents (Cyanoacryl glue)</td>
<td>Injection</td>
<td></td>
<td>Sclerosing agent</td>
</tr>
<tr>
<td>4.</td>
<td>Tranexamic acid</td>
<td>Injection</td>
<td>500mg/5ml</td>
<td>Antifibrinolytic</td>
</tr>
<tr>
<td>No.</td>
<td>Drug</td>
<td>Form</td>
<td>Strength</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>--------------</td>
<td>------------</td>
<td>------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>5.</td>
<td>Vitamin K</td>
<td>Injection</td>
<td>10mg/ml</td>
<td>Phytonadione (Vitamin)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laxatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Lactulose</td>
<td>Syrup</td>
<td>10gm/15ml</td>
<td>Laxative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drugs used for pain management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opioid Analgesics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Morphine</td>
<td>Injection</td>
<td></td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tablet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Pethidine</td>
<td>Injection</td>
<td></td>
<td>Injection: 50 mg (hydrochloride) in 1 ml ampoule</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Fentanyl</td>
<td>Injection</td>
<td>50mcg/ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Codeine</td>
<td>Tablet</td>
<td>15mg, 30mg (phosphate)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Tramadol</td>
<td>Injection</td>
<td>50mg/ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Opioids</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Paracetamol</td>
<td>Injection</td>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suppository</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tablet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. **Ibuprofen** Tablet 400mg NSAIDS
3. **Ketorolac** Tablet Injection 10mg 15mg/ml NSAIDS
4. **Naproxen** Tablet 250mg NSAIDS
5. **Diclofenac** Injection Table 75mg/ml NSAIDS 50mg, 100mg
6. **Hyoscine butyl bromide** Tablet Injection 10mg, 20mg 10mg/ml Anticholinergics

### Drugs for neuropathic pain management

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Dosage</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Amitriptyline</td>
<td>Tablet</td>
<td>10mg, 25mg</td>
<td>TCA (Tricyclic antidepressants)</td>
</tr>
<tr>
<td>2.</td>
<td>Carbamazepine</td>
<td>Tablet</td>
<td>100mg, 200mg</td>
<td>Anticonvulsant</td>
</tr>
<tr>
<td>3.</td>
<td>Duloxetine</td>
<td>Tablet</td>
<td>20mg</td>
<td>Antidepressant, SNRIs (Serotonin-norepinephrine reuptake inhibitors)</td>
</tr>
<tr>
<td>4.</td>
<td>Pregabalin</td>
<td>Tablet</td>
<td>75mg</td>
<td>Anticonvulsant</td>
</tr>
</tbody>
</table>

### Drugs used for gynaecological and obstetric emergencies

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Dosage</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Oxytocin</td>
<td>Injection</td>
<td>Injection: 5 IU/ml, 10 IU/ml in 1 ml ampoule</td>
<td>Uterotonics (Neuropeptide)</td>
</tr>
<tr>
<td>2.</td>
<td>Methergin</td>
<td>Injection</td>
<td>200mcg/ml</td>
<td>Ergot alkaloids</td>
</tr>
<tr>
<td>3.</td>
<td>Misoprostol</td>
<td>Tablet</td>
<td>200mcg</td>
<td>Prostaglandins</td>
</tr>
<tr>
<td>5.</td>
<td>Mifepristone</td>
<td>Tablet</td>
<td>200mg</td>
<td>Antiprogestins</td>
</tr>
<tr>
<td>6.</td>
<td>Methyldopa</td>
<td>Tablet</td>
<td>250mg, 500mg</td>
<td>Alpha 2 agonist</td>
</tr>
<tr>
<td>7.</td>
<td>Magnesium sulphate</td>
<td>Injection</td>
<td>500mg/ml</td>
<td>Anticonvulsant</td>
</tr>
<tr>
<td>8.</td>
<td>Nifedipine</td>
<td>Tablet</td>
<td>10mg</td>
<td>Calcium channel blocker</td>
</tr>
<tr>
<td>9.</td>
<td>Pyridoxine</td>
<td>Tablet</td>
<td>10mg</td>
<td>Vitamin</td>
</tr>
<tr>
<td>10.</td>
<td>Promethazine</td>
<td>Injection</td>
<td>Injection: 25 mg (hydrochloride)/ml in 2 ml ampoule</td>
<td>Antihistaminic Antiemetic</td>
</tr>
<tr>
<td>11.</td>
<td>Tranexamic acid</td>
<td>Injection</td>
<td>500mg/5ml, 500mg</td>
<td>Antifibrinolytic</td>
</tr>
</tbody>
</table>

### Drugs used for metabolic and acid base disorders

#### Drugs for fluid and electrolyte imbalance

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Dosage</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Normal saline</td>
<td>Injection</td>
<td>0.9%/3%</td>
<td>Crystalloid</td>
</tr>
<tr>
<td></td>
<td>Drug Name</td>
<td>Formulation</td>
<td>Category</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Ringer’s Lactate</td>
<td>Injection</td>
<td>Crystalloid</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Dextrose normal saline</td>
<td>Injection</td>
<td>Crystalloid</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Dextrose solution</td>
<td>Injection</td>
<td>Crystalloid</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Water for injection</td>
<td>Injection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Potassium chloride</td>
<td>Injection</td>
<td>Electrolyte supplement</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Sodium bicarbonate</td>
<td>Injection</td>
<td>Alkalising agent</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Calcium gluconate</td>
<td>Injection</td>
<td>Antidote</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Insulin</td>
<td>Injection</td>
<td>Peptide hormone</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Kayexalate (sodium polystyrene)</td>
<td>Powder</td>
<td>Potassium binding resin</td>
<td></td>
</tr>
</tbody>
</table>

### Drugs for ocular, ENT and dental emergencies

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ciprofloxacin</td>
<td>Eye drops</td>
<td>Eye ointment: 0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solution (eye/ ear drops):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.3% (as hydrochloride)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fluoroquinolone</td>
</tr>
<tr>
<td>2.</td>
<td>Ofloxacin</td>
<td>Eye drops</td>
<td>Solution (eye drop): 0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fluoroquinolone</td>
</tr>
<tr>
<td>3.</td>
<td>Chloramphenicol</td>
<td>Eye drops</td>
<td>Eye ointment: 1% w/w</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solution (eye drop): 0.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broad spectrum antibiotic</td>
</tr>
<tr>
<td>4.</td>
<td>Oxymetazoline</td>
<td>Nasal drops</td>
<td>Solution (nasal drops):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.025%, 0.05%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nasal decongestant</td>
</tr>
<tr>
<td>6.</td>
<td>Silver nitrate</td>
<td>Powder</td>
<td>Anti-infective agent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(for chemical cauter)</td>
</tr>
<tr>
<td>7.</td>
<td>Aluminium hydroxide</td>
<td>Powder/ paste</td>
<td>Inorganic compound</td>
</tr>
<tr>
<td>8.</td>
<td>Zinc oxide</td>
<td>Powder/ paste</td>
<td>Inorganic compound</td>
</tr>
</tbody>
</table>

### Drugs used for plastic and burns

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Silver sulfadiazine</td>
<td>Ointment</td>
<td>Topical sulfonamide antibacterial</td>
</tr>
</tbody>
</table>
### Drugs used for mental health disorders

#### Sedatives

1. **Diazepam**
   - **Form**: Tablet
   - **Dosage**: 5mg
   - **Route**: Oral
   - **Label**: 5mg/ml in 2ml ampoule
   - **Class**: Benzodiazepines

2. **Lorazepam**
   - **Form**: Tablet
   - **Dosage**: 2mg
   - **Route**: Oral
   - **Label**: 1mg/ml
   - **Class**: Benzodiazepines

3. **Midazolam**
   - **Form**: Injection
   - **Dosage**: 1mg/ml in 5ml vial
   - **Class**: Benzodiazepines

4. **Chlordiazepoxide**
   - **Form**: Tablet
   - **Dosage**: 10mg, 25mg
   - **Class**: Benzodiazepines

5. **Alprazolam**
   - **Form**: Tablet
   - **Dosage**: 0.25mg
   - **Class**: Benzodiazepines

6. **Clonazepam**
   - **Form**: Tablet
   - **Dosage**: 0.25mg, 0.5mg
   - **Class**: Benzodiazepines

#### Antidepressants/ antipsychotics

1. **Escitalopram**
   - **Form**: Tablet
   - **Dosage**: 5mg
   - **Class**: SSRIs

2. **Fluoxetine**
   - **Form**: Tablet
   - **Dosage**: 10mg
   - **Class**: SSRIs

3. **Risperidone**
   - **Form**: Tablet
   - **Dosage**: 1mg
   - **Class**: Atypical antipsychotic

4. **Haloperidol**
   - **Form**: Injection
   - **Dosage**: 5mg
   - **Class**: Antipsychotic

### Drugs used for toxicological emergencies/ antidotes

1. **Activated Charcoal**
   - **Form**: Powder
   - **Dosage**: 10g in sachet
   - **Class**: Antidote

2. **Atropine**
   - **Form**: Injection
   - **Dosage**: 0.6mg/ml
   - **Class**: Antidote

3. **Flumazemil**
   - **Form**: Injection
   - **Dosage**: 0.1mg/ml
   - **Class**: Antidote

4. **Glucagon**
   - **Form**: Injection
   - **Dosage**: 1mg/ml
   - **Class**: Antidote (Glycogenolytic agent)

5. **Protamine**
   - **Form**: Injection
   - **Dosage**: 10mg/ml in 5ml ampoule
   - **Class**: Antidote

6. **Pralidoxime**
   - **Form**: Injection
   - **Dosage**: Injection: 500mg, 1g in ampoule
   - **Class**: Antidote

7. **N acetylcysteine**
   - **Form**: Injection
   - **Dosage**: 200mg/ml in 10ml ampoule
   - **Class**: Antidote

   - **Form**: Tablet
   - **Dosage**: Effervescent: 600mg

8. **Sodium bicarbonate**
   - **Form**: Injection
   - **Class**: Antidote

9. **Naloxone**
   - **Form**: Injection
   - **Dosage**: 400mcg hydrochloride in 1ml ampoule
   - **Class**: Antidote

10. **Fomepizole**
    - **Form**: Injection
    - **Dosage**: 1gm/ml
    - **Class**: Antidote

11. **Vitamin K**
    - **Form**: Injection
    - **Dosage**: 10mg/ml
    - **Class**: Antidote

12. **Physostigmine**
    - **Form**: Injection
    - **Dosage**: 1mg/ml
    - **Class**: Antidote
## Drugs used for reptile bites, animal bites and insect stings

<table>
<thead>
<tr>
<th></th>
<th>Drug Name</th>
<th>Formulation</th>
<th>Dose/Concentration</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tetanus toxoid</td>
<td>Injection</td>
<td>0.5ml</td>
<td>Vaccine</td>
</tr>
<tr>
<td>2</td>
<td>Anti-tetanus immunoglobulin</td>
<td>Injection</td>
<td>1000 IU/ ml, 3000 IU/ ml in vial</td>
<td>Vaccine</td>
</tr>
<tr>
<td>3</td>
<td>Rabies immunoglobulin</td>
<td>Injection</td>
<td></td>
<td>Vaccine</td>
</tr>
<tr>
<td>4</td>
<td>Rabies vaccine</td>
<td>Injection</td>
<td></td>
<td>CCEEVs (Cell culture and embryonated egg based vaccine)</td>
</tr>
<tr>
<td>5</td>
<td>Polyvalent anti snake venom</td>
<td>Injection</td>
<td>10ml vial</td>
<td>Antivenom</td>
</tr>
<tr>
<td>6</td>
<td>Hepatitis B Immunoglobulin</td>
<td>Injection</td>
<td></td>
<td>Vaccine</td>
</tr>
<tr>
<td>7</td>
<td>HBV (Hepatitis B vaccine)</td>
<td>Injection</td>
<td></td>
<td>Vaccine</td>
</tr>
</tbody>
</table>

## Drugs used for anaphylactic reactions

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<thead>
<tr>
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<th>Drug Name</th>
<th>Formulation</th>
<th>Dose/Concentration</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adrenaline</td>
<td>Injection</td>
<td>1mg/ml</td>
<td>Alpha and beta adrenergic agonist (sympathomimetics)</td>
</tr>
<tr>
<td>2</td>
<td>Hydrocortisone</td>
<td>Powder for injection</td>
<td>Powder for injection of 100mg (as sodium succinate) in vial with water for injection</td>
<td>Corticosteroids</td>
</tr>
<tr>
<td>3</td>
<td>Promethazine</td>
<td>Injection</td>
<td>Injection: 25 mg (hydrochloride)/ ml in 2 ml ampoule</td>
<td>Antihistaminic Antiemetic</td>
</tr>
<tr>
<td>4</td>
<td>Chlorpheniramine</td>
<td>Injection</td>
<td>Injection: 22.75 mg (maleate)/ ml in 2 ml ampoule</td>
<td>Antihistaminic H1 blocker</td>
</tr>
<tr>
<td>5</td>
<td>Glucagon</td>
<td>Injection</td>
<td>1mg/ml</td>
<td>Glycogenolytic agent</td>
</tr>
<tr>
<td>6</td>
<td>Prednisolone</td>
<td>Tablet</td>
<td>5mg, 10mg, 20mg</td>
<td>Oral Corticosteroid</td>
</tr>
<tr>
<td>7</td>
<td>Levocetirizine</td>
<td>Tablet</td>
<td>5mg</td>
<td>Antihistaminic H1 blocker</td>
</tr>
<tr>
<td>8</td>
<td>Ranitidine</td>
<td>Tablet Injection</td>
<td>150mg, 50mg</td>
<td>H2 blocker</td>
</tr>
</tbody>
</table>
## ANNEX III: Patient Referral Form

<table>
<thead>
<tr>
<th>Patient Information:</th>
<th>History and Physical Findings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Treatment received:</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
</tr>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
</tr>
<tr>
<td>Date of admission:</td>
<td></td>
</tr>
<tr>
<td>Time of admission:</td>
<td></td>
</tr>
<tr>
<td>AM/PM</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason for referral:</th>
<th>At the time of referral:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisional diagnosis at the time of referral:</td>
<td>GCS</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
</tr>
<tr>
<td></td>
<td>BP</td>
</tr>
<tr>
<td></td>
<td>R/R</td>
</tr>
<tr>
<td></td>
<td>Pulse</td>
</tr>
<tr>
<td></td>
<td>SpO₂</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Referring Health Center:</th>
<th>Referred to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/address of health centre:</td>
<td>Name/address of health centre:</td>
</tr>
<tr>
<td>Name of treating health worker:</td>
<td>Phone No.:</td>
</tr>
<tr>
<td>Phone No.:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode of transport:</th>
<th>Monitoring during transfer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulance</td>
<td>Treatment received during transfer:</td>
</tr>
<tr>
<td>Others: (Please Specify)</td>
<td>Feedback from the receiving health centre:</td>
</tr>
<tr>
<td>Escorting personnel:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Informed Written Consent:</th>
<th>Consent taken by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taken/ not taken</td>
<td>Name:</td>
</tr>
<tr>
<td></td>
<td>Designation:</td>
</tr>
<tr>
<td>Name:</td>
<td>Signature:</td>
</tr>
<tr>
<td>Relation:</td>
<td>Date and Time:</td>
</tr>
<tr>
<td>Phone No:</td>
<td></td>
</tr>
<tr>
<td>Signature:</td>
<td></td>
</tr>
<tr>
<td>Date and Time:</td>
<td></td>
</tr>
</tbody>
</table>
### ANNEX IV: Participants on Pre-Planning/ Preliminary Consultative Meeting with key government officials on STP of EHS

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

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

<table>
<thead>
<tr>
<th>SN.</th>
<th>Name</th>
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<th>Institution</th>
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<tbody>
<tr>
<td>1</td>
<td>Dr. Narendra K. Khanal</td>
<td>Sr. Consultant, MDGP</td>
<td>CSD</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Shree Ram Tiwari</td>
<td>Emergency Medicine Expert/Reviewer</td>
<td>MoHP</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Pomawati Thapa</td>
<td>Section Chief</td>
<td>CSD</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Ashis Shrestha</td>
<td>Emergency Medicine Expert/Reviewer</td>
<td>Patan Hospital</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Sanu Krishna Shrestha</td>
<td>Emergency Medicine Expert/Reviewer</td>
<td>Dhulikhel Hospital</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Ajay Singh Thapa</td>
<td>Emergency Medicine Expert/Reviewer</td>
<td>Grande Int. Hospital</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Bharat Mani Marhatta,</td>
<td>Sr. Pharmacy Officer</td>
<td>CSD</td>
</tr>
<tr>
<td>8</td>
<td>Ms. Nilam Kumari Singh</td>
<td>Nursing Officer</td>
<td>CSD</td>
</tr>
<tr>
<td>9</td>
<td>Dr. Khin Pa Pa Naing</td>
<td>Technical Officer-HSS</td>
<td>WHO Country Office Nepal</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Olita Shilpakar</td>
<td>Sr. Consultant Emergency Physician</td>
<td>PHRD Nepal</td>
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<tr>
<td>11</td>
<td>Mr. Janak Thapa</td>
<td>Executive Director</td>
<td>PHRD Nepal</td>
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<td>12</td>
<td>Ms. Saimona Karki</td>
<td>Documentation Officer</td>
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### ANNEX VII: Participants on Consultative Meeting with Professional Councils and Associations on STP of EHS

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

<table>
<thead>
<tr>
<th>SN.</th>
<th>Name</th>
<th>Designation</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Laxman Aryal</td>
<td>Secretary</td>
<td>MoHP</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Roshan Pokharel</td>
<td>Chief Specialist</td>
<td>MoHP</td>
</tr>
<tr>
<td>3</td>
<td>Mr. Mahendra Prasad Shrestha</td>
<td>Chief Specialist</td>
<td>MoHP</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Dipendra Raman Singh</td>
<td>DG</td>
<td>DoHS</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Bikash Devkota</td>
<td>Chief, QSRD</td>
<td>MoHP</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Gunaraj Lohani</td>
<td>Chief, PPMD</td>
<td>MoHP</td>
</tr>
<tr>
<td>7</td>
<td>Dr. Jageshwor Gautam</td>
<td>Chief, HCD</td>
<td>MoHP</td>
</tr>
<tr>
<td>8</td>
<td>Dr. Madan Kumar Upadhaya</td>
<td>Director</td>
<td>CSD/DoHS</td>
</tr>
<tr>
<td>9</td>
<td>Dr. Krishna Prasad Poudel</td>
<td>Director</td>
<td>EDCD/DoHS</td>
</tr>
<tr>
<td>10</td>
<td>Ms. Roshani Laxmi Tuitui</td>
<td>Director</td>
<td>NSSD/DoHS</td>
</tr>
<tr>
<td>11</td>
<td>Dr. Rajesh Pandav</td>
<td>Representative</td>
<td>WHO</td>
</tr>
<tr>
<td>12</td>
<td>Dr. Runa Jha</td>
<td>Director</td>
<td>NPHL</td>
</tr>
<tr>
<td>13</td>
<td>Dr. Yadu Chandra Ghimire</td>
<td>Director</td>
<td>NHTC</td>
</tr>
<tr>
<td>14</td>
<td>Dr. Bibek Kumar Lal</td>
<td>Director</td>
<td>STAC</td>
</tr>
<tr>
<td>15</td>
<td>Mr. Sunil Raj Sharma</td>
<td>Director</td>
<td>NHEICC</td>
</tr>
<tr>
<td>16</td>
<td>Dr. Guna Nidhi Sharma</td>
<td>Senior Health Administrator</td>
<td>MoHP</td>
</tr>
<tr>
<td>17</td>
<td>Dr. Shree Ram Tiwari</td>
<td>Emergency Medicine Expert/Reviewer</td>
<td>MoHP</td>
</tr>
<tr>
<td>18</td>
<td>Dr. Roshan Neupane</td>
<td>Sr. MS</td>
<td>MoHP</td>
</tr>
<tr>
<td>19</td>
<td>Dr. Surendra Chaurasia</td>
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