

CURRICULUM

MASTERS IN EMERGENCY MEDICINE (M.E.M)
BY SOCIETY FOR EMERGENCY MEDICINE INDIA (SEMI)
PRS HOSPITAL, TRIVANDRUM

Affiliated to
INTERNATIONAL FEDERATION OF EMERGENCY MEDICINE

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1. PREFACE

Emergency Medicine has long been established as a primary medical specialty in Australia, Canada, Ireland, the United Kingdom and the United States. The specialty of Emergency Medicine incorporates the resuscitation and management of all undifferentiated urgent and emergency cases until discharge or transfer to the care of another physician. Emergency Medicine is an inter-disciplinary specialty, one which is interdependent with all other clinical disciplines. It thus complements and does not seek to compete with other medical specialties.

The Society for Emergency Medicine in India (SEMI) was established in 1999. Emergency Medicine is currently recognised as a primary medical specialty in India. The recommended minimum period of training is three years. The essential features of a clinical specialty include a unique field of action, a defined body of knowledge and a rigorous training programme. Emergency Medicine has a unique field of action, both within the Emergency Department and in the community, and this curriculum document not only incorporates the relevant body of knowledge and associated competencies but also establishes the essential principles for a rigorous training programme. Not all institutes may choose to pursue this path of a primary medical specialty at this stage but those that do choose should be encouraged to adopt this curriculum and to train Emergency Physicians to an International standard which will enable them to transfer their skills across national borders.

This new and expanded version of the Curriculum presents a guideline for the development and organisation of recognised training programmes of comparable standard across the world. The document was developed by a Curriculum Task Force of SEMI, who were exposed to international curricula.

2. INTRODUCTION

2.1 THE SPECIALTY OF EMERGENCY MEDICINE

Emergency Medicine is a medical specialty based on the knowledge and skills required for the prevention, diagnosis and management of the acute and urgent aspects of illness and injury affecting patients of all age groups with a full spectrum of undifferentiated physical and behavioural disorders. It is a specialty in which time is critical. The practice of Emergency Medicine encompasses the pre-hospital and in-hospital reception, resuscitation and management of undifferentiated urgent and emergency cases until discharge from the Emergency Department or transfer to the care of another physician. It also includes involvement in the development of pre-hospital and in-hospital emergency medical systems.

2.2 THE CURRICULUM FOR EMERGENCY MEDICINE

Any curriculum must state the aims and objectives, content, experiences, outcomes and processes of the educational programme of a specialty. It should include a description of the training structure, such as entry requirements, length and organisation of the programme including its flexibilities, and assessment system and a description of the expected methods of learning, teaching, feedback and supervision. The curriculum should cover both generic professional and specialty specific areas. This document describes the recommended curriculum for Emergency Medicine training in India.

3. COMPETENCIES, KNOWLEDGE AND SKILLS

The curriculum covers knowledge, skills and expertise which the post graduate trainee in Emergency Medicine must achieve and includes:

- Core Competencies of the Emergency Physician
- System-Based Core Knowledge
- Common Presenting Symptoms
- Special Aspects of Emergency Medicine
- Core Clinical Procedures and Skills.

3.1 CORE COMPETENCIES OF AN EMERGENCY PHYSICIAN

Some of the competencies identified in this curriculum are those required of a hospital specialist in any medical discipline whilst others are more specific to the practice of Emergency Medicine. However, it is accepted that the levels of competence required of an Emergency Physician in specialised areas of medical practice should be limited to those which determine whether and when urgent or immediate more specialist referral is appropriate. Emergency Medicine complements and does not seek to compete with other hospital medical disciplines. The areas of competency in Emergency Medicine, as previously defined are:

- Patient care
- Medical knowledge
- Communication, collaboration and interpersonal skills
- Professionalism, ethical and legal issues
- Organisational planning and service management skills
- Education and research.

3.1.1 PATIENT CARE

Emergency Physicians care for patients with a wide range of pathology from the life threatening to the self limiting and from all age groups. The attendance and number of these patients is unpredictable and they mostly present with symptoms rather than diagnoses. Therefore the provision of care needs to be prioritised, and this is a dynamic process. The approach to the patient is global rather than organ specific. Patient care includes physical, mental and social aspects. It focuses on initial care until discharge or referral to other health professionals. Patient education and public health aspects must be considered in all cases. To ensure the above patient care, EPs must particularly focus on the following:

3.1.1.1 Triage

EPs must know the principles of triage which is the process of the allocation and medical prioritisation of care for the pre-hospital setting, the Emergency Department and in the event of mass casualties. It is based mainly on the evaluation of vital parameters and key symptoms to prioritise and categorise patients according to severity of injury or illness, prognosis and availability of resources.

3.1.1.2 Primary assessment and stabilisation of life threatening conditions

The ABCDE approach must be the primary assessment tool for all patients and does not require a diagnostic work-up. It is a structured approach with which to identify and resuscitate the critically ill and injured. EPs must be able to assess, establish and maintain: Airway [A], Breathing [B], Circulation [C], Disability [D] and Exposure [E] of the patient.

3.1.1.3 Focused medical history

EPs must focus the initial medical history on presenting complaints and on clinical findings as well as on conditions requiring immediate care.

3.1.1.4 Secondary assessment and immediate clinical management

EPs must perform secondary assessment with a timely diagnostic work-up focusing on the need for early action. Clinical management must also include further aspects of health (physical, mental and social).

3.1.1.5 Clinical decision making

EPs must be able to make clinical decisions including:

- Re-triage
- Immediate and/or definitive care provided in the ED
- Planning for admission or discharge.

3.1.1.6 Clinical documentation

EPs must make contemporaneous medical records which focus on:

- Relevant medical history
- Main complaints and abnormal findings
- Provisional diagnosis and planned investigations
- Results of investigations
- Treatment

- Conclusions and management decisions
- Patient information

3.1.1.7 Re-evaluation and further management

EPs must perform continuous re-evaluation of the patient, with adjustment of the provisional diagnosis and care when it becomes necessary.

3.1.2 MEDICAL KNOWLEDGE AND CLINICAL SKILLS

Emergency Physicians (EPs) need to acquire the knowledge and skills described in sections 3.2, 3.3, 3.4 and 3.5.

3.1.3 COMMUNICATION, COLLABORATION AND INTERPERSONAL SKILLS

Emergency Medicine is practised in difficult and challenging environments. Effective communication is essential for safe care and for building and maintaining good relationships, avoiding barriers such as emotions, stress and prejudices. EPs must be able to use both verbal and non-verbal communication skills, as well as information and communication technology. In the case of a patient who is incompetent by virtue of age or mental capacity, communication should be with a parent or other legal representative. EPs must be able to demonstrate communication and interpersonal skills that include the following:

3.1.3.1 Patients and relatives

EPs should give special attention to involving the patient in decision-making, seeking informed consent for diagnostic and therapeutic procedures, sharing information, breaking bad news, giving advice and recommendations on discharge and also communicating with populations with language barriers.

3.1.3.2 Colleagues and other health care providers

Important skills for an EP are sharing information on patient care, working as a member or the leader of a team, referring and transferring patients.

3.1.3.3 Other care providers such as the police, the fire department and social services EPs must give attention to respecting patient confidentiality.

3.1.3.4 Mass media and the general public

EPs must be able to interact with the mass media in a constructive way, giving correct information to the public and at the same time respecting the privacy of the patient.

3.1.4 PROFESSIONALISM AND OTHER ETHICAL AND LEGAL ISSUES

3.1.4.1 Professional behaviour and attributes

The general professional behaviour and attributes of Emergency Physicians must not be adversely influenced by working in stressful circumstances and with a diverse patient population. They must learn to identify their educational needs and to work within their own limitations. They must be able to self-motivate even at times of stress or discomfort. They must recognise their own as well as system errors and value participation in the peer review process.

3.1.4.2 Working within a team or as a leader of a team

EPs must understand the role of colleagues in other specialities and must be able to lead or to work effectively even in a new or large team often under considerable stress.

3.1.4.3 Delegation and referral

EPs must understand the responsibilities and potential consequences of delegating, referring to a colleague in another discipline or transferring the patient to another doctor, health care professional or health care setting.

3.1.4.4 Patient confidentiality

EPs must understand the law regarding patient confidentiality and data protection. They must know what confidentiality problems arise when dealing with relatives, the police, EMS communication, telephone discussions and the media.

3.1.4.5 Autonomy and informed consent

EPs must respect the right of competent patients to be fully involved in decisions about their care. They must also value the right of competent patients to refuse clinical procedures or treatment. They must understand how the ethical principles of autonomy and informed consent affect emergency practitioners.

3.1.4.6 The competent/incompetent patient

EPs must be able to assess whether a patient has the competence to make an informed decision. They must also understand the legal rights of a guardian or adult with power of attorney and when they treat minors. They must be familiar with those aspects of mental health legislation which relate to competence.

3.1.4.7 Abuse and violence

EPs must be able to recognise patterns of illness or injury which might suggest physical or sexual abuse or domestic violence to children or adults. They must be able to initiate appropriate child or adult protection procedures. They must also learn to prevent and limit the risks of violence and abuse to staff working in an emergency setting.

3.1.4.8 Do not attempt to resuscitate (DNAR) and limitations of therapeutic interventions

EPs must learn to discuss with colleagues and in a professional and empathic manner with relatives, the initiation or possible discontinuation of active interventions when this is considered to be medically appropriate. They must understand when and how they should use advance directives such as living wills and durable powers of attorney. Patients may formally signal their preferences for end of life care in a written document or may nominate a surrogate decision maker in the event of future incompetence. Legal standings of such documents is highly variable.

3.1.4.9 Medico-legal issues

EPs must operate within the legal framework of the country in which they are working.

3.1.4.10 Legislation and ethical issues in Emergency Medicine

EPs should have an understanding of ethics and law, as well as the legal aspects of bioethical issues in Emergency Medicine. They must be able to make a reasoned analysis of ethical conflicts and develop the skills to resolve ethical dilemmas in an appropriate manner. They must also look to the law for guidance, although the law does not always provide the answer to many ethical problems. Ethics in Emergency Medicine help to prepare EPs to face new ethical dilemmas in their practice. The use of ethical analysis provides the framework for determining moral duty, obligation and conduct. EPs must learn to identify, refine, and apply general moral principles to their practice related to:

- *Patient autonomy* (informed consent and refusal, patient decision-making capacity, treatment of minors, advance directives, the obligations of the Good Samaritan statutes).
- *End of life decisions* (limiting resuscitation, futility).
- *The physician-patient relationship* (confidentiality, truth telling and communication, compassion and empathy).
- *Issues related to justice* (duty, ethical issues of resuscitation, health care rationing, moral issues in disaster medicine, research, resuscitation issues in pregnancy).

3.1.5 ORGANISATIONAL PLANNING AND SERVICE MANAGEMENT SKILLS

This competence is needed to enhance the safety and quality of patient care and the work environment. Emergency Physicians must continuously adapt and prioritise existing and available resources to meet the needs of all patients and maintain the quality of care.

3.1.5.1 Case management

EPs must be able to provide and balance the different care processes between the individual patient and the total case-mix. After primary and secondary assessment, they may refer a patient to another point of contact within the health care or social network. They must provide clear guidance to those patients discharged without formal follow up.

3.1.5.2 Quality standards, audit and clinical outcomes

It is important that EPs use evidence-based medicine and recognise the value of quality standards to improve patient care which is effective and safe. They must be able to undertake audit and use clinical outcomes, including critical incident reporting, as ways of continuously improving clinical practice.

3.1.5.3 Time management

EPs must be able to manage the individual patient as well as the overall patient flow in a timely manner which is dependent upon available resources, accepted medical standards and public expectation. EPs must also learn to manage their own time in an effective way.

3.1.5.4 Information management

EPs often manage patients for whom limited information is available. They may need to communicate with other agencies to obtain relevant information whilst respecting the

confidentiality of the patient. Patient data collected during the process of care must be accessible to all involved health care professionals through adequate documentation. EPs need a broad knowledge of the latest advances in medicine and must be able to access and manage information relevant to the specific care of an individual patient.

3.1.5.5 Documentation

EPs are responsible for clear, legible, accurate, contemporaneous and complete records of patient care where the author, date and time are clearly identified. Documentation is a continuous process and all entries must be made in real time as far as possible.

3.1.6 EDUCATION AND RESEARCH

3.1.6.1 Self education and improvement

EPs must develop their knowledge and practice in EM by continuous education. They have to identify areas for personal improvement and learn to implement patient care based on scientific evidence.

3.1.6.2 Teaching skills

EPs must be involved in teaching undergraduate, graduate and post graduate health care students, and the general population. They must also continuously develop the skills to be effective teachers.

3.1.6.3 Critical appraisal of scientific literature

EPs must be able to investigate and evaluate their own practice. They must learn to use evidence-based medicine and guidelines, where applicable, and become familiar with the principles of clinical epidemiology, biostatistics, quality assessment and risk management.

3.1.6.4 Clinical and basic research

EPs must understand the scientific basis of EM, the use of scientific methods in clinical research and the fundamental aspects of basic research. They must be able to critically review research studies and be able to understand, present and implement them into clinical practice. They should understand the process of developing a hypothesis from a clinical problem and of testing that hypothesis. They should also understand the specific aspects of obtaining consent as well as the ethical considerations of research in emergency situations.

3.2 SYSTEM-BASED CORE KNOWLEDGE

This section of the curriculum gives an index of the system-based core knowledge appropriate to the management of patients presenting with undifferentiated symptoms and complaints. This list is mostly given in the following sequence: congenital disorders; inflammatory and infectious disorders; metabolic disorders; traumatic and related problems; tumours; vascular disorders, ischemia and bleeding; other disorders. These lists cannot be exhaustive.

3.2.1 CARDIOVASCULAR EMERGENCIES IN ADULTS AND CHILDREN

- *Arrhythmias*
- *Congenital heart disorders*
- *Contractility disorders*
 - Pump failure
 - Cardiomyopathies
 - Congestive heart failure
 - Acute pulmonary oedema
- Cardiac tamponade
- Valvular emergencies
- Inflammatory and infectious cardiac disorders
 - endocarditis
 - myocarditis
 - pericarditis
- Ischaemic heart disease
 - Acute coronary syndromes
 - Stable angina
 - Unstable angina
- Traumatic injuries
- Vascular and thromboembolic disorders
 - Aortic dissection/aneurysm rupture
 - Deep vein thrombosis
 - Hypertensive emergencies
 - Occlusive arterial disease
 - Thrombophlebitis
 - Pulmonary embolism
 - Pulmonary hypertension

3.2.2 DERMATOLOGICAL EMERGENCIES IN ADULTS AND CHILDREN

- Inflammatory and Infectious disorders
- Skin manifestations of immunological disorders, systemic disorders and toxic disorders

3.2.3 ENDOCRINE AND METABOLIC EMERGENCIES IN ADULTS AND CHILDREN

- Acute presentation of inborn errors of metabolism
- Adrenal insufficiency and crisis
- Disorders of glucose metabolism
 - Hyperosmolar hyperglycaemic state
 - Hypoglycaemia
 - Diabetic Ketoacidosis
- Thyroid disease emergencies
 - Hyperthyroidism
 - Hypothyroidism
 - Myxoedema coma
 - Thyroid storm

3.2.4 FLUID AND ELECTROLYTE DISTURBANCES

- Acid-Base disorders
- Electrolyte disorders
- Volume status and fluid balance

3.2.5 EAR, NOSE, THROAT, ORAL AND NECK EMERGENCIES IN ADULTS AND CHILDREN

- Bleeding
- Complications of Tumours- Airway Obstruction, Bleeding
- Foreign bodies
- Inflammatory and Infectious disorders
- Traumatic problems

3.2.6 GASTROINTESTINAL EMERGENCIES IN ADULTS AND CHILDREN

- *Congenital disorders*
 - Hirschsprung's disease
 - Meckel's diverticulum
 - Pyloric stenosis
- *Inflammatory and Infectious disorders*
 - Appendicitis

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- Cholecystitis
- Cholangitis
- Diverticulitis
- Exacerbations and complications of inflammatory bowel diseases
- Gastritis
- Gastroenteritis
- Gastro-oesophageal reflux disease
- Hepatitis
- Pancreatitis
- Peptic ulcer
- Peritonitis
- *Metabolic disorders*
 - Hepatic disorders
 - Hepatic failure
- *Traumatic and mechanical problems*
 - Foreign bodies
 - Hernia
 - Strangulation
 - Intestinal obstruction
- *Tumours*
- *Vascular disorders: Ischemia and Bleeding*
 - Ischaemic colitis
 - Upper and lower gastrointestinal bleeding
 - Mesenteric ischemia
- *Other problems like complications of*
 - Gastrointestinal devices
 - Surgical procedures

3.2.7 GYNAECOLOGICAL AND OBSTETRIC EMERGENCIES

- *Inflammatory and Infectious disorders-*
 - Mastitis
 - Pelvic Inflammatory Disease
 - Vulvovaginitis
- *Obstetric emergencies*
 - Abruptio placentae

- Eclampsia
- Ectopic pregnancy
- Emergency delivery
- HELLP syndrome
- Hyperemesis gravidarum
- Placenta previa
- Post-Partum Haemorrhage
- *Traumatic and related problems*
- *Tumours*
- *Vascular disorders*
 - Ischemia
 - Bleeding

3.2.8 HAEMATOLOGY AND ONCOLOGY EMERGENCIES IN ADULTS AND CHILDREN

- *Anaemia*
- *Complications of Lymphomas and Leukaemias*
- *Congenital disorders*
 - Haemophilia
 - Von Will brand's disease
 - Hereditary haemolytic anaemia
 - Sickle cell disease
- *Inflammatory and Infectious disorders*
 - Neutropenic fever
 - Infections in immuno-compromised patients
- *Vascular disorders*
 - Ischemia and Bleeding-acquired bleeding disorders (coagulation factor deficiency, Disseminated Intravascular Coagulation)
 - Drug induced bleeding (anticoagulants, antiplatelet agents and fibrinolytics)
 - Idiopathic Thrombocytopenic Purpura
 - Thrombotic Thrombocytopenic Purpura

- *Transfusion reactions*

3.2.9 IMMUNOLOGICAL EMERGENCIES IN ADULTS AND CHILDREN

- Allergies and anaphylactic reactions
- Inflammatory and Infectious disorders

3.2.10 INFECTIOUS DISEASES AND SEPSIS IN ADULTS AND CHILDREN

- Common viral and bacterial infections
- Food and water-borne infectious diseases
- HIV infection and AIDS
- Common tropical diseases
- Parasitosis
- Rabies
- Meningitis
- Typhoid and Paratyphoid fever
- Gas gangrene
- Botulism
- SARS
- Sepsis and septic shock
- Sexually transmitted diseases
- Streptococcal toxic shock syndrome
- Soft tissue infections
- Malaria
- Dengue
- Leptospirosis
- Tetanus

3.2.11 MUSCULO-SKELETAL EMERGENCIES

- *Congenital disorders*
 - Dislocated hip
 - Osteogenesis imperfecta
- *Inflammatory and Infectious disorders*
 - Arthritis
 - Bursitis
 - Cellulitis
 - Complications of systemic rheumatic diseases
 - Necrotising fasciitis
 - Osteomyelitis
 - Polymyalgia rheumatic
 - Soft tissue infections
- *Metabolic disorders* Complications of

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- Osteoporosis
- Other systemic diseases
- *Traumatic and degenerative disorder*
 - Back disorders
 - Common fractures and dislocations
 - Compartment syndromes
 - Crush syndrome
 - Osteoarthritis
 - Rhabdomyolysis
 - Soft tissue trauma

• *Tumours:*

3.2.12 NEUROLOGICAL EMERGENCIES IN ADULTS AND CHILDREN

- *Inflammatory and Infectious disorders*
 - Brain abscess
 - Encephalitis
 - Febrile seizures in children
 - Guillain-Barrè syndrome
 - Meningitis
 - Peripheral facial palsy (Bell's palsy)
 - Temporal arteritis
- *Traumatic and related problems*
 - Complications of CNS devices
 - Spinal cord syndromes
 - Peripheral nerve trauma and entrapment
 - Traumatic brain injury
- *Tumours common presentations and acute complications of*
 - Neurological tumours
 - Metastatic tumours
- *Vascular disorders*
 - Ischemia and Bleeding- carotid artery dissection
 - Stroke
 - Subarachnoid haemorrhage
 - Subdural and extradural haematoma
 - Transient ischaemic attack

- Venous sinus thrombosis

- *Other problems*

- Acute complications of chronic neurological conditions (e.g. myasthenic crisis, multiple sclerosis)
- Acute peripheral neuropathies
- Seizures and status epilepticus

3.2.13 OPHTHALMIC EMERGENCIES IN ADULTS AND CHILDREN

- *Inflammatory and Infectious disorders*

- Conjunctivitis
- Dacrocystitis
- Endophthalmitis
- Iritis
- Keratitis
- Orbital and Periorbital cellulitis
- Uveitis

- *Traumatic and related problems*

- Foreign body in the eye
- Ocular injuries

- *Vascular disorders*

- Ischemia and Bleeding-retinal artery and vein occlusion
- Vitreous haemorrhage

- *Others*

- Acute glaucoma
- Retinal detachment

3.2.14 PULMONARY EMERGENCIES IN ADULTS AND CHILDREN

- *Congenital*

- Cystic fibrosis

- *Inflammatory and Infectious disorders*

- Asthma
- Bronchitis
- Bronchiolitis
- Pneumonia
- Empyema
- COPD exacerbation

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- Lung abscess
- Pleurisy and Pleural effusion
- Pulmonary fibrosis
- Tuberculosis
- *Traumatic and related problems*
 - Foreign body inhalation
 - Haemothorax
 - Tension pneumothorax
 - Pneumomediastinum
- *Tumours*- Common complications and acute complications of
 - Pulmonary tumours
 - Metastatic tumours
- *Vascular disorders*
 - Pulmonary embolism
- *Other disorders*
 - Atelectasis
 - ARDS
 - Spontaneous pneumothorax

3.2.15 PSYCHIATRIC AND BEHAVIOUR DISORDERS

- *Behaviour disorders*
 - Affective disorders
 - Confusion
 - Consciousness disturbances
 - Intelligence disturbances
 - Memory disorders
 - Perception disorders
 - Psycho-motor disturbances
 - Thinking disturbances
- *Common psychiatric emergencies*
 - Acute psychosis
 - Anorexia and bulimia complications
 - Anxiety and panic attacks
 - Conversion disorders
 - Deliberate self-harm and suicide attempt

- Depressive illness
- Personality disorders Substance
- Drug and alcohol abuse

3.2.16 RENAL AND UROLOGICAL EMERGENCIES IN ADULTS AND CHILDREN

• *Inflammatory and Infectious disorders*

- Epididymo-orchitis
- Glomerulonephritis
- Pyelonephritis
- Prostatitis
- Sexually transmitted diseases
- Urinary tract infections

• *Metabolic disorders*

- Acute renal failure
- Nephrotic syndrome
- Nephrolithiasis
- Uraemia

• *Traumatic and related problems*

- Urinary retention
- Testicular torsion

• *Tumours*

• *Vascular disorders*

- Ischemia
- Bleeding

• *Other disorders*

- Comorbidities in dialysis and renal transplanted patients
- Complications of urological procedures and devices
- Haemolytic uremic syndrome

3.2.17 TRAUMA IN ADULTS AND CHILDREN

• *Origin of trauma*

- Burns
- Blunt trauma
- Penetrating trauma

• *Anatomical location of trauma*

- Head and neck

- Maxillo-facial
- Thorax
- Abdomen
- Pelvis
- Spine
- Extremities
- *Polytrauma patient*
- *Trauma in specific populations*
 - Children
 - Elderly
 - Pregnant women

3.3 COMMON PRESENTING SYMPTOMS

This section of the Curriculum lists the more common presenting symptoms of patients in the emergency setting. The differential diagnoses are listed according to the systems involved and then in alphabetical order. The diagnoses requiring immediate attention, in terms of potential severity and need of priority, are highlighted in bold. These lists of possible diagnoses cannot be exhaustive.

3.3.1 ACUTE ABDOMINAL PAIN

- *Gastrointestinal causes*
 - Appendicitis
 - Cholecystitis
 - Cholangitis
 - Acute pancreatitis
 - Complications of hernias
 - Diverticulitis
 - Hepatitis
 - Hiatus hernia
 - Inflammatory bowel disease
 - Intestinal obstruction
 - Ischaemic colitis
 - Mesenteric ischemia
 - Peptic ulcer
 - Peritonitis

- Viscous perforation

• ***Cardiac/vascular causes***

- Acute myocardial infarction
- Aortic dissection
- Aortic aneurysm rupture

• ***Dermatological cause***

- Herpes zoster

• ***Endocrine and metabolic causes***

- Addison's disease
- Diabetic ketoacidosis
- Other metabolic acidosis
- Porphyria

• ***Gynaecological and Obstetric cause***

- Complications of pregnancy
- Ectopic pregnancy
- Pelvic Inflammatory Disease
- Rupture of ovarian cyst
- Ovarian torsion

• ***Haematological causes***

- Acute porphyria crisis
- Familial mediterranean fever
- Sickle cell crisis

• ***Musculo-skeletal causes***

Referred pain from thoraco-lumbar spine

• ***Renal and Genitourinary causes***

- Pyelonephritis
- Renal stones

• ***Respiratory causes***

- Pneumonia
- Pleurisy

• ***Toxicology***

• ***Trauma***

3.3.2 ALTERED BEHAVIOUR AND AGITATION

- *Psychiatric causes*
 - Acute psychosis
 - Depression
- *Cardiac/Vascular causes*
 - Hypertension
 - Vasculitis
- *Endocrine and metabolic causes*
 - Hypoglycaemia
 - Hyperglycaemia
 - Electrolyte imbalance
 - Hyperthermia
 - Hypoxemia
- *Neurological causes*
 - Cerebral space occupying lesions
 - Dementia
 - Hydrocephalus
 - Intracranial hypertension
 - CNS infections
- *Toxicology*

3.3.3 ALTERED LEVEL OF CONSCIOUSNESS IN ADULTS AND CHILDREN

- *Neurological causes*
 - Cerebral tumour
 - Epilepsy and status epilepticus
 - Meningitis
 - Encephalitis
 - Stroke
 - Subarachnoid haemorrhage
 - Subdural and extradural haematoma
 - Traumatic brain injury
- *Cardiovascular causes*
 - Hypoperfusion state
 - Shock
- *Endocrine and metabolic causes*
 - Electrolyte imbalances

- Hepatic coma
- Hypercapnia
- Hypothermia
- Hypoxia
- Hypoglycaemia/ hyperglycaemia
- Uraemia
- *Gynaecological and Obstetric causes*
 - Eclampsia
- *Infectious causes*
 - Septic shock
- *Psychiatric causes*
 - Conversion syndrome
- *Respiratory causes*
 - Respiratory failure
- *Toxicology*

3.3.4 BACK PAIN

- *Musculo-Skeletal causes*
 - Fractures
 - Intervertebral disc strain and degeneration
 - Strain of muscles
 - ligaments and tendons
 - Spinal stenosis
 - Arthritides
 - Arthrosis
- *Cardiovascular causes*
 - Aortic aneurysm
 - Aortic dissection
- *Infectious causes*
 - Osteomyelitis
 - Discitis
 - Pyelonephritis
 - Prostatitis
- *Endocrine and metabolic causes*
 - Paget's disease

- *Gastrointestinal causes*
 - Pancreatitis
 - Cholecystitis
- *Dermatological causes*
 - herpes zoster
- *Gynaecological causes*
 - Endometriosis
 - Pelvic inflammatory disease
- *Haematological and Oncological causes*
 - Abdominal tumours
 - Vertebral tumours
- *Neurological cause:*
 - Subarachnoid haemorrhage
- *Renal and Genitourinary causes*
 - Renal abscess
 - Renal calculi
- *Trauma*

3.3.5 BLEEDING (NON TRAUMATIC)

- *Ear, Nose, Throat causes*
 - Ear bleeding (otitis, trauma, tumours)
 - Epistaxis
- *Gastrontestinal causes*
 - Haematemesis and melaena (acute gastritis, gastro-duodenal ulcer, Mallory Weiss syndrome, Oesophageal varices)
 - Rectal bleeding (acute diverticulitis, Haemorrhoids, Inflammatory bowel disease, tumours)
- *Gynaecological and Obstetric causes*
 - Menorrhagia/Metrorrhagia (abortion, abruptio placentae, tumours)
- *Renal and Genitourinary causes*
 - Haematuria (pyelitis, tumours, urolithiasis)
- *Respiratory causes*
 - Haemoptysis (bronchiectasis, pneumonia, tumours, tuberculosis)

3.3.6 CARDIAC ARREST

- *Cardiac arrest treatable with defibrillation*
- *Cardiac arrest treatable without defibrillation*

3.3.7 CHEST PAIN

- *Cardiac/vascular causes*
 - Acute coronary syndrome
 - Aortic dissection
 - Arrhythmias
 - Pericarditis
 - Pulmonary embolism
- *Respiratory causes*
 - Pneumonia
 - Pneumomediastinum
 - Pneumothorax (especially tension pneumothorax)
 - Pleurisy
- *Gastrointestinal causes*
 - Gastro-oesophageal reflux disease
 - Oesophageal rupture
 - Oesophageal spasm
- *Musculo-Skeletal causes*
 - Costosternal injury
 - Costochondritis
 - Intercostal muscle pain
 - Pain referred from thoracic spine
- *Psychiatric causes*
 - Anxiety
 - Panic attack
- *Dermatological causes*
 - Herpes zoster

3.3.8 CRYING BABY

- *I - Infections*
 - Herpes stomatitis
 - Meningitis
 - Osteomyelitis
 - Urinary tract infection

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- *T* –
 - Testicular torsion
 - Trauma
 - Teeth problems
- *C - Cardiac*
 - Arrhythmias
 - Congestive heart failure
- *R* -
 - Reaction to milk
 - Reaction to medications
 - Reflux
- *I* -
 - Immunisation and allergic reactions
 - Insect bites
- *E - Eye*
 - Corneal abrasions
 - Glaucoma
 - Ocular foreign bodies
- *S – Some gastrointestinal causes*
 - Hernia
 - Intussusception
 - Volvulus

3.3.9 DIARRHOEA

- *Infectious causes*
 - AIDS
 - Bacterial enteritis
 - Viral
 - Parasites Food-borne
 - Toxins
- *Toxicological causes*
 - Drugs related
 - Poisoning (including Heavy metals, Mushrooms, Organophosphates, Rat poison, Seafood)
- *Endocrine and metabolic causes*

- Carcinoids
- Diabetic neuropathy
- *Gastrointestinal causes*
 - Diverticulitis
 - Dumping syndrome
 - Ischaemic colitis
 - Inflammatory bowel disease
 - Enteritis due to radiation or chemotherapy
- *Haematological and Oncological causes*
 - Toxicity due to cytostatic therapies
- *Immunology*
 - Food allergy
- *Psychiatric disorders*
 - Diarrhoea factitia

3.3.10 DYSPNOEA

- *Respiratory Causes*
 - Airway obstruction
 - Broncho-alveolar obstruction
 - Parenchymal diseases
 - Pulmonary shunt
 - Pleural effusion
 - Atelectasis
 - Pneumothorax
- *Cardiac/vascular causes*
 - Cardiac decompensation
 - Cardiac tamponade
 - Pulmonary embolism
- *Ear, Nose, Throat causes*
 - Epiglottitis
 - Croup
 - Pseudocroup
- *Fluid & Electrolyte disorders*
 - Hypovolaemia
 - Shock

- Anaemia
- *Gastrointestinal causes*
 - Hiatus hernia
- *Immunological causes*
 - Vasculitis
- *Metabolic causes*
 - Metabolic acidosis
 - Uraemia
- *Neurological causes*
 - Myasthenia gravis
 - Guillain Barre syndrome
 - Amyotrophic lateral sclerosis
- *Psychiatric disorders*
 - Conversion syndrome
- *Toxicology*
 - CO intoxication
 - Cyanide intoxication
- *Trauma*
 - Flail chest
 - Lung contusion
 - Traumatic pneumothorax
 - Haemothorax

3.3.11 FEVER AND ENDOGENOUS INCREASE IN BODY TEMPERATURE

- *Systemic infectious causes*
 - Sepsis and septic shock
 - Parasitosis
 - Flu-like syndrome
- *Organ-specific infectious causes*
 - Endocarditis
 - Myocarditis
 - Pharyngitis
 - Tonsillitis
 - Abscesses
 - Otitis

- Cholecystitis and cholangitis
- Meningitis
- Encephalitis
- *Non-infectious causes*
 - Steven-Johnson syndrome
 - Thyroid storm
 - Pancreatitis Inflammatory bowel disease
 - Pelvic inflammatory disease
 - Toxic shock
- *Haematological and Oncological causes*
 - Leukaemia and lymphomas
 - Solid tumours
- *Immunological causes*
 - Arteritis
 - Arthritis
 - Lupus
 - Sarcoidosis
- *Musculo-Skeletal causes*
 - Osteomyelitis
 - Fasciitis
 - Cellulitis
- *Neurological causes*
 - Cerebral haemorrhage
- *Psychiatric causes*
 - Factitious fever
- *Renal and Genitourinary causes*
 - Pyelonephritis
 - Prostatitis
- *Toxicology*

3.3.12 HEADACHE IN ADULTS AND CHILDREN

- *Vascular cause*
 - Migraine
 - Cluster headache
 - Tension headache

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- Cerebral haemorrhage
- Hypertensive encephalopathy
- Ischaemic stroke
- *Haematological and Oncological causes*
 - Brain tumours
- *Immunological causes*
 - Temporal arteritis
 - Vasculitis
- *Infectious causes*
 - Abscesses
 - Dental infections
 - Encephalitis
 - Mastoiditis
 - Meningitis
 - Sinusitis
- *Musculo-Skeletal causes*
 - Cervical spine diseases
 - Temporomandibular joint syndrome
- *Neurological causes*
 - Trigeminal neuralgia
- *Ophthalmological causes*
 - Optic neuritis
 - Acute glaucoma
- *Toxicology*
- *Trauma*

3.3.13 JAUNDICE

- *Gastrointestinal causes*
 - Cholangitis
 - Hepatic failure
 - Pancreatic head tumour
 - Pancreatitis
 - Obstructive cholestasis
- *Cardiac/Vascular causes*
 - Chronic cardiac decompensation

- *Haematological and Oncological causes*
 - Haemolytic anaemias
 - Thrombotic Thrombocytopenic Purpura
 - Haemolytic Uraemic Syndrome
 - Disseminated Intravascular Coagulation
- *Infectious causes*
 - Malaria
 - Leptospirosis
- *Gynaecological causes*
 - HELLP syndrome
- *Toxicology*
 - Drug induced haemolytic anaemia
 - Snake venom

3.3.14 PAIN IN ARMS

- *Cardiac/Vascular causes*
 - Aortic dissection
 - Deep venous thromboembolism
 - Ischaemic heart disease
- *Musculo-skeletal causes*
 - Periarthritis
 - Cervical spine arthrosis
- *Trauma*

3.3.15 PAIN IN LEGS

- *Cardiac/Vascular causes*
 - Acute ischemia
 - Arteritis
 - Deep venous thrombosis
 - Superficial thrombophlebitis
- *Immunological causes*
 - Polymyositis
- *Infectious causes*
 - Arthritis
 - Cellulitis
 - Necrotising fasciitis

- Osteomyelitis
- *Musculo-Skeletal causes*
 - Sciatalgia
- *Neurological causes*
 - Sciatica
- *Nervous system causes*
 - Peripheral nerve compression
- *Trauma*

3.3.16 PALPITATIONS

- *Cardiac/Vascular causes*
 - Brady-arrhythmias (including sinus bradycardia and AV blocks),
 - Extrasystoles
 - Tachy-arrhythmias (including atrial fibrillation, sinus tachycardia, supraventricular tachycardia, ventricular tachycardia)
- *Endocrine and metabolic causes*
 - Thyrotoxicosis
- *Toxicology*

3.3.17 SEIZURES IN ADULTS AND CHILDREN

- *Neurological causes*
 - Generalised epilepsy
 - Partial complex or focal epilepsy
 - Status epilepticus
- *Cardiac/Vascular causes*
 - Hypertensive encephalopathy
 - Syncope
 - Dysrhythmias
 - Migraines
- *Endocrine and metabolic causes*
 - Metabolic seizures
- *Gynaecological causes*
 - Eclampsia
- *Infectious causes*
 - Febrile seizures in children

- *Psychiatric causes*
 - Narcolepsy
 - Pseudo-seizures
- *Respiratory causes*
 - Respiratory arrest
- *Toxicology*

3.3.18 SHOCK IN ADULTS AND CHILDREN

- *Anaphylactic*
- *Cardiogenic*
- *Hypovolaemic*
- *Obstructive*
- *Septic*
- *Neurogenic*
- *Cardiac/Vascular causes*
 - Cardiogenic shock
 - Arrhythmias
- *Endocrine and metabolic causes*
 - Addison's crisis
- *Fluid and Electrolyte disorders*
 - Hypovolaemic shock
- *Gastrontestinal causes*
 - Vomiting
 - Diarrhoea
- *Gynaecological causes*
 - Toxic shock
- *Immunological causes*
 - Anaphylactic shock
- *Infectious causes*
 - Septic shock
- *Neurological causes*
 - Neurogenic shock
- *Trauma*
 - Hypovolemic shock

- Neurogenic shock

3.3.19 SKIN MANIFESTATIONS IN ADULTS AND CHILDREN

- *Dermatological causes*

- Eczema
- Psoriasis
- Skin tumours

- *Immunological causes*

- Vasculitis
- Urticaria
- Steven-Johnson syndrome
- Lyell syndrome

- *Infectious causes*

- Viral exanthemata
- Meningococcaemia
- Herpes zoster/simplex
- Abscesses of the skin

- *Psychiatric causes*

- Self-inflicted skin lesions or from abuse

- *Toxicology*

- *Haematological and Oncological causes*

- Idiopathic Thrombocytopenic Purpura
- Thrombotic Thrombocytopenic Purpura

3.3.20 SYNCOPE

- *Cardiac/vascular causes*

- Aortic dissection-Cardiac arrhythmias (including brady-tachy syndrome, Brugada syndrome, drug overdose, long QT syndrome, sick sinus syndrome, Torsades de pointes, ventricular tachycardia)
- Other causes of hypoperfusion (including ischemia, valvular, haemorrhage, obstruction: e.g. aortic stenosis, pulmonary embolism, tamponade)
- Orthostatic hypotension

- *Endocrine and metabolic causes*

- Addison's disease

- *Fluid and Electrolyte disorders*

- Hypovolaemia

- *Gastrointestinal causes*
 - Vomiting
 - Diarrhoea
- *Neurological causes*
 - Autonomic nervous system disorder
 - Epilepsy
 - Vasovagal reflex
- *Toxicology*

3.3.21 URINARY SYMPTOMS (DYSURIA, OLIGO/ANURIA, POLYURIA)

- *Renal and Genitourinary causes*
 - Acute renal failure
 - Acute urinary retention
 - Cystitis
 - Pyelonephritis
 - Prostatitis
- *Cardiac/Vascular causes*
 - Cardiac decompensation
- *Endocrine and metabolic causes*
 - Diabetes mellitus
 - Diabetes insipidus
- *Fluid and Electrolyte disorders*
 - Hypovolaemia

3.3.22 VERTIGO AND DIZZINESS

- *Ear and Labyrinth causes*
 - Benign postural vertigo
 - Meniere's disease
 - Otitis
 - Vestibular neuritis
 - Viral Labyrinthitis
- *Cardiac/Vascular causes*
 - Arrhythmias
 - Hypotension
- *Endocrine and metabolic causes*

- Hypoglycaemia
- *Haematological and Oncological causes*
 - Anaemia
- *Nervous system causes*
 - Acoustic neuroma
 - Bulbar or cerebellar lesions
 - Multiple sclerosis
 - Temporal epilepsy
- *Psychiatric causes*
 - Anxiety
- *Respiratory causes*
 - Hypoxia

• *Toxicology*

3.3.23 VOMITING

- *Gastrointestinal causes*
 - Appendicitis
 - Cholecystitis
 - Gastroparesis
 - Gastric obstruction and retention
 - Gastroenteritis
 - Hepatitis
 - Pancreatitis
 - Pyloric stenosis
 - Small bowel obstructions
- *Cardiac/Vascular causes*
 - Myocardial ischemia
- *Ear, Nose, Throat causes*
 - Vestibular disorders
- *Endocrine and metabolic causes*
 - Diabetic ketoacidosis
 - Hypercalcaemia
- *Fluid and Electrolyte disorders*
 - Hypovolaemia
- *Gynaecological and Obstetric causes*

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- Pregnancy
- *Infectious causes*
 - Sepsis
 - Meningitis
- *Neurological causes*
 - Cerebral oedema or haemorrhage
 - Hydrocephalus
 - Intracranial Space Occupying Lesions
- *Ophthalmological causes*
 - Acute glaucoma
- *Psychiatric causes*
 - Eating disorders
- *Renal and Genitourinary causes*
 - Renal calculi
 - Uraemia
- *Toxicology*

3.4 SPECIFIC ASPECTS OF EMERGENCY MEDICINE

3.4.1 ABUSE AND ASSAULT IN ADULTS AND CHILDREN

- Abuse in the elderly and impaired
- Child abuse and neglect
- Intimate partner violence and abuse
- Sexual assault
- Patient safety in Emergency Medicine
- Violence management and prevention in the Emergency Department

3.4.2 ANALGESIA AND SEDATION IN ADULTS AND CHILDREN

- Pain transmission (anatomy, physiology, pharmacology)
- Pain assessment
- Pharmacology of sedative and pain relieving drugs
- Psychological and social aspects of pain in paediatric, adult and elderly patients

3.4.3 DISASTER MEDICINE

- Disaster preparedness
- Major incident planning/procedures/practice

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- Disaster response
- Mass gatherings
- Specific medical topics (triage, bioterrorism, blast and crush injuries, chemical agents, radiation injuries)
- Debriefing and mitigation

3.4.4 ENVIRONMENTAL ACCIDENTS IN ADULT AND CHILDREN

- Electricity (electrical and lightning injuries)
- Flora and Fauna (injuries from exposure, bites and stings)
- High-altitude (medical problems)
- NBCR (nuclear, biological, chemical and radiological, decontamination, specific aspects)
- Temperature (heat and cold related emergencies)
- Travel medicine
- Water (near-drowning, dysbarism and complications of diving, marine fauna)

3.4.5 FORENSIC ISSUES

- Basics of relevant legislation in the country of practice
- Recognise and preserve evidence
- Provide appropriate medical documentation (including forensic and clinical photography, collection of biological samples, ballistics)
- Appropriate reporting and referrals (e.g. child abuse or neglect, gunshot and other forms of penetrating wounds, elder abuse, sexual assault allegations)
- Medico-legal documentation

3.4.6 INJURY PREVENTION AND HEALTH PROMOTION

- Collection and interpretation of data related to prevention and health promotion
- Epidemiology of Accidents and Emergencies
- Formulation of recommendations

3.4.7 PATIENT MANAGEMENT ISSUES IN EMERGENCY MEDICINE

- Emergency Department organisation (administration, structure, staffing, resources)
- Management of specific populations:
 - Children in special circumstances including child protection
 - Elderly patients
 - Homeless patients
 - Mentally incompetent adults
 - Psychiatric patients

3.4.8 PROBLEMS IN THE ELDERLY

- Atypical presentations (e.g. abdominal pain, infections, myocardial infarction)
- Delirium
- Dementia
- Falls (causes & investigations)
- Immobility
- Multiple pathology and multiple therapies
- Self-dependency
- Trauma & Co-morbidity

3.4.9 TOXICOLOGY IN ADULTS AND CHILDREN

- General principles of toxicology and management of poisoned patients
- Principles of drug interactions
- Specific aspects of poisoning and antidotes

Common Indian poisons

- Insecticides -Organo phosphates, Organo chlorates, Carbamates, Pyrethroids
- Herbicides – Paraquat, Diquat, Glyphosate, Chlorophenoxy compounds
- Rodenticides -Non anticoagulants (Ratol/Yellow Phosphorous, Zinc phosphide)
-Anti coagulants (Warfarin-type, Superwarfarins)
- Plant poisons - Oleander, Cleistanthus Collinus, Gloria superba, Calactus, Datura, Abrus precatorius, strychnine and regional poisons
- Sani powder
- Endosulphan
- Corrosives/Caustics
- Hydrocarbons

Envenomation

- Bites & Stings – Harmful arthropods (including Scorpions, Honey bees, Wasps, Spiders)
- Reptile bites

•Drug Overdoses

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- Paracetamol
- Beta blocker
- Calcium channel blocker
- Tricyclic Anti-Depressants
- SSRIs
- Benzodiazepines
- Opioids
- NSAIDS- Aspirin, Salicylates
- Digoxin
- Iron
- Cyanide
- Anticonvulsants
- Antipsychotics
- Lithium
- Barbiturates
- Coumarin derivatives
- Alcohol
- Cocaine
- Dyshaemoglobinemia

3.4.10 PRE-HOSPITAL CARE

- Emergency Medical Services organisation (administration, structure, staffing, resources)
- Medical transport (including neonates and children, air transport)
- Paramedic training and function
- Safety at the scene
- Collaboration with other emergency services (e.g. police, fire department)

3.4.11 PSYCHO-SOCIAL PROBLEMS

- Social wellbeing of specific populations
- Patients with social issues
- Frequent visitors
- Social care following discharge

3.5 CORE CLINICAL PROCEDURES AND SKILLS

3.5.1 CPR SKILLS

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- Cardio-pulmonary resuscitation procedures in a timely and effective manner according to the current ACLS guidelines for adults and children
- Advanced CPR skills (e.g. therapeutic hypothermia, open chest CPR)

3.5.2 AIRWAY MANAGEMENT SKILLS

- Open and maintain the airway in the emergency setting (insertion of oropharyngeal or nasopharyngeal airway)
- Endotracheal intubation
- Alternative airway techniques in the emergency setting (e.g. laryngeal mask insertion, surgical airway)
- Difficult airway management algorithm
- Use of rapid sequence intubation in the emergency setting

3.5.3 ANALGESIA AND SEDATION SKILLS

- Assessment of the level of pain and sedation
- Monitor vital signs and potential side effects during pain management
- Provide procedural sedation and analgesia including conscious sedation (including testing of life support equipment)
- Use of appropriate local, topical and regional anaesthesia techniques

3.5.4 BREATHING AND VENTILATION MANAGEMENT SKILLS

- Assessment of breathing and ventilation
- Oxygen therapy
- Interpretation of blood gas analysis, pulse oximetry and capnography
- Bag-mask-valve ventilation
- Thoracocentesis
- Chest tube insertion, connection to under-water drainage and assessment of functioning
- Non-invasive ventilation techniques
- Invasive ventilation techniques

3.5.5 CIRCULATORY SUPPORT AND CARDIAC SKILLS AND PROCEDURES

- Administration of fluids including blood and substitutes
- Monitoring of ECG and the circulation
- Defibrillation and pacing (e.g. cardioversion, transcutaneous pacing)
- Emergency pericardiocentesis
- Vascular access (peripheral venous, arterial, and central venous catheterisation, intraosseous access)

3.5.6 DIAGNOSTIC PROCEDURES AND SKILLS

- Interpretation of ECG
- Appropriate request and interpretation of laboratory investigations (blood chemistry, blood gases, respiratory function testing and biological markers)
- Appropriate request and interpretation of imaging (e.g. x-rays, ultrasound, CT/MRI)
- Performance of focused sonographic assessment

3.5.7 ENT SKILLS AND PROCEDURES

- Anterior rhinoscopy
- Insertion of nasal pack
- Inspection of oropharynx and larynx
- Otoscopy
- Removal of foreign body if airway is compromised
- Insertion and replacement of tracheostomy tube

3.5.8 GASTROINTESTINAL PROCEDURES

- Insertion of nasogastric tube
- Gastric lavage
- Peritoneal lavage
- Abdominal hernia reduction
- Abdominal paracentesis
- Sengstaken Blakemore tube insertion
- Measurement of abdominal pressure
- Proctoscopy

3.5.9 GENITOURINARY PROCEDURES

- Insertion of indwelling urethral catheter
- Suprapubic cystostomy
- Testicular torsion reduction
- Evaluation of patency of urethral catheter

3.5.10 HYGIENE SKILLS AND PROCEDURES

- Decontamination of patient and the environment
- Patient isolation and staff protection

3.5.11 MUSCULOSKELETAL TECHNIQUES

- Aseptic joint aspiration
- Fracture immobilisation
- Reduction of joint dislocation
- Log roll and spine immobilisation

- Splinting (plasters, braces, slings, tapes and other bandages)
- Management of compartment syndrome
- Fasciotomy
- Escharotomy

3.5.12 NEUROLOGICAL SKILLS AND PROCEDURES

- Evaluation of consciousness including the Glasgow Coma Scale
- Fundoscopy
- Lumbar puncture
- Interpretation of neuro-imaging

3.5.13 OBSTETRIC AND GYNAECOLOGICAL SKILLS AND PROCEDURES

- Emergency delivery
- Vaginal examination using speculum
- Assessment of the sexual assault victim

3.5.14 OPHTHALMIC SKILLS AND PROCEDURES

- Removal of foreign body from the eye
- Slit lamp examination
- Lateral canthotomy

3.5.15 TEMPERATURE CONTROL PROCEDURES

- Measuring and monitoring of body temperature
- Cooling techniques (evaporative cooling, ice water or slush immersion)
- Internal cooling methods
- Warming techniques
- Monitoring heat stroke patients
- Treatment and prevention of hyper- and hypothermia

3.5.16 TRANSPORTATION OF THE CRITICALLY ILL PATIENT

- Telecommunication and telemedicine procedures
- Preparation of the EMS vehicle
- Specific aspects of monitoring and treatment during transportation

3.5.17 WOUND MANAGEMENT

- Abscess incision and drainage
- Aseptic techniques
- Treatment of lacerations and soft tissue injuries
- Wound irrigation and wound closure

3.6 The orientation of training in emergency medicine shall encompass the following:

3.6.1. Principles of emergency care

- (a) Organizational issues and quality standards
- (b) Manpower and skill mix
- (c) Resuscitation, recognition of threats to life and limb
- (d) Triage of the emergency department patient
- (e) Understanding of 'timeliness' and documentation
- (f) Interface with primary/community care
- (g) Therapeutics and pain control
- (h) Patient dignity and privacy
- (i) Ethical issues and confidentiality

3.6.2. Emergency medical services

- (a) Pre-hospital care and the ambulance service
- (b) Paramedic training and function
- (c) Major incident planning/procedures/practice

3.6.3. Epidemiology of accidents and emergencies

3.6.4. Accident prevention and health promotion

3.6.5. Legislation

3.7 Problem-oriented core curriculum

3.7.1. Cardiac arrest

- (a) Cardiopulmonary resuscitation
 - (i) Chain of survival
 - (ii) Cardiopulmonary resuscitation
 - (iii) Choking victim
- (b) Cardiac life support to advanced level
 - (i) Universal algorithm
 - (ii) Ventricular fibrillation/ventricular tachycardia treatment
 - (iii) Pulseless electrical activity/asystole treatment
 - (iv) Peri-arrest arrhythmias
 - (v) Drugs and pacing
 - (vi) Resuscitation team

3.7.2. Airways management and anaesthesia

(a) Principle of airway management

(i) Rapid sequence intubation

(ii) The difficult airway

(b) Pain management

(c) Conscious sedation

3.7.3. Headache

(a) Primary headaches

(i) Hemicranias

(b) Secondary headaches

(i) Cerebrovascular diseases

(ii) Meningitis

(iii) Encephalitis

3.7.4. Chest pain

(a) Acute coronary syndromes

(b) Pulmonary embolism

(c) Aortic dissection

3.7.5. Dyspnoea and respiratory failure

(a) Heart failure and pulmonary oedema

(b) Hypoxemic respiratory failure

(c) Hypercapnoeic respiratory failure

(d) Asthma attack

(e) Pneumothorax

(f) Foreign body

(g) Chest infections

3.7.6. Syncope

(a) Brady-arrhythmias

(i) Cardiac pacing

(b) Other causes of syncope

3.7.7. Palpitations

(a) Tachy-arrhythmias

(i) Electric cardioversion

(ii) Anti-arrhythmic drugs

3.7.8. Shock

- (a) The cardiovascular triad
- (b) Haemorrhagic shock
- (i) Gastrointestinal bleeding
- (c) Cardiogenic shock
- (d) Septic shock
- (e) Anaphylactic shock
- (f) Adrenal failure
- (g) Blood/blood products
- (h) Cardiovascular drugs
- (i) Fluids
- (ii) Vasopressors

3.7.9. Abdominal pain

- (a) Acute abdomen
- (b) Aortic aneurysm
- (c) Intestinal ischemia
- (d) Cholangitis, cholecystitis
- (e) Acute pancreatitis

3.7.10. Vomiting and diarrhoea

- (a) Intestinal occlusion
- (b) Pseudo-obstruction
- (c) Colitis and enteritis
- (d) Dehydration

3.7.11. Pelvic and back pain

- (a) Urinary tract infections
- (b) Nephrolithiasis
- (c) Acute renal failure
- (d) Pelvic inflammatory disease
- (e) Sexual assault
- (f) Ectopic pregnancy
- (g) Epididymitis
- (h) Testicular torsion
- (i) Obstetric emergencies
- (i) Emergency delivery
- (ii) Bleeding in pregnancy

3.7.12. Leg pain

- (a) Deep venous thrombosis
- (b) Peripheral arterial diseases
- (c) Thrombophlebitis
- (d) Osteomyelitis
- (e) Arthritis

3.7.13. Fever and infections

- (a) Fever of unknown origin
- (b) Systemic inflammatory response syndrome/sepsis
- (c) Tuberculosis
- (d) Malaria
- (e) HIV
- (f) Hepatitis

3.7.14. Seizures

- (a) Epileptic seizures
- (b) Other causes of seizures

3.7.15. Vertigo and dizziness

- (a) Peripheral vertigo
 - (i) Labyrinthitis
 - (ii) Cupulolithiasis
 - (iii) Meniere disease
- (b) Central vertigo
- (c) Causes of dizziness

3.7.16. Coma and neurological impairment

- (a) Metabolic coma**
 - (i) Hypoglycaemia
 - (ii) Ketoacidosis
 - (iii) Hyperosmolar coma
 - (iv) Hepatic encephalopathy
- (b) Neurological coma**

3.7.17. Other metabolic and endocrine disorders

- (a) Electrolyte abnormalities
 - (i) Hyper/hyponatremia
 - (ii) Hyper/hypokalemia

- (iii) Hyper/hypocalcemia
- (b) Acid-base abnormalities
- (c) Acute thyroid crisis

3.7.18. Haemorrhagic diathesis

- (a) Disseminated intravascular coagulation
- (b) Thrombotic thrombocytopenic purpura
- (c) Heparin-induced thrombocytopenia
- (d) Myeloproliferative diseases

3.7.19. Eye emergencies

- (a) Non-traumatic
 - (i) Conjunctivitis
 - (ii) Uveitis
 - (iii) Retinal artery occlusion
 - (iv) Retinal vein occlusion
 - (v) Acute glaucoma
 - (vi) Retinopathy
- (b) Traumatic
 - (i) Chemical burns
 - (ii) Retinal traumatic injuries
 - (iii) Hyphema
 - (iv) Foreign body/corneal abrasion

3.7.20. Intoxications

- (a) Initial management of poisoning
 - (i) Decontamination
 - (ii) Elimination
- (b) Recognition of clinical syndromes
- (c) Antidotes

3.7.21. Trauma

- (a) Trauma resuscitation
 - (i) Primary survey
 - (ii) Secondary survey
 - (iii) FAST
 - (iv) Definitive care
 - (v) Transfer arrangements

(b) Head and spinal cord trauma

(c) Chest trauma

- (i) Blunt/penetrating
- (ii) Tension pneumothorax
- (iii) Cardiac tamponade
- (iv) Massive haemothorax
- (v) Open chest wound
- (vi) Aortic dissection
- (vii) Blast injury
- (viii) Flail chest/lung contusion

(d) Abdominal trauma

(e) Pelvic/genitourinary trauma

(i) Pelvic fractures

(ii) Bladder rupture

(f) Extremity trauma

(i) Skeletal trauma

(ii) Vascular trauma

(iii) Soft tissue trauma

(iv) Accurate diagnosis of bony, tendon and nerve injuries

(g) Trauma in pregnancy

3.7.22. Environmental

(a) Burns

(b) Heat illness

(c) Hypothermia and frost bites

(d) Near drowning

(e) Lightning and electrocution

3.7.23. Paediatrics

(a) Paediatric resuscitation (basic and advanced)

(b) Paediatric trauma

(c) Croup and pseudo-croup

(d) Asthma

(e) Fever

(f) Dehydration/gastrointestinal disorders

- (g) Meningitis
- (h) Seizures
- (i) Child abuse
- (j) Pain management

3.7.24. Dermatological emergencies

- (a) Erythroderma
- (b) SSSS/TEN
- (c) Stevens–Johnson syndrome
- (d) Pemphigus/pemphigoid
- (e) Erysipelas
- (f) Necrotizing fasciitis
- (g) Herpes zoster
- (h) Scabies

3.7.25. Musculoskeletal disease

- (a) Orthopaedic and neurovascular examination
- (b) Strains/sprains/fractures
- (c) Dislocations
- (d) Nerve entrapment syndromes

3.7.26. Behaviour

- (a) Mental state examination
- (b) Organic illness manifest as behavioural disorders
- (c) Acute psychosis
- (d) Suicidal and homicidal evaluation
- (e) Alcohol abuse
- (f) Drug abuse
- (g) Aggression

3.7.27. Social and geriatrics

- (a) Overall care of the patient
- (b) Psychosocial assessment
- (c) Homelessness
- (d) Frequent attenders
- (e) Multisystem pathology

3.7.28. Pre-hospital

3.7.29. Disaster medicine

3.8 Clinical skills

The candidate should become familiar with, or expert in, each skill. The skills should be learned during the emergency department postings.

3.8.1. Airway management and C-spine control

- (a) Basic airway management
- (b) Advanced airway management
 - (i) Tracheal intubation
 - (ii) Alternative procedures
- (c) Surgical airway
 - (i) Cricothyroidotomy

3.8.2. Electric therapy

- (a) Cardioversion/defibrillation
- (b) Cardiac pacing

3.8.3. Major trauma management and trauma team organization

3.8.4. Pulmonary procedures

- (a) Invasive ventilation principles
- (b) Non-invasive ventilation
- (c) Thoracentesis
- (d) Needle/tube thoracostomy

3.8.5. Circulation procedures

- (a) Central venous access
 - (i) Subclavian vein
 - (ii) Jugular vein
 - (iii) Femoral vein
- (b) Arterial access
 - (i) Radial artery
 - (ii) Femoral artery
- (c) Pericardiocentesis
- (d) Intraosseous access
- (e) Monitoring
 - (i) Electrocardiogram, NIBP, arterial oxygen saturation

(ii) Mixed venous oxygen saturation

(iii) CPV

3.8.6. Diagnostic skills

(a) Interpretation of radiograph

(i) Chest X-ray

(ii) Plain abdominal X-ray

(iii) Skeletal X-rays

(iv) Computed tomography scans

(v) Magnetic resonance imaging

(b) Emergency ultrasound

(i) FAST

(ii) Emergency echocardiography

(iii) Emergency abdominal ultrasound

(iv) DVT Assessment

(V) Optic Nerve Sheath Diameter

3.8.7. Decontamination procedures

(a) Gastric lavage

(b) Skin decontamination

3.8.8. Paracentesis

3.8.9. Slit lamp examination

3.8.10. Wound management

(a) Wound preparation

(b) Wound closure techniques

(c) Dressing techniques

(d) Joint aspiration, soft tissue injection

(e) Anaesthetic techniques

3.8.11. Orthopaedic emergency procedures

(a) Splinting/immobilization

(i) Spinal immobilization

(ii) Limb splinting

(iii) Log rolling

(b) Reduction of dislocations

3.8.12. Local and regional anaesthesia

3.8.13. Emergency delivery

3.8.14. Ear, nose and throat procedures

- (a) Indirect laryngoscopy
- (b) Nasal packing

3.8.15. Transportation of patients

3.8.16. Communication skills

- (a) Patients and relatives
- (b) Colleagues and other personnel
- (c) Bereavement
- (d) Difficult referral
- (e) Breaking a bad news

3.8.17. Attitudes

- (a) Leadership
- (b) Reliability
- (c) Teamwork
- (d) Self-motivation
- (e) To children. The capacity to establish and maintain a responsible and trusting relationship with the young patient and the family
- (f) Health promotion

3.9 Other skills

The candidate should get experience with research, reading and writing, and with lecturing and teaching to other students and presenting at Scientific Meetings.

3.9.1. Research skills

- (a) Literature survey
- (b) Scientific study design
- (c) Data evaluation/ Statistics
- (e) Preparing publications

3.9.2. Teaching Skills

- (a) Lecture preparation
- (b) Small Group techniques
- (c) Presentation techniques
- (d) Teaching critique
- (e) Departmental teaching programme
- (f) Professional Development (self-directed learning)

3.9.3. Managerial Skills

- (a) Department policies/procedures
- (b) Staff management (manpower/personnel procedures)
- (c) Equipment (from choosing to order)
- (d) Resource management/clinical budgeting
- (e) Contracting/standards setting
- (f) Information technology
- (g) Clinical Audit/quality monitoring
- (h) Compliments/complaints
- (i) Medico legal statements
- (j) Committee Work
- (k) Liasing with other agencies
- (l) Public Relations/media
- (m) Major Incident planning/exercises

4. STRUCTURE OF TRAINING

4.1 TRAINING PROCESS

Recognised specialist training in Emergency Medicine must conform to national and institutional regulations and must take into account the individual needs of trainees. It must encompass integrated and updated practical, clinical and theoretical instruction. It must be based on clinical participation and responsibilities in patient care. The trainee must attain the core competencies described in the sections 3.1 and 3.5 of this document.

4.1.1 TRAINING STRUCTURE

Each Training Programme must be recognised at national level in accordance with SEMI regulations. The responsibility and authority for organising, coordinating, managing and assessing the individual training centre and the training process must be clearly identified and supervised in each centre by SEMI. Emergency Medicine trainers and training Departments must be accredited in conformity with national standards.

4.1.2 DURATION OF TRAINING

Specialty training in Emergency Medicine is set to a period of 3 years of full-time training as a primary medical specialty. Training must take place in a full-time appointment according to SEMI regulations.

4.1.3 WORKING CONDITIONS

The working conditions and responsibilities of trainers and trainees must be defined and made known and should be in accordance with SEMI regulations. The educational goals of the Training Programme and learning objectives of trainees must not be compromised by excessive reliance on trainees to fulfil institutional service obligations. The overall structuring of duty hours and on-call schedules must focus on the needs of the patient, continuity of care, and the educational needs of the trainee.

4.1.4 ASSESSMENT METHODS AND TOOLS

A portfolio based on the core curriculum must be used for assessment. In the portfolio, the trainee documents the theoretical, clinical and practical experience. The acquired competencies must be validated by the trainers on an annual basis. The standard assessment methods must be formative and summative, as previously defined.

4.1.4.1 Formative assessment and Documentation

Formative assessment is used as part of an ongoing learning or developmental process in giving feedback and advice. It must provide benchmarks to orientate the trainee. It must evaluate the trainee's progress and identify the strengths and weaknesses of that individual. The evaluation and any recommendations must be fully shared with the trainee.

The following should be part of formative assessment:

- *Formal Documentation of trainee's development and progress*
- *Workplace based Assessment:*
 - Observed clinical care of unselected patients during working time.
 - Video or observed operating of the trainee within a team.
 - Mini Clinical Examination (or Direct Observation of Procedural Skills), to assess the knowledge, procedural and practical skills and attitudes of the trainee's interaction with a patient.
 - Case-Based Discussion, to explore clinical reasoning on a recent case.
- *Non-workplace based Assessment*

It includes processes such as case presentations, review of research in progress, review of critical incidents, review of teaching by trainee, role play/scenario teaching.

4.1.4.2 Summative assessment

Summative assessment is usually a test that takes place after a specified training period with the purpose of deciding whether the trainee has reached a standard to proceed to the next level of training or to be awarded a certificate of Completion of Training. The methods of summative assessment should include:

- *Written examinations* (multiple choice questions, short answered questions, essays).
- *Oral and practical examinations* (clinical vivas and objective structured clinical examinations or OSCEs i.e. stations to assess medical knowledge, clinical, communication and ethical skills in short predetermined scenarios).
- *Evaluation of trainee's Portfolio.*

4.2 RESEARCH

- The trainee shall be required to undertake research and write papers under the guidance of consultant.

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- The candidate will have to submit a proposal/topic for the project work within three months of the joining of the course.
- The work period for the project will be 1½ year to 2 year. Papers from the project should be accepted for publication in an indexed journal.
- Special credit should be given for additional published case reports, published articles.
- The candidate should write two reviews as the topics presented by him on seminars.
- Another article as first author should also be submitted for publication in an indexed journal before the candidates appear in the final MEM EMERGENCY MEDICINE examination.

4.2.1 DISSERTATION

The candidates registered for MEM would be required to prepare a dissertation after undertaking original investigative (clinical or experimental) work. The progress of this work, which is an important pre-requisite for completion of MEM course, shall be reviewed at monthly meeting of the department and results published at appropriate time based on progress of the work. Satisfactory completion of such work is pre-requisite for candidates to appear for MEM examination. The program must ensure meaningful, supervised research experience with appropriate protected time while maintaining the clinical experience. These residents must learn the design and interpretation of research studies, responsible use of informed consent and research methodology and interpretation of data and statistical analysis. They would be advised and supervised by qualified staff members in the conduct of research. They must learn to use library, Medline search, and internet facilities etc. This training would help them to develop skills in planning, designing and conduct of research studies.

- a. All candidates registered to undergo MEM EMERGENCY MEDICINE shall be assigned topic for dissertation/ thesis within 4 months of his/her admission to the course and title of the topics assigned to the candidates be intimated to the SEMI.
- b. The dissertation/thesis shall be in a bound volume of minimum of 50 pages and not exceeding 100 pages of typed matter (Double line spacing and on one side only) excluding certification, acknowledgements, annexures and bibliography.
- c. Four copies of dissertation shall be submitted six months prior to the commencement of the examinations on the prescribed date to the office of SEMI.
- d. Acceptance of the dissertation is a prerequisite for appearing in the Theory Examination

4.3 FACULTY

The faculty for Emergency Medicine must include an appropriate number of trainers. Trainers should devote a large proportion of their professional efforts to training and should be given sufficient time to meet the educational requirements of the programme.

4.4 TRAINEES

All trainees must share responsibility with their trainers for their education. The trainees must be pro-active in identifying their own knowledge gaps and must take advantage of all the formal and informal learning opportunities offered.

4.4.1 SUPERVISION

Trainees must be supervised by trainers in such a way that the trainees assume **progressively increasing responsibility** according to their level of education, ability and experience. Schedules for trainers must be structured to ensure that supervision is readily available to trainees on duty. The level of responsibility accorded to each trainee must be determined.

4.4.2 EXPERIENCE

The trainee must learn through exposure to a full range of clinical cases and be able to appreciate the issues associated with the delivery of safe, high quality and cost effective health care. The trainee must be involved in the treatment of a sufficient number of patients and perform an adequate number of procedures of sufficient diversity. Administrative, teaching, and leadership skills must also be included in the Training Programme.

4.5 TRAINING CENTRES

A Training Centre is defined as a hospital or group of hospitals which together receive an appropriate case-mix and therefore offer the trainee experience in the full range of the specialty of Emergency Medicine. Within the Training Centre there should be an Emergency Department with a patient load not less than 6000/year and which provides care at all hours. Each Training Centre must encompass relevant specialties in order to give the trainee the opportunity of developing their clinical skills and fulfilling the curriculum and their portfolio. It must provide both space and opportunities for practical and theoretical study as well as for research activities and critical appraisal of medical literature. Training Centres must be approved and recognised by SEMI.

5. RECOGNITION

In order to harmonise the quality of training in Emergency Medicine across India, the following additional steps should be considered.

5.1 SEMI ACCREDITATION

National standards for accreditation of training centres, training programmes and theoretical and practical courses must be developed.

5.2 SEMI EXAMINATION

An examination in Emergency Medicine which confirms successful completion of specialty training in mastering Emergency Medicine in accordance with this curriculum could be developed.

5.3 SEMI Examination PATTERN

Final Internal Assessment – 20 Marks

Paper I - Applied Basic Sciences

16 Short Notes x 5 = 80 marks

Paper II – Medical Emergencies [10 Short Answer Questions (SAQs) x 10 = 100 Marks]

- i. Cardiac Emergencies
- ii. Respiratory Emergencies
- iii. Neurological Emergencies
- iv. Renal & Electrolyte Emergencies
- v. Endocrine Emergencies
- vi. Infectious Diseases & Sepsis
- vii. Toxicology & Poisoning
- viii. Resuscitation
- ix. Psychiatric, Medico Legal Emergencies, Dermatology & Rheumatology
- x. Pediatric medical emergencies

Paper III – Surgical Emergencies [10 Short Answer Questions (SAQs) x 10 = 100 Marks]

- i. Gastrointestinal Emergencies
- ii. Obstetric & Gynaecologic Emergencies
- iii. Trauma & Orthopaedic Emergencies
- iv. ENT, Ophthalmological & Maxillofacial Emergencies
- v. Pain & Anaesthesia
- vi. Haematology & Oncology
- vii. Environmental Emergencies
- viii. Paediatric surgical Emergencies
- ix. Neurosurgical emergencies
- x. Burns

NOTE:

A minimum of 60% is required to pass in theory examination in each paper.

Paper IV – Practical Assessment [To Pass 7 out of 10 Stations]

Two stations from each Section shall be set in the Objective Structured Clinical Examination

SECTION- I:

HISTORY TAKING

1. Analgesia and Conflict resolution
2. Abdominal pain
3. Upper GI bleed
4. Lower GI bleed
5. Gastroenteritis

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6. Haematuria
7. Vaginal bleeding
8. Vaginal discharge
9. Emergency contraception
10. Pneumothorax
11. Diagnosis of Pulmonary embolism
12. COPD
13. Chest pain
14. Headache history
15. Management of TIA
16. Renal colic
17. Urinary tract infection
18. The febrile traveller
19. Febrile convulsion
20. Non accidental injury

SECTION- II:

LIFE SUPPORTS OSCEs

1. Maintaining an Airway
2. Emergency Intubation
3. Cardiac arrest
4. Head Injury
5. Conscious sedation (Procedural sedation)
6. Management of Oversedation
7. Primary survey (Tension pneumothorax)
8. Secondary survey
9. Pediatric trauma
10. Severe asthma
11. Arrhythmia
12. Paracetamol overdose
13. TCA overdose
14. Ethylene glycol poisoning
15. Digoxin toxicity/Oleander seed poisoning
16. Paraquat poisoning

17. Organophosphorous poisoning
18. Sani powder poisoning
19. Beta blocker overdose
20. Calcium channel blocker overdose
21. Benzodiazepine overdose
22. DKA management

SECTION- III:

SYSTEM SPECIFIC CLINICAL EXAMINATION

1. Dog bite (with focused History)
2. Examination of the shoulder
3. Examination of the wrist and hand – bony injury
4. Examination of the wrist and hand – soft tissue injury
5. Examination of cervical spine injury
6. Examination of the spine
7. Examination of the back
8. Examination of the hip
9. Examination the knee
10. Neurological examination of Upper limb
11. Cranial nerve examination
12. Neurological examination of Lower limb
13. AAA assessment (with focused history)
14. Deep vein thrombosis examination (with focused history)
15. Abdominal examination
16. Testicular torsion
17. Acute Loss of vision (with focused History)
18. Traumatic eye injury
19. Acute otitis media (with History)
20. Acute epistaxis (with History)
21. Maxillofacial injury
22. Vaginal examination
23. Respiratory examination
24. Cardiovascular examination
25. Thyroid examination

SECTION- IV:

COMMUNICATION SKILLS/TEACHING OSCE

1. Teaching Local anaesthesia
2. Teaching Femoral nerve block
3. C-spine injury
4. Acute respiratory acidosis
5. Chronic compensated respiratory acidosis
6. Metabolic acidosis with a normal anion gap
7. Metabolic acidosis with a high anion gap
8. DIC
9. HIV seroconversion
10. Needle stick injury
11. Breaking bad news
12. The difficult referral

SECTION- V:

PROCEDURAL SKILLS

1. Suturing a wound (with focused History)
2. Needle thoracocentesis
3. Chest drain insertion
4. Pericardiocentesis
5. Femoral nerve block
6. Central venous line placement
7. Arterial line placement
8. Intraosseous cannulation
9. Insertion of a male urethral catheter
10. Insertion of a suprapubic catheter
11. Needle cricothyroidotomy
12. Surgical cricothyroidotomy
13. Lumbar puncture
14. Reduction of a Colle's fracture
15. Reduction of posterior dislocation of hip
16. Reduction of anterior dislocation of shoulder

6. RECOMMENDED BOOKS

1. Emergency Medicine – Concept and Clinical Practice – IV Edition, Rosen Barkin
2. Principle and Practice of Emergency Medicine – George Schwartz
3. Emergency Medicine – Hamilton
4. Emergency Medicine – A comprehensive Study Guide – VI edition. –Tintinalli
5. Essential of Immediate Medical Care, II Edition – Dr. C. John Eaton
6. Emergency Department Management Principles and Application - Richard F Salluzzo
7. The Five Minute Emergency Medicine Consult - Rosen Barkin
8. Disaster Medicine - David E Hagan
9. Text Book Of Paed. Emergency Medicine – FLEISHER
10. Medical Emergencies In Children - Meherban Singh
11. Drugs Therapy in Emergency Medicine - Joseph P. Ornato/Edgar R. Gonzalez
12. Hamilton Bailey's 1995 - Emergency Surgery - BW Ellis, 12th edition.
13. Davidson's Principles and Practices of Medicine
14. Clinical Medicine - Kumar & Clark
15. Harrisons Principles of Internal Medicine

16. Clinical Management of Drug Overdose and Poisoning, - Haddad, Shannon,
Winchester
17. Text Book of EMERGENCY – IV edition – Shoe maker
18. Gold frank's Toxicologic Emergencies – VII edition
19. Pediatric Emergency Medicine: A Comprehensive Study Guide
by Gary R. Strange, William R. Ahrens, Steven Lelyveld, William Ahrens- McGraw-
Hill Professional; 1st edition (August 1, 1995)
20. Emergencies in Obstetrics and Gynaecology (Oxford Handbooks in Emergency
Medicine, Vol 8)by Lindsey Stevens, Anthony Kenney- Oxford University Press;
21. Principles of EMERGENCY
by Jesse B. Hall, Gregory A. Schmidt, Lawrence D. H. Wood- McGraw-Hill
Professional Publishing; 2nd edition

22. EMERGENCY
by Joseph M. Civetta, Robert W. Taylor, Robert R. Kirby- Lippincott Williams
23. Emergency Medicine: Topics and Problems for Students
by Jelinek- Blackwell Science Ltd;
24. Accidents and Emergencies in Children (Oxford Handbooks in Emergency Medicine)
25. Acute Medical Emergencies
by Ursula Guly, Drew Richardson- Oxford University Press; 1st edition (January 15,
1996)
26. Outline of Fractures (Churchill Livingstone), 11th Edition, John Crawford Adams,
David L. Hamblen
27. Outline of Orthopedics (Churchill Livingstone), 13th Edition, John Crawford Adams,
David L. Hamblen.
28. *Textbook of Medical Physiology* / A C Guyton & J E Hall - 11th ed - Philadelphia : W
B Saunders, 2005.
29. *Review of Medical Physiology* / W F Ganong – 22nd ed – New York : Lange Medical
Books, 2005.
30. *Lecture Notes on Human Physiology* / ed J J Bray - 4th ed - Oxford : Blackwell
Science, 1999.
31. Principles of Physiology for the Anaesthetist / I Power & P Kam - London : Arnold,
2001.

32. *Comprehensive Human Physiology : From Cellular Mechanisms to Integration* /ed by R Greger & U Windhorst – New York : Springer-Verlag, 1996.
33. *Physiology* / ed by R M Berne; M N Levy; B M Koeppen & B A Stanton -5th ed – St Louis : Mosby, 2003.
34. *Respiratory Physiology : the Essentials* / J B West - 7th ed - Philadelphia : Lippincott Williams & Wilkins, 2005.
35. *Nunn's Applied Respiratory Physiology* / A B Lumb & J F Lunn - 6th ed - Oxford : Elsevier-Butterworth Heinemann, 2005.
36. *Cardiovascular Physiology* / R M Berne and M N Levy - 8th ed - St Louis : Mosby, 2001.
37. *Basic Physics and Measurement in Anaesthesia* / P D Davis & G N C Kenny - 5th ed - Edinburgh : Butterworth-Heinemann, 2002.
38. *Clinical Monitoring : Practical Applications for Anesthesia and EMERGENCY* / ed by C L Lake; R L Hines & C D Blitt - Philadelphia : WB Saunders, 2001.
39. *Diagnostic Ultrasound: Physics and Equipment* / ed by P Hoskins; K Martin; T Whittingham & A Thrush – London : Greenwich Medical Media, 2003.
40. *Mathematics and Statistics in Anaesthesia* / S Cruickshank – Oxford : Oxford University Press, 1998.
41. *Pharmacology* / H P Rang; J M Ritter & M M Dale - 5th ed - Edinburgh : Churchill-Livingstone, 2003.
42. *Goodman and Gilman's the Pharmacological Basis of Therapeutics* / ed by ed by L L Brunton - 11th ed - New York : McGraw-Hill, 2005.
43. *Basic and Clinical Pharmacology* / B G Katzung - 9th ed – London : Prentice Hall, 2004.
44. *Pharmacology for Anaesthesia and Intensive Care* / T Peck; S Hill & M Williams – 2nd ed - Greenwich Medical Media, 2003.
45. *Pharmacology and Physiology in Anesthetic Practice* / R K Stoelting – 4th ed - Philadelphia : Lippincott Williams & Wilkins, 2006.
46. *Neural blockade : in Clinical Anaesthesia and Management of Pain* / ed by M J Cousins and P O Bridenbaugh - 3rd ed - Philadelphia : Lippincott, 1998.

47. Anesthetic Pharmacology : Physiologic Principles and Clinical Practice / ed by A S Evers & M Maze - New York : Churchill-Livingstone, 2004.
48. *Basic and Clinical Biostatistics* / B Dawson and R G Trapp – 4th ed – New York : McGraw-Hill, 2004.
49. *Statistical Methods for Anaesthesia and Intensive Care* / P S Myles and T Gin - Oxford : Butterworth-Heinemann, 2001.
50. *Neuromuscular Block* / S Feldman – Oxford : Butterworth-Heinemann 1996.
51. *Renal Physiology* / B M Koeppen & B A Stanton – 4th ed – Philadelphia : Mosby Elsevier, 2007
52. *Anatomy at a Glance* / O Faiz & D Moffat - 2nd ed – Mass. : Blackwell Pub., 2006.
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2. Emergency medical journal BMJ
3. Canadian journal of Emergency medicine
4. Annals of Emergency Medicine
5. Paediatric Emergency Medicine journals
6. Journal of Accident and Emergency Medicine
7. The American journal of Emergency Medicine
8. EMERGENCY clinics
9. Journal of Resuscitation
10. Journal of EMERGENCY
11. Circulation 2010