

Forensic Medicine & Toxicology Curriculum 2011

Preamble

The broad goal of teaching undergraduate students in Forensic Medicine and Toxicology is to produce a basic physician who is aware of medical and legal responsibilities in the practice of primary and secondary care medicine. The student must also be capable of making observations and use logical thinking to set enquiries on the possible track in criminal matters and medicolegal problems. He/she must be aware of the laws in relation to medical practice and medical negligence, and acquire knowledge regarding codes of conduct and medical ethics. He/she must be able to manage medical and legal issues in cases of poisoning/ overdose.

Principles

- Reduce information overload—stop students from learning unnecessary details.
- Define contents which have relevance even in the future with specific focus on the next decade.
- Improve upon traditional teaching methods—less emphasis on traditional "didactic" teaching, and more emphasis on problem based learning.
- Give students control over their own learning—let students also provide input as to what they need to know, and what they wish to be examined in.
- Make undergraduate training a platform for lifelong learning—becoming a Medical Practitioner is only the first stage of continuing medical education of a lifelong career.
- Improve Medical Practitioners' interpersonal communication skills—train students to be empathetic and relate better to the patients and their relatives, and their problems.

Learning Objectives

At the end of the course in Undergraduate Forensic Medicine & Toxicology, the student should be able to

1. Identify, examine and prepare report or certificate in medicolegal cases/situations in accordance with the law of the land, with particular emphasis on maintenance of medicolegal registers such as accident register, issuance of wound certificate, drunkenness certificate, death certificate, sickness and fitness certificate, etc., estimation of age by physical, dental and radiological examination and issuance of certificate, examination of victim/accused and issuance of certificate in sex-related offences.
2. Perform medicolegal postmortem examination and reasonably interpret autopsy findings, as well as the results of other relevant investigations to logically conclude the cause, manner and time since death – especially in accidental deaths, hanging, burns, drowning and poisoning.
3. Preserve and dispatch specimens and other relevant materials in medicolegal/postmortem cases to the appropriate Government agencies for necessary examination and report.
4. Understand and observe medical ethics, etiquette, duties, rights, and medicosocial and legal responsibilities of the physicians towards patients, profession, State and society at large.
5. Be aware of relevant legal/court procedures applicable to medicolegal/medical practice.
6. Deal with basic aspects of diagnosis and management of poisoning (acute & chronic), and develop competence to deal with medicosocial and medicolegal issues arising there-from.
7. Recognize and deal with the general principles of environmental, occupational, and preventive aspects of toxicology.

8. Manage medicolegal and medicosocial issues related to mass disasters, including chemical and bioterrorism
9. Recognize the importance of convincing patients/victims of the need for making a case medicolegal in nature in the casualty whenever required, as well as the importance of convincing relatives of brain-dead victims of trauma to donate organs for transplantation.

Knowledge

- Identify medicolegal cases
- Define responsibilities of a basic physician: both medicolegal and medicosocial.
- Appreciate physician's responsibilities in criminal matters
- Be aware of the principles of analytical toxicology
- Diagnose, manage & document acute/chronic poisonings

Skills

- Perform, make observations in post mortems/make logical inferences
- Prepare proper certificates related to death, age, wound, fitness and sickness
- Describe and testify as an expert witness in a Court of Law

Integration

- Provide integrated approach with other allied disciplines of medicine such as anatomy, pathology, radiology, hospital administration, emergency medicine, dentistry, microbiology, medicine, pharmacology, surgery, obstetrics & gynecology, pediatrics and psychiatry.
- Impart training relating to medicolegal responsibilities of physicians at all levels of health care.

Course Curriculum

Semester III (Total 30 hours)

Topics & Themes

I. Legal Procedures

- Define Courts in India and their powers: Supreme Court, High Court, Sessions Court, Magistrate's Court, Labour Court, Family Court, Executive Magistrate Court, Juvenile Court
- Describe Court procedures: summons, conduct money, oath, solemn affirmation, types of witnesses, recording of evidence, conduct of medical practitioner/medical officer in witness box
- Outline offences in Court: perjury; court strictures vis-à-vis medical officer
- Demonstrate medical certification and drafting of medicolegal reports:
 - maintenance of patient case records, discharge summary, prescribed registers to be maintained in health centres
 - maintenance of medicolegal register (e.g., accident register)
 - issuance of wound certificate
 - issuance of drunkenness certificate
 - Issuance of sickness/ fitness certificate
 - Procedure for issuance of death certificate: Medical Certification of Cause of Death - Form No.4 and 4A
 - Estimation of age by physical, dental and radiological examination, and issuance of certificate
 - Dying declaration

II. Identification

- Define 'Identification' and list the medicolegal aspects related to age

- Outline the principles involved in the methods of identification of an unknown living/ dead person by age, sex, stature, scars, moles, tattoos, dactylography, foot prints, hairs, poroscopy, DNA typing, photography and superimposition technique, dental examination including forensic odontology
- Outline the procedure and medicolegal formalities of exhumation
- Develop skills in the examination of mutilated human remains and skeletal remains.

III. Death and its medico legal aspects

- Define death and its types: somatic, cellular and brain-death.
- Differentiate and list natural and unnatural deaths
- Explain issues related to sudden natural deaths; anaesthetic & operative deaths
- Outline the salient features of organ transplantation in relation to The Human Organ Transplant Act 1994. Discuss ethical issues.
- Describe and exemplify the conditions of suspended animation.

IV. Postmortem changes

- Describe cooling of body, lividity, rigor mortis, cadaveric spasm, cold stiffening and heat stiffening
- Describe putrefaction, mummification, adipocere and maceration,
- Estimate time of death by various features and methods

V. Medicolegal autopsy

- Define medicolegal and clinical/pathological autopsies
- Describe the objectives, procedures and formalities of medicolegal autopsies, including the National Human Rights Commission Protocol

Semester IV (Total 40 hours)

Topics & Themes

I. Medical law and ethics

- Medical Jurisprudence
 - Definition and differentiation of forensic medicine and medical jurisprudence.
 - Explain medical negligence: civil and criminal negligence, contributory negligence, vicarious liability, res ipsa loquitor, prevention of medical negligence, and defence in medical negligence litigations
 - Explain Indian Medical Council (MCI) and State Medical Councils (SMC); Provisions of the Medical Council of India Act 1956; Registration of a medical practitioner – procedure; functions and disciplinary control of MCI and SMC.
 - Describe the Consumer Protection Act, 1986; medical indemnity insurance; civil litigations and compensations
 - Describe the legal and ethical aspects of
 - Euthanasia
 - HIV and Law
 - Stem cell research and cloning
- Social aspects and stress management in dealing with medicolegal cases
 - Outline the social aspects of medicolegal cases with respect to victims of assault, rape, attempted suicide, homicide, domestic violence, dowry-related cases
 - Outline the challenges in managing medicolegal cases
 - Develop skills in relationship management – human behaviour, communication skills, conflict resolution techniques
 - Outline the principles of handling work pressure – definition, types, causes, sources and skills for managing pressures while dealing with medicolegal cases by the medical practitioner/medical officer
- Bioethics
 - Define medical ethics and outline its historical evolution
 - Explain ethical principles: Respect for patient autonomy, non-maleficence, beneficence, justice
 - Explain various Oaths – Hippocrates, Charaka and Sushruta; Modified Declaration of Geneva and its relevance; Procedure for administration of Oath – Code of Medical Ethics 2002
 - Describe codes of conduct, professional conduct, etiquette and ethics in medical practice

- Enumerate and explain the rights, privileges and duties of a registered medical practitioner, disciplinary proceedings in professional misconduct, and penal erasure.
- Explain medical practitioner/medical officer-patient relationship: professional secrecy, privileged communications
- Discuss the rights of a patient
- Explain the legal issues of informed consent:
 - Types of consent and ingredients of informed consent
 - Age in relation to consent
 - Consent In relation to mental illness and alcohol intoxication
 - Consent in emergency situations
- Ethical dilemmas in medical profession in relation to consent, treatment and death
- Clinical research & ethics
 - Human experimentation, including clinical trials
 - Constitution and functioning of ethical committees
 - Ethical guidelines for biomedical research on human subjects & animals

II. Torture and Human Rights

- Define and explain issues relating to torture
- Identify injuries caused by torture and its sequelae
- Management of torture survivors
- Outline the National Human Rights Commission guidelines and protocols

III. Mechanical injuries

- Define, classify and differentiate – abrasion, contusion and laceration
- Differentiate simple from grievous injuries
- Describe stab wound, incised wound, defence cut, hesitation cuts, self inflicted injuries and fabricated wounds
- Differentiate between accidental, suicidal and homicidal injuries.
- Identification of the weapon by interpretation of the wound
- Explain the causes of death in mechanical injuries
- Determine the age of injury
- Classify firearms and interpret the findings of firearm wounds.
- Explain the medicolegal aspects of wounds.

IV. Regional injuries

- Injuries of head, neck, thorax, abdomen, pelvis, genitalia, vertebral column and other bones
 - Enumerate and describe types of skull fracture
 - Explain coup and contre coup injuries, intracranial haemorrhages, and injury to brain
 - Explain injuries to spine and spinal cord, thoracic, abdominal and pelvic viscera, bones and joints, and their medicolegal importance

V. Transportation injuries

- Road, rail & aviation injuries
 - State the importance of primary, secondary and tertiary impact injuries, crush syndrome
 - Outline the medicolegal importance of investigation of road, railway and aircraft accidents

VI. Injuries/ death due to heat, cold, electricity, lightning, explosives & radioactive substances

VII. Medicolegal management of mass disasters including chemical and bioterrorism

Semester V (Total 40 hours)

Topics & Themes

I. Mechanical asphyxia

- Define, state causes, enumerate types and describe postmortem appearances and medicolegal significance of hanging, strangulation, suffocation, traumatic asphyxia and drowning.

II. Virginity, pregnancy and delivery

- Describe sexual and reproductive rights of women in India
- Describe medicolegal aspects of virginity, pregnancy and delivery
- Explain legitimacy and medicolegal aspects of pregnancy and delivery, including in-vitro fertilisation and surrogacy
- Outline medicolegal aspects of reproductive medicine
 - Impotence

- Infertility – Male and Female
- Assisted pregnancies and legal problems, surrogate motherhood, hormone replacement therapy and postmenopausal pregnancies
- Explain principles of protection of women from domestic violence with particular reference to the Domestic Violence Act 2005
- Discuss principles of Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) (Prohibition of Sex Selection) Act 2003

III. Sexual offences

- Describe the medicolegal aspects of sexual offences and outline sexual paraphilias
- Explain the objectives and procedure of examination of victim and accused in cases of sexual offence.

IV. Abortion

- Define and classify abortion.
- Describe Medical Termination of Pregnancy Act, 1971 with amendment.
- Enumerate complications of criminal abortion
- Outline investigative procedure in deaths due to criminal abortion

V. Infant and childhood deaths

- Define still-born, dead-born and live-born child
- Describe the signs of still-born, dead-born and live-born child
- Describe the estimation of age of foetus
- Describe sudden infant death syndrome
- Explain child sexual abuse and its medicolegal implications

VI. Laboratory investigations in medicolegal practice

- Different types of specimens and tissues to be collected in medicolegal cases for investigative purposes from living persons/ dead bodies
 - Body fluids - blood, urine, semen, vaginal smear, saliva, viscera, skull, specimens for blood grouping & DNA analysis, specimens for histopathological examination
 - Methods of sample collection, preservation, labelling, dispatch, and interpretation of reports

VII. Emerging technologies in Forensic Medicine

- Outline the principles, reliability and medicolegal importance of:
 - DNA typing
 - Polygraph (Lie Detector)
 - Narcoanalysis
 - Brain mapping
 - Digital autopsy
 - Virtual autopsy
 - Imaging technologies

VIII. Forensic Psychiatry

- Classify common mental illnesses including post traumatic stress disorder (PTSD) as per DSM or ICD systems
- Define, classify and exemplify – delusions, hallucinations, illusion, impulse control and obsessive compulsive disorders, delirium, lucid interval.
- Describe the civil and criminal responsibilities of a mentally ill person
- Differentiate true insanity from feigned insanity.
- Certification of 'Insanity'
- Explain testamentary capacity and methods of restraint of an insane person.
- Outline the Indian Mental Health Act, 1987 with special reference to admission, care and discharge of a mentally ill person.

Semester VI (Total 40 hours)

Topics & Themes

I. General Toxicology

- Describe the general principles of diagnosis and management of common poisonings encountered in India

- General symptoms of poisoning, simple bedside tests to detect poison/drug in a patient's body fluids, basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidotal therapy, procedures of enhanced elimination, etc.
- Explain the medicolegal considerations in cases of suspected poisoning
 - Procedure of intimation of suspicious cases or actual cases of foul play to the police, maintenance of records, preservation and despatch of relevant samples for laboratory analysis.
- Outline the general principles of analytical toxicology
 - Brief description of common bedside tests in toxicology

II. Chemical Toxicology

- Describe the clinical features, fatal dose, management, postmortem appearances and medicolegal aspects of poisoning by:
 - Caustics
 - Inorganic – sulphuric, nitric, & hydrochloric acids
 - Organic – carbolic acid (phenol), oxalic, and acetylsalicylic acids
 - Inorganic elements
 - Phosphorus, iodine, barium
 - Heavy Metals
 - Arsenic, lead, mercury, copper, iron, cadmium, thallium
 - Alcohols
 - Ethanol, methanol, ethylene glycol
 - Hydrocarbons and Pesticides
 - Kerosene, petrol, benzene, methane, turpentine
 - Organophosphates, carbamates, organochlorines, pyrethroids, paraquat, aluminium and zinc phosphide
 - Toxic Gases
 - Ammonia
 - Carbon monoxide
 - Hydrogen cyanide & derivatives, methyl isocyanate, tear (riot control) gases

III. Pharmaceutical Toxicology

- Describe the clinical features, fatal dose, management, postmortem appearances and medicolegal aspects of poisoning by:
 - Antipyretics – paracetamol, salicylates
 - Anti-Infectives: Common antibiotics – an overview
 - Neuropsychotoxicology: Barbiturates, benzodiazepines, phenytoin, lithium, haloperidol, neuroleptics, tricyclics
 - Narcotic Analgesics, Anaesthetics, and Muscle Relaxants
 - Cardiovascular Toxicology
 - Cardiotoxic plants – oleander, odollam, aconite, digitalis
 - Gastro-Intestinal and Endocrinal Drugs – insulin

IV. Biotoxicology

- Describe the clinical features, fatal dose, management, postmortem appearances and medicolegal aspects of poisoning by:
 - Poisonous Plants: Castor, croton, calotropis, abrus, datura, strychnos
 - Food Poisoning & Food Adulterants: Bacterial, viral, chemical food poisoning, toxic mushrooms and fish, argemone
 - Venomous Bites and Stings: Snakebite, scorpion sting, bee & wasp sting, spider bite.

V. Sociomedical Toxicology

- Describe the clinical features, fatal dose, management, postmortem appearances and medicolegal aspects of poisoning by:
 - Substances of dependence and abuse: Tobacco, cannabis, amphetamines, cocaine, hallucinogens, designer drugs & solvent abuse
- Salient features of NDPS Act.

Required Skills To Handle Cases Pertaining to Forensic Medicine & Toxicology

Skill	Able to perform independently	Able to perform under guidance	Assist	Observe
Prepare proper certificates of birth and death*	+			
Prepare dying declaration	+			
Give evidence in a court of law as an expert witness	+			
Collect and do proper labeling, preservation and dispatch of medicolegal specimens	+			
Diagnose and manage common acute and chronic poisonings	+			
Perform medicolegal duties in cases of poisoning and log 5 cases in the record book	+			
Observe ten medicolegal autopsies** and enter the reports in practical record book				+
Age estimation from bones, x-rays and dentition		+		
Examination of injuries, weapons and report writing, Draft informed consent form	+			
Examination and reporting of an alcohol intoxication case	+			
Examination of victim & accused in sexual offences and report writing	+			
Study of specimens of poisons		+		
Perform simple bedside tests in poisoning	+			
Study of wet specimens during autopsy	+			

*The student should be able to fill up correct proformas in an adequate manner to inform births and deaths to relevant authorities under the Birth and Death Registration Act.

**Medical colleges not having autopsy facilities can depute the students to the nearest Government/Civil hospital

Course Regulations

Course duration

A total teaching time of 150 hours may be allotted for transacting Forensic Medicine & Toxicology curriculum over 4 semesters (3rd to 6th semester)

Course schedule

The principle of integration should form the basis for scheduling the course contents. Forensic Medicine & Toxicology should integrate with the following departments for teaching the subject:

Horizontal: Pathology, Microbiology, Pharmacology

Vertical: Anatomy, Physiology, General Medicine, General Surgery and Obstetrics and Gynaecology, Pediatrics & Radiodiagnosis

Methods of instruction:

- A. This course must be operated on a lecture, discussion, and practical (including demonstration and student participation) format.
- B. Students may be required to make presentations of selected topics to the class.
- C. Structured problem-based exercises may be provided to simulate specific case examples.
- D. Audio visual material and/or printed handouts will supplement reading and classroom instruction.
- E. Exposure visit to:

Mandatory:

- Casualty department

Desirable:

- Forensic Science laboratory – toxicology and ballistics
- Crime Scene
- Exhumation
- Court –
 - Criminal [expert testimony of homicides]
 - Consumer [medical negligence cases]

Methods of learning:

1. Read and study assigned and/or recommended readings.
2. Participate in class discussions.
3. Participate in group interactions and ask questions during lectures.
4. Seminars by students
5. Complete required assignments.
6. Practicals –
 - a. Hands-on laboratory work
 - b. Clinical Forensic Medicine cases
 - c. Moot courts
 - d. Documentation: Clinical examination of patients/victims
 - e. Visit to Crime Scene: Inquest by Police, Magistrate
 - f. Collect, pack, label, & despatch evidentiary material

Visit to Casualty/Inpatient wards: trauma, poisoning and other cases of medicolegal importance.

Methods of assessment & evaluation:*Formative assessment:*

1. Periodic objective/problem based tests
2. Activity – Case studies/ Seminars/ Individual and group assignments
3. Research Activity: Short term projects
4. Practical assessment
5. Structured oral viva voce

Summative Assessment:

A minimum of 2 theory and practical sessional examinations should be held in the 4th, and 6th semesters

At the end of the sixth semester of MBBS, two papers of University theory examination, one practical examination and viva voce must be conducted.

Paper 1 – Forensic Medicine and Forensic Psychiatry – 3 hours

Paper 2 – Medical Jurisprudence and Toxicology – 3 hours

Details of Assessment: Marks

University Theory Paper 1 - 80 (Forensic Medicine 70 + Forensic Psychiatry – 10)

University Theory Paper 2 - 80 (Medical Jurisprudence 30 + Toxicology – 50)

University Practical Examination – 80 Viva Voce – 20

Internal Assessment - Theory 20 Practical 20

TOTAL 300

Assessment methods must include essay questions, short answer questions, MCQs, problem solving exercises, objective and structured clinical examination (OSCE), objective and structured practical examination (OSPE), microscopic examination, records review, and structured oral viva voce.

In practical examination, the distribution of marks shall be as follows: any 4 of the following exercises carrying 20 marks each, depending on the locally available resources:

- i. Age estimation of subject and issuance of age certificate
- ii. Examination and certification of injured person
- iii. Examination of a case of drunkenness
- iv. Problem solving exercise based on medicolegal autopsy report
- v. Problem solving exercise of a case of simulated poisoning
- vi. Examination and certification of victim/ accused in sexual assault case
- vii. Examination and reporting on a weapon
- viii. Examination and discussion on two articles or poisons of medicolegal importance

The marks obtained in the internal assessments should be considered along with the final marks obtained in the theory and practical examination.

A candidate must obtain 50 percent in aggregate, with 50 percent in Theory + Viva Voce (minimum of 40% in theory), & 50 percent in practicals.

Internship:

Compulsory internship posting of 15 days to the department of Forensic Medicine & Toxicology. The posting should include working in the mortuary, casualty, handling clinical forensic medicine cases (including toxicology), and attending court. During the posting, the candidate should assist minimum of TWO medicolegal autopsies, and perform ONE medicolegal autopsy under guidance. Medical colleges not having autopsy facilities can depute the interns to the nearest Govt/Civil hospital.