

M.D. ANAESTHESIA - SYLLABUS

May - 2006

At the end of three years of training as residents in anaesthesia, the candidates should be fully conversant with theory and practical aspects of:

- A. Human Anatomy and Physiology** of various organ systems and cellular components in relation to Anaesthesia including muscles, neuromuscular junction, nerve plexuses, cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and temperature homeostasis, theories of mechanism of production of anaesthesia, changes during pregnancy, various tests/investigations to evaluate the functional status of organ systems as applied to Anaesthesia Management, Intensive Care Practice and Pain Relief
- B. Pharmacology** as applied to Anaesthesia, Intensive Care Practice and Pain Relief including General Pharmacological Principles, Pharmacokinetics and Pharmacodynamics of Anaesthetic Drugs (including Uptake and Distribution of Inhaled Anaesthesia agents and All the Adjuncts used in Anaesthesia, Drugs used for treatment of various Diseases and Drug Interaction
- C. Pathophysiology of various diseases** including disorders of cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and immune systems, various tests/investigations to grade/measure the disease process of various organ systems as applied to anaesthesia management, intensive care practice and pain relief
- D. Medicine** as applied to the practice of Anaesthesia including diagnosis and management of Diabetes, Hypertension, Bronchial Asthma, Chronic Obstructive Pulmonary Diseases, Respiratory Failure, ARDS, Myocardial Ischemia / Infarction, Arrhythmia, Shock, Congestive Heart Failure, Acute / Chronic Renal Failure, Head Injury, Unconscious patients, Status Epilepticus / Asthmaticus, Endocrine Disorders, Diseases related to Dysfunction of Hepatobiliary, Muscular, Connective Tissues and Immune system, Management of Perioperative Infection, Neuromuscular Disorders, Poisoning etc. and interpretation of ECG / Blood Gases / Other Biochemical Values and Function Tests
- E. Physics** as applied to Anaesthetic gases, vapours, anaesthesia machine, breathing systems, monitors, ventilators, therapeutic devices & other relevant equipment including physical principles involved in their construction and functioning
- F. Perioperative Anaesthesia management** including pre-operative evaluation, intra-operative management as well as post-operative care, monitoring (invasive as well as non-invasive) as applied to various surgical specialities and age groups.
- G. Theory and practice of various techniques / aspects of Routine & Emergency cases of General Anaesthesia** (e.g., Intravenous / Inhalational, Endotracheal / Mask / LMA / COPA, Spontaneous/Controlled mode of ventilation, induced hypotension / hypothermia etc.), **Regional Blocks** (Spinal, Epidural & Peripheral Nerve block) and **Local Anaesthesia**, including **various postures** required for anaesthetic/surgical procedures, their effects and **Recent Advances** for most minor to supra major surgeries in the field of:
 - **General surgery:** e.g. minor cases like haemorrhoidectomy to supra major cases like Liver transplant
 - **Gynaecology and Obstetrics**
 - **ENT and Head & Neck**
 - **Orthopaedics**
 - **Ophthalmology**
 - **Pediatric & Neonate:** Differences between adult and pediatric Anatomy, Physiology, Pharmacology, Anaesthesia principles, pediatric/neonatal emergencies, postoperative care, fluid & ventilator management etc

- **Cardiac, Vascular & Thoracic:** Conduct of closed heart as well as open heart surgeries (Valvular, Ischemic, Congenital -Cyanotic & Acyanotic), CABG (including off pump), Pulmonary Cases (Insertion of Double Lumen Tube, one lung anaesthesia), Thymus and Vascular surgeries etc. Ability to go on Cardiopulmonary bypass and disconnect from bypass, Ability to take, manage and interpret Arterial, Central Venous and P.A. Lines, postoperative care, management of re-explorations etc.
- **Neurosurgery:** Ability to monitor ICP, Management of head injuries, bleeds, tumours, etc with raised ICT. Ability to safely manage cases in sitting, prone, lateral, jack-knife positions and Anaesthetic management for neuro-radiology procedures
- **Urology:** Management of endoscopic surgeries like TURP/TURBT etc, Problems related to TURP, extracorporeal shock wave lithotripsy, percutaneous placement of nephrostomy etc., anaesthetic management of patients with acute and chronic renal failure, anaesthetic management of renal transplant cases of donor as well as recipient.
- **Plastic:** Management of burns contractures, congenital faciomaxillary abnormalities like cleft lip and palate, faciomaxillary injuries like fracture mandible, maxilla, zygoma, panfacial fractures, difficult intubations, microvascular surgeries, reconstructive surgeries, aesthetic surgeries etc
- **Dental:** Monitored Anaesthesia Care, Anaesthetic management of pedodontia patients, maxillo-facial surgeries including TMJ Ankylosis, Awake, Retrograde & Fiberoptic intubations
- **Endoscopies / laparoscopies:** Anaesthetic management, specific requirement and complications of various endoscopies like cystoscopy, ureteroscopy, PCNL, hysteroscopy, thoracoscopy, mediastinoscopy etc. and Lap. assisted/laparoscopic surgery like hysterectomy, tube ligation, appendicectomy, cholecystectomy etc.
- Anaesthesia for various **diagnostic, therapeutic and Specialized** procedures
- Anaesthesia for **Geriatric patients**
- Anaesthesia for surgery using **LASER**
- **Anaesthesia / Sedation techniques out side operating room:** Electroconvulsive shock therapy (ECT), Electrophysiologic tests, Radiofrequency ablation, Cardioversion, Cardiac catheterization, Special anaesthetic considerations in radiology and interventional radiology related to Dye allergies, Embolization, Monitoring / Equipment options in the MRI suite

H. History of Anaesthesia

- Airway Management:** Assessment of difficult airway, Awake, Retrograde, Use of intubating LMA's, Intubating Stylets, Various laryngoscopes designated for difficult airway, Insertion of Combitube, Ability to perform Cricothyrotomy and use of Venturi, Minitrach & Fiberoptic intubations etc
- Basic & Advanced Cardiopulmonary & Cerebral Resuscitation (CPCR)** for all age group of patients under different situations e.g., neonates, pregnant females, poisoning cases, trauma victims etc.
- Acid base & Fluid management** including use of Crystalloids, Colloids, blood & blood products
- Arterial, Central Venous and P.A. Lines:** Establishment, management and interpretation
- Anaesthetic drugs used in perioperative care**
- Equipments** (Minor to advanced monitoring) – their use, maintenance, sterilisation and care
- Medical gases: Knowledge of** Manufacturing, Storage and Central pipeline Systems
- Day Care / Outpatient Anaesthesia.**
- Remote Location Anaesthesia:** Anaesthetic practice during **disasters** and for large turnover surgeries in **camps / mass casualties.**

- R. Emergency Anaesthesia**
- S. Monitored Anaesthesia Care**
- T. Labour Analgesia**
- U. Pain relief – Acute & Chronic**
- V. Critical care practice** including oxygen therapy, respiratory therapy, ventilatory support, haemodynamic monitoring, prevention and management of multi organ failure, and care of patients with brain damage or brain dead patients For organ Transplant
- W. Advanced Trauma Life Support (ATLS)**
- X. Occupational Hazards**
- Y. Safety in Anaesthesia**
- Z. Complications of Anaesthetic procedures, its prevention, detection and management**
- AA. Record keeping in Anaesthesia**
- BB. Medical Audit**
- CC. Quality Assurance**
- DD. Anaesthesia standards:** e.g., Minimum monitoring standard
- EE. Medicolegal aspects in Anaesthesia**
- FF. Ethics in Anaesthesia**
- GG. Principles of Evidence Based Medicine**
- HH. Basic Research Methodology and Clinical Trials**
- II. Bio-statistics**
- JJ. Computers:** Utility, computer assisted learning and data storage, Computerised anaesthesia records
- KK. Skills:** for planning of operation theater, pain clinic, recovery room, intensive care etc. including selection and purchase of equipments

TRAINING PROGRAMME

A. ADMINISTRATION OF ANAESTHESIA & PERIOPERATIVE PATIENT CARE

1 Year Residents:–

Assisting during minor & major anaesthesia procedures and managing patients in recovery or intensive care areas (all Under Supervision)

The first month of the first year will be spent in orientation in the operating rooms and attending lectures covering the basics of the discipline. After that the first year of training will be spent in learning the fundamentals of anesthesiology with emphasis on checking of anaesthesia equipment including anaesthesia machine, airway equipment and appropriate monitors, preparation of appropriate dosages of various drugs required at specific point of time, mastering clinical skills regarding selection and implementation of an appropriate anaesthesia plan, placement of lines, induction of anaesthesia, intubation, maintenance of anaesthesia, and the successful reversal of anesthetic agents. Emphasis will also be placed on learning regional anaesthesia and Cardiopulmonary resuscitation. Also the candidates will be assigned guides for thesis so as to help them prepare protocols.

To start with the first year residents will observe and then slowly become independent in giving general anaesthesia and Regional anaesthesia to patients belonging to ASA grade I & II for minor and major surgery, under graded supervision. They will be posted in rotation to the following specialties during the first year: Preoperative assessment area, General Surgery, Gynecology, Obstetrics, Orthopedic, ENT, and Recovery Room. They will be assigned to cases in the Operating Room at the hospitals attached to medical teaching institutes affiliated to the University under which they have registered and will gain experience under the direction and supervision of respective academic faculty.

II Year Residents:-

Assisting during minor & major procedures under anaesthesia, managing patients in recovery or intensive care areas and Independently conducting minor procedures under anaesthesia (GA/RA) for ASA grade I or II patients (excluding expected difficult airway cases and cases with expected major body fluid shift)

The second year of training will be devoted to the subspecialties/superspecialities of anesthesia at the hospitals affiliated to medical teaching institute and the university under the supervision of a faculty member with an aim to concentrate on mastering the knowledge and technical skills associated with providing anesthesia to subspecialty/superspeciality patients. Residents will be rotated in Pediatric anesthesia, Neuroanesthesia, Cardiovascular and Thoracic anesthesia, Ambulatory anesthesia, Obstetrics, Dental Surgery, Ophthalmology, Pain Clinic / Pain Management, Peripheral Theatres, Anaesthesia Outside Operating Rooms, Trauma care, Transplant Surgeries etc. They will be taught to give general anaesthesia and regional anesthesia (Extradural Block - EDB, Spinal Block, and Peripheral Nerve Blocks) to ASA grade I, II, III & IV patients under supervision for superspeciality theaters. They should be able to give GA/RA to other ASA grade I & II patients independently. Rotations in critical care areas e.g., Trauma Ward, Post Anesthesia Care Unit / ICU / Emergency Medical Service will also be part of the second year training curriculum. They should learn pediatric and trauma life support and maintain skills for basic and advanced cardiac life support. The student should be able to analyze and present scientific data and write a thesis.

III Year Residents:-

Assisting during minor & major procedures under anaesthesia, managing patients in recovery or intensive care areas and Independently conducting both minor and major procedures under anaesthesia (GA/RA) for ASA grade I or II patients (excluding expected difficult airway cases and cases with expected major body fluid shift)

The third (final) year of training will be devoted to management of most complex cases available at the institute under the supervision of a faculty member. The residents will be trained to exercise independent judgment, to take responsibility while caring for such patients, and to take part in research projects under the supervision of a faculty member. The student should be able to plan and administer anaesthesia to all patients under graded supervision including patients for Cardiac, Neurosurgery, Pediatric surgery and for all major surgery of subspeciality branches. The aim at the end is to be competent and independent soon after the third year of residency in providing anaesthesia to elective and emergency cases belonging to all specialities. The resident should be able to manage critically ill patients and treat intractable pain. They should also know how to organize mass casualty.

B. THESIS -

- The aim of thesis should be to make the student able to demonstrate capability in research by planning and conducting systematic scientific inquiry & data analysis and deriving conclusion.
- Thesis protocol should be submitted at the end of six months after admission in the course to the Research Committee of the Institute. The protocol must be presented in the department of Anaesthesiology before being forwarded. The research committee appointed by the Dean/Principal to scrutinize in references to its feasibility, statistical validity, ethical aspects, etc would approve the Protocol.
- Protocol in essence should consist of:
 - a) Introduction and objectives of the research project.
 - b) Brief review of literature.
 - c) Suggested materials and methods, and (scheme of work)

d) Statistician should be consulted at the time of selection of groups, number of cases and method of study. He should also be consulted during the study.

e) Bibliography

- Chief guide for thesis will be from the department of Anaesthesiology and co-guide(s), if needed, will be from the department of Anaesthesiology or from other disciplines related to the thesis.
 - The thesis shall relate to the candidate's own work on a specific research problem or a series of clinical case studies in accordance with the approved plan.
 - The thesis shall be written in English, printed or typed on white A4 size bond paper bearing the matter on one side of paper only and bound with cloth/rexine, with the title, author's name and the name of the College printed on the front cover.
 - The thesis shall contain: Introduction, review of literature, material and methods, observations, discussions, conclusion and summary and reference as per index medicus.
 - Each candidate shall submit to the Dean four copies of thesis, through their respective Heads of the Departments, not later than six months prior to the date of commencement of theory examination in the subject
- C. **ACTIVITIES** – Participation by way of attendance / presentation in Didactic lectures, Symposia, Seminars, Group discussions, Workshops, Morbidity & Mortality meet, Panel Discussion etc. **Each Student should have actively participated in at least 6 academic sessions per year** during the total training period of three years (total 18).

D. **LOG BOOK MAINTENANCE** of all the clinical and academic work done by the student in his/her tenure of three years.

Minimum Procedures/Cases required to be done and entered in the log book

Regional Block	
Spinal	= 30 to do
Epidural	= 30 to do
Combined Spinal Epidural	= 20 to do
Caudal	= 10 to do
Bier Block (IVRA)	= 5 to do
Sciatic/Femoral	= 5 + 5 (to observe or do)
Ankle Block	= 5 (to observe or do)
Stellate Ganglion Block	= 3 (to observe or do)
Brachial Plexus	= 5 to observe & 10 to do
Sympathetic Block	= 3 (to observe or do)
Trigger Point injection	= 3 (observe)
Other peripheral N. Block	= 3 to do
Ophthalmic Blocks	= 5 (to observe)
Field Block	= 3 (to observe or to do)
Anaesthesia for:	
General Surgery	= 50 (to do)
Gynecology	= 50 (to do)
Obstetrics	= 20 (to do)
ENT	= 20 (to do)
Orthopedics	= 20 (to do)
Ophthalmology	= 5 (to do)
Plastic Surgery	= 5 (to do)
Endoscopy / Laparoscopy	= 5 (to do)
Urology	= 5 (to do)

Open Heart	= 5 (to observe)
Closed Heart	= 5 (to observe)
Pediatric Surgery	= 5 (to observe)
Craniotomy	= 5 (to observe)
Spinal Surgery	= 5 (to observe)
Joint Replacement	= 5 (to observe)
Anesthesia for organ transplant	= 5 (to observe - desirable)
ECT	= 10 (to do)
Radiology / CT Scan	= 5 (to do) Anaesthesia/sedation
Procedures	
Internal Jugular Cannulation	= 5 + 5 (to observe or do)
External Jugular Cannulation	= 5 to do
Subclavian Vein Cannulation	= 5 + 5 (to observe or do)
Peripheral Central Line	= 15 to do
Arterial Line Cannulation	= 10 to do
Endotracheal Intubation	= 250 to do
LMA insertion	= 30 to do
Difficult Airway Management	= 5 to do
Conduct of Cases	
ASA I	= 300 to do
ASA II	= 200 to do
ASA III	= 50 (to observe)
ASA IV	= 30 (to observe)
Labour Analgesia	= 5 (to observe or do)

ASSESSMENT (As per Direction No. 01/2008 dtd. 26/05/2008)

Recommended Reading

I. Books

S.No	Name	Authors / Editors	Year of publication	Last Edition	Publication House
1	Lee's Synopsis of Anaesthesia	G.B.Cashman, N.J.H Davies	2006	13 th	Butterworth-Heinemann
2	Wylie & Churchill Davidson's – A practice of Anaesthesia	Thomas E. Healy Paul R. Knight	2003	7 th	Arnold
3	Anaesthesia	Miller Ronald D.	2005	6 th	Elsevier Churchill Livingstone
4	Yao and Artusio's Anesthesiology	Fun-Sun F.Yao	2003	5 th	Lippincott Williams & Wilkins
5	Anesthesia and Co-existing Disease	R. K. Stoelting S.F. Dierdorf	2002	4 th	Churchil Livingstone
6	Anesthesia and Uncommon Disease	Fleisher	2005	5 th	Saunders Elsevier
7	Clinical Anaesthesiology	G.E.Morgan M.S.Mikhail	2005	4 th	McGraw-Hill
8	Understanding Anaesthesia Equipment	Jerry A. Dorsch Susan E. Dorsch	1998	4 th	Williams & Witkins

9	Wards Anaesthesia Equipments	Davey	2005	5 th	Baillirro Tindall
10	Anatomy for Anaesthetists	Harold Ellis Stanley Fieldman	2005	8 th	Blackwell Science
11	Pharmac. & Physiology in Anaesthetic Practice	R. K Stoelting S.C.Hillier	2006	4 th	Lippincott-Raven
12	Shnider and Levinson's Anesthesia for Obstetrics	Hughes Levinsons Rosen	2002	4 th	Lippincott Williams & Wilkins
13	Paediatric Anaesthesia	Gregory	2005	4 th	Churchil Livingstone
14	Cardiac Anesthesia	Kaplan	2005	4 th	W. B. Saunders & Co.
15	Thoracic Anesthesia	Kaplan	2003	3 rd	Churchil Livingstone
16	Clinical Application of Mechanical Ventilation	David W. Chang	2001	2 nd	Delmar-Thomas Learning

II. "Recent Advances in Anaesthesia and Analgesia" Last two Editions: Mosby Publications

III Journals

1. Indian Journal of Anaesthesia	5. Anaesthesia
2. Journal of Anaesthesiology and Clinical Pharmacology	6. British Journal of Anaesthesia
3. Indian Journal of Critical Care Medicine	7. Anesthesia & Analgesia
4. Anesthesiology Clinics of North America	8. Anesthesiology

Addition of Ultrasonography In curriculum of Anaesthesiology.

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ULTRASONOGRAPHY SYLLABUS

[For MD/ DA Anaesthesiology Curriculum]

The following 'Ultrasonography Syllabus' shall be included in the learning & training programme of MD & DA courses (Postgraduate degree & Postgraduate Diploma course) in Anaesthesiology.

'Ultrasonography syllabus' learning & practical training shall be completed by postgraduate students [during their three years course of MD in anaesthesiology] of MD anaesthesiology. The students shall be posted for ultrasonography training as follows:

- a) 2nd term of first year = 10 days posting
- b) 2nd term of second year = 10 days posting
- c) 1st term of third year = 10 days posting

'Ultrasonography syllabus' learning & practical training shall be completed by postgraduate students [during their two years course of DA in anaesthesiology] of DA anaesthesiology. The students shall be posted for ultrasonography training as follows:

- a) 2nd term of first year = 15 days posting
- b) 1st term of second year = 15 days posting

The necessary skills of ultrasonography shall be acquired by the MD & DA students before appearing for final university theory & practical examinations of Maharashtra University of health sciences, Nashik.

The Head of the department shall prepare the time table/ posting of MD & DA postgraduate students by rotation in the Radio-diagnosis department of their respective Medical Colleges.

As per the syllabus & in relation to anaesthesiology practical skills, the basic applied & practical training of Ultrasonography & Doppler shall be conducted by the faculty of Radio-diagnosis department of the respective Medical Colleges.

KNOWLEDGE TO BE ACQUIRED BY MD & DA P.G. STUDENTS

1. Ultrasound Physics- Image generation

= [2Theory Lecture]

- a) Ultrasound waves
- b) Piezoelectric effect
- c) A B M modes
- d) Principle of Doppler

2. Equipment

= [1 Theory Lecture]

a) Probe selection; b) Knobology; c) Depth , Gain, MB, Needle guide etc d) Image storing & archiving

3. Sono-anatomy of common arteries, veins and nerves = [2 Theory Lecture]

- a) Applied sono-anatomy of Brachial Plexus, Lumbarplexus& Sacral plexus
- b) Applied sono-anatomy of thoracic, lumbar, PV areas.
- c) Ability to interpret 3D anatomy from 2D cross sectional image.
- d) Applied sono-anatomy Neck for central venous canulation of IJV, subclavian vein
- e) Applied sono-anatomy of abdomen- spleen, liver & kidney, IVC, Aorta & Portal vein. [For assessment of soft organ injury in trauma cases]

4. Skills to be attained

- i) Image acquisition
- ii) Ability to effectively apply "PART" maneuver- pressure, alignment, rotation & tilting
- iii) Performance, patient, monitor- ergonomics.

2. Needling (Get the needle on the target)

- i) In plane & out of plane concepts.
- ii) Ability to use needle visualization preset.
- iv) Ability to get the target, needle tip visualization.

5. Teaching & Learning Methods

- Lectures to cover up the basic principles & sono-anatomy
- Practical demonstration in the operating room
- Phantom training for needling.

6. Attitude and Behavior

- Provides explanations of regional anaesthesia techniques in a way that patients can understand.
- Understand the patient anxieties about regional techniques, especially the stress of undergoing surgery while conscious.
- Recognizes the need for communication with staff about use of regional block
- Handles patient gently during performance of regional block.
- Meticulous attention to safety and sterility during performance of regional blocks.
- Enlist help/ advice from other professionals when appropriate.

7. Workplace & training objectives

- Trainees should take appropriate opportunities to use regional anaesthesia in patients undergoing a range of operations in specialties' such as orthopedics, gynecology, urology and plastic surgery in order to demonstrate their attainment of the listed requirements
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8. USG guided central venous cannulations

- Internal Jugular Vein; Subclavian Vein; Femoral vein

9. Cleaning & Disinfection

- a) Knowledge about the cleaning solutions & its implication

10. PCPNDT act Rules & regulation & guidelines



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P. P. Aggarwal

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