# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Anatomy)

A. **Cognitive domain**

At the end of the course, the student will be able to:

1. Describe gross anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord.
2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She/He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.
3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.
4. Demonstrate knowledge about the sequential development of organs and systems along with its clinical anatomy, recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. She/He should be able to explain developmental basis of variations and congenital anomalies.
5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtual microscopy.
6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.
7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.
8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.
9. Describe important procedures in cytogenetics and molecular genetics with its application.
10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.
11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics and pharmacogenetics.
12. Demonstrate knowledge about reproduction genetics, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.

13. Explain principles of gene therapy and its applied knowledge.
14. Describe immune system and cell types involved in defense mechanisms of the body. Also explain gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibility testing.
16. Demonstrate applications of knowledge of structure & development of tissue organ system to comprehend deviations from normal.
17. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
18. Explain collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.
19. Demonstrate knowledge about surface marking of all regions of the body.
20. Able to interpret various radiographs of the body, normal CT Scan, ultrasound and MRI.
21. Demonstrate knowledge about different anthropological traits and use of related instruments.
22. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution.
23. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy.

**B. Affective domain**

At the end of the course the student will be able to:

1. Demonstrate self-awareness and personal development in routine conduct. (Self awareness)
2. Communicate effectively with peers, students and teachers in various teaching-learning activities. (Communication)
3. Demonstrate

   a. Due respect in handling human body parts & cadavers during dissection. (Ethics & Professionalism)

   b. Humane touch while demonstrating living surface marking in subject/patient. (Ethics & Professionalism)
4. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure. (Equity and social accountability)

6. Motivate & counsel the undergraduate students in the process of learning.
7. Demonstrate work ethics in the workplace.

**C. Psychomotor domain**

At the end of the course the student will be able to:

1. Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.
2. Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.
3. Locate and identify clinically relevant structures in dissected cadavers.
4. Locate and identify cells & tissues under the microscope.
5. Identify important structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography.
6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.
7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.
8. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs.
9. Deliver lectures & demonstrate practical skills effectively to the undergraduate students.
10. Maintain documentation of attendance and conduct of Internal Assessment exams of undergraduate students.
11. Maintain documents, regarding resource materials of the department like library books, soft tissues, cadavers, wet & dry museum specimens.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Physiology)

**A. Cognitive Domain**

At the end of the course the student will be able to:

1. Teach the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) and their management to undergraduate medical and paramedical students.
2. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.
3. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.
4. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.
5. Contribute to society by imparting physiological understanding of health problems.
6. Plan a research study and conduct basic and clinical systemic investigations.

**B Affective domain**

At the end of the course the student will be able to:

1. Demonstrate self-awareness and personal development in routine conduct. (Self-awareness)

2. Communicate effectively with peers, students and teachers in various teaching-learning activities. (Communication)

3. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.

4. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (Equity and social accountability)

**C. Psychomotor Domain**

At the end of the course the student will be able to perform:

**I. Hematology Experiments**

1. Estimation of hemoglobin

2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)

3. Determination of Total Leucocytes (WBC) Count : TLC
4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC
5. Determination of Arneth Count
6. Determination of Bleeding Time (BT) and Clotting Time (CT)
7. Determination of Blood groups (A,B,O and Rh system)
8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)
9. Determination of Osmotic Fragility of Red Blood Cells
10. Determination of Platelet Count
11. Determination of Reticulocyte Count
12. Determination of Absolute Eosinophil Count
13. Study of Haemopoietic Cells Present in the Bone Marrow

**II. Animal Experiments** (All animal experiments will be compliant with Govt. of India Regulations, notified from time to time). Experiments in Amphibian/Dog/Cat will be conducted by computer assisted simulation models/ facilities. Other experiments will be performed as permissible by CPCSEA guidelines.

Previously recorded graphs of animal experiments will be analysed and data interpreted.

At the end of the course the student will be able to:

**A. Amphibian (Frog) Experiments**

1. Determine effect of temperature on simple muscle twitch.
2. Determine effect of two successive stimuli (of same strength) on skeletal muscle.
3. Determine effect of increasing strength of stimuli on skeletal muscle.
4. Determine effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Determine effect of free load and after load on skeletal muscle.
6. Determine effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study isometric contraction in skeletal muscle.
8. Determine conduction velocity of sciatic nerve and effect of variables on it.
9. Enumerate properties of cardiac muscle – Refractory period, All-or-None Law, extra- systole and compensatory pause, beneficial effect.
10. Experiment on regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Determine effect of physiological and pharmacological variables on intact frog's heart.

12. Perform experiments on perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.

13. Perform experiments on perfusion of blood vessels in the frog.

14. Perform experiments on capillary circulation (Frog Web).

15. Elicit postural and protective reflex in the frog.

**B. Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)**

At the end of the course, the student will be able to perform:

1. General management of mammalian experiments.

2. Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.

3. Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.

4. Effect of stimulation and distension of carotid sinus on blood pressure and respiration.

5. Effect of stimulation of splanchnic nerve.

6. Effect of stimulation of peripheral somatic nerve (sciatic nerve).

7. Study of hypovolemic shock and its reversal.

8. Perfusion of isolated mammalian heart and study the effects of drugs and ions.

9. Recording of isolated intestinal movement and tone and studying the effect of drugs and ions.

10. Study of various stages of menstrual cycle, cervical smear and vaginal smear.

**III. Human Physiology**

Clinical Physiology

At the end of the course, the studenent will be able to perform experiments on:

1. Physiological principles of clinical examination.

2. General Physical examination, physiological basis of some clinical symptoms and signs.

3. General principles of Inspection/Palpation/Percussion/Auscultation.

**Nerve muscle physiology**

1. Ergography and hand grip spring dynamography and study of human fatigue.

2. Recording of electromyography (EMG) and its application.

3. Recording of nerve conduction.

**Cardiovascular system (CVS)**

1. Clinical examination of CVS.
2. Examination of arterial & venous pulses.
3. Measurements of arterial blood pressure and effect of head-up/head-down tilt.
4. Recording of 12 lead Electrocardiography (ECG) and its interpretation.
5. Measurement of blood flow.

**Respiratory system**

1. Clinical examination of respiratory system.
2. Stethography – study of respiratory movements and effect of various factors.
3. Assessment of respiratory functions (spriometry, vitalography, and gas analysis).
4. Measurement of BMR.
5. Cardio pulmonary resuscitation (CPR) and Artificial respiration.

**Gastrointestinal system: Clinical examination of abdomen.**

**Integrative Physiology / Excretory system**

1. Recording of body temperature/effect of exposure to cold and hot environment
2. Studies in stimulated environment - microgravity; high altitude; hot and cold environment.
3. Human studies involving sweat, salivation and urine.

**Reproductive system**

1. Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
2. Semen analysis: sperm count and motility.

**Nervous System including Special senses**

1. Clinical examination of the nervous system and its physiological basis.
2. Examination of higher mental functions.
3. Examination of cranial nerves.
4. Examination of sensory system.
5. Examination of motor system including reflexes.
6. Clinical examination of special senses:
    (i) Smell and Taste
    (ii) Test for hearing to deafness
    (iii) Physiology of eye:
    (a) Clinical examination of the eye and pupillary reflex
    (b) Visual acuity

(c) Perimetery – mapping out of visual field and blind spot

(d) Accommodation

(e) Fundoscopy

(f) Colour vision and colour blindness

7. Reaction (visual and auditory) and reflex time.

8. Electroencephalography (EEG) and Polysomnography

9. Autonomic Nervous System (ANS) Testing.

10. Neuro-electrodiagnostic techniques:

(i) Nerve conduction study.

(ii) Visual evoked potential (VEP).

(iii) Brainstem auditory evoked potential (B.A.E.P).

(iv) Somato-sensory evoked potential (SEP).

(v) Motor evoked potential (MEP).

Others

1. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.

2. Tests for physical fitness: Cardio – respiratory responses to steady state exercise using

(i) Harvard step test

(ii) Bicycle Ergometry

(iii) Treadmill test for determination of VO2 max

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Biochemistry)

**A. Cognitive domain**

At the end of the course the student will be able to:

1. Describe and apply biochemical principles to explain the normal state, abnormal disease conditions and mechanism of action used in the perception, diagnosis and treatment of diseases.
2. Explain energy transactions in a living system, and describe importance of biomolecules in sustaining the life process.
3. Describe pathways of the intermediary metabolism along with their individual and integrated regulation and apply that in understanding the functioning of the body.
4. Describe and apply the concept of nutrition in health and disease, micro- and macronutrition and essential nutrients, and interlinks of nutrients with metabolism and functions of a living system.
5. Apply and integrate knowledge of molecular and metabolic conditions in normal and disease states for clinical problem solving and research
6. Acquire knowledge on application of various aspects of genetic engineering in medicine
7. Acquire knowledge and apply the principle of statistics, biostatistics and epidemiology to the evaluation and interpretation of molecular and metabolic disease states.
8. Evaluate, analyze and monitor disease states by applying relevant biochemical investigations and interpreting the clinical and laboratory data.
9. Able to integrate principles of immunology in biochemistry.
10. Demonstrate knowledge of basics of research methodology, develop a research protocol, analyse data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
11. Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, prepare modules for PBL, organize and conduct PBLs, case discussions, small group discussions, Seminars, Journal club and research presentations
12. Demonstrate knowledge of principles of Instrumentation.

13. Demonstrate knowledge about recent advances and trends in research in the field of clinical biochemistry.

**B. Affective domain**

At the end of the course the student will be able to:

1. Effectively explain to patients from a variety of backgrounds, the molecular and metabolic basis of disease states and lifestyle modifications.
2. Communicate biochemical reasoning effectively with peers, staff and faculty, and other members of the health care team.
3. Demonstrate empathy and respect towards patients regardless of the biochemical nature of their disease.
4. Demonstrate respect in interactions with patients, families, peers, and other healthcare professionals.
5. Demonstrate ethical behavior and integrity in one's work.
6. Demonstrate effective use of nutrition, lifestyle and genetic counseling.
7. Be aware of the cost of diagnostic tests and economic status of patients.
8. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills and expertise.

**C. Psychomotor domain**

At the end of the course the student will be able to:

1. Select, justify, and interpret the results of clinical tests in biochemistry.
2. Develop differential diagnoses for molecular and metabolic causes of diseases.
3. Suggest preventive, curative, and/or palliative strategies for the management of disease.
3. Predict effectiveness and adverse effects associated with disease intervention.
5. Demonstrate skills for clinical diagnosis, testing, understanding of biochemical conditions and diagnostic service.
6. Perform important biochemical, immunological and molecular biology techniques.
7. Observed working of important advanced techniques.
8. Demonstrate standard operating procedures of various methods and techniques used in clinical biochemistry.
9. Determination of enzyme activity and study of enzyme kinetics. Ideally it should be accompanied by purification (partial) of the enzyme from a crude homogenate to emphasise the concepts of specific activity, yield and fold purification
10. Demonstrate and report routine investigations in hematology and microbiology

11. Demonstrate presentation skills at academic meetings and publications.

By the end of the course, the post graduate student will be able to demonstrate the following:

- Performance of reactions of carbohydrates, amino acids and proteins, and lipids
- Experiments to demonstrate constituents of milk
- Experiments to demonstrate normal and abnormal constituents of urine
- Determination of iodine number and saponification number of fats
- Estimation of ammonia and amino acids by Sorenson formal titration 
    - Estimation of nitrogen estimation in a given amino acid solution by micro
    - Kjeldahl method
- Estimation of phosphorus by Fiske Subbarao method
- Estimation of ascorbic acid in lime
- Estimation of calcium content in milk
- Estimation of proteins by Folin's method and dye binding method.
- Two-dimensional paper chromatography for separation of amino acids
- Preparation and estimation of starch, glycogen, cholesterol, casein (phosphorus in casein) and hemoglobin from biological samples Determination of enzyme activity and study of enzyme kinetics, using any 2 suitable enzymes (eg, catalase from rat liver and acid phosphatase from potatoes).
- Estimation of clinical analytes as detailed below:

  Blood glucose, glycated haemoglobin; performance of glucose tolerance test

  o Electrolytes, arterial blood gas analysis

  o Cholesterol, triglycerides, free fatty acids, phospholipids, Lp (a), urea, creatinine, uric acid, ammonia, microalbuminuria

  o Parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time)

  o Calcium, magnesium, copper (and ceruloplasmin), serum iron, TIBC and ferritin

  o Markers of myocardial damage (CK, CK MB, troponins, LDH)

  o Other enzymes of diagnostic relevance (eg. phosphatases, amylase etc)

  o Vitamins D and B12 and folate
- Electrophoresis of serum proteins
- Electrophoresis of lipoprotein (Optional)
- Electrophoretic separation of LDH isozymes or any other isoenzymes
- Clearance tests
- CSF analysis

- Thyroid function tests and other hormone assays by ELISA/RIA
    - Preparation of buffers.

**Clinical Laboratory**

- Taking any one parameter, students should prepare a Levy Jennings chart and plot inter-assay and intra-assay variation for the laboratory.
- Implementation of Westgard rules.

**Optional:**

Determination of reference values for any one parameter for the clinical laboratory

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Microbiology)

**A. Cognitive Domain:**

At the end of the course, the student will be able to describe the following:

**General Microbiology**

1. Important historical events and developments in microbiology.
2. Basic as well as advanced knowledge in various microscopes and microscopic techniques used in diagnostic microbiology.
3. Various bio-safety issues including physical and biological containment, universal containment, personal protective equipment for biological agents.
4. Various isolation precautions including standard and transmission based precautions.
5. In-depth knowledge about various method of Sterilization, disinfection and Lyophilization.
6. Nomenclature, classification and morphology of bacteria as well as other microorganisms.
7. Various types and significance of normal flora of human body in health and disease states.
8. Requirements for growth and nutrition of bacteria along with bacterial metabolism.
9. Various types and role of bacterial toxins and bacteriocins.
10. Microbiology of air, milk, water as well as hospital environment.
11. Various types of host-parasite relationship and their significance.
12. Various antimicrobial agents and mechanisms drug resistance.
13. Bacterial genetics, bacteriophages and molecular genetics relevant for medical microbiology.
14. Applications of quality assurance, quality control in microbiology and accreditation of laboratories.

**Immunology**

1. Components of immune system, types of immunity (Innate, acquired, mucosal, humoral and cell mediated immunity) and immune response.
2. Describes and identify uses of various antigens, immunoglobulins (antibodies) and antigen and antibody reactions
3. Complement system and Cytokines.
4. Various disorders like hypersensitivity, immunodeficiency and auto-immunity involving immune system.
5. MHC complex, Immune tolerance, Transplantation and Tumor immunity.
6. Various types, techniques, advances, and applications of vaccines and immunotherapy.

7. Measurement of immunological parameters.

8. Immunological techniques and their applications in diagnostic microbiology as well as research.

9. Mechanisms and significance of immune-potentiation and immune-modulation.

**Systemic bacteriology**

At the end of the course the student will be able to:

1. Demonstrate knowledge and skills in various techniques for isolation and identification of bacteria.

2. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major bacterial pathogens of medical importance given below:

a. Gram positive cocci including Staphylococcus, Micrococcus, Streptococcus, anaerobic cocci etc.

b. Gram negative cocci including Neisseria, Branhamella, Moraxella etc.

c. Gram positive bacilli including Lactobacillus, Coryneform bacteria, Bacillus and aerobic bacilli, Actinomyces, Nocardia, Actinobacillus and other actinomycetales, Erysipelothrix, Listeria, Clostridium and other spore bearing anaerobic bacilli etc.

d. Gram negative bacilli including Vibrios, Aeromonas, Plesiomonas, Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas and other non-fermenters, Pasteurella, Francisella, Bacteroides, Fusobacterium, Leptotrichia and other anaerobic gram negative bacilli etc.

e. Helicobacter, Campylobacter, Calymmatobacterium, Streptobacillus, Spirillum and miscellaneous bacteria

f. Enterobacteriaceae

g. Mycobacteria

h. Spirochaetes

i. Chlamydia

j. Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.

k. Rickettsiae, Coxiella, Bartonella etc.

**Mycology**

1. Explain general characteristics including morphology, reproduction and classification of fungi

2. Demonstrate knowledge and skills for isolation and identification of fungi

3. Explain tissue reactions to fungi

4. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major fungal pathogens of medical importance given below:

a. Yeasts and yeast like fungi including Candida, Cryptococcus,
Malassezia, Trichosporon, Geotrichum, Saccharomyces etc.

b. Mycelial fungi including Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes etc.

c. Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffei etc.

d. Dermatophytes

e. Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis and Otomycosis.

f. Pneumocystis jirovecii infection

g. Rhinosporidium seeberi and Lacazia loboi (formerly named Loboa loboi)

h. Pythium insidiosum

i. Prototheca

5. Identify laboratory contaminant fungi

6. Explain Mycetism and mycotoxicosis along with agents involved

7. Demonstrate knowledge about antifungal agents and perform in vitro antifungal susceptibility tests.

**Virology**

1. Demonstrate knowledge about general properties, classification, morphology, virus replication and genetics of viruses.

2. Explain pathogenesis of viral infections.

3. Demonstrate knowledge about isolation and identification of viruses.

4. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major DNA viruses of medical importance including Pox viruses, Herpes viruses, Adeno viruses, Hepadna virus, Papova viruses and Parvo viruses etc.

5. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major RNA viruses of medical importance including Entero viruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses, Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human Immunodeficiency Virus, Arbo viruses, Corona viruses, Calci viruses etc.

6. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major Hepatitis viruses.

7. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of unclassified viruses and slow viruses including prions.

8. Demonstrate knowledge about viral vaccines and anti-viral drugs.

**Parasitology**

1. Demonstrate knowledge about general characters, classification and methods of identification of parasites.

2. Demonstrate knowledge about epidemiology, morphology, antigenic nature, life cycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of Protozoan parasites of medical importance including Entamoeba, Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Microsporidium, Cyclospora Isospora, Babesia, Balantidium, etc.

3. Demonstrate knowledge about epidemiology, morphology, antigenic nature, lifecycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of helminthes of medical importance including those belonging to Cestoda Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipyllidium, Multiceps etc.), Trematoda (Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus, Clonorchis, Opisthorchis etc.) and Nematoda (Trichiuris, Trichinella, Strongyloides, Ancylostoma, Necator, Ascaris, Toxocara, Enterobius, Filarial worms, Dracunculus etc. )

4. Demonstrate knowledge about common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis of medical importance.

5. Demonstrate knowledge about anti-parasitic vaccine and drugs.

**Applied Microbiology**

1. Demonstrate knowledge about epidemiology of infectious diseases.

2. Demonstrate knowledge about antimicrobial prophylaxis and therapy.

3. Demonstrate knowledge about hospital acquired infections.

4. Demonstrate knowledge about management of biomedical waste.

5. Effectively investigate an infectious outbreak in hospital and community.

6. Demonstrate knowledge about infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital

infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicaemia, endocarditis, haemorrhagic fever etc.

7. Demonstrate knowledge about opportunistic infections.

8. Demonstrate knowledge about various sexually transmitted diseases.

9. Demonstrate knowledge about principles, methods of preparation, administration and types of vaccines.

10. Effectively use information technology (Computers) in microbiology.

11. Demonstrate knowledge and applications of Automation in Microbiology.

12. Demonstrate knowledge and applications about molecular techniques in the laboratory diagnosis of infectious diseases.

13. Demonstrate knowledge in statistical analysis of microbiological data and research methodology.

14. Demonstrate knowledge in animal and human ethics involved in microbiology.

15. Demonstrate knowledge in safety in laboratory and Laboratory management.

B. **Affective Domain:**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and students for effective teaching.

**C. Psychomotor domain:**

At the end of the course, the student will be able to:

1. Collect/transport specimens for microbiological investigations.

2. Prepare, examine and interpret direct smears from clinical specimens.

3. Plate clinical specimens on media for isolation, purification, identification and quantification purposes.

4. Prepare stains viz. Gram, Albert's, Ziehl Neelsen (ZN), Silver impregnation stain and special stains for capsule and spore etc.

5. Prepare and pour media like Nutrient agar, Blood Agar, Mac-Conkey agar, Sugars, Kligler iron agar/Triple sugar iron agar (TSI), Robertson's cooked meat broth, Lowenstein Jensens medium, Sabouraud's dextrose agar etc.

6. Prepare reagents - oxidase, Kovac etc.

7. Perform quality control of media, reagents etc.

8. Operate autoclave, hot air oven, filters like Seitz and membrane filters etc.

9. Take care of and operate microscopes.

10. Wash and sterilize glassware (including plugging and packing).

11. Take care, maintain and use common laboratory equipments like autoclave, hot air oven, water bath, centrifuge, refrigerators, incubators etc.

12. Adopt aseptic practices in laboratory and safety precautions. Selection of Personal Protective Equipment according to task and donning (gloves, mask, eye protection, gown etc).

13. Perform sterility tests.

14. Identify bacteria of medical importance up to species level (except anaerobes which could be up to generic level).

15. Perform techniques of anaerobiosis.

16. Perform tests for Motility: hanging drop, Cragie's tube, dark ground microscopy for spirochaetes.

17. Perform routine and special tests - Catalase test, Oxidase test, slide and tube coagulase tests, niacin and catalase tests for Mycobacterium, bile solubility, chick cell agglutination, sheep cell haemolysis, satellitism, CAMP test, and other biochemical tests.

18. Prepare antibiotic discs; performance of antimicrobial susceptibility testing eg. Kirby-Bauer, Stoke's method, Estimation of Minimal Inhibitory/Bactericidal concentrations by tube/plate dilution methods.

19. Perform tests for ß-lactamase production.

20. Screen for gram negative isolates for ESBL and MBL

21. Screen for Staphylococci for Methicillin Resistance.

22. Screen for Enterococci for Vancomycin resistance.

23. Perform tests for disinfectants.

24. Perform quantitative analysis of urine by pour plate method and semi quantitative analysis by standard loop tests for finding significant bacteriuria.

25. Dispose off contaminated materials like cultures.

26. Dispose infectious waste.

27. Perform bacteriological tests for water, air and milk.

28. Maintain and preserve bacterial cultures.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES- PG (MD/MS)
## M.D.(Pharmacology)

At the end of the course the students will be able to:

**A. Cognitive domain**

1. Describe and apply pharmacological principles to explain the mechanism/s of the effects of drugs used in diagnosis, prevention and treatment of diseases of all systems of human body.
2. Explain pharmacodynamics and pharmacokinetics of drugs.
3. Describe mechanisms of drug-drug interactions and their clinical importance.
4. Apply and integrate knowledge of pathophysiology of diseases and its modulation by drugs.
5. Acquire knowledge on pharmacogenetics and pharmacogenomics
6. Acquire knowledge on principles of pharmacoeconomics
7. Acquire knowledge on pharmacoepidemiology, including drug utilization studies.
8. Aquire knowledge and understanding of principles of Good clinical practice (GCP) and Good laboratory practice (GLP) guidelines
9. Acquire knowledge on essential medicines
10. Acquire knowledge on pharmacovigilance
11. Acquire knowledge and apply the principle of biostatistics in the evaluation and interpretation of drug safety and efficacy studies
12. Describe how to evaluate, analyse and monitor preclinical and clinical data in drug discovery
13. Able to integrate principles of immunology in biochemistry.
14. Demonstrate knowledge of basics of research methodology, develop a research protocol, conduct the study, record experimental observations, analyse data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
15. Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, modules for problem based learning (PBL), case discussions, small group discussions, seminars, Journal club and research presentations
16. Demonstrate knowledge about computer assisted learning (CAL) softwares and ability to use them efficiently to promote learning of pharmacology.
17. Demonstrate knowledge of principles of Instrumentation.
18. Demonstrate knowledge about recent advances and trends in research in the field of pharmacology and clinical pharmacology.

19. Acquire knowledge on generic drugs and generic prescription.
20. Acquire knowledge on rational use of drugs and prescription auditing
21. Aquire knowledge about antimicrobial stewardship programs and strategies for containment of antibiotic resistance
22. Acquire knowledge on animal toxicity studies
23. Acquire knowledge on common poisoning
24. Acquire knowledge on the legal and ethical issues involved in drug development and research.
25. Acquire knowledge in Biostatistics including use of statistical softwares :
    - Estimation Sample size for a clinical trial
    - Scales of measurement, data display, measures of central tendency (mean, median, mode)
    - Dispersion of data (variance, standard deviation)
    - Selection of tests (of significance) and their applicability
    - Correlation and regression analysis
    - Basics of systematic reviews and meta-analysis

**B. Affective domain**

At the end of the course the students will be able to:

1. Effectively explain to patients, the effects and side effects of drugs, including the need for medication adherence.
2. Communicate effectively with pharmacological reasoning with students, peers, staff and faculty, and other members of the health care team on rational use of drugs and improving spontaneous reporting of adverse events.
3. Demonstrate respect in interactions with peers, and other healthcare professionals.
4. Demonstrate ethical behavior and integrity in one's work.
5. Demonstrate ability to generate awareness about the use of generic drugs in patients.
6. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills, expertise and perpetual professional development.

**C. Psychomotor domain**

At the end of the course the students will be able to:

1. Predict efficacy and adverse effects associated with use of drugs, along with causality assessment.
2. Demonstrate skills for prescription writing.
3. Perform major *in vivo* and *in vitro* animal experiments.
4. Observe and understand basic principles of working of important advanced techniques, like High Performance Liquid Chromatography (HPLC).
5. Demonstrate standard operating procedures of various methods and techniques used in clinical trials and research.
6. Determine levels of common poisons in blood

7. Demonstrate presentation skills at academic meetings, publications and writing research projects for funding agencies.

8. Be able to analyze and evaluate a research paper.

By the end of the course, the trainee should have acquired practical skills in the following:

1. In vivo and ex vivo experiments, like organ bath, analgesiometer, physiography/ polygraph,

convulsiometer, plethysmograph, learning and memory, models foraffective disorders.

2. Administration of drugs by various routes (subcutaneous, intravenous, intraperitoneal) in experimental animals

3. Collection of blood samples and oral gavage in experimental animals

4. Preparation and administration of a drug solution in appropriate strength and volume

5. Experiments to show dose response curve of agonists (in the presence or absence

of an antagonist) on various biological tissues, like

i) Isolated rabbit/rat/ guinea-pig intestine

ii) Isolated rat uterus

6. Determination of EC50, ED50, pD2 and pA2 values of drugs

7. Performing in vivo experiments to study effect of mydiatrics and miotics on rabbit eye

8. Performing in vivo experiments to study effect of antiepileptic drugs using animal models of epilepsy

9. Performing in vivo experiments to study effect of analgesics using animal models of analgesia

10. Performing in vivo experiments to study effects of drugs on learning, memory and motor coordination

11. Estimation of toxic drug levels using chemical and biological tests (alkaloids, glycosides, steroids, barbiturates, salicylates) by commonly used methods)

12. Clinical pharmacology

By the end of the course, the student will be able:

i) Prepare protocol for a clinical trial.

ii) Prepare Informed consent form and participant information sheet for research involving human participants.

iii) Report Serious Adverse Effect (SAE).

iv) Evaluate promotional drug literature.

v) Prepare “Drug Information Sheet” (WHO criteria).

vi) Interpret bioavailability parameters with the help of given pharmacokinetics data

vii) Perform causality assessment and report ADR as per Pharmacovigilance Programme of India (PvPI)

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (General Medicine)

**A. Cognitive domain**

By the end of the course, the student will be able to describe and discuss:

**Basic Sciences**

1. Basics of human anatomy as relevant to clinical practice e.g. surface anatomy of various viscera, neuro-anatomy, important structures/organs location in different anatomical locations in the body; common congenital anomalies.
2. Basic functioning of various organ-system, control of vital functions, pathophysiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.
3. Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.
4. Various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.
5. Pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.
6. Various poisons with specific reference to different geographical and clinical settings, diagnosis and management.
7. Research Methodology and Studies, epidemiology and basic Biostatistics.
8. National Health Programmes.
9. Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.
10. Recent advances in relevant basic science subjects.

**Systemic Medicine**

1. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bioterrorism.

2. Aging and Geriatric Medicine including Biology, epidemiology and neuropsychiatric aspects of aging.

3. Clinical Pharmacology - principles of drug therapy, biology of addiction and complementary and alternative medicine.

4. Genetics - overview of the paradigm of genetic contribution to health and disease, principles of Human Genetics, single gene and chromosomal disorders and gene therapy.

5. Immunology - The innate and adaptive immune systems, mechanisms of immune mediated cell injury and transplantation immunology.

6. Cardio-vascular diseases - Approach to the patient with possible cardiovascular diseases, heart failure, arrhythmias, hypertension, coronary artery disease, valvular heart disease, infective endocarditis, diseases of the myocardium and pericardium and diseases of the aorta and peripheral vascular system.

7. Respiratory system - approach to the patient with respiratory disease, disorders of ventilation, asthma, Congenital Obstructive Pulmonary Disease (COPD), Pneumonia, pulmonary embolism, cystic fibrosis, obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum.

8. Nephrology - approach to the patient with renal diseases, acid-base disorders, acute kidney injury, chronic kidney disease, tubulo-interstitial diseases, nephrolithiasis, Diabetes and the kidney, obstructive uropathy and treatment of irreversible renal failure.

9. Gastro-intestinal diseases - approach to the patient with gastrointestinal diseases, gastrointestinal endoscopy, motility disorders, diseases of the oesophagus, acid peptic disease, functional gastrointestinal disorders, diarrhea, irritable bowel syndrome, pancreatitis and diseases of the rectum and anus.

10. Diseases of the liver and gall bladder - approach to the patient with liver disease, acute viral hepatitis, chronic hepatitis, alcoholic and non-alcoholic steatohepatitis, cirrhosis and its sequelae, hepatic failure and liver transplantation and diseases of the gall bladder and bile ducts.

11. Haematologic diseases - haematopoiesis, anaemias, leucopenia and leucocytosis, myelo-proliferative disorders, disorders of haemostasis and haemopoietic stem cell transplantation.

12. Oncology - epidemiology, biology and genetics of cancer, paraneoplastic syndromes and endocrine manifestations of tumours, leukemias and lymphomas, cancers of various organ systems and cancer chemotherapy.

13. Metabolic diseases - inborn errors of metabolism and disorders of metabolism.

14. Nutritional diseases - nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.

15. Endocrine diseases - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.

16. Rheumatic diseases - approach to the patient with rheumatic diseases, osteoarthritis, rheumatoid arthritis, spondyloarthropathies, systemic lupus erythematosus (SLE), polymyalgia, rheumatic fibromyalgia and amyloidosis.

17. Infectious diseases - Basic consideration in Infectious Diseases, clinical syndromes, community acquired clinical syndromes. Nosocomial infections, Bacterial diseases - General consideration, diseases caused by gram – positive bacteria, diseases caused by gram - negative bacteria, miscellaneous bacterial infections, Mycobacterial diseases, Spirochetal diseases, Rickettsia, Mycoplasma and Chlamydia, viral diseases, DNA viruses, DNA and RNA respiratory viruses, RNA viruses, fungal infections, protozoal and helminthic infections .

18. Neurology - approach to the patient with neurologic disease, headache, seizure disorders and epilepsy, coma, disorders of sleep, cerebrovascular diseases, Parkinson's disease and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.

19. The mental condition characterized by complete self absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communication etc.

20. Dermatology - Structure and functions of skin, infections of skin, papulosquamous and inflammatory skin rashes, photo-dermatology, erythroderma, cutaneous manifestations of systematic diseases, bullous diseases, drug induced rashes, disorders of hair and nails, principles of topical therapy.

**B. Affective Domain:**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**C. Psychomotor domain**

At the end of the course the student will be able to:

**Clinical Assessment Skills**

- Elicit a detailed clinical history
- Perform a thorough physical examination of all the systems

**Procedural skills**

At the end of the course the student will be able to perform:

- Test dose administration
  - Mantoux test
- Sampling of fluid for culture
- IV- Infusions
- Intravenous injections
- Intravenous canulation
- ECG recording
- Pleural tap
- Lumbar puncture
- Cardiac
  - TMT
  - Holter Monitoring
  - Echocardiogram
  - Doppler studies
- Cardio Pulmonary Resuscitation (CPR)
- Central venous line insertion, CVP monitoring
- Blood and blood components matching and transfusions
- Arterial puncture for ABG
- Fine needle aspiration cytology (FNAC) from palpable lumps
- Bone marrow aspiration and biopsy
- Abdominal paracentesis - diagnostic
- Aspiration of liver abscess
- Pericardiocentesis
- Joint fluid aspiration
- Liver biopsy
- Nerve/ muscle/ skin/ kidney/ pleural biopsy
- Ultrasound abdomen, echocardiography

- Upper GI endoscopy, procto-sigmoidoscopy

**Respiratory management**

- Nebulization
- Inhaler therapy
- Oxygen delivery

**Critically ill person**

- Monitoring a sick person
- Endotracheal intubation
- CPR
- Using a defibrillator
- Pulse oximetry
- Feeding tube/Ryle's tube, stomach wash
- Naso-gastric intubation
- Urinary catheterization – male and female
- Prognostication
- Haemodialysis

**Neurology**

At the end of the course, the student will be able to interpret:

- Nerve Conduction studies
- EEG
- Evolved Potential interpretation
- Certification of Brain death

Intercostal tube placement with underwater seal thoracocentesis

Sedation

Analgesia

**Laboratory**

At the end of the course, the student will be able to demonstrate diagnostic abilities in:

- Urine protein, sugar, microscopy
- Peripheral blood smear
- Malarial smear
- Ziehl Nielson smear-sputum, gastric aspirate
- Gram's stain smear-CSF, pus
- Stool pH, occult blood, microscopy
- KOH smear

- Cell count - CSF, pleural, peritoneal, any serous fluid

At the end of the course the student will have observed the procedures of:

- Subdural, ventricular tap
- Joint Aspiration – Injection
- Endoscopic Retrograde Cholangio- Pancreatography (ERCP)
- Peritoneal dialysis

**Interpretation Skills**

At the end of the course the student will be able to:

Elicit clinical data (history and examination findings), formulate a differential diagnosis inorder of priority, using principles of clinical decision making, plan investigative work-up,keeping in mind the cost-effective approach i.e. problem solving and clinical decision making.

At the end of the course the student will be able to interpret investigative reports of:

- Blood, urine, CSF and fluid investigations - hematology, biochemistry
- X-ray chest, abdomen, bone and joints
- Treadmill testing
- ABG analysis
- Ultrasonography
- CT scan chest and abdomen
- CT scan head and spine
- MRI
- Barium studies
- IVP, VUR studies
- Pulmonary function tests
- Immunological investigations
- Echocardiographic studies

**Interpretation under supervision**

At the end of the course the student will be able to interpret under supervision:

- Hemodynamic monitoring
- Nuclear isotope scanning
- MRI spectroscopy/SPECT
- Ultrasound guided aspiration and biopsies

**Communication skills**

While eliciting clinical history and performing physical examination, at the end of the course, the student will be able to:

- Communicate health, and disease
- Communicate about a seriously ill or mentally abnormal
- Communicate about death
- Obtain informed consent
- Demonstrate empathy with patient and family members
- Write referral letters, and replies
- Write discharge summaries
- Write death certificates
- Perform pre-test counseling for HIV
- Perform post-test counseling for HIV
- Pedagogy - teach students, other health functionaries -lectures, bedside clinics, discussions
- Provide health education - prevention of common medical problems, promoting healthy life-style, immunization, periodic health screening, counseling skills in risk factors for common malignancies, cardiovascular disease, AIDS
- Provide dietary counseling in health and disease
- Develop case presentation skills including recording case history/examination, preparingfollow-up notes, preparing referral notes, oral presentation of new cases/follow-up cases
- Provide co-coordinating care - team work (with house staff, nurses, faculty etc.)
- Link patients with community resources
- Provide referral
- Provide genetic counseling

**Others**

At the end of the course, the student will be able to:

- Demonstrate:
  - professionalism
  - ethical behavior (humane and professional care to patients)
- Utilize information technology
  - Medline search, Internet access, computer usage

- Research methodology

- design a study
- interpret and present scientific data

- Self-directed learning
  - identify key information sources
  - perform literature searches
  - use information management
- Therapeutic decision-making
  - managing multiple problems simultaneously
  - assessing risks, benefits and costs of treatment options
  - involving patients in decision-making
  - selecting specific drugs within classes
  - Rational use of drugs.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Paediatrics)

**A. Cognitive domain**

At the end of the course in , the students will be able to:

1. Recognize the key importance of child health in the context of the health priority of country.
2. Practice the specialty of Paediatrics in keeping with the principles of professional ethics.
3. Identify social, economic, environmental, biological and emotional determinants of child and adolescent health, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to children.
4. Recognize the importance of growth and development as the foundation of Paediatrics and help each child realize her/his optimal potential in this regard.
5. Take detailed history; perform full physical examination including neurodevelopment and behavioral assessment and anthropometric measurements in the child and make clinical diagnosis.
6. Perform relevant investigative and therapeutic procedures for the paediatric patient.
7. Interpret important imaging and laboratory results.
8. Diagnose illness based on the analysis of history, physical examination and investigations.
9. Plan and deliver comprehensive treatment for illness using principles of rational drug therapy.
10. Plan and advice measures for the prevention of childhood disease and disability.
11. Plan rehabilitation of children with chronic illness and handicap and those with special needs.
12. Manage childhood emergencies efficiently.
13. Provide comprehensive care to normal, 'at risk' and sick neonates.
14. Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation.
15. Recognize the emotional and behavioral characteristics of children, and keep these fundamental attributes in focus while dealing with them.
16. Demonstrate empathy and humane approach towards patients and their families and keep their sensibilities in high esteem.
17. Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.

18. Develop skills as a self-directed learner. Recognize continuing educational needs; use appropriate learning resources and critically analyze published literature in order to practice evidence-based Paediatrics.

19. Demonstrate competence in basic concepts of research methodology and epidemiology.

20. Facilitate learning of medical/nursing students, practicing physicians, paramedical health workers and other providers as a teacher-trainer.

21. Implement National Health Programs, effectively and responsibly.

22. Organize and supervise the desired managerial and leadership skills.

23. Function as a productive member of a team engaged in health car, research and education.

24. Recognize mental conditions, characterized by self absorption, reduced ability to respond, abnormal functioning in social interaction with or without repetitive behavior, poor communication (autism) and collaborate with Psychiatrists/Child Psychologists for the treatment of such patients.

**B. Affective Domain**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective
teaching.

**C. Psychomotor domain**

At the end of the course, the student will be able to:

**I. History and Examination**

Elicit, process and systemically present Paediatrics history and examination with due emphasis on the important and minimization of less important facts.

i) Recognise and demonstrate physical findings

ii) Record height, weight, head circumference and mid arm circumference and interpret these parameters using growth reference standard assessment of
nutritional status and growth.

iii) Assess pubertal growth.

iv) Assess complete development by history and physical examination, and recognizing developmental disabilities, including autism.

v) Perform systematic examination.

vi) Perform neonatal examination including gestation assessment by physical neurological criteria.

vii) Perform examination of the fundus and the ear-drum.

viii) Perform skills related to IMNCI and IYCF

**II. Monitoring Skills**

At the end of the course, the student will be able to:

Perform non-invasive monitoring of blood pressure, and interpret pulse and respiratory rates, saturation; ECG.

**III. Investigative Procedures**

At the end of the course, the student will be able to perform:

i) Venous, capillary and arterial blood sampling using appropriate precautions

ii) Pleural, peritoneal, pericardial aspiration; subdural, ventricular and lumbar puncture

iii) Tuberculin test

iv) Biopsy of liver and kidney

v) Urethral catheterization and suprapubic tap

vi) Gastric content aspiration

**IV. Therapeutic Skills**

At the end of the course, the student will be able to :

i) Perform breast feeding assessment and counseling; management of common problems.

ii) Establish central and peripheral vascular access; CVP monitoring.

iii) Administer injections using safe injection practices.

iv) Determine volume and composition of intravenous fluids and heir administration.

v) Administer neonatal and Pediatric basic and advanced life support.

vi) Perform oxygen administration, CPAP and nebulization therapy.

vii) Perform blood and blood component therapy.

viii) Perform intraosseous fluid administration.

ix) Perform phototherapy, umbilical artery and venous catheterization and exchange transfusion.

x) Perform nasogastric feeding

xi) Conduct common dressings and abscess drainage; intercostal tube insertion

xii) Perform basic principles of rehabilitation

xiii) Perform peritoneal dialysis

xiv) Initiate mechanical ventilation

**V. Bed side investigations, including**

At the end of the course, the student will be able to interpret:

i) Complete blood counts, micro ESR, peripheral smear

ii) Urinalysis

iii) Stool microscopy and hanging drop

iv) Examination of CSF and other body fluids

v) Blood sugar

vi) Shake test on gastric aspirate

vii) Gram stain, ZN stain

**VI. Patient Management Skills**

At the end of the course, the student will be:

i) Proficient in management of pediatric emergencies, including emergency triaging.

ii) Drawing and executing patient management plan and long term care.

iii) Documenting patient records on day to day basis and problem oriented medical record.

iv) Able to take care of a normal and sick newborn, management of neonatal disorders hypothermia, sepsis, convulsions, jaundice, metabolic problems.

v) Identifying need for timely referral to appropriate departments/health facility and pre-transport stabilization of the sick child.

**VII. Communication Skills; Attitudes; Professionalism**

At the end of the course, the student will be able to:

i) Communicate with parents/child about nature of illness and management plan prognostication, breaking bad news.

ii) Counsel parents on breast feeding, nutrition, immunization, disease prevention, promoting healthy life style.

iii) Provide genetic counseling.

iv) Communicate with and establish relationship with colleagues, nurses and paramedical workers.

v) Establish appropriate relation with pharmaceutical industry.

vi) Apply health economics.

vii) Practice professional and research ethics.

**VIII. Interpretation of Investigations**

At the end of the course, the student will be able to:

i. Plan x-ray chest, abdomen, skeletal system.

ii. Contrast radiological studies: Barium swallow, barium meal, barium enema, MCU

iii. Interpret ultrasound skull and abdomen

iv. Interpret histopathological, biochemical and microbiological investigations

v. Interpret CT Scan and MRI (skull, abdomen, chest)

vi. Interpret electrocardiogram, electroencephalogram

vii. Interpret results of arterial and venous blood gases

viii. **Desirable**: Interpret radio-isotope studies, audiogram, neurophysiological studies, (BERA, VER, Electromyography [EMG], Nerve Conduction Velocity
[NCV]), lung function tests

**IX. Academic Skills**

At the end of the course, the student will be able to:

i. Describe basic research methodology, possess basic IT skills. Plan the protocol of the thesis, its execution and prepare final report.

ii. Perform review of literature.

iii. Conduct clinical sessions for undergraduates medical students.

iv. Desirable: write and present a paper. Teach sessions for nurses and medical workers.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Psychiatry)

By the end of the course, the student will be able to:

**A. Cognitive domain**

**1. General topics:**

1. Demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.

2. Explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities), and Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology, Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics.

3. Describe delirium, dementia, amnestic & other cognitive disorders and mental disorders due to a general medical condition.

4. Explain follow-up care of person suffering from chronic relapsing psychiatric ailments.

5. Explain emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.

6. Describe pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.

7. Explain (a) normal child development and adolescence, mental retardation in children (b) learning & associated disorders and their management

8. Explain mechanisms for rehabilitation of psychiatric patients.

9. Describe substance related disorders and their management.

10. Expalin psychotic disorders, mood disorders, and anxiety disorders and their management.

11. Explain sexual and gender identity disorders and their management.

12. Explain eating disorders and sleep disorders and their management.

13. Describe recent advances in Psychiatry.

14. Explain routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.

15. Explain various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Health Mental Health Programmes etc.).

16. Describe research methodologies.

**B. Affective Domain:**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel
3. Demonstrate respect for the rights of the patient including the right to information and second opinion.
4. Develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**C. Psychomotor domain**

At the end of the course, the student will be able to:

 Become an expert in good history taking, physical examination, mental state examination, and able to establish rapport and counsel family members and patients on scientific basis. choose the required investigations for both short and long term management.

At the end of the course, the student will be able to:

1. Obtain a proper relevant history, and perform a humane and thorough clinical examination including detailed mental state examinations using proper communication skills.
2. Arrive at a logical working diagnosis and differential diagnosis after clinical examination.
3. Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.
4. Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
5. Write a complete case record with all necessary details.
6. Write a proper discharge summary with all relevant information.
7. Obtain informed consent for any examination/procedure.
8. Perform clinical audit.
9. Perform modified Electroconvulsive therapy (ECT).

The student, at the end of the course will be able to perform independently, the following:

1. Conduct detailed Mental Status Examination (MSE)
2. Cognitive behaviour therapy
3. Supportive psychotherapy
4. Modified ECT
5. Clinical IQ assessment

6. Management of alcohol withdrawal
7. Alcohol intoxication management
8. Opioid withdrawal management
9. Delirious patients
10. Crisis intervention

The student will be able to demonstrate approach to patient with variety of clinical presentations including following symptoms:

1. Auditory hallucinations
2. Visual hallucinations
3. Pseudo hallucination
4. Seizures true and pseudo seizure
5. Panic attack
6. Manic symptoms
7. Behavioural symptoms of schizophrenia
8. Catatonia
9. Delirium
10. Malingering

The student, at the end of the course will be able to perform under supervision, the following:

1. Behaviour therapy
2. Opioid intoxication management
3. Genetic counselling
4. Family therapy

The student, at the end of the course will be able to assist the expert in the following:

1. Interpersonal therapy
2. Management of suicide attempt

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D.(Dermatology, Venereology & Leprosy)

**A. Cognitive domain**

At the end of the course, the student will be able to:

- Describe structure, functions and development of human skin.
- Describe ultrastructural aspects of epidermis, epidermal appendages, dermo epidermal junction, dermis, and sub-cutis.
- Describe basic pathologic patterns and reaction patterns of skin.
- Demonstrate the knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.
- Describe the basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Describe papulosqamous and vesiculobullous disorders.
- Describe disorders of epidermal appendages and related disorders.
- Describe inflammatory and neoplastic disorders of Skin.
- Describe skin lesions in nutritional, metabolic and heritable disorders.
- Describe pharmacokinetics and principles of topical and systemic therapy.
- Describe drug reaction, its diagnosis and management.
- Describe cutaneous manifestations of systemic disorders.
- Describe anatomy of male and female genitalia, epidemiological transmission, clinical aspects and management of STDs and HIV.
- Describe clinical features, reactions, treatment and rehabilitation in leprosy.
- Describe etiology, pathophysiology, principles of diagnosis and management of common problems in dermatology including emergencies in adults and children.
- Describe indications and methods for fluid and electrolyte replacement therapy including blood transfusion in dermatological conditions.
- Describe common dermatological malignancies in the country and their management including prevention.
- Evaluate ECG, chest X-ray (CXR), biochemical, haematology and immunology reports related to dermatology.

- Describe common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immuno-fluorescence, immuno-peroxidase and other related techniques.
- Describe basics of laser operation and precautions which needs to be taken.
- Demonstrate competence in basic concepts of research methodology and interpretation of data in medical literature/publications.
- Skilled as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant published literature in order to practice evidence-based dermatology;
- Demonstrate broad idea how to approach an uncommon dermatological disease.

**B. Affective Domain**

At the end of the course, the student will be able to:

- Demonstrate self-awareness and personal development in routine conduct.
- Demonstrate **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations and shows positive approach.
- Demonstrate **Motivation and Initiative: I**nnovative, enterprising, does not shirk duties or leave any work pending and motivates team members.
- Demonstrate **Honesty and Integrity:** Is truthful, admits mistakes, does not cook up information, has ethical conduct and exhibits good moral values.
- Demonstrate **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.
- Maintain confidentiality with regards to history, physical examination and management of patients.
- Identify social, economic, environmental, biological and emotional determinants of patients, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to patients at individual and community level against skin, venereal disease and leprosy.
- Recognize the emotional and behavioral characteristics of patients and keep these fundamental attributes in focus while dealing with them.
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities.

- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.
- Organize and supervise the desired managerial and leadership skills.
- Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

**C. Psychomotor Domain**

A student at the end of the training, will be able to:

- Maintain general medical skills as learnt in MBBS
- Provide basic life support (BLS).
- Expertly measure blood pressure, provide intravenous access, blood sampling, fluid electrolytes therapy, pleural and cerebrospinal fluid (CSF) fluid examination.
- Provide basic and advanced life-saving support services in emergency situations.
- Undertake complete monitoring of the patient and identify social, economic, environmental and emotional determinants in a given case and take them into account for planning therapeutic measures.
- Recognize conditions that may be outside the area of his specialty/competence and refer them to the proper specialist.

**Dermatology, Venereology and Leprosy, HIV/AIDS Skills**

At the end of the course, the student will be able to:

- Skillfully perform history taking, physical examination, diagnosis and management of patients in dermatology, venereology and leprosy.
- Identify, classify and differentiate cutaneous findings in dermatological terms in a systematic way.
- Perform systemic examination (chest, cardiac, abdomen, neurological, genitals, oral, eye and gynaecological examination) relevant to dermatologic condition.
- Manage dermatologic emergencies like angioedema, toxic epidernmal necrolysis (TEN), Stevens-Johnson syndrome (SJS), pemphigus, drug reaction and necrotic erythema nodosum leprosum (ENL).

- Plan and deliver comprehensive treatment for diseases using principles of rational drug therapy.
- Plan and advice measures for the prevention of infectious disease.
- To manage pediatric cases with skin diseases.
- Plan rehabilitation of patient suffering from chronic illness and disability and those with special needs like leprosy.
- Demonstrate skills in documentation of case details and of morbidity/mortality data relevant to the assigned situation.

**Laboratory Skills**

The student will be able to:

- Perform common laboratory procedures like potassium hydroxide (KOH) mount, Gram stain, Giemsa stain, acid fast bacilli (AFB) stain, Woods lamp examination, stains, culture media etc. related to the cutaneous diagnosis independently.
- Order relevant investigations and interpret them to reach to a diagnosis.
- Familiar with other recent investigations.

**Dermatopathology**

At the end of training the student will be competent enough to:

- Interpret histopathology of common skin diseases.
- Diagnose common skin diseases by examining slides under microscope.

**Surgery in dermatology**

At the end of training the student will be able to independently perform:

1. Incisions, take stitches and sutures.
2. Skin biopsy and nail biopsy.
3. Chemical peels, manual dermabrasion, Platelet rich plasma(PRP), skin punch grafting, Blister grafting and wound dressing independently.
4. Cryosurgery, nail surgery and acne surgery.
5. Chemical cauterization, cryotherapy, patch and photopatch test, slit smears and tissue smears.

**Venereology**

At the end of training the student will be able to:

1. To be competent in the clinical approach to the patient of STDs andHIV/AIDS.

2. Interpret the histopathological diagnosis including laboratory aids related with venereology.
3. Perform dark ground illumination, gram stain, Bubo aspiration and tissuesmear.
4. Manage the patient according to syndromic approach for treatment ofSTDs.

**Leprosy**

At the end of training the student will be able to:

1. Diagnose and approach the case of leprosy.
2. Perform AFB smear.
3. Manage cases of lepra reaction.
4. Identify, judge and decide when to refer the patients at appropriate level for surgery or rehabilitation.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRM OUTCOMES - PG (MD/M.S)
## M.S. (General Surgery)

By the end of the course, the student will be able to:

**A. Cognitive domain**

- Demonstrate knowledge of applied aspects of basic sciences like applied anatomy, physiology, biochemistry, pathology, microbiology and pharmacology.
- Demonstrate knowledge of the bedside procedures and latest diagnostics and therapeutics available.
- Describe aetoiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adults and children.
- Demonstrate the theoretical knowledge of general principles of surgery.
- Demonstrate the theoretical knowledge of systemic surgery including disaster management and recent advances.
- Demonstrate the theoretical knowledge to choose, and interpret appropriate diagnostic and therapeutic imaging including ultrasound, Mammogram, CT scan, MRI.
- Demonstrate the knowledge of ethics, medico-legal aspects, communication skills and leadership skills. The PG student should be able to provide professional services with empathy and humane approach.

**B. Affective domain**

Should be able to

- Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to word reports, obtain a proper relevant history and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
- Obtain informed consent for any examination/procedure and explain to the patient and attendants the disease and its prognosis with a humane approach.

- Provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

**C. Psychomotor domain**

- Perform a humane and thorough clinical examination including internal examinations and examinations of all organs/systems in adults and children
- Write a complete case record with all necessary details.
- Arrive at a logical working diagnosis / differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance (need based).
- Choose, perform and interpret appropriate imaging in trauma - ultrasound FAST (Focused Abdominal Sonography in Trauma).
- Perform minor operative procedures and common general surgical operations independently and the major procedures under guidance.
- Provide basic and advanced life saving support services in emergency situations.
- Provide required immediate treatment and comprehensive treatment taking the help of specialist as required.
- Perform minimally invasive surgery in appropriate clinical settings. Must have undergone basic training in operative laparoscopy related to general and GI Surgery.
- Undertake complete patient monitoring including the preoperative and postoperative care of the patient.
- Write a proper discharge summary with all relevant information.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.S. (Orthopaedics)

At the end of training the student will be able to:

**A. Cognitive domain**

1. Demonstrate sufficient understanding of the basic sciences relevant to orthopaedic speciality through a problem based approach.

2. Describe the Principles of injury, its mechanism and mode, its clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculoskeletally injured patient.

3. Identify and describe the surface anatomy and relationships within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck.

4. Define and describe the pathophysiology of shock (circulatory failure).

5. Define and describe the pathophysiology of Respiratory failure

6. Describe the principles and stages of bone and soft tissue healing

7. Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.

8. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.

9. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.

10. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage.

11. Describe the physiological coagulation cascade and its abnormalities.

12. Describe the pharmacokinetics and dynamics of drug metabolism and excretion of analgesics, anti inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents.

13. Describe biostatistics and research methodology.

14. Describe the clinical presentation, plan and interpret investigations, institute management and prevention of the following disease conditions:

a. Nutritional deficiency diseases affecting the bones and joints

b. Deposition arthropathies

c. Endocrine abnormalities of the musculoskeletal system

d. Metabolic abnormalities of the musculoskeletal system

e. Congenital anomalies of the musculoskeletal system

f. Developmental skeletal disorder of the musculoskeletal system

15. Describe the pathogenesis, clinical features plan and interpret investigations and institute the management in adults and children in:

a. Tubercular infections of bone and joints (musculoskeletal system)

b. Pyogenic infections of musculoskeletal system

c. Mycotic infections of musculoskeletal system

d. Autoimmune disorders of the musculoskeletal system

e. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy

f. Osteoarthrosis and spondylosis

16. Describe the pathogenesis, clinical presentation, plan and interpret investigations and institute appropriate treatment in the following conditions:

a. Post polio residual paralysis

b. Cerebral palsy

c. Muscular dystrophies and myopathies

d. Nerve Injuries

e. Entrapment neuropathies

17. Identify the diagnosis and describe management of musculoskeletal manifestation of AIDS and HIV infection.

18. Describe the aetiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.

19. Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care.

20. Identify a problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings.

21. Identify and manage emergency situation in disorders of musculoskeletal system.

22. Describe the basics of diagnostic imaging in orthopaedics like:

a. Plain x-ray

b. Ultrasonography

c. Computerised axial tomography

d. Magnetic resonance imaging

e. PET scan

f. Radio Isotope bone scan

g. Digital Subtraction Angiography (DSA)

h. Dual energy x-ray Absorptiometry

i. Arthrography

23. Describe the aetiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.

24. Describe the basics, principles of biomaterials and orthopaedic metallurgy.

25. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.

26. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.

**B. Affective Domain:**

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**Attitudes including Communication skills and Professionalism**

**a. Communication skills:**

- Exhibit participation in honest, accurate health related information sharing in a sensitive and suitable manner.
- Recognize that being a good communicator is essential to practice effectively.
- Exhibit effective and sensitive listening skills.
- Recognize the importance and timing of breaking bad news and knows how to communicate.
- Exhibit participation in discussion of emotional issues.
- Exhibit leadership in handling complex and advanced communication,
- Recognize the importance of patient confidentiality and the conflict between confidentiality and disclosure.
- Establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication.
- Obtain comprehensive and relevant history from patients/relatives.
- Counsel patients on their condition and needs.

b. **Teamwork**:

Seek cooperation, coordination and communication among treating specialties and paramedical staff.

c. **Counseling of relatives**:

- Counsel relatives regarding patients condition, seriousness, bereavement and counseling for organ donation in case of brain stem death.

d. **Leadership**:

- Create awareness on trauma prevention, education of the public, paramedical and medical persons.

**e. Advocacy**:

- Undertake consultation with the government and other agencies towards cause of trauma care.

f. **Ethics**:

Adopt The Code of Medical Ethics as proposed by Medical Council of India.

**B. Psychomotor domain**

At the end of the first year of M.S. Orthopaedics programme, the student will be able to:

1. Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis.
2. Impart wound care where applicable.
3. Apply all types of POP casts/slabs, splints and tractions as per need.
4. Identify shock and provide resuscitation.
5. Perform aspiration of joints and local infiltration of appropriate drugs.
6. Perform appropriate wound debridement.
7. Perform arthrotomy of knee joint.
8. Perform incision and drainage of abscess.
9. Perform split thickness skin grafting.
10. Perform fasciotomes.
11. Apply external fixators.
12. Apply skeletal tractions including skull tongs.
13. Triage a disaster situation and multiple trauma patients in an emergency room.
14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating.
15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
16. Perform on a cadaver standard surgical approaches to the musculo skeletal system.

**2.** At the end of the second year of M.S. Orthopaedics programme, the student will be able to:

1. Take an informed consent for standard orthopaedic procedures.
2. Perform closed/open biopsies for lesions of bone, joints and soft tissues.
3. Perform split thickness skin grafting and local flaps.
4. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.
5. Perform sequestrectomy and saucerisation.
6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow.
7. Perform repair of open hand injuries including tendon repair.
8. Perform arthrodesis of small joints.
9. Perform diagnostic arthroscopy on models and their patients.
10. Perform carpal tunnel/tarsal tunnel release.
11. Apply ilizarov external fixator.
12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities.
13. Perform amputations at different levels.
14. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia.

**3.** At the end of the third year of M.S. Orthopaedics programme, the student will be able to:

1. Assist in the surgical management of polytrauma patient.
2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle.
3. Assist in spinal decompressions and spinal stabilizations.
4. Assist in operative arthroscopy of various joints.
5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow.
6. Assist in corrective osteotomes around the hip, pelvis, knee, elbow, finger and toes.
7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
8. Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand.
9. Assist in spinal deformity corrections.
10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intramedullary nailing, LRS.
11. Assist in limb lengthening procedures.
12. Assist in Revision surgeries.
13. Provide pre and post OP care.
14. Perform all clinical skills as related to the speciality..

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.S. (Ophthalmology)

At the end of the course, the student will be able to:

a) Offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services.

b) Periodically self assess his or her performance and keep abreast with ongoing advances in the field and apply the same in his/her practice.

c) Aware of her/his own limitations to the application of the specialty in situations, which warrant referral to more qualified centers or individuals.

d) Apply research and epidemiological methods during his/her practice. The postgraduate student should be able to present or publish work done by him/her.

e) Contribute as an individual/group towards the fulfillment of national objectives with regard to prevention of blindness.

f) Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

**A. Cognitive domain**

At the end of the course, the student will be able to:

**Basic Medical Sciences:**

- Describe the structure and function of the eye and its parts in health and disease.
- Describe and apply knowledge of the structure and function of the parts of Central Nervous System and other parts of the body with influence or control on the structure and function of the eye.
- Describe and develop competence in executing common general laboratory procedures employed in diagnosis and research in Ophthalmology.

**1. Clinical Ophthalmology:**

At the end of the course, the student will be able to:

- Demonstrate scientific and rational approach to the diagnosis of ophthalmic cases presented.
- Investigate and establish cause and effect of the disease.
- Manage and treat all types of ophthalmic cases.

- Competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and muscle anomalies.
- Competently handle all ophthalmic medical and surgical emergencies.
- Demonstrate micro-surgery and special surgical techniques.
- Demonstrate the knowledge of the pharmacological (including toxic) aspects of drugs used in ophthalmic practice and drugs commonly used in general diseases affecting the eyes.

**2. Refraction:**

At the end of the course, the student will be able to:

- Assess refractive errors and prescribe glasses for all types of refraction problems competently.
- Describe manufacture and fitting of glasses and competently judge the accuracy and defects of the dispensed glasses.

**3. Ophthalmic super-specialties:**

At the end of the course, the student will be able to:

- Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology and refer appropriate cases to neurology and neuro-surgery.
- Examine, diagnose and demonstrate understanding of management of (medical and surgical) complicated problems in the field of (a) lens, (b) glaucoma, c) cornea, (d) retina, (e) pediatric ophthalmology, (f) oculoplasty, (g) uvea, and (I) genetic problems in ophthalmology.
- Demonstrate understanding of the manufacture, and competence in prescription and dispensing of contact lenses and ocular prosthesis.

**4. Ophthalmic pathological/microbiological/biochemical sciences**

At the end of the course, the student will be able to:

- Interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

**5. Community Ophthalmology**

At the end of the course, the student will be able to:

Guide rehabilitation workers in the organisation and training of the blinds in art of daily living and in the vocational training of the blind leading to gainful employment.

**6. Research :**

At the end of the course, the student will be able to:

- Recognise a research problem.
- State the objectives in terms of what is expected to be achieved in the end.

- Plan a rational approach with appropriate controls with full awareness of the statistical validity of the size of the material.
- Spell out the methodology and carry out most of the technical procedures required for the study.
- Accurately and objectively record on systematic lines results and observation made.
- Analyze the data with the aid of an appropriate statistical analysis.
- Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
- Write a thesis in accordance with the prescribed instructions.
- Write at least one scientific paper as expected of International Standards from the material of this thesis.

**B. Affective Domain:**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to write reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**C. Psychomotor domain**

At the end of the course, the student will be able to perform:

**Essential diagnostic skills:**

**I. Examination techniques along with interpretation**

**1. Slit lamp Examination**

i. Diffuse examination

ii. Focal examination

iii. Retroillumination – direct and indirect

iv. Sclerotic scatter

v. Specular reflection

vi. Staining modalities and interpretation

**2. Fundus evaluation**

- Direct/Indirect ophthamoscopy
- Fundus drawing

- 3-mirror examination of the fundus
- 78-D/90-D/60-D examination
- Amsler's charting

**II. Basic investigations along with their interpretation**

**1. Tonometry**

Tonometry - Applanation/Identation/Non-contact

**2. Gonioscopy**

Gonioscopy grading of the anterior chamber angle

**3. Tear/ Lacrimal function tests**

i. Staining- fluorescein and Rose Bengal

ii. Schirmer test/tear film break up time

iii. Syringing

iv. Dacrocystography

**4. Corneal**

- Corneal scraping and cauterization
- Smear preparation and interpretation (Gram's stain /KOH )
- Media inoculation
- Keratometry - performance and interpretation
- Pachymetry
- Corneal topography - if available

**5. Colour Vision evaluation**

- Ishihara pseudoisochromatic plates
- Farnsworth Munsell, if available

**6. Refraction**

i. Retinoscopy- Streak/ Priestley Smith

ii. Use of Jackson's cross-cylinder

iii. Subjective and objective refraction

iv. Prescription of glasses

**7. Diagnosis and assessment of Squint**

i. Ocular position and motility examination

ii. Synoptophore usage

iii. Lees screen usage

iv. Diplopia charting

v. Assessment of strabismus - cover tests/prisms bars

vi. Amblyopia diagnosis and treatment

vii. Assessment of convergence, accommodation, stereopsis, suppression

**8. Exophthalmometry**

Usage of Hertel's exophthalmometer - proptosis measurement

**9. Contact lenses**

- Fitting and assessment of RGP and soft lenses
- Subjective verification of over refraction
- Complications arising of contact lens use
- Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon

**10. Low Vision Aids**

- Knowledge of basic optical devices available and relative advantages and disadvantages of each.
- The basics of fitting with knowledge of availability & cost.

**III.** She/he will be able to interpret results of the following tests:

1. Fundus photography

2. Fluorescein angiography

3. Ophthalmic ultrasound A-scan/B scan

4. Automated perimetry for glaucoma and neurological lesions

5. Radiological tests - X rays - Antero posterior/ Lateral view PNS (Water's view) / Optic canal views Localisation of intra-ocular and intra-orbital FBs Interpretations of -USG/ CT/ MRI Scans

6. OCT and UBM

7. ERG, EOG, and VEP

**IV. Minor surgical procedures**

At the end of the course, the student will be able to perform independently:

- Conjunctival and corneal foreign body removal on the slit lamp
- Chalazion incision and curettage
- Pterygium excision
- Biopsy of small lid tumours
- Suture removal- skin/conjunctival/corneal/ corneoscleral
- Tarsorrhaphy
- Subconjunctival injection

- Retrobulbar, parabulbar anaesthesia
- Posterior Sub-Tenon's injections
- Artificial eye fitting

**V. Surgical procedures**

1. At the end of the course, the student will be able to perform independently:

a. Ocular anaesthesia:

- Retrobulbar anaesthesia
- Peribulbar anaesthesia
- Facial blocks- O'Brein / Atkinson/Van lint and modifications
- Frontal blocks
- Infra orbital blocks
- Blocks for sac surgery

2. At the end of the course, the student will be able to perform independently:

and deal with complications arising from the following surgeries :

Lid Surgery - Tarsorrhaphy

- ✓ Ectropion and entropion
- ✓ Lid repair following trauma
- ✓ Epilation

Destructive procedures

- ✓ Evisceration with or without implant
- ✓ Enucleation with or without implant

Sac surgery

- ✓ Dacryocystectomy
- ✓ Dacryocystorhinostomy
- ✓ Probing for congenital obstruction of nasolacrimal duct Strabismus surgery

Strabismus surgery

- ✓ Recession and resection procedures on the horizontal recti.

Orbit surgery

- ✓ Incision and drainage via anterior orbitotomy for abscess

Cyclocryotherapy/Cyclophotocoagulation

3. At the end of the course, the student will be able to perform independently with an operating microscope:

- Cataract surgery

  i. Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantation, I year and II year – wet lab training in bull's eye (first 3 months).

  ii. Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation

  iii. Intracapsular cataract extraction (second year)

  iv. Cataract with Phacoemusification (third year) as well as management of cataract surgery complications.

  v. Secondary AC or PC IOL implantation

- Retinal Surgery

  i.Assisting vitrectomy and scleral buckling procedures

  ii. Intra-vitreal and intra-cameral (anterior chamber) injection techniques and doses of drugs for the same

  iii. Needs to know the basis of open sky vitrectomy (anterior segment)

- Ocular surface procedures

  i. Pterygium excision with modifications
  ii. Conjunctival cyst excision/foreign body removal
  iii. Corneal foreign body removal
  iv. Conjunctival flap/ peritomy

- Glaucoma Surgery

  i. Trabeculectomy

- Corneal Surgery

  ii. Repair of corneo - scleral perforations
  iii. Corneal suture removal
  iv. Application of glue and bandage contact lens

4. Will have performed/assisted the following microscopic surgeries:

  i. Keratoplasty

  Therapeutic and optical

  ii Glaucoma surgery

  Pharmacological modulation of trabeculectomy

  Trabeculotomy

  Goniotomy

Glaucoma valve implant surgery

5. Will have desirably be able to perform following laser procedures:

- ✓ Yag Capsulotomy
- ✓ Laser iridotomy
- ✓ Focal and panretinal photocoagulation

6. Will have assisted in Keratorefractive procedures.

**Operations:**

At the end of the course, the student will have:

Performed operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member.

Assisted with senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the postoperative care of these cases.

In **first phase**, the post graduate student will have trained in preparations of cases for operation, pre-medication and regional anaesthetic blocks.

In the **next phase**, the postgraduate student will have assisted the operating surgeon during the operations.

In the **third phase**, the post graduate student will be able to operate independently assisted by senior post graduate student or a faculty member.

# GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY

## PROGRAM OUTCOMES – PG (MD\MS)
## M.S. (ENT)

## SUBJECT SPECIFIC COMPETENCIES

### A. Cognitive Domain

**At the end of training, the student will be able to demonstrate ability to practically apply knowledge gained during training period. This would include the following:**

**Basic Sciences related to Otolaryngology**

- Physiology- Mechanism of perception of smell and taste, mechanism of breathing and voice production, lacrimation, deglutition and salivation. Functional tests of the nose and paranasal sinuses, mechanism of cough and sneezing.
- Physics of sound, theories of hearing, mechanism of perception of sound and speech production, physiology of equilibrium and cerebral function. Physiology of brain in connection with hearing, speech, smell and phonation. Audiologic tests like audiometry, impedance, evoked potentials, OAE, Speech audiometry.
- Physiology of larynx, tracheobronchial tree and oesophagus - Histology of mucous membranes, internal ear and other associated organs and structures, nose, PNS Nasopharynx, Larynx, Tracheo-Bronchial tree, Lymphoepithetical system. Mechanism of immune system/immunology and genetics.
- Anatomy-Embryogenesis of ear, nose and throat including palate and the larynx, Oesophagus, trachea and lungs, tongue, salivary gland Head and Neck and skull base etc.
- Parapharyngeal spaces in the neck including connective tissue barriers of larynx.
- Applied anatomy of the skull bones, accessory sinuses, external, middle and inner ears, nose, PNS, nasopharynx, meninges, brain, pharynx, larynx, trachea and bronchi, lungs, pleurae, oesophagus and the mediastinum.
- Anatomy of all cranial nerves with their functions.

**Principles and Practices of Otolaryngology, Audiology and Speech Pathology**

- Clinical Methodology as applied to ORL HN diseases in adult and children and the accessory sinuses, diagnosis and surgical treatment of diseases of nose, throat and ear in adult and children. Prevention and treatment, infectious diseases of Otolaryngology and Head Neck region.
- Circulatory and nervous disturbances of the nose, throat and ear and their effects on other organs of the body. Deformities, injuries sinus infections, polyps and the tumors of the nose, and paranasal sinuses.

- Examination of the ear, deafness and allied diseases, complications of diseases of the ear. Injuries, tumors, nervous and circulatory neurological disturbances of the ear. Diagnosis and treatment of tinnitus and vertigo. Diagnosis and rehabilitation of the Hearing handicapped including, dispensing of hearing aid and other vibrotactile aids.
    - Surgical pathology of Otolaryngology and Head Neck region.
    - Basic knowledge of anaesthesia as related to ENT.
    - Examination of diseases of children (Paediatric ORL) in connection with throat and larynx. Neurological and vascular disturbances. Congenital and neonatal stridor.
    - Pathology of various diseases of the larynx and throat, tracheo-bronchial tree and their causative organisms.
    - Indications and various techniques of direct laryngoscopy, nasal endoscopy. Bronchoscopy and oesophagoscopy, including microlaryngoscopic procedures.
    - Reading of radiograms, scans, audiograms, nystagmograms and tympanograms in connection with ENT diseases/disorders.
    - Special apparatus for the diagnosis and treatment of the diseases of ear, nose and throat including audiometer, BERA, Speech analyser etc.

**Recent advances in Otolaryngology and Head Neck surgery**

- Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases
- The knowledge of the frontiers of the oto-laryngology and lateral skull base surgery
- Rhinoplasty, endoscopic sinus surgery, and anterior cranial fossa surgery
- Knowledge of LASERS and fibre optics
- Other methods of managing Hearing loss
- Implantable hearing aids and cochlear implants
- Phonosurgery
- Etiology and Managements of sleep apnoea/snoring
- Hypophysectomy and optic nerve decompressions
- Immunotherapy and modalities of the gene therapy
- Newer techniques for Radiotherapy including, use of gamma knife for treatment of Intracranial tumors and other malignancy
- Chemotherapy of cancer

**General Surgical Principles and Head-Neck Surgery**

- General Surgery, Head and Neck oncology, and Medicine as applicable to the ENT disorders/diseases. Surgery of congenital deformities of nose, ear (Pinna) and trachea/oesophagus etc.

- Radiology, Imaging – computed tomography and magnetic resonance imaging, (MRI) and intervention radiology and angiography as related to ENT
- General Pathologic aspects such as wound healing and also pathology Pathogenesis of ENT diseases, Pharmacology, molecular biology, genetics, cytology, haematology, and immunology as applicable to otolaryngology
- General Principles of faciomaxillary traumatology and neck injury
- Plastic Surgery as applicable to Otolaryngology

## B. Affective Domain

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student will demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student will be able to choose the required investigations to enhance the attitude, communicative skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

## C. Psychomotor Domain

**By the end of the training, a student will be able to demonstrate his skills in:**

- Taking a good history and demonstrating good examination techniques.
- arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.
- Will be able to perform and demonstrate the practical skills in the field of ENT including the following:
    - Examination of the ear, nose and throat oral cavity examination
    - Clinico-physiological examination and evaluation of the audio-vestibulo neurological system
    - Examination of the larynx and the throat including flexible endoscopy, stroboscopy, voice analysis and the clinico-physiological examination of the speech
    - Examination of the otological and audiological system including Tuning fork testing, audiological evaluation, micro and otoendoscopy
    - Clinical and physiological evaluation of the nose and paranasal sinuses including nasal endoscopy and olfactory evaluation

- Examination of the neck and its structures

- Will demonstrate and perform various therapeutic skills related to the speciality such as :
  - Tracheostomy
  - Anterior/ posterior nasal packing
  - Ear Packing and Syringing
  - Foreign body removal from ear, nose and throat
  - Airway management including basic life support skills, Cardiopulmonary resuscitation, intubation, homeostasis maintenance, IV fluid, electrolyte maintenance and principles of blood transfusion alimentation including Nasogastric feeding, gastrostomy
  - Wound suturing, dressings and care of the wounds
  - Basic principles of rehabilitation
  - common procedures like FNAC, biopsy, aspiration from serous cavities, lumber puncture etc.
- Will understand principles of and interpret X-rays/CT/MRI, audiograms, ENG, BERA, OAE, ultrasonographic abnormalities and other diagnostic procedures in relation to the speciality
- Will have observed/performed under supervision the various surgical procedures in relation to the speciality

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.S. (Obstetrics & Gynaecology)

**A. Cognitive Domain**

At the end of the course the student will be able to:

- Recognize the health needs of women and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics
- Acquire the competencies pertaining to Obstetrics and Gynaecology that are required to be practiced in the community and at all levels of health System:
  - ✓ On genetics as applicable to Obstetrics.
  - ✓ On benign and malignant gynecological disorders.
  - ✓ On Gynecological Endocrinology and infertility.
  - ✓ On interpretation of various laboratory investigations and other diagnostic modalities in Obstetrics & Gynecology.
  - ✓ On essentials of Pediatric and adolescent Gynecology.
  - ✓ On care of postmenopausal women and geriatric Gynecology.
  - ✓ On elementary knowledge of female breast & its diseases.
  - ✓ On vital statistics in Obstetrics & Gynecology.
  - ✓ Anesthesiology related to Obstetrics & Gynecology.
  - ✓ Reproductive and Child Health, family welfare & reproductive tract infections.
  - ✓ STD and AIDS & Government of India perspective on women's health related issues.
  - ✓ Medico-legal aspects in Obstetrics & Gynecology.
  - ✓ Asepsis, sterilization and disposal of medical waste.
- Effectively communicate with the family and the community
- Describe the contemporary advances and developments in medical sciences as related to Obstetrics and Gynaecology.
- Maintain medical records properly and know the medico-legal aspects in respect of Obstetrics & Gynecology
- Differentiate between audit and research and how to plan a research project and demonstrate the skills to critically appraise scientific data and literature has acquired skills in educating medical and paramedical professionals

**Ethical and Legal Issues:**

The post graduate student will be able to describe the principles and legal issues surrounding informed consent with particular awareness of the implication for the unborn child, postmortem examinations consent to surgical procedures includingtubal ligation/vasectomy, parental consent and medical certification, research and teaching and properly maintain medical records.

**Risk Management:**

The post graduate student will be able to demonstrate a working knowledge of the principles of risk management and their relationship to clinical governance and complaints procedures.

**Confidentiality:**

The post graduate student will be:

- Aware of the relevant strategies to ensure confidentiality and when it might be broken.
- Describe the principles of adult teaching and should be able to teach common practical procedures in Obstetrics and Gynaecology and involved in educational programme in Obstetrics and Gynaecology for medical and paramedical staff.
- Abreast with all recent advances in Obstetrics and Gynaecology and practice evidence based medicine.

**Use of information technology, audits and standards:**

- The post graduate student will be able to :
- Use computing systems including data collection, storage, retrieval, analysis and presentation.
- Practice quality improvement and be aware of management and how to perform, interpret and use clinical audit cycles and the production and application of clinical standards, guidelines and protocols.
- Describe National Health Programmes related to Obstetrics and Gynaecology and be aware of all the Acts and Laws related to specialty.

**Health of Adolescent Girls and Post-Menopausal Women**

At the end of the course the student will be able to:

- Recognize the importance of good health of adolescent and postmenopausal women.
- Identify and manage health problems of post-menopausal women.
- Plan an intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Manage geriatric problems.

**Reproductive Tract and 'HIV' Infection**

At the end of the course the student will be able to:

- Describe epidemiology of RTI and HIV infection in Indian women of reproductive age group;cause, effect and management of these infections.
- Describe HIV infections in pregnancy, its effects and management.
- Explain relationship of RTI and HIV with gynaecological disorders.
- Plan and implement preventive strategies.

**Medico-legal Aspects**

At the end of the course the student will be able to demonstrate:

- Knowledge and correct application of various Acts and Laws while practicing Obstetrics and Gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Knowledge of importance of proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Knowledge of steps recommended for examination and management of rape cases.
- Knowledge of steps taken in the event of death of a patient.

**B. Affective domain**

At the end of the course the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**2. Psychomotor domain**

At the end of the course the student will be able to demonstrate the following clinical & operative skills:

**Operative Skills in Obstetrics and Gynaecology**

- Adequate proficiency in common minor and major operations, post-operative management and management of their complications.

- Operative procedures which must be done by P G students during training period:

**(in graded manner – assisting, operating with senior person assisting, operating under supervision)**

2. **Obstetrics:** Venesection, culdocentesis

- ➢ Conduct normal deliveries
- ➢ Episiotomy and its repair
- ✓ Application of forceps and ventouse
- ✓ Carry out caesarian section delivery
- ✓ Manual removal of placenta
- ✓ Management of genital tract obstetrical injuries.
- ✓ Post partum sterilization/Minilap tubal ligation
- ✓ Medical termination of pregnancy – various methods

**2. Gynaecology:** Endometrial / cervical biopsy.

- ➢ Dilatation and curettage
- ➢ Coldocentesis, Colpotomy
- ✓ Opening and closing of abdomen
- ✓ Operations for pelvic organ prolapse
- ✓ Ovarian cyst operation
- ✓ Operation for ectopic pregnancy
- ✓ Vaginal and abdominal hysterectomy

At the end of the course, the student would have OBSERVED and/or ASSISTED when possible, the following Operations:

- ➢ Internal podalic version
- ➢ Caesarean Hysterectomy
- ➢ Internal iliac artery ligation
- ➢ Destructive obstetrical operations
- ➢ Tubal microsurgery
- ➢ Radical operations for gynaec malignancies
- ➢ Repair of genital fistulae
- ➢ Operations for incontinence
- ➢ Myomectomy, Laparoscopic and hysteroscopic surgery

**Diagnostic Procedures**

At the end of the course, the student will be able to perform:

- Interpretation of x-rays – Twins, common fetal malformations / mal-presentations, abnormal pelvis (pelvimetry), Hysterosalpingography

- Sonographic pictures at various stages of pregnancy – normal and abnormal pregnancies, Fetal biophysical profile, common gynaecological pathologies.
- Amniocentesis
- Fetal surveillance methods – Electronic fetal monitoring and its interpretation
- Post-coital test
- Vaginal Pap Smear
- Colposcopy
- Endoscopy – Laparo and Hystero-scopy.

**Health of Adolescent Girls and Post-Menopausal Women**

At the end of the course, the student will be able to:

- Provide advice on importance of good health of adolescent and postmenopausal women.
- Perform identification and management of health problems of post-menopausal women.
- Perform planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Provide advice on geriatric problems.

**Reproductive Tract and 'HIV' Infection**

At the end of the course, the student will be able to:

- Provide advice on management of RTI and HIV infections in Indian women of reproductive age group.
- Provide advice on management of HIV infections in pregnancy, relationship of RTI and HIV with gynaecological disorders.
- Perform planning and implementation of preventive strategies.

**Medico-legal Aspects**

At the end of the course, the student will be able to:

- Provide correct application of various Acts and Laws while practicing obstetrics and gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Implement proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Implement the steps recommended for examination and management of rape cases.
- Follow proper procedures in the event of death of a patient.

**Environment and Health**

At the end of the course, the student will be able to:

- Follow proper procedures in safe disposal of human body fluids and other materials.
- Follow proper procedures and universal precautions in examination and surgical procedures for the prevention of HIV and other diseases.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Anaesthesiology)

At the end of the course, the student will be able to:

**Cognitive domain**

- Demonstrate knowledge of Anatomy related to diaphragm, upper and lower airway, heart and coronary circulation , Regional anaesthesia – field block, central neuraxial, blockade, block for acute pain states
- Perform Procedures like –Intramuscular injections, arterial and venous cannulations and Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) in detail and translate its application in a problem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents – intra-venous and inhalational, Neuromuscular blocking agents and reversal of muscle relaxants) – general principles, concepts of pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.
- Demonstrate knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipments (used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipments, manufacture, filling and transport of gases and liquid oxygen. Etc.
- Demonstrate knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.

- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, Infection control, cross contamination in OT and ICU. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of:
  - ✓ Post-operative pain: various modalities
  - ✓ Nausea and vomiting
  - ✓ Identified emergencies and postoperative complications.
  - ✓ Special precautions to be taken in specific surgical patients.
- Demonstrate knowledge of acute pain management, chronic pain therapy &therapeutic nerve blocks, acupuncture, acupressure and other non-conventional methods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.
- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:
  - ✓ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
  - ✓ Associated medical disorders in surgical patients
  - ✓ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
  - ✓ Induced hypothermia, incidental, environmental safety of patient.

- ✓ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
- ✓ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/ transplantation/burns and plastic surgery.
- ✓ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery.
- ✓ Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator, Multiple organ failure.

- ➢ Demonstrate knowledge pertaining to care of terminally ill, Hospices management, Do not resuscitate orders.
- ➢ Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- ➢ Demonstrate knowledge of Ethics and clinical trial.
- ➢ Demonstrate knowledge of Hospital, ICU and OT design and planning.
- ➢ Demonstrate knowledge of Medical education including evidence based medical education.
- ➢ Demonstrate knowledge of principles of human resources and material management.

**A. Affective Domain:**

At the end of the course, the student will be able to:

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**C. Psychomotor domain**

At the end of the course, the student will be able to demonstrate ability **as a perioperative physician**, in terms of:

- ➢ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
- ➢ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri-operative care of the patient.
- ➢ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.

- Prioritizing problems, present cases clearly and systematically to attending consultants.
- Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
- Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri-operative procedures.
- Assessing and explaining risk of procedure and taking informed consent.
- Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
- Ability to choose and order the required investigations to be done in a particular patient peri operatively
- Demonstrate ability in performing
  - ✓ Pre-operative equipment check
  - ✓ Selection of drugs
  - ✓ Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.
- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolarity and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical co relation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:

  a. Electrocardiogram with ST-segment analysis

  b. Noninvasive blood pressure

  c. Capnograph: values and changes in values and waveform.

d. Pulse oximetry: values and changes in values

e. Neuromuscular blockade monitor

f. Invasive arterial pressure: waveform and changes in the waveform

g. Central venous pressure: values and waveform

h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.

i) Cardiac output

ii) Mixed venous oxygen saturation

iii) Evoked potential

iv) Transesophageal echocardiography: basic understanding

- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumber puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries, able to manage critically ill patients and treat intractable pain.
- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
  - ✓ Organize resources in case of mass casualty.
  - ✓ Perform triage.
  - ✓ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
  - ✓ Manage massive haemorrhage and massive blood transfusion.
  - ✓ Transport critically ill patient.
  - ✓ Perform anaesthetic management of geriatric patients with fracture neck of femur
  - ✓ Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and

management of bowel obstruction, septicaemic \ shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta

- ✓ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic
- ✓ Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
- ✓ Management of intra-operative cardiac arrest
- ✓ Management of intra-operative bronchospasm

- ➢ Demonstrate ability to document a Medico-legal aspect.
- ➢ Demonstrate ability to provide special sedation /**anaesthesia requirements outside operating Room,** eg **Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Oncho radiotherapy**, **Electroconvulsive shocktherapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologic procedures, lithotripsy** etc **.**
- ➢ Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.
- ➢ Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- ➢ Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**
- ➢ Assess the patient's recovery and condition for a safe discharge or transfer.
- ➢ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthsia Care Unit (PACU) especially those in relation to cardio-respiratory systems:

1. Airway integrity and compromise.
2. Arrhythmia
3. Hypertension
4. Hypotension
5. Pain prevention and pain relief
6. Nausea and vomiting
7. Decreased urine output
8. Emergence delirium
9. Delayed emergence from anaesthesia
10. Shivering
11. Post-obstructive pulmonary edema.

- Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
- Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.
- Demonstration of following abilities in **Intensive Care Unit**

**Understand the spectrum of critical illnesses requiring admission to ICU.**

- Recognize the critically ill patient who needs intensive care –Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
- Monitor progress of patients by physiological scoring systems
- Practice infection control practices and control of nosocomial infections.
- Insert central venous lines, arterial lines using ultrasound and interpreting the data.
- Manage cardiovascular instability, respiratory failure and postoperative pulmonary complications
- Understand the operation of mechanical ventilators including different 7 mmune 77 or modalities non-invasive ventilation, complications and modes of weaning.
- Apply Principles and application of Oxygen Therapy
- Provide Glycemic control in the critically ill patient
- Practice Hypothermia and prevention of cerebral injury after cardiac arrest
- Deliver appropriate nutritional support – enteral and parenteral.
- Properly use of sedative/hypnotic drugs in the ICU.
- Practice ethical and legal aspects of critical care
- Demonstrate good communication skills with patient and relatives.
- Practice proper Sterilization of ICU equipment.
- Demonstrate of following abilities in **Acute and Chronic Pain Management**
- Perform assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
- Classify types of pain – acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
- Practice the different modalities of physical therapy that may relieve both acute and chronic pain
- Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
- Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.

- Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess.
- Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture
- Demonstration of abilities to manage **Chronic Pain**
- Practice different modalities of chronic pain management – physical therapy, psychotherapy, (including cognitive behavioural approaches), neuroablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.
- Describe Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
- Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain – phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain – myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
- Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
- Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve
- Recognize complications associated with each blocks and know appropriate treatment of each
- Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
- Mechanisms and side effects of other therapies used for treating pain.
- The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to
- communicate.
- Awareness of the principles for insertion and management of implantable drug delivery pumps.
- Awareness of the basic principles of palliative care.

- **Demonstrate practice of Regional Anaesthesia**
- Applying general principles of pharmacology of local anaesthetics and various adjuvants.
- Familiarizing with the relevant anatomy for regional techniques.
- Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
- Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
- Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
- Performing the following regional anaesthesia techniques:

o Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.

- **Demonstrate practice of Thoracic Anaesthesia**

- ✓ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
- ✓ Various approaches and their relevant equipments for lung isolation.
- ✓ Various double lumen tubes and their placement.
- ✓ Application of Principle of chest drain.
- ✓ Respiratory Physiology and management of one lung ventilation (OLV).
- ✓ Indications, contraindications and hazards of OLV.
- ✓ Application of the knowledge of Anatomy of lung and broncho-pulmonary segments.
- ✓ Anatomy and techniques for intercostals nerve block and thoracic epidural.
- ✓ Management of thoracic epidural anaesthesia and analgesia
- ✓ Anatomy, techniques and placement of paravertebral block/catheter.
- ✓ Post-operative care of patients after lung surgery.
- ✓ Peri-operative management of patients with myasthenia gravis.
- ✓ Peri-operative management of patients with mediastinal mass.
- ✓ Anaesthetic management of mediastinoscopy, major airway stenting.
- ✓ Lung volume reduction surgery and problems.

- **Demonstrate practice of Cardiovascular Anaesthesia**:

- ✓ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.
- ✓ Application of the knowledge of Distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.
- ✓ Regulation of blood pressure, hypotensive anaesthesia.
- ✓ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.
- ✓ Application of the knowledge of anatomy and physiology of vascular heart disease like co-arctation of aorta.
- ✓ Assessment of cardiac patient with ischaemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization, echocardiography, stress testing, and radio-nucleide imaging.
- ✓ Application of Principle and complication of cardiopulmonary bypass
- ✓ Application of Principle of trans-esophageal echocardiography
- ✓ Application of Principle of circulatory support: inotropes, IABP, pacing
- ✓ Coagulation and management of coagulopathy.
- ✓ Off pump bypass
- ✓ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, 10mmune1010or10ion procedures.
- ✓ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
- ✓ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
- ✓ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
- ✓ Robotic cardiac surgery.

➢ **Demonstrate practice of Paediatric Anaesthesia**

- ✓ Application of knowledge of Anatomical changes in paediatric patient and neonates.
- ✓ Application of knowledge of Physiology and pharmacology in paediatric patient.
- ✓ Guideline for pre-operative fasting in children and pre-medication.
- ✓ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
- ✓ Anaesthesia management for premature and newborn.

- ✓ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
- ✓ Problems of transporting a sick pediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
- ✓ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
- ✓ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular and rectal routes and monitor pediatric patients.
- ✓ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block
- ✓ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
- ✓ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
- ✓ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
- ✓ Management of patients requiring paediatric intensive care, 11mmune1111or management, and support of circulation.
- ✓ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in paediatric anaesthesia.
- ✓ Paediatric pain management
- ✓ Assessment of a child with URTI, with a heart murmur.
- ✓ Management of fluid and electrolytes in children.
- ✓ Anaesthetic management of a malignant hyperthermia susceptible child.
- ✓ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, 11mmune11-oesophagus fistula, thoracotomy.
- ✓ Anaesthesia for Fetal Surgery.

- ✓ Sedation techniques including the selection, management and monitoring of children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.

➢ **Demonstrate practice of Transplant anaesthesia**

- ✓ Application of knowledge of basic pathophysiology of renal and liver failure. Principles of anesthetizing an 12mmune-compromised patient.
- ✓ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.

➢ **Demonstrate practice of Neuroanaesthesia**

- ✓ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
- ✓ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
- ✓ Anesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
- ✓ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
- ✓ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
- ✓ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
- ✓ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension ("tight brain")
- ✓ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
- ✓ Intracranial surgery and spinal surgery, both routine and emergency.
- ✓ Monitoring: techniques for detection and management of air embolism.
- ✓ Lumbar puncture and CSF drainage.
- ✓ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
- ✓ Management of subarachnoid haemorrhage and vasospasm.
- ✓ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

At the end of the course, the student will be able to **perform**

**Name of procedure:**

1. Blind Nasal intubation
2. Failed intubation drill (includes Fiberoptic Laryngo/ Bronchoscope)
3. Double Lumen Tube
4. Bronchial Blocker placement
5 Jet Ventilation
6. Suctioning and physiotherapy of wet lung
7. Intubation in Neonates
8. Initiation and management of ventilation
9. Combined Spinal Epidural
10. Brachial Plexus Block
11. Intravenous Regional Anaesthesia
12. Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle – each
13 Cervical-Superficial and Deep, Stellate, Splanchnic – each
14. Central Venous Line by Brachial, Jugular and Subclavian veins
15. Radial and Femoral Artery cannulation
16. CVP monitoring
17. Pulmonary Capillary Wedge Pressure
18. Neuro-muscular transmission Monitoring
19. Anaesthetic Depth eg. BIS monitoring

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc

At the end of 3 years, the post graduate student will be able to:

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.
- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.

- Participate in anaesthesia audit.
- Perform information management in preoperative evaluation and outcome enhancement and
- Practice proper communication skill on patient and relatives.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Radio-diagnosis)

**A. Cognitive Domain**

A post graduate student on completing MD (Radiodiagnosis) will be able to:

1. Acquire good basic knowledge in the various sub-specialties of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascularradiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women's imaging.
2. Independently conduct and interpret all routine and special radiologic and imaging investigations.
3. Provide radiological services in acute emergency and trauma including its medicolegal aspects.
4. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and will be able to describe proper costeffective algorithm of various imaging techniques in a given problem setting.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. Decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.
7. Able to formulate basic research protocols and carry out research in the field of radiology-related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student/consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.
9. Interact with other specialists and super-specialists so that maximum benefit accrues to the patient.
10. Organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
11. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.

12. Acquire knowledge of interventional radiology.

**B. Affective Domain:**

1. Function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**C. Psychomotor domain**

At the end of the course, the student will be able to:

**A) Interpretation of images:**

**Interpret images on all imaging modalities of diseases of following organs :**

1. **Musculo-skeletal System -** Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.

2. **Respiratory System -** Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.

3. **Cardiovascular System** - Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.

**4.Gastro-intestinal tract and hepato-biliary pancreatic system** - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas**.**

5.**Urogenital System** - Interpretation of various diseases and disorders of genitorurinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.

6. **Central Nervous System (C.N.S.) -** Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.

7. Imaging in Emergency Medicine.

8. Imaging in Obstetrics and Gynecology.

9. Imaging of Breast and interventional procedures.

11. ENT, EYE and Dental Imaging**.**

11. Imaging of endocrine glands and those involved with metabolic diseases.

12. Clinical applied radionuclide imaging.

13. Interventional Radiology

**B) Skills in performing a procedure**

**The student should be able to perform the following procedures:**

1) **GIT contrast studies:** Barium studies (swallow, upper GI, Follow through, enema); fistulogram; sialogram; cologram/ileostogram,

2) **GU:** Excretory urography, MCU, RGU, nephrostogram, genitogram,

3) **Ultrasound:** Studies of whole body including neonatal transfontanell studies, Doppler studies,

4) **CT scan:** should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.

5) **MRI:** plan and perform MRI studies of whole body

6) **DSA:** should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.

7) **Radiography:** should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.

8) **Interventional radiology:** The student should be able to perform simple, common non-vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)

## M.D. (Immuno Haematology & Blood Transfusion)

**The functioning of an Immunohematologist is based on ten core principles as listed below:**

1. Person centred care
2. Blood Safety
3. Comprehensive care in collaboration with Clinicians
5. Laboratory Care
6. Safe Transfusion Practices and disease prevention
7. Collaborative, coordinated team-based care
8. Resource management and use of ICT
9. Research aptitude in Immunohematology and Immunogenetics
10. Lifelong self-learning

**By the completion of the course, the student will be able to demonstrate the ability to:**

1. Identify the need for appropriate blood and blood components for transfusion.
2. Perform all necessary laboratory investigations to ensure safety of blood products and absence of Transfusion Transmissible Diseases, before blood and its components are used.
3. Diagnose a case of mismatched blood transfusion
4. Manage a case of mismatched blood transfusion
5. Identify the need for Immunogenetics and its applications in Transfusion Medicine
6. Conduct Blood Donation Camps.
7. Demonstrate Professionalism by maintaining patient autonomy and confidentiality
9. Demonstrate knowledge and skills required to carry out research
10. Investigate for Hematological conditions like Anaemia, Hemophilia, ITP etc.
11. Demonstrate knowledge and skills for Quality control and assurance of Blood bank quality as per the Standard guidelines.
12. Communicate effectively with the public and media in matters relating to national blood supply and to create awareness about blood donation & blood safely.
13. Use information technology for the smooth functioning of blood banks.
14. Undertake accurate self-appraisal, develop a personal continuing education strategy and pursue lifelong mastery of transfusion haematology.
15. Function efficiently as a member of a Health care team to support Clinical Transfusion services.

**A. Cognitive Domain**

**At the end of the course, the student will be able to demonstrate the knowledge of::**

**I. Basic Sciences (Immunology, Medical Genetics, Hemostasis & Physiology of Formed Elements of blood)**

- The current concepts of structure and function of the immune system, its aberrations and mechanisms thereof. The student
- The basic principles of immunoglobulins, antigen, antibody and complement system, antibody development after immunization and infection.
- Basic concepts and their clinical relevance of the following:
  - o Mechanisms of acute inflammation
  - o Healing and repair
  - o Physiology of Immune System
  - o Hypersensitivity reactions
  - o Autoimmunity
  - o Transplantation Immunology
- Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of important procedures employed in clinical and experimental studies relating toimmunology – this is inclusive of but not limited to:
  - o ELISA techniques
  - o Radioimmunoassay
  - o HLA typing
  - o Hybridoma technology
  - o Isolation of T & B lymphocytes
  - o CD4 / CD8 count
  - o Microlymphocytotoxicity test
  - o Cellular assays
  - o Electrophoresis and Immunofluorescence
- The principles of basic genetics with regard to Mendelian Laws of Inheritance, phenotype / genotype and population genetics.
- The nomenclature, organization and polymorphism of the human major histocompatibility complex, including HLA class I, II, and III genes.
- The role of HLA typing in organ and bone marrow/stem cell transplantation and association with disease.

- The basic concept of haematopoiesis and bone marrow kinetics.
- The basic physiology and biochemistry of red cells, platelets and leukocytes in terms of their kinetics, function, life span and antigenic systems. Know the membrane structure and function of red cells, platelets and leukocytes and be able to apply their implication in transfusion medicine
- Hemoglobin structure, synthesis, function, its aberrations and degradation

including iron and bilirubin metabolism, laboratory diagnosis anemia and management.

- The disorders of white blood cells, their laboratory diagnosis and management and the role of transfusion medicine in the management of these disorders.
- The composition and function of plasma constituents.
- The pathophysiology and laboratory features of intravascular and extravascular hemolysis
- The physiology of hemostasis with regard to role of platelets, coagulation pathway and fibrinolysis, its aberrations and mechanisms thereof such as coagulopathy of liver disease, vitamin K deficiency, disseminated intravascular coagulation & hemophilias (A, B, and C) etc.
- Hemodynamics of blood flow and shock; estimation of blood volume and be able to interpret the application of radionuclides tagging for blood volume estimation.
- The principles of Molecular Biology especially related to the
- Disease processes and its use in various diagnostic tests.

**II. Blood Collection/Blood Center/Component Processing**

The student should be able to demonstrate understanding of the processes associated with Blood:

- Donor motivation (motivation strategies), recruitment, selection and proper donor care in blood center as well as in outdoor blood donation camps and be able to understand importance of cold chain maintenance. The student should:
- Donor counseling and notification (Pre- and Post-donation).
- Various categories of blood donors including autologous and directed donors and be able to know their clinical relevance.
- Process of apheresis and demonstrate proficiency in selection of apheresis machine, apheresis donor and be able to obtain apheresis product meeting quality standards
- Mechanisms of adverse effects of blood / apheresis donation, its clinical features, management and prevention.
- Demonstrate understanding of various anticoagulants / preservatives used for collection and storage of blood and components:

- Various "storage lesions" in blood components, factors affecting the storage lesions and its prevention.
- Demonstrate understanding of various plasticizers used in blood banking and their clinical relevance.
- Principles of component preparation by various methods, be familiar with preparation of modified components such as leukofiltered, irradiated or saline washed, pooled or volume reduced components following aseptic conditions.
- Demonstrate understanding of the basic principles of preparation and composition of recombinant products such as Factor Vll, Factor Vlll, Factor lX, concentrate and hematopoietic growth factors.
- Understand the factors influencing quality of blood and blood components including quality of blood bag / apheresis.
- Maintenance of quality of blood components as per recommended standards by various agencies (DGHS, DCGI, NABH, NACO, AABB, EC)
- Identify problems in the blood/apheresis collection and component preparation area and offer viable solutions

**III. Transfusion transmitted infection**

At the end of the course, the student will be able to demonstrate:

- Various strategies for improving blood safety in general and TTI testing in particular pertaining to Indian conditions.
- The typical time course of appearance and disappearance of serum antigens and antibodies used in screening of major transfusion transmitted infection, including HIV, hepatitis B, hepatitis C, syphilis and malaria and others.
- The principles of blood safety including testing for various transfusion transmitted infection (TTI), proper disposal of infectious waste, laboratory safety, personnel safety.
- Newer technologies that are being introduced in the field ofTTI testing. The feasibility of NAT (Nucleic acid testing) in Indian blood transfusion services.
- Demonstrate understanding of the new emerging threats (including Prions, vCJD, Lyme Disease, West Nile Virus, Dengue, Chikungunya etc.) to blood supply in the country including bacterial contamination, their detection and prevention.

**IV. Immunohematology / Blood Group Serology / Compatibility testing**

- Demonstrate understanding of the knowledge of various major and minor blood group systems including their biosynthesis, antigen/antibodies, phenotype/genotype frequency, clinical significance.

- Demonstrate understanding of the various Immunohematological laboratory tests including its quality essentials.
- Demonstrate knowledge of principle of pretransfusion testing, including ABO/Rh testing, RBC antibody screen, and antibody identification. The student should also demonstrate understanding of resolution of discrepant results in ABO/Rh grouping and pretransfusion testing and be able to provide solutions for the management of such cases.
- Demonstrate understanding of use of various potentiators and their applications in solving immunohematological problems such as polyagglutination, subgroups of ABO system, red cell antibody detection
  - o Enzymes
  - o Lectins
  - o LISS / Albumin
  - o others
- The student will be able to describe :
  - ✓ Various advances in this field including automation and computerization.
  - ✓ The pathophysiology, clinical features, lab diagnosis & management of various clinical conditions requiring immunhematological and transfusion support including
    - o Multi-transfused patients such as thalassemia, sickle cell disease etc
    - o Alloimmunized antenatal cases( HDN)
    - o Transfusion reactions
    - o Immune hemolytic anemias
    - o ABO mismatched transplants (BMT / Solid organ)
  - ✓ The pathophysiology, clinical features, lab diagnosis & management of Rh, ABO and other blood group incompatibility in antenatal patients including exchange transfusion / intra-uterine transfusion.
  - ✓ Demonstrate knowledge regarding "rare blood group donor" including identification, cryo-preservation of rare blood and making their registry.

**A. Clinical Transfusion Service**

**At the end of the course, the student will be able to:**

- Demonstrate knowledge of the principles of patient/ unit identification and its importance in blood safety.
- Demonstrate knowledge of the principles of blood inventory management.

- Demonstrate understanding of the rational use of blood and components in various clinical conditions including monitoring of transfused patients.
- Recognize the symptoms and signs of hemolytic and non-hemolytic transfusion reactions and demonstrate knowledge of the pathophysiology, treatment, and prevention of these complications
- Demonstrate understanding of the major non-infectious complications of blood transfusions, including red cell alloimmunization, transfusion-related acute lung injury, transfusion associated graft versus host disease, volume overload, post transfusion purpura, iron overload etc. and the risk of these complications, and strategies to prevent them.
- Demonstrate knowledge of pathophysiology, clinical features, diagnosis and management of these conditions.
- Demonstrate knowledge of pathophysiology, diagnosis & management of anemia
    - o Iron deficiency anemia
    - o Megaloblastic anemia
    - o Aplastic anemia
    - o Anemia of chronic diseases
    - o Neonatal anemia
- Demonstrate understanding of pathophysiology, clinical / laboratory diagnosis and treatment of patients with bleeding disorders such as Hemophilia, von Willebrand's disease, thrombophilia, acquired coagulation disorders including DIC, liver disease etc.
- Demonstrate understanding of the pathophysiology, clinical features, lab diagnosis and platelet support in thrombocytopenic conditions such as aplastic anemia, ITP, NAIT, hematological malignancies etc. The student should also Demonstrate understanding of complications of platelet transfusion including refractoriness to platelets, its diagnosis and management.
- Demonstrate understanding of the basic principles of neonatal transfusions including serological testing, type of transfusion support, exchange transfusion, intra uterine transfusion and monitoring.
- Demonstrate knowledge of the pathophysiology, diagnosis and transfusion support in acute blood loss including massive transfusion protocols, complications of massive transfusion and their prevention.
- Demonstrate understanding of the knowledge of various methods of blood conservation, including pre- and peri-operative autologous blood collection, and approaches to "bloodless" surgery.

- Demonstrate knowledge of the use of various point-of-care tests (TEG, ROTEM) for hemostasis & recommend component therapy depending on the results.
- Demonstrate knowledge of principles of transfusion support in general surgery and special procedures such as cardiac surgery or oncological surgery.
- Demonstrate knowledge of the principles of hematopoietic stem cell transplantation, including collection, processing, and storage of these stem cell products, and the indications for use (e.g., bone marrow, peripheral blood, and cord blood).
- Demonstrate understanding of guidelines for stem cell research by regulatory agencies like ICMR, DBT etc.

**VI. Therapeutic Apheresis, Therapeutic Plasma Exchange and Cytapheresis**

At the end of the course, the student will be able to demonstrate knowledge of:

- The principles of apheresis technology, including centrifugation, filtration, and immunoadsorption.
- The indications for therapeutic apheresis including cytapheresis and of the appropriate replacement fluids to be used in various situations.

**VII. Regulatory Skills / Quality Assurance/ Quality Control in blood transfusion**

At the end of the course, the student will be able to demonstrate knowledge of:

- The requirements and applications of all applicable regulatory and accrediting agencies. [e.g., DCGI, NABH, AABB].
- The patient / blood donor privacy and data security requirements, including the use of Institutional Review Board (IRB) protocols for conducting clinical, for conducting stem cell research- ICSCRT (Institutional Committee for Stem Cell Research and Treatment).
- Training, certification, licensing, and competency assessment standards for transfusion laboratory professionals, including medical laboratory technicians.
- The importance of a comprehensive transfusion laboratory safety policy and Programme
- How SOPs are used, developed, authored, and reviewed and their importance in mandatory laboratory inspection by various accrediting agencies.
- Development of quality manual.
- The role of quality assurance, quality management, and process improvement principles in laboratory operation and planning.
- The role of risk management in the transfusion laboratory and become familiar with the nature of, patient safety initiatives, and forensic testing such as paternity testing.
- Demonstrate understanding of the elements of current good manufacturing practices as they apply to the collection, processing, and storage of all blood components / products

- The principles & objectives of total quality management in transfusion service including premises, personnel, instruments / reagents, biosafety and external / internal quality control.
- Operational aspects: The importance of EQAS in blood transfusion services.
- The principles and objectives of equipment management including specification, equipment selection, installation, calibration/standardization / validation, and preventive maintenance.
- The fundamental concepts of medical statistics. Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies e.g., correlation coefficients, expected versus observed, etc. And their interpretation.
- Principles of specimen collection (e.g., phlebotomy technique, safety, and specimen tubes) and specimen processing and traceability
- Demonstrate understanding of knowledge of error management in blood bank including root cause analysis and CAPA.
- Demonstrate knowledge of various records and their maintenance as per regulatory requirements.

**B. Affective Domain**

At the end of the course, the student will be able to:

**I. Basic Sciences (Immunology, Medical Genetics, Hemostasis & Physiology of Formed Elements of blood)**

- Demonstrate honesty and integrity in all interactions.
- Demonstrate responsibility and trustworthiness in the execution of all duties.
- Demonstrate the ability to accept criticism and to understand the limitations of one's own knowledge and skills.
- Demonstrate a commitment to excellence and ongoing professional development
- Demonstrate professionalism in taking a bleeding history from a patient.

**II. Blood Collection/Blood Center/Component Processing**

a. Function as a part of a team that is essential for the selection and management of a blood donor. She/He should therefore develop an attitude of cooperation with colleagues so necessary for this purpose. It is implied that she/he will, whenever necessary, interact with the blood donor, patient, clinician and other colleagues to provide the best possible blood transfusion support, diagnosis or opinion.

b. Demonstrate compassion and sensitivity in the care of patients and respect for their privacy and dignity.

c. Show respect for donor / patient autonomy.

d. Demonstrate professionalism during blood donor selection, counseling and notification.

e. Always adopt ethical principles and maintain proper etiquette in her/his dealings with blood donors, outdoor camp organizers and other health personnel.

f. Obtain informed consent from donor.

g. Respect the rights of the blood donor including the right to information and maintaining confidentiality.

h. Develop communication skills not only to word reports and professional opinions but also to interact with blood donors, outdoor camp organizers, peers and paramedical staff.

i. Always adopt principles of laboratory / personnel safety and respect documentation required as per law.

**III. Transfusion transmitted infection**

- Respect the rights of the sero-positive blood donor including confidentiality, right to information.
- Adopt ethical principles and maintain proper documentation while interacting with other inter related labs such as ICTCs, counselor, state AIDS Control Societies etc.
- Follow all safety policies and adhere to the department's laboratory safety plan and personal hygiene plan.

**IV. Immunohematology / Blood Group Serology / Compatibility testing**

- Interact with clinical colleagues in professional manner to provide best possible transfusion support and opinion in immunohematological problems.
- Demonstrate improvement in the affective traits of organizational skills, work habits, attitude, interpersonal skills, and problem-solving ability.
- Maintain a clean and orderly work area.

**V. Clinical Transfusion Service**

- Function as a part of a team that is essential for the diagnosis and management of a patient. She/he should therefore develop an attitude of cooperation with colleagues so necessary for this purpose.
- Interact with clinical colleagues in professional manner to provide best possible transfusion support and opinion.
- Demonstrate improvement in the affective traits of organizational skills, work habits,attitude, interpersonal skills, and problem-solving ability.
- Maintain a clean and orderly work area.
- Accept constructive criticism as a learning process. Utilize constructive criticism to correct deficiencies and improve performance.

- Demonstrate inquisitiveness by asking necessary questions concerning practical performance or theoretical application of laboratory procedures

**VI. Therapeutic Apheresis, Therapeutic Plasma Exchange and Cytapheresis**

- Communicate effectively with clinicians and patients regarding emergent or scheduled therapeutic apheresis procedures through conversations and writing of consult notes

**C. Psychomotor Domain**

At the end of the course, the student will be able to:

- Demonstrate competency in performing & interpretation of various methods of hemoglobin estimation and complete hemogram.
- Demonstrate competency in preparation and interpretation of peripheral blood smear in health and disease conditions – inclusive of but not limited to:
  - o Nutritional (Iron deficiency/Vit B12 and Folic acid deficiency) anemia
  - o Hemolytic anemia (Immune , Sickle Cell, Thalassemia, Microangiopathic)
  - o Thrombocytopenia
  - o Acute leukemia
  - o Chronic leukemia
  - o Hemoparasites
  - o Myelodydpastic syndromes
  - o Myeloproliferative disorders
- Demonstrate competency in performing and interpretation of laboratory tests in coagulation and thrombosis such as prothrombin time, activated partial thromboplastin time (APTT), fibrinogen, thrombin time, platelet function testing, mixing tests, factor assays, investigations in DIC etc.
- Demonstrate competency in interpretation of Hb electrophoresis/HPLC
- Demonstrate proficiency in performing and interpreting various laboratory immunological tests pertaining to transfusion science such as
  - o isolation of T & B lymphocytes
  - o immunoelectrophoresis
  - o flow cytometry
  - o CD4 / CD8 counts
- Demonstrate proficiency in HLA typing techniques, including serological methods, micro-cytotoxicity assays, nucleic acid assays and lymphocyte culture.
- Conversant with the steps of a Polymerase Chain Reaction (PCR)and demonstrate competence in the steps and interpretation of Western Blot and Hybridization procedures.

**Blood Collection/Blood Center/Component Processing**

At the end of the course, the student will be able to:

- Compare and contrast the eligibility requirements for allogeneic, autologous & apheresis blood donations.
- Demonstrate proficiency in selection of whole blood donors (minimum 500) and apheresis donors (minimum 25)
- Demonstrate competency in various types of autologous blood collection and their application in clinical transfusion service
- Demonstrate proficiency in collection of whole blood with regard to preparation of phlebotomy site, proper volume and sample collection in minimum 500 donors.
- Demonstrate proficiency in evaluating and managing minimum 25 adverse reactions associated with blood donation/phlebotomy (whole blood and apheresis donations).
- Demonstrate the proficiency in organization of at least 10 outdoor blood donation camps and demonstrate skills to motivate blood donors / organizers.
- Demonstrate knowledge of the indications for therapeutic phlebotomy and demonstrate proficiency in at least 05 cases.
- Demonstrate proficiency in preparation of following components 500 each as per department SOP
  - o Packed red blood cells
  - o Fresh Frozen Plasma
  - o Platelet concentrate
  - o Cryoprecipitate (Minimum 25)
- Demonstrate knowledge of the significance of storage of blood components at appropriate temperature and demonstrate proficiency in compatibility, labeling requirements of various components
- Proficient in donor notification and counseling (Pre- and Post- donation) and the donor look-back process.
- Demonstrate proficiency in various modifications of blood components such as irradiation, cell washing, volume depletion and leuko depletion
- Demonstrate proficiency in performing leuko-filtration in at least 05 blood components
- Demonstrate proficiency in selection of apheresis machine, blood donor and be able to obtain apheresis product meeting quality standards in at least 25 procedures.
- Demonstrate proficiency in performing quality control tests on at least 25 each blood such as PRBC, FFP, Platelets, Cryoprecipitate.

**Transfusion transmitted infection**

At the end of the course, the student will be able to:

- Compare & contrast various methodologies such as ELISA, rapid & chemiluminescence used in screening of transfusion transmitted infections.
- Demonstrate proficiency in performing, interpretation, documentation of at least 500 blood donor screening tests for TTIs as per departmental SOP.
- Demonstrate proficiency in preparation and interpretation of LJ Chart (5 nos.) and root cause analysis (RCA) and Corrective and Preventive action (CAPA) as and when required.
- Perform and be able to interpret non-treponemal and treponemal antibody tests used to diagnose syphilis.
- Demonstrate proficiency in proper handling and disposal of biohazardous material as per regulatory requirements.
- Demonstrate proficiency in the preparation and use of in-house external controls in transfusion transmitted infection screening.
- Demonstrate proficiency in Gram staining in at least 10 samples of biological fluids.

**Immunohematology / Blood Group Serology / Compatibility testing**

At the end of the course, the student will be able to:

- Demonstrate proficiency in preparation of cell suspensions of appropriate concentration following cell washing techniques correctly & grade and interpret antibody-antigen reactions according to the established criteria.
- Demonstrate proficiency in performing ABO/Rh grouping in at least 500 donor / patient samples using department SOP.
- Demonstrate proficiency in performing, interpretation and resolving discrepant results in pre-transfusion testing, ABO/Rh grouping, red cell antibody screen, and antibody identification.
- Compare and contrast conventional cross matching versus type and screen using various advanced technologies. Demonstrate proficiency in performing at least 50 cross matches as per department SOP.
- Differentiate between the direct and indirect antiglobulin tests and identify appropriate uses for each. The student should be able to perform direct and indirect antiglobulin test on appropriate specimens, grading and recording the results appropriately with the use of "check cells".
- Identify sources of error in antiglobulin testing.
- Using a cell panel, perform antibody identification procedures and correctly interpret the results. Identify clinically significant RBC antibodies from an antibody panel including

multiple alloantibodies and mixtures of alloantibodies and autoantibodies; determine how difficult it will be to obtain blood for this patient, and effectively communicate these results to clinicians.

- Demonstrate proficiency in performing & interpretation of various immunohematological tests:
  - o Direct Antiglobulin test (50 tests)
  - o Indirect Antiglobulin test (50 tests)
  - o Red cell antibody detection and identification (25 tests)
  - o Titration of Anti D and Anti A and Anti B (25 tests)
  - o Elution (10 tests)
  - o Adsorption
  - o Minor blood group typing
  - o Saliva Inhibition Test
  - o Resolution of ABO discrepancy
- Demonstrate proficiency in selection of blood unit for a patient with auto immune hemolytic anemia in at least 5 cases.
- Demonstrate proficiency in cryo preservation of reagent red cells in minimum 5 cases.

**Clinical Transfusion Service**

**The student will be able to:**

- Demonstrate proficiency in evaluating and recommending treatment plans for minimum of 10 transfusion reactions.
- Identify irregular antibodies in pregnant patients that are clinically significant and make appropriate recommendations for blood products. Demonstrate proficiency in preparation and transfusion of blood for intrauterine transfusion / exchange transfusion.
- Choose appropriate blood components and derivatives based on a thorough knowledge of the indications for transfusion.
- Demonstrate proficiency in the evaluation and appropriate transfusion therapy of thrombocytopenic patients (both adult and pediatric) including neonatal alloimmune thrombocytopenia.
- Demonstrate proficiency in provision of transfusion support in special patient populations (e.g., hematology/ oncology, pediatrics, thalassemia, hemophilia, transplantation, cardiac surgery and burn/trauma).

- Demonstrate proficiency in the appropriate use of blood components in several clinical conditions such as (inclusive of but not limited to) hemoglobinopathies, hemophilia, autoimmune hemolytic anemia, massive transfusion, obstetric conditions etc.
- Demonstrate familiarity with the appropriate use of highly specialized blood products (e.g., granulocytes, donor lymphocyte infusions, HLA-matched platelets, and coagulation factor concentrates).

- Demonstrate competence in the management of blood inventory and the ability to communicate effectively the hospital's needs to the blood donor recruiters, Triage and screen requests for blood components appropriately during inventory shortages.
- Demonstrate proficiency in evaluating effectiveness of platelet transfusion including patient's with refractoriness to platelet transfusions. Outline the principles of histocompatibility testing and platelet cross-matching and apply this knowledge in selecting appropriate platelet products when indicated.
- Demonstrate competency in providing transfusion and immunohematological support to patients with bone marrow / stem cell transplantation including cryo-preservation of stem cell, quality control and infusion.

**Therapeutic Apheresis, Therapeutic Plasma Exchange and Cytapheresis**

**The student will be able to:**

- Demonstrate proficiency in evaluating and preparing patients for therapeutic apheresis, including discussion with the patient of the risks and benefits associated with apheresis procedures and obtaining informed consent.
- Perform plasma exchange including calculation & type of replacement fluid to be used and monitoring patient for complications and efficacy of the procedure.
- Demonstrate proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis.
- Demonstrate proficiency in the treatment of patients using specialized methods (e.g., photopheresis and immunoadsorption columns).

**Regulatory Skills / Quality Assurance/ Quality Control in blood transfusion**

**The student will be able to:**

- Demonstrate proficiency in preparing at least 05 SOP for the department.
- Demonstrate proper use of instrumentation and computerization in a transfusion laboratory.
- Compare and contrast the various means of performing blood utilization reviews.
- Explain the logistics required in determining appropriate blood inventory for a geographic region and the process of meeting daily, weekly and monthly collection goals.

- Recognize sources of pre-analytical variation and the role of biological variability in laboratory assessment.
- Calculate means, standard deviation and standard error from the given experimental data.
- Demonstrate the proficiency in preparedness for getting accreditation.
- Generate various reports required for the various regulatory authorities.
- Perform root cause analysis in at least 5 cases.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES - PG (MD/M.S)
## M.D. (Emergency Medicine)

**Goals:**

The goals of postgraduate training for M.D. Emergency Medicine students are to train a M.B.B.S. ctor who will be capable and competent to:

- Practice Emergency Medicine with adequate competency and skills with sound knowledge.
- Practice Emergency Medicine in ethical manner, with empathy and due care to the needy.
- Continue to update with the advances regularly.
- Treat his/her team and juniors as learners and share his/her knowledge and skills.
- Be aware of national priorities in health and serve as per need towards achieving the goals of national health policies.

**Objectives:**

The following objectives are laid out to achieve the goals of the course. These objectives are to be achieved by the time the candidate completes the course. The Objectives are considered under the sub headings.

- Knowledge (Cognitive domain)
- Skills (Psycho motor domain)
- Human Values, Ethical practice and Communication abilities (Affect or domain)
- Importance of golden hour and window period etc.

**Knowledge:**

A list of objectives related to knowledge and higher cognitive abilities that are expected to be achieved during the course are given.

At the end of the training, the candidate must be able and competent to:

- Understand and describe etiology, pathophysiology principles of diagnosis and management of common medical , surgical, pediatric emergencies and apply the same knowledge and skills in the management of patients
- Understand, describe and practice effectively the indications and methods for fluid and electrolyte replacement therapy including blood transfusion nutrition.
- Demonstrate understanding of basic sciences relevant to emergency conditions.

- Identify social, economic, environmental and emotional determinants in a given case, and take them into account during planning therapeutic measures, advice regarding the operative or non-operative management of the case and to carry out the management effectively.
- Undertake audit, use information technology tools and carry out research, both basic and clinical, with the intent of generating knowledge &spread it through publications and presentations for the benefit of scientific community and general public.
- Recognize & refer conditions outside the competency level to appropriate expertise.
- Attend, update and upgrade professional skills regularly as required by participating in instructional courses, workshops, CMEs, conferences or training programmes.
- Be a good teacher by inculcating teaching methodology and skills so as to teach students, colleagues and support staff. .
- Use evidence based medicine and effectively &advocate them in decision making.
- Be capable of managing medico-legal aspects of trauma and other non traumatic emergency conditions.
- Be effective team leaders in secondary health care facilities & team member.
- Be capable of organizing and executing effective treatment in mass casualties.
- Develop knowledge of ventilator and its setting in different conditions.

**Skills**

- Be a competent clinician to take proper clinical history, examine the patient, perform essential diagnostic procedures and order relevant tests and interpret them to come to a reasonable diagnosis about the surgical conditions.
- Be a competent emergency physician to perform minor operative procedures. Competent in providing basic and advance life saving support services (BLS & ACLS) in emergencies and manage them, manage poly trauma, acute surgical emergencies including abdominal and thoracic emergencies
- Undertake thorough wound management including various traumatic wounds and burns.
- Mechanical ventilation
- Central venous line, central arterial line etc.

**Human Values, Ethical practice and Communication abilities:**

- Practice emergency medicine ethically and provide care irrespective of other considerations like caste, creed, religion etc. and social status. Should be sensitive and responsiveness towards patients' age, culture, religion, gender and disability etc.
- Be honest and maintain professional integrity, accountability, compassion and respect in all aspects of patient care.
- Be a good communicator who can explain patients in lay terms the outcome, various options of management and obtain true informed consent.
- Be able to respect patients' autonomy, confidentiality, right for information and decision making.

- Understand the limitations of his knowledge and skills and ask for help from experts and colleagues.
- Follow ethical guidelines during research in animals or human subjects.
- Be a motivated leader to bring about best in his team.
- The student should demonstrate a commitment to excellence and continuous professional development.

# Vinayaka Mission's Kirupananda Variyar Medical College & Hospitals, Salem – 636308.

## PROGRAM OUTCOMES

## M.D. (Community Medicine)

### Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Community Medicine is an academic subject, a branch of Medicine which deals with promotion of health and prevention of diseases, involving people's participation, utilizing professional management skills. The Community Medicine specialist, will inculcate a holistic view of health and medical interventions primarily focused on Community Health/Population Health. Thus, he/she should be equipped with the knowledge, skills, competencies in primary, secondary & tertiary care, control and prevention of outbreaks/epidemics, community diagnosis, health needs assessment, epidemiological assessment, research and planning evidence-based health policies and programmes.

The Guidelines for teaching Community Medicine, therefore, should be designed to create a cadre of professionals who are competent to meaningfully contribute their expertise in planning, implementation, co-ordination, monitoring, evaluation of Primary Health Care Programs based on scientific evidence. The competencies must cover a wide spectrum of skills viz., technical, managerial, administrative, organizational skills, applied skills in Health Information Management, software application and soft skills of communication, motivation, decision-making, team building, training in scientific communication and medical writing.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject- content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

## *SUBJECT SPECIFIC OBJECTIVES*

1. To create a skilled cadre of medical professionals having expertise in application of principles of Public Health, Community Medicine and applied epidemiology, contributing meaningfully in formulating National Health Policies & Programmes with a systems approach for overall human development.
2. To standardize the teaching & training approaches at post- graduate level, for Community Medicine
3. Research: To formulate research questions, do literature search, conduct study with an appropriate study design and study tool; conduct data collection and management, data analysis and report.

### *SUBJECT SPECIFIC COMPETENCIES*

**At the end of the course the student should be able to acquire the following competencies under the three domains, Cognitive, Affective and Psychomotor:**

### A. Cognitive domain (The student should be able to:)

1. Describe conceptual (and applied) understanding of Public Health, Community Medicine, clinical and disease-oriented approach, preventive approach & health promotion, disease control & promotion.
2. Have knowledge about communicable and non-communicable diseases, emerging and re- emerging diseases, their epidemiology, control and prevention.
3. Apply the principles of epidemiology, health research and Bio-statistics, application of qualitative research methods
4. Calculate Odds Ratio, Relative Risk, Attributable risk and other relevant health and morbidity indicators.
5. To describe nutritional problems of the country, role of nutrition in health and disease and to describe common nutritional disorders
6. Develop nutrition plan for an individual based on his requirements and with concerns to special situations if applicable
7. Plan comprehensive programme to address issue of malnutrition in a given area for a specific group
8. To describe the concept of Environmental Health and its various determinants.
9. Identify environmental health issues in a given area/community
10. Assess impact of adverse environmental conditions on health of human beings

11. Plan awareness programmes at various levels on environmental issues and mobilize community resources and participation to safeguard from local adverse environmental conditions
12. Should be able to provide technical advice for water purification, chlorination, installing gobar gas plant, construction of soakage pits etc.
13. Be a technical expert to advice on protection measures from adverse environmental exposure
14. To describe the working of Primary Health Care system, Panchayat Raj system, National Health Programmes, urban/rural differences, RCH, Demography and Family Welfare.
15. Do orientation of the inter-linkage of health sector and non-health sector for promotion of Health & control and prevention of diseases.
16. Have familiarity with administrative procedures and protocols
17. Have knowledge about role of media and its use in health.
18. Have knowledge of Health Care Administration, Health Management and Public Health Leadership
19. To describe Health Policy planning, Medical Education technology, Information Technology and integration of alternative Health system including AYUSH.
20. To describe the intricacies of Social & Behavioral sciences and their applications.
21. To describe Public Health Legislations
22. To understand and describe International Health & Global Diseases surveillance.
23. To relate the history of symptoms with specific occupation, diagnostic criteria, preventive measures, identification of various hazards in a specific occupational environment and legislations.
24. To keep abreast of recent advances in Public Health & formulate feasible, optimal, sustainable, cost effective strategies in response to the advances in public health & development.
25. To describe the principles of Health Economics and apply it in various public health settings.
26. To explain and correlate common health problems (medical, social, environmental, economic, psychological) of urban slum dwellers, organization of health services in urban slum areas
27. Develop workable interventions for control and prevention of emerging and re-emerging diseases at local, national and global level.
28. Identify behavior pattern of individual or group of individuals detrimental or adversely affecting their health
29. Define and identify vulnerable, under-privileged high risk communities and their special needs

30. To create awareness about various public health laws
31. Evaluate cost effectiveness and cost benefits of a Health Program
32. Understand and express implications of 'Poverty Line', 'Social Inclusion', 'Equity', 'taxations', 'Insurance' on Health care management.
33. To categorize hospital waste and be able to guide for proper disposal.
34. To provide a comprehensive plan for disaster management and mitigation of sufferings.

## B. Affective domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## C. Psychomotor domain: ((The student should be able to:)

**The student should be able to perform independently the following :**

- Conduct community surveys for assessment of health & morbidity profile, epidemiological determinants, assessment of health needs, disease surveillance, evaluation of health programmes and community diagnosis
- Conduct epidemic investigations, spot maps, predict disease trends, preparation of reports, planning and implementation of control measures
- Demonstrate clinical skills of preparing case history, examination, provisional diagnosis, treatment and clinical case management and interpretation of laboratory findings. Conduct common procedures such as incision, drainage, dressings & injections.
- Do data collection, compilation, tabular and graphical presentation, analysis and interpretation, applying appropriate statistical tests, using computer-based software application for validation of findings
- Conduct epidemiological research studies to establish cause-effect relationships in elaborating the epidemiology of diseases and health events
- Develop appropriate IEC Material, assessment of community communication needs, training skills, counseling skills, conduct Health Education Programmes in urban and rural settings

- Conduct dietary surveys, assessment of nutritional status, nutritive values of common food menus, detection of food adulterants, use of lactometer, recording and interpretation of growth and development charts.
- Use and apply various instruments and processes concerned with environmental health and biological waste management eg. waste collection, segregation and disposal as per protocols, needle-disposers, disinfection procedures. Also use of Dosi-meters, Kata / Globe Thermometer, Slings Psychrometer, Gobar Gas Plant, Soakage pit, Solar Energy, functioning of ILRs, Deep Freezers, Cold Boxes, Vaccine Carriers.
- identify different types of mosquitoes, detect vector breeding places and orientation of the methods of elimination of breeding places and placement of a mosquito-proof water tank.
- Conduct clinical screening of various diseases and organize community health camps involving community participation in urban and rural settings. Use of Snellen charts for vision, Ischiara's chart for colour blindness, tourniquet tests for dengue diagnosis in fever, BMI and other physical measurements of infants, children and adults etc., copper-T insertions and preparation of pap smear.
- Conduct tests for assessment of chlorine demand of water (Horrock's Apparatus), procedure of well-water and urban water-tank chlorination, assessment of chlorination levels, physical examination of water, methods domestic water purification, oriented in use of water filters.
- Prepare health project proposals with budgeting based on the project objectives.

**Miscellaneous skills: (The student should be able to)**

1. Devise appropriate health education messages for public health awareness using various health communications strategies.
2. Identify family level and community level interventions and facilitate the implementation of the same e.g. food hygiene, food storage, cooking demonstrations, community kitchen, kitchen garden, empowerment of women for promoting nutritional health etc.
3. Demonstrate counselling skills for family planning services.
4. Plan and execute BCC strategy for individuals.
5. Conduct measurement of occupational exposure to harmful influences.
6. Diagnose occupational hazards and undertake surveys to identify occupational exposures as and when necessary.
7. Elicit appropriate response at individual and community level to prevent occupational hazards including IEC activities at different levels.
8. Use modern IT applications especially internet & internet-based applications.