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1. Introduction

Medical education is a continuum from Undergraduate through internship to Postgraduate Medical Training, which is further divided into two stages: basic and higher professional training. Medical science is complex and evolving; therefore, continued update, review and re-education are mandatory in the Medical Profession. In fact, self-learning aided by Continued Medical Education (CME) programs should continue throughout the career of a medical practitioner and re-training is desirable.

Bangabandhu Sheikh Mujib Medical University (BSMMU) has recently introduced a structured competency based residency program in different specialties. For Surgical specialties, the Phase A training program, which lasts for two years, aims at a broad-based training in basic principles of surgery. The faculty of surgery of BSMMU consists of different disciplines of surgery with specialty and subspecialty. Of them, seven disciplines have introduced a common curriculum for Phase-A residency programme. These are General Surgery, Pediatric Surgery, Urology, Orthopedics, Neurosurgery, Cardiac surgery, and Otorhinolaryngology.

The University plays a vital role in promoting research activities in various disciplines. This structured training programme is aimed at producing competent and skilled professionals in surgical practice in our perspective maintaining an international standard.

2. Objectives

2.1. General Educational Objectives

a. Medical expert

- The main focus of a resident in training for Surgery is to develop himself/herself as a medical expert as such he or she must strive at developing a broad based knowledge in General Surgery. The resident will progressively acquire in

depth knowledge in more and more areas of the specialty during his/her training.

- The resident will also develop and sharpen clinical examination skills with excellent diagnostic and therapeutic judgment.
- The resident will acquire and sharpen his/her procedural and surgical skills in all surgical areas throughout his/her training.
- Throughout his/her training the resident will demonstrate continuous progress in management of medical and surgical emergencies as it relates to Surgery.
- The resident will develop and sharpen his/her consultation skills and consistently be able to analyze and integrate relevant information and be able to formulate proper diagnosis and implement the appropriate therapy. He/she will show ability to communicate the recommendations with colleagues effectively and clearly.

b. Health advocate

The resident will show ability in recognizing socio-economic, environmental and psychological factors involved in the health and well being of patients. He/she will demonstrate and develop knowledge and proper utilization of available resources and to strive to act as advocates for patient health when appropriate.

c. Communicator

The resident will learn throughout his/her training to communicate effectively with patients and their families. He/she will also demonstrate progress in communicating clearly and effectively in both verbal and written forms with other physicians and other health care professionals.

d. Collaborator

The resident will demonstrate a growing understanding of the

roles of other physicians from various disciplines as well as other health care professionals in patient care. He/she will develop and improve ability to collaborate with patients, their families and other caregivers in order to provide adequate patient care.

e. Manager

- The resident will develop and improve knowledge in operating health care facilities both in hospital and private setting. He/she will continue to develop managerial skills in dealing with employees and other co-workers in various health care settings.
- He/she will demonstrate and improve on leadership skills including the ability to work effectively within the patient care team.
- The resident will demonstrate appropriate resource utilization. He/she will continuously strive to maintain balance between patient care and academic need and other personal activities.

f. Scholar

- The resident will acquire skills in research activities in the allied fields so as to ensure ongoing basic and clinical research as well as quality assurance as it relates to the practice of Surgery.
- He/she will also develop and improve teaching and supervisory skills throughout his/her training. This includes patient teaching as well as involvement in student and peer teaching.
- He/she will demonstrate and improve independent learning abilities in order to maintain and advance professional development.
- He/she will develop and improve critical appraisal skills and show the ability to interpret and assess the validity of scientific data.

g. Health Professional

- The resident will be able to demonstrate the highest standard in clinical care and ethical conduct. He/she will show an understanding and adherence to ethical and legal codes of clinical practice in such areas as confidentiality and informed consent.
- He/she will demonstrate integrity, honesty and good surgical practice.
- He/she will be a professional in offering health care irrespective of gender, racial and cultural issues.

2.2 Objectives of Phase A curriculum

1. To provide a broad experience in General surgery including its interrelationship with other disciplines and sub-specialties.
2. To enhance medical knowledge, clinical skills, and competence in bedside diagnostic and therapeutic procedures including minor interventions.
3. To achieve technical proficiency and surgical skills through supervised exposure in the operating room
4. To achieve the professional requirements for specialty-specific training (Phase B).
5. To cultivate the correct professional attitude and enhance communication skill towards patients, their families and other healthcare professionals.
6. To enhance sensitivity and responsiveness to community needs and the economics of health care delivery.
7. To enhance critical thinking, self-learning, and interest in research and development of patient-care service.
8. To cultivate the practice of evidence-based medicine and critical appraisal skills.
9. To inculcate a commitment to continuous medical education and professional development.

3. Admission Requirements:

Medical graduates with successful completion of internship and with full registration with the BMDC are eligible for the competitive admission test.

A. Pre-requisites for admission in Phase-A

- a) MBBS or equivalent degree as recognized by BMDC
- b) One year of internship / in-service training
- c) Completion of one year after internship / in-service training
- d) BMDC registration

B. The applicants should not be above 45 years of age on enrolment.

Candidates for residency have to sit for a written MCQ-type admission test on Basic Medical Sciences and Faculty-based topics.

4. Phase A (Core surgical) Training:

The two-year core surgical training provides foundation training in General Surgery, which includes components of educational (academic) and training programme on principles of surgery and relevant topics of applied medical sciences. This training programme will focus on developing core knowledge and skills, providing a foundation for consolidation and further study within advanced specialty-specific training. The two years period is divided into 8 blocks; each block consists of 3 months. Residents shall be on rotation in different disciplines being directed by course director or course coordinator.

4.1. Expected outcomes at the completion of Phase-A Training Programme:

At the completion of phase-training, it is expected that a Resident will have:

- a) A comprehensive knowledge and skills acquired during undergraduate teaching and training.
- b) Gained experience in, and had the opportunity to develop and demonstrate competency in, a comprehensive range of "core" generic and discipline-specific knowledge, skill and attitudes.
- c) Gained a background knowledge and understanding of the full range of discipline areas which will facilitate cross referral/multi-specialty teamwork etc.
- d) Acquired the skills to be able to work within, and fully utilize, multidisciplinary team-based approaches to assessment, management and care of their patients.
- e) Implemented their future career-planning and decision making processes based on a more informed level of knowledge and understanding.

4.2. Structure of training:

- i) The core programme consists of two years of supervised training with formative assessment and feedback.
- ii) The residents should have at least one year of training in units dealing with general surgical problems, of which at least six months should be spent in a unit dealing with a comprehensive range of surgical emergencies. They would also have to attend specialty services in parallel with duties in general surgery.
- iii) Residents should acquire competence through supervised performance of the required numbers of diagnostic and therapeutic procedures during their Phase A training.
- iv) Resident should attend the courses, workshops, seminar, symposium with active participation as per curriculum requirements.

5. Domains of Learning

5.1 Knowledge:

- i) Aetiology, clinical manifestations, disease course and prognosis, investigations and management of common surgical problems.

- ii) Scientific basis and recent advances in pathophysiology, diagnosis and management of surgical conditions.
- iii) Spectrum of clinical manifestations and interaction of multiple medical diseases in the same patient,
- iv) Psychological and social aspect of medical illness,
- v) Cost-effective use and interpretation of investigations and special diagnostic procedures,
- vi) Critical analysis of the efficacy, cost-effectiveness and cost-utility of treatment modalities.
- vii) Patient safety and risk management,
- viii) Medical audit and quality assurance,
- ix) Surgical ethics and medico legal issues related diagnostic and therapeutic interventions.

5.2 Skills:

- i) Ability to take detailed history, gather relevant data from patients, and assimilate the information to develop diagnostic and management plans,
- ii) Competence in eliciting abnormal physical signs and interpreting their significance,
- iii) Ability to relate clinical abnormalities with pathophysiologic states and diagnosis of diseases,
- iv) Ability to select appropriate investigation and diagnostic procedures for confirmation of diagnosis and patient management,
- v) Skills in performing important bedside diagnostic and therapeutic procedures and understanding of their indications. Residents should acquire competence through supervised performance of the required number of procedures during the 2-year training period and will have to record them in the log book.

- vi) Ability to present clinical problems and literature review in grand rounds, journal club and seminars,
- vii) Good communication skill and interpersonal relationship with patients, families, medical colleagues, nursing and allied health professionals,
- viii) Ability to mobilize appropriate resources for management of patients at different stages of medical illness, including critical care, consultation of medical specialties and other disciplines, ambulatory and rehabilitative services, and community resources.

5.3 Attitudes:

- i) Well-being and restoration of health of patients must be the prime consideration.
- ii) Empathy and good rapport with patient and relative are essential attributes.
- iii) An aspiration to be the team-leader in total patient care involving nursing and allied healthcare professionals should be developed.
- iv) The cost-effectiveness of various investigations and treatments in patient care should be recognized.
- v) The privacy and confidentiality of patients and the sanctity of life must be respected.

6. Teaching - Learning methods

For trainees to maximize their learning opportunities it is important that they work in a good environment. This includes encouragement for self-directed learning as well as recognizing the learning potential in all aspects of day to day work. The bulk of learning occurs as a result of clinical experiences (experimental learning, on-the-job learning) and self-directed study. The degree of self-directed learning will increase as trainees become more experienced. Teaching and learning occurs using several methods

that range from formal didactic lectures to planned clinical experiences. Aspects covered will include knowledge, skills and practice relevant to General Surgery in order to achieve specific learning outcomes and competencies. The theoretical part of the curriculum presents the current body of knowledge necessary for practice as a general surgeon. In this programme this will be imparted using lectures, grand teaching round, clinico-pathological meetings, morbidity/mortality review meetings, literature reviews and presentations, journal clubs, self-directed learning, conferences and seminars.

6.1. Training Rotation

Residents will undergo training in different disciplines on rotation during first 21 months and the last 3 months would be allocated for eligibility assessment and preparation for phase A final examination. Phase-A rotation will be as follows

6.2. Learning medium: English

6.3. Educational Strategies:

- Problem oriented learning
- Student centered
- Patient centered
- Learning at OPD and at indoor segment
- Community based
- Community oriented

6.4. Academic activities

- Case presentation
- Seminar
- Journal clubs
- Surgical audit session
- Tutorials

6.5. Expectations from the residents on general surgery rotation:

- At the end of the training program, the residents will be able to learn to
 - Take history properly
 - Examine the patient methodically
 - Enter the information correctly in the history sheet
 - Critically analyze the case correlating relevant and pertinent informations
 - Formulate a clinical diagnosis and differential diagnoses
 - Know formulating first line and second line investigations
 - Interpret the investigations and laboratory reports
 - Apply practical and working knowledge to interpret the investigations done in a patient for diagnosis
 - Manage common surgical problems
 - Initiate management in all emergency surgical problems.
 - Know to diagnose and manage patients coming with multiple medical problems/diagnoses
 - know when to refer, how to refer and whom to refer
 - The residents will be assigned with the particular job for admitted patient as per distribution and will have to present the case during ward round or case discussion schedule.
 - They will attend outpatient clinic and shall have shifting duties as assigned by the department/units
 - They will attend lecture classes, tutorials, journal clubs, grand round, clinical meeting and other departmental academic and training activities
 - During the rotation in general surgery, they will have to perform predetermined number of the procedures as mentioned in the logbook

6.6. Expectations from the residents on specific rotation

- At the end of the training program in a specific rotation, the residents will be competent enough to carry out diagnostic work-up and day-to-day management of the common problems encountered in the respective specialty
- They will attend outpatient clinic, specialty clinics, evening, night or other duties as assigned by the department/units
- They will attend lecture classes, tutorials, journal clubs, grand round, clinical meeting and other departmental academic and training activities
- They will have practical and working knowledge and be able to interpret the investigations necessary for diagnosis of disease relevant to the specialty
- During the rotation in a specific specialty they will perform the relevant procedures as quantified in the logbook

7. Record Keeping

The evidence requires confirming progress through training includes:

- i) Details of the training rotations, weekly timetable and duty rosters, case-mixes and numbers of practical procedures and outcomes.
- ii) Confirmation of attendance at events in the educational programme, at departmental and interdepartmental meetings and other (optional) educational events.
- iii) Confirmation (certificates) of attendance at subject-based/skills-training/instructional courses.
- iv) Recorded attendance at conference and meetings.
- v) A properly completed logbook with entries capable of testifying to the training objectives which have been attained and the level of performance achieved.
- vi) Continued medical education activity.
- vii) Supervisor's reports on observed performance in the workplace.

7.1. Logbook:

Residents are required to maintain a log book in which entries of academic/professional work done during the period of training should be made on a daily basis, and signed by the supervisor. Completed and duly certified logbook will form a part of the application for appearing in phase final examinations.

7.2. Portfolio:

This is a collection of evidence documenting trainee's learning and achievements during their training. The trainee takes responsibilities for the portfolio's creation and maintenance. It will form the basis of assessment of progression.

8. Assessment

The assessment method is comprehensive, integrated and phase-centered attempting to identify attributes expected of specialists for independent practice and lifelong learning and covers cognitive, psychomotor and affective domains. It keeps strict reference to the components, the contents, the competencies and the criteria laid down in the curriculum.

8.1 Principles of assessment

1. Assessment process will reflect the aim and objectives of the curriculum
2. There will be provision for external assessors for quality assurance.
3. The assessment methods will be reliable and valid. A wide range of assessment methods will be adopted which will include:
 - a) Written: Short answer questions (SAQs).
 - b) structured clinical assessment (SCA)
 - c) clinical examination
4. Assessment will be both formative and summative.
5. Assessment will emphasize: i) Recall of knowledge. ii) Critical thinking and problem solving / analysis/synthesis or evaluation. iii) Skill including transferable skill such as communication skill

8.2. Assessment Methods

The assessment method will be comprehensive, integrated and phase-centered attempting to identify attributes expected of specialists for independent practice and lifelong learning and covers cognitive, psychomotor and affective domains. It keeps strict reference to the components, the contents, the competencies and the criteria laid down in the curriculum. Assessment includes both Formative Assessment and Summative (Phase final) Examinations.

8.3. Formative Assessment:

Formative assessment will be conducted throughout the training. It will be carried out for tracking the progress of residents, providing feedback, and preparing them for final assessment (Phase completion exams).

There will be continuous (day-to-day) and periodic type of formative assessment.

- **Continuous (day-to-day) formative assessment** in classroom and workplace settings provides guide to a resident's learning and a faculty's teaching / learning strategies to ensure formative lesson / training outcomes.
- **Periodic formative assessment** is quasi-formal and is directed to assessing the outcome of a block placement or academic module completion. It is held at the end of Block Placement and Academic Module completion. The contents of such examinations include Block Units of the Training Curriculum and Academic Module Units of the Academic Curriculum.
 - **End of Block Assessment (EBA):** End of Block Assessment (EBA) is a Periodic Formative Assessment and is undertaken after completion of each training block, assessing knowledge, skills and attitude of the residents. Components of EBA are written examination, Structured Clinical Assessment (SCA), medical record review, logbook review and portfolio assessment. Incomplete block training must be satisfactorily completed by undergoing further training for the block to be eligible for appearing in the next phase completion examination.

8.4. Summative (Phase A Final) Examination:

Phase A Final examination will be common for Surgery and Allied and will have following components:

- Written examination (SAQ/SEQ)
- Clinical examination:
 - Long case (1)
 - Short cases (4)
 - Structured Clinical Assessment (SCA – 10)

End Block Examination Sheet

Category of assessment	Assessment scale (score / grade)	Score/ grade achieved
Written examination	Total marks 50	
Clinical examination	Total marks 100	
Medical record review	Satisfactory: 80-100 % satisfactorily completed Unsatisfactory: <80% satisfactorily completed	
Log book assessment	Complete: 80-100% of the task were satisfactorily completed Recoverable: 60-79 % of the task were satisfactorily completed Irrecoverable: <60% of the task were satisfactorily completed	
Portfolio assessment	Up to date : 80-100% completed and satisfactory Deficient: <80% completed and satisfactory	
Resident work-based Competence assessment: a) Clinical competency b) Communication skill c) Scholarship d) Professionalism	Average Rating scale 1 to 10	

9. Supervision and training monitoring

The training will incorporate the principle of gradually increasing responsibility, and provide each trainee with a sufficient scope, volume and variety of experience in a range of settings that includes inpatients, outpatients, emergency and intensive care. All elements of work in training rotation will be supervised with the level of supervision varying depending on the experience of the resident and the clinical exposure. Outpatient and referral supervision must routinely include the opportunity to personally discuss all cases. As training progresses the resident should have the opportunity for increasing autonomy, consistent with safe and effective care for the patient. Residents will at all times have a supervisor, responsible for overseeing their education and training.

Supervisors are responsible for supervision of learning throughout the program to ensure patient safety, service delivery as well as the progress of the resident with learning and performance. They set the lesson plans based on the curriculum, undertake appraisal, review progress against the curriculum, give feedback on both formative and summative assessments, and ensures proper recording of the and signing the logbook. The residents are made aware of their limitations and are encouraged to seek advice receive help at all times.

The course coordinator of each department coordinates all training and academic activities of the program in collaboration with the course manager(s). The course director of each faculty directs, guides and manages curricular activities under his/her jurisdiction and is the person to be reported to for all events and performances of the residents and the supervisors

10. Curriculum implementation, Review and Updating:

Both supervisors and residents are expected to have a good knowledge of the curriculum and should use it as a guide for their training programme. Since surgical practice is rapidly changing because of the development of newer concepts and technologies the need for review and up-dating of curricula is evident. The curriculum is specifically designed to guide an educational process and will continue to be the subject of active redrafting, to reflect changes in both Medicine and educational theory and practice. Residents and supervisors are encouraged to discuss the curriculum and to feedback on content and issue regarding implementation with the course director, review will be time tabled to occur annually for any minor changes to the curriculum.

11. Syllabus

The aim of the syllabus for phase-A training is to guide the residents to acquire broad based knowledge on surgery before entering the phase B specialty-specific training. Patients present themselves with problems and it is the problem that needs solving. A specialist who has broad based knowledge of surgery will be able to solve the problem in a better way. So the ultimate objective of phase A training is to produce a knowledgeable, competent, altruistic specialist with up to date background knowledge of surgery. Emphasis has been laid on common diseases frequently encountered in this part of the world. By the end of Phase A training (core surgical training), the resident should be able to:

- a) Assess presenting symptoms and signs
- b) Formulate appropriate investigations and accurately interpret investigation reports
- c) Communicate the diagnosis and prognosis

- d) Institute appropriate treatment recognizing indications, contraindications and side effects of clinical conditions
- e) Select the patient properly for surgery; prepare the patient for surgery appropriately.
- f) Provide optimum perioperative care
- g) Understand the follow up program of a surgical disease

On this background, it is expected that residents will be able

- i. to acquire knowledge on common surgical problems, emergency conditions, and rehabilitation.
- ii. to acquire skill (diagnostic, clinical and decision making)
- iii. to develop attitude (caring, learning, and ethical)

11.1. Learning objectives:

a. Clinical skill:

- i) Elicit the history and obtain other relevant data.
- ii) Conduct an appropriate physical examination.
- iii) Synthesis findings from history and physical examination to develop a differential diagnosis, identify problems, make problem list and formulate management plan.
- iv) Plan and arrange investigation appropriately.

b. Patient care and therapeutics

1. Provide optimum care for the patient
2. Prescribe appropriate and safe pharmacotherapy
3. Incorporate health and wellness promotion in clinical practice
4. Manage patients with surgical problems
5. Facilitate ongoing care planning

c. Procedural skills

1. Prepare patients for procedure/surgery,
2. Competently perform procedures/surgery ,
3. Provide care following procedure

d. Management of acute surgical problems

1. Recognize and manage the critically ill patient,
2. Manage specific acute surgical problems
3. Communicate with patients and their families in an emergency situation

e. Management of patients with undifferentiated presentations

1. Manage patients with undifferentiated presentations (eg, Abdominal pain, haematuria, etc)

f. Management of patients with common disorders of organs

1. Disorders of the gastrointestinal system
2. Endocrine and metabolic disorders
3. Disorders of the musculoskeletal system
4. Disorders of the genito-urinary system
5. Disorders of the neurological system
6. Disorders of the cardiovascular system

g. Management of patients with defined disease processes

1. neoplastic diseases
2. genetic disorders
2. infectious diseases
3. electrolytes and acid base disorders

h. Management of patients with surgical problems throughout the lifespan

1. Common problems in adolescents
2. Common problems in pregnancy
3. Common problems associated with the menopause
4. Problems in the older patient
5. Patients at the end of life

11.2. Outline of core syllabus

Core syllabus in which the resident should acquire good knowledge, clinical competence including appropriate technical abilities is outlined below.

12. A. Basic science.

Anatomy

a) Cell Biology

1. Structural details of cell with functional implication.
2. Cell division and its anomalies.

b) General Anatomy:

Anatomy of skin, Anterior abdominal wall with inguinal canal, Posterior abdominal wall including nerve plexus, Pelvis – floor & wall, Peritoneum & intra-abdominal spaces, Esophagus, stomach, Small & large intestine, Rectum and anal canal, Liver, gall bladder, bile ducts, Pancreas, Spleen, Kidney, Ureter, Adrenal glands, Rectum, anal canal, ischio-rectal fossa, Bladder, prostate, seminal vesicles, External genitalia, Uterus, uterine tubes, ovaries & vagina, Breast, Thyroid Gland, Parathyroid & Adrenal Gland, Vascular System, Lymphatic System, Autonomic Nervous System

c) Relevant aspects of developmental anatomy:

i) Embryogenesis, ii) Development of organs in embryonic period, iii) describe the development of cardiovascular, respiratory, genitourinary, gastrointestinal and nervous systems, iv) describe the developmental anomalies of vascular, respiratory, genitourinary, gastrointestinal and nervous system.

d) Basic genetics:

Describe the chromosomes, Understand the protein synthesis.

e) Relevant general histology:

i) classify tissue. ii) describe the general features of epithelial, connective, adipose, muscular and the nervous tissue. iii) describe the microscopic features of blood and lymphatic vessels. iv) describe the microscopic features of liver, pancreas, biliary tract, GI tract, heart, lung, lymphoid organs, and kidney.

Physiology**General Physiology:**

i) Functions of different parts of a cell, ii) Synthesis and functions of cytokines, iii) Synthesis and functions of growth factors.

Blood:

i) Blood groups, blood transfusion, Rh incompatibility ii) Anemia-definition, classification, jaundice, iron metabolism iii) Immunity-definition, classification, T & B lymphocytes, Immunoglobulins

Alimentary system:

i) Saliva, mechanism of deglutition, physiological apnea. ii) Stomach, gastric juice, hydrochloric acid, receptors, receptor blocker, iii) Emptying of stomach, local hormones of the gastrointestinal tract, iii) Bile-composition, functions, liver-functions, liver function tests. iv) Pancreatic juice, composition, functions, bicarbonate & enzymes rich secretion of succus entericus. v) Digestion of carbohydrate, protein, fats, vitamins & water. vi) Absorption of carbohydrate, protein, fats, vitamins & water. vii) Movement of GI tract, defecation reflex, diarrhea, constipation, dietary fibres

Cardiovascular system:

i) Cardiac muscle. Junctional tissues, generation & conduction of cardiac impulse, heart block ii) Cardiac cycle-events, pressure & volume changes, heart sounds iii) Heart rate-its regulation, pulse. ECG, iv) Blood pressure-definition, types, measurement, regulation, hypertension, v) Hemodynamics, cardiac output, venous return, physics of blood flow, peripheral resistance, vi) Coronary circulation-peculiarities, greater & lesser circulation, regional circulation, vii) local blood flow, microcirculation. viii) Blood vessels-physiological classification, ix) innervations, vasoconstrictor & vasodilator agents, shock

Respiratory system:

i) Respiration-internal and external mechanism of breathing, dead space, apnea. ii) Lung volumes & capacities, pulmonary & alveolar ventilations. iii) Composition of air, gaseous exchange, respiratory unit, respiratory membrane. iv) Oxygen carriage, oxy-hemoglobin dissociation curve & factors shifting the curve, Bohr effect v) Carbon dioxide carriage, chloride shift, Haldane effect. vi) Regulation of respiration-nervous & chemical regulation of respiration during exercise. vii) Respiratory insufficiency-hypoxia, cyanosis, asphyxia, acclimatization, O₂ therapy. viii) Respiratory acidosis & alkalosis & its compensation. ix) Respiratory changes during muscular exercise

Renal physiology & Body fluid:

i) Renal blood flow, JG complex, GFR-dynamics & measurement, ii) Renal tubular reabsorption & secretion, iii) Counter current mechanism of kidney. iv) Concept of plasma clearance, osmolal & free water clearance, urea & creatinine clearance. v) Mechanism of acidification of urine. Renal compensatory mechanism of acidosis & alkalosis. vi) Renal function test, composition of normal urine, physiology of micturition vii) Body fluid compartment-values, measurement, water balance, uremia, edema

Endocrine system:

i) Different hormones of body, chemical nature and control of secretion, basic mechanism of action of hormone ii) Hormone of hypothalamus, hypothalamo-hypophysial tract. iii) Anterior & Posterior pituitary glands hormones, Gigantism, acromegaly, dwarfism) Thyroid hormones, hyperthyroidism, hypothyroidism. iv) Parathormone, calcitonin, calcium metabolism, tetany a) Adrenocortical hormones, cushings syndrome, addisons disease, conn's syndrome. v) Endocrine pancreas, insulin, glucagons, diabetes, normal glucose tolerance curve

Reproductive system:

i) Female hormones, chemical nature, functions, control of secretions. **ii)** Regulation of menstruation, ovulation, menarche, menopause. **iii)** Mamogenesis, hormones acting on breast, lactation. **iv)** Physiology of pregnancy, placental hormones, pregnancy test. **v)** Neonatal physiology. **vi)** Testicular hormones, functions, regulation of secretions. **vii)** Puberty, male and female secondary sex characters. **viii)** Spermatogenesis-steps, control, semen. **ix)** Male and female contraception

Nervous system & special senses:

i) Neuron, nerve fibres-its classification, synapses, neurotransmitters, effects of nerve secretion **ii)** Receptors-details, Tracts-details, **iii)** Reflex-definition, classification, properties, arc Cerebral cortex-motor, sensory & intellectual function, CSF, Blood brain barrier, **iv)** Thalamus & hypothalamus-endocrien & vegetative functions, emotion, thirst, hunger, satiety, temperature regulation **v)** Limbic system, emotion (cognition, conation, affection), Autonomic nervous system, reticular formation, sleep & wakefulness, basal ganglia, **vi)** Cerebellum, neural circuit, control of motor activity, cerebellar disorder, muscle tone, **vii)** Refractive media, visual pathway, light reflexes, pathways, accommodation reaction. **viii)** Physiology of hearing, auditory pathway. **ix)** Physiology of smell & taste, modalities of taste

Pharmacology**a) General Pharmacology:**

Classification, mechanism of action, adverse reaction and the basic principle of therapy of a particular drug or a group of drugs. Pharmacodynamics of drugs, routes of drug administration, bioavailability and the factors affecting bioavailability of drugs. Therapeutic index of drugs.

b) Antimicrobial drugs: **i)** principles of prophylactic antibiotic therapy. **ii)** empirical antibiotic therapy. **vi)** role of culture and sensitivity for antibiotic therapy. **vii)** combination of drugs in antibiotic therapy.

c) Chemotherapeutic drugs:

principles of therapy of Cisplatin, Cyclophosphamid, Doxorubicin, Mitomycin, Flurourcil, Methotrexate, Vincristine and Bleomycin

d). Anesthetic agents:

pre-anesthetic medication, muscle relaxants, inhaled general anesthetics, intravenous general anesthetics and local anesthetics.

e). Anti-inflammatory drugs.

i) classify anti-inflammatory drugs, describe the mechanism of action, **ii)** drug interactions, adverse reactions and basic principles of therapy of NSAIDS (Aspirin, Diclofenac, Aceclofenac, Ibuprofen, Indomethacin, and Ketoprofen, **iii)** describe the mechanism of action, drug interactions, adverse reactions and basic principles of therapy of Naproxin. **iv)** describe the mechanism of action, drug interactions, adverse reactions and basic principles of therapy of Piroxicam. **v)** describe the mechanism of action, drug interactions, adverse reactions and basic principles of therapy of Aciaminophen.

f) Opioids:

i) classify Opioids., **ii)** describe the mechanism of action, drug interactions, adverse reactions and principles of therapy of Morphine, Fentanyl, Buprenorphine, Codeine and Pentazocine. **iii)** describe the mechanism of action, drug interactions, adverse reactions and principles of therapy of Opioid antagonists(Naloxone, Naltrexone).

g) Anti-hemorrhagic agents:

i) classify anti-hemorrhagic drugs. ii) describe the mechanism of action, drug interactions, adverse reactions and of principles of therapy of Aminocaproic acid, Tranexamic acid and Protamine Sulphate.

General Pathology

Cellular adaptation, injury, degeneration, apoptosis & necrosis

Inflammation:

a) acute and chronic inflammation -- stimuli, vascular changes, cellular changes. b) mediators of acute inflammation. c) synthesis and mechanism of action of histamine, serotonin, kinins, arachidonic acid metabolites and clotting factors. d) morphological patterns of acute and chronic inflammation (serous, fibrinous, suppurative, ulcer, granuloma). e) Systemic effects of acute and chronic inflammation. f) outcomes of acute and chronic inflammation. g) consequences of deficiency or excess of acute and chronic inflammation.

Cytokines:

i) Effects of cytokines deficiency or excess. ii) clinical use of cytokines..

Growth factors:

i) Effects of growth factors deficiency or excess. ii) clinical use of growth factors.

Wound healing :

i) Stages of wound healing. ii) Factors affecting wound healing.

Complement System:

early and late stages of stimulation of complement system iii) disease conditions related to complement system.

Hemorrhage and hemorrhagic disorders:

i) classification ii) patho-physiology iii) clinical presentations.

Thromboembolism:

Coagulation and types of coagulation, mechanism of extrinsic & intrinsic coagulation, pathogenesis of thrombus formation, coagulation factors & compliments. Hyprcoagulable states. Morphological types of thrombi, fate of thrombus. Consumption coagulopathy, DIC, venous thrombosis. Embolism, different types of embolism, Infarction.

Body fluid, shock and blood transfusion:

Fluid, electrolytes and acid base balance, oedema, dehydration, shock and its classification, body's response to shock, pathogenesis of different types of shock, chemical mediator, multiple organ failure, consumption coagulopathy. (DIC),

Blood transfusion:

Indication, Contraindication, Complication, Blood products and Blood substitutes.

Genetic disorders:

Gene, DNA structure and composition, molecular basis of inheritance.

The genetic code, Gene structure, Gene mutation, mutational basis of inherited disease, Gene mapping techniques.

DNA technology, Problems and pitfalls in the clinical application of DNA Technology.

Tumour. Carcinogenesis. Spread of tumours & tumour immunity:

Cell cycle, Factors affecting growth, Growth factors. cellular biology of cancer

Epidemiology. etiology of neoplasm, role of virus in carcinogenesis, carcinogens, oncogenes, tumour suppressor genes.

Neoplasm, classification of neoplasm, differentiation, rate of growth, mode of spread.

Host defense against cancer (tumour immunity), anti tumour effector mechanism, Immunosurveillance, Immunotherapy, Gene theory of tumor, Biopsy-Histopathology & cytology, Immunohistochemistry.

Microbiology

a) Bacteria: Morphology and structure of bacterial cell, growth requirement, drug resistance in micro-organisms. Classification of gram positive and negative bacteria, pyogenic organisms, Mycobacterium, Clostridia group of organisms. Recombinant DNA technology and their application in medical microbiology. Normal flora of the body. Nosocomial infection. Sterilization and disinfection. Collection, handling, and transport of samples of microbial investigations.

b) Fungus: Dermatophytes. Pathological lesions caused by dermatophytes and Candida.

c) Parasite:

i) parasites. ii) pathological lesions caused by E.histolytica, Giardia, Trichomonas, Leishmania, Malarial parasite, Echinococcus, Ascariasis, hook worm, liver flukes, Trichuris trichura, S. stercoralis, Taenia and by W. bancrofti. iii) Clinical presentations of Malaria and Filariasis.

d) Virus:

i) classification, ii) pathological lesions caused by Hepatitis virus, Polio virus, Rabies virus, Rota virus, measles virus Rubella virus and HIV. iii) viral oncogenesis.

Immunology:

A) General immunology

i) messenger molecules of immune system. **ii)** primary and secondary immune response. **iii)** antigen and antibody. **iv)** mechanism of antibody production. **v)** monoclonal antibodies. **vi)** autoimmune reactions. **vii)** immunoglobulins: a) structure, synthesis and functions of immunoglobulins. b) autoantibodies. c) principles of immune therapy.

B) Hypersensitivity reactions :

a) hypersensitivity reactions. b) different types of hypersensitivity reactions.

Genetics

Principles of human genetics :

i) cell cycle. **ii)** mitosis and meiosis. **iii)** chromosome structure. **iv)** regulation of gene expression. **v)** genetic mutation. **vi)** laws of inheritance. **v)** Mendelian modes of inheritance **vi)** non-Mendelian modes of inheritance. **vii)** genetic diseases. **viii)** chromosome abnormalities. **ix)** phenotypes of common genetic disorders.

Recombinant DNA technology

i) principles of recombinant DNA technology. **ii)** methods of DNA analysis. **iii)** methods of recombinant DNA technology **iv)** applications of recombinant DNA technology .

Genetics and congenital abnormalities

i) birth defects. **li)** genetic causes of malformations. **lii)** genetic basis of vascular anomalies.

Clinical genetics

i) genetic predisposition in vascular disorders. **ii)** prenatal diagnosis of genetic disease. **iii)** population screening for genetic disease and congenital malformations. **iv)** genetic engineering. **v)** gene therapy. **vi)** genetic counseling

Applied immunology

a. Histocompatibility complex: i) structure and function of Histocompatibility Complex. ii) HLA system. iii) conditions related with HLA system.

b. general principles of immunological laboratory techniques

i) precipitation tests. ii) agglutination tests. iii) immunoelectrophoresis. iv) immunofluorescence test. v) ELISA test. vi) complement fixation test.

c. Autoimmunity

i) basic principles of autoimmunity. ii) autoimmune diseases.

d. Transplantation and tumour immunology

i) basic principles of transplantation. ii) basic principles of tumour immunology. iii) immunotherapy for tumours. iv) classify grafts. v) acute phase reaction of transplantation. vi) subacute phase reaction of transplantation. vii) describe late phase reaction of transplantation

Epidemiology and Research methodology**a. Epidemiology**

i) disease monitoring and surveillance systems. ii) screening of a disease. iii) experimental designs.

b. Research methodology

i) problem for the selection of research topic. ii) data collection techniques. iii) writing report on the study effectively. iv) principles of screening and the organization/implementation of screening and audit v) randomized controlled trials and techniques of meta-analysis. vi) involving with the activities of ethical committee for research.

Bio-statistics and Medical Audit**a. Bio-statistics**

i) basic statistics. ii) applications of statistics in medical science. iii) statistical methods. iv) sampling techniques, including sampling bias and sample calculations, population parameters and sampling techniques. v) basic concepts of probability. vi) comparisons of means and variations. vii) statistical tests. viii) significance, confidence interval, Type I error and Type II error. ix) data acquisition, storage, interpretation and statistical analysis; scientific writing and presentational skills including the formulation of a grant application

b. Medical audit

i) clinical audit and feedback. ii) principles of audit in vascular surgery screening programs. iii) involving in the medical audit to assess the progress of the disease process and their management.

Syllabus for outside placement**Department of Radiology**

1. Basic principles of different imaging modalities: a) Plain x-ray b) Contrast x-ray (Barium, gastrographin), c) Ultrasound, d) CT Scan, e) MRI
2. Knowledge about legal requirements in relation to the use of ionizing radiation
3. How to read? And the Introduction of common radiological diagnosis by a) Plain X-ray film, b) Contrast X-ray film c) Ultrasound d) CT scan e) MRI
4. Basic techniques of interventional radiological procedures,
5. Clinical applications of interventional techniques,
6. Potential complications of interventional radiological procedures and strategies for their prevention and treatment

Department of Intensive Care Unit (ICU) & critical care medicine:

- 1) Preliminary knowledge about HDU/ICU, 2) Indications of intubation 3) Indications of extubation 4) Preliminary knowledge about ventilator machine, 5) Indication and placement of CVP line 6) Drawing of arterial blood (femoral/radial) for blood gas analysis 7) Placement arterial line 8) Interpretation of blood gas analysis 8) Management of metabolic acidosis and alkalosis, 9) Management of respiratory acidosis and alkalosis, 10) Management of different electrolytes imbalance, 11) Management of shock, 12) Management of ARDS, 13) Management of SIRS, MODS, MOF

Department of Pathology:

1. How to send a specimen to the department of pathology for histopathology, and cytopathological examinations?
2. Knowledge about frozen section biopsy, FNAC, basic staining method, immunological staining method.
3. Basic knowledge of histopathological character of common surgical specimens (appendicitis, cholelithiasis, carcinoma GB, stomach, liver, pancreas, colon, SCC, BCC, malignant melanoma, thyroid etc)

Department of Nuclear Medicine:

1. Basic knowledge about commonly used radionuclide agent (technetium-99m, different labeled radio-iodine etc), use, advantage, disadvantage, hazards, precautions, principles of storages, disposal etc
2. Basic knowledge and interpretation different nuclear medicine study: a) Radio-iodine uptake scan, b) HIDA Scan, c) SPECT scan, d) MIBI scan.
3. Knowledge about therapeutic option nuclear medicine: a) radio-iodine ablation therapy

13. Basic Principles and techniques of surgery.**1. Basic procedures**

- a) IV canulation
- b) NG tube placement
- c) Urinary catheterization
- d) Wound dressing
- e) Stitch removal
- f) P/R and P/V procedures
- g) Venesection

2. Basic preparatory surgical skill

- a) Hand washing technique
- b) Gloves wearing
- c) Gown & mask-cap wearing
- d) Identification of instruments and suture materials
- e) Preparation of operation field
- f) Draping
- g) Assisting minor to major surgeries
- h) Surgical incisions ,Opening of operative field
- i) Closure of operative field, / principle of wound closure

3. Basic concept on operation theatre and instruments

- a) Modern operation theatre
- b) Basic principles of using diathermy
- c) Basic principles of using laser
- d) Swabs and packs, implant materials, ligature, sutures, staples and clips
- e) Knowledge about general surgical instruments
- f) Knowledge about laparoscopic instruments

4. Communication & information sharing with colleagues, patient and staff

5. Resuscitation of a patient in accident and emergency department (RTA, mass casualty)
 - a) Preliminary knowledge about ICU care
 - b) Knowledge about tracheostomy
 - c) Principles of Burn management

6. Fluid-electrolytes, acid-base, blood transfusion, blood substitutes

- a) Fluid and electrolyte balance & fluid regimens before and after surgery
- b) Acid-base balance and treatment of disturbances
- c) Blood component therapy in surgery
- d) Adverse consequence of blood transfusion and Massive blood transfusion

7. Perioperative care Preoperative care of a patient

- a) Preoperative preparation for surgery
- b) Preoperative assessment , workups and anesthesia.
- c) Basic concept of local, regional and general anesthesia
- d) Informed consent for surgery, consent taking
- e) Enteral and parenteral nutrition before and after surgery

7.1a. Pre-operative assessment of patient

Objectives:

The trainees will be able to:

- i) describe the routine investigations in surgery.
- ii) state the operative fitness of the surgical patients.
- iii) describe the patient counseling.
- iv) state informed written consent from patient/guardian.
- v) assess cardiac functions and interpret ECG and echocardiography.
- vi) assess renal functions.
- vii) assess pulmonary functions and interpret the function tests.
- viii) assess liver functions and interpret liver function tests
- ix) assess coagulation status of the patient.

7.1b. Surgery in patient with co-morbidities

Objectives: The trainees will be able to:

- i) describe the complications of surgery in diabetic patients.

- ii) explain protocol for diabetic control in patients being prepared for surgery.
- iii) describe the protocol for surgery in patient having hypertension,
- iv) bronchial asthma, hepatic insufficiency, renal insufficiency or in patient having heart disease or coagulation disorder.

7.2. Per-operative care

- a) antibiotic Prophylaxis
- b) Surgical access and incisions
- c) Knot tying/suture materials
- d) surgical dissection
- e) Precautions against loss of instruments or swab
- f) Principles of wound closure
- g) Principles of skin closure
- h) Principles of skin cover
- i) Knowledge about flaps and Graft
- j) Basic knowledge of swab/pack/ligature/ Tourniquet
- k) Suture materials

7.3. Postoperative care

- a) Postoperative care including maintenance of I/O chart, diabetic chart, dietary chart, and medication chart.
- b) operation note writing
- c) Postoperative fluid and electrolytes plan
- d) d)Management of postoperative pain
- e) Management of different surgical drain
- f) Prevention and management of general postoperative complication
- g) Principles of wound management
- h) Surgical dressing
- i) Wound infection/surgical infection
- j) Biopsy / histopathology / cytopathology / frozen section

7.3a. post-operative monitoring and care

Objectives: The trainees will be able to

- a) explain and manage the post-operative hemorrhage.
- b) manage the post-operative infection.
- c) explain acid-base balance.
- d) describe the correction of electrolyte imbalance
- e) describe the pulmonary embolism.
- f) explain the pulmonary edema.
- g) describe the multi-organ failure..
- h) understand the use of the inotropes & chronotropes.
- i) describe the cardio-pulmonary resuscitation (CPR).
- j) explain acute renal failure.
- k) explain the cardiac arrhythmias & cardiac arrest.
- l) resuscitation and intensive care of the unconscious patient.

8. Basics for surgical patients

- a) DIC
- b) ARDS
- c) MOF
- d) Minimal access surgery
- e) care of Terminal illness
- f) Genetic aspect of surgery
- g) Screening for surgical disease
- h) Surgical audit
- i) Basic principles of transplant surgery

9. Miscellaneous

- a) Waste product disposal in OT
- b) Radiology / imaging (x-ray/USG/CT/MRI/MRCP)
- c) Postoperative complication-management
- d) Sinus / fistula / ulcer / swelling/abscess / gangrene / cyst / hemorrhage/blood transfusion reaction / tumor / Hamartomas / scar / keloid

- e) Principles of laparoscopic / endoscopic surgery / (indication / contraindication / complications)
- f) Writing preoperative order; operation note, postoperative order

14. Basic course contents for the surrogate residents during rotations:**a) Department of Orthopedic surgery**

Knowledge to be earned regarding following topics during orthopedic placement

- 1) History taking of musculoskeletal disorders
- 2) Clinical examination of musculoskeletal disorders: a) Examination of upper limbs and joints, b) Examination of lower limbs and joints, c) Examination of spine (cervical, thoracic, lumbar).
- 3) Preliminary knowledge about musculoskeletal imaging: a) Plain radiography, b) CT scan, c) MRI, d) Bone scan.
- 4) Fracture and dislocation: a) Preliminary knowledge about fracture and dislocation, b) How to investigate a patient with fracture and dislocation? c) How to describe a fracture and dislocation concisely and correctly? d) Basic principles of reduction and holding a fracture and dislocation, e) Knowledge about common complications and how to check for them, f) Basic pathophysiology of fracture healing, g) Basic knowledge of management of fracture and dislocation.
- 5) Principles of management of hand and foot infections.
- 6) Preliminary knowledge about bones and joints infection and connective tissue disorders.
- 7) Preliminary knowledge about bone tumors.
- 8) Preliminary knowledge about congenital disorder of musculoskeletal system.
- 9) Sports injuries (Preliminary knowledge about diagnosis and management).
- 10) Principles of management of trauma surgery.
- 11) Teaching & practicing about various bandages (circular, spiral, reverse spiral, and others) & plaster for immobilization

b) Department of Pediatric surgery:

Knowledge to be earned regarding following topics during pediatric surgery placement

1. History taking, clinical examinations, investigations and reaching to a diagnosis of common pediatric problems, 2) Knowledge of relevant anatomical, physiological and psychological differences between adults and children, 3) Knowledge about the structured approach to managing children with major trauma, 5) Pathology and principles of management of common pediatric surgical problems: a) inguinoscrotal swelling, b) acute scrotum, c) Undescended testis d) acute abdomen in children, e) congenital anomalies of abdominal wall defect, f) obstructive uropathy in children, g) Urinary tract infection in children, h) intestinal obstruction in neonate and children, i) Child with constipation, j) Per rectal bleeding in children, k) Surgical jaundice in neonate & children, l) persistent vomiting in children, m) Surgical aspect in a newborn with respiratory distress, n) Common childhood malignancy, o) Hypospadias, epispadias & ectopia vesicae, p) Circumcision, q) Necrotizing enterocolitis, r) Rectal prolapsed, p) Meckle's diverticulum, q) Swallowed or inhaled foreign body
2. Following short cases are to be learnt: Hypospadias, Epispadias, Ectopia vesicae, Cleft lip / cleft palate, Cystic hygroma, Umbilical hernia, Meningocele/meningomyelocele, Hydrocephalous, Undescended testis, Congenital club foot

c) Department of Urology:

Knowledge to be earned regarding following topics during Urology placement 1) History taking, clinical examinations, investigations and reaching to a diagnosis of common Urology problems, 2) Knowledge about major urological symptoms and signs, 3) Knowledge about the most commonly used investigations for

urological conditions, 4) Urethra & penis, 5) Prostate and seminal vesicles, 6) Urinary bladder, 7) The Kidney and ureter, 8) Testis and scrotum, 9) Urethral catheterization, 10) SPC

d) Department of Cardiothoracic surgery:

Following topics to be learned during cardiothoracic surgery placement 1) History taking, clinical examinations, investigations and reaching to a diagnosis of common cardiac/thoracic problems, 2) Knowledge about major cardiac/thoracic symptoms and signs, 3) Knowledge about the most commonly used investigations for cardiac/thoracic conditions, 4) Preliminary knowledge about common cardiac/thoracic conditions management: a) Cardiopulmonary resuscitation, b) Cardiopulmonary trauma, c) IHD, d) Valvular heart disease, e) Congenital heart disease, f) Pleural effusion, g) surgical infectious lung condition h) Pulmonary malignancy, 6) placement of chest tube

e) Department of Emergency:

Knowledge to be earned regarding following topics during casualty placement

- i) Principles of resuscitation of a patient in accident and emergency department (RTA, mass casualty. (ATLS guide line for trauma management). ii) Management of blunt, lacerated, & penetrating trauma. Iii) Management of gun-shot injury, iv) Management of blunt injury. v) Management of mass casualty, vi) Clinical technique to be learned is emergency department: a) Intubation of a patient, b) placement of chest tube, c) placement of CV line, d) Wound dressing, e) Wound closure, f) Different types of bandage, plaster,

f) Department of Burn & Plastic:

Knowledge to be earned regarding following topics during placement in the department of Burn & plastic surgery

1) Immediate care of a burn patient, 2) Knowledge about assessment of burn, 3) Classification burn and its importance in management, 4) Fluid resuscitation, 5) Monitoring of resuscitation, 6) Treatment of the burn wound, 7) Additional aspects of treating the burned patient (analgesia, energy balance & nutrition, control of infection, nursing care, physiotherapy, psychological), 8) Surgery for the acute burn wound, 9) Delayed reconstruction and scar management Plastic surgery: 1) Basic principles of reconstructive ladder, 2) Knowledge about skin graft 3) FLAPS, 4) Microvascular surgery

g) Department of Vascular surgery:

Knowledge to be earned regarding following topics during placement in the department of Vascular Surgery 1) History taking, clinical examinations, investigations and reaching to a diagnosis of common vascular problems, 2) Knowledge about major vascular (arterial, venous and lymphatic) symptoms and signs, 3) Knowledge about the most commonly used investigations for vascular conditions, 4) Preliminary knowledge about common vascular disease management: a) Peripheral vascular disease, b) Deep vein thrombosis, c) Varicose vein and venous ulcer, d) Lymphedema, e) Vascular aneurysm, f) Hemangioma, cystic hygroma, g) Thrombophlebitis, 5) Preliminary knowledge about the management of acute vascular problem: a) Acute limb ischemia, b) Compartment syndrome, c) Vascular trauma 6) Principles of vascular surgery: a) Anticoagulation therapy, b) Basic technique of vascular (arterial, venous and lymphatic) repair, c) Basic technique of vascular anastomosis, d) Suturing and suture materials for vascular surgery, e) venous cut down technique

h) Department of Neurosurgery:

Knowledge to be earned regarding following topics during placement in the department of Neurosurgery 1) History taking, clinical examinations, investigations and reaching to a diagnosis of common Neurosurgical problems, 2) Preliminary knowledge about imaging of brain & spinal cord (Plain x-rays, CT scan, MRI, MR angiogram) 3) Management head injuries, 4) Management of

space occupying lesion of brain and spinal cord, 5) Knowledge of GCS score, 5) Management spinal injuries and spinal shock, 6) Management of hydrocephalus, epilepsy, 7) Management of low back pain and PLID, 8) Knowledge about brain death

i) Department of Medical oncology and radiation

Following topics to be learned during Oncology and radiotherapy placement

1) Pathogenesis of cancer: a) Cell cycle control, b) Abnormal cell cycle control, c) Angiogenesis and Metastasis, d) Acquisition & Accumulation of genetic disease 2) Knowledge about different tumor markers 3) Principles of Cancer chemotherapy: i) Growth characteristics of tumors. ii) Principles of cytotoxic chemotherapy. iii) Classification cytotoxic drugs. iv) Mechanism of action of cytotoxic drugs. v) Drug resistance, vi) Combination chemotherapy. vii) Timing of chemotherapy. viii) Routes of administration. ix) Clinical assessment of response. x) Toxicity of chemotherapy. xi) Basics of hormone therapy. xii) Adjuvant chemotherapy. xiii) Neoadjuvant chemotherapy. xiv) Recent advances in chemotherapy 4) Principles of radiotherapy: a) Sources of ionizing radiation. b) Action of ionizing radiation. c) Radiotherapy planning and doses. d) Basic knowledge about radiotherapy as a primary treatment & adjuvant therapy. e) Complications of radiotherapy and its management. f) Radiotherapy in future

j) Department of Intensive Care Unit (ICU) & critical care medicine:

Following topics to be learned during ICU placement: 1) Preliminary knowledge about HDU/ICU, 2) Indications of intubation; intubate & record at least 5 cases, 3) Indications of extubation; extubate & record at least 5 cases, 4) Preliminary knowledge about ventilator machine, 5) Indication and placement of CVP line in at least 5 cases, 6) Drawing of arterial blood (femoral/radial) for blood gas analysis – at least 5 cases, 7) Placement arterial line and record at least 5 cases, 8) Interpretation of blood gas analysis 8) Management of metabolic

acidosis and alkalosis, 9) Management of respiratory acidosis and alkalosis, 10) Management of different electrolytes imbalance, 11) Management of shock, 12) Management of ARDS, 13) Management of SIRS, MODS, MOF.

k) Department of Radiology

(Following topics to be learned during placement in the department of Radiology)

1) Basic principles of different imaging modalities: a) Plain x-ray b) Contrast x-ray (Barium, gastrographin), c) Ultrasound, d) CT Scan, e) MRI, 2) Knowledge about legal requirements in relation to the use of ionizing radiation, 3) Plain X-ray film: a) How to read? b) Introduction of common radiological diagnosis, 4) Contrast X-ray film: a) How to read? b) Introduction of common radiological diagnosis, 5) Ultrasound: a) How to read? b) Introduction to diagnosis of common surgical diseases, 6) CT scan: a) How to read? b) Introduction of common radiological diagnosis, 7) MRI: a) How to read? b) Introduction of common radiological diagnosis, 8) Basic techniques of interventional radiological procedures, 9) Clinical applications of interventional techniques, 10) Knowledge about potential complications of interventional radiological procedures and strategies for their prevention and treatment

l) Department of Pathology:

Following topics to be learned during pathology placement

i) How to send a specimen to the department of pathology for histopathology, cytopathological examinations? ii) Knowledge about frozen section biopsy. iii) Knowledge about FNAC, iv) Knowledge about basic staining method, v) Knowledge about immunological staining method. vi) Basic knowledge of histopathological character of common surgical specimens (appendicitis, cholelithiasis, carcinoma GB, stomach, liver, pancreas, colon, SCC, BCC, malignant melanoma, thyroid etc)

m) Department of Nuclear Medicine:

Following topics to be learned during nuclear medicine placement

i) Basic knowledge about commonly use radionuclide agent (technetium-99m, different labeled radio-iodine etc), use, advantage, disadvantage, hazards, precautions, principles of storages, disposal etc ii) Basic knowledge and interpretation different nuclear medicine study: a) Radio-iodine uptake scan, b) HIDA Scan, c) SPECT scan, d) MIBI scan. iii) Knowledge about therapeutic option nuclear medicine: a) radio-iodine ablation therapy

n) Department of Internal Medicine:

Following topics to be learned during internal medicine placement

1) Knowledge about management of myocardial infarction, hypertension, arthymias and other common cardiac problems, 2) Knowledge about management of renal disorder (Acute renal failure, chronic renal failure, urinary infection and other common problems), 3) Knowledge about management of diabetes, 4) Knowledge about respiratory diseases (bronchial asthma, chronic bronchitis & other common respiratory problems), 5) Knowledge about management of hypothyroidism, hyperthyroidism, hyper and hypoadrenalism, 6) Knowledge about the management of stroke patients, 7) Knowledge about the management of liver diseases (acute hepatitis, chronic hepatitis, cirrhosis)