CURRICULUM FOR COMPETENCY BASED

POSTGRADUATE TRAINING PROGRAMME

FOR

M.Ch. IN PEDIATRIC SURGERY

(3-YEARS PROGRAMME)

1. GOAL

The goal of this course is to produce pediatric surgeons who are capable of demonstrating commensurate expertise in the field. The training programme will focus on to develop an aptitude to care for neonates and children with specific knowledge, skills and attitudes in the specialty of Pediatric Surgery. It will help him/her to function as a safe Pediatric surgeon, an independent clinical consultant, a medical teacher and conduct research studies in this field.

2. PROGRAM OUTCOMES

Upon completion of the M.Ch Pediatric Surgery program, the trainee shall be able to acquire certain subject specific competencies in the cognitive, psychomotor and affective domain.

1. Cognitive Domain	
Sr. No.	**Competencies**
1.1	Acquire comprehensive knowledge of the basics of paediatric surgery including all allied specialties related to paediatric surgery like Embryology, Genetics, Basic Anatomy, Physiology, Biochemistry, Pharmacology and Pathology.
1.2	Possess knowledge of the commonly used radio-imaging techniques like Plain X-ray, Ultrasound, CT and MRI various contrast radiographies and nuclear imaging techniques.
1.3	To get acquainted with the diagnosis and management of common neonatal and pediatric surgical problems.
1.4	To learn the principles of pediatric medical care as applicable to pediatric surgical practice.
1.5	To learn about research methodology and biostatistics and to participate in clinical and experimental research studies
1.6	Possess knowledge about recent advances in the subject of Paediatric surgery and all its allied specialties.

1.7	Working knowledge of the sophisticated and routine equipment, consumables used in paediatric surgery.
2. Psychomotor domain	
2.1	Diagnose and management of majority of the conditions in the speciality of Paediatric surgery on the basis of clinical assessment and appropriate investigations.
2.2	Able to apply sound clinical judgment and rationale cost effective investigations for the diagnosis and management of paediatric surgery cases in OPD, Wards, Emergency Room and Intensive care unit.
2.3	Acquire skills in routine ward procedures (e.g. bladder catheterization, wound dressings, peripheral vascular access, child restraint etc.).
2.4	Acquire skills in the performance and interpretation of special investigations such as Gastro-intestinal contrast studies, Contrast investigations of genito-urinary tract, Ultrasound, Intra-operative investigations like Intra-op. cholangiogram.
2.5.	Prepare a patient for an elective/emergency surgery and provide specific post-operative care.
2.6	Monitor the post-operative patient in the routine post-op ward /high dependency unit/ and in the intensive care setting.
2.7	Acquire proficiency in prescribed minor and major operative procedures, and provide these, initially with assistance and later independently.
2.8	Acquire skills in invasive procedures like Cystoscopy, gastroscopy, Lumbar puncture, intrathecal, Central venous access with chemotherapy administration.
2.9	Acquire exposure in sophisticated procedures like Hydrostatic reduction for Intussusceptions and intra-lesional injections.
2.10	Provide Basic and Advanced Life Support services in emergencies e.g. NALS, PALS.
3. Affective Domain	
3.1	Develop and practice effective communication skills including consent taking

3.2	Professionally interact and obtain relevant specialist/ancillary services' consultation where appropriate.
3.3	Develop an ability to work in team
3.4	Inculcate ethical principles in all aspects of pediatric surgical practice/research like professional honesty and integrity, humility, moderation, informed consent, counselling, awareness of patients' rights and privileges, etc.
3.5	Teach the Postgraduate Students: MS General surgery and MD Paediatrics
3.6	Organize specific teaching and training programmes for paramedical staff, associated professionals and patient education programmes.
3.7	Perform Clinical and Investigative studies and to present in Seminars, meetings and conferences etc.

3. ELIGIBILITY

M.S. General Surgery from INI/NMC recognized Institute/ D.N.B. from recognised institute shall be the minimum qualification.

4. SELECTION OF CANDIDATES

The selection shall be through the entrance test conducted by the competent authority.

5. DURATION OF TRAINING

The training shall be of 3 years. During these years, the candidate shall be a senior resident who will perform clinical, teaching and research activities as prescribed in curriculum. During the last six months, the candidate shall be given additional administrative responsibilities.

6. SYLLABUS

Course contents:

6.1 Topics

6.1.1. Basic sciences as applied to Pediatric Surgery

- Medical genetics and gene therapy.
- Antenatal diagnosis and fetal intervention
- Developmental and transitional physiology of the respiratory, cardiovascular and renal systems

- Neonatal physiology and assessment of the surgical neonate.
- Neonatal sepsis
- Nutrition – enteral, parenteral
- Vascular access
- Principles of imaging (radiodiagnosis, nuclear) in Pediatric practice
- Pharmacology and use of common drugs , antibiotics and policy
- Pediatric analgesia and anaesthesia , critical care , mechanical ventilation
- General principles of Endoscopy and Minimal Access Surgery – fetoscopy, genitourinary endoscopy, tracheo-bronchoscopy, laparoscopy, thoracoscopy, robotic surgery
- Biomedical ethics and legal issues in Pediatric surgical practice.
- The organisation of a Pediatric Surgical unit
- HIV/AIDS in children
- National health policy-programs pertinent to Pediatric practice
- Telemedicine and telesurgery - principles , practice and limitations

6.1.2. Trauma

- Birth trauma
- Pediatric trauma – general principles.
- Thoracic, abdominal, genitourinary, central nervous system trauma
- Soft tissue and envenomation injuries
- Musculoskeletal and vascular trauma
- Burns
- Child abuse

6.1.3. Pediatric Oncology

- General principles of oncology, radiotherapy and chemotherapy
- Wilms' tumor
- Neuroblastoma
- Liver tumours
- Rhabdomyosarcoma
- Germ cell tumours
- Other tumour of childhood (outline)-Leukemias, Lymphomas, Bone tumours, CNS tumours, Retinoblastoma

6.1.4. Transplantation

- General principles
- Kidney and liver transplantation
- Outline of other solid organ and bone marrow transplantation

6.1.5. Head and Neck Disorders

- Craniofacial anomalies
- Cleft lip and palate
- Disorders of the upper airway and oral cavity.
- Salivary glands
- Disorders of lymph nodes.
- Thyroid and parathyroid gland
- Cysts and sinuses of the neck
- Torticollis

6.1.6. Thoracic Disorders

- Congenital chest wall deformities.
- Disorders of the breast.
- Diaphragmatic hernia and eventration
- Mediastinal mass lesions.
- Endoscopy of the upper aerodigestive tract.
- Congenital tracheal and Bronchopulmonary/ foregut malformations
- Infective pleuro-pulmonary condition.
- Congenital oesophagal anomalies
- Esophagal motility disorders, achalasia cardia, gastro-esophageal reflux
- Esophageal rupture, injury, stricture, perforation.
- Esophagal replacement.

6.1.7. Abdominal Disorders

- Umbilical disorders and abdominal wall defects.
- Inguinal hernias and hydroceles
- Testicular maldescent, torsion
- Hypertrophic pyloric stenosis.
- Duodenal atresia, annular pancreas.
- Jejunoileal atresia and stenosis
- Meconium ileus
- Meckel’s diverticulum
- Intussusception.
- Disorder of midgut rotation.
- Short bowel syndrome
- Gastrointestinal endoscopy and laparoscopy.
- Gastrointestinal bleeding
- Gastrointestinal duplications.
- Mesenteric and omental cysts
- Ascites
- Polypoid disease of the GIT
- Necrotising enterocolitis.

- Intestinal stomas
- Primary peritonitis.
- Inflammatory bowel disease in children.
- Colonic atresia and functional obstruction.
- Appendicitis
- Hirschsprung disease, neuromuscular disorders of intestines
- Anorectal malformations.
- Congenital short colon /pouch colon
- Colonic and rectal tumours
- Neonatal/Infantile obstructive cholangiopathy
- Congenital biliary dilatation.
- Infective and inflammatory hepatobiliary disorders
- Benign liver tumours
- Portal hypertension
- Disorders of the pancreas
- Splenectomy and post-splenectomy sepsis.
- Adrenal gland.

6.1.8. Genitourinary and related disorders

- Renal agenesis, dysplasia, cystic disease, ectopia
- Pelvi-ureteral junction obstruction
- Vesico-ureteric reflux
- Infective and inflammatory renal disorder.
- Pediatric urolithiasis
- Congenital ureteric anomalies.
- Prune belly syndrome
- Urinary diversion and undiversion, bladder augmentation
- Disorders of bladder function.
- Structural bladder disorders
- Exstrophy – epispadias complex
- Hypospadias.
- Anomalies of the external genitalia
- Disorders of Sex Differentiation
- Abnormalities of the female genital tract.

6.1.9. Miscellaneous Pediatric Surgical Disorders

- Spina bifida
- Hydrocephalus
- Congenital heart disease
- Congenital orthopaedic deformities
- Amputation, bone and joint infections

- Conjoined twins
- Hemangioma & vascular malformations.

6.1.10. Recent Advances

- Minimal Access surgery of all areas including laparoscopy, thoracoscopy, ventriculoscopy, STEALTH and endoscopic surgeries, gastrointestinal endoscopy including ERCP (endoscopic retrograde cholangiopancreatography), Bronchoscopy and Endourology.
- Robotics in Pediatric Surgery
- Use of newer energy sources in surgery including LASER, harmonicscalpel etc.
- Use of various types of staplers: Intestinal, Vascular, Endo GI etc
- Fetal surgery

6.2 Skills

6.2.1. Clinical examination, outpatient and inpatient evaluation

Assess the pediatric patient /neonate with surgical problems by:

- Eliciting pertinent history.
- Performing correct physical examination.
- Making a working diagnosis.
- Determining the type of care that is appropriate – outpatient/ Inpatient /daycare.
- Initiate and institute life-saving emergency care, including CPR.
- Requesting appropriate investigations and interpretation of their result.
- Identify pre-operative and post-operative complications promptly and deal with them safely.
- Document and maintain a record of patients systematically. Seek professional help from other colleagues where needed.
- Treat patients and their relatives with respect and empathy.
- Able to counsel caretakers and the family of patient and obtain requisite consent for care.

6.2.2. Diagnostic modalities in Pediatric Surgery

6.2.2.1. Radiological procedures

- Apply knowledge of imaging modality (USG,CT,MR) to investigate surgical diseases of childhood
- Interpret the radiological images to correctly identify normal structures, abnormalities and pathology
- Familiarity with conduct and interpretation of intra-operative imaging like radiography and ultrasonography

- To perform certain investigative and therapeutic procedures in the radiology suite with due precautions :
    1. Esophageal swallow
    2. Upper GI contrast study
    3. Contrast enema
    4. Therapeutic contrast enemas in meconium ileus
    5. Reduction of select idiopathic intussusception with radiological (air/contrast enema) or ultrasonography (hydrostatic)
    6. Voiding cystourethrogram
    7. Retrograde urethrogram
    8. Antegrade studies through drainage tubes
    9. Percutaneous drainage, biopsy

6.2.2.2. Nuclear Medicine

1. Renal Dynamic Diuretic Radionuclide scintigraphy with various isotopes like EC, MAG3, DTPA
2. Static Cortical renogram– DMSA
3. Direct Radionuclide Cystography (DRCG)
4. Hepatobiliary scintigraphy
5. MIBG scan
6. Lymphatic scintigraphy
7. Thyroid scintigraphy
8. Gastro-esophageal reflux scintigraphy
9. RBC blood pool scan
10. Technitium Meckel's scan
11. PET scan
12. Liver-Spleen scan
13. Bone scan

6.2.2.3. Urodynamics

1. Uroflowmetry
2. Cystometrogram
3. Video urodynamics

6.2.2.4. Others

1. 24 hour pH monitoring
2. Esophageal and anorectal manometry
3. Intracranial pressure monitoring
4. Basics of pathological biopsies, examination including frozen section
5. Immune histochemistry

6.2.3. Surgical skills:

Quantum of Surgical Work

The operative work experience would be acquired through graded surgical responsibility including investigations, history writing, preoperative and postoperative management, initially assisting in operative work and later an independent operative work responsibility under supervision. All entries related to surgical work must be done in log book. The following number of surgical cases should be assisted /operated by each candidate during the training program:

1. Indexed neonatal surgical cases/procedures: 50 to100
2. General pediatric surgical cases/procedures: 50 to100
3. Pediatric gastro - intestinal surgical cases/ Procedures: 50 to100
4. Pediatric urological cases/procedures: 50 to100
5. Pediatric thoracic surgical cases/procedures: 25 to 50
6. Pediatric oncology cases/procedures: 25-30
7. Pediatric Plastic surgery cases/procedures: 25-30
8. Pediatric neurosurgical cases/procedures: 25-30
9. Pediatric endoscopic procedures: 25-30
10. Pediatric Laparoscopic procedures: 20-30

NOTE: The number of cases mentioned are merely guide lines and are desirable but not mandatory

6.3. Attitudes and Values

6.3.1. Communication skills, patient counselling and consent taking: Effective communication with the patient/caretakers regarding the nature and extent of disease, treatment options available and realistic outcome following optimal management is essential.

6.3.2. Group /Team approach: function as a part of a team, co-operate with colleagues, and interact with the patient to provide the optimal medical care.

6.3.3. Ethical practice: Abide by ethical principles in medical practice, maintain proper etiquette in dealings with patients, caretakers and other health personnel including due attention to the patient's right to information, consent and second opinion.

6.3.4. Maintain professional integrity while dealing with patients, colleagues, seniors, pharmaceutical companies and equipment manufacturers.

6.3.5. Preparation of oral presentation, medical documents, professional opinion in interaction with patients, caretakers, peers and paramedical staff – both for clinical care and medical teaching.

7. TEACHING- LEARNING METHODS:

7.1 **Seminars/Webinars:** To be presented by the trainee under supervision of teaching faculty. The topics will include Basic and advanced Pediatric and Neonatal surgery along with recent advances.

7.2 **Journal Review:** It will include discussion on recent articles, which relate to various topics in Pediatric Surgery and allied disciplines.

7.3 **Clinical Case presentation:** Representative clinical cases shall be presented and discussed in detail in presence of faculty.

7.4 **Operative procedures planning and discussion:** This session aims at discussing common operative procedures and practical details.

7.5 **Clinical grand rounds:** A clinical grand round, involving presentation of unusual and difficult cases will be done by a post graduate student, in the presence of all the clinical staff belonging to the department of Pediatric surgery. The exercise is to develop the clinical acumen of the trainee.

7.6 **Pediatric Radiology/Nuclear Medicine meet:** Radiological and nuclear medicine investigations of various cases are discussed in consultation with the faculty of Radiology and Nuclear Medicine.

7.7 **Mortality and Morbidity meets**: Mortality and morbidity meets will be arranged to discuss complications and deaths occurring during patients' management to identify the areas for improvement.

7.8 **Dissertation review:** It will be planned to assess the progress of trainee and to take necessary corrective steps if there are any lacunae.

7.9 **Attendance and presentation at academic meets:** The trainee must attend minimum of two accredited scientific meetings (CME, symposia, and conferences) during 3 years of teaching programme. Trainee will present at least one poster or read one paper at State/National / International Pediatric Surgical or sub-speciality (Pediatric Urology, Pediatric Surgical Oncology etc.) conferences during the second / third year of the training period.

7.10 **Research Publication (Research skills):** Trainee will preferably publish one clinical research paper in indexed journal with significant impact factor.

7.11 **Didactic Lectures by faculty**

Frequency of teaching activities:

Sr No	Teaching/Learning Activity	Frequency
1.	Clinical Case presentation	Once a week
2.	Clinical grand rounds	Once a week
3.	Operative procedure planning and discussion	Once a week
4.	Journal Review	Once fortnight
5.	Seminars/Webinars	Once a month
6.	Pediatric Radiology/Nuclear Medicine meet	Once a month
7.	Mortality and Morbidity meets	Once every 3 months
8.	Dissertation review	Once every 6 months

8. DISSERTATION

Every student registered as post graduate shall carry out research project under the guidance of a recognized post graduate teacher, the result of which shall be written up and submitted in the form of a dissertation. Work for writing the dissertation is aimed at contributing to the development of a spirit of enquiry, besides exposing the student to the techniques of research, critical analysis, acquaintance with the latest advanced in medical science and the manner of identifying and consulting available literature. Dissertation will be done in accordance with institutional protocol.

Process to be completed within six months of admission to M.Ch. Pediatric Surgery program:

Activity	**July admission**	**January admission**
Selection of topic in consultation with PG Guide	September /October	March /April
Approval by Department PG Committee		
Institute Scientific Committee approval	November / December	May / June
Institute Ethics Committee approval		
Final approval letter by Academics Section	31st December	30th June

9. LOG BOOK

The trainees will maintain a log book of the work carried out by them and the training program undergone during the period of training including details of the surgical operations assisted or done independently. The log book will be checked and assessed periodically by the faculty members imparting the training.

10. ROTATIONAL POSTINGS

Apart from routine postings in ward, OPD, operation theatre and speciality clinics, the M.Ch. (Pediatric Surgery) trainee will be posted in the following allied specialities.

1. Pediatric Intensive Care Unit: Duration- 4 weeks. This is intended to familiarize the student to the principles of pediatric medical intensive care and its applications to pediatric surgical care.
2. Neonatology Intensive Care Unit: Duration- 4 weeks. During this posting, the candidate will receive training on care of the sick neonates, particularly premature and small for date.

11. ASSESSMENT

11.1 Essential Pre-Requisite To Appear For Summative Assessment

1. Minimum 80% attendance in each year of training.
2. Minimum of four satisfactory six monthly progress reports
3. Approval of Dissertation
4. Minimum one scientific paper/poster presentation at International / National / State Pediatric Surgery Conference
5. Minimum one research paper – published / accepted for publication / sent for publication in a peer-reviewed indexed scientific Journal.

11.2 Formative assessment:

Theory:

Time	Marks	Total
At end of first year (Paper I)	100	500
At end of second year (Paper II)	100	
Preliminary (3 Papers of 100 marks each)	300	

- Pattern for Paper I and Paper II: Marks: 100 Duration: 3 hours 10 questions of 10 marks each
- The Prelim Examination will be conducted in accordance with the pattern of the final examination for theory.

Practical:

Time	Marks	Total
At end of first year (Practical I)	100	500
At end of second year (Practical II)	100	
Preliminary	300	

- Pattern for Practical I and Practical II
    1. Long Case 50 marks
    2. Operative Procedure discussion :30 marks
    3. Radiology, Surgical Pathology 20 marks
- Pattern for Practical Examination (Preliminary)

    1.Long Case 100 marks

    2.Two Short cases 50 marks each

    3.Viva-voce 100 marks comprising of

        1. Radiology and Nuclear imaging
        2. Instruments, tubes, catheters and Operative procedures
        3. Surgical pathology
        4. Research Methodology and logbook evaluation

11.3 Six monthly progress report:

The progress of the PG student will be monitored with the help of a structured six monthly report. The report will contain details pertaining to attendance, teaching-learning activities, clinical duties, teaching assignments, practical work, marks obtained at intermediate examinations, papers / posters presented, research publications and progress of dissertation work. The performance of the student will be graded by the PG Guide and the Head of the Department.

Summative Assessment:

1. Theory: There shall be three theory papers as follows:

Paper I	Basic Sciences in Pediatric Surgery, Trauma, Transplantation, Pediatric Oncosurgery
Paper II	Pediatric Surgery
Paper III	Pediatric Urology
Paper IV	Recent advances in Pediatric surgery

2. Practical: The practical examination should consist of the following

1.	Three cases from various sections of Pediatric surgery/sub-specialities	History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2	Ward rounds	Discussion of practical problems in the management of pediatric patients undergoing surgery, communication skills and consent
3	Demonstration of Operative Procedure	Evaluation of surgical skill
4	Viva-voce examination	I. Instruments, tubes, catheters and Operative procedures II. Radiology and Nuclear imaging III. Surgical pathology IV. Research Methodology and logbook evaluation

12. Evaluation

SN	Assessment type	Marks allotted	Remark	Total Marks
1	Theory Papers (Four Papers)	100 marks each	Minimum pass marks 50% in each paper	400
2	Practical Examinations	500	Include clinical cases, operative demonstration, ward round and viva-voce	500
2.a	Long Clinical Case	100 (1 long case)	Discussion of History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management	
2.b	Short clinical case	100 2 short cases (50 marks each)	Interpretation of clinical findings, differential diagnosis, investigations, prognosis and management	
2.c	Surgical Demonstration	100	Evaluation of surgical skill	
2.d	Ward rounds (Four cases)	100	Discussion of practical problems in the management of pediatric patients undergoing surgery(one station for communication skills and consent taking skills)	
2.e	Viva-voce (I-IV)	25 each	Discussion on various aspects of pediatric surgery	
			TOTAL	900

In order to be declared successful in summative assessment, the candidate must score:

1. A minimum of 40% marks in Theory and overall 50% marks for passing in theory
2. A minimum of 50% marks in practical examination

13. Recommended Reading:

A. Books (latest edition)

1. Coran AG, Adzick NS, Krummel TM, Laberge JM, Shamberger RC, Caldamone AA. Pediatric Surgery, Elsevier - Health Sciences Division;
2. Holcomb GW, Murphy JP, Peter SD. Holcomb and Ashcraft's Pediatric Surgery.
3. Docimo SG, Canning D, Khoury A, Salle JLP. The Kelalis-King-Belman Textbook of Clinical Pediatric Urology, CRC Press.
4. Pizzo PA, Poplack DG, Adamson PC, Blaney SM, Helman L. Principles and Practice of Pediatric Oncology, Wolters Kluwer.
5. Davenport M, Spitz L, Coran A. Operative Pediatric Surgery, CRC Press.
6. Holcomb GW, Rothenberg SS. Atlas of Pediatric Laparoscopy and Thoracoscopy; Elsevier..
7. Holschneider AM, Hutson JM. Anorectal Malformations in Children: Embryology, Diagnostics, Surgical Treatment and Follow up: Springer.
8. Puri P. Newborn Surgery,CRC Press.
9. Hadidi A, David MA. Hypospadias Surgery: An Illustrated Guide: Springer.

B. Journals

1. Journal of Indian Association of Pediatric Surgeons
2. Journal of Pediatric Surgery
3. Pediatric Surgery International
4. Journal of Pediatric Urology
5. Seminars in Pediatric Surgery
6. Indian Pediatrics
7. Indian Journal of Pediatrics

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