PEDIATRIC SURGERY

PGY 1 and 2

Medical Knowledge

A. NEONATAL

Acquire knowledge of the basic embryology, anatomy, and physiology of commonly encountered neonatal conditions:

1. Describe post parturition neonatal physiology, including cardiopulmonary changes, initiation of gastrointestinal function, and changes in blood volume.

2. Outline fluid and electrolyte management of the neonate, including appropriate volumes, maintenance electrolytes; and describe the effect of hypothermia and radiant heating.

3. Calculate enteral and parenteral nutritional support of term and premature neonates.

4. Describe the immunologic factors unique to neonates, including common pathogens of neonatal infection and pharmacokinetics of commonly used antibiotics and other drugs.

5. Summarize the embryology of common congenital anomalies, including:
    a. Tracheoesophageal fistula
    b. Congenital diaphragmatic hernia
    c. Intestinal atresias
    d. Body wall defects
    e. Cysts and masses
    f. Malrotation
    g. Anorectal anomalies
    h. Hirschsprung's disease
    i. Cyanotic and noncyanotic congenital cardiac disease

6. Explain the pathophysiology of neonatal necrotizing enterocolitis (NNEC).

7. Describe arterial and venous anatomy of the neonate, and specify techniques for arterial and central venous cannulation.

1. Describe the diagnosis, preoperative evaluation, and management of common congenital anomalies, including:
    a. Tracheoesophageal fistula
    b. Congenital diaphragmatic hernia
    c. Body wall defects
    d. Midgut volvulus and atresias
    e. Anorectal anomalies
    f. Congenital heart defects

2. Explain the perioperative care of neonates, including:
    a. Ventilator support
    b. Fluid and electrolyte management

c. Nutrition
d. Antibiotic use
e. Management of coagulopathy

3. Discuss neonatal nutritional assessment and supervision of long-term nutritional support.

1. Describe the development of the newborn throughout childhood in terms of the following criteria:
    a. Weight, length, and head size
    b. Nutritional requirements (eg., oral, enteral, and parenteral)
    c. Hematologic indices
    d. Water balance and renal function
    e. Hormonal influences on development

2. Summarize normal embryologic development, including anatomic and physiologic variation of the following organ systems:
    a. Integument
    b. Central nervous system
    c. Respiratory
    d. Cardiovascular
    e. Alimentary
    f. Genitourinary
    g. Gynecology
    h. Musculoskeletal

3. Classify congenital malformations of the newborn by type, origin, and the need for surgical intervention:
    a. Gastrointestinal: esophageal atresia, pyloric stenosis, malrotation and duodenal intestinal atresia, necrotizing enterocolitis, meconium ileus, Hirschsprung's disease, imperforate anus
    b. Cardiovascular: obstructive lesions, patent ductus arteriosus (PDA), cyanotic and acyanotic defects
    c. Pulmonary: diaphragmatic hernia, sequestration, cystic defects, and lobar emphysema
    d. Abdominal wall defects: umbilical and inguinal hernias, omphalocele, and gastroschisis
    e. Genitourinary: polycystic kidneys, exstrophy of the bladder, undescended testis, torsion of the testis, obstructive uropathy
    f. Inborn and genetic errors: Trisomy 18, Down's Syndrome
    g. Branchial cleft, thyroglossal duct cyst, thyroid disorders
    h. Cystic hygroma
    i. Craniofacial deformities

4. Summarize the basic approach to the diagnosis and management of more common surgical problems of infancy and childhood, such as:
    a. Pyloric stenosis
    b. Intestinal obstruction
    c. Perforated appendicitis
    d. Necrotizing enterocolitis
    e. Inguinal hernia
    f. The battered child

5. Identify the technical aspects of the following procedures:
    a. Excision of skin and subcutaneous lesions

b. Incision and drainage of abscesses
c. Node biopsy
d. Chest tube placement
e. Oral intubation
f. Venous cutdown, arterial access
g. Gastrostomy
h. Herniorrhaphy
i. Circumcision

6. Describe the fundamental considerations in the pre- and post- operative care of infants and children in the cases listed above.

7. Explain the principles of diagnosis and treatment for common causes of gastrointestinal hemorrhage in the neonate, infant, child, and adolescent.

Patient Care

1. Establish percutaneous venous and arterial access in infants over 2 kg.

2. Perform a comprehensive initial evaluation of a neonate with suspected conditions amenable to surgical intervention.

3. Perform basic surgical procedures under appropriate supervision such as:
   a. Tube thoracostomy
   b. Incision and drainage of cysts and abscesses
   c. Insertion of central venous catheters

4. Participate in the perioperative care of a neonate by documentation of the clinical course of care in daily progress notes.

5. Complete oral or written examination of surgical topics listed in #3 above.

6. Perform basic surgical procedures with attending supervision, including, but not limited to:
   a. Percutaneous central venous catheterization
   b. Abdominal wound closure
   d. Reduction of incarcerated hernia
   e. Neonatal circumcision

7. Complete the following clinical tasks:
   a. Initial evaluation of common congenital anomalies
   b. Participation in the performance of gastrointestinal procedures such as:
      (1) Gastrostomy
      (2) Colostomy
8. Provide supervised perioperative surgical care, including:
   a. Ventilator support
   b. Fluid and electrolyte management
   c. Nutrition
   d. Antibiotic use
   e. Management of coagulopathy

1. Evaluate surgical conditions in the pediatric population through a comprehensive history, physical examination, and appropriate diagnostic studies.

2. Participate in the management of simple surgical problems in the pediatric population, including:
    a. Integument
        (1) Excision of skin and subcutaneous lesions
        (2) Skin grafts-minor
        (3) Incision and drainage of abscesses
        (4) Breast biopsy
    b. Head and Neck
        (1) Excision of dermoid cysts and small skin lesions
        (2) Node biopsy
    c. Thoracic
        (1) Chest tube placement
        (2) Lung biopsy
    d. Cardiovascular
        (1) Central catheter placement
        (2) Venous cutdown
        (3) Arterial line placement
    e. Alimentary
        (1) Gastrostomy
        (2) Pyloromyotomy
        (3) Rectal biopsy
        (4) Appendectomy
        (5) Herniorrhaphy (umbilical and inguinal)
        (6) Open-liver biopsy
    f. Genitourinary
        (1) Circumcision
        (2) Orchiopexy
        (3) Torsion of testis or appendages
    g. Gynecology
        (1) Oophorectomy, simple
        (2) Vaginoscopy for foreign body or biopsy
    h. Musculoskeletal
        (1) Muscle biopsy

Practice Based Learning

Familiarity with the literature regarding surgical management of conditions afflicting the pediatric population including areas of controversy is also expected.

Interpersonal and Communication Skills

1. The PGY 1 and 2 residents should instruct students about the preoperative and postoperative care of surgical patients and the principles of surgery.

2. Residents should develop good interpersonal skills with nurses, patients, and families.

Professionalism

1. Demonstrate commitment to patient care and acquiring the necessary knowledge to successfully carry out the duties of a PGY 1 or 2 resident.

2. They are expected to attend pediatric surgery clinics as assigned the equivalent of at least one full day a week.

3. Develop a working relationship with members of the pediatric intensive care unit in managing postoperative pediatric patients.

Systems-Based Practice

1. Develop an appreciation of multi-disciplinary approaches to pediatric surgery patients by participating in multi-disciplinary outpatient and inpatient activities.

2. Presentation of pediatric surgery patients in multidisciplinary patient management conferences.

PGY IV

Medical Knowledge

1. Outline the technical principles for performance of inguinal herniorrhaphy in the term and premature infant.

2. Explain the evaluation of infants with gastrointestinal dysfunction, including bilious emesis, bloody diarrhea, and abdominal distention.

3. Describe the pathophysiology relative to operative correction of intestinal atresia, omphalocele, gastroschisis, and anorectal anomalies.

4. Discuss the surgical management of the premature infant with complications of NEC, including appropriate bowel resection and stoma construction.

5. Describe the immediate operative care of life-threatening anomalies, including:
    a. Congenital diaphragmatic hernia
    b. Midgut volvulus
    c. Neonatal necrotizing enterocolitis
    d. Body wall defects

6. Outline the operative management of major reconstructive procedures.

1. Explain the approach to surgical management, (ie., diagnosis, perioperative care, surgical therapy, and postoperative follow-up) of more complex surgical procedures for infants and children such as:
    a. Large skin grafts
    b. Thyroidectomy
    c. Thoracotomy for biopsy, for pulmonary resection
    f. Flexible endoscopy
    g. Antireflux procedure
    h. Bowel resection
    i. Repair of hepatic, biliary, and pancreatic injury
    j. Splenectomy
    k. Diaphragmatic hernia

2. Analyze the pathophysiology, diagnosis, and management options in the treatment of short-gut

syndrome.

3. Demonstrate an understanding of the special psychological, social, and education issues confronting selected pediatric trauma/postoperative patients.

3. Understand principles of non-operative management of solid organ injury.

1. Describe the immediate operative care of life-threatening anomalies, including:
    a. Congenital diaphragmatic hernia
    b. Midgut volvulus
    c. Neonatal necrotizing enterocolitis
    d. Body wall defects

2. Discuss neonatal nutritional assessment and supervision of long-term nutritional support.

3. Outline the operative management of major reconstructive procedures.

4. Discuss indications for and technical aspects of endoscopic evaluation of the newborn.

5. Describe the pathophysiology and therapeutic requirements of neonatal lesions listed in the section immediately above.

6. Outline the therapeutic options as a surgical consultant for neonatology service in a tertiary newborn intensive care unit.

7. Outline the technical principles involved in the performance of gastrostomy, colostomy, and central venous catheter insertion.

Patient Care

1. Formulate a plan of care for infants with gastrointestinal dysfunction such as:
    a. Bilious emesis
    b. Bloody diarrhea
    c. Abdominal distention
    d. Intestinal atresia
    e. Omphalocele
    f. Gastroschisis
    g. Anorectal anomalies

2. Perform inguinal herniorrhaphy on a neonate with appropriate supervision.

3. Participate in the surgical management of neonatal necrotizing enterocolitis, including bowel resection and stoma construction.

4. Complete the initial evaluation of a neonate with life-threatening anomalies.

5. Evaluate the postoperative nutritional needs of neonates and calculate appropriate nutritional support.

6. Participate actively in the surgical management of major reconstructive procedures.

7. Provide comprehensive management of the surgical care of neonates and infants.

8. Perform numerous surgical procedures:
    a. Bedside procedures:
        (1) Cutdown
        (2) Tube thoracostomy

(3) Incision and drainage

b. Common procedures:
   (1) Central line
c. Urgent procedures:
   (1) Laparotomy
   (2) Gastrostomy
   (3) Colostomy
d. Emergent procedures:
   (1) Body wall defects
   (2) Tracheostomy
   (3) Thoracostomy
e. Reconstructive procedures

9. Manage unstable infants with NEC through consultation.

1. Evaluate pediatric patients for problems requiring more complex surgical intervention.

2. Participate in preoperative, operative, and postoperative care of more complex problems in pediatric surgery such as:
   a. Integument
      (1) Large skin grafts for burns
      (2) Abdominal wall defects
   b. Head and Neck
      (1) Branchial cleft and thyroglossal duct cysts
      (2) Cystic hygroma
      (3) Thyroidectomy
      (4) Esophageal atresia and tracheoesophageal fistula
   c. Thoracic
      (1) Laryngoscopy, bronchoscopy, esophagoscopy
      (2) Tracheostomy
      (3) Thoracotomy for biopsy, lung resection
      (4) Diaphragm repair
   d. Cardiovascular
      (1) Resection of small vascular cutaneous lesions such as (A-V) malformation,
      (2) Repair of congenital heart defects
      (3) Repair of aortic anomaly/injury
      (4) Support of a child with extracorporeal membrane oxygenation (ECMO)
   e. Alimentary
      (1) Flexible endoscopy
      (2) Antireflux procedure
      (3) Ladd procedure for malrotation
      (4) Bowel resection for necrotizing enterocolitis, inflammatory bowel disease, intussusception, intestinal atresia, intestinal duplications
      (5) Colostomy
      (6) Closure of enterostomy
      (7) Biopsy of tumor (open or endoscopic)
      (9) Laparotomy for trauma
      (10) Splenectomy, splenic repair
      (11) Laparotomy for abscess, adhesive obstruction
      (12) Repair of hepatic injury
      (13) Cholecystectomy (open or laparoscopic)
      (14) Meconium syndromes
      (15) Omphalomesenteric duct anomalies
      (16) Anorectal malformations

(17) Hirschsprung's disease and reconstruction options
(18) Liver tumors

f. Neurogenic
   (1) Neuroblastoma
   (2) Meningomyelocele

g. Genitourinary
   (1) Wilm's tumor
   (2) Undescended testicle

h. Musculoskeletal
   (1) Rhabdomyosarcoma
   (2) Teratomas

Practice Based Learning

Familiarity with the literature regarding surgical management of conditions afflicting the pediatric population including areas of controversy is also expected.

Interpersonal and Communication Skills

The resident should instruct medical students and residents about the preoperative and postoperative care of surgical patients and the principles of surgery. They should also demonstrate the ability to teach junior house staff basic surgical skills and assist them with introductory level cases. The Chief resident must display leadership skills and the ability to run an effective multi-level service with numerous residents and medical students on the service. Organization, time management and administrative skills for managing a team of residents and students should be demonstrated.

Professionalism

4. Demonstrate commitment to patient care and acquiring the necessary knowledge to successfully carry out the duties of a PGY 4 resident.

5. They are expected to attend pediatric surgery clinics as assigned the equivalent of at least one full day a week.

3. Develop a working relationship with members of the pediatric intensive care unit in managing postoperative pediatric patients.

Systems-Based Practice

6. Develop an appreciation of multi-disciplinary approaches to pediatric surgery patients by participating in multi-disciplinary outpatient and inpatient activities.

7. Presentation of pediatric surgery patients in multidisciplinary patient management conferences.