

## **PEDIATRIC GENERAL SURGICAL ROTATION**

### **DESCRIPTION**

The resident will partake in a clinical rotation in pediatric surgery.

### **CONTACTS**

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### **REQUIRED READINGS**

1. Pediatric Surgery, 6<sup>th</sup> ed., Mosby. Grosfeld, O'Neill, Fonkalsrud, Coran (eds)
2. Atlas of Pediatric Laparoscopy and Thoracoscopy. Holcomb, Georgeson, Rothenberg (eds), Saunders

### **EDUCATIONAL GOALS**

To give the resident an appreciation for the preoperative, operative, and postoperative surgical care of the child, including pediatric surgical physiology and the social dynamics of pediatric care.

### **LEARNING OBJECTIVES**

The objectives of training in Pediatric Surgery are to develop a Pediatric Surgeon who can assume complete responsibility for the preoperative, operative, and postoperative management of the problems relegated to his area of special expertise and who can interact appropriately with allied colleagues involved in the care of pediatric patients. Incorporated into this experience will be a graduated level of responsibility in which the first year resident is strictly supervised and the second year resident takes on increasing responsibility. Additionally, it is expected that the resident in Pediatric Surgery will develop the sensitivity required to deal not only with pediatric patients, but also with their families while maintaining the attitude and deportment commensurate with the primary care of pediatric patients. Interwoven with these objectives will be those of an ethical and academic nature that will reflect the conscience of modern Pediatric Surgery and help shape the future. The summary objectives are to ensure that pediatric surgeons maintain the leadership and direction of the profession of Pediatric Surgery.

## *Medical Knowledge & Patient Care*

### *Head and Neck:*

At the end of training, the resident will be able to demonstrate knowledge of, and the capacity to manage patients in relation to the different patterns of disease, natural history and responses to treatment of head and neck disease in children. This will include:

- congenital lesions: thyroglossal duct cyst, branchial cleft cysts; sinuses and other remnants; lymphangiomas, hemangiomas
- salivary glands : tumors, hemangiomas, inflammation/calculi, ranula
- neck masses: inflammatory (acute and chronic adenitis); tumors (lymphoma, rhabdomyosarcoma, neuroblastoma, teratoma, nasopharyngeal carcinoma); congenital torticollis
- cranial trauma: diagnosis and emergency management including indications for increased intracranial pressure (ICP) monitoring, Glasgow Coma Scale (GCS)
- cervical trauma: injuries to the esophagus, trachea, blood vessels; airway management; tracheostomy; recognition and emergency management of cervical spine fractures

### *Non-Cardiac Thoracic Surgery*

At the end of training, the resident will be able to demonstrate knowledge of, and the capacity to manage patients in relation to the different patterns of disease, natural history, and responses to treatment of non-cardiac chest conditions in children. This will include:

- esophageal atresia and tracheoesophageal fistula (TEF): embryology, classification, diagnosis, treatment, complications with their treatment
- esophageal achalasia, webs, stenosis (congenital and acquired), duplications
- acquired esophageal conditions: gastroesophageal (GE) reflux, Barrett's esophagus, hiatal hernia; strictures, perforations (cervical, distal), foreign bodies, lye ingestion
- congenital lung lesions: cystic adenomatoid malformation (CCAM), pulmonary sequestration, lobar emphysema, blebs and spontaneous pneumothorax; hypoplasia and pulmonary hypertension
- acquired lung lesions: emphysema, abscess/pneumatocele, empyema, chylothorax, pulmonary metastases, infiltrates in immunosuppressed patients, lung complications in cystic fibrosis (CF).
- congenital airway lesions: stenosis, broncho- and tracheomalacia
- acquired airway lesions: bronchial adenoma (e.g. carcinoids); recognition of foreign body aspiration
- mediastinal lesions: cysts, tumors according to location (anterior, middle, posterior)
- chest wall conditions: pectus excavatum and carinatum; tumors; reconstruction
- diaphragmatic conditions: congenital diaphragmatic hernia (Bochdalek, Morgagni); diaphragmatic eventration and phrenic nerve palsy; trauma

## *Abdomen*

At the end of training, the resident will be able to demonstrate knowledge of, and the capacity to manage patients in relation to the different patterns of disease, natural history, and responses to treatment of abdominal disease in children. This will include:

- gastrointestinal physiologic issues: secretion, absorption, motility, blood supply; continence, defecation; short bowel syndrome, intestinal adaptation; physiologic testing (manometry, pH study)
- gastric conditions: pyloric stenosis (including physiologic disturbances), antral web; spontaneous perforation, antral dysmotility; stress ulcer, gastritis and other forms of acid/peptic disease
- duodenal conditions: atresia, stenosis, web (including windssock variant); diverticula, duplications; peptic ulcer
- small intestinal conditions: malrotation, jejunoileal atresia / stenosis, meconium ileus and equivalent; Meckel's diverticulum and related vitelline duct anomalies; necrotizing enterocolitis (NEC); intussusception; duplications, mesenteric cysts; neoplasms; Crohn's disease; congenital bands, mesenteric defects, bowel obstruction
- colonic conditions: appendicitis; inflammatory bowel disease, typhlitis; meconium plug syndrome, intestinal pseudo-obstruction; Hirschsprung's disease, neuronal intestinal dysplasia; colonic atresia, polyps (juvenile, familial, adenomatous)
- anorectal conditions: imperforate anus (and variants); fissures, abscesses, fistulae, condylomata, rectal prolapse; constipation, fecal incontinence
- hepatic conditions: congenital and acquired liver cysts, trauma, tumors (see oncology section); portal hypertension; liver abscess
- biliary conditions: biliary atresia, biliary hypoplasia; bile duct perforation, choledochal cyst; gallstones, acute/chronic cholecystitis; physiologic jaundice, cholestatic syndromes; liver transplantation (indications, complications, results)
- splenic conditions: hereditary spherocytosis, thalassemia, sickle cell disease; red blood count (RBC) enzyme deficiencies (pyruvate-kinase, hexose-kinase); other hemolytic anemias, idiopathic thrombocytopenic purpura (ITP); Gaucher's disease, splenic cyst, lymphangioma, abscess
- pancreatic conditions: cystic fibrosis; pancreas divisum, annular pancreas; pancreatitis [(trauma, lipid, steroid, drug and gallstone induced), ductal anomaly]; congenital cysts, pseudocysts, tumors, hyperinsulinism
- abdominal wall conditions: gastroschisis, omphalocele and variants; hernias (umbilical, inguinal, epigastric, femoral, etc.); vitelline duct remnants; umbilical granuloma
- abdominal trauma (operative and non-operative): intestinal trauma, lap belt injury; hepatic trauma; splenic trauma (indications for surgery, splenorrhaphy, partial splenectomy, vaccines, prophylactic antibiotics, splenectomy risks)

### *Genitourinary Tract Conditions*

At the end of training, the resident will be able to demonstrate knowledge of, and the capacity to manage patients in relation to the different patterns of disease, natural history, and responses to treatment of genitourinary conditions in children. This will include:

- penis: phimosis, paraphimosis, balanitis, circumcision (indications and contraindications, including complications and their treatment)
- inguinoscrotal area: cryptorchidism, varicocele, hydrocele, acute scrotum (torsion, epididymitis)
- bladder: exstrophy (bladder, cloacal); urachal anomalies
- tumors: (see oncology section)
- trauma: kidney, ureter, bladder with adequate knowledge of pelvic fractures and urethral injuries

### *Gynecologic Conditions*

At the end of training, the resident will be able to demonstrate knowledge of, and the capacity to manage patients in relation to the different patterns of disease, natural history, and responses to treatment of gynecologic conditions in children. This will include:

- congenital conditions: vaginal atresia, hemato/hydro(metro)colpos, bifid vagina, duplex uterus, urogenital sinus
- inflammatory conditions: pelvic inflammatory disease, vulvovaginitis, vulvar abscess, fusion labia minora
- traumatic/mechanical conditions: vaginal laceration, child abuse; torsion (normal ovary, cyst, tumor)
- neoplastic conditions: ovarian cysts (follicular, teratomatous, carcinomatous, serous, mucinous); ovarian solid tumors (yolk sac, teratoma, carcinoma, theca/lutein, arrhenoblastoma, dysgerminoma); vaginal and uterine tumors (yolk sac, rhabdomyosarcoma); vulvar lesions (cysts, nevi, hemangioma)

### *Intersex Anomalies*

The resident will, in collaboration with other health professionals, care for children with intersex anomalies. They will demonstrate knowledge of, and the capacity to manage patients with these conditions based different patterns of disease, natural history, responses to treatment and ethical implications of gender assignment. This will include patients with adrenogenital syndrome (variants, enzyme deficiencies, diagnosis and treatment), mixed gonadal dysgenesis, true- and pseudo- hermaphroditism, testicular feminization syndrome and its variants, and gonadal tumors that may develop in these patients.

### *Endocrine Anomalies*

The resident will, in collaboration with other health professionals, care for children with endocrine anomalies. They will demonstrate knowledge of, and the capacity to manage

patients with these conditions based on different patterns of disease, natural history, and responses to treatment. This will include:

- thyroid disease: hyperthyroidism (diagnosis, medical therapy, management of thyroid storm, preparation for surgery, surgical techniques); thyroiditis; tumors (role of fine-needle aspiratory cytology, other diagnostic techniques; therapy by type, multiple endocrine neoplasia syndromes); management of thyroid mass following neck irradiation; postoperative management (hypocalcemia, respiratory distress, recurrent nerve palsy, follow-up for malignancy)
- parathyroid conditions: hypoparathyroidism; hyperparathyroidism (primary, secondary, tertiary)
- breast conditions: neonatal hypertrophy, mastitis; gynecomastia; nipple discharge; fibroadenoma, fibrocystic disease; cystosarcoma phyllodes; premature thelarche
- gastrointestinal problems: gut hormones; all endocrine disorders affecting the gastrointestinal tract
- pancreatic conditions: hyperinsulinism (newborn - adenoma vs. neonatal pancreatic dysplasia, diagnosis, medical and surgical treatment; older child - adenoma, hyperplasia); Tumors (islet cell tumors, VIPoma, gastrinoma including Zollinger-Ellison syndrome); (see gastrointestinal and trauma sections)
- adrenal conditions: adrenocortical tumors (aldosteronoma - Conn's syndrome ; Cushing's syndrome -hyperplasia vs. carcinoma ; virilizing tumors) ; pheochromocytoma (diagnosis, sites including extra-adrenal, bilateral, localization techniques, surgery - perioperative blood pressure control, technique, search for multiple/extra-adrenal tumors); (see section on tumors)
- testicular conditions: cryptorchidism; tumors – (see oncology section)

### *Oncology*

The resident will, in collaboration with other health professionals, care for children with cancer. They will demonstrate knowledge of, and the capacity to manage patients with these conditions based on the different patterns of disease, natural history, and responses to treatment. This will include:

- general principles: oncogenes, DNA-flow cytometry (diploid, aneuploid); paraneoplastic and tumor-associated syndromes (e.g., opsomyoclonus); hyperthermia, immunotherapy, radiation biology, immunosuppression and opportunistic infections, cancer nutrition, chemotherapy and drug action; surgical complications of chemotherapy, radiation and bone marrow transplantation
- renal tumors: Wilms' tumor, mesoblastic nephroma, nephroblastomatosis, adenocarcinoma and rhabdoid tumor
- adrenal tumors: neuroblastoma, ganglioneuroblastoma, carcinoma
- liver tumors: benign (hemangioma, hemangiomatosis, hemangioendothelioma, hamartoma, adenoma, focal nodular hyperplasia [FNH]); malignant (hepatoblastoma, hepatocellular carcinoma)
- soft tissue sarcomas: rhabdomyosarcoma (all sites; principles of therapy according to site/histology), fibrosarcoma, leiomyosarcoma, liposarcoma, neurofibromas

- teratomas: sacrococcygeal and gonadal tumors with embryology, pathology, familial teratomas, associated syndromes; other teratoma sites
- lymphoma: Hodgkin's Disease; Non-Hodgkin's Disease, including pathology (surface markers), sites, patterns of presentation including post-transplantation lymphoproliferative disease and acquired immunodeficiency syndrome
- bone tumors: osteogenic sarcoma and Ewing's sarcoma (including peripheral neuroectodermal tumors) as they relate to pediatric surgical intervention (rib resection, lung metastases, etc.
- gonadal tumors: testicular: benign and malignant, including teratoma, other germ cell and non-germ cell tumors, paratesticular rhabdomyosarcoma, metastatic (e.g. leukemia)
- ovarian: see gynecology section

### *Skin and Subcutaneous Tissues*

The resident will demonstrate knowledge of and the capacity to manage patients in relation to the different patterns of disease, natural history, and responses to treatment of cutaneous and subcutaneous conditions in children. This will include skin and subcutaneous lesions (nevi, nevus sebaceous, pilomatrixoma, juvenile melanoma; hemangioma, lymphangioma, lipoma; dermoid and epidermoid cyst); ingrown toenails and paronychia; burns; and pilonidal sinus and abscess.

### *Transplantation and Intestinal Rehabilitation*

The resident will, in collaboration with other health professionals, be involved in the care of children with organ transplants or awaiting transplantation. They must therefore demonstrate knowledge of the indications for pediatric liver, kidney, small bowel transplants, and of immunosuppressive agents (effects and complications).

The resident will, in collaboration with other health professionals, also be involved in the care of children with short bowel syndrome, and demonstrate an understanding of the multidisciplinary approach to this disorder, including the surgical options for bowel lengthening.

### *Fetal Medicine*

Pediatric surgeons are an integral part of the multidisciplinary prenatal evaluation of parents and infants with a known surgical disease. The resident will participate in a number of ways in this prenatal management.

- Counseling of future parents of fetuses with gastroschisis, omphalocele, congenital diaphragmatic hernia, cystic adenomatoid malformation of the lung, pulmonary sequestration, congenital tumors (teratomas), ovarian and abdominal masses and cysts, esophageal atresia, and others. Counseling includes a description of the condition and its scope, treatment options, complications and long-term outcome.

- Participate in the planning and performance of ex-utero, intrapartum (EXIT) procedures, in conjunction with members of the maternal-fetal medicine, neonatology and anesthesia departments; planning includes prenatal, preoperative imaging and discussions regarding timing of the intervention.
- The resident will understand the rationale for fetal intervention, the reasons for failure of this approach and the current treatment options and outcomes. Conditions include congenital diaphragmatic hernia, myelomeningocele, congenital hydrocephalus, hypoplastic left (and right) heart syndrome and aortic (pulmonary) stenosis, urinary tract obstruction, abdominal wall defects, twin-to-twin transfusion syndrome, and tension hydrothorax.

## **TECHNICAL SKILLS OBJECTIVES**

By the end of training, the resident should have acquired and demonstrated the following generic skills, as they apply to a pediatric surgical practice. Please refer to the Resident Evaluation Form for an outline of the management and procedural examples for competency based achievement as the residency progresses

### *a. Surgical Skills*

- The resident is expected to be able to perform independently the full spectrum of operative interventions related to the primary pediatric surgery conditions listed above. Several additional areas of skill expertise are listed below.

### *b. Trauma*

The Pediatric Surgery resident is expected to:

- function as a trauma team leader
- function as the operating surgeon for pediatric multiple trauma patients, and as supervising surgeon in an operating room in which several specialty groups may be working simultaneously, if required
- have primary responsibility for the non-operative care of the trauma patient including burns
- be able to obtain airway and vascular access in the trauma patient, and perform appropriate diagnostic procedures

### *c. Endoscopy*

The resident should be familiar with the indications, techniques and complications of:

- laryngoscopy, bronchoscopy
- esophagoscopy
- thoracoscopy
- laparoscopy
- cystoscopy
- proctosigmoidoscopy

The resident must also know the basics of cystoscopy and vaginoscopy as applied to the treatment of ambiguous genitalia and imperforate anus.

#### *d. Other Procedures*

The resident should be familiar with the indications, techniques and complications of:

- central line insertion or other vascular cannulation (temporary and long-term, implantable ports, ECMO)
- tracheostomy, gastrotomies and other enterostomies, pleural and peritoneal based shunts, intestinal and airway dilatation techniques

### **COMPETENCY-BASED OBJECTIVES**

The resident is expected to demonstrate an appreciation of the unique psychological needs of pediatric patients and their families and must be able to deal effectively and compassionately with family members. They should develop an understanding of the ethical principles as related to the complex issue of congenital abnormalities and as applied to children undergoing medical treatment, participating in research, etc. They should demonstrate an appreciation of the economic factors that influence decision making and the impact of such factors on families. They are expected to be aware of legal issues regarding consent, confidentiality and refusal of treatment.

The resident should communicate effectively with the hospital's physicians, nurses, other health professionals and health-related agencies. He/she should be able to act in a consultative role with other physicians and health professionals. The resident should demonstrate high standards of ethical behavior and respect the dignity of patients and colleagues, including their age, culture, disabilities, ethnicity, gender and sexual orientation. They should demonstrate integrity, honesty, compassion and empathy in caring for the patients. He/she is expected to maintain comprehensive, timely and legible medical records.

#### **1) Patient Care**

##### *General Requirements:*

- Provide care that is compassionate, appropriate, and effective for the treatment of surgical problems of infants and children. Obtain and synthesize relevant history from patients, their families and the community.
- Establish a therapeutic relationship with patients and their family and discuss appropriate information with the health care team.
- Listen effectively.
- Demonstrate effective communication skills.
- Maintain adequate records.

##### *Specific Requirements:*

- Demonstrate an appreciation of the unique psychological needs of pediatric patients.
- Demonstrate an appreciation of the unique relationship between pediatric patients and their families and be able to deal effectively and compassionately with family

members by establishing therapeutic relationships.

## **2) Interpersonal and Communication Skills**

### *General Requirements:*

- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### *Specific Requirements:*

- Effectively use the team approach in the management of critically and chronically ill patients, such as newborns with congenital anomalies and children with cancer, inflammatory bowel disease, or transplantation.
- Demonstrate an appreciation of the unique relationship between pediatric patients and their families and be able to deal effectively and compassionately with family members.
- Demonstrate an appreciation of the unique psychological needs of pediatric patients.

## **3) Practice-Based Learning and Improvement**

### *General Requirements:*

- Utilize resources effectively to balance patient care, learning needs, and outside activities.
- Allocate finite health care resources wisely.
- Work effectively and efficiently in a health care organization.
- Utilize health care technology to optimize patient care, life-long learning and other activities.
- Recognize the importance of maintenance of competence and evaluation of outcomes.
- Demonstrate enthusiasm for fostering medical education among trainees and colleagues.

### *Specific Requirements:*

- Demonstrate an appreciation of the economic factors that influence decision-making and the impact of such factors on families.
- Understand the principles and practice of quality assurance and improvement, and actively participate in hospital-based quality assurance and improvement programs.
- Provide evidence of continuing review of contemporary medical literature as indicated by comments on rounds, in conferences and other settings, and by demonstration with an electronic journal library in their learning portfolio.

## **4) Systems-Based Practice**

### *General Requirements:*

- Identify the important determinants of health affecting patients and the larger context and system of health care with the ability to effectively call on system resources to provide care that is of optimal value.

- Contribute effectively to improved health of patients and communities and importantly, injury prevention.
- Recognize and respond to those issues where advocacy is appropriate.

*Specific Requirements:*

- As an example, the resident should be knowledgeable about appropriate use of car safety restraints according to the child's size (i.e. rear-facing infant seats, forward-facing car seats, booster seats, lap-shoulder belts).
- Contribute to health-maintenance advocacy for children, including such areas as travel safety, helmet use, children operating machinery or motorized vehicles and accessibility to firearms.
- Recognize the need for referral to appropriate subspecialists.

## **5. Medical Knowledge**

*General Requirements:*

- Develop, implement and monitor a personal continuing education strategy.
- Critically appraise sources of medical information to formulate evidence based practices.
- Facilitate learning of patients, house staff/students and other health care professionals through formal and informal teaching opportunities.
- Understand and appreciate the patterns of study and review that will constantly update the knowledge, technical skills and innovations that will maintain competence in the future.

*Specific Requirements:*

- Contribute to development of new knowledge to foster the academic growth of the specialty of Pediatric Surgery by participating in scholarly work.

## **6. Professionalism**

*General Requirements:*

- Deliver the highest quality care with integrity, honesty and compassion.
- Exhibit appropriate personal and interpersonal professional behaviors.
- Practice medicine ethically consistent with one's obligations as a physician.

*Specific Requirements:*

- Demonstrate sensitivity to age, gender, culture and ethnicity in dealing with patients and their families.
- Understand the ethical principles as related to the complex issue of congenital abnormalities (e.g. gender assignment for an intersex anomaly) and as applied to children submitted to medical treatment, research, etc.
- Recognize the importance of maintenance of competence and evaluation of outcomes.
- Understand the legal issues related to consent, confidentiality, and refusal of

treatment.

- Demonstrate sensitivity to age, gender, culture, and ethnicity in dealing with patients and their families.

### **PROFESSIONAL DEVELOPMENT**

The pediatric surgical resident will participate in professional development seminars that currently form part of the surgical education curriculum for PGY5 residents in general surgery at Stanford. These seminars are conducted with carefully chosen guest speakers and are designed to prepare the finishing resident for a number of issues they will encounter as they transition into practice. Topics covered include:

- Session 1 – Legal issues surrounding malpractice and how to avoid litigation.
- Session 2 – Financial planning for the new surgeon.
- Session 3 – Effective leadership and communication skills.
- Session 4 – Entering into private practice.
- Session 5 – Entering into academic practice.
- Session 6 – Contract Negotiation
- Session 7 - Issues related to billing and documentation