

Curriculum for the Stanford Program for Pediatric Surgery Residency

DOCUMENTS

1. Pediatric Surgery Rotation
2. Neonatal Intensive Care Rotation
3. Pediatric Intensive Care Rotation

PEDIATRIC GENERAL SURGICAL ROTATION

DESCRIPTION

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

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REQUIRED READINGS

1. Pediatric Surgery, 6th 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 contra-

- 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 on 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, hemangiomas, 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,

- 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

Neonatal Intensive Care Rotation

DESCRIPTION

The resident will partake in a clinical rotation in the neonatal intensive care unit.

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REQUIRED READINGS

Richard A. Polin *et al.* Workbook in Practical Neonatology
or equivalent text

EDUCATIONAL GOALS

To give the first year pediatric surgery resident an appreciation for the intensive care of the neonate, particularly as it pertains to surgical conditions, and to familiarize the resident with neonatal physiology and the social dynamics of neonatal care. This four week experience will be supervised by the neonatology faculty and will confer a graduated level of responsibility.

LEARNING OBJECTIVES

During the rotation in the Neonatal Intensive Care Unit the resident in Pediatric Surgery will achieve the following objectives as listed under the categories of general core competencies.

Medical Knowledge

The resident will:

- 1) Recognize that birth is but one point in the continuum of events which begin before conception and that many neonatal problems can be anticipated based on an understanding of the perinatal history and the complications of pregnancy, labor and delivery placing a neonate at risk.
- 2) Be able to recognize and treat neonatal medical emergencies.
- 3) Be able to recognize and treat neonatal surgical emergencies.
- 4) Become familiar with long-term consequences of prematurity.

- 5) Become facile in the treatment of stable convalescent infants.
- 6) Understand the effects of prematurity on transitional physiology and subsequent infant development.
- 7) Understanding novel technologies and approaches such as ECMO and inhaled nitric oxide therapy.
- 8) Acquire special knowledge in an area of clinical or basic science research.

Patient Care & Technical Skills

The resident will:

- 1) Demonstrate a mastery of the technical skills for resuscitation & stabilization including initiation of ventilation, intubation, umbilical arterial and venous access, lumbar puncture, suprapubic bladder aspiration, peripheral arterial puncture, peripheral insertion of central venous catheters, tube thoracostomy, and tracheal intubation, conventional and high frequency mechanical ventilatory management.
- 2) Be able to stabilize and transport critically ill neonates.
- 3) Be competent in newborn physical examination.
- 4) Be able to perform accurate assessment of gestational age.
- 5) Be able to provide adequate guidance and counseling of new parents.
- 6) Exhibit the skills necessary (generation of a hypothesis, development of a research protocol, data tabulation, manuscript preparation, etc.) to successfully carry out a clinical or basic science research project.
- 7) Achieve certification in the Neonatal Resuscitation Program and Pediatric Advanced Life Support.

Systems-Based Practice

The resident will:

- 1) Recognize the need for referral to appropriate subspecialists.
- 2) Make efficient use of medical resources including awareness of the benefits of prenatal care for mother, fetus and neonate, awareness of the cost to society of neonatal intensive care, and rational use of laboratory and radiologic studies.
- 3) Demonstrate familiarity with the discharge planning process and appropriate follow-up care.

Professionalism

The resident will:

- 1) Understand the ethical principles governing decisions to initiate, terminate or modify intensive care; exhibiting facility in speaking with families about the appropriate or inappropriate application of technology; supporting families in such situations.
- 2) Demonstrate organization of information and prioritization of problems.

Practice-Based Learning & Improvement

The resident will:

- 1) Exhibit evidence of continuing review of contemporary medical literature as indicated by comments on rounds, in conferences and other settings.
- 2) Show enthusiasm for fostering medical education among trainees and colleagues.

Interpersonal and Communication Skills

The resident will:

- 1) Exhibit competence in public speaking.

Learning Activities (See Tables 1 & 3 under *Competency-Based Goals and Objectives*)

- 1) Active participation on daily rounds and all patient care activities in the NICU
- 2) Attendance at all educational lectures, including the multidisciplinary Perinatal Conference and Clinical Consensus Conferences. The resident will present one case or a series of similar cases in depth at one of the Perinatal Conferences.
- 3) Participation in the following formal programs at the Center for Advanced Pediatric Education (CAPE): NeoSim (simulation-based training in neonatal resuscitation), ECMO Sim (simulation-based training in the management of ECMO emergencies), and Compassionate Delivery of Bad News (simulation-based training in delivering difficult news, discussing discontinuation of intensive care support, etc.). These programs will be tailored specifically to the needs of the fellow in Pediatric Surgery.
- 4) Participation in the ECMO and Advanced Respiratory Support course
- 5) Although there is no in-house call responsibilities, the resident will need be available by pager for select delivery room cases (e.g. the birth of a child with gastroschisis). There is also the option for the resident to stay later into the evening for index neonatal resuscitation cases (e.g. multiple births).

Pediatric Intensive Care Rotation

DESCRIPTION

The resident will partake in a clinical rotation in the pediatric intensive care unit.

CONTACTS

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REQUIRED READINGS

Rogers Textbook of Pediatric Intensive Care, or equivalent text.

EDUCATIONAL GOALS

To give the first year pediatric surgery resident an appreciation for the intensive care of the child, particularly as it pertains to surgical conditions, and to familiarize the resident with pediatric physiology and the social dynamics of pediatric intensive care, including the management of the polytrauma patient. This four week experience will be supervised by the critical care faculty and will confer a graduated level of responsibility.

LEARNING OBJECTIVES

At the end of the rotation, the resident will become familiar with the following, based on the general core competencies:

Medical Knowledge & Patient Care

- 1) Fluid, Nutrition and Electrolyte management in the critically ill child.
- 2) Respiratory support required to manage the critically ill child:
 - a. This includes the application both non-invasive and invasive ventilation techniques
 - b. Exposure to the use of inhalational gases (e.g. Nitric oxide, heliox)
 - c. Exposure to both conventional, high frequency ventilation, and use of extracorporeal oxygenation devices
 - d. Bedside flexible bronchoscopy with and without lavage.
 - e. Mastery of bag-mask ventilation and insertion of laryngeal mask airway device.
- 3) Cardiovascular support
 - a. Vascular Access techniques (with and without bedside ultrasound guidance)

- b. Pharmacologic support for cardiac output
- 4) Neurologic care
 - a. Appropriate use of muscle relaxants, sedation, analgesia in the ICU setting
 - b. Monitoring of the neurologically injured child
 - c. Management of abnormal intracranial pressure
- 5) Multidisciplinary care issues including (but not limited to):
 - a. Infectious Diseases
 - b. Hematologic diseases
 - c. Gastroenterology
 - d. Imaging studies for the critically ill infant and child
 - e. Transport medicine

Systems-Based Practice

The resident will:

- 1) Recognize the need for referral to appropriate subspecialists and demonstrate appropriate communication skills within the multidisciplinary PICU environment.
- 2) Make efficient use of medical resources including awareness of the benefits of pediatric intensive care, awareness of the cost to society of pediatric intensive care, and rational use of laboratory and radiologic studies.
- 3) Demonstrate familiarity with the discharge planning process and appropriate follow-up care.

Professionalism

The resident will:

- 1) Understand the ethical principles governing decisions to initiate, terminate or modify intensive care; exhibiting facility in speaking with families about the appropriate or inappropriate application of technology; supporting families in such situations.
- 2) Demonstrate organization of information and prioritization of problems.
- 3) Participate in end-of-life decisions and discussions.

Practice-Based Learning & Improvement

The resident will:

- 1) Exhibit evidence of continuing review of contemporary medical literature as indicated by comments on rounds, in conferences and other settings.
- 2) Show enthusiasm for fostering medical education among trainees and colleagues.
- 3) Demonstrate familiarity with the medical literature as it relates to common pediatric critical care problems.

Interpersonal and Communication Skills

The resident will exhibit competence in public speaking.

Medical Knowledge

The resident will use and be taught evidence-based medicine in the practice of pediatric critical care medicine.

Learning Activities (See Tables 2 & 3 under *Competency-Based Goals and Objectives*)

1. Learning activities will include daily rounds, didactic teaching conferences, and M&M reviews. The resident assigned to the PICU service will be required to attend and participate in the weekly conferences. These include weekly didactic lectures, multidisciplinary rounds, service review (“check-out”), fellows’ board review, and combined cardiology/critical care conference.
2. While rotating in the PICU, the resident will supervise the pediatric residents and students, work with the PICU attendings and fellows.
3. The resident will take call every fourth night, in-house. He will be paired on call with the third year PICU fellow.